



MARIN MUNICIPAL WATER DISTRICT

220 Nellen Avenue Corte Madera CA 94925-1169

www.marinwater.org

January 28, 004

Philip S. Isorena
Senior Water Resources Control Engineer
California Environmental Protection Agency
State Water Resources Control Board, Division of Water Quality
1001 I Street
Sacramento, CA 95814

Dear Mr. Isorena:

Please find enclosed a completed Notice of Intent for the Statewide NPDES General Permit "For Discharge of Aquatic Pesticides for Aquatic Weed Control in Irrigation Systems, Drinking Water Canals, and Surface Water Impoundments That are Waters of the United States."

Please also find enclosed a Mitigated Negative Declaration (MND) which has been circulated on January 27, 2004 for public review, and the related "Notice of Intent" to adopt the MND pursuant to CEQA. The Marin Municipal Water District (District) uses copper sulfate for control of nuisance algae in four of its water supply reservoirs. The District is using the categorical exception provision in Section 5.3 of the "Policy for Implementationand Estuaries of California" in case there are exceedances of the California Toxics Rule criteria for copper related to the District's use of copper sulfate. This CEQA document fulfills the requirement for use of the exception provision and contains the information required by section V of the Notice of Intent form.

End of public circulation for the MND is March 1, 2004. Adoption of the document by the District's Board of Directors is anticipated to occur on March 17, 2004. When the document is certified you will receive a copy. Should you have further questions please contact Larry Grabow at 415-945-1551, e-mail lgrabow@marinwater.org.

Sincerely yours,

Ron Theisen, P.E.
Acting General Manager

- Enclosures: 1. Notice of Intent with Area Map (for Permit)
2. Notice of Intent (for MND adoption)
3. Initial Study/MND





California
Environmental
Protection Agency

State Water Resources Control Board

Division of Water Quality

1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
FAX (916) 341-5463 • Internet Address: <http://www.swrcb.ca.gov>



Arnold Schwarzenegger
Governor

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways to you can do to reduce demand and cut energy costs, see our website at <http://www.swrcb.ca.gov>.

DRAFT
Attachment A
to Water Quality Order
No. 2004-__-DWQ
November 26, 2003

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF
WATER QUALITY ORDER NO 2004-__-DWQ, STATEWIDE GENERAL
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT
FOR DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED CONTROL IN
IRRIGATION SYSTEMS, DRINKING WATER CANALS, AND
SURFACE WATER IMPOUNDMENTS THAT ARE WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG _____

FORM A

I. NOTICE OF INTENT STATUS (see instructions)

MARK ONLY ONE ITEM 1. New Applicator 2. Change of Information for WDID#

II. PESTICIDE APPLICATOR INFORMATION

A. Name/Agency Marin Municipal Water District		D. Contact Person Lawrence J. Grabow	
B. Mailing Address 220 Nellen ave		E. Title Laboratory Manager	
C. City Corte Madera	County Marin	State CA	Zip 94925
		F. Phone (415) 945-1551	

III. RECEIVING WATER INFORMATION

A. Do wastes and pesticide residues discharge to (check all that apply):

1. Canals, ditches, or other constructed conveyance facilities owned and controlled by Applicant? _____

2. Other conveyance systems? - Enter owner's name: _____

B. Regional Water Quality Control Board(s) where application sites are located (REGION 1,2,3,4,5,6,7,8, or 9): REGION 2
(List all regions where pesticide application is proposed.)

C. Name of receiving water(s): (river, lake, creek, stream, bay, ocean):
Lagunitas Creek, Nicasio Creek

FOR OFFICE USE ONLY Date Received _____

IV. PESTICIDE APPLICATION INFORMATION

A. Target Organism: Algae Aquatic Weeds (surface) Aquatic Weeds (submerged)
 OTHER (identify): _____

B. Aquatic Pesticides Used: List Name and Active ingredients - Copper Sulfate Pentahydrate ; Copper
Reported receiving water hardness in mg/L (required for copper-based aquatic pesticide applications) - 46 - 160 mg/L

C. Period of Application: Start Date May End Date November

D. Types of Adjuvants Used: None

V. REQUIRED INFORMATION FOR DISCHARGERS APPLYING FOR A SECTION 5.3 EXCEPTION

- A. Submitted CEQA documentation to the State Water Resources Control Board? Yes No
- B. Have potentially affected public and governmental agencies been notified? Yes No
- C. Has the following required information been submitted to the State Board? Yes No
 - i. A detailed description of the proposed action, including the proposed method of completing the action;
 - ii. A time schedule; and
 - iii. Contingency plans.

VI. VICINITY MAP AND FEE

- A. Have you included vicinity map(s) with this submittal? YES NO
Separate vicinity maps must be submitted for each Region where a proposed discharge will occur.
- B. Have you included payment of the annual fee with this submittal? YES NO

VII. CERTIFICATION

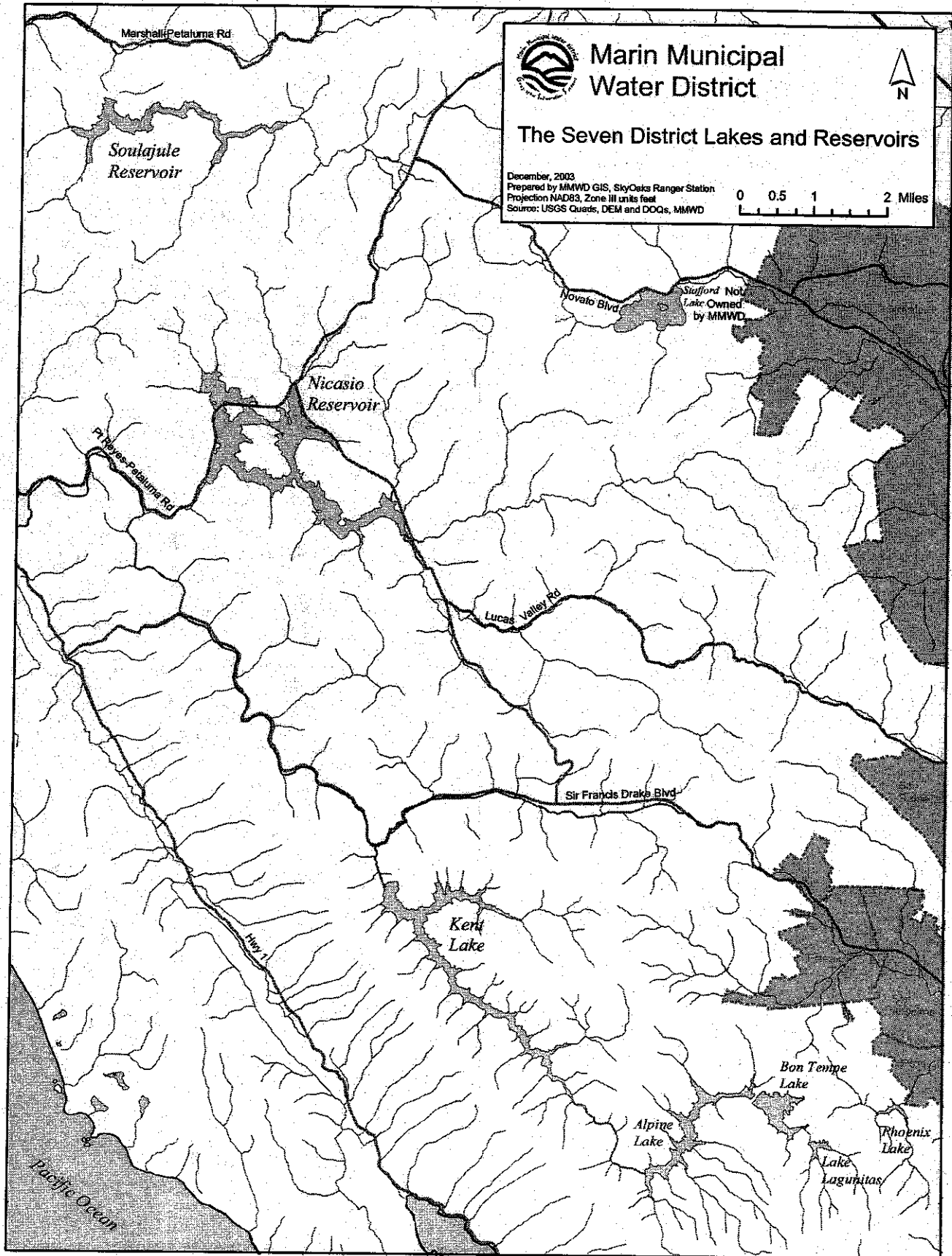
"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the permit, including developing and implementing a monitoring program, will be complied with."

Printed Name: Lawrence J Grabow
Signature: Lawrence J Grabow Date: 1/28/04
Title: Laboratory Manager

VIII. FORM A SUBMITTAL INFORMATION

A. Send the completed and signed Form A along with the annual fee, supporting documentation and vicinity map(s) to the appropriate Regional Board.





MARIN MUNICIPAL WATER DISTRICT

NOTICE OF INTENT

To Adopt A Mitigated Negative Declaration Pursuant to the California Environmental Quality Act

FILED

Date: January 21, 2004
To: Interested parties
From: Marin Municipal Water District
220 Nellen Avenue
Corte Madera, CA 94925

JAN 23 2004

MICHAEL J. SMITH
MARIN COUNTY CLERK

BY _____
DEPUTY

Subject: Proposed Mitigated Negative Declaration (MND) for the continued use and application of copper sulfate to Nicasio, Kent, Alpine and Bon Tempe Reservoirs, Marin County, California, for taste and odor control of drinking water.

Comment Period Closes:

This is to advise that Marin Municipal Water District (MMWD), acting as lead agency, has prepared an Initial Study (IS) to: 1) identify potential environmental impacts that might result from this proposed project; 2) determine whether any such environmental effects can be mitigated to a level of insignificance in compliance with the California Environmental Quality Act (CEQA) Guidelines; and 3) determine whether a MND is the appropriate level of CEQA review for the proposed project.

MMWD is forwarding the IS/Proposed MND to State of California Responsible and Trustee agencies and interested parties for review and comment in compliance with the CEQA Guidelines, California Code of Regulations (CCR), sections 15063(g) and 15071. As mandated by state law, the minimum public review period for this document is 30 days.

Prior to project approval, MMWD will consider all written comments regarding this proposed MND that are received by 4:30 p.m. on March 1, 2004, as required in CEQA Guidelines, California Code of Regulations, Section 15074(b).

The proposed MND and supporting studies are available for review at the office of MMWD. Please call Eric McGuire at Marin Municipal Water District, e-mail at emcguire@marinwater.org or by phone at (415) 945-1586.

Adoption of MND by MMWD: The adoption of the Proposed MND, and project approval, will be considered at the regularly scheduled meeting of the Board of Directors of MMWD, on March 17, 2004, at the District offices, 220 Nellen Avenue, Corte Madera, CA. The meeting begins at 7:30 p.m.

POSTED 01/23/2004 TO 02/24/2004



TITLE AND DESCRIPTION. The Marin Municipal Water District (MMWD) is applying for a new statewide general National Pollutant Discharge Elimination System (NPDES) permit in order to continue its application of copper sulfate pentahydrate (copper sulfate), when necessary, to four of its seven reservoirs: Bon Tempe, Alpine, Kent, and Nicasio. This use of copper sulfate is termed the Algae Control Program.

Copper sulfate is used by MMWD to control the growth of algae species that can degrade the District's water supply by creating objectionable tastes and odors in drinking water. The District has been treating its reservoirs with copper sulfate on an as-needed basis since 1922. These applications are currently authorized under the State Water Resources Control Board's (SWRCB) Water Quality Order No. 2001-12-DWQ: Statewide General NPDES Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit No. CAG990003). This General Permit expires on January 31, 2004. The SWRCB has notified MMWD and other agencies that it intends to develop a new general NPDES permit for application of aquatic pesticides to replace the expired general permit.

LOCATION. Bon Tempe, Alpine, and Kent reservoirs are located on the north slope of Mt. Tamalpias, west of the communities of Ross and San Anselmo and east of Highway 1 in Marin County, California. Nicasio Reservoir is located about four miles north of Kent Lake in Marin County on Lucas Valley Road to the west of the community of Novato.

DETERMINATION. An Initial Study has been prepared by MMWD. On the basis of this study it is determined that the proposed algae control program will not have a significant effect on the environment for the following reasons:

- The proposed project requires no new construction or modification of existing District facilities. For this reason, it will have no effect on aesthetics, agricultural resources, air quality, cultural resources, geology and soils, hydrology, land use and land use planning, mineral resources, noise, population and housing, public services, recreation, transportation and traffic, or utilities and public services.
- There are no federal- or state-listed rare, threatened or endangered species present in the reservoirs. The algae control program will result in copper concentrations in and adjacent to the areas of the reservoirs where copper sulfate is applied that will be high enough for several days to potentially cause a temporary decline in population densities of aquatic organisms such as isopods, daphnia, fathead minnows or related species, and some species of freshwater aquatic invertebrates. This is not expected to result in a significant change in the aquatic communities of the treated reservoirs.
- Copper sulfate applications will not significantly change copper concentrations in the water of creeks downstream of treated reservoirs. Those streams support self-sustaining populations of four federal- and/or state-listed threatened or endangered species: California freshwater shrimp, foothill yellow-legged frog, coho salmon, and steelhead trout. The algae control program will not reduce the number or restrict the range of these species.
- Between 60 and 90 percent of the copper applied to the reservoirs will remain in the sediments of the reservoirs. Most of the remaining copper leaving the reservoirs is transported to the District's treatment plants where as much as about 90 percent is



removed. The use of copper sulfate in the reservoirs will not affect the District's ability to meet drinking water standards for this element.

MITIGATION. Proposed mitigation measures included in the project to avoid potentially significant effects are:

***Hazards and Hazardous Waste.** All field personnel working directly with copper sulfate will undergo safety training. Contractors and their employees will be required to have appropriate licenses and permits associated with handling copper sulfate. MMWD may provide additional refresher training sessions prior to a treatment event, as needed.*

All field personnel participating in the application, handling and transport of copper sulfate will be required to wear appropriate personal protective equipment such as protective goggles, gloves, boots, coveralls, and a respirator that meets Occupational Safety and Health Administration (OSHA) 29 CFR 1910.134 requirements.

The application and handling procedures for copper sulfate will be consistent with the product label instructions as approved by the California Department of Pesticide Regulation and the recommendations on the manufacturer's Material Safety Data Sheet.

***Hydrology and Water Quality.** As part of Best Management Practices for the algae control program, MMWD will include a regular schedule of water sampling during the summer months to analyze for concentrations of the algae by-products (geosmin and 2-Methylisoborneol) that create objectionable tastes and odors in drinking water. This information will be used along with taste and odor samples, visual observations, and customer complaints to determine the location and timing of treatment in order to limit the use of copper sulfate.*

The project area is not on any list of hazardous waste facilities, land designated as hazardous waste property, and is not a hazardous waste disposal site or any other site that would qualify for listing under Government Code Section 65962.5.


Eric McGuire, Environmental Services Coordinator

1-23-2004
Date



12

#243534

MICHAEL J. SMITH
MARIN COUNTY CLERK

03-19-2004 FRI 11:05

01 CLERK 1
#243534
NEG DECLARATION

1250.00
30.00
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1280.00
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FEE EXEMPT
SUBTOTAL
TOTAL
CHECK
CHANGE

ITEM 2
CLERK 1
8037 09:407

NOTICE OF DETERMINATION

TO: Clerk, County of Marin
Civic Center
San Rafael, CA 94903

From: Marin Municipal Water District
220 Nellen Avenue
Corte Madera, CA 94925

SUBJECT:

FILING OF NOTICE OF DETERMINATION IN COMPLIANCE WITH SECTION 21108 OR 21152 OF THE PUBLIC RESOURCES CODE

PROJECT TITLE: Copper Sulfate Applications to the Nicasio, Kent, Alpine and Bon Tempe Reservoirs, Marin County

STATE CLEARINGHOUSE NUMBER: 2004012115

CONTACT PERSON: Eric McGuire (Telephone 415.945-1586)

PROJECT LOCATION: Marin Municipal Water District Watershed tributary to Lagunitas Creek, and Nicasio Reservoir, tributary to Nicasio Creek.

PROJECT DESCRIPTION: Continuation of use, by MMWD, of the application of copper sulfate pentahydrate (copper sulfate), when necessary, to four of its seven reservoirs; Bon Tempe, alpine, Kent and Nicasio. This use is for the control of certain algae that impacts the quality of its domestic water supply.

This is to advise that the Marin Municipal Water District has approved the above described project on March 17, 2004, and has independently made the following determinations regarding the above described project.

1. The project will not have a significant effect on the environment.
2. A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures were made a condition of the approval of the project.
4. A Statement of Overriding Consideration was not adopted for this project.
5. This is to certify that the Mitigated Negative Declaration with comments and responses and a record of project approval is available to the general public at MMWD, 220 Nellen Avenue, Corte Madera, California 94925.

Alex Ferman

President, Board of Directors

Date: 3/17/04

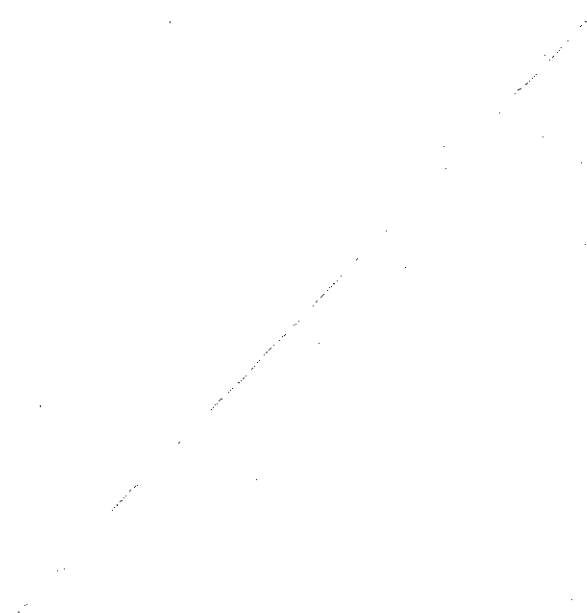
FILED

MAR 19 2004

ATTEST: *Monique Lodi pro tem for*
Secretary, Board of Directors

BY: *[Signature]*
MICHAEL J. SMITH
MARIN COUNTY CLERK
DEPUTY

POSTED 03/19/04 TO 04/19/04



FINAL

**INITIAL STUDY / MITIGATED
NEGATIVE DECLARATION**

for

**COPPER SULFATE
APPLICATIONS TO THE NICASIO,
KENT, ALPINE AND BON TEMPE
RESERVOIRS IN MARIN COUNTY**

Prepared for



Marin Municipal Water District
220 Nellen Avenue
Corte Madera, CA 94925-1169

March 2004

URS

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94607-4014



Marin Municipal Water District

NEGATIVE DECLARATION

TITLE AND DESCRIPTION. The Marin Municipal Water District (MMWD) is applying for a new statewide general National Pollutant Discharge Elimination System (NPDES) permit in order to continue its application of copper sulfate pentahydrate (copper sulfate), when necessary, to four of its seven reservoirs: Bon Tempe, Alpine, Kent, and Nicasio. This use of copper sulfate is termed the algae control program.

Copper sulfate is used by MMWD to control the growth of algae species that can degrade the District's water supply by creating objectionable tastes and odors in drinking water. The District has been treating its reservoirs with copper sulfate on an as-needed basis since 1922. These applications are currently authorized under the State Water Resources Control Board's (SWRCB) Water Quality Order No. 2001-12-DWQ: Statewide General NPDES Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit No. CAG990003). This General Permit expires on January 31, 2004. The SWRCB has notified MMWD and other agencies that it intends to develop a new general NPDES permit for application of aquatic pesticides to replace the expired general permit.

LOCATION. Bon Tempe, Alpine, and Kent reservoirs are located on the north slope of Mt. Tamalpais, west of the communities of Ross and San Anselmo and east of Highway 1 in Marin County, California. Nicasio Reservoir is located about four miles north of Kent Lake in Marin County on Lucas Valley Road to the west of the community of Novato.

DETERMINATION. An Initial Study has been prepared by MMWD. On the basis of this study it is determined that the proposed algae control program will not have a significant effect on the environment for the following reasons:

- The proposed project requires no new construction or modification of existing District facilities. For this reason, it will have no effect on aesthetics, agricultural resources, air quality, cultural resources, geology and soils, hydrology, land use and land use planning, mineral resources, noise, population and housing, public services, recreation, transportation and traffic, or utilities and public services.
- There are no federal- or state-listed rare, threatened or endangered species present in the reservoirs. The algae control program will result in copper concentrations in and adjacent to the areas of the reservoirs where copper sulfate is applied that will be high enough for several days to potentially cause a temporary decline in population densities of aquatic organisms such as isopods, daphnia, fathead minnows or related species, and some species of freshwater aquatic invertebrates. This is not expected to result in a significant change in the aquatic communities of the treated reservoirs.

- Copper sulfate applications will not significantly change copper concentrations in the water of creeks downstream of treated reservoirs. Those streams support self-sustaining populations of four federal- and/or state-listed threatened or endangered species: California freshwater shrimp, foothill yellow-legged frog, coho salmon, and steelhead trout. The algae control program will not reduce the number or restrict the range of these species.
- Between 60 and 90 percent of the copper applied to the reservoirs will remain in the sediments of the reservoirs. Most of the remaining copper leaving the reservoirs is transported to the District's treatment plants where as much as about 90 percent is removed. The use of copper sulfate in the reservoirs will not affect the District's ability to meet drinking water standards for this element.

MITIGATION. Proposed mitigation measures included in the project to avoid potentially significant effects are:

Hazards and Hazardous Waste. All field personnel working directly with copper sulfate will undergo safety training. Contractors and their employees will be required to have appropriate licenses and permits associated with handling copper sulfate. MMWD may provide additional refresher training sessions prior to a treatment event, as needed.

All field personnel participating in the application, handling and transport of copper sulfate will be required to wear appropriate personal protective equipment such as protective goggles, gloves, boots, coveralls, and a respirator that meets Occupational Safety and Health Administration (OSHA) 29 CFR 1910.134 requirements.

The application and handling procedures for copper sulfate will be consistent with the product label instructions as approved by the California Department of Pesticide Regulation and the recommendations on the manufacturer's Material Safety Data Sheet.

Hydrology and Water Quality. As part of Best Management Practices for the algae control program, MMWD will include a regular schedule of water sampling during the summer months to analyze for concentrations of the algae by-products (geosmin and 2-Methylisoborneol) that create objectionable tastes and odors in drinking water. This information will be used along with taste and odor samples, visual observations, and customer complaints to determine the location and timing of treatment in order to limit the use of copper sulfate.

Eric McGuire, Environmental Services Coordinator

Date

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Appendix B	Air Calculation Worksheet
Appendix C	Sample Material Data Safety Sheet
Appendix D	Response to Comments on Draft Initial Study

List of Tables, Figures, Appendices and Acronyms

Acronyms

APMP	Aquatic Pesticide Monitoring Program
BAAQMD	Bay Area Air Quality Management District
BMPs	Best Management Practices
CAP	Clean Air Plan
CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CTR	California Toxics Rule
DPR	Department of Pesticide Regulation
EPA	United States Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GAC	Granular activated carbon
MIB	2-Methylisoborneol
MMWD	Marin Municipal Water District
MND	Mitigated Negative Declaration
MSDS	Material Safety Data Sheet
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
OSHA	Occupational Safety and Health Administration
PAC	Powdered activated carbon
RWQCB	Regional Water Quality Control Board
SIP	Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California
SFEI	San Francisco Estuary Institute
SWRCB	State Water Resources Control Board



1.1 INTRODUCTION AND LOCATION

The Marin Municipal Water District (MMWD) is applying for a new statewide general National Pollutant Discharge Elimination System (NPDES) Permit in order to continue its application of copper sulfate pentahydrate (copper sulfate), when necessary, to four of its seven reservoirs: Bon Tempe, Alpine, Kent, and Nicasio (Figure 1). Copper sulfate, an aquatic pesticide registered with the California Department of Pesticide Regulation (DPR), is used by the District to control the growth of algae species that can degrade the District's water supply. Certain algae species produce two organic chemicals, geosmin and 2-methylisoborneol (MIB), that cause musty, earthy tastes and odors in drinking water that can be detected by sensitive humans in concentrations as low as two to five parts per trillion.

MMWD has been treating its reservoirs with copper sulfate on an as-needed basis since 1922. These applications are currently authorized under the State Water Resources Control Board's (SWRCB) Water Quality Order No. 2001-12-DWQ: Statewide General National Pollution Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit No. CAG990003). This General Permit expires on January 31, 2004.

The SWRCB has notified MMWD and other agencies that it intends to develop a new general NPDES permit for application of aquatic pesticides to replace the expired general permit, and that this new general permit will require strict compliance with water quality criteria contained in the California Toxics Rule (CTR), the State Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), and applicable Basin Plans (the San Francisco Bay Basin Plan in the case of MMWD). Collectively, these plans and policies are designed to protect and maintain the existing beneficial uses of water.

The SIP provides an implementation mechanism for all priority pollutant criteria and objectives for point source, non-ocean water discharges. Under the new statewide general NPDES permit requirements, concentrations of priority pollutants cannot exceed the numeric thresholds set forth in the CTR outside designated treatment areas or mixing zones. MMWD's reservoirs would be considered designated treatment areas under the new statewide general NPDES permit. The SIP provides a categorical exception from the CTR for dischargers who conduct resource or pest management programs in order to fulfill statutory requirements, and to protect beneficial uses of water and public health. Because copper is among the 126 identified priority pollutants, MMWD's application of copper sulfate is subject to review for compliance with the prescribed water quality standards under the new statewide general NPDES permit.

MMWD's primary purpose in periodically applying copper sulfate to its reservoirs is to control algae blooms and, in turn, achieve secondary drinking water standards for taste and odor. Therefore, such discharges qualify for a categorical exception to the CTR standards. For this reason, MMWD plans to apply for coverage of its algae control program under the SWRCB's new general permit for aquatic pesticides and, as part of that application, seek a categorical exception for its use of copper sulfate. If granted, MMWD would comply with all terms and conditions of the general permit.

This Mitigated Negative Declaration (MND) was prepared to comply with California Environmental Quality Act (CEQA) requirements associated with MMWD's continued use of

copper sulfate to control algae in its reservoirs. The MND has been prepared in response to the regulatory requirements established by the SWRCB.

On January 21, 2004, MMWD initiated public circulation of a draft Initial Study and Notice of Intent to adopt the MND. The public review period for the Initial Study and MND closed on March 1, 2004. Public and agency comments received during the review period, and responses to those comment, are provided in Appendix D.

1.2 BACKGROUND

MMWD is a public water supply and management agency that is responsible for providing drinking water to over 170,000 consumers in the eastern corridor of southern Marin County, from the Golden Gate Bridge northward to Pacheco Ridge or the Novato city limits, bounded by San Francisco Bay to the east, and stretching west to San Geronimo Valley. The District manages over 38,000 acres of watersheds and 7 reservoirs.

Rainfall runoff captured north of Mount Tamalpais is MMWD's primary water supply source. The water is stored in seven reservoirs that have been created by damming creeks that make up MMWD's 79 square mile watershed: Lake Lagunitas, Phoenix Lake, Alpine Lake, Bon Tempe Lake, Kent Lake, Nicasio Reservoir, and Soulajule Reservoir. These impoundments have a combined storage capacity of over 25 billion gallons (79,566 acre-feet). Supplemental water supply is provided by regular imports from the Russian River. The capacity and average inflow of each of MMWD's reservoirs are shown in Table 1.

Table 1
Marin Municipal Water District Reservoir System

Reservoir	Date of Construction	Capacity (acre-ft)	Average Inflow (acre-ft)
Lagunitas	1872	390	1,700
Bon Tempe	1948	4,020	4,200
Alpine	1918	8,900	9,100
Kent	1953	32,894	34,600
Nicasio	1961	22,400	30,400
Phoenix	1905	411	3,400
Soulajule	1980	10,572	16,000

Water from Lake Lagunitas flows into Bon Tempe Lake, which in turn flows into Alpine Lake. Water from Alpine Lake may be pumped back into Bon Tempe Lake, or may flow into Kent Lake. Water from Kent Lake may also be pumped back into Alpine Lake.

Water from the reservoirs and any supplemental supplies is transported via pipeline to the San Geronimo and Bon Tempe plants where it is treated and distributed to customers. With the exception of Kent Lake, water is not released from the reservoirs to downstream creeks except during winter months on those occasions when runoff volumes in the watersheds above the

reservoirs exceed the storage capacity of the reservoirs. Water is released from Kent Lake throughout the year to provide flows in Lagunitas Creek to support the aquatic ecosystem.

MMWD's reservoirs receive nutrients from the watersheds that flow into them. These nutrients support plant growth in the reservoirs to the depth that sunlight can penetrate. While plants are natural and important components of the aquatic environment, excessive growth of certain species of algae can have a detrimental effect on water bodies and their inhabitants. Algae "blooms," or rapidly growing blue-green cyanobacteria growth, can cause one or more of the following:

- Give treated drinking water unpleasant taste and odors;
- Produce green mats of algae that cloud water bodies which may have an adverse aesthetic impact for residents;
- Stunt or interfere with a balanced fish population. Oxygen depletion may occur when algae decompose; this may result in fish kills;
- Under favorable environmental conditions, could produce low levels of nervous system and liver toxins in water. Significant levels of these toxins have been associated only with livestock ponds in arid climates and these concentrations would not occur in MMWD reservoirs.

Aquatic herbicides are effective and are often used as a means of controlling aquatic vegetation. Copper sulfate is a commonly used contact herbicide, which can control algae growth in drinking water supplies when it comes in direct contact with the algae. If properly used, herbicides such as copper sulfate control vegetation without harming fish. This is the case because copper sulfate quickly combines with the natural hardness in water (calcium carbonate) to form copper carbonate or malachite. In this form, copper is insoluble and non-toxic, although copper is likely to remain present in sediments and may affect benthic organisms. Copper also combines with organic compounds in water and sediment to become less bioavailable.

As indicated above, MMWD applies copper sulfate to Alpine, Bon Tempe, Kent, and Nicasio reservoirs. These applications are only done in response to significant growth of algae species that produce geosmin and MIB. As water temperatures rise in the spring, the District monitors algae growth through visual observations, taste and odor samples, algae species analysis and count, chemical analyses for geosmin and MIB concentrations, and customer complaints. Copper sulfate is applied when concentrations of taste and odor compounds rise to threshold levels, and the applications are targeted to the specific areas of the reservoirs where those species producing the taste and odor compounds are present in significant amounts. Table 2 shows the type of copper sulfate treatment that has been applied to each of the four reservoirs. To the best knowledge of District staff, copper sulfate has never been applied Soulajule Reservoir and Phoenix Lake. Some District memoranda suggest that copper sulfate was applied to Lake Lagunitas in the 1920s and 1930s, but no applications have been made to that reservoir since that time.

Table 2
Water Bodies Treated with Copper Sulfate

Treated Reservoirs	Type of Treatment
Bon Tempe	Benthic algae
Alpine	Benthic algae
Kent	Benthic algae
Nicasio	Suspended algae

While the long-term effects of aquatic herbicides on water quality and the aquatic ecosystem are still being studied, MMWD remains committed to providing consistent water quality for its customers that is safe and reliable, with minimal environmental impacts. The San Francisco Estuary Institute (SFEI) is conducting the Aquatic Pesticide Monitoring Program (APMP) to evaluate the behavior of aquatic pesticides in water. MMWD has volunteered two of its reservoirs and its water quality data for the study. Meanwhile, MMWD is also studying the efficacy of chemical alternatives to the use of copper sulfate.

