APPLICATION OF COPPER TO THE STATE WATER PROJECT TO CONTROL AQUATIC WEEDS AND ALGAL BLOOMS

MITIGATED NEGATIVE DECLARATION
JANUARY 2004

DEPARTMENT OF WATER RESOURCES

The Department of Water Resources

Application of Copper to the State Water Project to Control Aquatic Weeds and Algal Blooms

Mitigated Negative Declaration

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INTRODUCTION AND LOCATION

The Department of Water Resources (DWR) has applied for a statewide general National Pollutant Discharge Elimination System (NPDES) Permit from the State Water Resources Control Board (SWRCB) to continue application of aquatic pesticides when necessary, to State Water Project aqueducts, forebays and reservoirs (Table 1). Figure 1. shows the location of SWP facilities. This Mitigated Negative Declaration (MND) was prepared by DWR to comply with California Environmental Quality Act (CEQA) requirements associated with regulatory requirements established by the SWRCB.

DWR currently applies copper complexes including copper sulfate pentahydrate, Komeen,® and Nautique® on an as-needed basis to control aquatic weeds and algal blooms so that such blooms do not degrade drinking water quality through elevated tastes and odors, production of algal toxins, clogging of filters, and reduction in water flows. These applications of copper for resource management currently are authorized under the 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).[1] This General Permit expires on January 31, 2004.

The SWRCB has notified interested parties that it intends to develop a new general NPDES permit for application of aquatic pesticides to replace the expiring General Permit, and that this new general permit will require strict compliance with California Toxics Rule criteria, the State Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SWRCB Policy), and applicable Basin Plans.[2] Thus, any aquatic pesticide that contains a Priority Pollutant (such as copper) would be prohibited from being applied in concentrations that would exceed applicable water quality criteria outside of an established mixing zone. Section 5.3 of the SWRCB Policy, however, authorizes variances from the Priority Pollutant criteria for public agencies.

Among other things, Section 5.3 provides a Categorical Exception from the toxics standards where the discharge is necessary to implement control measures (1) for resource or pest management or (2) to meet statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code, and for certain maintenance and cleaning activities. DWR's primary purpose in periodically applying aquatic pesticides to its reservoirs and aqueducts is: (1) to control algal blooms and, in turn, achieve secondary drinking water standards for taste and odor; and (2) to control aquatic weeds that impact the beneficial uses and conveyance of water supplies for municipal, irrigation, and industrial purposes.

Therefore, such discharges qualify for a Categorical Exception to the toxics standards. Accordingly, DWR 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. If granted, DWR would comply with all terms and conditions of the general permit.

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[1] USEPA, in interim guidance issued on July 11, 2003, states that the direct application of a pesticide to waters of the United States to control pests and consistent with all relevant requirements of FIFRA "does not constitute the discharge of a pollutant that requires an NPDES permit under the Clean Water Act." Chief Counsel for the SWRCB, in a memorandum issued on July 25, 2003 disagreed with USEPA's position and advised the SWRCB not to follow the guidance.

[2] Cantu, C. 2003

Table 1.

Aquatic weed and algal bloom control programs in the State Water Project.

	Water	Region (RWQCB)	County	Problem Biota	Associated Problem	Aquatic Pesticide
	RESERVOIRS					
1	Clifton Court Forebay	5	Contra Costa	Aquatic weeds Cyanobacteria	*Reduce water flows Taste and odor, filter	Komeen, Nautique Copper sulfate
2	Castaic Lake	4	Los Angeles	Cyanobacteria	Taste and odor, filter clogging, and toxins	Copper sulfate
3	Lake Perris	8	Riverside	Cyanobacteria	Taste and odor, filter clogging, and toxins	Copper sulfate
4	Tehachapi Afterbays	6	Kern	Cyanobacteria	Taste and odor	Copper sulfate
	AQUEDUCTS					
5	South Bay Aqueduct	2	Alameda, Contra Costra	*Cladophora* and Cyanobacteria	*Reduced water flow taste and odor	Copper sulfate
6	Coastal Branch Aqueduct	5	Kings, San Luis Obispo	Aquatic weeds and Cyanobacteria	Taste and odor, filter clogging, and toxins	Copper sulfate
7	East Branch Aqueduct	6	Los Angeles, San Bernardino, Riverside	Cyanobacteria	Taste and odor, filter clogging, and toxins	Copper sulfate

* Creates operational problems by clogging trash racks and filters

RWQCB - Regional Water Quality Control Boards

Region 2	San Francisco Bay
Region 4	Los Angeles
Region 5	Central Valley
Region 6	Lahontan
Region 8	Santa Ana

The proposed Project would involve the continued application of copper to control aquatic weeds and algal blooms at State Water Project reservoirs and aqueducts operated by the Department of Water Resources (Table 1). **Figures 1-7** provide area maps for each of the reservoirs and aqueducts. The facilities are located within the boundaries of five Regional Water Quality Control Boards. Table 2. summarizes general characteristics of each reservoir.

PROJECT BACKGROUND

DWR operates and manages SWP, the largest state-built, multipurpose water projects in the United States. The SWP depends on a complex system of dams, reservoirs, power plants, pumping plants, canals, and aqueducts to deliver water. The Project provides drinking water to more than 23 million California residents and SWP water is used to irrigate about 600,000 acres of farmland, mainly in the south San Joaquin valley. Also, SWP was designed and built to control floods, generate power, and provide recreational facilities as well as enhance habitats for fish and wildlife.

The mission of DWR is to manage the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments. To carry out this mission, DWR routinely monitors and tests water samples from its reservoirs, canals, aqueducts, and other water supply facilities to assure compliance with state and federal requirements for safe drinking water quality.

Water quality monitoring provides detailed information on concentrations and distribution of chemical, physical, and biological properties at 29 stations throughout the Project. Objectives of this monitoring are to:

- Assess the influence of hydrological conditions & project operations on water quality.
- Document long-term changes in SWP Water Quality.
- Provide water quality data to assess water treatment plant operational needs.
- Identify, monitor, & respond to water quality emergencies & determine impacts to the project.
- Provide data needed to determine if State Water Contracts Article 19 & DHS Drinking Water Standards are being met.
- Assess issues of concern through special studies.

DWR applies copper for two main purposes: (1) to control cyanobacteria (bluegreen algae) that can produce taste and odor compounds, and (2) to control aquatic weeds and attached algae that can negatively impact conveyance of water supplies for municipal, irrigation, and industrial purposes.

DWR routinely monitors the taste and odor compounds produced by algae. Chemical substances in water that often are associated with earthy, musty smelling or tasting water include geosmin and 2-methylisoborneol (MIB), which are produced in natural and manmade lakes by certain types of algae. Geosmin and MIB are natural byproducts of algal chlorophyll production, although not all algae produce them or produce them in the same amounts, so the presence of algae alone is not a good indicator of taste and odor problems.

DWR's evaluation of a taste and odor event is based upon microscopic examination of samples, flavor profile analysis, and most importantly, the chemical analysis of MIB and geosmin. When sampling results indicate that concentrations of geosmin or MIB in reservoir waters are increasing within the 1 to 10 nanograms per liter (ng/l) range (1 ng/l is one nanogram per liter of water, or one part per trillion), DWR water quality staff respond by searching for the location of the source of the geosmin or MIB. To do this, water quality samples are collected and analyzed, and field staff ascertains possible algae sources. If an algae source is identified, DWR staff then develop a copper sulfate application plan to control the specific algae that are associated with the elevated geosmin and/or MIB concentrations.

Figure 1. Clifton Court Forebay

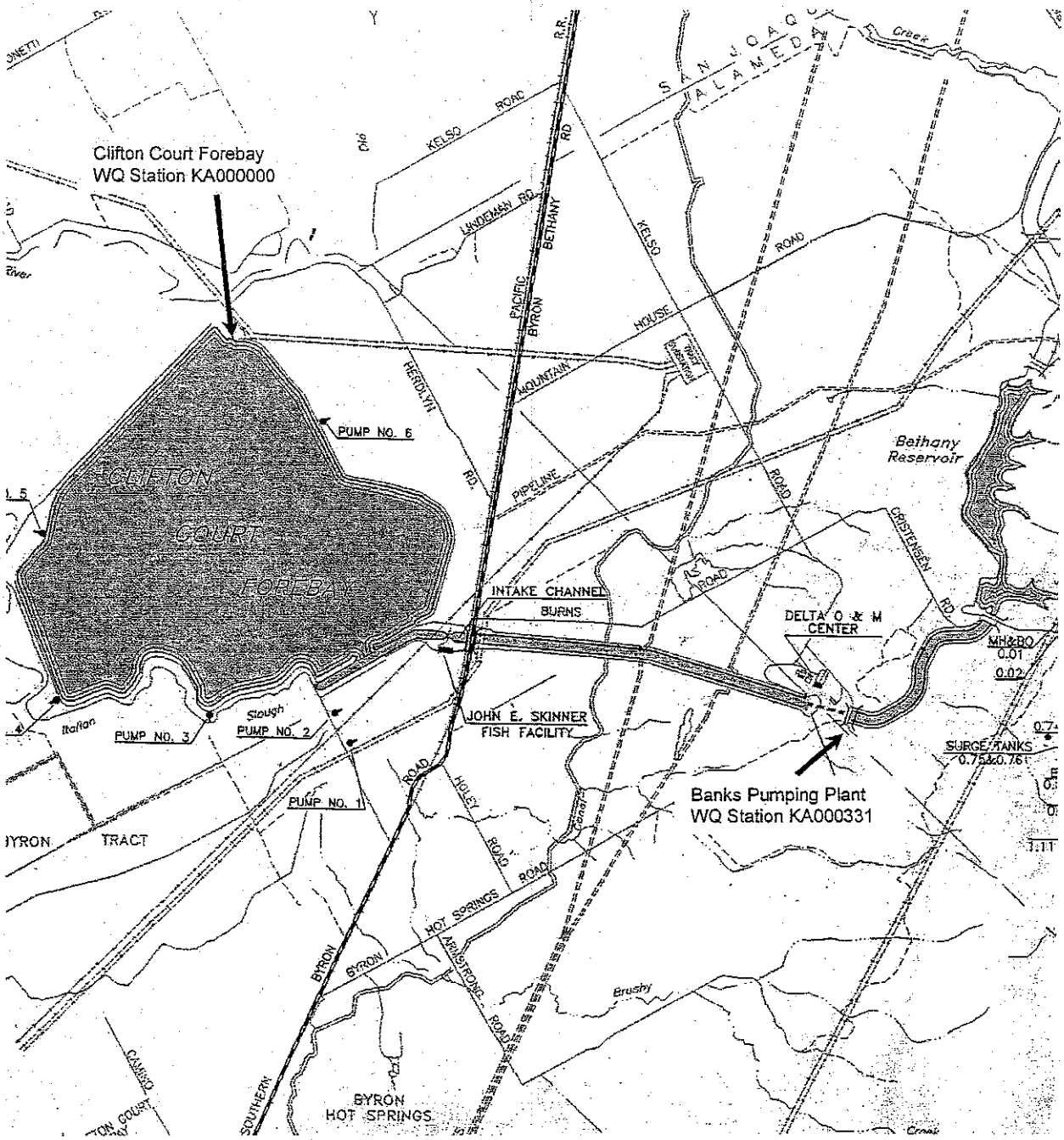

Figure 2. South Bay Aqueduct

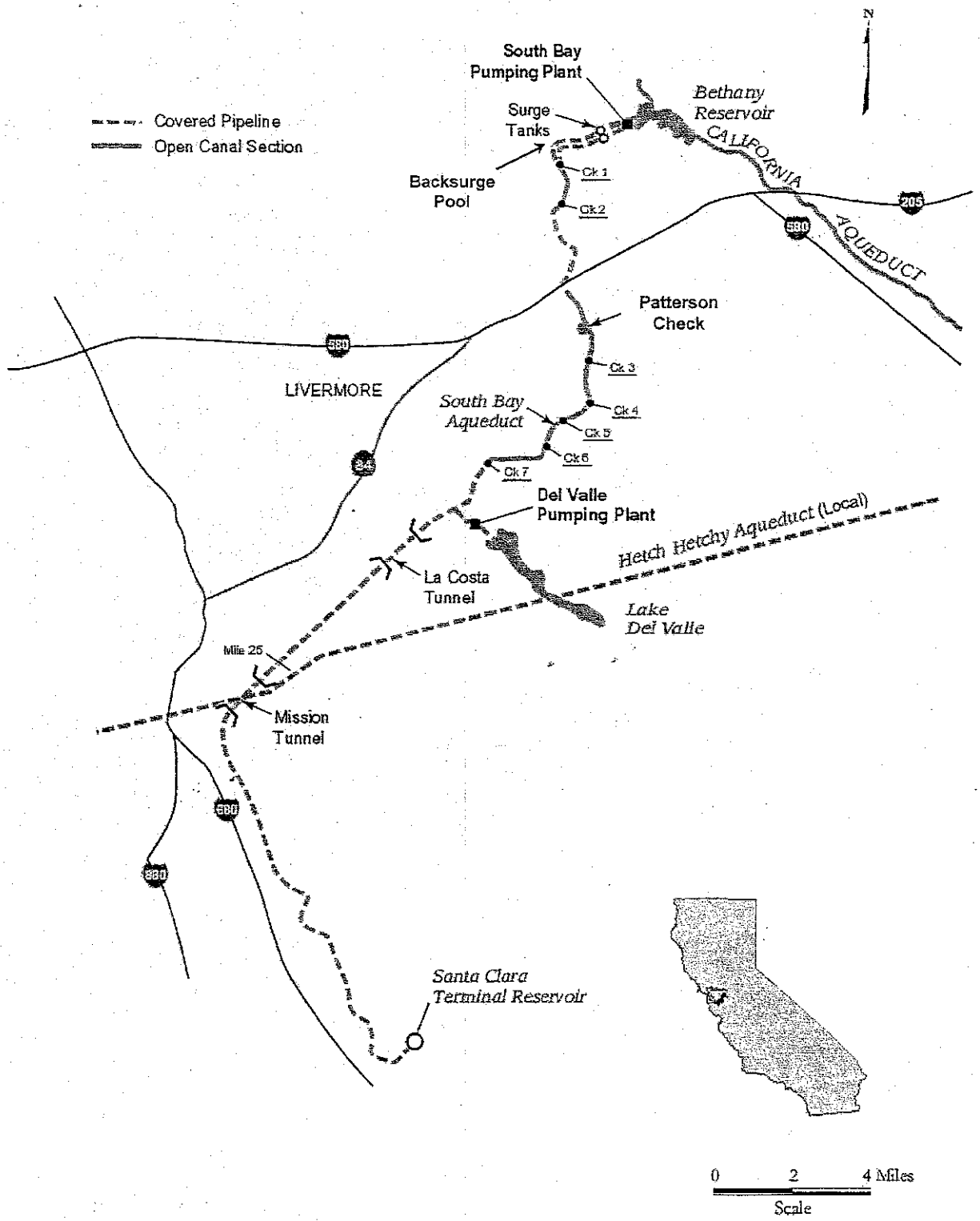

Figure 3. California Aqueduct – Coastal Branch

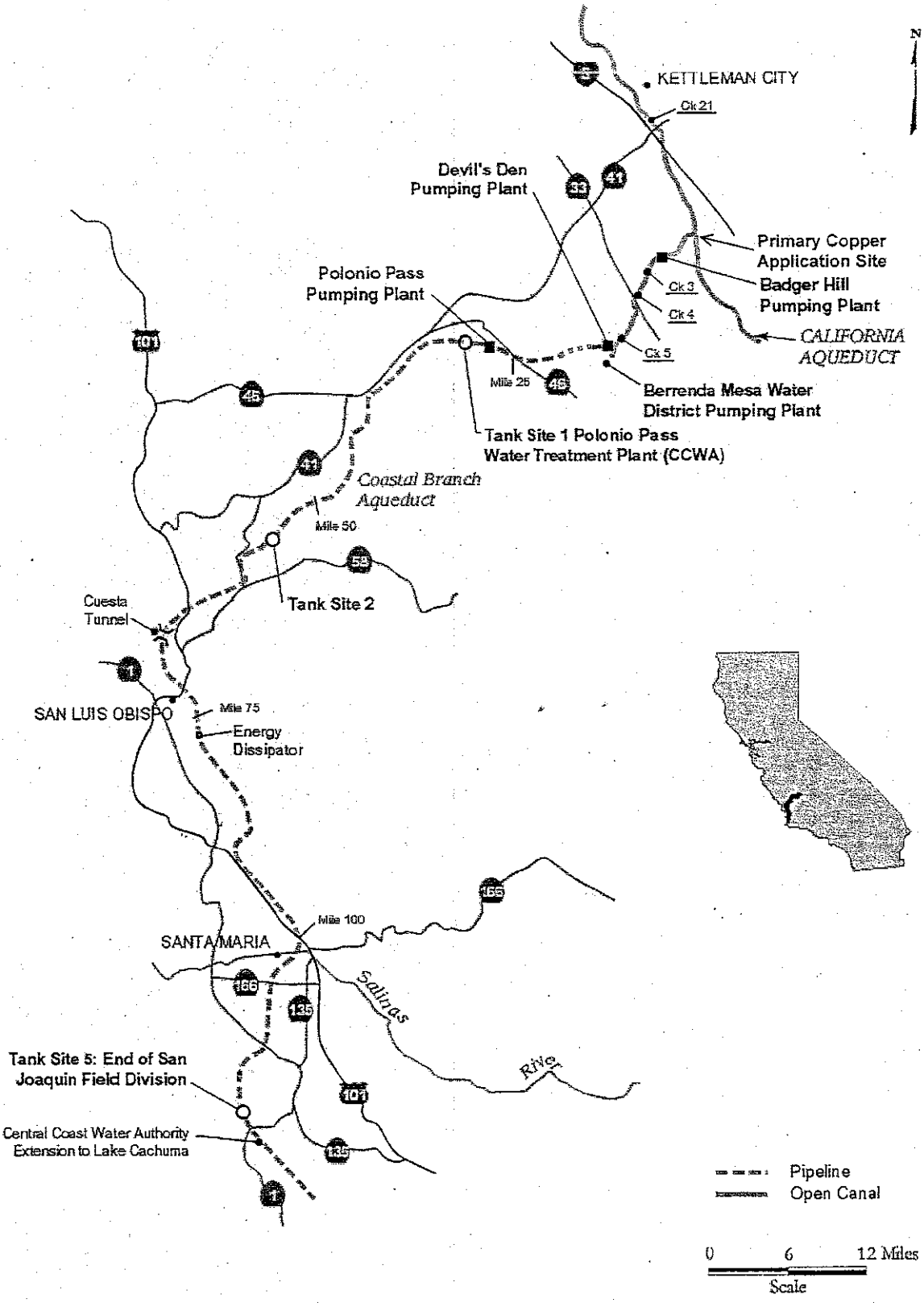

Figure 4. California Aqueduct – East Branch

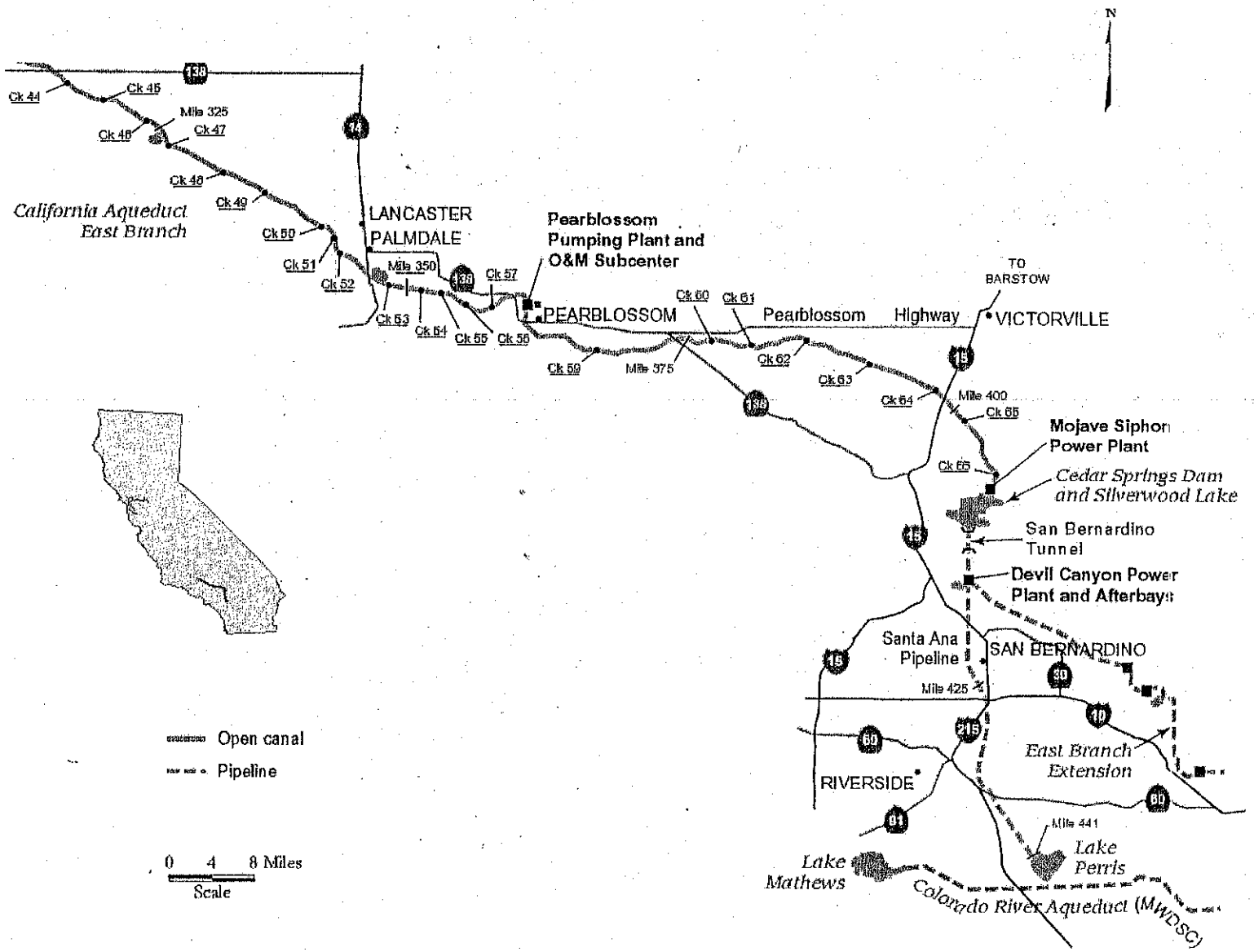

Figure 5. Castaic Lake

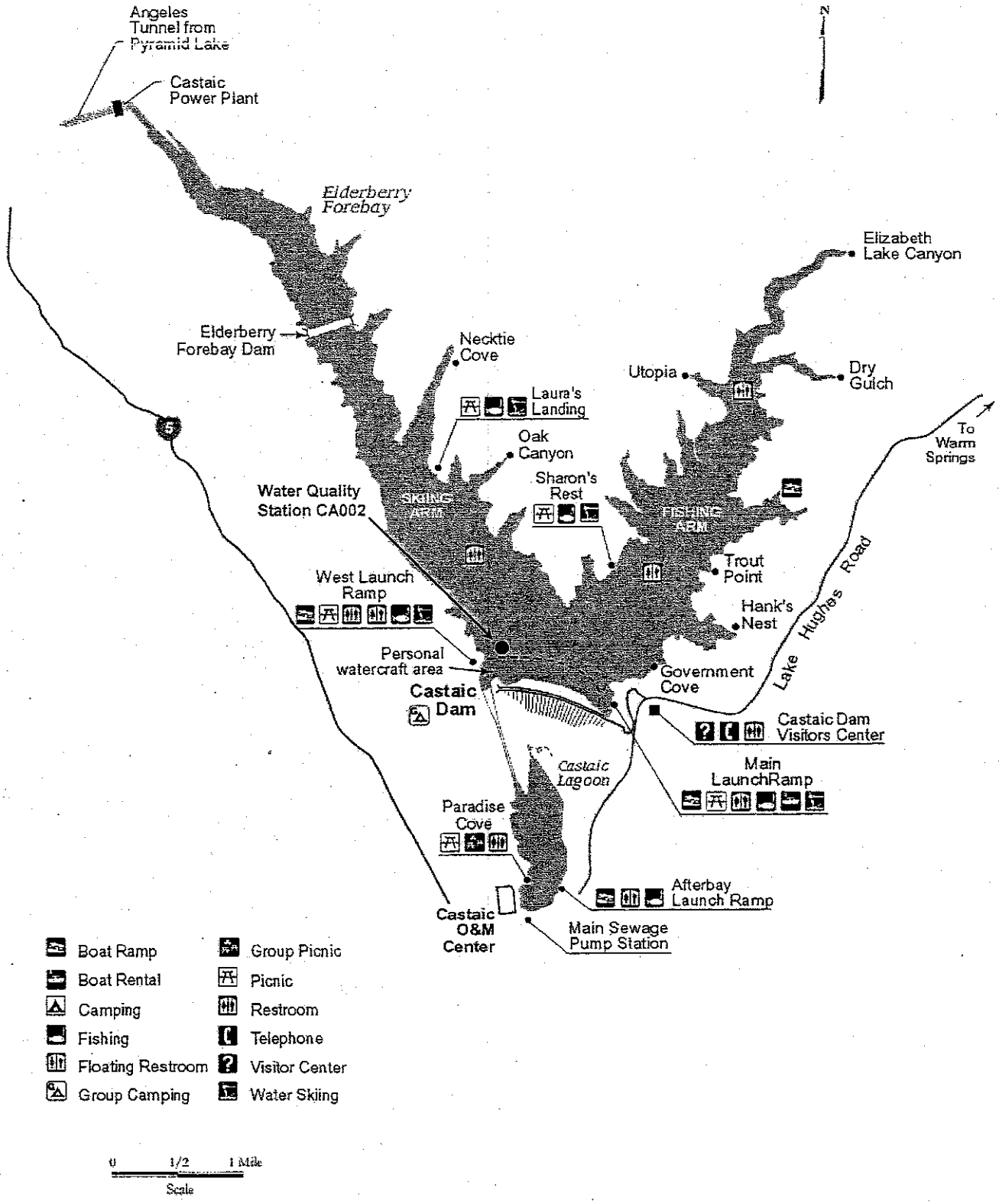

Figure 6. Perris Lake

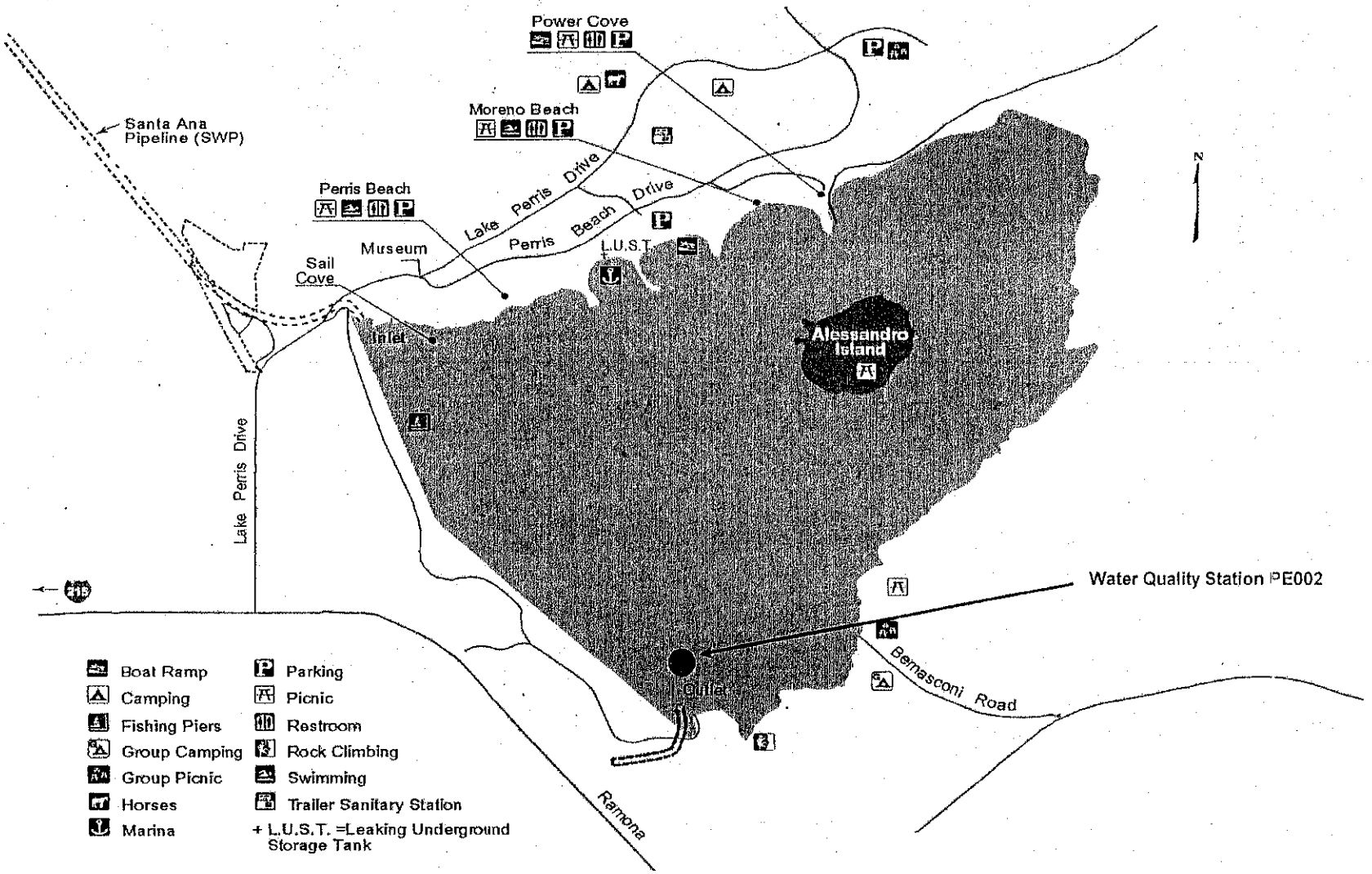

Figure 7. Tehachapi Afterbay and proposed Tehachapi Second Afterbay

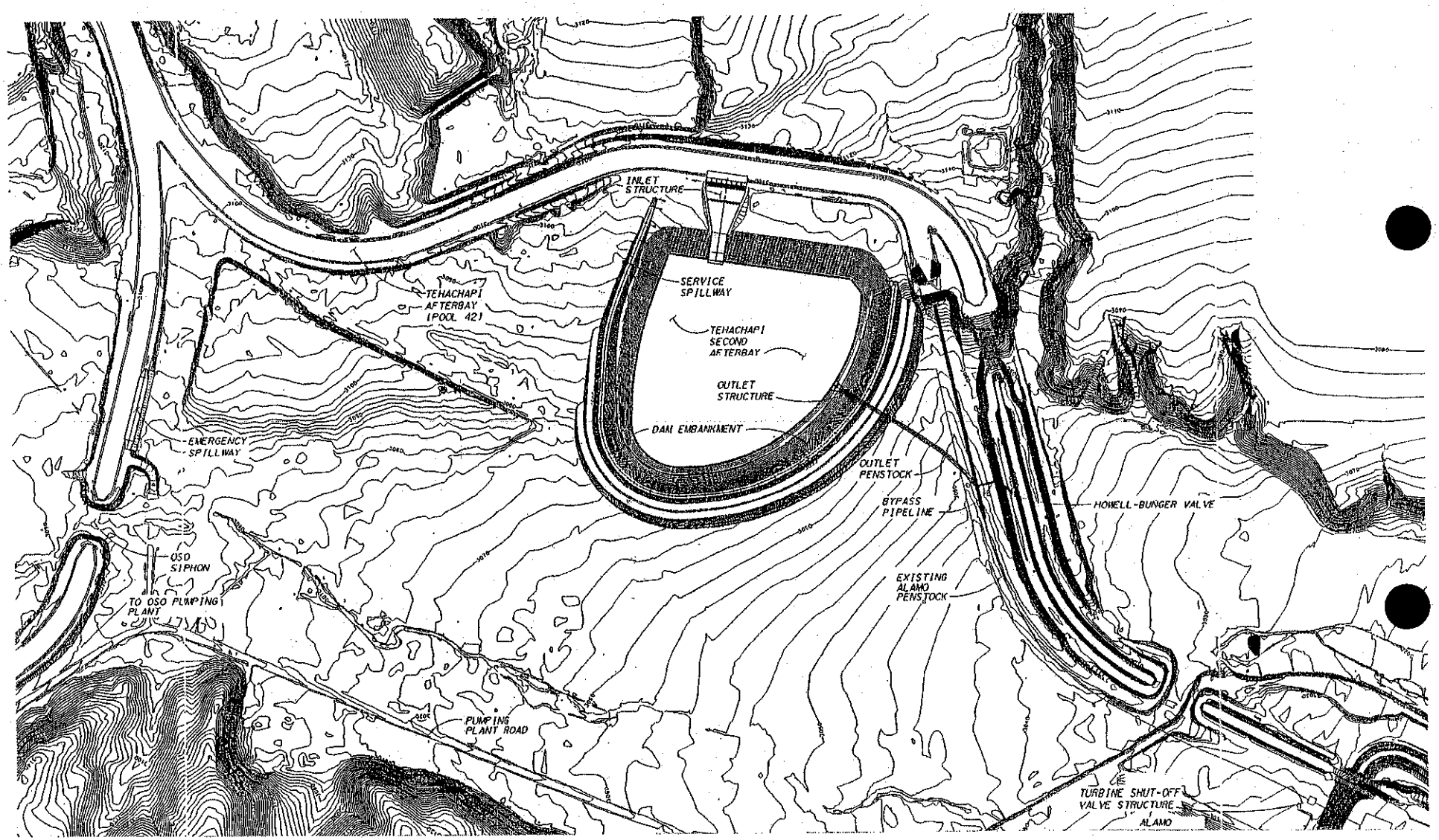

TABLE 2. SWP Reservoir and Aqueduct Characteristics

	Maximum Volume (af)	Surface area at Max vol (ac)
RESERVOIRS		
Clifton Court Forebay	28,653	2,180
Castaic Lake	323,702	2,235
Lake Perris	131,450	2,320
Tehachapi Afterbay	550	40
	Flow[1] (cfs)	
AQUEDUCTS		
South Bay Aqueduct	150 - 310	
Coastal Branch Aqueduct	90 - 220	
East Branch Aqueduct	2000	

[1]Flow = range in flow during copper sulfate applicatons

Prior to application of copper sulfate, DWR evaluates potential operational strategies to avoid introducing the taste and odor compounds into the distribution system. These modifications may include withdrawing water from varying depths on the intake towers, blending, or utilizing other sources of water until the taste and odor compounds naturally disperse. If application of copper sulfate is deemed necessary, this early warning monitoring provides detailed information on the location of the source blooms, allowing for spot applications.

Aquatic weeds and attached algae can restrict the conveyance of water in the SWP. Aquatic weed accumulation may be so severe that pumping at the Harvey O. Banks Delta Pumping Plant is restricted or halted and water delivery to the California and South Bay Aqueducts ceases. Six species[3] of the submersed aquatic weeds that are prevalent in Clifton Court Forebay are listed as" Prevalent species in California considered to be among the world's most troublesome aquatic weeds" (University of California, 2001.)

To minimize the impact of aquatic weeds and algae, DWR applies copper at regular intervals throughout the growing season (April – October) at the South Bay Aqueduct and Coastal Branch of the California Aqueduct. This scheduled application of copper began in the late 1960's in the South Bay Aqueduct, soon after canal operations began. In addition, liquid copper products (Nautique®, Komeen®) are applied periodically in Clifton Court Forebay to control aquatic weeds.

PROJECT DESCRIPTION

DWR proposes to continue the existing copper application operations at Clifton Court Forebay, South Bay Aqueduct, Coastal Branch, East Branch, Castaic Lake, and Lake Perris for controlling aquatic weeds and algal blooms under the new statewide NPDES permit. DWR's *Quality Assurance Project Plan - Monitoring Plan for Copper Treatments in the State Water Project* herein referred to as "Monitoring Plan" was prepared to control aquatic weed and taste and odor problems while minimizing the use of copper (refer to Appendix A). Receiving water monitoring procedures for the new statewide NPCES permit will adhere to the Monitoring and Reporting Program described in Attachment B of the permit. The monitoring would support DWR's three types of aquatic pesticide applications: (a) treatment of reservoirs and forebays with copper sulfate crystals to control algal blooms (b) treatment of aqueducts with copper sulfate crystals to control taste and odor and filter clogging, and (c) treatment of Clifton Court Forebay with Nautique to control aquatic weeds.

a) Treatment of reservoirs and forebays with copper sulfate crystals to control algal blooms

Applications of copper sulfate crystals would be made to the two reservoirs and forebay using agricultural spreaders suspended from helicopters. The spreaders would be operated over areas identified for treatment. Heliports or landing pads with loading areas currently are located at Castaic Lake, Lake Perris and Clifton Court Forebay would continue to be used for the Project.

The solid copper sulfate (in crystalline form) would be applied by helicopter. The applicator would be properly licensed for application of pesticides, and ground crews would wear appropriate personal protective equipment to reduce exposure to copper sulfate.

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[3] Egeria (*Egeria densa*), coontail (*Ceratophyllum demersum*), common elodea (Elodea Canadensis), Eurasian watermilfoil (*Myriophyllum spicatum*), curleyleaf pondweed (*Potamageton crispus*), and sago pondweed (*Potamageton pectinatus*).

During application, the Castaic Lake, and Lake Perris reservoirs would be restricted or closed for recreational use. Access to shoreline fishing would be restricted at Clifton Court Forebay. DWR staff would direct helicopter crews from a boat on the reservoir (setting buoys on the reservoir if necessary) to assure application(s) in designated areas of the reservoir only. Application areas would vary in size, but not greater than 1,600 acres. No changes in current existing application methods would be proposed for the Project.

b) **Treatment of aqueducts with copper sulfate crystals to control taste and odor and filter clogging**

Applications of copper sulfate crystals would be made to the aqueducts following the Best Management Practices described in the Monitoring Plan. The portions of the aqueduct that are treated with copper sulfate are closed to public access. The treatments are supervised by a licensed Pest Control Advisor.

c) **Treatment of Clifton Court Forebay with liquid copper pesticides to control aquatic weeds**

Applications of copper sulfate crystals would be made using an agricultural sprayer suspended from a helicopter. The sprayer would be operated over areas identified for treatment. Heliports or landing pads with loading areas currently located at Clifton Court Forebay would continue to be used for the Project.

The liquid copper aquatic pesticides would be applied by a helicopter. The applicator would be properly licensed for application of pesticides, and ground crews would wear appropriate personal protective equipment to reduce exposure to the pesticide.

During application, access to shoreline fishing would be restricted. DWR staff would direct helicopter crews from a boat on the reservoir (setting buoys on the reservoir if necessary) to assure application(s) in designated areas of the reservoir only. Application areas would vary in size, but may be greater than 1000 acres. No changes in current existing application methods would be proposed for the Project. In addition, the application is done during the Vernalis Adaptive Management Plan (VAMP) period in May to reduce impacts to fisheries.

PROJECT SCHEDULE

Application of copper to the reservoirs and forebays would be carried out only as needed, that is, when other options have been exhausted. Application of copper sulfate to the aqueducts is required on regular intervals throughout the growing season to prevent loss in water delivery capacity.

REQUIRED APPROVALS

Continued application of copper would require obtaining a permit from the SWRCB.

SECTION 2
INITIAL STUDY

This MND complies with Section 21064.5 of the California Public Resources Code (California Environmental Quality Act [CEQA]) and Article 6 of the *State CEQA Guidelines* (14 California Code of Regulations). The following Initial Study, Environmental Checklist, and evaluation of potential environmental effects (see Section 3) 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 less-than-significant levels.

An explanation is provided for all determinations, including the citation of sources as listed in Section 5. A "No Impact" or a "Less-than-Significant Impact" determination indicates that the proposed Project would not have a significant effect on the physical environment for that specific environmental category. With regard to the water quality and hazardous materials categories, the proposed Project would include specific mitigation measures (see Section 4) to reduce the potentially significant impacts to a less-than-significant levels. 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