All applications are supervised by qualified fisheries biologist(s) with a thorough understanding of the lake biology and the ramifications of indiscriminate chemical application. Copper sulfate will be applied in accordance with label instructions approved by DPR.

2.1 PROJECT DESCRIPTION

MMWD proposes to continue the existing copper sulfate application operations at Alpine, Bon Tempe, Kent, and Nicasio reservoirs for controlling algae blooms under the new statewide general NPDES permit. This algae control program will be done in accordance with the requirements of the new statewide general NPDES permit using a monitoring program consistent with that permit. The most recent draft statewide general NPDES permit is contained in Appendix A.

MMWD would begin monitoring for taste- and odor-producing algae in the spring (April/May). This would be done by collecting and analyzing taste and odor samples, sampling algae for microscopic examination to determine species, and monitoring customer complaints. When a potential problem is identified, water samples would be analyzed for geosmin and MIB concentrations. To the extent possible, application of copper sulfate would be avoided by blending waters to dilute concentrations of geosmin and MIB, and in the case of Kent Reservoir, withdrawing water from the lower portion of the lake where the colder hypolimnetic (lower strata) water is physically isolated from the warmer epilimnetic (upper strata) water that has sufficient light and warmth to support the algae producing these compounds. As the summer months progress, algae growth is often great enough that blending and selective use of reservoir waters is not adequate to control taste and odor problems. At this point, copper sulfate would be applied selectively where monitoring indicates an algae bloom is contributing to the problem.

Applications would be conducted, as necessary, using the most effective method for the type of algae being treated. Nicasio Reservoir has the highest nutrient loading of the District's reservoirs and taste and odor problems are associated with suspended or planktonic algae. Bottom-dwelling or benthic algae growing near the shore where light can penetrate the water is the principal source of taste and odor problems in Alpine, Kent, and Bon Tempe reservoirs. For treatment of planktonic algae in Nicasio, large copper sulfate granules (approximately 3/4-inch) would be poured into a burlap sack that is attached to a boom that lays across the front of a boat. The sack would then be slowly dragged through the upper several feet of water in the treatment area to dissolve the copper sulfate into the water. A typical treatment at this reservoir would cover approximately one third of the lake near the dam. For treatment of benthic algae in Alpine, Kent, and Bon Tempe reservoirs, medium copper sulfate granules (approximately 1/4- to 1/2-inch) would be loaded into an agricultural spreader mounted to a 20-foot pontoon boat and spread over the treatment area. Application of copper sulfate granules directly onto the algae mats maximizes the effectiveness of the treatment and minimizes the amount of copper in the water body. Typically, a 24-foot wide swath would be treated around the perimeter of each of the reservoirs in areas of the perimeter where there is evidence of benthic algae growth.

The treatment dose would be determined by algae species, water hardness, water temperature, and alkalinity as well as whether water is clear, turbid, flowing, or static. Ideally, water should be clear and application would always be done at least one hour before sunset for maximum absorption of copper sulfate by algae. Typically, MMWD's reservoirs have an alkalinity range of 49 ppm to 72 ppm (moderate alkalinity), making the conditions ideal for copper sulfate applications. Once the application is completed, algae would absorb the copper sulfate within hours after treatment, and treatment success should be evident within three to five days. Based on past experience, the copper sulfate dose rate for Nicasio Reservoir ranges from 0.01 to 0.03 milligrams per liter (mg/L) for the treatment area. Copper composes about 25 percent of the

copper sulfate pentahydrate that would be used for the application; therefore, the copper dose rate would range from 0.0025 to 0.0075 mg/L. In Alpine, Bon Tempe, and Kent reservoirs, the copper sulfate dose rate would range from 0.18 to 0.46 mg/L for the treatment area, with a copper dose rate of 0.045 to 0.115 mg/L.

The dose rates and methods of application described above are in accordance with copper sulfate label instructions approved by DPR. DPR registered copper sulfate and approved the label instructions in accordance with California's pesticide registration program. In registering the compound and approving labeling instructions, DPR considers, among other things, the "[p]otential for environmental damage, including interference with the attainment of applicable environmental standards (e.g., air quality standards and water quality objectives)," and "[t]oxicity to aquatic biota or wildlife" (Cal. Code Regs., tit. 3, § 6158, subs. (c), (d)). Therefore, application of copper sulfate in accordance with labeling instructions indicates that DPR has determined that such application will not result in harm to biological resources.

MMWD would prepare a monthly copper sulfate use report for each month in which copper sulfate application has taken place. This report would be submitted to the San Francisco Bay Regional Water Quality Control Board (RWQCB). A copper sulfate use report would also be submitted to the County Agricultural Commissioner. MMWD would monitor in accordance with the monitoring plan established by the new general statewide NPDES permit. The MMWD Laboratory Supervisor would be responsible for ensuring that the treatment program is carried out in accordance with the requirements of the NPDES permit. All copper sulfate applications would continue to be conducted by qualified fisheries biologist(s) with a thorough understanding of the lake biology and the ramifications of indiscriminate chemical application.

The boats used for applying copper sulfate are stored in a shed at the San Geronimo Treatment Plant. The copper sulfate is also stored there in 50-pound sacks. Following treatment applications, the boats would be returned to the plant and washed down on a berm draining into a drying bed at the plant. Therefore, residual copper sulfate would be contained within the drying bed. Empty copper sulfate sacks would be placed in the dumpster at the plant for disposal in a sanitary landfill.

2.1.1 Best Management Practices

The following best management practices (BMPs) would be used for copper sulfate applications:

- Conduct preliminary and secondary site inspections to confirm presence of target algae species and determine appropriate treatment dose. Sample the source for taste and odor analysis, and/or MIB and geosmin analysis. Laboratory analysis may also include microscopic algae count, algae speciation, and/or alkalinity.
- Treatment should take place at times when uptake by algae is most likely and alkalinity is favorable (at least one hour before sunset).
- Perform a visual inspection after the treatment.
- Follow all copper sulfate label instructions.
- Comply with all DPR and Department of Health Services regulations.
- Evaluate options to treatment (including nontoxic and less toxic alternatives).

- Check copper concentration before releasing any treated water from Kent Reservoir in support of minimum stream flow requirements mandated by SWRCB Order WR95-17.

2.2 REQUIRED APPROVALS

Implementation of the proposed project would necessitate that MMWD obtain a new statewide general NPDES permit from the SWRCB. No other permits would be required.

2.3 CONSISTENCY WITH GENERAL PLAN, ZONING, AND APPLICABLE LAND USE CONTROLS

Each of the treatment areas where copper sulfate applications would take place are designated as reservoirs by the County of Marin. As there would be no change to the function of these reservoirs, the proposed project remains consistent with the Countywide Plan, zoning and applicable land use controls for the area.

2.4 ALTERNATIVES

MMWD has evaluated a number of alternatives to copper sulfate application for controlling algae in its reservoirs. These alternatives include: 1) other pesticides, 2) changes in reservoir operations, 3) water treatment for geosmin and MIB, and 4) reduction of available nutrients. These alternatives are described below.

Under CEQA, an alternatives analysis is not required for a project evaluated based on a negative declaration or a mitigated negative declaration (CEQA Guidelines § 15071). However, MMWD has included such an analysis in order to fully explore alternative means of meeting the project's objectives.

2.4.1 Other Pesticides

Cutrine is a chelated copper compound that does not react with the hardness in water. Unlike copper sulfate which rapidly complexes with inorganic and organic compounds after application in waters with the low alkalinity range of the MMWD water supply (49 to 72 mg/L0, chelated copper would persist, causing substantial toxicity to non-target aquatic organisms. Therefore, cutrine is not suitable for use in MMWD's reservoirs.

Other alternatives to controlling algae growth include endothal compounds (Aquathol K, Hydrothol 191), Diquat (also called Reward), fluridone (Sonar or AVAST!), glyphosate (Rodeo), and 2,4-D esters and amines. Endothal compounds are not affected by particulates or dissolved organic material. They should not be used in tank mixtures with copper, as they can have antagonistic reactions with chelated copper compounds. Diquat is a contact herbicide that will act on a very short contact time. It causes a rapid die-off of the shoot portions of the plant it contacts, but is not effective on roots, rhizomes or tubers, requiring subsequent applications. Diquat will bind to particulate and dissolved organic matter, which restricts its use in some water bodies. The aquatic herbicide 2,4-D is used primarily for broadleaf algae species. It is a selective systemic herbicide that does not generally harm pondweeds or water celery. However, it is also not effective against elodea or hydrilla.

Fluridone is a nonselective systemic aquatic herbicide. It requires very long exposure times but may be effective at very low concentrations. Fluridone is widely used for both hydrilla and Eurasian watermilfoil management. It appears to work best where the entire lake or flowage system can be managed, but not in spot treatments or high water exchange areas.

Although these alternatives have been successfully used for algae control, they are not as effective as copper sulfate treatment for the conditions in MMWD's reservoirs.

2.4.2 Reservoir Operations

As indicated above in Section 2.1, the application of copper sulfate is reduced to the extent possible by blending water to reduce the concentration of geosmin and MIB or withdrawing water from a layer in a stratified reservoir that does not contain these algae by-products. MMWD does not have sufficient storage capacity in its reservoir system to solely use this approach to preventing taste and odor problems with treated drinking water. Only Kent Lake has intake structures set up to withdraw from upper and lower portions of the lake, and Nicasio Reservoir is too shallow and windy to reliably stratify during the summer. Reconstruction of reservoir intake structures in Alpine and Bon Tempe to allow water withdrawal from varying depths would cost millions of dollars, and this would not solve the problem. Through the summer season, the amount of geosmin and MIB produced by algae would ultimately be too large to be effectively diluted by the relatively small volume of water in the reservoirs not containing these compounds.

2.4.3 Treatment for Geosmin and MIB

Powdered Activated Carbon (PAC). PAC can be applied seasonally to raw water to reduce the level of geosmin and MIB. Addition of PAC at the MMWD treatment plants is not feasible because the PAC settles rapidly in a clarifier and therefore would not remain in contact long enough to absorb sufficient quantities of geosmin and MIB. It would be necessary to construct storage and feed systems that would meter PAC into the raw water pipelines extending from the reservoirs to the treatment plants to maximize the contact time and minimize the PAC dose and cost. Operating costs would vary depending on the severity and duration of the algae blooms and the PAC dosage required. Typical doses range from 10-25 mg/L and may be required for 3 to 6 months of annual operation.

The District determined that this alternative would be too expensive to implement. The annual cost of using copper sulfate is approximately \$35,000. In 1996, the District estimated that the amortized capital and operating costs of using PAC would range from \$175,000 to \$370,000, assuming average treatment plant flows and a four-month application period. The actual cost would now be about 30 percent higher than this 1996 estimate, and the cost does not include land acquisition costs for the PAC storage and feed systems. In addition, it is unknown how high the concentration of geosmin and/or MIB would climb without copper sulfate treatment.

Granular Activated Carbon (GAC). GAC installed in the existing filters at the treatment plants may be effective for removing geosmin and MIB if the filter design provides sufficient contact time which has not been determined. The initial capital cost to modify and convert the existing filters in both the District's treatment plants was estimated to be \$1.5 million in 1996. With a typical effective GAC life of 3 years, the annual cost was estimated to be \$230,000 to \$460,000. The range of cost is a function of contact time required and the intensity of the algae

blooms. Again, it is unknown how high the concentration of geosmin and/or MIB would climb without copper sulfate treatment. The cost of using GAC was also determined to be too expensive to implement.

Disinfection Using Ozone. Disinfecting raw water with ozone instead of chlorine is effective at reducing geosmin and MIB. However, ozonation increases the available organic carbon in treated water and further biological treatment is often required to prevent bacterial regrowth in the distribution system. Therefore, the GAC filter caps described above may also be required to provide the necessary biological stability for treated water at customer's taps. Ozone capital cost was estimated in 1996 to be \$20 million or \$21.5 million if GAC was included. Additional operating and maintenance costs were estimated to be \$450,000 per year and annual electric power costs would increase by \$365,000 per year. This represents a 65 percent increase in electric power use at the treatment plants. The cost of disinfection using ozone was determined to be too expensive to implement.

2.4.4 Reduction of Nutrients

Algae growth in water is dependent on nutrient levels and sunlight. Algae growth in most surface waters is phosphorus limited. Inactivation of sediment phosphorus in lakes and reservoirs using alum, lime, or iron salts has been successful in the midwest and eastern United States for controlling planktonic algae. After treatment with these chemicals, planktonic algae growth is inhibited through phosphorus limitation. Long-term success is dependent on the dose rate and amount of external phosphorus loading that could maintain high water column phosphorus concentrations.

As indicated above, only Nicasio Reservoir is treated for planktonic algae. In Alpine, Kent, and Bon Tempe, taste and odor problems are caused by benthic algae. With the exception of a few studies, evaluation of benthic algae production after alum addition has not been studied. Gypsum has recently been evaluated as a means to prevent sediment phosphorus release from sediments using isolated test basins in a Finnish lake. Application of gypsum to control benthic algae growth is not known to have been studied.

MMWD received a \$15,000 grant from SFEI to study the use of alum and gypsum for control of algae in its reservoirs. The results of the study were inconclusive due to problems associated with experimental design. MMWD plans to continue to evaluate the use of these compounds for algae control.



SECTION THREE

Initial Study/Determination

This Mitigated Negative Declaration complies with Section 21064.5 of the California Public Resources Code (CEQA) and Article 6 of the *State CEQA Guidelines* (14 California Code of Regulations). The following Initial Study Checklist Form, subsequent Environmental Checklist, and evaluation of potential environmental effects were completed in accordance with Section 15063(d) of the *State CEQA Guidelines* to determine if the proposed project could have any potentially significant effect on the physical environment, and if so, what mitigation measures would be imposed to reduce such impacts to a level that is less than significant.

An explanation is provided for all determinations, including the citation of sources as listed in Section 5. A "No Impact" or "Less Than Significant Impact" determination indicates that the proposed project would not have a significant effect on the physical environment for the specific environmental category. With regard to the water quality and hazardous materials categories, the proposed project would include specific mitigation measures to reduce the potentially significant impacts to a less-than-significant level. No other environmental categories for this evaluation were found to be potentially affected in a significant manner by the proposed project.

INITIAL STUDY AND ENVIRONMENTAL CHECKLIST FORM

Project Title:	Copper Sulfate Applications To the Nicasio, Kent, Alpine And Bon Tempe Reservoirs in Marin County
Lead Agency's Name and Address:	Marin Municipal Water District 220Nellen Avenue, Corte Madera, CA 94925-1169
Lead Agency Contact:	Bob Castle
Project Location:	Nicasio Reservoir, Kent Reservoir, Alpine Reservoir, and Bon Tempe Reservoir
General Plan Land Use Designation	Reservoirs
Zoning	Public facilities
Description:	See Project Description, Section 2.1
Agencies Whose Approval is required: SWRCB	
Surrounding Land Uses: See Project Location, Section 1.1	

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|--|---|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Agriculture Resources | <input type="checkbox"/> Air Quality |
| <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Cultural Resources | <input type="checkbox"/> Geology /Soils |
| <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Hydrology / Water Quality | <input type="checkbox"/> Land Use / Planning |
| <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Noise | <input type="checkbox"/> Population / Housing |
| <input type="checkbox"/> Public Services | <input type="checkbox"/> Recreation | <input type="checkbox"/> Transportation/Traffic |
| <input type="checkbox"/> Utilities / Service Systems | <input type="checkbox"/> Mandatory Findings of Significance | |

Determination

On the basis of this initial evaluation:

- I find that the proposed project **COULD NOT** have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.
- I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.
- I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.
- I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.
- I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier Environmental Impact Report (EIR) or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

Date

Signature

Date



4.1 AESTHETICS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?				✓
b. Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?				✓
c. Substantially degrade the existing visual character or quality of the site and its surroundings?				✓
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				✓

DISCUSSION:

a, b, c, and d) No impact. The proposed project would not adversely impact scenic vistas or the aesthetic quality of the project area. Two scenic highways, Sir Francis Drake Boulevard and Highway 1, are in the vicinity of the Nicasio, Kent, Alpine and Bon Tempe reservoirs. However, because the proposed project would only involve the periodic application of copper sulfate to existing reservoirs, no adverse aesthetic impacts would occur.

The project would not require construction of any new structures or any other land disturbance. The proposed project would not have any short-term or long-term impacts to existing scenic resources such as trees, rock outcroppings, or historic buildings in the vicinity. Furthermore, the proposed project would not create a demand for additional lighting or the use of other reflective materials beyond existing conditions.

4.2 AGRICULTURAL RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and project site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				✓

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and project site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				✓
c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				✓

DISCUSSION:

a, b, and c) No impact. There are no agricultural lands or related operations in the project vicinity. All project-related activities would be conducted within MMWD-owned property. As such, no adverse environmental impacts to agricultural resources would result from the proposed project.

4.3 AIR QUALITY

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?			✓	
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			✓	
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			✓	
d. Expose sensitive receptors to substantial pollutant concentrations?				✓
e. Create objectionable odors affecting a substantial number of people?				✓

DISCUSSION:

a, b, and c) Less Than Significant Impact. National and state ambient air quality standards for criteria air pollutants have been established for carbon monoxide (CO), ozone (O₃), nitrogen oxides (NO_x), sulfur dioxide (SO₂), and particulate matter less than 10 micrometers and 2.5 micrometers in aerodynamic diameter (PM₁₀ and PM_{2.5}, respectively). Ozone is not released directly from emission sources. Instead, it is a product of the photochemical reaction of reactive organic gases (ROG) and nitrogen dioxide (NO₂) in the atmosphere. Therefore, potential project impacts of ozone are typically evaluated based on emission estimates for these two ozone precursors.

Other pollutants, such as lead, also have federal and state ambient air quality standards, but they are not discussed in this document because emissions of these pollutants caused by the algae control program are expected to be minimal. Program-related emissions are due primarily to light-duty truck and outboard motor operations. In the case of lead, program-related emissions are negligible because lead has been phased out of gasoline.

National and state ambient air quality standards specify the concentrations of pollutants that the public can be exposed to without adverse health effects. Individuals vary widely in their sensitivity to air pollutants, so standards are designed to protect more sensitive populations such as children and the elderly. National and state standards are reviewed and updated periodically based on new health effects studies.

The project area is subject to major air quality planning programs required by the federal Clean Air Act, which was last amended in 1990, and the California Clean Air Act of 1988. Both the federal and state statutes require the development of plans to guide the air quality improvement efforts of state and local agencies. The federal plan, known as the State Implementation Plan (SIP), requires control strategies that demonstrate attainment with national ambient air quality standards by deadlines established in the federal Clean Air Act. The state plan, called the Clean Air Plan (CAP), requires satisfactory progress to attaining state ambient air quality standards. This includes a five percent per year reduction in emissions or a demonstration that all feasible measures have been proposed for implementation. Both the SIP and CAP rely on the combined emission control programs of the U.S. Environmental Protection Agency (EPA), California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD).

For planning purposes, regions such as the San Francisco Bay Area are given an air quality status label by the federal and state regulatory agencies. Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated as "attainment areas" on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards, areas are designated as "nonattainment areas." An area that recently exceeded ambient standards but is now in attainment is an attainment area that is referred to as a "maintenance area."

Nonattainment areas are further classified based on the severity and persistence of the air quality problem as "moderate," "severe," or "serious." Classifications determine the applicability and minimum stringency of pollution control requirements. In general, the more serious the air quality classification, the more stringent the control requirements are that must be contained in the regional air quality plans.

The EPA has classified the San Francisco Bay Area, which includes Marin County, as a moderate nonattainment area for O₃ and a maintenance attainment area for CO until at least 2008

(40 CFR 81.305). CARB has given the Bay Area state-level nonattainment status for O₃ and PM₁₀.

The BAAQMD has established significance thresholds for air pollutant emissions to assist agencies in determining whether a project may have a significant air quality impact (BAAQMD 1999). Pollutant emissions associated with the algae control program consist of exhaust from light duty trucks (3/4- and 1-ton pickup trucks) used to haul boats to the reservoirs and outboard motors used to power the boats during copper sulfate applications. Table 3 provides the significance thresholds established by the BAAQMD for these types of "mobile sources." Below these threshold levels, emissions are not high enough to interfere with the BAAQMD's ability to attain regional air quality plans.

Table 3 also provides emission estimates for the algae control program. These estimates are based on emission factors for light duty trucks and outboard motors developed by CARB and the EPA (EPA 1985 and CARB 2002), and past operating procedures for the program. Based on treatment records from 1995 through 2003, copper sulfate is applied on the average of 12 times per year (three treatments at Nicasio Reservoir, five treatments at Bon Tempe Reservoir, one treatment at Alpine, and two treatments at Kent). The round trip from the copper sulfate storage location at the San Geranimo Treatment Plant to any of the reservoirs averages approximately 15 miles and the boats operate an average of approximately four hours during each treatment. As indicated in Table 3, emissions from the algae control program are substantially below the significance thresholds established by the BAAQMD. Appendix B includes an air emissions calculation worksheet.

Table 3
Estimated Project Operational Emissions

Air Pollutant	BAAQMD Significance Thresholds (lb/day) ¹	Project Emissions (lb/day)
Carbon Monoxide	550	106.0
Reactive Organic Gases	80	36.0
Nitrogen Oxides	80	0.23
Particulate Matter	80	0.0012

¹Source: BAAQMD 1999

d) No Impact. The BAAQMD defines sensitive receptors as residential areas, schools, playgrounds, health care facilities, day care facilities, and athletic facilities. None of these receptors are located within the proximity of Alpine, Kent, Bon Tempe, or Nicasio reservoirs. Copper sulfate is dissolved into the water at Nicasio Reservoir. It is applied in 1/4- to 1/2-inch crystals from an agricultural spreader attached to a boat in the other three reservoirs. Therefore, there are no copper sulfate emissions associated with treatment procedures. As discussed above, criteria pollutant emissions from the use of motor vehicles and outboard motors associated with the algae control program are below thresholds of significance. For these reasons, sensitive receptors are not exposed to substantial pollutant concentrations.

e) No Impact. The algae control program would not create odors. Copper sulfate is odorless (MSDS, Appendix C). The purpose of its application is to reduce taste and odor-producing algae growth in the reservoirs. The program would not generate any odors.

4.4 BIOLOGICAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			✓	
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			✓	
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			✓	
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			✓	
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				✓
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				✓

DISCUSSION:

a) **Less Than Significant Impact.** Copper may exist in natural surface waters as free hydrated ions, complexed with inorganic and organic ligands, or sorbed onto surfaces of suspended particles. Copper toxicity to aquatic organisms is primarily due to soluble forms, such as the free ion Cu^{2+} (cupric ion) and some hydroxy and carbonate complexes (Mastin and Rodgers 2000). The cuprous ion (Cu^+) is another soluble form, but this species is unstable in aerated water over the pH range of most natural water (6 to 8) and will oxidize to the cupric state (USEPA 1980). Copper sulfate is highly soluble in water (USEPA 1980) and Cu^{2+} is rapidly formed when copper sulfate is applied to surface water. However, once copper ions are formed they tend to sorb strongly to particles, and may precipitate out of solution if conditions are appropriate

(EXTOXNET 2003, USEPA 1980). Precipitated and organically bound forms of copper are generally less bioavailable to aquatic biota (Mastin and Rodgers 2000). Due to the complex interactions of copper with other chemical species found in natural waters, the proportions of the various copper compounds that actually exist in the water column depends on factors such as pH, temperature, alkalinity, hardness, and the concentrations of bicarbonate, sulfide, and organic ligands (USEPA 1980, Mastin and Rodgers 2000). Hardness is a measure of the concentration of calcium and magnesium salts in water. Alkalinity is a measure of the concentration of carbonate, bicarbonate, and hydroxide and contributes to the total hardness.

Although essential for the normal growth of many organisms, the copper ion can be toxic at concentrations above those necessary for growth. In aquatic plants, copper causes photosynthetic and growth inhibition, and it can accumulate and cause irreversible harm at levels above those required for growth. Fish can be affected by aquatic concentrations of copper. Behavior, growth, migration, and metabolism of sensitive species can be adversely impaired at low concentrations. Higher concentrations affect reproduction and survival. Aquatic invertebrates tend to be more sensitive to copper than fish are. Birds and mammals are relatively resistant to copper toxicity (Eisler 1998). Copper does have the potential to bioaccumulate in the tissue of some organisms (EPA 1980; U.S. DOE 1996). Copper does not appear to bioconcentrate at high levels in the edible portions of most freshwater aquatic species (EPA 1980). While some species of mammals and birds may spend a considerable portion of their time in the water, such organisms do not respire water and only dermal exposure would occur. In addition, upper trophic level species that depend on aquatic species for food may be adversely affected if copper concentrations are high enough to significantly reduce their food supplies.

Because upper trophic level organisms such as birds and mammals tend to be less sensitive to copper toxicity, the evaluation of the potential effects of the algae control program focused on direct toxicity to aquatic organisms. Direct toxicity refers to both acute and chronic toxicity that occurs as a result of direct contact, or dermal exposure, with contaminated media such as water or sediment (as opposed to indirect contact, which occurs through ingestion of contaminated prey or other media). Acute toxicity refers to lethality during short-term exposure (generally up to 96 hours). Chronic toxicity refers to sublethal adverse effects (such as reduced growth or reproduction) during long-term exposure.

Special Status Species

A search of the California Department of Fish and Game (CDFG) California Natural Diversity Data Base (CNDDDB) (CDFG 2003), and field survey information collected by MMWD, was used to identify potentially occurring special-status species in the MMWD watershed. These are species listed as threatened or endangered under the federal or California Endangered Species Acts or designated as "species of concern" by the U.S. Fish and Wildlife Service (USFWS) or CDFG. Though many special status species have been documented within the region over the past several decades, only a limited number of species were identified as likely to be present within the project area in the affected habitat (freshwater streams and pools). These species and potential effects due to elevated copper concentrations are described in the following paragraphs, and toxicity data for potentially affected species are summarized in Table 4.

Plants. A number of riparian special status plant species were identified in the CNDDDB search of the project region. These species are:

- Sonoma alopecurus (*Alopecurus* var. *sonomensis*)
- Marin checker lily (*Fritillaria affinis* var. *tristulis*)
- Swamp harebell (*Campanula californica*)
- Mason's lilaeopsis (*Lilaeopsis masonii*)
- Hairless popcorn flower (*Plagiobothrys glaber*)
- Marin knotweed (*Polygonum marinense*)
- California beaked rush (*Rhynchospora californica*)
- Point Reyes checkerbloom (*Sydalcea calycosa* spp. *rhizomata*)

The Sonoma alopecurus is a federal-listed endangered species, and Mason's lilaeopsis is a state-listed rare species. The other species are listed as federal or state species of concern or California Native Plant Society special status species.

With the exception of some salt-marsh plants that do not grow in freshwater habitats, none of these are true aquatic plants, more typically growing along stream banks or in the floodplain. Because the special-status plant species in the region do not grow in freshwater, they would not receive direct and continuous exposure to copper applied as part of the algae control program. Therefore, the program would not reduce the number or restrict the range of any of these species.

Invertebrates. Aquatic invertebrates that are special status species potentially occurring within the project region include Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), which is designated as a federal species of concern, and California freshwater shrimp (*Syncaris pacifica*), which is listed as a federal and state endangered species (CNDDDB 2003). Both of these species have the potential to occur in ponds located along creeks and rivers.

Ricksecker's water scavenger beetle is known only from pond habitats scattered around the San Francisco Bay area, including Marin, Sonoma, Alameda, and Contra Costa counties (Essig 2003). The only sighting of this species reported close to the project region occurred in 1940 in the vicinity of Bolinas (CNDDDB 2003). An extensive survey conducted in 1988 was unsuccessful at locating any individuals of this species in the San Francisco Bay area (Essig 2003). There is no data indicating that this species has been found within the area potentially affected by the project. Therefore, it is unlikely that this species is present in the MMWD watershed.

District reservoirs are not suitable habitat for California freshwater shrimp. MMWD has conducted extensive surveys of this species in Lagunitas Creek in 1991, 1994, 1996, 1997, 1998, 1999, and 2000 to monitor the status of the population there. The numbers of adult individuals found in 2000 (1,527) were higher than those found in any of the other years. A total of 4,844 juvenile and adult shrimp were captured and released in 2000 (MMWD 2002). Based on survey results, Lagunitas Creek supports a self-sustaining population of California freshwater shrimp.

Because District reservoirs are not suitable habitat for California freshwater shrimp, the proposed project would not directly impact this species. As discussed below under "Impacts to Streams," water from reservoirs that have been treated with copper sulfate is released or spilled into Lagunitas Creek. This does not appear to have reduced the number or restricted the range of California freshwater shrimp since application of copper sulfate has taken place in the

reservoirs since 1922 and Lagunitas Creek continues to support a self-sustaining population of the species with the highest numbers occurring in the tenth year of monitoring.

Reptiles and Amphibians. One special status reptile, the western pond turtle (*Clemmys marmorota marmorota*), has been sited in the project region (CBDDDB 2003). This species is classified as a federal and state species of concern. No federal or state threatened or endangered reptile species is present in the MMWD watershed.

The western pond turtle is found in areas of permanent or nearly permanent water, such as streams, ponds, wetlands, and reservoirs. Surveys for the western pond turtle were conducted at Bon Tempe Creek and Alpine Lake, Bon Tempe Lake, Lake Lagunitas, and Phoenix Lake in 2003 (Garcia and Associates 2003b). The species was present at all of these locations. Based on a population study using a mark-recapture technique, the population of western pond turtle in these areas appears to be in decline. This is believed to be a result of competition with the red-eared slider (*Trachemys scripta elegans*), a well-known successful invasive species around the world, which was found in large numbers (67 individuals) at Phoenix Lake and breeding at Phoenix and Alpine lakes, introduction of parasites and disease through contact with other turtle species, fishing, illegal harvest of turtles, and watering the road along Phoenix Lake, which could favor red-eared slider hatchling success (Garcia and Associates 2003b).

No data on copper toxicity to turtles or other reptiles were found. However, because this species spends a large portion of its time out of the water, and nesting and growth of early life stages occurs on land rather than in water, it is likely that this species would receive lower exposure to copper in the water than would true aquatic organisms. Because western pond turtle populations have been present in the area throughout the decades copper sulfate has been used in the reservoirs, and they receive lower exposure than true aquatic organisms, the proposed project would not significantly impact them.

The CNDDDB search identified one special status amphibian, the foothill yellow-legged frog (*Rana boylei*) that has been sighted in the project region. This species is listed as a federal threatened and a CDFG species of concern. It is typically found in shallow streams and riffles (CBDDDB 2003). Several sightings have occurred within the project area, including Lagunitas Creek. Surveys for the foothill yellow-legged frog and the California red-legged frog (*Rana aurora draytonii*), a federally-listed threatened species and a California species of special concern, were conducted in the Mt. Tamalpais watershed from April to September 2003. The foothill yellow-legged frog surveys were conducted at Swede George Creek, the East Fork of Swede George Creek, Van Wyck Creek, Barth's Creek, Cataract Creek, and the West, Middle, and East forks of Lagunitas Creek. The California red-legged frog surveys were conducted at Bon Tempe Creek, Phoenix Reservoir, Phoenix Creek, and Lagunitas Reservoir. No frogs of either species were encountered during the surveys (Garcia and Associates 2003a). However, the foothill-yellow legged frog was observed at several locations in the Mt. Tamalpais watershed during surveys in 2002 (Garcia and Associates 2003a).