1. **Project Title:** The Application of Copper to the State Water Project to Control Aquatic Weeds and Algal Blooms

2. **Lead Agency Name and Address:** The Department of Water Resources
   1416 9th Street
   Sacramento, California 95814

3. **Contact Person and Phone Number:** Daniel F. Peterson, (916) 653-9978

4. **Project Location:** State Water Project reservoirs and aqueducts: Clifton Court Forebay, South Bay Aqueduct, Coastal Branch, East Branch, Lake Perris, Castaic Lake, and Tehachapi Afterbays (see Table 1, Section 1 for list of Counties locations).

5. **Project Sponsor's Name and Address:** The Department of Water Resources
   1416 9th Street
   Sacramento, California 95814

6. **General Plan Designation:** Reservoirs and aqueducts

7. **Zoning:** Public Facilities

8. **Description of Project:** See Project Description in Section 1 of the MND.

9. **Surrounding Land Uses and Setting:** See Project Description in Section 1 of the MND.

10. **Other Public Agencies Whose Approval is Required:** SWRCB

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.

☐ Aesthetics	☐ Agriculture Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☒ Hazards & Hazardous Materials	☒ Hydrology/Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities / Service Systems	☐ Mandatory Findings of Significance	

DETERMINATION: (To be completed by the Lead Agency)
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 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.

Daniel F Peterson
Signature

Daniel F. Peterson
Printed Name

January 14, 2004
Date

The Department of Water Resources
For

SECTION 3
EVALUATION OF ENVIRONMENTAL IMPACTS - Reservoirs

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
I. AESTHETICS -- Would the project:				
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) **No Impact.** No designated scenic vistas or state scenic highways would be impacted by this proposed project. The closest Caltrans-designated scenic highway to any of the reservoirs or aqueducts is an underground portion of the South Bay Aqueduct from mile marker 25 to mile marker 29.5 which runs adjacent to I-680 from Calavaras Road west to Highway 238. The proposed Project would not alter existing scenic conditions because no new structures would be built. No impact would occur.

b) **No Impact.** The proposed Project would consist entirely of the periodic application of aquatic pesticides to the existing reservoirs and aqueducts and would not involve any permanent or long term alterations to existing visual conditions. Implementation of the proposed Project would not affect any historic buildings, rock outcroppings or other scenic resources. Hence, the proposed Project would have no impact on existing scenic resources.

c) **No Impact.** No structures, physical alterations, or other physical changes would be included in the proposed Project that would degrade visual conditions in the vicinity. Hence, the proposed Project would not degrade the existing visual character or quality of the site and its surroundings. Therefore, no impact would result from Project implementation.

d) **No Impact.** The proposed Project would not introduce any new source of substantial light or glare. Therefore, implementation of the proposed Project would have no impact.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and 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:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
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 & c) No Impact. There are no agricultural resources or operations within the Project sites. All Project activities would be conducted entirely within DWR-owned property at existing reservoirs and aqueducts. No development or acquisition of new lands would be involved. Therefore, no lands enrolled under the Williamson Act would be impacted. No impacts to agricultural resources would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. 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:				
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 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) Less-than-significant impact. The proposed Project will be situated within three air basins. Each basin has an air quality management district which is the regional agency empowered to regulate stationary and certain mobile air emission sources within its respective air basin. Clifton Court Forebay and the South Bay Aqueduct are located within the air basin regulated by the

San Francisco Bay Area Air Quality Management District (SFBAQMD). The San Francisco Bay Air Basin is in non-attainment for ozone and particulates (PM_{10}). The Tehachapi Afterbays and the portion of the Coastal Branch of the California Aqueduct that would be treated as part of the Project are situated within the San Joaquin Valley Unified Air Basin (SJVUAB) which is regulated by the San Joaquin Valley Air Pollution Control District (SJVAPCD). SJVAPCD is also in non-attainment for particulates (PM_{10}) and ozone. The East Branch of the California Aqueduct, Castaic Lake and Lake Perris are situated within the South Coast Air Basin (SCAB) and are regulated by the South Coast Air Quality Management District (SCAQMD).

Air Quality Management Districts are responsible for the preparation of Air Quality Management Plans which establish emission control measures for activities within the air basin that contribute to the non-attainment condition. The proposed Project would result in minimal vehicle emissions from the use of pickup trucks for the typical application and the less frequent use of a helicopter. The South Bay Aqueduct and the Coastal Branch of the California Aqueduct are treated twice monthly from April through October. The East Branch of the California Aqueduct has been treated three times per year since 1999 and Clifton Court Forebay has received one or two helicopter applications per summer since 1996. Castaic Lake and Lake Perris have both received about one helicopter application per year since 1994. The proposed Project would not involve any construction activities, nor would it change existing conditions. The proposed Project would not conflict with or result in an impact to policies or control measures set forth by the Air Quality Management Districts, and would not result in a violation of air quality standards.

c) **Less-than-significant impact.** Emissions associated with the project would include exhaust from ~~a~~ pick up trucks and a helicopter. The typical application involves the use of a pick up truck and applications at Project locations range from 3 to 24 times per year. Three of the Project locations require the use of a helicopter for aerial application on an annual basis; although Clifton Court Forebay receives two applications during some years. The proposed Project would not result in a cumulatively considerable increase in any of the emissions of criteria pollutants. The proposed Project would not change the existing condition and the emissions associated with the proposed project would be less than significant.

d) **Less-than-significant impact.** Copper sulfate would be directly administered to the reservoirs from an agricultural spreader attached to a helicopter and applied to the aqueducts either directly or enclosed in burlap bags suspended in the water column, thereby avoiding sensitive receptors. The SCAQMD defines sensitive receptors as residential areas, schools, playgrounds, health care facilities, and athletic facilities. The closest sensitive receptors to any of the reservoirs are scattered residences above the shores of Castaic Lake. The Department of Fish and Game, as well as, the Department of Parks and Recreation, County Agricultural Commissioner, and appropriate SWP water contractors are notified prior to copper sulfate, Nautique and Komeen applications and portions of the reservoirs are closed to recreational boating and fishing during the treatment periods.

Since the copper sulfate applied to the water would be in granular form, any dust emissions generated by its application would be minimal. Copper sulfate is not a toxic air contaminant according to the SCAQMD. Most of the dust would settle out into the reservoirs within a few hundred feet of the application areas. Nautique is a liquid aquatic pesticide and would therefore not create dust emissions. Therefore, implementation of the proposed Project would have a less-than-significant impact on local sensitive receptors.

e) **No Impact.** Project implementation would not create any substantial odors. Copper sulfate is odorless and Nautique has a slight ammoniacal odor. The purpose of the pesticide application would be to reduce taste and odor producing algae and aquatic weed growth in the SWP reservoirs and aqueducts. The Project would not generate any odors.

IV. 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, regulations or by the California Department of Fish and Game or US 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.** The proposed Project would involve the periodic application of aquatic pesticides to existing SWP reservoirs, aqueducts, and forebays. Several federal and state-listed threatened and/or endangered species are known to exist in the aquatic and terrestrial areas adjacent to the Project sites but not within the proposed Project reservoirs and aqueduct sites. The California Natural Diversity Data Base (CNDDB) of the California Department of Fish and Game was consulted to reveal any State or federally listed, sensitive, or species of concern occurring adjacent to the Project locations.

The CNDDB reports several occurrences of California red-legged frog (*Rana aurora draytonii*), which is federally listed as threatened, in the area near the South Bay Aqueduct and Clifton Court Forebay; Monitoring by Department of Water Resource's biologist has not revealed occurrences of the California red-legged frog within the lined portions of the State Water Project. In addition, predation on the California red-legged frog would be high within the SWP and the frog's preferred habitat is lacking (Hogan, 2003). San Joaquin kit fox (*Vulpes macrotis mutica*) also occur in the area near the South Bay Aqueduct and Clifton Court Forebay; although no occurrences have been reported in or adjacent to the Project location. It is conceivable that San Joaquin Kit Fox individuals could move through the Project location, nevertheless, the project would have a less-than-significant impact on the San Joaquin kit fox for the following reasons (1) San Joaquin kit fox is known to be nocturnal and the aquatic pesticide treatments would take place during daylight hours, (2) there would be no direct copper toxicity to the San Joaquin kit fox, and (3) any disturbance to the San Joaquin Kit Fox would be temporary and infrequent as Clifton Court Forebay is treated by helicopter once or twice annually and the South Bay Aqueduct is treated twice monthly April to October.

Clifton Court Forebay is located in Contra Costa County which is currently in the planning stage of setting up a Habitat Conservation Plan for 190,000 acres in the eastern portion of the County. The proposed Project would not affect habitat conservation areas. No copper sulfate, Nautique, or Komeen would be dispersed within the habitat conservation areas.

The section of the Coastal Branch of the California Aqueduct that would be treated as part of the Project has known occurrences of San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), giant kangaroo rat (*Dipodomys ingens),* and San Joaquin kit fox. An occurrence of San Joaquin woollythreads (*Monolopia congdonii*), approximately 100 plants, was reported within the right-of-way of the Coastal Aqueduct near the South Dome area of Kettleman Hills. The copper sulfate applications on the Coastal Branch would be administered directly into the aqueduct. Terrestrial

species would not be impacted by the Project. The proposed Habitat Conservation Plan for the aqueduct maintenance activities in the San Joaquin Field Division would not be impacted in any way.

A CNDDB search for the Project areas at Castaic Lake, and at the location of the Tehachapi Afterbays revealed no occurrences of any State or federally listed, sensitive, or species of concern occurring adjacent to these Project locations.

A CNDDB search for the Project portion of the East Branch of the California Aqueduct revealed one occurrence of the coast (San Diego) horned lizard (*Phrynosoma coronatum*) in the general vicinity of the California Aqueduct, four miles north, northeast of Lake Hughes. The water in this portion of the aqueduct would be treated with copper sulfate; however the copper sulfate would not be administered from this location. Portions of the East Branch of the California Aqueduct that are in this Project are located in areas covered by the San Bernardino Valley-wide Multi species Habitat Conservation Plan. No copper sulfate would be dispersed within the habitat conservation areas and terrestrial species would not be impacted by the Project.

A CNDDB search for Lake Perris revealed an occurrence of Stephens' kangaroo rat (*Dipodomys stephensi*) within the areas surrounding the Lake. The copper sulfate applications to Lake Perris would be administered directly into the Lake. The lands surrounding Lake Perris are identified for conservation under the Riverside County MSHCP/NCCP and the Riverside County Habitat Conservation Agency Habitat Conservation Plan (HCP). The proposed Project would not affect habitat conservation areas. Project activities would include unloading pallets of copper sulfate from a truck to the helicopter pad area, loading the copper sulfate into bins, and depositing the material into the reservoir using a helicopter. No copper sulfate would be dispersed within the habitat conservation areas. The helicopter pad areas are devoid of vegetation and are not part of the habitat conservation areas. Terrestrial species would not be impacted by the Project.

The California Department of Fish and Game has reported that the following fish species can be found within the aqueducts and reservoirs of the State Water Project: large mouth bass (*Micropterus salmoides*), small mouth bass (*Micropterus dolomieu*), striped bass (*Morone saxatilis)*, channel catfish (*Ictalurus punctatus*), white catfish (*Ameiurus catus*), black bullhead (*Ameiurus mela*), brown bullhead (*Ameiurus nebulosus*), yellow bullhead (*Ameiurus natalis*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), redear sunfish (*Lepomi microlophus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), warmouth (*Lepomis gulosus*), pumpkinseed (*Lepomis gibbosus*), bigscale logpearch (*Percina macrolepida*), staghorn sculpin (*Leptocottus armatus*), riffle sculpin (*Cottus gulosus*), Sacramento sucker (*Catostomus occidentalis*), mosquitofish (*Gambusia* spp.), goldfish (*Carassius* spp.), rainbow trout (*Oncorhynchus mykiss*). carp (*Cyprinus carpio*), shokihaze goby (*Tridentiger barbatus*), chameleon goby (Tridentiger trigonocephelus), yellow fin goby (*Acanthogobius flavimanus*), rainwater killifish (*Lucania parva*), threadfin shad (*Dorosoma petenense*), inland silversides (*Menidia beryllina*), golden shiner (*Notemigonus crysoleucas*), red shiner (*Notropis lutrensis*) fathead minnow (*Pimephales promelas*), California roach (Lavinia symmetricus), speckeled dace (*Rhinichthys osculus*). Native fish species found within the SWP include tule perch (*Hysterocarpus traski*), splittail (*Pogonicthys macrolepidotus*), Sacramento pikeminnow (*Ptychocheilus grandis*), hardhead (*Mylopharodon conocephalus*), hitch (*Lavinia exilicauda*), Sacramento blackfish (*Orthodon microlepidotus*), threespine stickleback (*Gasterosteus aculeatus*), and the prickly sculpin (*Cottus asper*) (*Wern Ette, 2003)*. None of these species are listed or fully protected species.

Clifton Court Forebay is known to contain winter-run Chinook salmon (*Oncorhynchus tshawytscha*), which is listed State and federally as endangered, and Delta smelt (*Hypomesus transpacificus*), which is State and federally listed as threatened. Aquatic pesticides are applied to approximately 30 percent of the Forebays' surface area during a treatment, allowing fish to avoid the application areas. Clifton Court Forebay typically is treated with Nautique or Komeen in May during the pumping restrictions of

the Vernalis Adaptive Management Plan. The pumping restriction results in longer than normal gate closures at Clifton Court Forebay. The water generally resides in the Forebay for several days prior to the aquatic pesticide applications and predation upon winter-run salmon and Delta smelt is a known factor. The copper concentrations would be applied according the label to achieve a maximum concentration of 1,000 ppb. California Department of Fish and Game laboratory tests have shown that concentrations of 1,000 ppb are many times below the 96 hour LC_{50} values for Delta smelt (DBW, 2001).

Salmonids tend to be more sensitive to copper than other species but tests for rainbow trout have also shown LC_{50} values many times higher than the application concentrations that would occur with this Project (DBW, 2001). Thus, it is likely that neither the winter-run Chinook salmon, nor Delta smelt, would be impacted by the concentrations of copper that would be used in Clifton Court Forebay. The impact on these listed fish species would be less than significant.

Studies have shown that the application of copper at label rates to surface waters for nuisance algae control in reservoirs has no apparent negative effects on most adult game fish. However, copper sulfate has been shown to be toxic to larval fish and aquatic invertebrates and has shown a potential for bioaccumulation depending on the physical, biological, and chemical factors present within the ecosystem. Bioaccumulation of copper sulfate poses less of a threat to birds than to other animals, with the lowest lethal dose for this material in pigeons and ducks being 1,000 parts per million (mg/kg). Application of copper sulfate in specific areas of the reservoirs would provide opportunities to fish to avoid the application sites. While temporary impacts to these animals may occur during aquatic pesticide applications, the Project's impacts would be less than significant.

b & c) Less-than-significant impact. The proposed Project would be implemented entirely within the open water of the existing SWP aqueducts and reservoirs and would not disturb any upland habitat adjacent to the Project areas. Lake Perris and Castaic Lake support small areas of wetland and riparian habitat. The South Bay Aqueduct, the East Branch, the Coastal Branch, and the Tehachapi Afterbay are concrete-lined and do not support wetland habitat.

d) Less-than-significant impact. Project activities would be conducted entirely within the existing SWP aqueducts and reservoirs and would not interfere substantially with the movement of any native resident or migratory fish or wildlife corridors, or impede the use of native wildlife nursery sites. Resident fish and potential impacts to fish nursery sites are evaluated in Item IV.a above. The impact would be less than significant.

e) No Impact. The Project would consist of applying aquatic pesticides to the water of existing reservoirs and aqueducts and would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. No impact would occur.

f) No Impact. Some areas around the East Branch of the California Aqueduct and Lake Perris are designated as reserves and managed under various Conservation Plans (refer to Item IV.a). The proposed Project would be conducted entirely within existing SWP aqueducts and reservoirs and designated operations areas, outside of upland habitat, and would not affect any MSHCP, Natural Community Conservation Plan or other Conservation Plan. Therefore, the proposed Project would not conflict with or impact any provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §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 & d) No Impact. The proposed Project would be implemented entirely within the open water of the existing Project reservoirs and aqueducts and would include no elements that would alter or otherwise disturb any known historical, archaeological or paleontologic resources. As the Project would only involve water treatment with no ground disturbances, there would be no impacts to unrecorded cultural resource sites. Therefore, no impacts to cultural resources would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. GEOLOGY AND SOILS -- Would the project:				
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 Publication 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 & e) No Impact. The Project would consist of applying aquatic pesticides to the water of existing SWP reservoirs and aqueducts and would not include any new structures, ground disturbances, or other elements that could expose persons or property to geological hazards. There would be no risk of landslide or erosion of topsoil. The Project would not require a septic or other wastewater system, as workers would use existing facilities in the operation areas of the reservoirs or aqueducts. No impacts to soils or geologic conditions would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
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 it 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 two 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 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 & b) Less-than-Significant Impact with Mitigation Incorporation. The proposed Project would involve handling copper sulfate pentahydrate, Nautique, and Komeen. All are regulated hazardous materials.

Copper sulfate: Acute exposure to humans can cause eye, skin, and respiratory irritation, and can be harmful if swallowed.[4] The Material Safety Data Sheet (MSDS) for copper sulfate is included in Appendix B. Use of this material would create a potential for spills that could affect worker safety and the environment. The spills could occur potentially during transport from storage sites in the Field Division to the application site and helicopter pads. Spills could also occur during loading into the helicopter spreader, and during transport by helicopter to the application sites. Potential risks would exist for spills to occur during the application process. Exposure to spills could affect humans and the environment.

Nautique and Komeen: Acute exposure to humans can cause eye, skin, and respiratory irritation, and can be harmful if swallowed.[5, 6] The Material Safety Data Sheets (MSDS) for Nautique and Komeen are included in Appendix C and D, respectively. Use of this material would create a potential for spills that could affect worker safety and the environment. The spills could occur potentially during transport to the helicopter pads and during loading into the applicator. Exposure to spills could affect humans and the environment.

DWR has a Hazardous Waste Management Program for the handling, storage, disposal, transport, and source reduction of hazardous waste. The existing Program includes procedures for containment and cleanup of hazardous materials/wastes spills, and establishes hazardous waste contingency. In addition, each Field Division has a contract with a private firms specializing in hazardous material cleanup. With implementation of the proposed mitigation measures as noted below, along with the Hazardous Waste Management Program, the Project would result in a less-than-significant impact.

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[4] Material Safety Data Sheet for Copper Sulfate
[5] Material Safety Data Sheet for Nautique
[6] Material Safety Data Sheet for Komeen

Mitigation Measure:

To ensure worker safety protection, DWR would require handlers of copper sulfate, Nautique, and Komeen to undergo training specific to the application process. DWR would also require workers to wear personal protective equipment for handling this aquatic pesticide, including disposable coveralls, gloves and respirators. DWR would further require that applications of copper sulfate, Nautique and Komeen be conducted in a manner consistent with the product labeling. Finally, DWR would comply with the recommendations on the MSDS for worker protection to minimize potential for exposure to the aquatic pesticides. With implementation of the following proposed mitigation measures, the potential to create a significant hazard to the public or to the environment would be reduced to a less-than significant impact:

HAZ-1 Annual training in safety shall be required for all DWR employees participating in the application or handling of copper sulfate, Nautique, and Komeen. Similarly, DWR shall require that all participating contractors and their employees or agents secure and maintain in force such licenses and permits as are required by law, in connection with the application or handling of copper sulfate.

HAZ-2 DWR shall require its employees participating in the application or handling of copper sulfate and Nautique, to wear appropriate personal protective equipment, including protective eyewear, gloves, boots, and coveralls, as well as a respirator that meets OSHA 29 CFR 1910.134 requirements.

HAZ-3 DWR shall apply copper sulfate, Nautique, and Komeen in a manner consistent with the product labeling.