No California red-legged frogs have been observed in the MMWD watershed, including surveys for this species in 2003 using appropriate U.S. Fish and Wildlife Service survey protocol. The closest known occurrences of this species are at two ponds along the Bolinas Ridge located

about 9 miles from the closest potential breeding site (Hidden Lake) in the Mt. Tamalpais watershed that contains MMWD reservoirs. The steep slope separating the Bolinas Ridge sites from the potential sites in the Mt. Tamalpais watershed would likely preclude dispersal of California red-legged frogs to these areas (Garcia and Associates 2003a). For these reasons, the proposed project would not reduce the number or restrict the range of the California red-legged frog.

District reservoirs are not suitable habitat for foothill yellow-legged frogs. As indicated above, no individuals of this species were found in the project area in 2003. Currently, extant populations of the foothill yellow-legged frog appear to be located mostly on the north side of the Mt. Tamalpais watershed, north of Alpine Lake. Known populations within the Mt. Tamalpais watershed are found along Big Carson Creek, Little Carson Creek, and its tributaries. Foothill yellow-legged frogs that were once present in the south part of the watershed where the MMWD reservoirs are located, for example at Cataract Creek, are now in decline or more likely extirpated. Human made barriers (e.g., dams, roads, trails) appear to preclude frog colonization from north to south of Alpine Lake. Before the construction of Alpine Dam, foothill yellow-legged frogs could disperse using Lagunitas Creek and Cataract Creek. Both creeks are potential corridors and suitable habitat for frogs. The foothill yellow-legged frog population was apparently abundant 10 years ago (CDFG 2003); now, this population appears to have been extirpated (Garcia and Associates 2003a).

Based on survey results and other studies (Semlitsch 2003), it is possible that the decline of foothill yellow-legged frogs is correlated with recreation within the Mt. Tamalpais watershed. Populations of this frog are still encountered in areas with low to no human impact (e.g., Little Carson Creek). Suitable habitats (e.g., Cataract Creek), where foothill yellow-legged frog populations are apparently extirpated, experience much higher human impact such as higher use of trails and proximity of trails to creeks (Garcia and Associates 2003a).

Because District reservoirs are not suitable habitat for foothill yellow-legged frogs, the proposed project would not directly impact this species. As discussed below under "Impacts to Streams," water from reservoirs that have been treated with copper sulfate is released or spilled into Lagunitas Creek. This does not appear to have reduced the number or restricted the range of the species since application of copper sulfate has taken place in the reservoirs since 1922 and streams downstream of the reservoirs supported abundant populations of the species 10 years ago.

Fish. Two special status fish species, the coho salmon (*Oncorhynchus kisutch*) and the steelhead trout (*Oncorhynchus mykiss*) have been identified in the project region. Coho salmon is listed as a federal threatened species and a California endangered species. Steelhead trout is listed as a federal threatened species. Populations and spawning runs of both species have been surveyed annually by MMWD in the Lagunitas Creek drainage since 1995 (MMWD 2003b, 2003c). Spawning for both species occurs in Lagunitas Creek and its tributaries above Nicasio Creek where appropriate spawning habitat is available to them. The creeks of the drainage support a self-sustaining population of both coho salmon and steelhead trout. These species are not present in the reservoirs of the District. A discussion of potential project impacts to coho salmon and steelhead trout are described below under "Impacts to Streams."

Birds. The following special status bird species were identified in the CNDDDB search of the project region:

- Western snowy plover (*Charadrius alexandinus nivosus*)
- Black swift (*Cypseloides niger*)
- California black rail (*Laterallus jamaicensis coturniculus*)
- California clapper rail (*Rallus logirostris obsoletus*)
- Humboldt Bay owl's-dover (*Castilleja ambigua* ssp. *Humboldtiensis*)
- Osprey (*Pandion haliateus*)

The western snowy plover is a federal listed threatened species and the California clapper rail is a federal and state listed endangered species. The California black rail is a state threatened species. The black swift and Humboldt Bay owl's-dover are federal species of concern while the osprey is a state species of concern. The western snowy plover, California black rail, and California clapper rail utilize salt-marsh habitat which is not present in the area affected by the algae control program. The black swift and Humboldt Bay owl's-dover do not feed on aquatic organisms. Therefore, they would not be affected by the algae control program.

Ospreys forage mainly in estuaries, and in the oceans close to shore. Their diet is almost exclusively live fish although on occasion they will eat dead fish as well. Their nesting sites are of primary concern and Kent Reservoir is a known nesting site for this species. Ospreys nest solitarily or semi-colonially, and along the coast in California, they nest primarily in trees. The first osprey nest was found at Kent Reservoir in 1967 (Shuford 1993) and the population has increased steadily since then. In 1990, 35 occupied nests were recorded and in 2003, 55 occupied nests were identified (Shuford 1993; Moore, online comm.). The Marin County breeding population is considered the most southerly stronghold for this species in California, although populations occur south of the area in Baja California and the Gulf of California (Shuford 1993).

Copper sulfate has been added to Kent Reservoir almost every year since it was constructed in 1953. As indicated in Section 3.1, birds and mammals are relatively resistant to copper toxicity (U.S. EPA 1998). In addition, copper does not appear to bioconcentrate at high levels in the edible portions of most freshwater aquatic species (U.S. EPA 1980). The increasing osprey breeding population at Kent Reservoir indicates that the application of copper sulfate has not impacted these birds directly through toxicity or indirectly through a reduction in their food supply.

Mammals. Two special status mammalian species were identified in the CNDDDB search of the project region: Salt-marsh harvest mouse (*Reithrodontomys raviventris*) and Point Reyes mountain beaver (*Aplodontia rufa phaea*). The salt-marsh harvest mouse is a federal- and state-listed endangered species. The Point Reyes mountain beaver is a federal species of concern. Both of these species are normally found in coastal habitat rather than freshwater riverine or freshwater lake habitat. Therefore, it is unlikely that these species would be affected by copper concentrations in surface water, or that they would experience a reduction in their food supply.

Although they were not identified in the CNDDDB search, several species of special status bats have been found to be present or are suspected to be present in the vicinity based on MMWD surveys (Garcia and Associates 2003c). These species include:

- Townsends big-eared bat (*Corynorhinus townsendii*)
- Pallid bat (*Antrozous pallidus*)
- Fringed myotis (*Myotis thysanodes*)
- Yuma myotis (*Myotis yumanensis*)
- Long-legged myotis (*Myotis volans*)
- Long-eared myotis (*Myotis evotis*)

All of these species are either federal and/or state listed species of concern.

Although bats may feed on insects flying over water bodies, they are unlikely to receive significant direct exposure to copper concentrations in the surface water of the reservoirs. If copper concentrations were high enough to significantly reduce the population of insects in the feeding ranges of these bat populations, it is possible that bat populations could be affected. However, bats feed on a wide array of insects, including those that do not have an aquatic life stage. Therefore, it is unlikely that these bat species would be adversely affected by application of copper sulfate to the reservoirs.

Impacts to Reservoirs

Bon Tempe, Alpine, Kent, and Nicasio reservoirs support established warmwater and coldwater, non-native, recreational fisheries and their associated aquatic habitats. Game species found in the reservoirs include large mouth bass (*Micropterus salmoides*), crappies (*Pomoxis annularis*, *P. nigromaculatus*), bullheads (*Ictalurus* spp.), and rainbow trout (*Oncorhynchus mykiss*). No rare, threatened or endangered species are known to be present in the reservoirs. For this reason, the proposed project would not reduce the number or restrict the range of such species.

An AQUIRE (Aquatic Toxicity Information Retrieval) database search was conducted to identify studies that investigated adverse effects to fish and aquatic invertebrates correlated with chemical concentrations in surface water. The U.S. Environmental Protection Agency (EPA) developed the AQUIRE database in 1981, and it contains over 200,000 records of toxicity values for aquatic life based on a variety of test endpoints. Scientific papers published both nationally and internationally on the toxic effects of chemicals to aquatic organisms and plants are collected and reviewed for AQUIRE. Independently compiled laboratory data files that include AQUIRE parameters and meet the quality assurance criteria are also included in the database. Toxicity test results and related testing information for any individual chemical from laboratory and field aquatic toxicity tests are extracted and added to AQUIRE. The database is composed of lethal, sublethal, and bioconcentration effects data for freshwater and marine organisms. All AQUIRE data entries are subjected to established quality assurance procedures. For evaluation of acute toxicity, studies that employ short-term lethal endpoints were reviewed to identify concentrations associated with adverse effects or lethality. For evaluation of chronic toxicity, studies based on sublethal endpoints were considered because sensitive endpoints such as reproductive and developmental effects are preferred over lethality. These endpoints are associated with critical stages in an organism's life. In the absence of reproductive and developmental endpoints, effects

on growth were considered. Chronic studies that provide both a no observable effect concentration (NOEC) and a lowest observable effect concentration (LOEC) were preferred, as these studies allow a distinction to be made between doses that produced no effects and doses associated with observed effects.

The treated reservoir exhibiting the highest concentrations of copper is Bon Tempe Lake. Bon Tempe copper concentrations were statistically significantly higher ($p < 0.05$) than all others in the Mount Tamalpais watershed. The highest concentration measured during quarterly sampling was 20.1 $\mu\text{g/L}$ total recoverable copper in August 2002. This concentration occurred during the copper sulfate application season and was a temporary condition not indicative of actual long-term exposure of aquatic organisms to copper. For calculation of the representative exposure point concentration for use in ecological risk assessment, the U.S. EPA recommends using the average concentration to represent "a reasonable estimate of the concentration likely to be contacted over time" (U.S. EPA 2002). The EPA guidance states that "because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean, a conservative estimate of the average chemical concentration, should be used for this variable" (U.S. EPA 1989). The 95 percent UCL for Bon Tempe Reservoir was calculated to be 11.01 $\mu\text{g/L}$ total copper. Based on the toxicity data identified in the literature (Choudhary et al. 1998, de Nicola Giudici and Guarino 1989, de Nicola Giudici, Migliori, and Guarino 1987, Eisler 1998, Hatakeyama et al. 1989, Havens 1994, Lande and Guttman 1973, Leland et al. 1989, Mastin and Rodgers 2000, Mudge et al. 1993, U.S. Department of Energy 1996, and Van der Geest et al. 1999a and b), these concentrations may be high enough to potentially affect certain aquatic organisms likely to be present in the reservoir such as isopods, daphnia, fathead minnows or related species, and some species of freshwater aquatic invertebrates in the Orders Ephemeroptera, Plecoptera, Coleoptera, Trichoptera, and Diptera. These concentrations would not be expected to restrict the use of the reservoir by the western pond turtle.

During the 2002 general permit sampling at Bon Tempe, the total copper concentration sampled 2 hours after treatment at the location where the copper concentration was expected to be at its highest was 78 $\mu\text{g/L}$ (73 $\mu\text{g/L}$ dissolved). This concentration would not be likely to persist longer than several days (Murray-Gulde et al. 2002), but is high enough to potentially cause acute toxicity (lethality) to some organisms likely to be present in the reservoir, primarily in the early life stages. The affected organisms may include but are not limited to isopods, daphnia, beetles, fathead minnows or related species, ceriodaphnia, caddisflies, and mayflies. This high concentration would be limited to the treatment area and would not affect aquatic organisms in other parts of the reservoir. Therefore, the short-term effect of this high concentration would not be expected to significantly alter overall populations or communities of aquatic organisms in the reservoir.

In Alpine Lake, the highest concentration measured during quarterly sampling was 12 $\mu\text{g/L}$ total copper in November 2001. The 95 percent UCL on the mean for the entire sampling period was calculated to be 4.99 $\mu\text{g/L}$ total recoverable copper. Based on the toxicity data presented in the literature, the maximum concentration measured may be high enough to potentially affect early life stages of isopods, beetles, daphnia, fathead minnows or related species, and some species of freshwater aquatic invertebrates in the Orders Ephemeroptera, Plecoptera, Coleoptera, Trichoptera, and Diptera. However, this high concentration was a temporary condition, and more typical conditions represented by the 95 percent UCL are unlikely to result in significant effects to

populations or communities, although some reductions in the population densities of some species may occur.

In Kent Lake, the highest concentration measured during quarterly sampling was 5 $\mu\text{g/L}$ total copper in August 2000. The 95 percent UCL on the mean for the entire sampling period was calculated to be 3.26 $\mu\text{g/L}$ total recoverable copper. None of the measured concentrations exceeded acute or chronic criteria, and are unlikely to result in significant effects to populations or communities of aquatic organisms.

In Nicasio Lake, the highest concentration measured during quarterly sampling was 12 $\mu\text{g/L}$ total recoverable copper in November 2001. The 95 percent UCL on the mean for the entire sampling period was calculated to be 7.16 $\mu\text{g/L}$ total copper. Based on the toxicity data presented in the literature, the maximum concentration measured may be high enough to potentially affect early life stages of certain aquatic organisms such as isopods, daphnia, fathead minnows or related species, and some species aquatic invertebrates in the Orders Ephemeroptera, Plecoptera, Coleoptera, Trichoptera, and Diptera. However, this high concentration was a temporary condition, and more typical conditions represented by the 95 percent UCL are unlikely to result in significant effects to populations or communities, although some reductions in the population densities of some species may occur.

During the 2002 general permit sampling at Nicasio, the total copper concentration sampled 2 hours after treatment at the location where the copper concentration was expected to be at its highest was 139 $\mu\text{g/L}$ (109 $\mu\text{g/L}$ dissolved). This concentration would not be likely to persist longer than several days (Murray-Gulde et al. 2002), but is high enough to potentially cause acute toxicity (lethality) to some organisms likely to be present in the reservoirs, including isopods, daphnia, frogs, fathead minnows or related species, ceriodaphnia, caddisflies, and mayflies. Based on the work of Havens (1994), a concentration this high would be likely to cause a significant decrease in the biomass of many zooplankton and invertebrate species, although this decrease is likely to be temporary in nature for most species. As in the case of Bon Tempe Reservoir, this high concentration would be limited to the treatment area and would not affect aquatic organisms in other parts of the reservoir. Therefore, the short-term effect of this high concentration would not be expected to significantly alter overall populations or communities of aquatic organisms in the reservoir.

As indicated above, the algae control program may result in temporary reductions in the populations of aquatic invertebrates and other zooplankton in Bon Tempe, Alpine, and Nicasio reservoirs. Aquatic invertebrates and zooplankton are major sources of food for fish species in the reservoirs. Therefore, the use of copper sulfate may have an indirect effect on game fish populations in the treated reservoirs by reducing the amount of food available for the fish. Maintenance of a municipal water supply and creation of a productive fishery are often contradictory management goals. Fisheries, on the one hand, require abundant food supply, high nutrient levels, stable water levels, and suitable fish habitats. Water supply, on the other hand, requires clean (low nutrient levels and no algae blooms) water with the least amount of treatment, and water that is available on demand, necessitating fluctuating water levels in reservoirs. Fish populations would be less than optimal with or without the algae control program because of large water level fluctuations and rapid flushing rates required for the primary use of the reservoirs as a municipal water supply. As discussed in the project description, MMWD minimizes the use of copper sulfate to the extent practicable by blending water and withdrawing water not affected by algae by-products, monitoring algae growth, and

focusing the application of copper sulfate to identified algae blooms. Because of these practices and the principal use of the reservoirs for a municipal water supply, the impact of the algae control program on the aquatic habitats of the treated reservoirs is considered less-than-significant.

Impacts to Streams

As discussed in Hydrology and Water Quality, item a, below, MMWD collects quarterly water quality samples from Lagunitas and Nicasio creeks downstream of treated reservoirs and Walker and San Geronimo creeks that do not receive water from treated reservoirs and therefore represent background conditions. Based on an evaluation of quarterly monitoring data collected from 1999 to 2003, total copper concentrations in the water from Walker Creek exceeded copper water quality criteria more frequently than any other creek sampled in the watershed. In addition, there was no statistical difference in total copper concentrations between the creeks downstream of treated reservoirs and creeks representing baseline conditions. This indicates that the algae control program does not significantly affect total copper concentrations in surface waters outside the treated reservoirs. Therefore, the program would not impact aquatic communities in the creeks of the watersheds.

At MMWD's water sampling station in Lagunitas Creek downstream of Kent, Alpine, Bon Tempe, and Lagunitas (Sample Site #5, Figure 2), the highest concentration measured during quarterly sampling was 19.7 $\mu\text{g/L}$ in March 2001. This time frame was prior to the start of the copper sulfate application season and is likely due to resuspension of copper contained in the sediments of Lagunitas Creek. The 95 percent UCL on the mean for the entire sampling period was calculated to be 8.43 $\mu\text{g/L}$.

In Nicasio Creek downstream of Nicasio Reservoir (Sample Site # 3, Figure 2), the highest concentration measured during quarterly sampling was 101 $\mu\text{g/L}$ in March 2000, prior to the start of the copper sulfate application season. The 95% UCL on the mean for the entire sampling period was calculated to be 15.71 $\mu\text{g/L}$.

At Sample Site # 2 (Figure 2) in Lagunitas Creek downstream of Nicasio Creek, Alpine, Bon Tempe, Kent, Lagunitas, and Nicasio, the highest concentration measured during quarterly sampling was 37 $\mu\text{g/L}$ in May 1999. The 95% UCL on the mean for the entire sampling period was calculated to be 9.95 $\mu\text{g/L}$. There were no statistically significant differences in copper concentrations when compared to the reference creeks (Sample Sites # 1 and #4).

Based on the toxicity data presented in the literature cited above, maximum copper concentrations in all of the sampled streams, whether they are or are not downstream of treated reservoirs, may be high enough to potentially affect certain aquatic organisms such as isopods, beetles, daphnia, and fathead minnows or related species, and species of aquatic invertebrates in the Orders Ephemoptera, Plecoptera, Coleoptera, Trichoptera, and Diptera. Some of the higher copper concentrations measured in Lagunitas, San Geronimo, and Nicasio Creeks may be high enough to potentially affect coho salmon, steelhead trout, California freshwater shrimp, and yellow-legged frog during sensitive life stages when those concentrations are compared with toxicity data available in the literature.

As discussed above, the relative bioavailability and toxicity of copper is extremely dependent on factors such as pH, temperature, alkalinity, hardness, and the concentrations of bicarbonate, sulfide, and organic ligands. Water samples collected in the MMWD drainage have been

analyzed for total copper. Copper toxicity to aquatic organisms is primarily due to soluble forms such as the free ion Cu^{2+} . Based on the biological resources of the Lagunitas Creek drainage, it would appear that much of the copper present in the water of these creeks is not in a highly toxic form for aquatic organisms. As indicated above, MMWD has conducted extensive surveys of California freshwater shrimp in Lagunitas Creek in most years since 1991, and have found a self-sustaining population with the highest number of adult individuals found in 2000. Annual coho salmon and steelhead population and reproduction surveys conducted in the Lagunitas Creek watershed since 1995 have also documented self-sustaining populations of these sensitive species.

The highest copper concentrations measured in Lagunitas Creek downstream of Kent Reservoir (Sample Site #5) and in Nicasio Creek downstream of Nicasio Reservoir (Sample Site #3) were measured in March, at least five months after the copper sulfate application season when most of the copper applied to the reservoirs had been removed from the water through formation of insoluble inorganic and organic complexes. These concentrations were also 3 to 9 times higher than the highest copper concentrations recorded in Kent and Nicasio Reservoirs, respectively. This information would indicate that copper in the stream water is primarily related to native material present in the streambeds. This conclusion is also supported by the fact that there were no statistically significant differences in copper concentrations between streams that receive water from treated reservoirs and streams that do not. For these reasons, the algae control program would not have a significant impact on aquatic communities in the streams of the watershed, and would not restrict the number or range of coho salmon, steelhead trout, California freshwater shrimp or foothill yellow-legged frog.

b and c) Less Than Significant Impact. The algae control program would be conducted in the open water of Bon Tempe, Alpine, Nicasio, and Kent reservoirs and would not disturb any upland habitat adjacent to the project area. Shoreline vegetation of these reservoirs support small areas of wetland and riparian habitat dominated by cattail (*Typha latifolia*), sedge (*Carex sp.*), and bulrush (*Scirpus sp.*).

Copper can cause toxicity in plants by disrupting photosynthesis when it is in concentrations above $200 \mu\text{g/L}$ (EPA 1986). However, it has a low propensity to accumulate in soil, usually precipitating out of solution and becoming biologically inactive (TOXNET 1975-1986). As indicated in item a above, copper concentrations in the treated reservoirs are substantially below this level. Therefore, the program would result in less-than-significant impacts to wetland and riparian habitats.

d) Less Than Significant Impact. The algae control program would take place entirely within existing reservoirs and would not interfere with the movement of any native resident or migratory fish or wildlife corridors or impede the use of native wildlife nursery sites. Impacts to resident fish and evaluated in item a above.

e) No Impact. The algae control program would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) No Impact. The reservoirs that would be treated with copper sulfate are not located in an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

4.5 CULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?				✓
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?				✓
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				✓
d. Disturb any human remains, including those interred outside of formal cemeteries?				✓

DISCUSSION:

a, b, c, and d) No impact. Under the proposed project, the application of copper sulfate would continue to take place within MMWD's reservoirs. The project does not involve any effects to historical structures or ground disturbance in the area. Therefore, there would be no impacts to historic, archaeological, or paleontological resources in the project vicinity.

4.6 GEOLOGY AND SOILS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				✓
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Pub. 42.				✓
ii. Strong seismic ground shaking?				✓
iii. Seismic-related ground failure, including liquefaction?				✓
iv. Landslides?				✓
b. Result in substantial soil erosion or the loss of topsoil?				✓
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?				✓
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				✓
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				✓

DISCUSSION:

a, b, c, d, and e) No impact. The continued application of copper sulfate to existing reservoirs would not alter or in any way adversely impact the geologic features of the region. While the periodic application of copper sulfate may lead to an increase in sediment accumulation over time, this would not affect geologic processes such as seismic shaking, ground failure or landslides. The proposed project would not require the use of septic tanks or wastewater disposal systems.

4.7 HAZARDS AND HAZARDOUS MATERIALS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?		✓		
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		✓		
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				✓
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.				✓
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				✓
f. For a project located within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				✓
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				✓
h. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				✓

DISCUSSION:

a and b) Less Than Significant Impact with Mitigation Incorporated. Copper sulfate is classified as a hazardous substance. Although it is registered by the EPA and is considered safe for aquatic use, if used improperly, it could result in eye, skin, or upper respiratory tract irritation in humans¹. In excess quantities, it could also be toxic to fish and aquatic invertebrates. Exposure to these risks may occur from spills during the storage, handling, transport, or application of the copper sulfate.

The potential hazard is reduced to a level that is less than significant by the mitigation practices listed below. Copper sulfate would be applied only by trained personnel, consistent with approved product specifications. All operators would be trained in handling copper sulfate spills; all spray equipment carries tools and materials for handling spills. A manufacturer's sample Material Safety Data Sheet (MSDS) is attached as Appendix D.

HAZ-1 *All field personnel working directly with copper sulfate would undergo safety training. Contractors and their employees would be required to have appropriate licenses and permits associated with handling copper sulfate. MMWD may provide additional refresher training sessions prior to a treatment event, as needed.*

HAZ-2 *All field personnel participating in the application, handling and transport of copper sulfate would be required to wear appropriate personal protective equipment such as protective goggles, gloves, boots, coveralls, and a respirator that meets Occupational Safety and Health Administration (OSHA) 29 CFR 1910.134 requirements.*

HAZ-3 *The application and handling procedures for copper sulfate would be consistent with the product label instructions as approved by DPR and the recommendations on the manufacturer's MSDS.*

c) No impact. There are no schools within a ¼ mile radius from the reservoir sites where copper sulfate application would take place. Therefore, the proposed project would have no impact.

d) No impact. The reservoir sites are not listed on any hazardous waste site lists compiled in Government Code Section 65962.5. No impact would occur as a result.

e and f) No impact. No airport or private airstrip is located in the project area. The application of copper sulfate in MMWD's reservoirs would have no impact on resources associated with an airport or airstrip.

g) No impact. No emergency evacuation routes would be impeded or altered either temporarily or permanently by the project.

h) No impact. Application of copper sulfate would be limited to the open waters of the designated MMWD reservoirs. There would be no increased exposure to wildland fires as a result of the proposed project.

¹ Copper sulfate is Generally Recognized as Safe (GRAS) by the Food and Drug Administration. When used as an aquatic herbicide, the EPA has exempted it from the requirement of a tolerance (maximum level of residue that may be present) under 40 CFR 180.1001(b)(1). However, copper sulfate is classified under EPA Toxicity Category II substance, indicating that it may cause eye and dermal irritation upon direct contact.

4.8 HYDROLOGY AND WATER QUALITY

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements?		✓		
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				✓
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site?				✓
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site?				✓
e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				✓
f. Otherwise substantially degrade water quality?		✓		
g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				✓
h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?				✓
i. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?				✓
j. Inundation by seiche, tsunami, or mudflow?				✓

DISCUSSION:

a and f) Less Than Significant Impact with Mitigation Incorporated. MMWD currently applies copper sulfate to four of its reservoirs under the SWRCB's Water Quality Order No. 2001-12-DWQ: Statewide General NPDES Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit No. CAG990003). This General Permit will expire on January 31, 2004. As described in Section 1.1, a new NPDES permit with more stringent compliance requirements will replace the existing permit at that time. Coverage under the new NPDES permit will require that MMWD demonstrate either that a) copper sulfate discharges comply with water quality criteria promulgated by the CTR and the National Toxics Rule (NTR) or b) that MMWD would qualify for an exception from compliance with such criteria, pursuant to Section 5.3 of the SWRCB's SIP policy.

Compliance with Water Quality Standards

The SIP policy provides an implementation mechanism for all priority pollutant criteria, including copper. Under the new statewide general NPDES Permit requirements, concentrations of priority pollutants cannot exceed the numeric thresholds set forth in the CTR, outside designated treatment areas or mixing zones such as the affected reservoirs. The recommended total copper water quality criteria for freshwater aquatic life is dependent on water hardness and is expressed as chronic and acute values. When water hardness is 100 mg/L, the recommended acute threshold for total copper is 14 micrograms per liter ($\mu\text{g/L}$) and the recommended chronic threshold for total copper is 9.3 $\mu\text{g/L}$. As water hardness increases, this threshold also increases (EPA 2002).

MMWD takes water samples at all reservoirs on a quarterly basis. Samples are collected at a depth of 10 feet in the vicinity of the dams. Lagunitas Reservoir is considered a control reservoir for Kent, Bon Tempe, and Alpine reservoirs as they fall in the same watershed and all but Lagunitas are treated with copper sulfate. Soulajule Reservoir is considered a reference location for Nicasio Reservoir as their watersheds are similar in soils, vegetation, morphology, and geology and Soulajule does not receive copper sulfate treatment.

Measured concentrations of total copper in Phoenix and Kent reservoirs have not exceeded criteria in the last four years of monitoring (1999 to 2003), while concentrations in Alpine Reservoir exceeded both 4-day and 1-hr average criteria in one sample (0.012 $\mu\text{g/L}$ on 11/7/01 with a 1-hr criteria of 0.0103 $\mu\text{g/L}$ and a 4-day criteria of 0.0070 $\mu\text{g/L}$). Bon Tempe Reservoir had the most exceedances (10), with the majority of sample concentrations in the last four years exceeding the 4-day average criteria and many exceeding the 1-hour acute criteria (Table 5). Lagunitas and Soulajule reservoirs have had generally low copper concentrations for the last four years of monitoring (Table 6). Concentrations in Lagunitas Reservoir have once exceeded the chronic (4-day average) copper criteria even though this reservoir is not treated with copper sulfate. Bon Tempe copper concentrations were statistically significantly higher ($p < 0.05$) than concentrations at the other reservoirs in the Mount Tamalpais Watershed (Alpine, Kent, Phoenix, and Lagunitas). Finally, copper concentrations in Nicasio Reservoir consistently exceeded the criteria during the August sampling events (Table 5). At other times of the year, the copper concentrations are below criteria. Nicasio's copper concentrations are significantly higher than its reference reservoir, Soulajule ($p < 0.05$).

MMWD also monitors copper in streams on a monthly basis, at locations shown in Figure 2. Reference sampling locations were established to provide a comparison of copper concentrations

in creeks receiving treated water to creeks that are not influenced by copper sulfate applications. The San Geronimo Creek sampling location (Sample Site # 4) is considered a reference location for the two Lagunitas Creek locations (Sample Sites # 2 and # 5) as they are in the same watershed and the San Geronimo location is upstream of any copper sulfate applications. The Walker Creek location (Sample Site # 1) is considered a reference location for the Nicasio Creek location (Sample Site # 3) as their watersheds are similar and no copper sulfate application occurs in the Walker Creek watershed.

The three sampling locations downstream of copper-treated reservoirs (Sample Sites # 2, #3, and # 5) exceeded copper criteria in roughly half the samples taken over the last four years (Table 7). Walker Creek (Sample Site # 1) exceeded copper criteria more than any other creek (Table 8). Because Soulajule Reservoir does not receive copper sulfate applications, it is likely that there are high concentrations of copper in the native materials of the watershed. San Geronimo Creek (Sample Site # 4), the other reference creek sampling location, exceeded copper criteria three times during the last four years of monthly sampling (Table 7). None of the creeks downstream of copper-treated reservoirs were found to contain statistically significant differences in copper concentration when compared to the reference creeks.

Section 5.3 of the State Water Resources Control Board's (SWRCB) Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California provides a categorical exception from the toxics standards where the discharge is necessary to implement control measures for resource or pest management or to meet statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code. MMWD's purpose in periodically applying copper sulfate to some of its reservoirs is to control algae blooms and, in turn, achieve secondary drinking water standards for taste and odor. As indicated above by the past use of copper sulfate, the algae control program would temporarily elevate copper concentrations above the freshwater threshold set forth in the California Toxic Rule (CTR) for aquatic life in Alpine, Bon Tempe, and Nicasio reservoirs. These reservoirs are defined as treatment zones eligible for an exemption under the draft new statewide general NPDES permit. No existing information indicates that the copper sulfate applications affect receiving waters downstream of the treatment zones. Therefore, the District's copper sulfate discharges qualify for a categorical exception to the toxics standard. Accordingly, MMWD plans to apply for coverage under the SWRCB's new general permit for aquatic pesticides, and as part of that application, seek a categorical exception for its use of copper sulfate. If granted, MMWD would comply with all terms and conditions of the general permit.

MMWD is responsible for ensuring that the water supplied to the public meets state and federal drinking water standards. California has primacy for the implementation of federal drinking water standards and compliance with state standards ensures compliance with federal standards. The California Department of Health Services primary Maximum Contaminant Level (MCL) for copper is 1.3 mg/L (1,300 µg/L or parts per million [ppm]). The primary MCL is established to be protective of human health. The secondary MCL for copper of 1.0 mg/L (1,000 µg/L or ppm) is designed to be protective of secondary water quality concerns such as aesthetics or taste and odor. As indicated in Table 5, copper concentrations in the District's treated reservoirs are orders of magnitude below these drinking water standards.

MMWD will reduce the impact on aquatic organisms in treated reservoirs to a less than significant level by continuing to minimize its application of copper sulfate. By 2005, the District will have completed construction of a new laboratory. That laboratory will allow the

District to conduct its own analyses of water samples for geosmin and MIB, the algae by-products that produce taste and odor problems in drinking water. This will allow the District to accurately track the location and size of algae blooms so that copper sulfate applications can be more focused than current practices allow.