HAZ-4 DWR shall comply with the recommendations provided on the Material Safety Data Sheet applicable to the specific aquatic pesticide product to be used.

c) **No Impact.** No known existing or proposed schools are located within ¼ mile of the reservoirs, aqueducts, or helicopter pads. No impact would occur.

d) **No Impact.** The Project sites are not listed on any hazardous waste site lists compiled in Government Code Section 65962.5. Hence, there would be no impact.

e & f) **Less-than-significant impact.** No airports are located within two miles of aqueduct and reservoir treatment sites. No spreaders containing copper sulfate, Nautique, and Komeen would fly over housing, roadways, or habitat conservation areas. The use of helicopters would not pose hazards to people working in the Project areas, nor would it result in any impacts to airport facilities.

g) **No Impact.** The proposed Project would not affect emergency evacuation routes, as public roadways would not be affected by the Project. No impact would result from the Project.

h) **No Impact.** The Project would not increase fire hazards at the reservoirs. Helicopter refueling activities would take place on existing dirt, concrete or asphalt pads. No impact from wildland fires would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. HYDROLOGY AND WATER QUALITY -- Would the project:				
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 stormwater 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) Less-than-significant Impact with Mitigation Incorporation.
Compliance with Federal and State Water Quality Standards: National Toxics Rule/California Toxics Rule as discussed in Section 1, the application of copper sulfate currently is permitted under and governed by Water Quality Order No. 2001-12-DWQ, NPDES Permit for Discharges of Aquatic Pesticides to Waters of the United States (General Permit), General Permit CAG990003. This General Permit was issued by the SWRCB in July 2001 and is scheduled to expire on January 31, 2004.

The SWRCB has notified interested parties that it intends to develop a new general permit for aquatic pesticides to replace the expiring General Permit No. CAG990003. However, to obtain coverage under this new permit, the SWRCB is requiring applicants to demonstrate either that its discharges comply with the water quality criteria for Priority Pollutants under the California Toxics Rule (CTR) and National Toxics Rule (NTR) or that it qualifies for an exception from compliance with such criteria, pursuant to Section 5.3 of the SWRCB's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SWRCB Policy). The CTR contains the copper water quality criteria for surface waters in California.

Among other things, Section 5.3 provides a Categorical Exception from the toxics standards where the discharge is necessary to implement control measures (1) for resource or pest management or (2) to meet statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code, and for certain maintenance and cleaning activities. DWR's purpose in periodically applying aquatic pesticides to its reservoirs and aqueducts is to: control algal blooms and, in turn,

achieve secondary drinking water standards for taste and odor; and to control aquatic weeds that impact the beneficial uses and conveyance of water supplies for municipal, irrigation, and industrial purposes. Therefore, such discharges qualify for a Categorical Exception to the toxics standards. Accordingly, DWR's 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, and Nautique. If granted, DWR would comply with all terms and conditions of the general permit.

DWR's use of copper compounds to control algal blooms and aquatic weeds would temporarily elevate copper concentrations above the freshwater thresholds set forth in the CTR for aquatic life, resulting in a potentially significant impact.[7] However, with the implementation of the proposed mitigation measures (e.g., seeking a variance from these thresholds via a Categorical Exception), this potentially-significant impact would be reduced to a less-than significant level.

Existing data indicate that copper concentrations in DWR's reservoirs and aqueducts decreases quickly following the initial application of this pesticide. Furthermore, the copper concentrations are below the CTR copper human health criteria for consumption of water and organisms of 1.3 mg/l. Thus, DWR's use of copper sulfate, Nautique, and Komeen would not result in any long-term exceedance of the applicable toxics standards for copper. Finally, DWR would continue collecting samples in accordance with the new statewide permits receiving water monitoring protocols.

The results of these monitoring events would be submitted to the SWRCB, pursuant to the reporting requirements of the NPDES permit. The reports would indicate the hardness, temperature, pH, and dissolved oxygen at two points as described in the general permit.

Compliance with Federal and State Drinking Water Standards:

Copper levels at DWR's reservoir outlets and aqueducts are generally an order of magnitude below the federal and state drinking water standards In addition, water withdrawn from SWP reservoirs and aqueducts undergoes conventional treatment prior to distribution. DWR delivers untreated water to its SWP contractors and other agencies. These contractors are responsible for the water treatment process involving coagulation, flocculation, sedimentation, filtration, and disinfection, which further reduces copper concentrations. Thus, periodic application of copper sulfate and Nautique is not expected to adversely affect DWR's ability meet applicable drinking water standards.

Mitigation Measures:

With the implementation of the following proposed mitigation measures, in conjunction with Mitigation Measure HAZ-3 (described above in Section VII, Hazards and Hazardous Materials), impacts to water quality standards and waste discharge requirements would be less than significant:

HYDRO-1 *DWR shall apply for coverage under the State Water Resources Control Board's new NPDES Permit for Discharges of Aquatic Pesticides and, as part of that application, seek a Categorical Exception, pursuant to Section 5.3 of the SWRCB's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.*

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[7] The recommended water quality criteria for copper in freshwater 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 copper is 13 micrograms per liter (µg/l). This level increases as water hardness increases. EPA, 2002

HYDRO-2 *DWR shall continue to monitor and report copper levels in its reservoirs and aqueducts in accordance with the monitoring requirements of the SWRCB's new NPDES permit.*

To the extent feasible, take full advantage of operational options (e.g., selective water withdrawal, bypass and blending) to avoid or minimize the use of copper sulfate;

To the extent feasible, treat algal blooms prior to their exponential growth phase to minimize the amount of aquatic pesticides used; and

b) No Impact. The proposed Project would not involve any construction activities or require the use of groundwater. No impact on groundwater recharge or supplies would result from the Project.

c, d & e) No Impact. The proposed Project would not involve construction of any structures that would alter drainage patterns or increase storm water runoff. The Project would not increase erosion or siltation on- or off-site. No streambeds would be altered. No increase in drainage capacity of local storm sewers would be required. No impact would result from the Project.

f) Less-than-significant Impact with Mitigation Incorporation. See response to item VIII.a above.

g, h, i & j) No Impact. Since the proposed Project would involve no new construction, no housing or other structures would be placed within a designated 100-year floodplain. The proposed Project would not alter the floodplain or have the potential to redirect flood flows. The Project would not be subject to tsunami or inundation due to mudflows. Nor would the Project expose personnel to a substantial risk due to seiche waves or from flooding as a result of a catastrophic dam failure. Copper sulfate treatments in the reservoirs and aqueducts would occur only periodically, as needed. The reservoir applications would take place above the surface elevations and each reservoir has a substantial freeboard around its perimeter, even when the reservoirs are full. No impacts would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. LAND USE AND PLANNING - Would the project:				
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 proposed Project would be implemented within the open water of existing SWP water reservoirs and aqueducts. Nearby housing and other development would not be affected. The proposed Project would not result in any division of an established community. Therefore, no impact would occur.

b) **No Impact.** The proposed Project would involve the application of aquatic pesticides to SWP reservoirs and aqueducts, each of which is located within property owned and operated by DWR. The purpose of the proposed Project would be to control aquatic weeds and algal blooms and, in turn, achieve secondary drinking water standards for taste and odor. Implementation of the Project would not create any new land uses or alter any existing uses. Rather, the proposed Project would involve the continuation of copper sulfate and Nautique treatments, which have occurred routinely at reservoirs; Clifton Court Forebay, Lake Perris, Castaic Lake and aqueducts; South Bay, Coastal Branch, and East Branch for the past several years. Implementation of the proposed Project would not conflict with any applicable land use plan, policy or agency regulation. No impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. MINERAL RESOURCES -- Would the project:				
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?	☐	☐	☐	☒
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 & b) No Impact. All Project activities would be limited to adding copper to the water of existing SWP reservoirs and aqueducts, and no development or ground disturbances would occur. Therefore, the proposed Project would not result in the loss of availability of any mineral resource that would be of future value. No impacts would occur.

XI. 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 within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐

Discussion:

a & d) Less-than-significant Impact. The application process in reservoirs would involve the use of a helicopter for approximately four to eight hours a few days per year during daytime hours. None of the reservoirs are located close to residential areas. The helicopter activity would only occur during the daytime hours. Noise from the helicopter would be intermittent occurring for brief periods during a few days per year. Other noise-generating equipment used on the helipad site would include trucks. Noise from this equipment would not exceed noise levels generated by the local roadways. The minimal use of the helicopter and other equipment would result in a less-than-significant noise impact. The application process in aqueducts would not involve any noise generating equipment.

b) No Impact. No substantial groundborne noise or vibration would result from the Project. No vibration impact would occur with Project implementation.

c) No Impact. The proposed Project would be carried out on a periodic basis as needed, and only during brief periods of time. An application process would typically be completed in four to eight hours. The Project would not create any permanent noise sources. Therefore, no impact would occur.

e & f) Less-than-significant Impact. No Projects are located within 2 mile vicinity of an airport. No noise generating equipment is used during the application of copper sulfate to the aqueducts. Therefore, no impact would occur.

XII. 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 numbers 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) **No Impact.** The proposed Project would be entirely implemented within the open water of existing reservoirs and aqueducts. No new commercial buildings or housing would be built in conjunction with Project implementation. The proposed Project would not directly or indirectly induce substantial population growth in the area. Hence, no impacts relating to substantial population growth would occur.

b) **No Impact.** No housing or other structures would be constructed, demolished, or replaced as a result of the proposed Project. All operations would occur within the boundaries of the existing reservoirs and aqueducts. There would be no net increase of employment possibilities at the proposed Project sites and no additional housing would be needed during operations. Therefore, no impact to housing would occur with Project implementation.

c) **No Impact.** No displacement of persons or housing would occur with Project implementation. Therefore, the proposed Project would not necessitate the construction of any replacement housing. No impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. PUBLIC SERVICES				
a) 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 public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

Discussion:

a) **No Impact.** The proposed Project would involve the application of aquatic pesticides to the water of existing reservoirs and aqueducts. The proposed improvements would not alter or require the construction of new schools, parks, or other public facilities, nor would the proposed Project substantially increase the need for police and fire services beyond existing conditions. The Project would result in beneficial effects to water service by controlling algae blooms and aquatic weeds which might otherwise degrade drinking through elevated taste and odors problems and reduce water delivery capacity water by obstructing conveyance structures.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. RECREATION --				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility 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 & b) No Impact. The proposed Project would involve the periodic application of aquatic pesticides to the existing SWP reservoirs and aqueducts. The proposed Project would not increase demand for neighborhood or regional parks. Boating and fishing recreational uses in reservoirs would be temporarily shut down during the application process. These closures would occur a few times per year. No impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. TRANSPORTATION/TRAFFIC -- Would the project:				
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) **No Impact.** The Project would involve the application of aquatic pesticides to open water with the use of a helicopter. The copper sulfate, Nautique, and Komeen would be delivered on pallets or in tanks to the helicopter pads for reservoir applications. Up to five workers would be needed during an application event. Each application would require one to two trucks to deliver the aquatic pesticide for each application event. No impact would occur.

c) **No Impact.** The proposed Project would require the use of helicopters. A flight plan would be filed routinely for each occurrence and no long-term or permanent alteration of air traffic patterns from planes associated with public or private use airports would be required. The helicopters would not transport any aquatic pesticides to or from the airports. Copper sulfate for aqueduct applications would be delivered by truck to the warehouse. No impact would occur.

d) **No Impact.** The proposed Project would be limited to the open water of existing reservoirs and aqueducts, and no alterations of roadways would be required. No incompatible uses or substantial increase in hazards would occur as a result of the proposed Project. Hence, no impact would occur.

e) **No Impact.** Refer to item VII.g (Hazards and Hazardous Materials) for discussion

f) **No Impact.** The existing operational areas of DWR properties that are designated for storage, loading, and handling of aquatic pesticides have sufficient parking capacity to accommodate the proposed Project. No additional parking outside of DWR's properties would be required. No new helicopters would be required for reservoir applications and existing activities relying on helicopters have been ongoing for a number of years at the reservoirs, no additional parking requirements would be necessary. Hence, no impact would occur with respect to parking capacity.

g) **No Impact.** The proposed Project would not involve or conflict with any alternative transportation policies. No impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. UTILITIES AND SERVICE SYSTEMS Would the project:				
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) **No Impact**. The proposed Project would be limited to the application of aquatic pesticides to existing water reservoirs and aqueducts and would not generate additional wastewater. The Project would not result in discharges that would cause an exceedance of any wastewater treatment requirements. Therefore, no impacts would occur.

b) **No Impact.** The proposed Project would be limited to the application of aquatic pesticides to existing water reservoirs and aqueducts. The Project would not increase demand for water or wastewater treatment facilities in the region. Implementation of the proposed Project would result in no impacts with regards to water or wastewater treatment plants.

c) **No Impact.** Implementation of the proposed Project would not require paving and/or the installation of new facilities. There would be no increase in the amount of storm water runoff as a result of the Project. Therefore, the proposed Project would not necessitate the construction or expansion of storm water drainage facilities. No impacts would occur.

d) **No Impact**. The Project would be limited to the treatment of an existing water supply and would contain no elements that would require additional water supply. Hence, no impacts would occur.

e) **No Impact**. The proposed Project would not increase the amount of wastewater discharged into the existing sewer system. Hence, no impact would occur.

f) **Less-than-significant Impact.** DWR proposes to continue the existing copper application operations at Clifton Court Forebay, Castaic Lake, Lake Perris, South Bay Aqueduct, Coastal Branch, and East Branch, for controlling aquatic weeds and algal blooms under the SWRCB's new NPDES permit, although such operations would be extended to the proposed Tehachapi Second Afterbay. Any solid waste generated by the proposed Project would be hauled to an approved offsite landfill or recycling facility with sufficient permitted capacity, as is the case presently. Implementation of the Project would result in only minor increases in solid waste production following copper sulfate applications to Tehachapi Second Afterbay (this Afterbay has not yet been constructed). However, any increases in solid waste generation would be negligible and would not impact the landfill's capacity. Hence, the proposed Project would result in a less than- significant impact.

g) **No Impact.** The proposed Project would not result in an increased production of solid waste, nor would it conflict with applicable federal, state, and local statutes and regulations related to solid waste. No impacts would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. MANDATORY FINDINGS OF SIGNIFICANCE				
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 animal community, reduce the number or restrict the range of a rare or endangered plant or animal 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 will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

Discussion:

a) **Less-than-significant Impact with Mitigation Incorporation.** The proposed Project would involve the periodic application of copper sulfate and Nautique (aquatic pesticides) to existing State Water Project water storage reservoirs; Clifton Court Forebay, Castaic Lake, Lake Perris, Tehchapi Afterbays; and aqueducts; South Bay Aqueduct, Coastal Branch, and East Branch owned and operated

by the Department of Water Resources. Applications of these aquatic pesticides would take place, on an as needed basis, to control algal blooms and aquatic weeds so that such blooms do not degrade drinking water quality through elevated taste and odor problems, production of algal toxins, and/or through filter clogging. The Project would not require any physical alteration or construction of any facilities at the Project sites. Nor would the Project result in any ground disturbance or tree or vegetation removal. Implementation of the Project may temporarily impact aquatic species present in the reservoirs and aqueducts and their associated habitats during pesticide applications. However, these impacts would be temporary and less than significant. Several species of rare or endangered animals are known to exist in the terrestrial areas adjacent to the Project sites. However, none of these species would be impacted by the proposed Project. Likewise, the Project would not eliminate any important examples of California history. Therefore, implementation of the proposed Project, in conjunction with the proposed mitigation measures related to hydrology/water quality and hazards/hazardous materials to reduce potentially significant impacts (i.e., potential to degrade the quality of the environment), would result in a less-than-significant impact.

b) **No Impact.** The Project sites are each located within properties owned and operated by DWR. No foreseeable cumulative impacts in conjunction with potential local or regional projects would occur. Application events would typically be conducted only a few times per year in the reservoirs, on an as-needed basis. Applications in the aqueducts would occur more frequently, as often as twice-monthly during the algal growth season. Therefore, the impacts of Project application in the area would not be cumulatively considerable and would have no cumulative impact.

c) **Less-than-significant Impact with Mitigation Incorporation.** As previously discussed in Sections 3 and 4 of this MND, the proposed Project would reduce any hazard-related impacts to the human beings to less-than-significant levels with the implementation of the proposed mitigation measures in conjunction with strict compliance with DWR's Hazardous Waste Management Program, as well as applicable safety laws and regulations. The proposed Project may induce limited and temporary noise intrusions during Project application, which would be less-than-significant. Hence, the proposed Project would result in less-than-significant effects on human beings.

SECTION 4
LIST OF MITIGATION MEASURES

HAZARDS AND HAZARDOUS MATERIAL

HAZ-1 *Annual training in safety shall be required for all DWR employees participating in the application or handling of copper sulfate, Nautique, and Komeen. Similarly, DWR shall require that all participating contractors and their employees or agents secure and maintain in force such licenses and permits as are required by law, in connection with the application or handling of copper sulfate.*

HAZ-2 *DWR shall require its employees participating in the application or handling of copper sulfate, Nautique, and Komeen to wear appropriate personal protective equipment, including protective eyewear, gloves, boots, and coveralls, as well as a respirator that meets OSHA 29 CFR 1910.134 requirements.*

HAZ-3 *DWR shall apply copper sulfate, Nautique, and Komeen in a manner consistent with the product labeling.*

HAZ-4 *DWR shall comply with the recommendations provided on the Material Safety Data Sheet applicable to the specific aquatic pesticide product to be used.*

HYDROLOGY AND WATER QUALITY

HYDRO-1 *DWR shall apply for coverage under the State Water Resources Control Board's new NPDES Permit for Discharges of Aquatic Pesticides and, as part of that application, seek a Categorical Exception, pursuant to Section 5.3 of the SWRCB's Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.*

HYDRO-2 *DWR shall continue to monitor and report copper levels in its reservoirs and aqueducts in accordance with the monitoring requirements of the SWRCB's new NPDES permit.*

--- To the extent feasible, take full advantage of operational options (e.g., selective water withdrawal, bypass and blending) to avoid or minimize the use of copper sulfate;

--- To the extent feasible, treat algal blooms prior to their exponential growth phase to minimize the amount of aquatic pesticides used; and

--- Focus resources on the specific type (i.e. planktonic or benthic) and location of the problem algae.

SECTION 5
REFERENCES

California State Water Resources Control Board, Water Quality Order NO. 2001-12-DWQ *Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit)General Permit No. CAG990003, Waste Discharge Requirements* http://www.swrcb.ca.gov/resdec/wqorders/2001/wqo/wqo2001-12.doc.

Cantu, C., 2003. Letter from Celeste Cantu, Executive Director State Water Resources Control Board, California Environmental Protection Agency to Interested Parties Regarding Status of Aquatic Pesticides Permits, August 6, 2003.

Department of Boating and Waterways. 2001. Final Environmental Impact Report for the *Egeria densa* Control Program., Sacramento, CA.

Diamond, J.M., C. Gerardi, E. Leppo, and T. Miorelli, *Using a Water-Effect Ratio Approach to Establish Effects of an Effluent-Influenced Stream on Copper Toxicity to the Fathead Minnow. Environmental Toxicology and Chemistry*, Vol.16, No. 7, pp. 1480-1486, 1997.

Hogan, J. 2003. Personal communication, California Department of Water Resources, Sacramento, CA.

University of California. 2001. Aquatic Pest Control. Statewide Integrated Pest Management Project, Agriculture and Natural Resources, Publication 3337.

U. S. Environmental Protection Agency, *Guidance for registration of pesticide products containing copper sulfate. Fact sheet No 100,* 1986.

U. S. Environmental Protection Agency, *National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047,* 2002

Wernette, F. 2003. Personal communication, California Department of Fish and Game, Stockton, CA.

SECTION 6

AGENCIES CONTACTED

1. State Water Resources Control Board

SECTION 7

LIST OF PREPARERS
Department of Water Resources

Jeffrey Janik, Staff Environmental Scientist
Tim Smith, Environmental Scientist
Daniel F. Peterson, Environmental Program Manager

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold Schwarzenegger
Governor

Jan Boel
Acting Deputy Director

February 17, 2004

Daniel Peterson
Department of Water Resources
1416 9th Street
Sacramento, CA 95814

Subject: Application of Copper-Based Pesticides to the State Water Project (SWP) to Control Aquatic Weeds and Aglal Blooms
SCH#: 2004012091

Dear Daniel Peterson:

The State Clearinghouse submitted the above named Negative Declaration to selected state agencies for review. The review period closed on February 13, 2004, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
(916)445-0613 FAX(916)323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Ba

SCH# 2004012091
Project Title Application of Copper-Based Pesticides to the State Water Project (SWP) to Control Aquatic Weeds and Aglal Blooms
Lead Agency Water Resources, Department of

Type Neg Negative Declaration

Description DWR is applying for coverage under the State Water Resources Control Boards' new statewide general NPDES permit for discharge of aquatic pesticides to control algal blooms and aquatic weeds in SWP aqueducts and reservoirs, and, as part of that application seek a Categorical Exception for the use of copper sulfate, Nautique, and Komeen.

Lead Agency Contact

Name Daniel Peterson
Agency Department of Water Resources
Phone 916 653.9978 **Fax**
email
Address 1416 9th Street
City Sacramento **State** CA **Zip** 95814

Project Location

County Contra Costa, Los Angeles, Riverside, Kern, Alameda, Kings, ...
City
Region
Cross Streets
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways State Water Project Aqueducts, Lake Perris, and Castaic Lake
Schools
Land Use

Project Issues Toxic/Hazardous; Water Quality

Reviewing Agencies Resources Agency; Department of Boating and Waterways; Department of Fish and Game, Headquarters; Department of Parks and Recreation; Caltrans, Division of Transportation Planning; State Water Resources Control Board, Division of Water Quality; Native American Heritage Commission; Regional Water Quality Control Board, Region 2; Regional Water Quality Control Board, Region 4; Regional Water Quality Control Bd., Region 5 (Fresno); Regional Water Quality Control Bd., Region 6 (Victorville); Regional Water Quality Control Board, Region 8; State Lands Commission

Date Received 01/15/2004 **Start of Review** 01/15/2004 **End of Review** 02/13/2004

Note: Blanks in data fields result from insufficient information provided by lead agency.

STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

February 19, 2004

Ms. Jarma Bennett
Division of Water Quality
State Water Resources Control Board
Post Office Box 100
Sacramento, California 95812-0100

Dear Ms. Bennett:

A copy of the Notice of Determination for the Project: "Application of Copper-Based Pesticides to the State Water Project to Control Aquatic Weeds and Algal Blooms" is enclosed. The review period for the above named Negative Declaration closed on February 13, 2004, and no state agencies submitted comments by that date.

The enclosed letter dated February 17, 2004 from the State Clearinghouse and Planning Unit acknowledges that we have complied with the Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

If you have any questions, please contact Jeff Janik of my staff at (916) 653-5688 or by email at jjanik@water.ca.gov.

Sincerely,

Daniel F. Peterson

Daniel F. Peterson, Chief
Environmental Assessment Branch
Division of Operations and Maintenance

Enclosures

Distribution List: (See attached list.)

Distribution List
Regional Water Quality Control Boards

Tina Low
San Francisco Bay Regional
Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, California 94612

Augustine Anijielo
Los Angeles Regional
Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, California 90013

Emily Alejandrino
Central Valley Regional
Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova California 95670-6114

Gene Rondash
Lahontan Regional
Water Quality Control Board
15428 Civic Center Drive, Suite 100
Victorville, California 92392

Jessie Powell
Santa Ana Regional
Water Quality Control Board
3737 Main Street, Suite 500
Riverside, California 92501

Notice of Determination

Form C

To: ☑ Office of Planning and Research
PO Box 3044, 1400 Tenth Street, Room 212
Sacramento, CA 95812-3044

☐ County Clerk
County of _____

From: (Public Agency) Dept. Water Resources
1416 9th Street
Sacramento, CA 95814
(Address)

Subject:
Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

Application of Copper-Based Pesticides to the State Water Project (SWP) to Control Aquatic Weeds and Algal Blooms
Project Title

2004012091	DWR, Daniel Peterson	916-653-9978
State Clearinghouse Number (If submitted to Clearinghouse)	Lead Agency Contact Person	Area Code/Telephone/Extension

State Water Project (Contra Costa, Los Angeles, Riverside, Kern, Alameda, Kings...)
Project Location (include county)

Project Description:

DWR is applying for coverage under the State Water Resources Control Boards' new statewide general NPDES permit to discharge aquatic pesticides to control algal blooms and aquatic weeds in SWP aqueducts and reservoirs, and, as part of that application, seek a Categorical Exception in the use of copper sulfate, Nautique, and Komeen.

This is to advise that the Department of Water Resources has approved the above described project on
☑ Lead Agency ☐ Responsible Agency

2/18/04 and has made the following determinations regarding the above described project:
(Date)

1. The project [☐will ☑will not] have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☑ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☑were ☐were not] made a condition of the approval of the project.
4. A statement of Overriding Considerations [☐was ☑was not] adopted for this project.
5. Findings [☑were ☐were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval is available to the General Public at:
Department of Water Resources, 1416 9th Street, Room 620, Sacramento, CA 95814

Daniel F Peterson 2/19/04 Chief, Env. Assessment Br.
Signature (Public Agency) *Date* *Title*

Date received for filing at OPR:

RECEIVED
FEB 19 2004
STATE CLEARING HOUSE

January 2004

Governor's Office of Planning and Research

February 19, 2004

Ms. Jarma Bennett
Division of Water Quality
State Water Resources Control Board
Post Office Box 100
Sacramento, California 95812-0100

Dear Ms. Bennett:

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The enclosed letter dated February 17, 2004 from the State Clearinghouse and Planning Unit acknowledges that we have complied with the Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

If you have any questions, please contact Jeff Janik of my staff at (916) 653-5688 or by email at jjanik@water.ca.gov.

Sincerely,

Original Signed By

Daniel F. Peterson, Chief
Environmental Assessment Branch
Division of Operations and Maintenance

Enclosures

Distribution List: (See attached list.)

bcc: Doug Thompson, Delta Field Division
James Phillips, San Joaquin Field Division
John Kemp, Southern Field Division

JJanik:Darlene Quinn
C:\environ\janik\SWRCB letter..doc

Distribution List
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Notice of Determination

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☐ County Clerk
County of _____

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1416 9th Street
Sacramento, CA 95814
(Address)

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Application of Copper-Based Pesticides to the State Water Project (SWP) to Control Aquatic Weeds and Algal Blooms
Project Title

2004012091	DWR, Daniel Peterson	916-653-9978
State Clearinghouse Number (If submitted to Clearinghouse)	Lead Agency Contact Person	Area Code/Telephone/Extension

State Water Project (Contra Costa, Los Angeles, Riverside, Kern, Alameda, Kings...)
Project Location (include county)

Project Description:

DWR is applying for coverage under the State Water Resources Control Boards' new statewide general NPDES permit to discharge aquatic pesticides to control algal blooms and aquatic weeds in SWP aqueducts and reservoirs, and, as part of that application, seek a Categorical Exception in the use of copper sulfate, Nautique, and Komeen.

This is to advise that the Department of Water Resources ☑ Lead Agency ☐ Responsible Agency has approved the above described project on 2/18/04 (Date) and has made the following determinations regarding the above described project:

1. The project [☐ will ☑ will not] have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☑ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☑ were ☐ were not] made a condition of the approval of the project.
4. A statement of Overriding Considerations [☐ was ☑ was not] adopted for this project.
5. Findings [☑ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval is available to the General Public at:
Department of Water Resources, 1416 9th Street, Room 620, Sacramento, CA 95814

Daniel F Peterson 2/19/04 Chief, Env. Assessment Br.
Signature (Public Agency) *Date* *Title*

Date received for filing at OPR:

RECEIVED
FEB 19 2004
STATE CLEARING HOUSE

January 2004

Governor's Office of Planning and Research

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Arnold
Schwarzenegger
Governor

Jan Boel
Acting Deputy
Director

February 17, 2004

Daniel Peterson
Department of Water Resources
1416 9th Street
Sacramento, CA 95814

Subject: Application of Copper-Based Pesticides to the State Water Project (SWP) to Control Aquatic Weeds and Aglal Blooms
SCH#: 2004012091

Dear Daniel Peterson:

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Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
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Document Details Report
State Clearinghouse Data Base

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Lead Agency Water Resources, Department of

Type Neg Negative Declaration

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Lead Agency Contact

Name Daniel Peterson
Agency Department of Water Resources
Phone 916 653.9978 **Fax**
email
Address 1416 9th Street
City Sacramento **State** CA **Zip** 95814

Project Location

County Contra Costa, Los Angeles, Riverside, Kern, Alameda, Kings, ...
City
Region
Cross Streets
Parcel No.
Township **Range** **Section** **Base**

Proximity to:

Highways
Airports
Railways
Waterways State Water Project Aqueducts, Lake Perris, and Castaic Lake
Schools
Land Use

Project Issues Toxic/Hazardous; Water Quality

Reviewing Agencies Resources Agency; Department of Boating and Waterways; Department of Fish and Game, Headquarters; Department of Parks and Recreation; Caltrans, Division of Transportation Planning; State Water Resources Control Board, Division of Water Quality; Native American Heritage Commission; Regional Water Quality Control Board, Region 2; Regional Water Quality Control Board, Region 4; Regional Water Quality Control Bd., Region 5 (Fresno); Regional Water Quality Control Bd., Region 6 (Victorville); Regional Water Quality Control Board, Region 8; State Lands Commission

Date Received 01/15/2004 **Start of Review** 01/15/2004 **End of Review** 02/13/2004

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

Monitoring Plan for Copper
in the State Water Project

Algae and Aquatic Weed Control Program

Water Quality Order No. 2001-12-DWQ
GENERAL PERMIT No. CAG990003
NPDES Permit for Discharge of Copper

Prepared by:
California Department of Water Resources
Division of Operations and Maintenance
Water and Plant Engineering Office
Environmental Assessment Branch

February 27, 2002

1.0 APPROVAL PAGE

This quality assurance project plan was prepared by staff of the Department of Water Resources, Environmental Assessment Branch. The document provides the instructions for this project and will be periodically reviewed and revised to update analytical procedures and program information.

Daniel F. Peterson

Daniel F. Peterson, Chief
Environmental Assessment Branch

Date 2-26-02

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ATTACHMENTS

2.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the organization, functions, procedures, and specific quality assurance (QA) and quality control (QC) activities for collecting and analyzing samples under the algae and aquatic weed control program in the State Water Project (SWP).