HYDRO-1 *As part of the Best Management Practices for the algae control program, MMWD will include a regular schedule of water sampling to analyze for geosmin and MIB concentrations during the algae growth season. This information will be used along with taste and odor samples, visual observations, and customer complaints to determine the location and timing of treatment in order to limit the use of copper sulfate.*

DPR has banned the use of copper sulfate in sewers and drains in San Francisco Bay Area counties including Marin County. This was done in response to concerns by Assembly Member Byron Sher (D, Palo Alto) over excessive discharges of copper and tributyltin into San Francisco Bay. DPR found that excessive copper and tributyltin discharges from Bay Area wastewater treatment plants was largely associated with the use of these pesticides to control plant root growth in sewers and microorganisms in cooling tower systems. The results of the study led to the DPR restrictions on the use of copper sulfate (Davidson 1995).

MMWD does not discharge copper sulfate to sewers and drains and is therefore not subject to the DPR restriction. Based on a simple mass balance analysis, 60 to 90 percent of the copper applied to District reservoirs is retained in the sediment of the reservoirs. Most of the remaining copper leaving the reservoirs is transported to the District's treatment plants where as much as about 90 percent is removed. As indicated above, copper concentrations in the District's treated drinking water is below the primary and secondary MCL of 1.3 and 1.0 mg/L, respectively. A small portion of dissolved copper is discharged to the ocean as a result of spills from the reservoirs after they have filled from winter rains.

b) No impact. The proposed project would have no impact on groundwater levels. The project would not call for the use of groundwater resources. Therefore, there would be no effect on the water table.

c, d, and e) No impact. The course of a stream or river would not be altered by periodic copper sulfate treatments in MMWD's reservoirs. The project would not result in any changes to the existing drainage pattern of the watershed. Therefore, no erosion, siltation, or flooding would occur on- or off-site as a result of the proposed project. Similarly, there would be no increase in storm water runoff, and no increase in drainage capacity would be required for the project.

g, h, i, and j) No impact. No new construction, including housing or other structures, would occur under the proposed project. Therefore, there would be no new structures in a designated 100-year floodplain, and no floodplain would be altered in any way. The project would not create conditions that could increase the risk of seiches, tsunamis, or mudflows.

4.9 LAND USE AND PLANNING

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?				✓
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.				✓
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				✓

DISCUSSION:

- a) **No impact.** The periodic application of copper sulfate in MMWD's existing reservoirs would not cause any direct changes in land use, and therefore would not result in any new physical division in an established community.
- b) **No impact.** Bon Tempe, Alpine, Kent, and Nicasio reservoirs are designated as drinking water reservoirs under the Marin Countywide Plan, which is currently being updated. Application of copper sulfate to these reservoirs has taken place to control algae blooms since 1922. Project implementation would enable the continuation of the copper sulfate application program, maintaining consistent drinking water quality for MMWD customers. The project would not create any new land uses or affect current uses. The Project would not conflict with any land use plans or policies.
- c) **No impact.** The proposed project would not conflict with any applicable habitat conservation plan or natural community conservation plan.

4.10 MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				✓

SECTION FOUR

Environmental Review Checklist

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				✓

DISCUSSION:

a and b) **No impact.** Copper sulfate applications would be limited to existing MMWD reservoirs for the purpose of controlling seasonal algae blooms in the water supply. These applications would have no impact on any known mineral resources. No impact would result.

4.11 NOISE

Would the project result in:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				✓
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				✓
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				✓
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?				✓
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				✓
f. For a project located within the vicinity or a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				✓

DISCUSSION:

a and d) No impact. Copper sulfate treatment events at MMWD's reservoirs would involve the use of light duty trucks (3/4- and 1-ton pickup trucks), and boats powered by outboard motors. Based on recent application patterns, approximately 12 treatment events would be anticipated to take place per year (between the four reservoirs). Each treatment event would likely require the use of one truck and one boat with outboard motor. The treatment would be completed in four to eight hours and would occur during the daytime. This temporary noise generated by treatment-related activities would not exceed the noise levels from nearby roadways. Furthermore, because there would be no increase in the number or scope of treatments, there would be no net increase in noise generated from the proposed project.

b) No impact. The proposed project would not cause an increase in groundborne noise or vibrations levels.

c) No impact. Because any noise that would be generated would occur only during treatment events, no permanent or long-term effects would occur.

e and f) No impact. The proposed project sites are not located within an airport land use plan, public airport, or private airstrip. Therefore, no impacts would occur.

4.12 POPULATION AND HOUSING

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				✓
b. Displace substantial amounts of existing housing, necessitating the construction of replacement housing elsewhere?				✓
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				✓

DISCUSSION:

a, b, and c) No impact. The proposed project would entail the continuation of current copper sulfate applications. The project would not create new water supply or alter the quality of the water provided to MMWD customers. As such, the project would not induce population growth, or displace housing or people.

4.13 PUBLIC SERVICES

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Fire Protection?				✓
b. Police Protection?				✓
c. Schools?				✓
d. Parks?				✓
e. Other public facilities?				✓

DISCUSSION:

a, b, c, d, and e) **No impact.** The primary purpose of the copper sulfate application program is to maintain drinking water quality and water supply sources. The project would not create the need for new or altered government facilities associated with fire and police protection, schools, and parks.

4.14 RECREATION

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?				✓
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				✓

DISCUSSION:

a and b) **No impact.** Approximately 1.5 million people visit MMWD's watershed each year. MMWD allows managed recreation activities including hiking, horseback riding, biking, and fishing (with a license) in its watershed. Camping, swimming, and boating are prohibited.

Recreational activities take place between sunrise and sunset. When fire-hazard conditions exist, the watershed is closed for recreational purposes.

With the implementation of the proposed project, the affected reservoir would be shut down for short periods during and immediately following a treatment event. The project would not create or expand any recreational facilities, and it would not induce increased recreational activity in the project vicinity.

4.15 TRANSPORTATION/TRAFFIC

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				✓
b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				✓
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				✓
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				✓
e. Result in inadequate emergency access?				✓
f. Result in inadequate parking capacity?				✓
g. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				✓

DISCUSSION:

a, b, c, d, e, f, and g) No impact. The continuation of the algae control program at MMWD reservoirs would have no long-term effect on transportation and traffic, including alternative transportation programs. The program would involve only 12 round trips per year by light-duty trucks. This would not change the level of service on any roadway. Parking and emergency access on adjacent lands would not be affected. This type of work has no effect on air traffic, nor does it create design features that might increase hazards.

4.16 UTILITIES AND SERVICE SYSTEMS

Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				✓
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				✓
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				✓
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				✓
g. Comply with federal, state, and local statutes and regulations related to solid waste?				✓

DISCUSSION:

a, b, c, d, and e) No impact. Copper sulfate application in existing reservoirs would not require wastewater treatment or any additional water supply. Therefore, no new or expanded facilities would be required. The project would not result in discharges that would cause an exceedance of any wastewater treatment requirements.

f and g) No impact. MMWD applies copper sulfate to its Bon Tempe, Kent, Alpine, and Nicasio reservoirs under its existing NPDES permit. The proposed project would enable the continuation of this copper sulfate program under a new permit. Solid waste (such as empty copper sulfate sacks) would be deposited at an approved offsite sanitary landfill site with sufficient permitted capacity. Because no new waste would be generated under the proposed project, existing landfill facilities would be able to accommodate the solid waste needs. As a result, the project would not conflict with any applicable federal, state, or local statutes and regulations, and no impact would occur.

4.17 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare or threatened plant or wildlife, or eliminate important examples of the major periods of California history or prehistory?		✓		
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?				✓
c. Does the project have environmental effects which would cause substantial adverse effects on human beings, either directly or indirectly?		✓		

DISCUSSION:

a) **Less Than Significant Impact with Mitigation Incorporated.** The proposed project would enable MMWD to continue a program to control algae blooms in MMWD's water supply system on an as-needed basis through the judicious application of copper sulfate, an aquatic pesticide, in four of its seven reservoirs (Bon Tempe, Kent, Alpine, and Nicasio). Left untreated, the algae blooms would degrade the taste and odor of the water to a level that would be detectable by consumers. Algae blooms would also pose other problems including the production of algal toxins and clogging filters.

While the project would not require any construction, ground disturbance, or expansion of facilities/services, copper concentrations may exceed CTR thresholds for aquatic life. With mitigation measure HYDRO-1, potential impacts could be reduced to a level that is less than significant.

b) **No impact.** The four reservoirs where the copper sulfate applications would take place are owned and operated by MMWD. No other known projects in these reservoirs or in the project vicinity exist; therefore, no cumulative impacts would occur. Under the proposed project, copper sulfate treatment events would occur approximately 12 times per year. Treatment events are not likely to be contemporaneous between two or more sites. Cumulative effects would not be expected.

c) **Less Than Significant Impact with Mitigation Incorporated.** Copper sulfate is an eye, dermal, and respiratory irritant to humans. Therefore, the implementation of mitigation measures HAZ-1, HAZ-2, and HAZ-3 in addition to adhering to MMWD's Monitoring Plan and BMPs will minimize or avoid any adverse impacts to human beings, either direct or indirect. Collectively, these measures will reduce the effect of the project to a level that is less than significant.

Hazards and Hazardous Materials

- HAZ-1** All field personnel working directly with the copper sulfate would undergo safety training. Contractors and their employees would be required to have appropriate licenses and permits associated with handling copper sulfate. MMWD may provide additional refresher training sessions prior to a treatment event, as needed.
- HAZ-2** All field personnel participating in the application, handling and transport of copper sulfate would be required to wear appropriate personal protective equipment such as protective goggles, gloves, boots, coveralls, and a respirator that meets OSHA 29 CFR 1910.134 requirements.
- HAZ-3** The application and handling procedures for the copper sulfate would be consistent with the product label instructions as approved by DPR and the recommendations on the manufacturer's MSDS.

Hydrology and Water Quality

- HYDRO-1** As part of the Best Management Practices for the algae control program, MMWD will include a regular schedule of water sampling to analyze for geosmin and MIB concentrations during the algae growth season. This information will be used along with taste and odor samples, visual observations, and customer complaints to determine the location and timing of treatment in order to limit the use of copper sulfate.



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SECTION SEVEN

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Figures



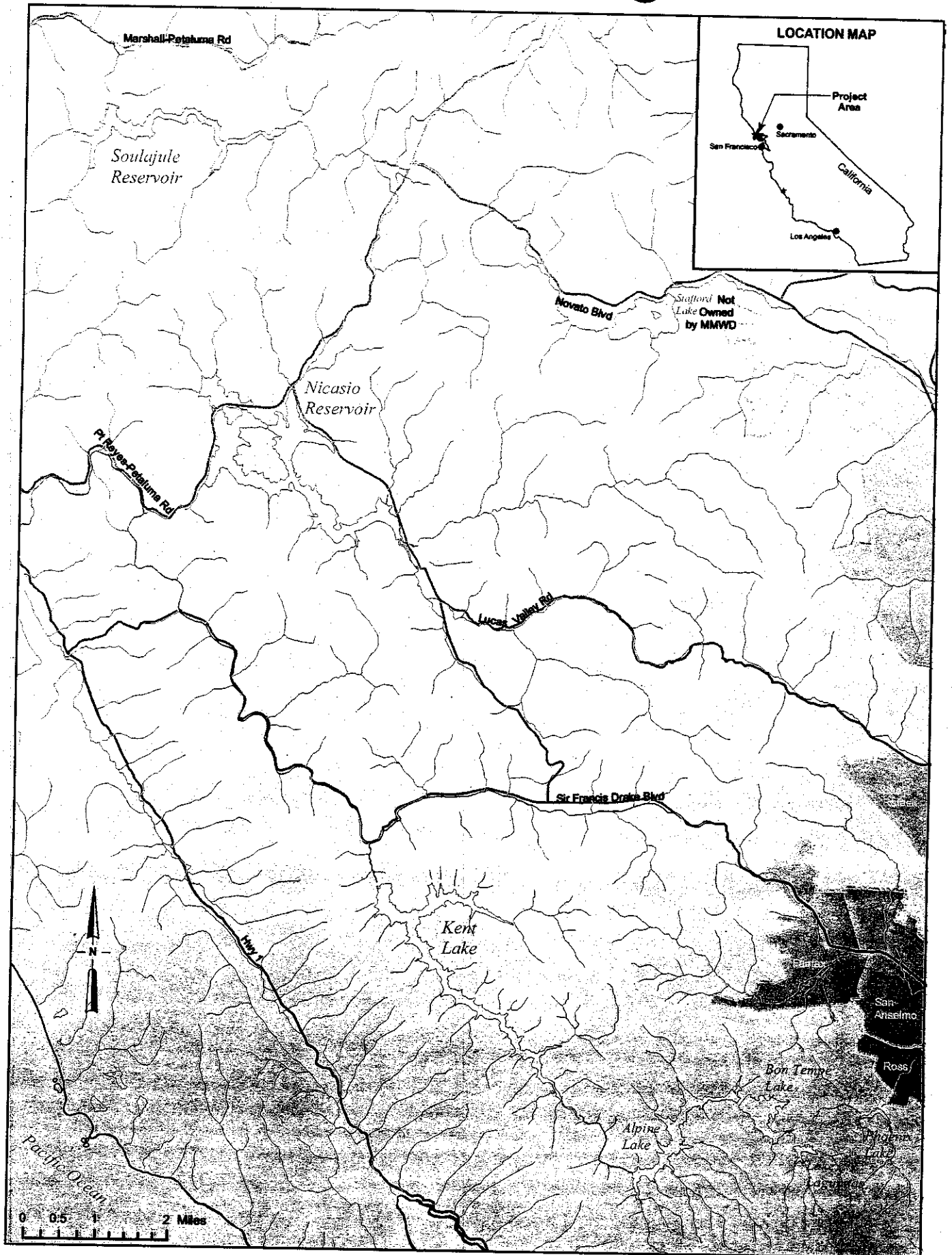


Figure 1. PROJECT SITE MAP



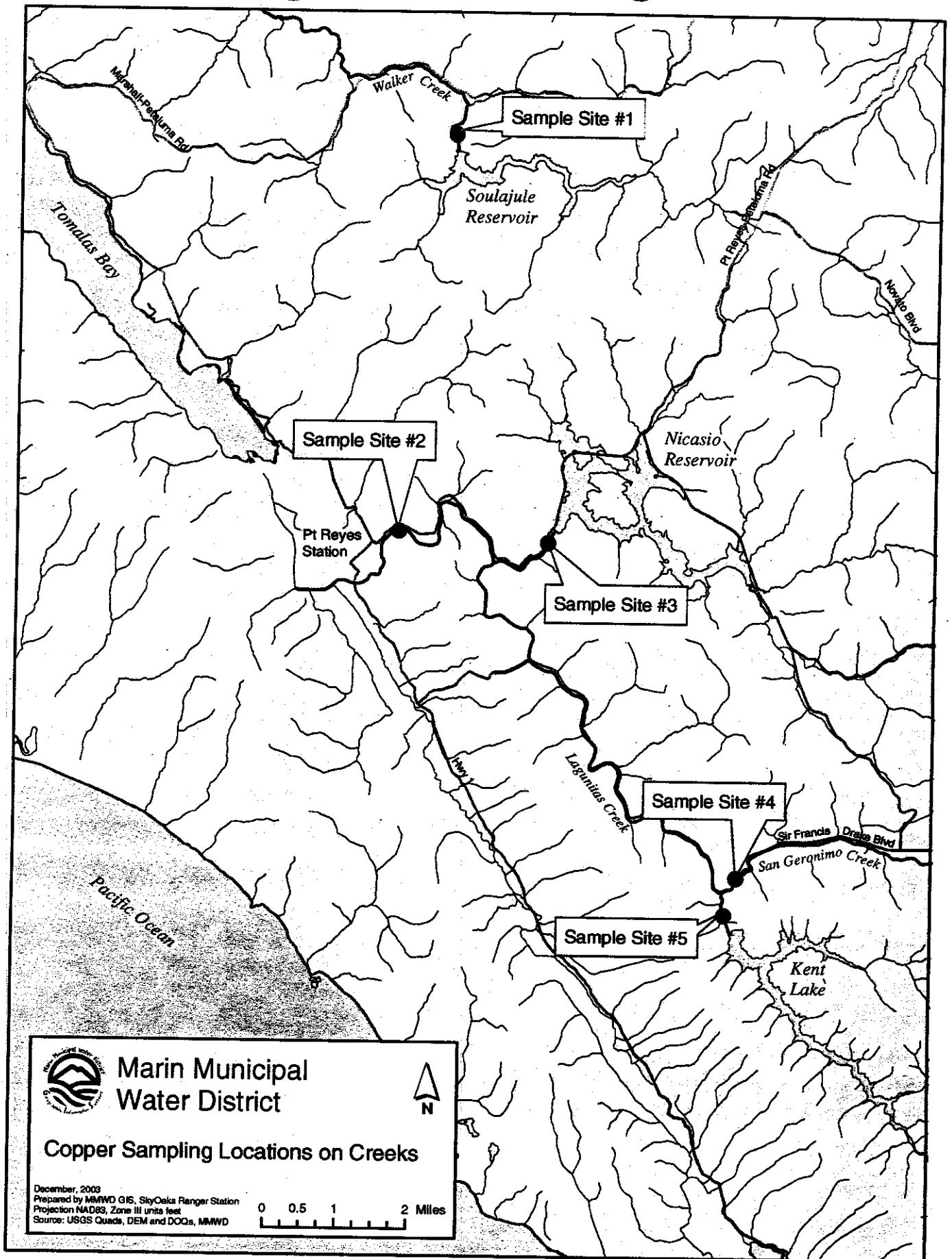


Figure 2



Tables



Table 4: Copper Toxicity Data for Freshwater Aquatic Species

Order	Common Name	Scientific Name	Special Status	Exposure Duration	Endpoint	NOEC (µg/L)	LOEC (µg/L)	EC50 (µg/L)	LC50 (µg/L)	Reference
Coleoptera	Rifle Beetle	<i>Optioservus divergens</i>	Represents - Federal Species of Concern, <i>Hydrochara rickseckeri</i>	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Coleoptera	Beetle	<i>Cleptelmis addenda</i>	Represents - Federal Species of Concern, <i>Hydrochara rickseckeri</i>	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Coleoptera	Beetle	<i>Lara (avara?)</i>	Represents - Federal Species of Concern, <i>Hydrochara rickseckeri</i>	1 year	Population density	>10	--	--	--	Leland et al. 1989
Cladocera	Water flea	<i>Moina macrocarpa</i>	None	2 days	Mortality	--	--	--	6.7	Hatakeyama and Sugaya (1989)
Cladocera	Water flea	<i>Daphnia magna</i>	None	2 days	Mortality	--	--	--	3.9	Hatakeyama and Sugaya (1989)
Cladocera	Water flea	<i>Chydorus sphaericus</i>	None	4 days	Biomass	--	--	50	--	Havens 1994
Cladocera	Water flea	<i>Eubosmina coregoni</i>	None	4 days	Biomass	--	--	50	--	Havens 1994
Cladocera	Water flea	<i>Bosmina longirostris</i>	None	4 days	Biomass	--	--	50	--	Havens 1994
Cladocera	Water flea	<i>Daphnia galeata</i>	None	4 days	Biomass	--	--	70	--	Havens 1994
Cladocera	Water flea	<i>Daphnia magna</i>	None	2 days	Mortality	--	12.5	--	18.9	Nastin and Rodgers 2000
Cladocera	Water flea	<i>Ceriodaphnia dubia</i>	None	7 days	Reproduction	25	50	--	--	Murray-Gulde et al. 2002
Cladocera	Water flea	<i>Ceriodaphnia dubia</i>	None	4 days	Survival	--	--	--	60	Murray-Gulde et al. 2002
Isopoda	Isopod	<i>Asellus aquaticus</i>	None	>60 days	Mortality	--	10	--	--	de Nicola Giudici and Guarino 1987
Isopoda	Isopod	<i>Proasellus coxalis</i>	None	>60 days	Mortality	--	10	--	--	de Nicola Giudici and Guarino 1989
Isopoda	Isopod	<i>Isoetes baltea</i>	None	120 days	Mortality	--	5	--	--	de Nicola Giudici and Guarino 1987
Ephemeroptera	Mayfly	<i>Ephoron virgo</i>	None	4 days	Mortality	--	--	--	77	Van der Geest et al. 1999b
Ephemeroptera	Mayfly	<i>Baetis</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Epeorus dilaticornis</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Epeorus longimanus</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Isonychia lepidus</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Drunella flavifrons</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Caudatella heterocandata</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Ephemerella infrequens</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Ephemerella spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Ephemeroptera	Mayfly	<i>Paraleptophlebia quillipes</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Pteronarcys princeps</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Yorapeta brevis</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Malenka (californica?)</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Calineuria californica</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Doronereia baumanni</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Sweltsa (pacific?)</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Plecoptera	Stonefly	<i>Cleptelmis addenda</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Arctopsyche grandis</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989

Table 4: Copper Toxicity Data for Freshwater Aquatic Species

Order	Common Name	Scientific Name	Special Status	Exposure Duration	Endpoint	NOEC (µg/L)	LOEC (µg/L)	EC50 (µg/L)	LC50 (µg/L)	Reference
Trichoptera	Caddisfly	<i>Hydropsyche ostri</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Rhyacophila acropedes</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Rhyacophila angelita</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Rhyacophila vacotta</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Glossosoma califica</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Hydroptila spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Brachycentrus americanus</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Micrasema spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Lepidostoma spp.</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Neophylax spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Trichoptera	Caddisfly	<i>Cyrnus trimaculatus</i>	None	7 days	Mortality rates of larvae	--	--	--	759 - same as 4 day study	Van der Geest et al. 1999a
Trichoptera	Caddisfly	<i>Cyrnus trimaculatus</i>	None	4 days	Mortality rates of larvae	--	--	--	7x lower than 2 day study	Van der Geest et al. 1999a
Trichoptera	Caddisfly	<i>Cyrnus trimaculatus</i>	None	4 days	Mortality	--	--	--	759	Van der Geest et al. 1999b
Trichoptera	Caddisfly	<i>Hydropsyche angustipennis</i>	None	2 days	Mortality	--	--	--	2,510	Van Der Geest et al. 1999b
Trichoptera	Caddisfly	<i>Hydropsyche angustipennis</i>	None	4 days	Mortality	--	--	--	350	Van Der Geest et al. 1999b
Trichoptera	Caddisfly	<i>Hydropsyche angustipennis</i>	None	7 days	Mortality	--	--	--	502	Van Der Geest et al. 1999b
Diptera	Crane fly	<i>Antocha monticola</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Diptera	Crane fly	<i>Dicranota spp.</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989
Diptera	Crane fly	<i>Cryptolabis spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Diptera	Moth fly	<i>Pericoma spp.</i>	None	1 year	Population density	2.5	5	--	--	Leland et al. 1989
Diptera	Biting midge	<i>Palpomyia</i>	None	1 year	Population density	10	--	--	--	Leland et al. 1989
Diptera	Black Fly	<i>Simulium spp.</i>	None	1 year	Population density	5	10	--	--	Leland et al. 1989
Diptera	Midges	Charonimidae	None	1 year	Population density	5	10	--	--	Leland et al. 1990
Diptera	Dance flies, dagger flies	Empididae	None	1 year	Population density	10	--	--	--	Leland et al. 1991
Diptera	Nidge larvae	<i>Chironomus tentans</i>	None	2 days	Mortality	--	750	--	1,136.50	Mastin and Rodgers 2000
Calenoida	--	Calanoid copepods	None	4 days	Biomass reduction	--	--	20	--	Havens 1994
Calenoida	--	Cyclopoid nauplii	None	4 days	Biomass reduction	--	--	200	--	Havens 1994
Cyclopoida	--	Cyclopoid copepodids	None	4 days	Biomass reduction	--	--	200	--	Havens 1994
Cyclopoida	--	Calanoid nauplii	None	4 days	Biomass reduction	--	--	20	--	Havens 1994
Amphipoda	Amphipod	<i>Hyalella azteca</i>	None	2 days	Mortality	--	100	--	157.8	Mastin and Rodgers 2000
Decapoda	Freshwater shrimp	<i>Paratya compressa improvisa</i>	Represents Federal and State Endangered Species - <i>Syncairs pacifica</i>	2 days	Mortality	--	--	--	29.7	Hankeyama and Sugaya (1989)
Anura	Northern leopard frog	<i>Rana pipiens</i>	Represents Federal Species of Concern - <i>Rana boylei</i> and <i>Clemmys marmorata marmorata</i>	20 weeks	Growth	50	60	--	--	Laride and Guttman (1973)

Table 4: Copper Toxicity Data for Freshwater Aquatic Species

Order	Common Name	Scientific Name	Special Status	Exposure Duration	Endpoint	NOEC (µg/L)	LOEC (µg/L)	EC50 (µg/L)	LC50 (µg/L)	Reference
Cypriniformes	Fathead minnow	<i>Pimephales promelas</i>	None	2 days	Mortality	--	20	--	19.2	Maslin and Rodgers 2000
Cypriniformes	Fathead minnow	<i>Pimephales promelas</i>	None	4 days	Mortality	125	250	--	--	Murray-Gulde et al. 2002
Cypriniformes	Fathead minnow	<i>Pimephales promelas</i>	None	4 days	Mortality	--	--	--	675.2	Murray-Gulde et al. 2002
Salmoniformes	Coho salmon	<i>Oncorhynchus kisutch</i>	Federal Threatened Species and State Endangered Species	60 days	Mortality	18	--	--	--	Mudge et al. 1993
Salmoniformes	Coho salmon	<i>Oncorhynchus kisutch</i>	Federal Threatened Species and State Endangered Species	60 days	Growth	21	--	--	--	Mudge et al. 1993
Salmoniformes	Coho salmon	<i>Oncorhynchus kisutch</i>	Federal Threatened Species and State Endangered Species	4 days	Mortality	--	--	--	61	Mudge et al. 1993
Salmoniformes	Coho salmon	<i>Oncorhynchus kisutch</i>	Federal Threatened Species and State Endangered Species	9 days	Mortality	--	--	--	61	Mudge et al. 1993
Salmoniformes	Steelhead trout	<i>Oncorhynchus mykiss</i>	Federal Threatened Species	60 days	Mortality	24	--	--	--	Mudge et al. 1993
Salmoniformes	Steelhead trout	<i>Oncorhynchus mykiss</i>	Federal Threatened Species	4 days	Mortality	--	--	--	90	Mudge et al. 1993
Salmoniformes	Steelhead trout	<i>Oncorhynchus mykiss</i>	Federal Threatened Species	9 days	Mortality	--	--	--	55	Mudge et al. 1993
Salmoniformes	Steelhead trout	<i>Oncorhynchus mykiss</i>	Federal Threatened Species	60 days	Growth	45	--	--	--	Mudge et al. 1993

Mann-Kendall Statistic "S" Analysis for MTBE Concentration Trend for well MW-2

MW-2	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	-ve	+ve
Date	8/3/2001	11/14/2001	2/13/2002	5/21/2002	9/4/2002	11/25/2002	2/5/2003	5/15/2003	8/5/2003	11/18/2003		
MTBE ppb	805	370	708	320	700	590	400	300	400			
Compare Event 1		-1*									6	2
Compare Event 2			+1*	+1*	-1*	+1*	+1*	+1*	+1*	+1*	2	5
Compare Event 3				+1*	-1*	+1*	+1*	+1*	+1*	+1*	6	0
Compare Event 4					-1*	+1*	+1*	+1*	+1*	+1*	1	4
Compare Event 5						+1*	-1*	+1*	+1*	+1*	4	0
Compare Event 6							-1*	+1*	+1*	+1*	2	1
Compare Event 7								+1*	+1*	+1*	2	0
Compare Event 8									+1*	+1*	0	1
Compare Event 9										+1*	0	1
SUM											23	13

Mann-Kendall S Value = -10
 (Negative Value = Declining Trend, Positive Value = Increasing Trend, Zero = Stable)
 Confidence Level of the Trend = 86.2%
 (From Gilbert R.O., 1987, Appendix A, Table A18)

Mann-Kendall Statistic "S" Analysis for TPH-g Concentration Trend for well MW-2

MW-2	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	-ve	+ve
Date	8/3/2001	11/14/2001	2/13/2002	5/21/2002	9/4/2002	11/25/2002	2/5/2003	5/15/2003	8/5/2003	11/18/2003		
TPH-g ppb	950	350	830	55	360	100	250	360	250	360		
Compare Event 1		-1*									6	2
Compare Event 2			+1*	+1*	-1*	-1*	+1*	+1*	+1*	+1*	5	2
Compare Event 3				+1*	-1*	-1*	+1*	+1*	+1*	+1*	0	5
Compare Event 4					-1*	+1*	+1*	+1*	+1*	+1*	0	5
Compare Event 5						+1*	+1*	+1*	+1*	+1*	2	1
Compare Event 6							+1*	+1*	+1*	+1*	3	0
Compare Event 7								+1*	+1*	+1*	0	2
Compare Event 8									+1*	+1*	0	1
Compare Event 9										+1*	0	1
SUM											21	13

Mann-Kendall S Value = -8
 (Negative Value = Declining Trend, Positive Value = Increasing Trend, Zero = Stable)
 Confidence Level of the Trend = 80.1%

Mann-Kendall Statistic "S" Analysis for Benzene Concentration Trend for well MW-2

MW-2	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	-ve	+ve
Date	8/3/2001	11/14/2001	2/13/2002	5/21/2002	9/4/2002	11/25/2002	2/5/2003	5/15/2003	8/5/2003	11/18/2003		
Benzene ppb	2.5	0.5	0.5	0.717	0.5	2.5	10	0.5	2.5	2.0		
Compare Event 1		-1*									5	1
Compare Event 2			+1*	+1*	-1*	+1*	+1*	+1*	+1*	+1*	0	5
Compare Event 3				+1*	-1*	-1*	+1*	+1*	+1*	+1*	2	4
Compare Event 4					-1*	+1*	+1*	+1*	+1*	+1*	0	4
Compare Event 5						+1*	+1*	+1*	+1*	+1*	2	1
Compare Event 6							+1*	+1*	+1*	+1*	3	0
Compare Event 7								+1*	+1*	+1*	0	2
Compare Event 8									+1*	+1*	1	0
Compare Event 9										+1*	0	1
SUM											13	17

Mann-Kendall S Value = 4
 (Negative Value = Declining Trend, Positive Value = Increasing Trend, Zero = Stable)
 Confidence Level of the Trend = 84%

* = laboratory reporting limit used. Actual values expected to be lower than the given number
 Source: Gilbert R.O., 1987; Statistical Methods For Environmental Pollution Monitoring; Van Nostrand Reinhold, New York.