The SWP, managed by the Department of Water Resources (DWR), is the largest state-built, multipurpose water project in the country. Approximately 20 million of California's residents receive at least part of their water from the SWP; and SWP's water is used to irrigate thousands of farmland acres. Also, the SWP was designed and built for flood control, power generation, recreation, and fish and wildlife protection.

Aquatic plants and algae pose a number of serious water quality and supply problems in the SWP (**Table 1**). Aquatic plants can accumulate on trash racks and other control structures resulting in reduced pumping at major SWP pumping plants. Blue-green algae produce a number of compounds that cause taste and odors in drinking water supplies. In addition, certain species of blue-green algae produce toxins that are potentially harmful to fish and wildlife and human health. To minimize the impacts caused by aquatic plants and algae, DWR applies copper compounds at six sites in the SWP. These sites are distributed throughout the state from the southern delta at Clifton Court Forebay to Lake Perris in the south. The treatment sites are located within the boundaries of five Regional Water Quality Control Boards (**Table 1**).

2.1 QAPP Objective and Use

The goal of the procedures and specifications established in this QAPP is to provide references, standardized procedures and quality specifications for the sampling, analysis and data review procedures required for copper monitoring in the SWP.

2.2 Project Planning Documents

The QAPP details the specific activities, standard field procedures, and specifications for this program. The QAPP and the standard operating procedures (SOPs) identify sampling locations, number of samples, field procedures and analytical methods used.

TABLE 1. DWR Aquatic Plant and Algae Management

Water	Region (RWQCB)	Target Biota	Associated Problem	Aquatic Pesticide
Reservoirs and Forebays				
Clifton Court Forebay *and* Banks Pumping Plant Intake Channel	5	Submersed plants	*Reduced water flow	Komeen, Nautique
Castaic Lake	4	Planktonic blue-green algae	Taste and odor, filter clogging, and toxins	Copper sulfate
Perris Lake	8	Planktonic blue-green algae	Taste and odor, filter clogging, and toxins	Copper sulfate
Aqueducts				
South Bay Aqueduct *and* Bethany Forebay	2	Attached *Cladophora* and blue-greens Submersed plants	*Reduced water flow taste and odor	Copper sulfate Komeen, Nautique
CA Aqueduct - Coastal Branch	5	Algae and submersed plants	*Reduced water flow	Copper sulfate
CA Aqueduct - East Branch	6	Attached blue-green algae	Taste and odor, filter clogging, and toxins	Copper sulfate

* Creates operational problems by clogging trash racks and filters

RWQCB - Regional Water Quality Control Boards

Region 2	San Francisco Bay
Region 4	Los Angeles
Region 5	Central Valley
Region 6	Lahontan
Region 8	Santa Ana

3.0 SITE DESCRIPTION AND HISTORY

3.1 Clifton Court Forebay

Clifton Court Forebay is located in the southeast corner of Contra Costa County about 10 miles northwest of the city of Tracy and within the borders of the Central Valley Regional Water Quality Control Board, Region 5 (**Figure 1**). The Forebay is a shallow 28,653 acre-foot reservoir at the head of the California Aqueduct. Water enters the forebay via a gated structure connected at West Canal, a channel of Old River that allows waters of Sacramento- San Joaquin Delta to enter the Forebay.

The Forebay provides storage for off-peak pumping and permits regulation of flows into the H.O. Banks Delta Pumping Plant. Inflows to the Forebay are generally made during high tides. Construction of the Forebay was completed in December 1969. Aquatic weeds are treated with Komeen or Nautique to reduce aquatic weeds clogging that clog and obstruct the primary and secondary trashracks at the Skinner Fish Protection Facility and at Banks Pumping Plant.

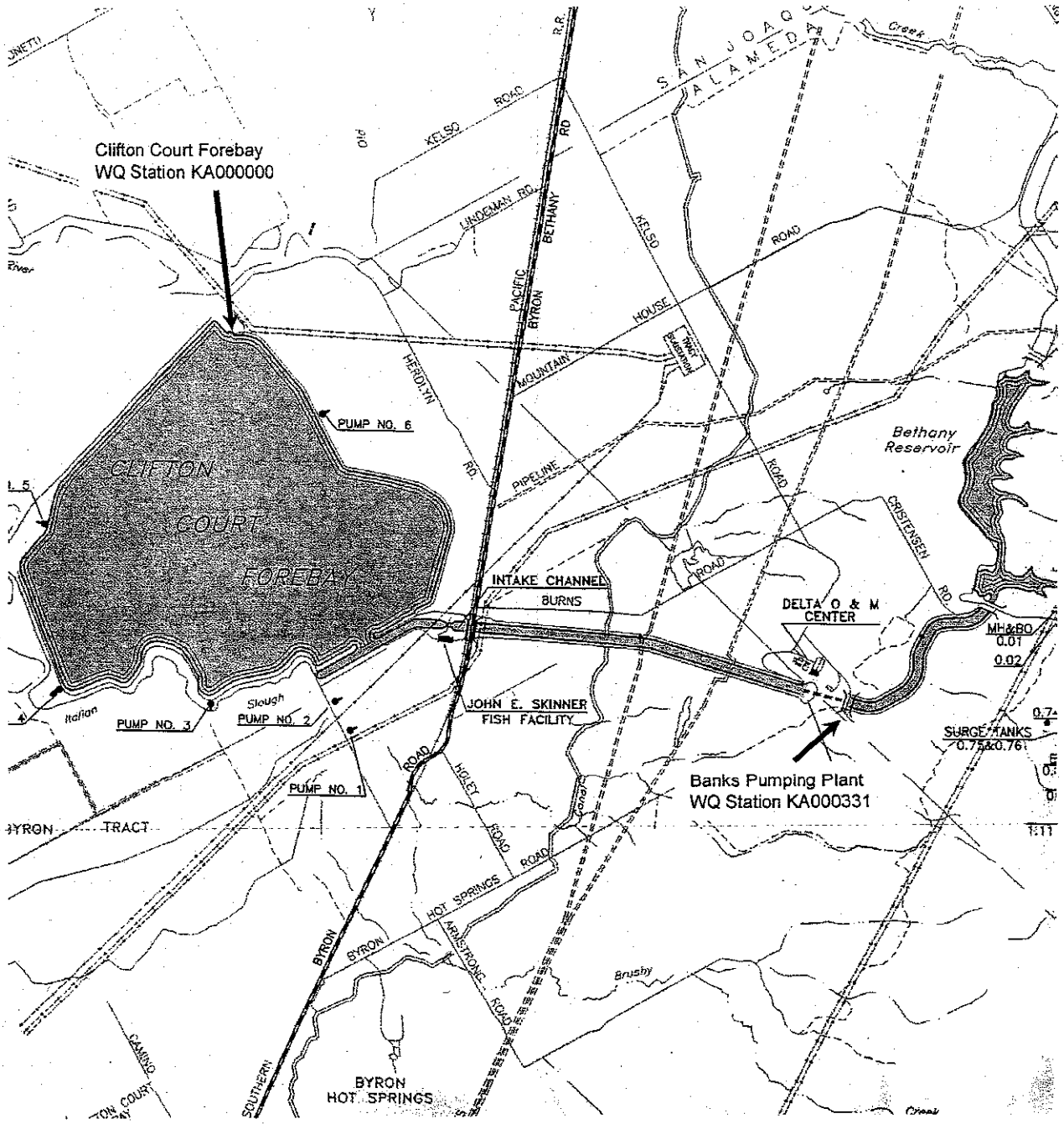
The aquatic plant community in the Forebay is composed of a mixed assemblage of mostly submersed plants including Egeria (*Egeria densa*), Sago Pondweed (*Potamogeton pectinalus*), Eurasian watermilfoil (*Myriophyllum speciatum*), Coontail (*Cerataphyllum demersum*), American pondweed (*Potamogeton nodosus*), Curlyleaf pondweed (*Potamogeton crispus*) and several other taxa of lesser abundance.

A manually operated trash rack system is used to remove aquatic weeds. The system is staffed and operated 24 hours per day during the peak aquatic weed season that usually spans from April to October. Weeds removed from the trashracks are deposited into an 8 yard capacity dumpster and hauled to a landfill for deposition.

Weeds in the Forebay began to create problems to water delivery in the early 1990's after a mechanical weed harvester was used. The procedure was unsuccessful and resulted in dispersing aquatic weeds from one isolated cove of about 250 surface acres to more than 1000 acres.

Clogging of trash racks at the Skinner Fish Protection Facility has caused a number of unscheduled shutdowns in pumping at Banks Pumping Plant. In response to the operational problems caused by the excessive amounts of weeds, the first chemical treatment was conducted in May 1995. Komeen (8 % copper as elemental) was applied to 300 surface acres by direct subsurface application from boats. A second Komeen treatment was conducted in September 1995 by helicopter to about 600 acres.

Figure 1. Clifton Court Forebay



From 1996 to 2000, Komeen was applied to 250 to 700 surface acres of the Forebay in one or two helicopter applications during the summer. In 2001, Nautique was applied to 700 acres.

3.2 South Bay Aqueduct

The South Bay Aqueduct originates at Bethany Reservoir (5,070 acre feet) about 1 mile downstream from Banks Pumping Plant and within the boundaries of the San Francisco Bay Regional Water Quality Control Board (Region 2). Completed in 1966, the 44.1 mile system serves portions of Alameda and Santa Clara Counties including the cities of Livermore and Santa Clara (**Figure 2**). Eleven of the 45-mile system is open canal and during April to October, copper sulfate is applied to control filter clogging, filamentous algae (*Cladophora*) and taste and odor producing blue-greens.

Algae problems began to occur in the SBA soon after the canal began operations in 1966. Copper sulfate was applied in the late 1960's to control problem algae that cause taste and odor problems and clog trash racks. From 1976 To 1986, an automated system was used to dispense liquid copper sulfate at 3 locations in the canal. Since 1986, copper sulfate crystals are applied about twice monthly during the April to October algal growth season.

3.3 California Aqueduct - Coastal Branch

The Coastal Aqueduct originates at California Aqueduct at milepost 184.63 near Kettleman City and extends 115 miles to near Vandenberg Air Force Base in San Luis Obispo County (**Figure 3**). Most of the canal system consists of enclosed pipelines and tunnels. Algae and attached weed problems are restricted to the first 14.8-mile open section of the canal beginning at the junction of the California Aqueduct to Devils Den Pumping Plant. The treated section is within the boundaries of the Central Valley Regional Water Quality Control Board (Region 5).

Copper sulfate crystals have been used since 1985 to control clogging problems at trashracks and pumping plants caused by attached algae (Cladophora) and attached aquatic plants including Horned pondweed. Copper is applied about twice monthly during the April to October growth season. Weekly treatments are sometimes needed during the summer months.

Figure 2. South Bay Aqueduct

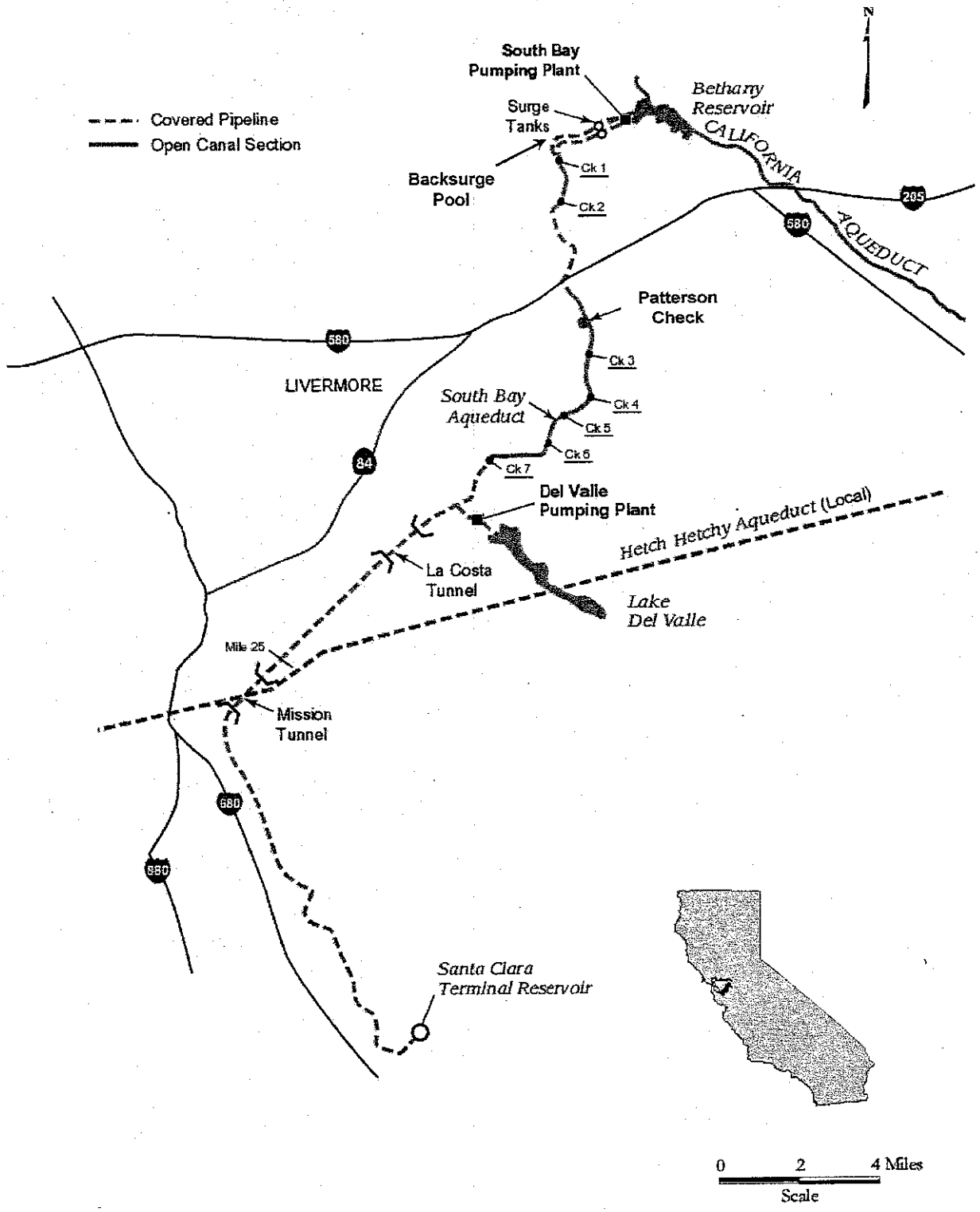
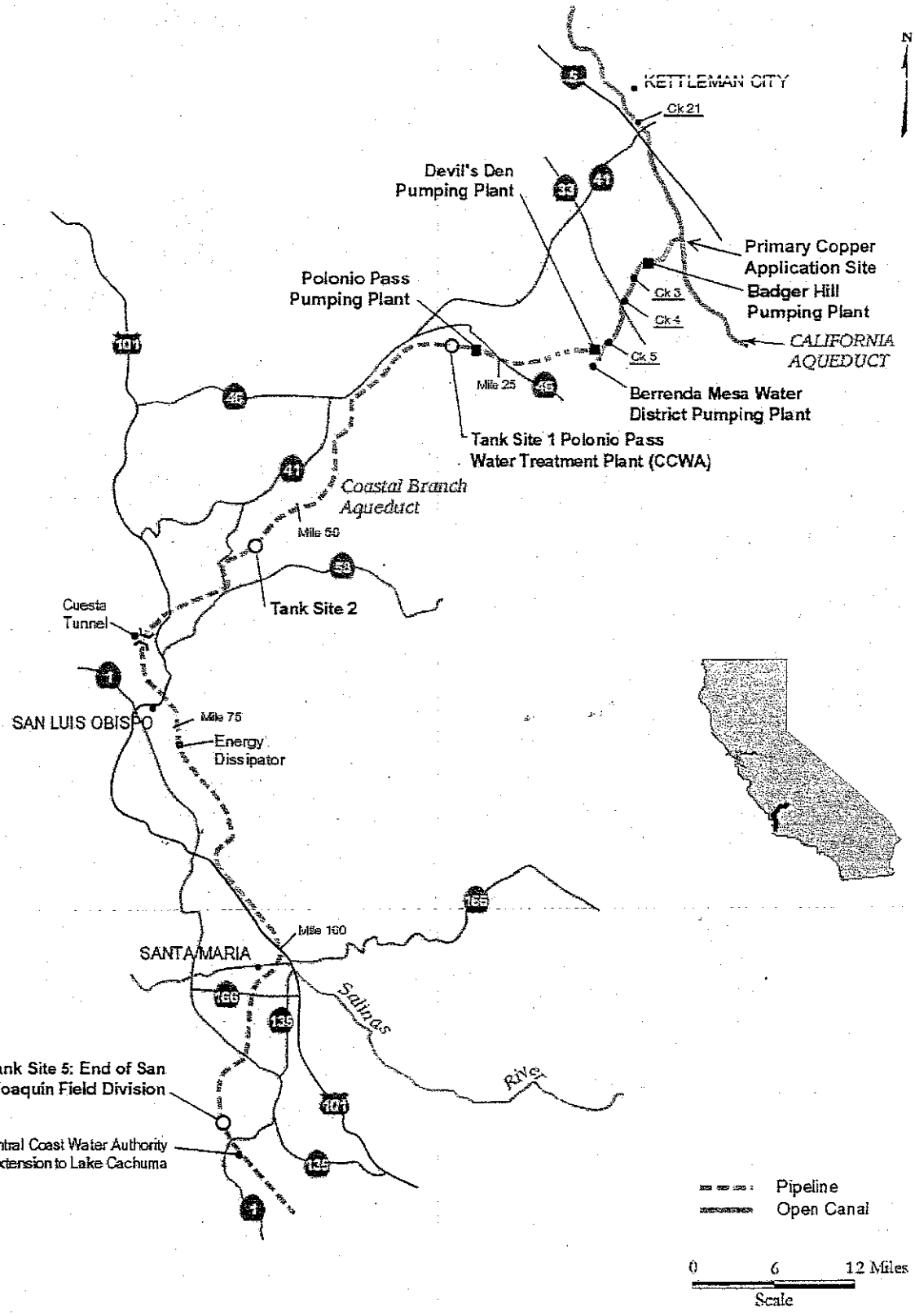