TABLE 5: Water Quality of Reservoirs Treated with Copper Sulfate

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr avg Cu Crit (ppm)	4-day avg Cu Crit (ppm)	Exceed?
00-01	Alpine Lake Dam	8/25/1999	0.001	72	0.0103	0.0070	
00-01	Alpine Lake Dam	11/9/1999	0.0061	62.85	0.0090	0.0063	
00-01	Alpine Lake Dam	2/9/2000	0.0033	57.1	0.0083	0.0058	
00-01	Alpine Lake Dam	5/4/2000	0.004	58	0.0084	0.0059	
00-01	Alpine Lake Dam	8/9/2000	0.003	68	0.0097	0.0067	
00-01	Alpine Lake Dam	11/8/2000	0.0021	66	0.0095	0.0065	
00-01	Alpine Lake Dam	2/7/2001	0.0023	64	0.0092	0.0064	
00-01	Alpine Lake Dam	5/8/2001	0.004	66	0.0095	0.0065	
00-01	Alpine Lake Dam	8/7/2001	<	74	0.0105	0.0072	
00-01	Alpine Lake Dam	11/7/2001	0.002	72	0.0103	0.0070	1-hr, 4-day
00-01	Alpine Lake Dam	2/12/2002	0.003	58	0.0084	0.0059	
00-01	Alpine Lake Dam	5/23/2002	0.0025	66	0.0095	0.0065	
00-01	Alpine Lake Dam	8/15/2002	0.0025	72	0.0103	0.0070	
00-01	Alpine Lake Dam	11/13/2002	0.0034	64	0.0092	0.0064	
00-01	Alpine Lake Dam	2/6/2003	0.0018	58	0.0084	0.0059	
Max			0.012				
95% UCL			0.00499				

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr avg Cu Crit (ppm)	4-day avg Cu Crit (ppm)	Exceed?
00-04	Bon Tempe Lake Dam	8/25/1999	0.012	58	0.0084	0.0059	1-hr, 4-day
00-04	Bon Tempe Lake Dam	11/9/1999	0.0137	60.94	0.0088	0.0061	1-hr, 4-day
00-04	Bon Tempe Lake Dam	2/9/2000	0.0066	57.1	0.0083	0.0058	4-day
00-04	Bon Tempe Lake Dam	5/4/2000	0.006	50	0.0073	0.0052	4-day
00-04	Bon Tempe Lake Dam	8/9/2000	0.01	56	0.0081	0.0057	1-hr, 4-day
00-04	Bon Tempe Lake Dam	11/8/2000	0.007	62	0.0089	0.0062	4-day
00-04	Bon Tempe Lake Dam	2/7/2001	0.006	62	0.0089	0.0062	
00-04	Bon Tempe Lake Dam	5/8/2001	0.0053	58	0.0084	0.0059	
00-04	Bon Tempe Lake Dam	8/7/2001	0.01	64	0.0092	0.0064	1-hr, 4-day
00-04	Bon Tempe Lake Dam	11/7/2001	0.011	68	0.0097	0.0067	1-hr, 4-day
00-04	Bon Tempe Lake Dam	2/12/2002	0.0041	52	0.0076	0.0053	
00-04	Bon Tempe Lake Dam	5/21/2002	0.0044	54	0.0078	0.0055	
00-04	Bon Tempe Lake Dam	8/13/2002	0.0201	62	0.0089	0.0062	1-hr, 4-day
00-04	Bon Tempe Lake Dam	11/13/2002	0.0085	64	0.0092	0.0064	4-day
00-04	Bon Tempe Lake Dam	2/6/2003	0.004	50	0.0073	0.0052	
Max			0.0201				
95% UCL			0.01101				

TABLE 5: Water Quality of Reservoirs Treated with Copper Sulfate

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr avg Cu Crit (ppm)	4-day avg Cu Crit (ppm)	Exceed?
00-08	Kent Lake Dam	8/25/1999	0.0047	64	0.0092	0.0064	
00-08	Kent Lake Dam	11/18/1999	0.0031	60.9	0.0088	0.0061	
00-08	Kent Lake Dam	2/15/2000	<	55.2	0.0080	0.0056	
00-08	Kent Lake Dam	5/17/2000	0.003	60	0.0087	0.0060	
00-08	Kent Lake Dam	8/8/2000	0.005	64	0.0092	0.0064	
00-08	Kent Lake Dam	11/17/2000	0.0017	62	0.0089	0.0062	
00-08	Kent Lake Dam	2/14/2001	0.0023	64	0.0092	0.0064	
00-08	Kent Lake Dam	5/10/2001	0.0017	64	0.0092	0.0064	
00-08	Kent Lake Dam	8/9/2001	<	70	0.1000	0.0069	
00-08	Kent Lake Dam	11/14/2001	0.004	70	0.1000	0.0069	
00-08	Kent Lake Dam	2/23/2002	0.0019	62	0.0089	0.0062	
00-08	Kent Lake Dam	5/7/2002	0.0025	61	0.0088	0.0061	
00-08	Kent Lake Dam	8/8/2002	0.0017	66	0.0095	0.0065	
00-08	Kent Lake Dam	11/6/2002	0.0012	70	0.1000	0.0069	
00-08	Kent Lake Dam	2/11/2003	<	56	0.0081	0.0057	
Max			0.006				
95% UCL			0.00326				

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr avg Cu Crit (ppm)	4-day avg Cu Crit (ppm)	Exceed?
00-16	Nicasio Lake Dam	8/24/1999	0.0086	64	0.0092	0.0064	
00-16	Nicasio Lake Dam	11/17/1999	0.0046	64.8	0.0093	0.0064	
00-16	Nicasio Lake Dam	2/10/2000	0.0035	60.9	0.0088	0.0061	
00-16	Nicasio Lake Dam	5/2/2000	0.005	56	0.0084	0.0059	
00-16	Nicasio Lake Dam	8/8/2000	0.012	64	0.0092	0.0064	1-hr, 4-day
00-16	Nicasio Lake Dam	11/15/2000	0.0044	64	0.0092	0.0064	
00-16	Nicasio Lake Dam	2/6/2001	0.0052	64	0.0092	0.0064	
00-16	Nicasio Lake Dam	5/9/2001	0.007	62	0.0089	0.0062	
00-16	Nicasio Lake Dam	8/8/2001	0.005	70	0.1000	0.0069	4-day
00-16	Nicasio Lake Dam	11/8/2001	0.005	71	0.1010	0.0070	
00-16	Nicasio Lake Dam	2/13/2002	0.0054	56	0.0081	0.0057	
00-16	Nicasio Lake Dam	5/16/2002	0.0041	62	0.0089	0.0062	
00-16	Nicasio Lake Dam	8/7/2002	0.0086	68	0.0097	0.0067	4-day
00-16	Nicasio Lake Dam	11/6/2002	0.0034	72	0.1003	0.0070	
00-16	Nicasio Lake Dam	2/12/2003	0.0033	60	0.0087	0.0060	
Max			0.012				
95% UCL			0.00716				

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr avg Cu Crit (ppm)	4-day avg Cu Crit (ppm)	Exceed?
00-19	Phoenix Lake Dam	8/26/1999	<	74	0.0105	0.0072	
00-19	Phoenix Lake Dam	11/16/1999	<	79.04	0.0112	0.0076	
00-19	Phoenix Lake Dam	2/17/2000	<	41.9	0.0062	0.0044	
00-19	Phoenix Lake Dam	5/9/2000	<	69	0.0099	0.0068	
00-19	Phoenix Lake Dam	8/10/2000	0.003	76	0.1008	0.0074	
00-19	Phoenix Lake Dam	11/16/2000	<	82	0.1116	0.0079	
00-19	Phoenix Lake Dam	2/13/2001	<	66	0.0095	0.0065	
00-19	Phoenix Lake Dam	5/15/2001	0.0011	68	0.0097	0.0067	
00-19	Phoenix Lake Dam	8/14/2001	<	75	0.1017	0.0073	
00-19	Phoenix Lake Dam	11/14/2001	<	78	0.1111	0.0075	
00-19	Phoenix Lake Dam	2/6/2002	<	56	0.0081	0.0057	
00-19	Phoenix Lake Dam	5/14/2002	<	70	0.1000	0.0069	
00-19	Phoenix Lake Dam	8/20/2002	<	74	0.1005	0.0072	
00-19	Phoenix Lake Dam	11/14/2002	<	78	0.1111	0.0075	
00-19	Phoenix Lake Dam	2/13/2003	<	54	0.0078	0.0055	
Max			0.003				
95% UCL			0.00239				

Notes:

- 1-hr and 4-day average copper water quality criteria are calculated from hardness data by USEPA California Toxics Rule for protection of aquatic life formula.
- Each reservoir below had 2 water samples analyzed for copper between Feb and May of 1999. These data have been excluded because the detection limits for those samples were higher than both copper criteria.

TABLE 6: Water Quality of Untreated Reservoirs

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr Avg. Cl-Cl (ppm)	4-day Avg. Cl-Cl (ppm)	Exceed?
00-22	Soulajule Lake Dam	8/24/99	< 0.0042	42	0.0062	0.0044	
00-22	Soulajule Lake Dam	11/17/99	< 0.003	41.9	0.0062	0.0044	
00-22	Soulajule Lake Dam	2/10/00	< 0.003	40	0.0059	0.0043	
00-22	Soulajule Lake Dam	5/3/00	0.003	46	0.0067	0.0048	
00-22	Soulajule Lake Dam	8/23/00	0.004	44	0.0065	0.0046	
00-22	Soulajule Lake Dam	11/15/00	0.0017	44	0.0065	0.0046	
00-22	Soulajule Lake Dam	2/8/01	0.0026	48	0.0070	0.0050	
00-22	Soulajule Lake Dam	5/9/01	0.0045	50	0.0073	0.0052	
00-22	Soulajule Lake Dam	8/8/01	< 0.002	50	0.0073	0.0052	
00-22	Soulajule Lake Dam	11/8/01	< 0.002	52	0.0076	0.0053	
00-22	Soulajule Lake Dam	2/13/02	0.003	44	0.0065	0.0046	
00-22	Soulajule Lake Dam	5/9/02	0.0047	50	0.0073	0.0052	
00-22	Soulajule Lake Dam	8/8/02	0.0024	54	0.0078	0.0055	
00-22	Soulajule Lake Dam	11/6/02	0.0016	54	0.0078	0.0055	
00-22	Soulajule Lake Dam	2/11/03	0.0024	46	0.0067	0.0048	
Max			0.0047				
95% UCL			0.00349				

Site ID	Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr Avg. Cl-Cl (ppm)	4-day Avg. Cl-Cl (ppm)	Exceed?
00-13	Lagunitas Dam	8/26/99	< 0.003	68	0.0097	0.0067	
00-13	Lagunitas Dam	11/16/99	< 0.003	68.56	0.0098	0.0068	
00-13	Lagunitas Dam	2/17/00	< 0.003	32.4	0.0048	0.0036	
00-13	Lagunitas Dam	5/18/00	< 0.003	56	0.0081	0.0057	
00-13	Lagunitas Dam	8/10/00	0.008	72	0.0103	0.0070	4-day
00-13	Lagunitas Dam	11/16/00	< 0.001	74	0.0105	0.0072	
00-13	Lagunitas Dam	2/13/01	< 0.002	62	0.0089	0.0062	
00-13	Lagunitas Dam	5/15/01	< 0.001	66	0.0095	0.0065	
00-13	Lagunitas Dam	8/14/01	< 0.002	74	0.0105	0.0072	
00-13	Lagunitas Dam	11/14/01	< 0.002	76	0.0108	0.0074	
00-13	Lagunitas Dam	2/6/02	< 0.001	46	0.0067	0.0048	
00-13	Lagunitas Dam	5/15/02	0.0014	64	0.0092	0.0064	
00-13	Lagunitas Dam	8/20/02	< 0.001	72	0.0103	0.0070	
00-13	Lagunitas Dam	11/14/02	< 0.001	72	0.0103	0.0070	
00-13	Lagunitas Dam	2/13/03	< 0.001	48	0.0070	0.0050	
Max			0.008				
95% UCL			0.00323				

Notes:

- 1-hr and 4-day average copper water quality criteria are calculated from hardness data by USEPA California Toxics Rule for protection of aquatic life formula.
- Each reservoir below had 2 water samples analyzed for copper between Feb and May of 1999. These data have been excluded because the detection limits for those samples were higher than both copper criteria.

TABLE 7: Water Quality of Creeks Receiving Flow from Treated Reservoirs

Site	Sample Date	Copper (ppm)	Lead (ppm)	Cadmium (ppm)	Chloride (ppm)	ESD (ppm)
Lag Creek @ Kent (Shafter Bridge)	4/28/99 <	0.005	62	0.0089	0.0062	
Lag Creek @ Kent (Shafter Bridge)	5/26/99	0.006	66	0.0095	0.0065	
Lag Creek @ Kent (Shafter Bridge)	6/16/99 <	0.003	68	0.0097	0.0087	
Lag Creek @ Kent (Shafter Bridge)	7/28/99 <	0.003	68	0.0097	0.0067	
Lag Creek @ Kent (Shafter Bridge)	9/1/99 <	0.003	64	0.0092	0.0064	
Lag Creek @ Kent (Shafter Bridge)	10/6/99	0.003	60	0.0087	0.0060	
Lag Creek @ Kent (Shafter Bridge)	11/3/99 <	0.003	80	0.0113	0.0077	
Lag Creek @ Kent (Shafter Bridge)	12/8/99	0.004	66.7	0.0096	0.0066	
Lag Creek @ Kent (Shafter Bridge)	1/12/00 <	0.003	62.8	0.0090	0.0063	
Lag Creek @ Kent (Shafter Bridge)	3/1/00 <	0.003	56.2	0.0081	0.0057	
Lag Creek @ Kent (Shafter Bridge)	3/29/00	0.0058	66	0.0096	0.0065	
Lag Creek @ Kent (Shafter Bridge)	4/26/00	0.0053	70	0.0100	0.0069	
Lag Creek @ Kent (Shafter Bridge)	6/7/00	0.0046	66	0.0095	0.0065	
Lag Creek @ Kent (Shafter Bridge)	7/12/00	0.0051	66	0.0095	0.0065	
Lag Creek @ Kent (Shafter Bridge)	1/24/01	0.0052	66	0.0095	0.0065	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	3/7/01	0.0197	68	0.0097	0.0067	4-day
Lag Creek @ Kent (Shafter Bridge)	4/11/01	0.008	66	0.0095	0.0065	
Lag Creek @ Kent (Shafter Bridge)	5/4/01	0.0044	68	0.0097	0.0067	
Lag Creek @ Kent (Shafter Bridge)	5/23/01	0.0038	64	0.0092	0.0064	
Lag Creek @ Kent (Shafter Bridge)	6/20/01	0.0159	66	0.0095	0.0065	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	7/18/01	0.0099	66	0.0095	0.0065	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	8/8/01	0.0133	70	0.0100	0.0069	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	9/20/01	0.0075	68	0.0097	0.0067	4-day
Lag Creek @ Kent (Shafter Bridge)	10/31/01	0.0085	72	0.0103	0.0070	4-day
Lag Creek @ Kent (Shafter Bridge)	12/5/01	0.0155	67	0.0096	0.0066	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	1/9/02	0.0165	63	0.0091	0.0063	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	2/21/02	0.0079	62	0.0089	0.0062	4-day
Lag Creek @ Kent (Shafter Bridge)	3/20/02	0.005	62	0.0089	0.0062	
Lag Creek @ Kent (Shafter Bridge)	4/17/02	0.01	64	0.0092	0.0064	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	5/8/02	0.012	64	0.0092	0.0064	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	5/29/02	0.012	64	0.0092	0.0064	1-hr, 4-day
Lag Creek @ Kent (Shafter Bridge)	6/26/02	0.0086	66	0.0095	0.0065	4-day
Lag Creek @ Kent (Shafter Bridge)	7/17/02	0.0043	68	0.0097	0.0067	
Lag Creek @ Kent (Shafter Bridge)	9/18/02	0.0043	64	0.0092	0.0064	
Lag Creek @ Kent (Shafter Bridge)	10/23/02	0.0089	62	0.0089	0.0062	4-day
Lag Creek @ Kent (Shafter Bridge)	1/22/03	0.0035	62	0.0089	0.0062	
Lag Creek @ Kent (Shafter Bridge)	2/19/03	0.0029	62	0.0089	0.0062	
Lag Creek @ Kent (Shafter Bridge)	3/19/03	0.0046	62	0.0089	0.0062	
Lag Creek @ Kent (Shafter Bridge)	4/9/03	0.0066	66	0.0095	0.0065	4-day
Lag Creek @ Kent (Shafter Bridge)	5/21/03	0.0047	68	0.0097	0.0067	
Lag Creek @ Kent (Shafter Bridge)	6/11/03	0.0036	62	0.0089	0.0062	1-hr, 4-day
Max		0.0197				1-hr, 4-day
95% UCL		0.00843				1-hr, 4-day

TABLE 7: Water Quality of Creeks Receiving Flow from Treated Reservoirs

Site	Sample Date	Capssal (ppm)	Trinitrotoluene (ppm)	1,1,1-Trichloroethane (ppm)	4-day BOD ₅ (ppm)	5-day BOD ₅ (ppm)	1-hr, 4-day BOD ₅ (ppm)
Lag Crk @ Nicasio Crk (Gallagher)	4/28/99	<	0.005	98	0.0137	0.0092	0.0092
Lag Crk @ Nicasio Crk (Gallagher)	5/26/99		0.037	100	0.0140	0.0093	0.0093
Lag Crk @ Nicasio Crk (Gallagher)	6/16/99	<	0.003	96	0.0135	0.0090	0.0090
Lag Crk @ Nicasio Crk (Gallagher)	7/28/99	<	0.003	6.1	0.0010	0.0009	0.0009
Lag Crk @ Nicasio Crk (Gallagher)	9/1/99	<	0.003	88	0.0124	0.0084	0.0084
Lag Crk @ Nicasio Crk (Gallagher)	10/6/99		0.003	76	0.0108	0.0074	0.0074
Lag Crk @ Nicasio Crk (Gallagher)	11/3/99	<	0.003	66	0.0095	0.0065	0.0065
Lag Crk @ Nicasio Crk (Gallagher)	12/8/99	<	0.003	83.8	0.0119	0.0080	0.0080
Lag Crk @ Nicasio Crk (Gallagher)	1/12/00		0.0039	78.1	0.0111	0.0076	0.0076
Lag Crk @ Nicasio Crk (Gallagher)	3/1/00		0.0031	60.9	0.0088	0.0061	0.0061
Lag Crk @ Nicasio Crk (Gallagher)	3/29/00		0.0032	91	0.0128	0.0086	0.0086
Lag Crk @ Nicasio Crk (Gallagher)	4/26/00		0.0053	100	0.0140	0.0093	0.0093
Lag Crk @ Nicasio Crk (Gallagher)	6/7/00		0.0058	94	0.0132	0.0088	0.0088
Lag Crk @ Nicasio Crk (Gallagher)	7/12/00		0.0076	96	0.0135	0.0090	0.0090
Lag Crk @ Nicasio Crk (Gallagher)	1/24/01		0.01	81	0.0115	0.0078	0.0078
Lag Crk @ Nicasio Crk (Gallagher)	3/7/01		0.0098	72	0.0103	0.0070	0.0070
Lag Crk @ Nicasio Crk (Gallagher)	4/11/01		0.0097	92	0.0129	0.0087	0.0087
Lag Crk @ Nicasio Crk (Gallagher)	5/4/01		0.0062	88	0.0124	0.0084	0.0084
Lag Crk @ Nicasio Crk (Gallagher)	5/23/01		0.0051	84	0.0119	0.0080	0.0080
Lag Crk @ Nicasio Crk (Gallagher)	6/20/01		0.0089	82	0.0116	0.0079	0.0079
Lag Crk @ Nicasio Crk (Gallagher)	7/18/01		0.0085	82	0.0116	0.0079	0.0079
Lag Crk @ Nicasio Crk (Gallagher)	8/8/01		0.0105	80	0.0113	0.0077	0.0077
Lag Crk @ Nicasio Crk (Gallagher)	9/20/01		0.0066	80	0.0113	0.0077	0.0077
Lag Crk @ Nicasio Crk (Gallagher)	10/31/01		0.0074	78	0.0111	0.0075	0.0075
Lag Crk @ Nicasio Crk (Gallagher)	12/5/01		0.0138	86	0.0121	0.0082	0.0082
Lag Crk @ Nicasio Crk (Gallagher)	1/9/02		0.0126	70	0.0100	0.0069	0.0069
Lag Crk @ Nicasio Crk (Gallagher)	2/21/02		0.0088	67	0.0096	0.0066	0.0066
Lag Crk @ Nicasio Crk (Gallagher)	3/20/02		0.005	82	0.0116	0.0079	0.0079
Lag Crk @ Nicasio Crk (Gallagher)	4/17/02		0.009	90	0.0116	0.0079	0.0079
Lag Crk @ Nicasio Crk (Gallagher)	5/8/02		0.013	96	0.0127	0.0085	0.0085
Lag Crk @ Nicasio Crk (Gallagher)	5/29/02		0.01	92	0.0135	0.0090	0.0090
Lag Crk @ Nicasio Crk (Gallagher)	6/26/02		0.0083	90	0.0129	0.0087	0.0087
Lag Crk @ Nicasio Crk (Gallagher)	7/17/02		0.004	76	0.0108	0.0074	0.0074
Max			0.037				
95% UCL			0.00995				

95% UCL

0.00995

TABLE 7: Water Quality of Creeks Receiving Flow from Treated Reservoirs

Site	Sample Date	Copper (ppm)	Hardness (ppm)	30-day Avg. Cl. (ppm)	30-day Avg. Cu. (ppm)	Exceed?
NICASIO CREEK	4/28/99 <	0.005	56	0.0081	0.0057	
NICASIO CREEK	5/26/99	0.015	94	0.0132	0.0088	1-hr, 4-day
Nicasio Creek	6/16/99 <	0.003	110	0.0153	0.0101	
Nicasio Creek	7/28/99 <	0.003	88	0.0124	0.0084	
Nicasio Creek	9/1/99 <	0.003	126	0.0174	0.0114	
Nicasio Creek	10/6/99	0.006	140	0.0192	0.0124	
Nicasio Creek	11/3/99 <	0.003	148	0.0203	0.0130	
Nicasio Creek	12/8/99	0.004	139	0.0191	0.0124	
Nicasio Creek	1/12/00	0.0037	116.2	0.0161	0.0106	
Nicasio Creek	3/29/00	0.101	57	0.0082	0.0058	1-hr, 4-day
Nicasio Creek	4/26/00	0.0068	68	0.0097	0.0067	4-day
Nicasio Creek	6/7/00	0.0046	122	0.0169	0.0111	
Nicasio Creek	7/12/00 <	0.003	128	0.0177	0.0115	
Nicasio Creek	1/24/01	0.0089	46	0.0067	0.0048	1-hr, 4-day
Nicasio Creek	3/7/01	0.0162	64	0.0092	0.0064	1-hr, 4-day
Nicasio Creek	4/11/01	0.0065	74	0.0105	0.0072	
Nicasio Creek	5/4/01	0.006	104	0.0145	0.0096	
Nicasio Creek	5/23/01	0.0059	116	0.0161	0.0106	
Nicasio Creek	6/20/01	0.0095	120	0.0166	0.0109	
Nicasio Creek	7/18/01	0.005	128	0.0177	0.0115	
Nicasio Creek	8/8/01	0.0264	154	0.0210	0.0135	1-hr, 4-day
Nicasio Creek	9/20/01	0.0125	156	0.0213	0.0136	
Nicasio Creek	10/31/01	0.0055	160	0.0218	0.0139	
Nicasio Creek	12/5/01	0.0038	106	0.0148	0.0098	
Nicasio Creek	1/9/02	0.0144	52	0.0076	0.0053	1-hr, 4-day
Nicasio Creek	2/21/02	0.0182	56	0.0081	0.0057	1-hr, 4-day
Nicasio Creek	3/20/02	0.007	60	0.0087	0.0060	4-day
Nicasio Creek	4/17/02	0.011	80	0.0113	0.0077	4-day
Nicasio Creek	5/8/02	0.011	116	0.0161	0.0106	4-day
Nicasio Creek	5/29/02	0.012	120	0.0166	0.0109	4-day
Nicasio Creek	6/26/02	0.0067	126	0.0174	0.0114	
Nicasio Creek	7/17/02	0.0055	138	0.0190	0.0123	
Nicasio Creek	9/18/02	0.0157	148	0.0203	0.0130	4-day
Nicasio Creek	10/23/02	0.0103	160	0.0218	0.0139	
Nicasio Creek	1/22/03	0.0057	54	0.0078	0.0055	4-day
Nicasio Creek	2/19/03	0.0078	56	0.0081	0.0057	4-day
Nicasio Creek	3/19/03	0.0068	58	0.0084	0.0059	4-day
Nicasio Creek	4/9/03	0.0043	64	0.0092	0.0064	
Nicasio Creek	5/21/03	0.0086	64	0.0092	0.0064	4-day
Nicasio Creek	6/11/03	0.0083	124	0.0171	0.0112	
Max		0.101				
95% UCL		0.01571				

Notes:

- 1-hr and 4-day average copper water quality criteria are calculated from hardness data by USEPA California Toxics Rule for protection of aquatic life formula.
- Each reservoir below had 2 water samples analyzed for copper between Feb and May of 1999. These data have been excluded because the detection limits for those samples were higher than both copper criteria.

TABLE 8: Water Quality of Creeks Receiving Flow from Untreated Reservoirs

Site	Sample Date	Copper (ppm)	Hardness (ppm)	1-hr, 4-day Cu Crit (ppm)	4-day Cu Crit (ppm)	Exceed?
SoulaJule Creek	4/28/99	<	0.005	0.0070	0.0050	4-day
SoulaJule Creek	5/26/99	0.048	0.048	0.0073	0.0052	1-hr, 4-day
SoulaJule Crk	6/16/99	0.003	0.003	0.0084	0.0059	
SoulaJule Crk	7/28/99	0.003	0.003	0.0073	0.0052	
SoulaJule Crk	9/1/99	0.003	0.003	0.0070	0.0050	
SoulaJule Crk	10/6/99	0.004	0.004	0.0073	0.0052	
SoulaJule Crk	11/3/99	0.004	0.004	0.0073	0.0052	
SoulaJule Crk	12/8/99	0.003	0.003	0.0062	0.0044	
SoulaJule Crk	1/12/00	0.0038	0.0038	0.0059	0.0043	
SoulaJule Crk	3/1/00	0.0041	0.0041	0.0066	0.0047	
SoulaJule Crk	3/29/00	0.0092	0.0092	0.0067	0.0048	1-hr, 4-day
SoulaJule Crk	4/26/00	0.008	0.008	0.0069	0.0049	1-hr, 4-day
SoulaJule Crk	6/7/00	0.0045	0.0045	0.0073	0.0052	
SoulaJule Crk	7/12/00	0.0054	0.0054	0.0070	0.0050	4-day
SoulaJule Crk	1/24/01	0.013	0.013	0.0158	0.0104	4-day
SoulaJule Crk	3/7/01	0.0141	0.0141	0.0078	0.0055	1-hr, 4-day
SoulaJule Crk	4/11/01	0.0164	0.0164	0.0066	0.0047	1-hr, 4-day
SoulaJule Crk	5/4/01	0.0065	0.0065	0.0073	0.0052	4-day
SoulaJule Crk	5/23/01	0.0075	0.0075	0.0073	0.0052	1-hr, 4-day
SoulaJule Crk	6/20/01	0.0069	0.0069	0.0074	0.0052	4-day
SoulaJule Crk	7/18/01	0.0059	0.0059	0.0076	0.0053	4-day
SoulaJule Crk	8/8/01	0.0133	0.0133	0.0078	0.0055	1-hr, 4-day
SoulaJule Crk	9/20/01	0.0149	0.0149	0.0081	0.0057	1-hr, 4-day
SoulaJule Crk	10/31/01	0.0069	0.0069	0.0081	0.0057	4-day
SoulaJule Crk	12/5/01	0.0063	0.0063	0.0078	0.0055	4-day
SoulaJule Crk	2/21/02	0.0144	0.0144	0.0076	0.0050	4-day
SoulaJule Crk	3/20/02	0.005	0.005	0.0070	0.0050	1-hr, 4-day
SoulaJule Crk	4/17/02	0.022	0.022	0.0070	0.0050	1-hr, 4-day
SoulaJule Crk	5/8/02	0.012	0.012	0.0070	0.0050	1-hr, 4-day
SoulaJule Crk	5/29/02	0.01	0.01	0.0076	0.0053	4-day
SoulaJule Crk	6/26/02	0.0062	0.0062	0.0076	0.0053	4-day
SoulaJule Crk	7/17/02	0.0111	0.0111	0.0078	0.0055	1-hr, 4-day
SoulaJule Crk	9/18/02	0.0097	0.0097	0.0081	0.0057	1-hr, 4-day
SoulaJule Crk	10/23/02	0.0198	0.0198	0.0084	0.0059	1-hr, 4-day
SoulaJule Crk	1/22/03	0.0074	0.0074	0.0071	0.0051	1-hr, 4-day
SoulaJule Crk	2/19/03	0.005	0.005	0.0073	0.0052	
SoulaJule Crk	3/19/03	0.0086	0.0086	0.0070	0.0050	
SoulaJule Crk	4/9/03	0.006	0.006	0.0070	0.0050	1-hr, 4-day
SoulaJule Crk	5/21/03	0.006	0.006	0.0078	0.0055	4-day

Max 0.048
95% UCL 0.01009

- Notes:
- 1-hr and 4-day average copper water quality criteria are calculated from hardness data by USEPA California Toxics Rule for protection of aquatic life formula.
 - Each reservoir below had 2 water samples analyzed for copper between Feb and May of 1999. These data have been excluded because the detection limits for those samples were higher than both copper criteria.

Appendix A

Draft Statewide General NPDES Permit for Discharge of Aquatic Pesticides



STATE WATER RESOURCES CONTROL BOARD

FACT SHEET

WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR
AQUATIC WEED AND PEST CONTROL IN WATERS OF THE UNITED STATES

GENERAL PERMIT NO. CAG _____

BACKGROUND

On March 12, 2001, the Ninth Circuit Court of Appeals held that discharges of pollutants from the use of aquatic pesticides to waters of the United States require coverage under a National Pollutant Discharge Elimination System (NPDES) permit (*Headwaters, Inc. v. Talent Irrigation District*¹). The Talent decision was issued just prior to the major season for applying aquatic pesticides. Because of the serious public health, safety, and economic implications of delaying applications of aquatic pesticides, the State Water Resources Control Board (State Board) adopted an interim NPDES permit, Water Quality Order (Order) No. 2001-12-DWQ on an emergency basis.

Order No. 2001-12-DWQ imposed requirements on any discharge of aquatic pesticides from public entities to waters of the United States in accordance with the State Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Policy). The Policy establishes procedures for implementing water quality standards for priority pollutants.²

Section 5.3 of the Policy allows for exceptions from its requirements for resource or pest management conducted by public entities. In order to qualify for an exception from meeting priority pollutant standards, a public entity must provide California Environmental Quality Act (CEQA) documentation and other exception requirements specified in section 5.3 and only cause a short term or seasonal exceedance. Because of the emergency adoption of Order No. 2001-12-DWQ, the State Board invoked an exemption to the requirements of section 5.3 and issued the permit incorporating a categorical exception to water quality standards.

Order No. 2001-12-DWQ required that dischargers develop a best management practices (BMPs) plan that minimizes adverse impacts to receiving waters and a monitoring and reporting plan that is representative of each type of aquatic pesticide application.

¹ *Headwaters, Inc. v. Talent Irrigation District*, (9th Cir. 2001) 243 F.3d 526.

² Priority pollutants are listed in 40 Code of Federal Regulations (CFR), section 131.38(b)(1), and include acrolein and copper.

ORDER NO. 2001-12-DWQ LAWSUIT

In August 2001, Waterkeepers Northern California (Waterkeepers) filed a lawsuit against the State Board challenging several aspects of Order No. 2001-12-DWQ. In a settlement agreement, the State Board agreed to fund a comprehensive aquatic pesticide monitoring program (APMP) that would assess pesticide alternatives, receiving water toxicity caused by residual aquatic pesticides, and other monitoring parameters. The State Board contracted with the San Francisco Estuary Institute (SFEI) to conduct the program. On February 5, 2004, SFEI provided the draft report to APMP's Steering Committee. The report made the following conclusions:

1. 2,4-D

The study monitored the effects of 2,4-D and a surfactant at the Stone Lake National Wildlife Refuge. No toxicity was observed at this sampling event; however, research has indicated that 2,4-D alone and in combination with a surfactant can cause endocrine disruption in juvenile trout. This endocrine disruption work has currently only been conducted under a worst-case application scenario and further work is being done to see what the effects are at lower more typical concentrations.

2. Acrolein

APMP work with acrolein this year focused on development of a field sampling method that would allow for accurate determination of concentrations in the environment. Toxicity testing is not possible with acrolein due to its rapid breakdown and volatilization. As acrolein is labeled as an aquatic pesticide, it is also functionally a biocide with very low Lowest Observed Effect Concentration (LOEC)/No Observed Effect Concentration (NOEC) values. Therefore, anywhere acrolein is found, it can be considered toxic. The most appropriate monitoring at this time would be chemical characterization only. The current U.S. Environmental Protection Agency (USEPA) method has an adequate Method Detection Limit (MDL); however, commonly used field sampling techniques are insufficient and will lead to erroneous results. APMP has developed an in-field derivitization method that can be easily adapted by commercial labs and private consulting firms with some Quality Assurance (QA) round-robin exercises to ensure accuracy. One additional consideration is the fact that there is limited data on acrolein's primary breakdown product, 3-hydroxypropanal. APMP intends on conducting more work on this compound in 2004.

3. Copper

Copper was monitored for in several water bodies, both lake and canal systems. In both lakes studies, the dissolved copper was found to have caused lethal and sublethal toxicity in juvenile trout for at least 24 hours after application and toxicity in ceriodaphnia (water flea) for at least a week after application. Sublethal toxicity was observed in a reservoir treated with granular copper for benthic algae control. In addition, chemical characterization showed that sediment copper concentrations were in some cases well above sediment quality guidelines but yet did not exhibit the amount of toxicity one would expect. The

data also indicated that sediment toxicity may be caused by applications in one lake. In a canal system treated with chelated copper, the treated water was toxic to both juvenile trout and water fleas while the treatment occurred. Due to the flow through nature of these systems residual water toxicity was not observed. Sediment toxicity was observed two weeks post application; however, chemical characterization did not confirm elevated copper concentrations so toxicity due to copper application was not confirmed.

4. **Glyphosate**

Glyphosate was monitored at several locations. It was commonly used with a surfactant. No toxicity was found to be associated with the glyphosate applications.

5. **Diquat Dibromide or Diquat**

Diquat was sampled at two locations (one small pond and one Delta slough). In the pond location, toxicity was seen immediately after application, but no additional samples were taken. In the Delta slough, no toxicity was seen that could be attributed to diquat.

6. **Fluridone**

Fluridone was sampled at several locations. In Costa Ponds, the fluridone water concentration ranged from 0.05 before application to 7.2 micrograms per liter ($\mu\text{g/L}$) one hour after application. The porewater fluridone concentration ranged from 0.08-1.24 $\mu\text{g/L}$. Toxicity was observed in all *Selenastrum* tests conducted, including the water collected before pre-application. This indicates that fluridone was not the only cause of toxicity. No toxicity was observed in the ceriodaphnia or fathead minnow tests. Monitoring during an application of liquid fluridone, the pesticide was found to accumulate in the tissue of fish and crayfish two weeks after application. At four weeks after the cessation of treatment, tissue concentrations had returned to pre-application levels.

In Big Bear Lake, the fluridone sediment concentrations ranged from 5.88-300 $\mu\text{g/L}$. Toxicity in the *Hyalloella* tests (10 and 28 day tests) was observed but bore no correlation to sediment fluridone concentration. The sediment fluridone concentration was also not correlated to the porewater fluridone concentration.

7. **Triclopyr**

Only one site treated with triclopyr was monitored in 2003. It was used with a surfactant. No toxicity was observed. Triclopyr will have wider usage when it receives registration from the California Department of Pesticide Regulation (DPR).

In summary, these results show that no toxicity was found with the use of 2,4-D, glyphosate and triclopyr. Toxicity testing is not possible with acrolein. Results were inconclusive for diquat and fluridone. Toxicity was confirmed only in copper-based applications. To confirm these results, additional monitoring will be conducted in 2004. Based on these results, this General Permit will require toxicity monitoring only for copper-based aquatic pesticides.

The APMP includes a section on Alternative or Non-Chemical Methods to Aquatic Pest Control. The report found that water quality impacts from alternative or non-chemical methods were minimal. Turbidity increased, but usually returned to pre-project status within days. Shredding in stagnant water bodies indicated decreases in dissolved oxygen, increases in nutrients, and an increase in biochemical oxygen demand. In general, water quality impacts were temporary or were not apparent. The report also found that costs depended on the water body and the particular weed being targeted. Using conventional pesticides for floating or submerged weeds in Delta water bodies proved most cost effective. A combination of chemical application and mechanical harvesting for milfoil in Big Bear Lake was most cost effective. Mowing was most effective for vegetation in wetlands. The use of alternative or non-chemical methods should be done at the appropriate time in the life cycle of the targeted weed and at the correct pesticide dilution to increase efficiency. Alum and gypsum may be a substitute for copper in controlling algae, but more research is needed to adequately produce useful results. Data results indicated that the relative cost-effectiveness of conventional pesticides versus alternative non-chemical methods varied among different project scenarios. In water bodies where harvesting was conducted routinely, the effects on water quality appeared to be short-lived, and unlikely to adversely affect beneficial uses.

MONITORING DATA REVIEW

State Board staff reviewed the 2003 annual monitoring reports from the aquatic pesticide dischargers and found that water quality in application areas return to background water quality levels when pesticides are applied with the proper label instructions. Results show that acrolein levels are not detectable after 24 hours. Generally, diquat and glyphosate returned to below water quality objective levels five days after application. Copper dissipated within two weeks when applied in small amounts or percentages. If greater amounts of copper were used, it took up to four weeks for the water to return to levels observed before application. Staff found that some sampling locations were not very clearly defined.

AQUATIC PESTICIDE PROJECTS

The use of aquatic pesticides by Control Agencies³ is necessary to manage resources and maintain beneficial uses such as to ensure the proper operation of municipal and agricultural irrigation water distribution systems, maintain capacity in flood control channels, maintain boating access, and control invasive species. Weed and pest control projects are undertakings necessary to control a specified type of weed or pest to an acceptable level in the Treatment Area⁴ that is being managed. The need for aquatic pesticide application events as part of a project can vary from week to week and from season to season due to such things as temperature and flow of the receiving water. It is a balancing act between managing resources and impairing

³ The Control Agency is the permitted discharger authorized by this General Permit. It is the agency responsible for controlling the weeds or pests. In some cases, such as irrigation districts, the Control Agency may own the conveyance system. In other cases, such as application to Delta waters, the Control Agency may not own the water body or conveyance system into which aquatic pesticides are applied. Additionally, the Control Agency may be the pesticide applicator, but it may also contract with a separate entity that does the actual pesticide application. In either case, however, the Control Agency must ensure that the discharge is in compliance with this General Permit.

⁴ The Treatment Area is the area being controlled or treated for aquatic weeds or pests.

resources. This General Permit and the other governmental regulatory programs described below provide different pieces to ensure this balancing act is successful.

RELATED AQUATIC PESTICIDE REGULATIONS

Pesticide formulations contain disclosed active ingredients that yield toxic effects on target organisms and may also have toxic effects on non-target organisms. They also contain inactive or inert ingredients, as well as adjuvants. Adjuvants are compounds chosen by the discharger and added to aquatic pesticides during an application event to increase the effectiveness of the aquatic pesticides on target organisms. Inactive ingredients and adjuvants are trade secrets and have not been publicly disclosed.

According to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), USEPA has sole jurisdiction of pesticide label language. Label language and any changes thereto must be approved by USEPA before the product can be sold in this country. As part of the labeling process, USEPA evaluates data submitted by registrants to ensure that a product used according to label instructions will cause no harm (or "adverse impact") on non-target organism that cannot be reduced (or "mitigated") with protective measures or use restrictions. Registrants are required to submit data on the effects of pesticides on target pests (efficacy) as well as effects on non-target pests. Data on non-target effects include plant effects (phytotoxicity), fish and wildlife hazards (ecotoxicity), impacts on endangered species, effects on the environment, environmental fate, breakdown products, leachability, and persistence; however, FIFRA is not necessarily as protective of water quality as the Clean Water Act (CWA).

DPR is responsible for reviewing the toxic effects of aquatic pesticide formulations and determining whether a pesticide is suitable for use in California's waters through a registration process. To do this, DPR also reviews data submitted by the registrants. While DPR cannot require manufacturers to make changes in labels, DPR can refuse to register products in California unless manufacturers address unmitigated hazards by amending the pesticide label. Consequently, requirements that are specific for use in California are included in many pesticide labels that are approved by USEPA.

DPR also licenses applicators of pesticides designated as a "restricted material"⁵. To legally apply pesticides, the applicator must be a holder of a Qualified Applicator Certificate or work under the supervision of someone who is certified. For aquatic pesticides, the qualified Applicator Certificate must have the category "aquatic."

State regulations require that the County Agricultural Commissioners (CACs) determine if a substantial adverse environmental impact will result from the proposed use of a restricted material. The CAC implements this by issuing Use Permits for the application of pesticides considered as restricted materials. In evaluating local conditions, CACs may use information supplied by DPR, which suggests permit conditions that reflect minimum measures necessary to

⁵ DPR designates a pesticide as a restricted material in California if it poses hazards to public health, farm workers, domestic animals, honeybees, the environment, wildlife, or crops other than those being treated ("Regulating Pesticides: A Guide to Pesticide Regulation in California," October 2001, DPR).

protect people and the environment. State regulations require that specific types of information be provided in an application to the CACs for a pesticide use permit. The CACs review the application to ensure that appropriate alternatives were considered and that any potential adverse effects are mitigated. The CACs also conduct pre-project inspections on at least five percent of projects.

PERMIT COVERAGE/NOTIFICATION REQUIREMENTS

This General Permit addresses the discharge of aquatic pesticides related to the application of 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, and rotenone-based aquatic pesticides to surface waters for the control of aquatic weeds and pests. Triclopyr is currently going through DPR's registration process. After its registration, the discharge associated with triclopyr-based pesticides will also be covered by this General Permit. Aquatic pesticides that are applied to Treatment Areas within waters of the United States in accordance with FIFRA label requirements and Use Permit restrictions are not considered pollutants. However, aquatic pesticides that discharge into areas outside the Treatment Area and residues⁶ are considered pollutants and require coverage under this General Permit.

This General Permit does not cover agricultural storm water discharges or return flows from irrigated agriculture because these discharges are not defined as "point sources" and do not require coverage under an NPDES permit. This General Permit also does not cover other indirect or nonpoint source discharges from applications of pesticides, including discharges of pesticides to land that may be conveyed in storm water or irrigation runoff. This General Permit does not cover the discharge of pollutants related to applications of pesticides other than 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, rotenone and triclopyr (after DPR registration), based pesticides; however, this General Permit includes a re-opener statement specifying that the permit may be reopened for the specific purpose of modifying the list of pesticides whose associated discharge is authorized by this General Permit.

The basic requirements of this General Permit include:

1. The discharger must follow all pesticide label instructions and any Use Permits issued by a CAC;
2. The discharger must be licensed by DPR or work under the supervision of someone who is licensed if the aquatic pesticide is considered a restricted material;
3. The discharger must comply with effluent limitations including developing and implementing an Aquatic Pesticide Application Plan (APAP);
4. The discharger must comply with applicable receiving water limitations; and
5. The discharger must comply with monitoring and reporting requirements.

To obtain coverage under this General Permit, a discharger must submit a completed Notice of Intent to Comply with the Terms of this General Permit (Notice of Intent, NOI), a vicinity map, and the first

⁶ "Residue" is defined as chemicals or by-products caused by the application of aquatic pesticides that persist in the receiving waters after a specified treatment period.

annual fee⁷ to the appropriate Regional Water Quality Control Board (Regional Board). These items constitute a complete application package, which authorize dischargers to discharge, unless the Regional Board requests additional information necessary to determine the applicability of the discharge to this General Permit. Dischargers who submit a valid NOI package are not required to submit an individual permit application, unless directed by a Regional Board that has determined the discharger submitting an NOI is not eligible for coverage under this General Permit

Separate NOIs are required for discharges located within more than one Regional Board's boundary, as defined in section 13200 of the California Water Code. Each enrollment will cover all discharges occurring within the boundaries of that Regional Board. Only one annual fee must be submitted for all covered discharges from one entity.

Authorization to discharge under this General Permit is terminated upon receipt by the discharger, from the appropriate Regional Board(s), of a Notice of Exclusion (NOE),⁸ or upon the adoption of either an individual or other general NPDES permit covering the discharge. Alternatively, the discharger may initiate termination under this General Permit by submitting a letter to the appropriate Regional Board explaining why coverage under the General Permit is no longer necessary.

WATERS OF THE UNITED STATES

This General Permit regulates the discharge of pollutants associated with the application of aquatic pesticides to waters of the United States. "Waters of the United States" include all waters currently used, used in the past, or susceptible to use in interstate commerce; all interstate waters; all other waters the use, degradation, or destruction of which would or could affect interstate or foreign commerce. Waters of the United States include waters used by interstate or foreign travelers for recreation, waters from which fish or shellfish are taken and sold in interstate or foreign commerce, impoundments⁹ of and tributaries to waters of the United States, and wetlands adjacent to waters of the United States. Waters of the United States include, but are not limited to, irrigation and flood control channels that exchange water with waters of the United States.

WATER QUALITY STANDARDS

The Clean Water Act (CWA) defines Water Quality Standards as "Provisions of state or federal law which consist of designated uses for the waters of the United States, water quality criteria for waters based upon such uses, and antidegradation policies. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act." [40 Code of Federal Regulations (CFR) section 131.3(i)].

⁷Payment of this fee is not necessary if you have paid an annual fee within the last year for coverage under the previous order, No. 2001-12-DWQ.

⁸An NOE is a one-page notice that indicates that the proposed discharger is not eligible for coverage under this General Permit and states the reason why.

⁹Surface water impoundments include, but are not limited to, drinking water reservoirs, ornamental lakes and ponds, and impoundments used to store irrigation water.

In California, the *Water Quality Control Plans* designate the beneficial uses of waters of the State and water quality objectives (WQOs) to protect those uses. The *Water Quality Control Plans* are adopted by the State and Regional Boards through a formal administrative rulemaking process, and, upon approval by USEPA, the WQOs for waters of the United States (generally surface waters) become State water quality standards.

USEPA has established water quality criteria in California for priority pollutants in the National Toxics Rule and the California Toxics Rule (CTR). The CTR criteria are also water quality standards.

EFFLUENT LIMITATIONS

NPDES permits for discharges to surface waters must meet all applicable provisions of sections 301 and 402 of the CWA. These provisions require controls that utilize best available technology economically achievable (BAT), best conventional pollutant control technology (BCT), and any more stringent controls necessary to reduce pollutant discharge and meet water quality standards.

Title 40, CFR section 122.44 states that if a discharge causes, has the reasonable potential to cause, or contributes to an excursion (Reasonable Potential) of a numeric or narrative water quality criterion, the permitting authority must develop effluent limits as necessary to meet water quality standards. Title 40, CFR section 122.44(k)(3) allows these effluent limits to be requirements to implement BMPs if numeric effluent limits are infeasible. It is infeasible for the State Board to establish numeric effluent limitations for pollutants in discharges associated with aquatic pesticide applications because:

1. The discharge of aquatic pesticides is not considered a discharge of pollutants according to the Talent decision. The discharge of pollutants occurs within the receiving waters after the pesticide has accomplished its purpose and becomes a residue. At what point this happens is not precisely known and varies depending on such things as target weed or pest, water chemistry, and flow. Therefore, in the application of aquatic pesticides, the exact effluent is unknown;
2. It would be impractical to treat the numerous short duration intermittent pesticide releases to surface waters from many different locations; and
3. Treatment, in many cases, may render the pesticide useless for aquatic weed and pest control.

Therefore, the effluent limitations contained in this General Permit are narrative and include requirements to develop and implement an APAP that describes appropriate BMPs, including compliance with all pesticide label instructions.

The BMPs required herein constitute BAT and BCT and will be implemented to minimize the areal extent and duration of impacts caused by the discharge of aquatic pesticides in the Treatment Area

and to allow for full restoration of water quality and protection of beneficial uses¹⁰ of the receiving waters both inside and outside the Treatment Area following completion of a resource or pest management event.

RECEIVING WATER LIMITATIONS

During an application event, the aquatic pesticide is at a sufficient concentration to actively kill or control target weeds and pests. When active ingredient concentrations are below this effective concentration, the aquatic pesticide becomes a residue. The minimum effective concentration, and the time required to reach it, vary due to site specific conditions, such as flow, target species, and water chemistry. The residues from an event are the pollutants regulated by this General Permit. The Receiving Water Limitations require that an event does not result in an exceedance of water quality standards:

1. Outside of the Treatment Area at any time, or
2. Anywhere in the receiving water (i.e., inside and outside the Treatment Area) anytime after completion of the event.

In recognition of the variability in the temporal extent of an event, this General Permit does not require it to be discretely defined. Instead, post-event monitoring of the water is required no more than a week from the time of aquatic pesticide application.

For those Control Agencies that have been granted a section 5.3 exception, the event may result in "short-term or seasonal" exceedance of water quality standards for priority pollutants inside and outside the Treatment Area. Again, there is no discrete definition of short-term but the intent is to allow the exception to apply for some period of time, such as the summer months (June, July, and August) and in some years extending through September due to weather. We do not intend for the exception to apply all year.

The Control Agency may apply aquatic pesticides longer than would be considered short-term or seasonal. However, it must demonstrate that exceedances of priority pollutant standards occur only during the defined short-term or season. It is up to the discharger to make this demonstration.

To protect all designated beneficial uses of the receiving water, the most protective (lowest) and appropriate (to implement the CTR criteria and WQOs in the *Water Quality Control Plans*) limit should be selected as the water quality limit for a particular water body and constituent.

Below are brief descriptions of the active ingredients covered by this General Permit.

¹⁰ Water bodies that do not expressly have designated beneficial uses are assigned the beneficial uses of the water body they are tributary to.

2,4-D

Applications of 2,4-D-based aquatic pesticides are used to control broad-leaved aquatic weeds, as well as water hyacinth. The recommended application method is the use of a portable spreader that can uniformly apply product to aquatic weeds.

The California Department of Health Services (DHS) and USEPA have promulgated a Primary Maximum Contaminant Level (MCL) of 70 µg/L for 2,4-D that is applicable for drinking water sources, or water bodies with a domestic or municipal supply (MUN) designation. This General Permit requires compliance with the Primary MCL for discharges to water bodies with MUN designation. The receiving water limitation for discharge of 2,4-D to water bodies with MUN designation is 70 µg/L.

Acrolein

Acrolein-based aquatic pesticides are used to control submerged and floating vegetation. Application is accomplished by directly injecting the acrolein-based pesticides into flowing water.

Acrolein is a priority pollutant, and its criteria are specified in Table (b)(1) of the CTR. Criteria are established for human consumption of water and organisms (320 µg/L)¹¹ and only organisms (780 µg/L)¹². The maximum recommended concentration of acrolein for the control of submerged or surface dwelling target species¹³ is 15,000 µg/L.

Acrolein is recommended to be applied at a concentration that is greater than the CTR criteria or applicable WQOs.¹⁴ Therefore, there would be a Reasonable Potential for aquatic pesticide applications to cause residue concentrations to exceed the CTR criteria or WQOs.

Regional Board Basin Plans contain narrative criteria prohibiting discharges from causing toxicity in receiving waters. USEPA found acute and chronic toxic effects to freshwater organisms at 68 µg/L and 21 µg/L, respectively.¹⁵ The Lowest Observed Effect Levels (LOELs) of 68 mg/L and 21 µg/L were determined from toxicity testing to freshwater organisms. Therefore, in order to protect freshwater aquatic life from toxic effects resulting from acrolein-based aquatic pesticide residue, this General Permit requires that receiving water residue of acrolein be less than the chronic 21 µg/L LOEL.

¹¹ These criteria apply to waters of the Sacramento-San Joaquin Delta and other waters of the State defined as inland waters that include a municipal use (MUN) use designation.

¹² These criteria apply to waters of the State defined as bays and estuaries including San Francisco Bay upstream to and including Suisan Bay and the Sacramento-San Joaquin Delta; and waters of the State defined as inland waters without an MUN use designation.

¹³ Acrolein safety manual.

¹⁴ Acrolein could be applied in a concentration much higher than CTR criteria or WQOs, which could in turn cause residue concentrations to exceed the criteria.

¹⁵ USEPA Goldbook, 1986.

This General Permit requires that:

- 1) Acrolein residue, resulting from applications to inland surface waters, bays, and estuaries with uses of water that support warm and cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates (designation WARM and COLD), be less than 21 µg/L;
- 2) Acrolein residue, resulting from applications to inland surface waters, bays, and estuaries with a MUN designation, be less than 320 µg/L; and
- 3) Acrolein residue, resulting from applications to inland surface waters, bays, and estuaries without a MUN or warm and cold designation, be less than 780 µg/L.

CTR criteria have been assigned as receiving water limitations in this case because the concern is with aquatic pesticide residue, not the application concentrations.

Copper

Copper-based aquatic pesticides are used to control algal and aquatic plant growth. There are many different formulations, and application methods vary from pitching water-soluble tablets to direct injection of copper-based liquid products.

Copper-based aquatic pesticide labels recommend applications of copper of up to 1,000 µg/L. Applicable water quality criteria for fresh and salt water, discussed below, are less than 1,000 µg/L. As described above for acrolein, limitations are required for discharges that have the Reasonable Potential to cause an exceedance of applicable criteria or WQOs.

Copper is a priority pollutant and the criteria for dissolved copper are specified in Table (b)(1) of the CTR. Criteria are established for maximum and continuous discharges in fresh and salt water. Conversion factors were also used to convert dissolved copper limitations to the total copper limitations assigned in this General Permit. The continuous or chronic criterion has been chosen in this case because it is the most protective considering that in many cases aquatic pesticides are applied several times per season and the limitation is for pesticide residue in receiving waters.

Freshwater copper criteria need to be adjusted for water hardness and may significantly differ from one irrigation system to another. It is necessary to specify a range of total copper limitations in this General Permit because of the possible variations in freshwater hardness statewide. The total copper limitation will be calculated using the following equation:

$$\text{Maximum Residual Total Copper Concentration} = \exp[0.8545(\ln(\text{hardness}) - 1.702)]$$

Table 1 of Attachment D gives a range of total copper receiving water limitations, calculated using the above equation. Receiving water hardness will be rounded to the nearest Table 1 value

to determine applicable total copper receiving water limitations.

Diquat

Diquat-based aquatic pesticides are used to control aquatic weeds. Diquat is a quick-acting contact pesticide, causing injury only to the parts of the plant to which it is applied.

Regional Board Basin Plans contain narrative criteria prohibiting discharges from causing toxicity in receiving waters. The Office of Environmental Health Hazard Assessment (OEHHA) has adopted a Public Health Goal (PHG) of 15 µg/L for diquat that is applicable for drinking water sources or water bodies with an MUN designation. PHGs represent levels of contaminants in drinking water that would pose no significant health risk to individuals consuming the water on a daily basis over a lifetime. In addition, the USEPA National Ambient Water Quality Criteria for Freshwater Aquatic Life Protection specifies an instantaneous maximum of 0.5 µg/L. Therefore, to prevent receiving waters with an MUN designation and WARM and COLD designation from toxicity due to the use of diquat-based aquatic pesticides, this General Permit requires compliance with OEHHA's PHGs and USEPA's water quality criteria for freshwater aquatic life protection for discharges to water bodies with MUN designation. The receiving water limitation for discharges of diquat to water bodies with MUN designation and WARM and COLD designation are 15 µg/L and 0.5 µg/L, respectively.

Endothall

Endothall-based aquatic pesticides are used to control a variety of aquatic weeds. USEPA has promulgated a Primary MCL of 100 µg/L for endothall that is applicable for drinking water sources or water bodies with an MUN designation. This General Permit requires compliance with USEPA Primary MCLs for discharges to water bodies with MUN designation. Therefore, the receiving water limitation for discharge of endothall to water bodies with MUN designation is 100 µg/L.

Fluridone

Fluridone is a systemic herbicide that kills the entire plant and is generally non-selective, which means most submersed plants and some floating leaved plants will be killed by fluridone during the treatment. USEPA has a reference dose as a drinking water level of 560 µg/L. This General Permit requires compliance with USEPA's reference dose of 560 µg/L for discharges to water bodies with MUN designation. Therefore, the receiving water limitations for discharge of fluridone to water bodies with MUN designation is 560 µg/L.

Glyphosate

Glyphosate-based aquatic pesticides are used to control emergent foliage of aquatic weeds. Glyphosate-based aquatic pesticides are ineffective on submerged or mostly submerged foliage. USEPA has promulgated a Primary MCL of 700 µg/L for glyphosate that is applicable for drinking water sources or water bodies with an MUN designation. This General Permit requires

compliance with USEPA Primary MCLs for discharges to water bodies with MUN designation. Therefore, the receiving water limitation for discharge of glyphosate to water bodies with MUN designation is 700 µg/L.

Rotenone

Rotenone-based aquatic pesticides are used to control fish. Rotenone inhibits the ability of fish to use oxygen.

Regional Board Basin Plans contain narrative criteria prohibiting discharges from causing toxicity in receiving waters. USEPA, in their Integrated Risk Information System (IRIS), established a reference dose of 28 µg/L for rotenone. Reference doses are calculated as safe exposure levels for non-cancer health effects, based on standard exposure assumptions, including 70 kg body weight, 2 liters per day water consumption rate and a relative source contribution from drinking water of 20 percent. In order to protect drinking water, the receiving water limitation in this General Permit for rotenone for waters with MUN designation is 28 µg/L.

CEQA EXEMPTION

Pursuant to California Water Code (Water Code) section 13389, Regional Boards are exempt from the requirement to comply with Chapter 3, Division 13 of the Public Resources Code when adopting NPDES permits.

POLICY EXCEPTION

The Policy contains implementation provisions for water quality standards. The Policy provides that categorical exceptions may be granted to allow short-term or seasonal exceptions from meeting the priority pollutant criteria/objectives if "necessary to implement control measures ... for resource or pest management... conducted by public entities to fulfill statutory requirements." The Policy specifically refers to vector or weed control, and pest and fishery management as bases for categorical exceptions. The exceptions are available only to public entities that have adequately provided the following, as listed in the Policy:

1. CEQA documentation including notifying potentially affected public and government agencies;
2. A detailed description of the proposed action which includes the proposed method of completing the action;
3. A time schedule;
4. A discharge and receiving water monitoring plan that specifies monitoring prior to application events, during application events, and after completion with the appropriate quality control procedures; and
5. Any necessary contingency plans.

The State Board requested in a letter dated August 6, 2003 that aquatic pesticide users who seek exceptions provide the above information. All the above information, except the monitoring

plan, must have been submitted to the State Board prior to the adoption of this General Permit for public entities to obtain a section 5.3 exception.

The public entities listed in Attachment E have prepared Initial Studies, Negative Declaration (ND), and Notices of determination or Mitigated Negative Declarations (MND) for the discharge of aquatic pesticides in accordance with the California Environmental Quality Act [CEQA (Public Resources Code Section 21000 et seq.))] to comply with the exception requirements of section 5.3 of the policy. The boards of each public entity, as the lead agencies under CEQA, approved the Final ND/MND and determined that the discharge of aquatic pesticides in their respective projects would not have significant effect on the environment. Those public entities have determined that the water quality or related water quality impacts identified in the environmental assessments of the ND/MND are less than significant. The boards of each public entity, as the lead agencies under CEQA, approved the Final ND/MND and are not required to meet priority pollutant criteria until after completion of the application event.

As required in section 15096 of the CEQA Guidelines, the State Board, as Responsible Agency under CEQA, considered the ND/MND approved by the board of each public entity and finds that the projects will have less than significant water quality impact if the waste discharge requirements in this General permit are followed. Accordingly, the public entities listed in Attachment E are hereby granted an exception pursuant to section 5.3 of the policy.

Aquatic pesticide users not listed in Attachment E are required to meet all applicable priority pollutant criteria in receiving waters outside the Treatment Area during treatment and inside and outside the Treatment Area after the treatment, consistent with applicable federal and State regulations.

The California Department of Food and Agriculture (CDFA) has determined that its ongoing projects to eradicate hydrilla are exempt from the requirements of CEQA because the activities are necessary to prevent or mitigate an emergency pursuant to Public Resources Code Section 21080 (b)(4). The bases for this determination are that the CDFA Hydrilla Program is mandated under sections 403 and 6048 of the Food and Agriculture Code and the Governor and/or the CDFA Secretary has declared that an emergency situation existed as each eradication project began. Although CDFA has determined the CDFA Hydrilla Program is exempt from CEQA, CDFA will coordinate all eradication activities with federal, state and local regulatory agencies to ensure no long-term significant environmental impacts occur.

As required in Section 15096 of the CEQA Guidelines, the State Board, as a Responsible Agency under CEQA, considered the exemption claimed by CDFA and finds that the projects will have less than significant water quality impact if the waste discharge requirements in this General Permit are followed. Accordingly, CDFA is hereby granted an exception pursuant to section 5.3 of the Policy, as long as the Governor or the CDFA Secretary has declared that an emergency situation exists prior to project implementation.

BMPs

The development of BMPs provides the flexibility necessary to establish controls to minimize the areal extent and duration of impacts caused by the discharge of aquatic pesticides. This flexibility allows dischargers to implement different BMPs for different types of applications and different types of waters.

Many of the label directions constitute BMPs to protect water quality and beneficial uses. Label directions may include: precautionary statements regarding toxicity and environmental hazards; directions for proper handling, dosage, application, and disposal practices; prohibited activities; spill prevention and response measures; and restrictions on type of water body and flow conditions.

Other BMPs may be appropriate. For example, using an integrated pest management strategy and using less harmful alternatives may be appropriate BMPs. Dischargers are required to consider alternative control measures to determine if there are feasible alternatives to the selected aquatic pesticide application event that could reduce potential water quality impacts. If the discharger identifies alternative control measures to the selected aquatic pesticide application event that could reduce potential water quality impacts and that are also feasible, practicable, and cost-effective, the discharger shall implement the identified alternative measures. These BMPs must be described in the discharger prepared APAP. The APAP shall describe application procedures including, but not limited to, such things as, how to determine application is necessary, gate closure procedures (if applicable), allowable weather conditions, allowable flow conditions, etc.

MONITORING REQUIREMENTS

This General Permit requires that dischargers comply with the Monitoring and Reporting Program (MRP), Attachment B of this General Permit.

The goal of the MRP is to assess the effectiveness of BMPs and determine compliance with the receiving water limitations specified in this General Permit. The MRP requires dischargers to choose one representative site for each type of aquatic pesticide used. Each representative site will be monitored for the active ingredient and other water quality parameters before, immediately after, and one week after each treatment. Toxicity monitoring is required with application of copper and rotenone-based aquatic pesticides. Dischargers must sample at least 20 percent of application events.

The MRP provided by this General Permit is considered baseline monitoring. Monitoring plans proposed by entities receiving a section 5.3. exception as a mitigation measure must also comply with that monitoring plan proposed in their CEQA document where the two plans differ.

The APMP, conducted by SFEI as an outcome of the settlement agreement, evaluated the toxicity of the 2,4-D, acrolein, copper, diquat, fluridone, glyphosate, and triclopyr. The APMP report states that no toxicity was found with the use of 2,4-D, glyphosate, and triclopyr; toxicity testing is not possible with acrolein due to its rapid breakdown and volatility; results were

inconclusive for diquat and fluridone; and toxicity in copper-based applications was confirmed. Additionally, during the prior permit term, there were no incidents to suggest that toxicity testing is warranted. Therefore, rotenone (because it was not part of the SFEI study) and copper-based pesticides are the only ones that require toxicity testing. However, all dischargers are required to conduct visual, physical, and chemical monitoring of all Treatment Areas and keep a log of these monitoring events during the first application and 20 percent of application events thereafter. In addition sediment testing is required for copper-based applications once during the season; participation in a bioassessment program is also required. If there are signs of water quality problems, such as through those inspections, the State or Regional Board may require toxicity monitoring.

As suggested by SFEI, the monitoring program requires water quality monitoring for the active ingredient as well as other indicator parameters.

PERMIT RE-OPENERS

This General Permit contains a re-opener provision that allows the General Permit to be re-opened for the specific purpose of adding agencies that have adequately met the Policy's exception criteria. Alternatively, General Permit users may file for an individual permit with the appropriate Regional Board.

The re-opener provision also allows for additional aquatic pesticides to be added to those authorized by this General Permit.

STATE WATER RESOURCES CONTROL BOARD

WASTE DISCHARGE REQUIREMENTS

WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR
AQUATIC WEED AND PEST CONTROL IN WATERS OF THE UNITED STATES

GENERAL PERMIT NO. CAG _____

The State Water Resources Control Board (hereafter State Board) finds that:

1. States may request authority to issue general National Pollutant Discharge Elimination System (NPDES) permits pursuant to Title 40, Code of Federal Regulations (CFR) section 122.28. On June 8, 1989, the State Board submitted an application to the U.S. Environmental Protection Agency (USEPA) requesting revisions to its NPDES program in accordance with 40 CFR sections 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES program. On September 22, 1989, the USEPA, Region 9, approved the State Board's request and granted authorization for the State to issue general NPDES permits.
2. Federal regulation at 40 CFR section 122.28(a)(1) allows NPDES permits to be written to cover a category of discharges within State political boundaries.
3. According to 40 CFR Section 121.1(b)(1), point source discharges pollutants to waters of the United States are authorized only when they are in accordance with an NPDES Permit.
4. In order to manage resources and protect beneficial uses, many agencies use aquatic pesticides to control aquatic weeds and pests.
5. On March 12, 2001, the Ninth Circuit Court of Appeals held that discharges of pollutants from the use of aquatic pesticides in waters of the United States require coverage under an NPDES permit (Headwaters, Inc. v. Talent Irrigation District¹).
6. Because of the serious public health, safety, and economic implications of delaying pesticide applications, the State Board adopted Water Quality Order (Order) No. 2001-12-DWQ, Statewide General NPDES Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States, on an emergency basis to provide immediate NPDES permit coverage for broad categories of aquatic pesticide use in California.

¹ Headwaters, Inc. v. Talent Irrigation District, (9th Cir. 2001) 243 F.3d 526.

7. In August 2001, Waterkeepers Northern California (Waterkeepers) filed a lawsuit against the State Board challenging several aspects of Order No. 2001-12-DWQ. Major aspects of the challenge included the emergency adoption of the Order without compliance with the California Environmental Quality Act (CEQA) and other exception requirements of the State Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Policy); failure to address cumulative impacts; and failure to comply with the California Toxics Rule (CTR).
8. In a settlement with the Waterkeepers' lawsuit, the State Board agreed to fund a comprehensive aquatic pesticide monitoring program (APMP) that would assess receiving water toxicity caused by aquatic pesticide residues. Available data from the APMP were used to develop the terms and conditions of this General Permit.
9. The results of the APMP show that no toxicity was found with the use of 2,4-D, glyphosate, and triclopyr; toxicity testing is not possible with acrolein due to its rapid breakdown and volatilization; toxicity effects were inconclusive for diquat and fluridone; and toxicity in copper-based applications was confirmed.
10. This General Permit is intended to cover the discharge of residue due to the application of 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, and rotenone-based aquatic pesticides to surface waters associated with controlling aquatic weeds pests. Triclopyr is currently going through the registration process at the California Department of Pesticide Regulation (DPR). After registration, triclopyr will be covered by this General Permit.
11. Pesticide formulations may include "active ingredients"² and "inert ingredients"³. Adjuvants⁴ may be added to the active ingredients in the application equipment that is used in the delivery of the pesticide. Adjuvants are regulated as pesticides in California.
12. For the purposes of this General Permit, aquatic pesticides that persist in the water body (residue) or breakdown products that persist in the water body (residue) after the completion of treatment are considered pollutants. The discharge of these pollutants is a threat to the beneficial uses of receiving waters and is regulated by this General Permit.
13. The aquatic pesticides covered by this General Permit are applied directly into the water body and/or directly to organisms in the water or on the water surface with the intent of killing the target aquatic organisms. The impacts of these chemicals may not be limited to the target organisms—other plants and aquatic life in the Treatment Area⁵ may be impacted.

² Active ingredients are manufacturer disclosed ingredients that yield toxic effects on target organisms.

³ Inert ingredients are additional ingredients that are not toxic to target organisms. These ingredients are trade secrets and therefore not disclosed by the manufacturer.

⁴ Adjuvants are ingredients that are added to aquatic pesticides during a treatment event. These ingredients are chosen by the discharger, based on site characteristics, and typically increase the effectiveness of aquatic pesticides on target organisms.

⁵ The Treatment Area is the area that is treated for aquatic weeds and pests.

Due to water movement at the treatment locations, residual pesticides can be carried to adjacent areas while concentrations in the water are still high enough to cause adverse impacts not only to aquatic organisms but also to other beneficial uses such as irrigation, municipal water supplies, and recreation (such as swimming).

14. As part of the pesticide registration process of pesticides for use in California, USEPA and DPR evaluate data submitted by registrants to ensure that a product used according to label instructions will cause no harm or adverse impact on non-target organisms that cannot be reduced or mitigated with protective measures or use restrictions. While DPR conducts these test, it does not require or conduct Compliance Monitoring.
15. DPR and the County Agricultural Commissioners (CACs) regulate the sale and use of pesticides in California. The use of pesticides must be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) pesticide label instructions. If applying a pesticide designated as a restricted material, applicators must either be licensed by DPR with a Qualified Applicator Certificate or work under the supervision of someone who is licensed and obtain Use Permits from CACs. For the use of aquatic pesticides, a Qualified Applicator Certificate with the category "aquatic" is required, and their use must be reported to the CACs where required by law or by agreement with DPR.
16. DPR regulates the use of pesticide-treated commodities and sites where needed to ensure that pesticide residues or breakdown products do not pose a hazard to human health or the environment. DPR also regulates the use of pesticides to reduce the release of residues from treated sites. This includes regulation of wastes generated by applications not in accordance with all laws and regulations, including drift from applications.
17. Under this General Permit, aquatic pesticide discharges require minimal or no treatment systems to meet limits and pose no significant threat to water quality. As such, they are eligible for Category 3 in section 2200(b)(9) of Title 23, California Code of Regulations (CCR). This category is appropriate because aquatic pesticide applications incorporate Best Management Practices (BMPs) to control potential impacts to beneficial uses, and this General Permit prohibits aquatic pesticide residue from causing exceedance of CTR criteria or water quality objectives. The annual fee associated with this rating can be found in section 2200(b)(9) of Title 23, CCR.
18. Section 122.44(k) of 40 CFR allows effluent limits to be in the form of BMP requirements, if numeric effluent limits are infeasible. Following USEPA label instructions and any other applicable use permit restrictions are BMPs. This General Permit also requires dischargers to implement other BMPs, such as considering less toxic methods of controlling aquatic weeds.
19. This General Permit requires submittal of a Notice of Intent to Comply with the Terms of this General Permit (NOI).

20. If the area of aquatic pesticide application extends beyond a Regional Water Quality Control Board (Regional Board) boundary, discharges in each Regional Board shall be covered by a separate Notice of Intent (NOI) under this General Permit. Only one annual fee must be submitted to the State Board.
21. Although a discharge may be eligible for coverage under this General Permit, the appropriate Regional Board may determine that the discharge must be regulated under an individual permit or a different general NPDES permit. If an individual or another general NPDES permit is issued for a discharge, then the applicability of this General Permit to the discharge is immediately terminated on the effective date of the other permit.
22. The State Board has considered antidegradation pursuant to 40 CFR section 131.12 and State Board Resolution No. 68-16. Discharges must be consistent with both State and federal antidegradation policies. The conditions of this General Permit require aquatic pesticide discharges to meet applicable water quality objectives. Waters of exceptional quality may be degraded due to the application of aquatic pesticides, while it would only be temporary and in the best interest of the people of the State. The nature of aquatic pesticides is to be toxic in order to protect beneficial uses such as municipal and agricultural supply, recreation, and human health (preventing floods by maintaining capacity in flood control channels). However, compliance with receiving water limitations must be maintained. Therefore, this General Permit is consistent with State and federal antidegradation policies.
23. There may be other non-toxic or less toxic control measures available to minimize the discharge of wastes to waters of the State. This General Permit requires dischargers to evaluate BMPs that may include alternative control options, procedures to determine that water quality impacts have been minimized, and a determination that there are no feasible alternatives to the selected resource or pest management measures.
24. The State Board, in establishing the requirements contained herein, considered factors including, but not limited to, the following:
 - a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose;
 - b. Other waste discharges;
 - c. Past, present, and probable future beneficial uses of the waters under consideration;
 - d. Environmental characteristics of the waters under consideration;
 - e. Economic considerations;
 - f. The need to maintain conveyance facilities to provide water supplies for municipal, irrigation, and industrial purposes; and
 - g. Seasonal and weather conditions that require timely implementation of control measures.
25. The designated beneficial uses of surface waters throughout the State may include domestic or municipal, industrial, and agricultural supply; water contact and non-contact recreation; navigation; ground water recharge; fresh water replenishment; hydropower generation; wildlife habitat; cold freshwater and warm freshwater habitat; fish migration and fish

spawning; marine habitat; estuarine habitat; shellfish harvesting; ocean commercial and sport fishing; preservation of areas of special biological significance; and preservation of rare and endangered species. To the extent that the applicable Regional Board Water Quality Control Plan (Basin Plan) designates additional or different beneficial uses, the Basin Plan shall govern.

26. USEPA establishes water quality criteria for Priority Pollutants in the National Toxics Rule and the CTR, and Regional Boards establish water quality objectives for Priority Pollutants in Basin Plans. The State Board's Policy went into effect on May 22, 2000 and generally requires limitations for all constituents that will cause, have the reasonable potential to cause, or contribute to toxicity in receiving waters.
27. Section 5.3 of the Policy provides that the State Board may allow short-term or seasonal categorical exceptions from meeting the Priority Pollutant criteria/objectives if it is determined to be necessary to implement control measures for resource or pest management conducted by public entities to fulfill statutory requirements, including, but not limited to, those in the California Fish and Game, Food and Agriculture, Health and Safety, and Harbors and Navigation codes. Section 5.3 requires that the provisions of CEQA are satisfied and, dischargers provide specific discharge information before an exception may be granted.
28. Because of the emergency nature of Order No. 2001-12-DWQ, many of the actions that would normally occur prior to issuance of a permit granting a section 5.3 categorical exception to Priority Pollutant objectives/criteria had not yet occurred. Therefore, Order No. 2001-12-DWQ was issued as a limited-term permit, which will expire on January 31, 2004. During the term of the Order No. 2001-12-DWQ, the public entities subject to this General Permit were to complete necessary CEQA documents and prepare other submittals to satisfy the criteria for the categorical exception.
29. The State Board has received CEQA documentation and all other information required for a section 5.3 exception from public entities listed in Attachment E to this General Permit. This General Permit grants the public entities listed in Attachment E a section 5.3 categorical exception from meeting Priority Pollutant criteria for short-term or seasonal time frames. This General Permit does not grant remaining enrollees a section 5.3 exception of the Policy.
30. This General Permit may be re-opened to modify Attachment E if additional entities qualify for a section 5.3 exception. This General Permit may also be re-opened if additional aquatic pesticides are registered by DPR.
31. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA (Public Resources Code section 21100, et seq.), in accordance with section 13389 of the California Water Code.
32. The State Board has notified interested agencies and persons of its intent to prescribe waste discharge requirements in this General Permit and has provided them with an opportunity to submit comments.

33. The State Board, in a public hearing, heard and considered all comments pertaining to the discharges to be regulated by this General Permit.
34. This Order shall serve as an NPDES permit pursuant to section 402 of the Clean Water Act and amendments thereto and shall take effect upon the date of adoption.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following:

A. Application Requirements:

Dischargers that apply 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, and rotenone and triclopyr (after DPR registration)-based aquatic pesticides to waters of the United States are eligible for coverage under this General Permit provided:

1. The discharger submits to the appropriate Regional Board a complete and accurate NOI form (Attachment A), vicinity map, and an annual fee (for first-time enrollees) to cover all discharges by that discharger within the boundaries of each Regional Board, as defined in section 13200 of the California Water Code. The NOI must be signed in accordance with the signatory requirements of Standard Provision B.
2. The discharger, upon request, submits any additional information which the State or Regional Board determines is necessary in order to ascertain whether the discharge meets the criteria for coverage under this General Permit.
3. The discharger does not receive a written Notice of Exclusion (NOE) from the Regional Board. The discharger's authority to discharge under this General Permit terminates upon receipt of an NOE.
4. The discharger is not covered by this General Permit until covered by an individual or other general NPDES permit regulating the discharge of aquatic pesticides.

B. Effluent Limitations:

1. The discharge of wastes other than as described in this General Permit is prohibited, unless authorized by a separate permit.
2. The discharge of wastes shall not cause or contribute to conditions of nuisance or pollution.
3. The discharge shall not cause or contribute to long-term adverse impacts on beneficial uses of waters of the United States.

4. The discharger shall apply pesticides in accordance with the developed Aquatic Pesticides Application Plan (APAP), as described in section D.4.

C. Receiving Water Limitations:

1. Discharge of treated water from the Treatment Area shall not exceed the following limitations.
 - a. All Aquatic Pesticide Applications:

Parameter	Limitation
Chronic Toxicity	Aquatic pesticide applications shall not cause or contribute to toxicity in receiving waters.

- b. Acrolein-Based Aquatic Pesticide Applications:

Beneficial Use Designation	Limitation	Reference
WARM and COLD	21 µg/L	USEPA National Ambient Water Quality Criteria for Freshwater Aquatic Life Protection, Lowest Observed Effect Level (LOEL)
MUN	320 µg/L	CTR
Other than WARM, COLD, or MUN	780 µg/L	CTR

- c. Copper-Based Aquatic Pesticide Applications⁶:
Discharges shall meet the appropriate limitation based on receiving water hardness, as described in Attachment D to this General Permit.
 - d. Other Aquatic Pesticide Discharges to Waters with MUN Designation:

Constituent	Limitation	Reference
2,4-D	70 µg/L	California Department of Health Services and USEPA Primary Maximum Contaminant Level (MCL)
Diquat	15 µg/L	Office of Environmental Health Hazard Assessment (OEHHA) Public Health Goal
Endothall	100 µg/L	California Department of Health Services and USEPA Primary MCL

⁶Public entities listed in attachment E are not required to meet this limitation in receiving waters during treatment.

Constituent	Limitation	Reference
Fluridone	560 µg/L	USEPA IRIS Reference Dose as a Drinking Water Level
Glyphosate	700 µg/L	California Department of Health Services and USEPA Primary MCL
Rotenone	28 µg/L	USEPA IRIS Reference Dose as a Drinking Water Level

- Discharges shall not cause or contribute to an exceedance of any CTR criteria or applicable water quality objective in a State or Regional Board Basin Plan outside the Treatment Area during the application event and in the receiving water after the completion of the event.

D. Aquatic Pesticide Use Requirements:

- License Requirements.** Dischargers must be licensed by DPR if such licensing is required for the aquatic pesticide application project.⁷ The pesticide use must be consistent with FIFRA pesticide label instructions and any Use Permits issued by CACs.
- Application Schedule.** When requested, the discharger shall provide a phone number to persons interested in the discharger's application schedule. The discharger shall provide the requester with the most current application schedule and inform the requester if the schedule is subject to change.
- Public Notice Requirements.** Every calendar year, prior to the first application of aquatic pesticides, discharger shall take steps to notify each water user within its district. The notification shall include the following information:
 - A statement of the discharger's intent to apply aquatic pesticide(s);
 - Name of pesticide(s);
 - Purpose of use;
 - General time period and locations of expected use;
 - Any water use restrictions or precautions during treatment;
 - A phone number that interested persons may call to get additional information from the discharger; and
 - A statement indicating that a water user may request that water deliveries be stopped during aquatic pesticide application.
- Aquatic Pesticides Application Plan (APAP).** The discharger shall develop an APAP that describes the BMPs that will be followed for each project. Best Management Practices (BMPs) shall be developed to mitigate effects to water quality resulting from pesticide applications. The APAP shall be revised to improve BMP effective to taking into consideration such things as water quality and visual monitoring results and target weed and pest control.

⁷ A license is required for application of a restricted material, as defined by DPR.

5. **Pesticide Application Log.** The discharger shall maintain a log for each aquatic pesticide application. The application log shall contain, at a minimum, the following information:
- a. Date of application;
 - b. Location of application;
 - c. Name of applicator;
 - d. List of gates in the Treatment Area that may discharge to surface waters;
 - e. Time of gate closure and reopening, include any calculations used to determine closure and reopening times;
 - f. Application details should include water temperature, irrigation canal total flow, time application started and stopped, and aquatic pesticide application rate and concentration;
 - g. Visual monitoring assessment ; and
 - h. Certification that applicator(s) followed the APAP.

E. Provisions:

1. **Permit Compliance.** The discharger must comply with all conditions of this General Permit including timely submittal of technical and monitoring reports as directed by the appropriate Regional Board's Executive Officer.
2. **Monitoring and Reporting.** The discharger shall comply with the provisions of the attached Monitoring and Reporting Program (MRP) contained in Attachment B to this General Permit and any revision thereto.
3. **Standard Provisions.** The discharger shall comply with all the applicable items of the Standard Provisions and Reporting for Waste Discharge Requirements (Standard Provisions), which are part of this General Permit (Attachment C).
4. **General Permit Reference.** A copy of this General Permit shall be kept where key operating personnel can refer to the document. Key operating and site management personnel shall be familiar with its contents.
5. **Monitoring Reports to USEPA.** When requested by USEPA, the discharger shall also submit Discharge Monitoring Reports to USEPA.
6. **Change of Control Agency.** In the event of any change in the Control Agency that sought coverage under this General Permit, the original Control Agency shall notify the succeeding Control Agency of the existence of this General Permit by letter, a copy of which shall be immediately forwarded to the appropriate Regional Board. Upon receipt of the letter, Regional Board staff shall terminate coverage of the original Control Agency under this General Permit. The new Control Agency shall complete and submit

to the Regional Board a revised NOI form (Attachment A) in accordance with Application A.1.

7. **Qualified Biologist Certification Following Project Completion.** Upon completion of an aquatic pesticide project, public entities listed in Attachment E to this General Permit shall provide certification by a qualified biologist that beneficial uses of receiving waters accepting aquatic pesticides have been restored.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on March 18, 2004.

AYE:

NO:

ABSENT:

ABSTAIN:

Debbie Irvin
Clerk to the Board



Terry Tamminen
California
Environmental
Protection Agency

State Water Resources Control Board



Arnold Schwarzenegger
Governor

Division of Water Quality

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DRAFT

Attachment A
to Water Quality Order
No. 2004-__-DWQ
February 10, 2004

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT
FOR DISCHARGES OF AQUATIC PESTICIDES TO SURFACE WATERS
OF THE UNITED STATES FOR MOSQUITO CONTROL
GENERAL PERMIT NO. CAG _____

I. NOTICE OF INTENT STATUS (See instructions)

MARK ONLY ONE ITEM 1. New Applicator 2. Change of Information for WDID#

II. PESTICIDE APPLICATOR INFORMATION

A. Name/Agency			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. Contact Person		H. Title	I. Phone

III. RECEIVING WATER INFORMATION

A. Do wastes and pesticide residues discharge to (check all that apply):	
1. <input type="checkbox"/>	Canals, ditches, or other constructed conveyance facilities owned and controlled by Applicant? _____
2. <input type="checkbox"/>	Other conveyance systems? – Enter owner's name: _____
B. Regional Water Quality Control Board(s) where application sites are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): REGION _____ (List all regions where pesticide application is proposed.)	
C. Name of receiving water(s): (river, lake, creek, stream, bay, ocean): _____	

IV. PESTICIDE APPLICATION INFORMATION

A. Target Organism: ___ Algae ___ Aquatic Weeds (surface) ___ Aquatic Weeds (submerged) ___ Mosquitos
 ___ OTHER (identify): _____

B. Aquatic Pesticides Used: List Name and Active ingredients: _____

C. Period of Application: Start Date _____ End Date _____

D. Types of Adjuvants Used: _____

V. VICINITY MAP AND FEE

A. Have you included vicinity map(s) with this submittal? YES NO
 Separate vicinity maps must be submitted for each Region where a proposed discharge will occur.

B. Have you included payment of the filing fee (for first-time enrollees only), with this submittal? ... YES NO

VI. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the permit, including developing and implementing a monitoring program, will be complied with."

A. Printed Name: _____

B. Signature: _____ Date: _____

C. Title: _____

VII. FORM A SUBMITTAL INFORMATION

Send the completed and signed form A along with the filing fee, supporting documentation, and vicinity map(s) to the appropriate Regional Board.

**INSTRUCTIONS
FOR COMPLETING THE NOI**

**WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FOR DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED AND PEST
CONTROL IN WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG _____**

These instructions are intended to help you, the discharger, complete the Notice of Intent (NOI) form for the general National Pollutant Discharge Elimination System (NPDES) permit. **Please type or print clearly when completing the NOI form and vicinity map(s).**

One NOI should be submitted by appropriate Control Agency to cover all proposed discharges within the boundaries of each Regional Water Quality Control Board (Regional Board). If proposed discharges will occur in more than one Region, submit extra copies of the NOI and maps for each Region where a discharge will occur. Only one annual fee is required for each Control Agency.

Section I – Notice of Intent Status

Please mark whether this is the first time coverage under this General Permit has been requested or if this is a change of information for a discharge already covered under this General Permit. If this is a change of information, please supply the eleven-digit Waste Discharge Identification (WDID) number for the discharge.

Section II – Control Agency Information

- A. Enter the name of the Control Agency.
- B. Enter the street number and street name where mail and correspondence should be sent (P.O. Box is acceptable).
- C. Enter the city that applies to the mailing address given.
- D. Enter the county that applies to the mailing address given.
- E. Enter the state that applies to the mailing address given.
- F. Enter the zip code that applies to the mailing address given.
- G. Enter the name (first and last) of the contact person for the Control Agency listed above.
- H. Enter the contact person's title.
- I. Enter the contact person's daytime telephone number of the contact person.

Section III – Receiving Water Information

- A. Check all boxes that apply. At least one box must be checked.
 1. Check this box if the application site is a canal, ditch, or other constructed conveyance system owned and controlled by the Control Agency. Print the name of the conveyance system.
 2. Check this box if the application site is a canal, ditch, or other constructed conveyance system owned and controlled by a different person or entity other than the Control Agency. Clearly print the name and the owner of the conveyance system.

3. Check this box if the application site is not a constructed conveyance system (including application to river, lake, creek, stream, bay, ocean) and enter the name of the water body.
- B. List all Region numbers where pesticide application is proposed. Regional Board boundaries are defined in section 13200 of the California Water Code. The numbers for each Region are given below and a map is attached.

- | | |
|--|--|
| 1- North Coast | 2- San Francisco Bay |
| 3- Central Coast | 4- Los Angeles |
| 5- Central Valley
(Sacramento, Fresno, Redding) | 6- Lahontan
(South Lake Tahoe, Victorville) |
| 7- Colorado River Basin | 8- Santa Ana |
| 9- San Diego | |

Section IV – Pesticide Application Information

- A. Check the appropriate target organism. If the target organism is not listed, check OTHER, and list the name or type of target organism in the space provided.
- B. List the name and active ingredients of each pesticide to be used.
- C. List the start and end date of proposed pesticide application season.
- D. List the name(s) and type(s) of adjuvants that will be used.

Section V – Aquatic Pesticides Application Plan (APAP)

An APAP must be prepared and the applicator familiar with its contents before aquatic pesticide application is authorized under this General Permit. If an APAP is not complete at the time of application, enter the date by which it will be completed.

Section VI – Notification

- A. Print the name of the appropriate official. For a municipality, State, federal, or other public agency, this would be a principal executive officer, ranking elected official, or duly authorized representative. The principal executive officer of a federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of USEPA).
- B. The person whose name is printed above must sign and date the NOI.
- C. Enter the title of the person signing the NOI.

Section VII – Vicinity Map and Fee

- A. If you have included vicinity map(s) with your Form A submittal, check the YES box if you have not included the vicinity map(s), check the NO box. **NOTE:** Vicinity map(s) of the proposed pesticide application site must be received before you can be covered by this General Permit. You must submit separate vicinity map(s) for each Regional Board service area where a discharge is proposed. If applying for coverage under Region 5, please send in two additional copies of the required map, if applying for coverage under Region 6, please send in one additional copy of the required map.

- B. Check the YES box if you have included payment of the annual fee for a Category 3 discharge specified in Title 23, California Code of Regulations, section 2200(b)(9) with your submittal. Check the NO box if you have not included this payment.

- NOTE:**
1. Payment of this fee is not necessary if you have paid an annual fee within the last year for coverage under the previous order, Order No. 2001-12-DWQ.
 2. You will be billed annually and payment is required to continue coverage.

STATE WATER RESOURCES CONTROL BOARD
MONITORING AND REPORTING PROGRAM (MRP)

WATER QUALITY ORDER NO 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM PERMIT FOR DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED
AND PEST CONTROL IN WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG _____

A. MONITORING PROVISIONS

1. **Sampling Procedures.** Unless otherwise approved by the appropriate Regional Water Quality Control Board (Regional Board) Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services. All analyses shall be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (Guidelines), promulgated by the U.S. Environmental Protection Agency (USEPA).
2. **Monitoring Frequency.** If the discharger monitors any constituent more frequently than required by this General Permit, the monitoring results shall be submitted to the appropriate Regional Board.
3. **Retention of Records.** The discharger shall retain records of all monitoring information including all calibration and maintenance records, copies of all reports required by this General Permit, and records of all data used to complete the application for this General Permit. Records shall be maintained for a minimum of three years from the date of the sampling, measurement, or report. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the appropriate Regional Board Executive Officer.
4. **Monitoring Records.** Records of monitoring information shall include the following:
 - a. The date, exact place, and time of sampling or measurements;
 - b. The individuals who performed the sampling or measurements;
 - c. The dates analyses were performed;
 - d. The individuals who performed the analyses;
 - e. The analytical techniques or method used; and

f. The results of such analyses.

5. **Device Calibration and Maintenance.** All monitoring instruments and devices that are used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

B. RECEIVING WATER MONITORING

1. The discharger shall choose, for each type of aquatic pesticide used, one representative monitoring site for each type of site. For example, if 2,4-D-based pesticides are used only in concrete lined canals only one representative site is needed. However, if 2,4-D-based pesticides are used in both concrete lined canals and in reservoirs, two representative sites would be required.
2. The discharger shall monitor the representative site(s) during the first application event of the season and 20 percent of the application event thereafter.
3. The following monitoring is required for each sampling:
 - a. **Background Monitoring**
Background samples can be upstream at the time of the application event, or they can be at the Treatment Area, just prior to the application event.
 - b. **Event Monitoring**
Event monitoring samples shall be collected immediately adjacent to the Treatment Area, immediately after the application event.
 - c. **Post-Event Monitoring**
Post-event samples shall be collected within the Treatment Area and immediately adjacent to the Treatment Area within one week of the application event.
4. The following parameters shall be analyzed for:

TABLE 1 - MONITORING PARAMETERS

SAMPLE TYPE	CONSTITUENT/ PARAMETER	SAMPLE METHOD	LABORATORY METHOD	FREQUENCY
Visual	1. Site description (pond, lake, open waterway, channel, estimate of percent cover by vegetation, etc.) 2. Appearance of waterway (sheen, color, clarity, etc.) 3. Weather conditions (fog, rain, wind, etc.)	Visual Observation	Not Applicable	First application and 20 percent of application events thereafter.

SAMPLE TYPE	CONSTITUENT/ PARAMETER	SAMPLE METHOD	LABORATORY METHOD	FREQUENCY
Physical	1. Temperature 2. Turbidity 3. Electrical conductivity/salinity 4. Total suspended solids	Grab	See USEPA Guidelines	First application and 20 percent of application events thereafter.
Chemical	1. Active Ingredient 2. pH 3. Dissolved Oxygen 4. Hardness (CaCO ₃) 5. Ammonia 6. Nitrate 7. Total Kjeldahl Nitrogen 8. Total Organic Carbon	Composite ¹	See USEPA Guidelines	First application and 20 percent of application events thereafter.
Toxicity	See Section C.	See Section C.	See Section C.	See Section C.
Sediment Toxicity	See Section D.	See Section D.	See Section D.	See Section D.
Bio-assessment	See Section E.	See Section E.	See Section E.	See Section E.

C. CHRONIC TOXICITY MONITORING FOR COPPER-BASED AND ROTENONE-BASED PESTICIDES ONLY

The discharger shall conduct freshwater or saltwater chronic toxicity tests on grab samples taken from receiving water sample locations specified in this MRP.

1. Freshwater

For receiving waters in which the salinity is equal to or less than 1 part per thousand 95 percent or more of the time (freshwater):

- a. The discharger shall conduct short-term tests with Cladoceran, water flea, *Ceriodaphnia dubia* (survival and reproduction test); fathead minnow, *Pimephales promelas* (larval survival and growth test); and green alga, *Selanastrum capricornutum* (growth test) for the first test for each aquatic pesticide formulation used (screening period). After this screening period, monitoring shall be conducted using the most sensitive species, specific to each aquatic pesticide formulation.

¹ The samples shall be composites, using three equal volumes of water, each collected one foot below the surface, or mid-depth if water body is less than two feet deep.

- b. The presence of chronic toxicity in freshwater shall be estimated as specified in USEPA's methods, (EPA/821-R-02-013).

2. Saltwater

For waters in which the salinity is greater than 1 part per thousand 95 percent or more of the time:

- a. Chronic toxicity testing shall be conducted with *Macrocystis pyrifera* (giant kelp), *Haliotis rufescens* (red abalone), and *Atherinops affinis* (topsmelt), for the first test for each aquatic pesticide formulation used (screening period). After this screening period, monitoring shall be conducted using the most sensitive species specific to each aquatic pesticide formulation.
- b. The presence of chronic toxicity in saltwater shall be estimated as specified in USEPA's methods (EPA/600-R-95-136).

3. Evaluation of Receiving Water Toxicity

If chronic toxicity is detected in treated waters, and upstream or untreated waters do not exhibit chronic toxicity for a sampling event, the discharger shall begin increased toxicity monitoring as described below. If upstream untreated chronic toxicity sampling exhibits toxicity, the sampling event is inconclusive and no additional monitoring is required.

4. Increased Toxicity Monitoring

If a sample indicates that the discharge is causing receiving water chronic toxicity, as determined under section C.3 of this MRP, the discharger shall:

- a. Monitor for chronic toxicity at the next aquatic pesticide application to the site where the exceedance occurred. If toxicity is not observed, the Discharger shall continue regular monitoring as described in section B of this MRP.
- b. If the second test (toxicity test required under section C.4.a of this MRP) indicates toxicity, the following dilution series shall be initiated: 12.5, 25, 50, 75, and 100 percent. Dilution series results will be used to determine the magnitude of the toxicity and shall be submitted to the Regional Board with regularly scheduled monitoring reports under section D of this MRP or as required by the Regional Board.

Further, the discharger shall conduct a toxicity identification evaluation² (TIE) and draft and implement additional best management practices (BMPs) in order to reduce toxicity caused by aquatic pesticide applications. The discharger shall also contact the Regional

² Toxicity Identification Evaluation is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases: characterization, identification, and confirmation, using aquatic organism toxicity tests.

Board at the earliest convenience (no later than two weeks after toxicity is observed in the second test required under section C.4.a of this MRP) and report verbally or in writing that toxicity was detected and the steps that are being taken to address the toxicity.

- c. The Discharger shall continue increased monitoring for toxicity (beginning with section C.4 of this MRP) at subsequent pesticide applications, conducting TIEs, and implementing BMP modifications until toxicity is no longer observed during a sampling event, as indicated in section C.4.a of this MRP.
- d. If a Discharger's BMP modifications are ineffective and six consecutive sampling events indicate that receiving water toxicity is being caused by the Discharger, the Discharger shall conduct a toxicity reduction evaluation³ (TRE). The TRE shall be initiated within 15 days of the sixth exceedance and shall include all reasonable steps to eliminate the source of toxicity.

D. Sediment Toxicity

To address potential effects of cumulative applications in a season, sediment toxicity for pesticides which partition to sediments and can be remobilized. These pesticides include copper and triclopyr. Sediment testing shall be conducted once during each application season. Dischargers must comply with this requirement either individually or by joining with other dischargers to participate in a Regional Pesticide Monitoring Program (RPMP) or a Joint Pesticide Monitoring Program (JPMP). Geographic proximity would be not mean much if the discharger type varied greatly because of the difference in the water systems. For example, it would not make sense for Potter Valley Irrigation District to conduct joint monitoring with Lake County Food and Agriculture sampling in Clear Lake. It would make sense for Potter Valley Irrigation District to conduct joint monitoring with Solano Irrigation District as both use chelated copper in a canal system.

E. Bioassessment

The Control Agency/Discharger shall participate and coordinate with the Surface Water Ambient Monitoring Program (SWAMP) being developed by the State Water Resources Control Board (State Board) to complete this requirement. The SWAMP has begun work on a statewide effort to determine how to identify reference sites with the goal of Index of Biological Integrity (IBI) development. The Control Agency/Discharger may participate in a RPMP or JPMP to comply with this requirement.

The purpose of this requirement is to detect biological trends in receiving waters and to collect data for the development of an IBI. The ultimate goals of bioassessment are to

³ Toxicity Reduction Evaluation is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. For additional information, see Appendix 1-5 of the State Water Resources Control Board's (*Policy*).

assess the biological integrity of receiving waters, to detect biological responses to pollution, and to identify probable causes of impairment not detected by chemical and physical water quality analysis.

The Control Agency/Discharger shall participate in and coordinate with the SWAMP to identify the most appropriate locations for bioassessment stations within the Stockton Urbanized Area.

The Control Agency/Discharger shall propose a bioassessment monitoring program by July 1 2005. Sampling shall begin within 30 days of approval of the sampling stations by the Regional Board Executive Officer.

The Control Agency/Discharger shall develop Standard Operation Procedures (SOPs) for the bioassessment monitoring program that describe all procedures and responsible parties. The SOPs must contain step-by-step field, laboratory, data entry, and QA/QC procedures. A copy of the SOPs shall be available to the Executive Officer upon request.

Field sampling must conform to the SOPs established for the California Stream Bioassessment Procedure (CSBP)⁴ when appropriate. A minimum of three replicate samples shall be collected at each bioassessment station once annually during the spring flow period (when flow is present) and possibly once during the fall pending flow conditions. For sampling of aquatic environments where the CSBP is not appropriate (e.g., an estuary or unwadable stream), the California Department of Fish and Game (DFG) and the Executive Officer shall be consulted in order to determine the most appropriate protocol to be implemented. Field crews shall be trained on aspects of the protocol and appropriate safety issues. All field data and sample Chain of Custody (COC) forms must be examined for completion and errors by the field crews, the receiving laboratory, and the Control Agency/Discharger. These forms shall be available to DFG or the Executive Officer upon request.

Taxonomic identification laboratories shall process the biological samples. This consists of sub-sampling organisms, enumerating and identifying taxonomic groups and entering the information into an electronic format. There should be intra-laboratory QA/QC results for subsampling, taxonomic validation and corrective actions. Biological laboratories should also maintain reference collections, vouchered specimens (the Control Agency/Discharger can request return of their sample voucher collections) and remnant collections. Biological laboratories shall participate in an inter-laboratory (external) taxonomic validation program at a recommended level of 20% for the first two years of the program. If there are no substantial QA/QC problems, the level of external validation may be decreased to 10% in year three upon approval by the Executive Officer. External QA/QC should be arranged through the DFG's Aquatic Bioassessment Laboratory in Rancho Cordova.

⁴ California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadable Streams), California Department of Fish and Game - Aquatic Bioassessment Laboratory, May 1999. Located at www.dfg.ca.gov/cabw/protocols.html.

The following results and information shall be included in the Annual Report:

1. All physical, chemical and biological data collected in the assessment;
2. Photographs and GPS locations of all stations;
3. Documentation of quality assurance and control procedures;
4. Analysis that shall include calculation of the metrics used in the CSBP;
5. Comparison of mean biological and habitat assessment metric values between stations and year-to-year trends;
6. Electronic data formatted to the DFG Aquatic Bioassessment Laboratory for inclusion in the Statewide Access Bioassessment Database and development of an Index of Biological Integrity for the region; and
7. Copies of all QA/QC documents from laboratories.

F. ADDITIONAL MONITORING

Dischargers that propose monitoring as part of their CEQA compliance must also comply with that monitoring plan where the two plans differ.

G. REPORTING

1. All reports shall be submitted to the appropriate Regional Board. All reports submitted in response to this Order must comply with the provisions stated in "Standard Provisions and Reporting for Waste Discharge Requirements (NPDES)" (Attachment C), section B, Monitoring and Reporting Requirements.
2. Annual reports shall be submitted to the appropriate Regional Board. The reports shall contain the following information:
 - a. Summary of General Permit compliance or violation;
 - b. Identification of BMPs and a discussion of their effectiveness in meeting the General Permit requirements;
 - c. A discussion of BMP modifications addressing violations of this General Permit;
 - d. Types and amounts of aquatic pesticides used at each application event during the monitoring period;
 - e. Sampling results for all required monitoring under sections B and C of this MRP and any additional sampling conducted in compliance with section A.1 of this MRP. Sampling results shall indicate the collection date, Minimum Levels, Method Detection Limits for each constituent analysis, and a comparison with applicable water quality standards. Sampling results shall be tabulated so that they are readily discernible; and
 - f. Recommend future monitoring and BMP modifications if needed based on evaluation of BMP effectiveness, water quality monitoring results, and visual monitoring results.

G. REPORT SCHEDULE

Monitoring reports shall be submitted to the Regional Board Executive Officer in accordance with the following schedule:

<u>Reporting Frequency</u>	<u>Reporting Period</u>	<u>Report Due</u>
Annual	January 1-December 31	March 1

STATE WATER RESOURCES CONTROL BOARD
STANDARD PROVISIONS AND REPORTING FOR
WASTE DISCHARGE REQUIREMENTS

WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED AND
PEST CONTROL IN WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG_____

A. General Provisions

1. **Duty to Comply** [Title 40, Code of Federal Regulations (CFR) 122.41(a)][California Water Code (CWC) 133811]
 - a. The Discharger must comply with all of the conditions of this General Permit. Any General Permit noncompliance constitutes a violation of the Clean Water Act and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action, for permit termination, revocation and reissuance or modification, or for denial of a permit renewal application.
 - b. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not been modified to incorporate the requirement.
2. **Duty to Mitigate** [40 CFR 122.41(d)]

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

3. **Proper Operation and Maintenance** [40 CFR 122.41(e)],

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a Discharger only when necessary to achieve compliance with the conditions of this General Permit.

4. Permit Actions [40 CFR 122.41(f)][CWC 13263(e)1[40 CFR 122.44(b)(1)]

- a. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.
- b. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge, and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the Discharger so notified.

5. Property Rights [40 CFR 122.41(g)][CWC 13263(g)]

- a. This General Permit does not convey any property rights of any sort, or any exclusive privileges.
- b. All discharges of waste into water of the State are privileges, not rights.

6. Duty to Provide Information [40 CFR 122.41(h)]

The Discharger shall furnish the Regional Water Quality Control Board (Regional Board), the State Water Resources Control Board (State Board), or the U.S. Environmental Protection Agency (USEPA), within a reasonable time, any information which the Regional Board, State Board, or USEPA may request to determine compliance with this General Permit. Upon request, the Discharger shall also furnish to the Regional Board, State Board, or USEPA copies of records required by this General Permit to be kept.

7. Inspection and Entry [40 CFR 122.41(h)]

The Discharger shall allow the Regional Board, State Board, USEPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this General Permit; and
- b. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this General Permit; and
- c. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this General Permit; and

- d. Sample or monitor, at reasonable times, for the purposes of ensuring permit compliance or as otherwise authorized by the Clean Water Act or the Porter-Cologne Water Quality Control Act, any substances or parameters at any location.

8. Bypass and Upset [40 CFR 122.41(m)] [40 CFR 122.41(n)]

a. Definitions.

- (1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
- (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- (3) "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Prohibition of Bypass.

- (1) Bypass is prohibited, and the Regional Board may take enforcement action against a permittee for bypass, unless:
 - (a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - (b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
 - (c) The permittee submitted notices as required under 40 CFR 122.41(m)(3).

c. Conditions necessary for a demonstration of upset.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- (1) An upset occurred and that the permittee can identify the cause(s) of the upset;

- (2) The permitted facility was at the time being properly operated;
- (3) The permittee submitted notice of the upset as required in 24-Hour Reporting; and
- (4) The permittee complied with any remedial measures required under 40 CFR 122.41(d).

d. Burden of proof.

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

9. **Transfers** [40 CFR 122.41(L)(3)] [CWC 133771] [40 CFR 122.61(a)(b)]

This General Permit is not transferable to any person except after notice to the Regional Board. The Regional Board may require modification or reissuance of the permit conditions to change the name of the Discharger and incorporate such other requirements as may be necessary under the Clean Water Act and the Porter-Cologne Water Quality Control Act.

10. **Severability**

The provisions of this General Permit are severable and, if any provision of this General Permit or the application of any of its provisions to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

11. **Pollution, Contamination, or Nuisance** [CWC 13050]

Neither the treatment nor the discharge shall create a condition of pollution, contamination, or nuisance.

B. Monitoring and Reporting Requirements

1. **Signatory Requirements** [40 CFR 122-41(k)] [40 CFR 122.221]

- a. All permit applications or Notices of Intent (NOIs) submitted to the Regional Board, State Board, or USEPA shall be signed as follows:
 - (1) For a corporation: by a responsible corporate officer. For the purpose of this provision, a responsible corporate officer means: a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

- (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
 - (3) For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA).
- b. All reports required by this General Permit and other information requested by the Regional Board, State Board, or USEPA shall be signed by a person described in paragraph (a) of this provision or by a duly authorized representative of that person. A person is a duly authorized representative only if:
- (1) The authorization is made in writing by a person described in paragraph (a) of this provision;
 - (2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (a duly authorized representative may thus be either a named individual or any individual occupying a named position); and
 - (3) The written authorization is submitted to the Regional Board, State Board, or USEPA.
- c. If an authorization under paragraph (b) of this provision is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this provision must be submitted to the Regional Board, State Board, or USEPA together with any reports, information, applications, or NOIs to be signed by an authorized representative.
- d. Any person signing a document under paragraphs (a) or (b) of this provision shall make the following certification:
- "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Monitoring Reports [40 CFR 122.41(l) (4)]

- a. Monitoring results shall be reported at the intervals specified in this General Permit.

- b. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms approved by the Regional Board or State Board for reporting results of monitoring of pollutants and sludge use or disposal practices.
- c. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this General Permit.

3. Compliance Schedules [40 CFR 122.41(l) (5)]

Reports of compliance or noncompliance with interim and final requirements contained in any compliance schedule of this General Permit shall be submitted no later than 14 days following each schedule date.

4. Twenty-Four Hour Reporting [40 CFR 122.41(l) (6)]

- a. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- b. The following shall be included as information that must be reported within 24 hours under this paragraph:
 - (1) Any bypass which exceeds any effluent limitation in this General Permit.
 - (2) Any upset which exceeds any effluent limitation in this General Permit.
 - (3) Violation of a maximum daily discharge limitation for any of the pollutants listed in this General Permit is to be reported within 24 hours. The Regional Board may waive the above required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours.

5. Other Noncompliance [40 CFR 122.41(l)(7)]

The Discharger shall report all instances of noncompliance not reported under Provisions (B.3) and (B.4) at the time monitoring reports are submitted. The reports shall contain the information listed in Provision (B.4).

6. Other Information [40 CFR 122.41(l) (8)]

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application or NOI, or submitted incorrect information in a permit application, NOI or in any report to the Regional Board, State Board, or USEPA, the Discharger shall promptly submit such facts or information.

7. Planned Changes [40 CFR 122.41(1)(1)]

The Discharger shall give notice to the Regional Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the General Permit nor to notification requirements under 40 CFR Part 122.42 (a) (1); or
- c. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application/NOI process or not reported pursuant to an approved land application plan.

8. Anticipated Noncompliance [40 CFR 122.41(1)(2)]

The Discharger shall give advance notice to the Regional Board or State Board of any planned changes in the permitted facility or activity, which may result in noncompliance with permit requirements.

9. Discharge Monitoring Quality Assurance (DMQA) Program [State Board/USEPA 106 Partnership Agreement]

The Discharger shall conduct appropriate analyses on any sample provided by USEPA as part of the DMQA program. The results of such analyses shall be submitted to USEPA's DMQA manager.

C. Enforcement Provisions

1. The Clean Water Act provides that any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed \$25,000 per day of violation. Any person who negligently violates permit conditions implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a fine of not less than \$2,500 or more than \$25,000 per day for each violation, or by imprisonment of not more than one year, or both. Higher penalties may be imposed for knowing violations and for repeat offenders. The Porter-Cologne Water Quality Control Act provides for civil and criminal penalties comparable to and in some cases greater than those provided under the Clean Water Act. [40 CFR 122.41(a)(2)][CWC sections 13385 and 13387].

2. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit including monitoring reports or reports of compliance or noncompliance shall be punished upon conviction by a fine of not more than \$10,000 per violation or by imprisonment for not more than six months per violation, or by both. [40 CFR 122-41(k)(2)].
3. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this General Permit shall, upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years, or both. Higher penalties may be imposed for repeat offenders. [40 CFR 122.41(j)(5)].

Attachment D

WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE
ELIMINATION SYSTEM PERMIT FOR THE DISCHARGE OF AQUATIC
PESTICIDES FOR AQUATIC WEED AND PEST CONTROL
IN WATERS OF THE UNITED STATES

Total Copper Receiving Water Limitations

Receiving Water Hardness (mg/L)	Limitation ($\mu\text{g/L}$)
50	5.2
75	7.3
100	9.3
150	16.9
200	21.6
250	26.1
300	30.5
350	34.9
400	39.1
450	43.2
500	47.3
600	55.2
700	63.0
800	70.6
1000	85.5

Receiving water hardness shall be rounded to the nearest Attachment D value to determine applicable total copper receiving water limitations applicable to section C.1.c of this General Permit.

DRAFT
Attachment E
to Water Quality Order
No. 2004-__-DWQ
February 10, 2004

STATE WATER RESOURCES CONTROL BOARD

**LIST OF PUBLIC ENTITIES GRANTED AN EXCEPTION
PURSUANT TO STATE BOARD POLICY FOR IMPLEMENTATION OF TOXICS
STANDARDS FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF
CALIFORNIA (POLICY)**

**WATER QUALITY ORDER NO. 2004-__-DWQ
STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT FOR THE DISCHARGE OF AQUATIC PESTICIDES FOR AQUATIC WEED AND
PEST CONTROL IN WATERS OF THE UNITED STATES
GENERAL PERMIT NO. CAG _____**

The public entities listed herein have prepared Initial Studies, Negative Declarations (ND), and Notices of Determination or Mitigated Negative Declarations (MND) for the discharge of aquatic pesticides in accordance with the California Environmental Quality Act [CEQA (Public Resources Code Section 21000 et seq.)] to comply with the exception requirements of section 5.3 of the Policy. The boards of each public entity, as the lead agencies under CEQA, approved the Final ND/MND and determined that the discharge of aquatic pesticides in their respective projects would not have a significant effect on the environment. These public entities have determined that the water quality or related water quality impacts identified in the environmental assessments of the ND/MND are less than significant. In addition to submitting the CEQA documentation, these public entities have also complied with the other exception requirements of section 5.3 of the Policy.

As required in Section 15096 of the CEQA Guidelines, the State Water Resources Control Board (State Board), as a Responsible Agency under CEQA, considered the ND/MND approved by the board of each public entity and finds that the projects will have less than significant water quality impact if the waste discharge requirements in this General Permit are followed. Accordingly, the public entities listed herein are hereby granted an exception pursuant to section 5.3 of the Policy.

The California Department of Food and Agriculture (CDFA) has determined that its ongoing projects to eradicate hydrilla are exempt from the requirements of CEQA because the activities are necessary to prevent or mitigate an emergency pursuant to Public Resources Code Section 21080 (b)(4). The bases for this determination are that the CDFA Hydrilla Program is mandated under sections 403 and 6048 of the Food and Agriculture Code and the Governor of California and/or the CDFA Secretary has declared that an emergency situation existed as each eradication project began. Although CDFA has determined the CDFA Hydrilla Program is exempt from CEQA, CDFA will coordinate all eradication activities with federal, state and local regulatory agencies to ensure no long-term significant environmental impacts occur.

As required in Section 15096 of the CEQA Guidelines, the State Board, as a Responsible Agency under CEQA, considered the exemption claimed by CDFA and finds that the projects will have less than significant water quality impact if the waste discharge requirements in this General Permit are followed. Accordingly, CDFA is hereby granted an exception pursuant to section 5.3 of the Policy, as long as the Governor or the CDFA Secretary has declared that an emergency situation exists prior to project implementation.

Public Entities with Policy Section 5.3 Exception

1. Contra Costa
2. Department of Food and Agriculture
3. Merced Irrigation District
4. Metropolitan Water District of Southern California
5. Modesto Irrigation District
6. Nevada Irrigation District
7. Oakdale Irrigation District
8. Placer County Water Agency
9. San Joaquin Area Flood Control Agency
10. Solano Irrigation District
11. South Feather Water and Power Agency
12. South San Joaquin Irrigation District
13. Turlock Irrigation District
14. Yolo County Flood Control and Water Conservation District

Appendix B
Air Calculation Worksheet



Truck Emissions

Fuel: gasoline
 Round Trip Mileage: 15
 No. Round Trips/yr 12

	Emission Factors (g/mi)*	Emissions (lb/day)	Emissions (lb/yr)	BAAQMD Thresholds (lb/day)	BAAQMD Thresholds (ton/yr)
CO	5.082	0.17	2.02	550	n/a
NOx	0.938	0.03	0.37	80	15
ROG	0.18	0.01	0.07	80	15
SO2	0.005	0.0002	0.0020	n/a	n/a
PM10	0.035	0.0012	0.0139	80	15

*Emission Factors from EMFAC2002, medium duty vehicle, Bay Area Average, year 2004.

Boat Emissions

Boat: Johnson
 Fuel: gasoline
 Horsepower: 48
 Hours per trip 4
 Trips per year: 12

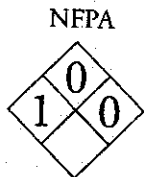
	Emission Factors (g/hp-hr)**	Emissions (lb/day)	Emissions (lb/yr)	BAAQMD Thresholds (lb/day)	BAAQMD Thresholds (ton/yr)
CO	250	105.8	1269.8	550	n/a
NOx	0.5	0.2	2.5	80	15
ROG	85	36.0	431.7	80	15
SO2	0.49	0.2	2.5	n/a	n/a
PM10	n/a	n/a	n/a	80	15

**Emission Factors from AP-42 Vol. II, Table II-4-1, Outboard engines.



Appendix C
Sample Material Data Safety Sheet





HMIS

PPE (See Section 15)

Health Hazard	1
Fire Hazard	0
Reactivity	0



Section 1. Chemical Product and Company Identification

Trade Name	Sugar Test 1 (Anthrax Kit only)	Code	RE/Sugar1
Manufacturer	HazTech Systems, Inc. P.O. Box 627 164 Dinsmore Fortuna, CA 95540	CAS #	7758-99-8
Chemical Name	Cupric sulfate pentahydrate	RTECS	GL8900000
Synonyms	Blue vitriol	TSCA	TSCA 8(b) inventory: Copper sulfate pentahydrate
		CI #	

In case of emergency contact CHEMTREC
(24 hours) at 800-424-9300

HazTech Systems, Inc. 800-337-2497

Spectrum Chemical Mfg. Corp. 310-516-8000

Chemical Formula CuSO4.5H2O in water

Supplier Spectrum Chemical Mfg. Corp.
14422 S. San Pedro St.
Gardena, CA 90248

Section 2. Composition and Information on Ingredients

Exposure Limits

Name	CAS #	TWA (mg/m ³)	STEL	CEIL (mg/m ³)	% by Weight
Copper sulfate pentahydrate Water	7758-99-8	1			4%
	7732-18-5				96%

Toxicological Data on Ingredients Copper sulfate pentahydrate:
ORAL (LD50): Acute: 300 mg/kg (Rat).

Section 3. Hazards Identification

Potential Acute Health Effects Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant). Slightly hazardous in case of skin contact (sensitizer). Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects **CARCINOGENIC EFFECTS:** Not available. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to kidneys, the nervous system. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	Allow the victim to rest in a well ventilated area. Seek immediate medical attention.
Ingestion	Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Section 5. Fire and Explosion Data

Flammability	Non-flammable.
Auto-Ignition Temperature	Not applicable.
Flash Point	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.
Fire Fighting Media and Instructions	Not applicable.
Special Remarks on Fire Hazards	Not applicable.

Section 6. Accidental Release Measures

Small Spill	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
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Section 7. Handling and Storage

Precautions	If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.
Storage	Keep in HazCat Kit.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Use in a well ventilated area.
Personal Protection	Gloves and goggles.

Section 9. Physical and Chemical Properties

Physical State and Appearance	Liquid	Volatility	Not available
Molecular Weight	Not available	Odor Threshold	Not available
pH (1% Solution in Water)	7 (Neutral)	Water/Oil Dist. Coeff.	Not available
Boiling Point	-100°C (212°F) lowest known (water)	Ionicity (in Water)	Not available
Melting Point	Not available	Dispersion Properties	Not available
Critical Temperature	Not available	Solubility	Easily soluble in water. Not available
Specific Gravity	Not available	Odor	Odorless
Vapor Pressure	Not available	Taste	Not available
Vapor Density	Not available	Color	Blue

Section 10. Stability and Reactivity Data

Stability	Product is stable.	Corrosivity	Corrosive in presence of steel.
Instability Temperature	Not available.	Special Remarks	Not available
Conditions of Instability	Not available.	Polymerization	Will not polymerize.
Incompatibility with Various Substances	Reactive with alkalis.		

Section 11. Toxicological Information

Route of Entry	Eye contact. Inhalation. Ingestion.
Toxicity to Animals	Acute oral toxicity (LD50): 300 mg/kg (Rat).
Chronic Effects on Humans	The substance is toxic to kidneys, the nervous system.
Other Toxic Effects on Humans	Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (irritant). Slightly hazardous in case of skin contact (sensitizer).
Special Remarks on Toxicity to Animals	Not available.
Special Remarks on Chronic Effects on Humans	May cause jaundice and liver enlargement.
Special Remarks on Other Toxic Effects on Humans	Material is irritating to mucous membranes and upper respiratory tract.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Products of Biodegradation	Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation	The products of degradation are more toxic.
Special Remarks on the Products of Biodegradation	Not available.

Section 13. Disposal Considerations

Waste Disposal

Recycle to process, if possible. Consult your local or regional authorities.

Section 14. Transport Information

DOT Classification CLASS 9: Miscellaneous hazardous material.

Identification Environmentally hazardous substance, n.o.s. (Cupric Sulfate) : UN3077 PG: III

Special Provisions for Transport Marine Pollutant

Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations Pennsylvania RTK: Copper sulfate pentahydrate
Massachusetts RTK: Copper sulfate pentahydrate
TSCA 8(b) inventory: Copper sulfate pentahydrate
CERCLA: Hazardous substances.: Copper sulfate pentahydrate

California Proposition 65 Warnings

Other Regulation OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other classifications WHMIS (Canada) CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC) R38- Irritating to skin.
R41- Risk of serious damage to eyes.

Section 16. Other Information

Catalog Number(s) RE/Sugar 1 (Anthrax Kit only)

References Not available.

Other Special Considerations Not available.

Validated by R. Houghton 8/06/01

Verified by R. Turkington

Call 1-800-543-5487

Notice to Reader

All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Haztech Systems, Inc. assumes no responsibility for the completeness or accuracy of the information contained herein.

Appendix D
Response to Comments on Draft Initial Study



APPENDIX D: RESPONSE TO COMMENTS ON DRAFT INITIAL STUDY

On January 21, 2004, the Marin Municipal Water District initiated public circulation of a draft Initial Study and Notice of Intent to adopt a Negative Declaration for its Algae Control Program. A single comment on the contents of the Initial Study was received during the public review period which closed on March 1, 2004. That comment requested further discussion of the potential impact of the Algae Control Program on human health. That information is provided below.

Copper is an essential nutrient for humans, and is incorporated into a number of proteins. This element is essential for hemoglobin synthesis, carbohydrate metabolism, catecholamine biosynthesis, and cross-linking of collagen, elastin, and hair keratin (OEHHA 1997). However, copper can be toxic above certain doses. Short periods of exposure above 1,300 µg/L can cause gastrointestinal disturbance, including nausea and vomiting. Use of water that exceeds 1,300 µg/L over many years could cause liver or kidney damage. Individuals with Wilson's disease may be more sensitive than others to the effect of copper contamination (U.S. EPA 2004). Evidence indicates that children under 10 years of age may be more susceptible to copper effects than are adults (OEHHA 1997). Other sensitive subgroups may include individuals with deficiency of the enzyme glucose-6-phosphate-dehydrogenase (G6PD), which occurs in some individuals of Chinese, Greek, Italian, and African American heritage, and extracorporeal dialysis patients (OEHHA 1997).

In drinking water, copper is likely to occur in the form of cupric ion (Cu²⁺) complexed with organic ligands (OEHHA 1997). Copper toxicity due to consumption of water containing high copper concentrations is rare (OEHHA 1997). Copper contamination usually is due to corrosion of household copper pipes, rather than contamination of source water (U.S. EPA 2004). Symptoms of mild copper poisoning from ingestion of contaminated water are nausea, abdominal cramps, diarrhea, vomiting, dizziness, and headaches (OEHHA 1997). There is no conclusive animal laboratory data or human epidemiological data to conclude that cancer is carcinogenic (OEHHA 1997).

The U.S. EPA has established a Maximum Contaminant Level Goal (MCLG) (primary, legally enforceable standard) for copper of 1,300 µg/L because EPA believes this level of protection would not cause any health problems based on toxicity data (U.S. EPA 2004). National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. The U.S. EPA recommends secondary standards to water systems but does not require systems to comply with them. The secondary standard for copper is 1,000 µg/L (U.S. EPA 2004).

The Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency has developed a Public Health Goal (PHG) for copper in drinking water of 112 µg/L. The PHG represents the concentration of copper at which adverse health effects would not be expected to occur, even over a lifetime of exposure.

This copper concentration was calculated based on children as a sensitive subgroup, using a report by Spitalny et al. (1984) on gastrointestinal effects of copper in children.

The District measured copper in Nicasio and Bon Tempe Reservoirs two hours after treatment with copper sulfate in the summer of 2002, as part of their general permit requirements (MMWD 2003a). At Nicasio, pre-treatment total copper was 0.037 $\mu\text{g/L}$ and post-treatment total copper was 139 $\mu\text{g/L}$ (109 $\mu\text{g/L}$ dissolved). At Bon Tempe, pre-treatment total copper was 16 $\mu\text{g/L}$ (17 $\mu\text{g/L}$ dissolved) and post-treatment total copper was 78 $\mu\text{g/L}$ (73 $\mu\text{g/L}$ dissolved) (MMWD 2003a). This concentration would not be likely to persist longer than several days (Murray-Gulde et al. 2002). This evidence indicates that, even immediately following treatment, copper concentrations are well below the primary and secondary MCLs. Although concentrations in raw water from the reservoirs may exceed the PHG at some locations in the reservoirs for a few days, these concentrations would not occur in the water distributed for human consumption. Up to about 90 percent of the copper in raw water entering the District's treatment plants from the reservoirs is removed during treatment prior to distribution.

The highest concentration measured in Bon Tempe Reservoir during quarterly sampling was 20.1 $\mu\text{g/L}$ total copper in August 2002. This concentration occurred during the copper sulfate application season and was a temporary high condition not indicative of actual long-term exposure of aquatic organisms to copper. For calculation of the representative exposure point concentration for use in ecological risk assessment, the U.S. EPA recommends using the average concentration to represent "a reasonable estimate of the concentration likely to be contacted over time" (U.S. EPA 2002). The EPA guidance states that "because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean, a conservative estimate of the average chemical concentration, should be used for this variable" (U.S. EPA 1989). The 95% UCL for Bon Tempe Reservoir was calculated to be 11.01 $\mu\text{g/L}$ total copper. In Alpine Reservoir, the highest concentration measured during quarterly sampling was 12 $\mu\text{g/L}$ total copper in November 2001. The 95% UCL on the mean for the entire sampling period was calculated to be 4.99 $\mu\text{g/L}$ total copper. In Kent Reservoir, the highest concentration measured during quarterly sampling was 5 $\mu\text{g/L}$ total copper in August 2000. The 95% UCL on the mean for the entire sampling period was calculated to be 3.26 $\mu\text{g/L}$ total copper. In Nicasio Reservoir, the highest concentration measured during quarterly sampling was 12 $\mu\text{g/L}$ total copper in November 2001. The 95% UCL on the mean for the entire sampling period was calculated to be 7.16 $\mu\text{g/L}$ total copper. All of these concentrations are well below the PHG and the primary and secondary MCLs for copper.

References

Office of Environmental Health Hazard Assessment (OEHHA), 1997. Public Health Goal for Copper in Drinking Water. Prepared by Pesticide and Environmental Toxicology Section, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. December.

Spitalny, K. C., J. Brondum, R. L. Vogf, H. E. Sargent, S. Kappel, 1984. Drinking water induced copper intoxication in a Vermont family. *Pediatrics* 74, 1103 – 1106.

U.S. EPA 2004. Consumer Fact sheet on copper.

http://www.epa.gov/safewater/contaminants/dw_contamfs/copper.html