Figure 3. California Aqueduct – Coastal Branch



3.4 California Aqueduct - East Branch

The California Aqueduct divides into two branches at Tehachapi Afterbay at milepost 304.02. The West Branch extends for about 32 miles passing through Pyramid Lake to the terminus at Castaic Lake. The East Branch continues about 140 miles from the bifurcation with the West Branch to its terminus at Lake Perris at milepost 443 and is within the boundaries of the Lahontan Regional Water Quality Control Board, Region 6 (**Figure 4**).

Off-flavor compounds, MIB and geosmin, produced by blue-green algae in the East Branch of the California Aqueduct have been controlled with copper sulfate since about 1991. Copper sulfate crystals have been applied a total of 11 times in the past 10 years with 9 applications conducted from 1999 to 2001. The most troublesome portion for taste and odor problems is located between about mileposts 326 and 403. Copper has also been applied to the first and second Devil Canyon Afterbays to control the attached blue-greens *Phormidium* sp. and *Oscillatoria* sp. The first treatment was in 1983 with a second in 1991. Copper was also applied in 2000 and 2001 to the first afterbay to limit the release of taste and odor compounds from lysing the blue-green cells. Normally, treatment is limited to a smaller area than the entire canal where the taste and odor algae are present.

3.5 Castaic Lake

Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct, located 45 miles northwest of Los Angeles and within the boundaries of the Los Angeles Regional Water Quality Control Board, Region 4 (**Figure 5**). The lake was completed in 1974 and provides emergency storage in the event of shutdown of the California Aqueduct to the north, act as a regulatory storage facility for deliveries during normal operation, and provide recreational development and fish and wildlife enhancement. The reservoir has a maximum operating storage of 323,702 acre-feet with a surface of 2,235 acres.

Copper sulfate is applied to Castaic Lake to manage taste and odor problems produced by planktonic blue-green algae (Cyanobacteria). Production of methyl iso-borneol (MIB) and geosmin by blue-green algae results in earthy, musty, and fishy tastes and odors in the water supply. In addition, some species of blue-greens can produce algal toxins that may be harmful to human health.

The first major off-flavor incident was reported in 1973 in Castaic Lake. Taste and odor events have been more frequent in the 1990's. Copper sulfate was first used in June 1994 to control *Psuedoanabaena* sp. Since 1994, copper sulfate has been applied by helicopter 8 times to reduce MIB and geosmin concentrations. Normally, only the "skiing arm" is treated.

Figure 4. California Aqueduct – East Branch

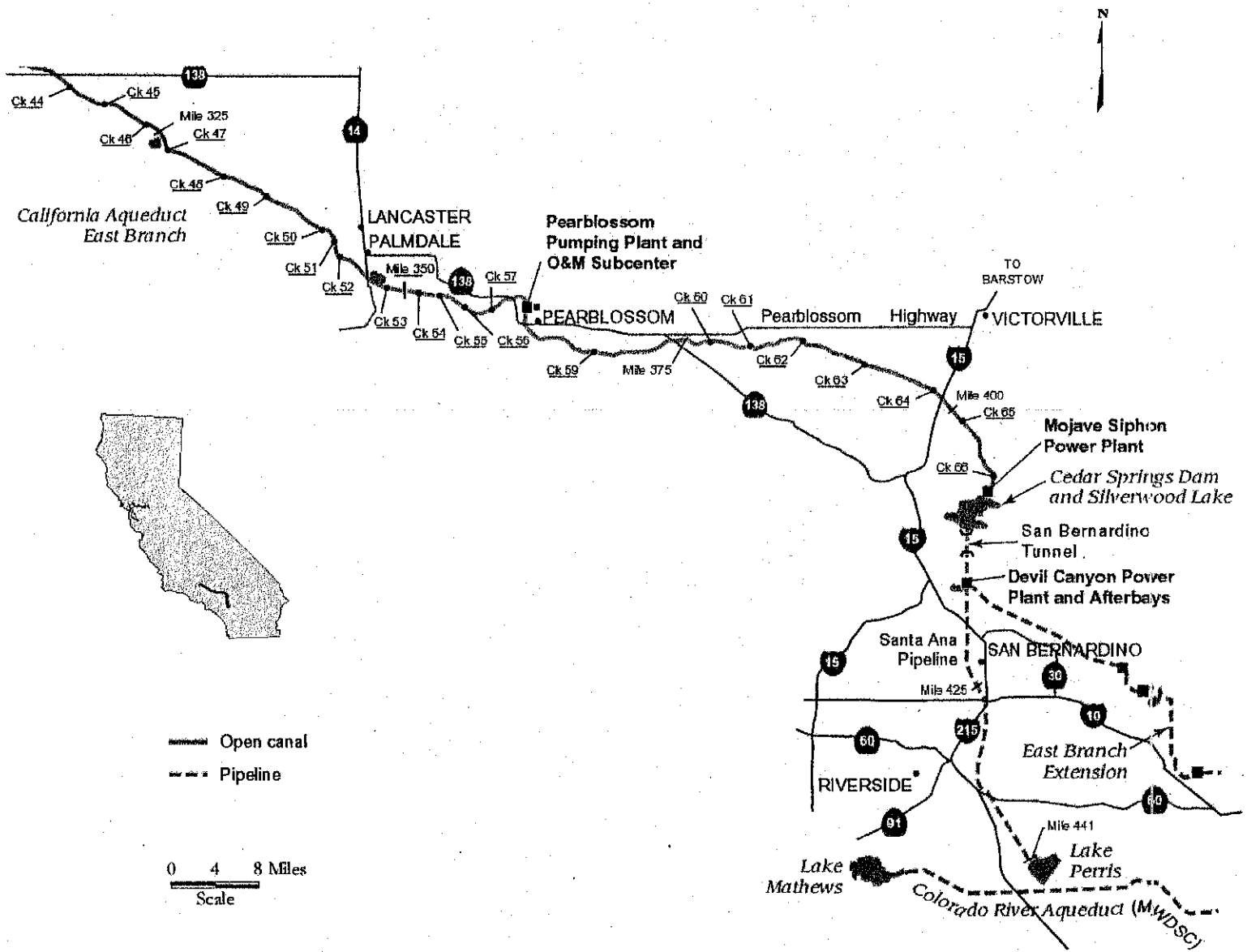
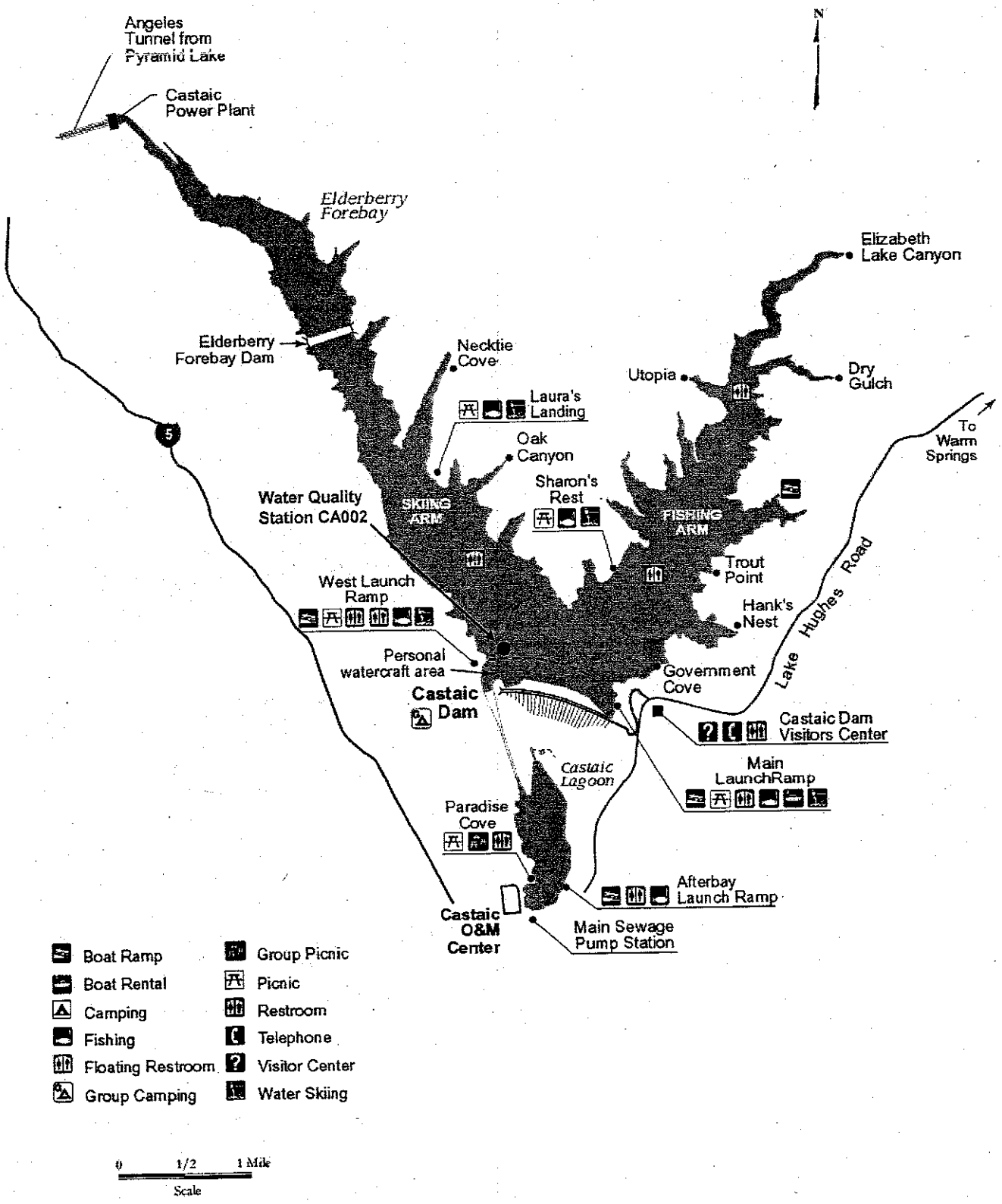


Figure 5. Castaic Lake



3.6 Lake Perris

Lake Perris is the terminal storage facility on the California Aqueduct, located in northwestern Riverside County about 13 miles southeast of the City of Riverside and within the boundaries of the Santa Ana Regional Water Quality Control Board, Region 8 (**Figure 6**). Completed in 1975, Lake Perris has a 131,450 acre-foot storage capacity and surface area of 2,320 ac. This shallow reservoir with a mean depth of about 50-ft is a multi-purpose facility that provides water supply, recreation, and fish and wildlife enhancement.

Taste and odor problems were first reported in Lake Perris in the late 1970's. Copper was applied at a low application rate during the early copper treatments from 1978 to 1984. Major off-flavor events in Lake Perris are common due to the shallow depth of the lake and high concentrations of bio-available nitrogen and phosphorus. In 1987, the first helicopter application was done and copper application rates increased to 10,000 to 12,000 pounds per treatment. Since 1984, copper was applied a total of 18 times with multiple treatments in 1987, 1990, and 1999. The blue-greens, *Synechococcus*, *Pseudoanabaena*, and *Anabaena* were isolated as the primary contributors to off-flavor incidents in Lake Perris. Normally, only the area west of Alessandro Island is treated.

4.0 SAMPLING LOCATIONS AND FREQUENCY

This section details the locations, frequency and duration of monitoring for copper in the SWP. A summary for all DWR treatment sites is provided in **Table 2.**

4.1 Clifton Court Forebay

4.1.1 Sampling Locations

Clifton Court Forebay sampling stations are shown in **Figure 1.**

- **Clifton Court Water Quality Station (MP 0.0):** Located above treated section at the inlet structure that allows water from Old River to enter the Forebay. Station provides real-time data with automated instruments that continuously measure turbidity, water temperature, pH, specific conductance, and algal fluorescence.
- **Treatment Zone:** Three random locations will be sampled within the about 700 surface acre treated section of the Forebay. Locations will be marked using GPS or a map.
- **Headworks - Banks Water Quality Station (MP 3.3):** Downstream from the treated section at Clifton Court. Travel time about 1 hour to this point during pumping at Banks. Station provides real-time data with automated instruments that measure turbidity, water temperature, pH, specific conductance, organic carbon, and algal fluorescence.

Figure 6. Perris Lake

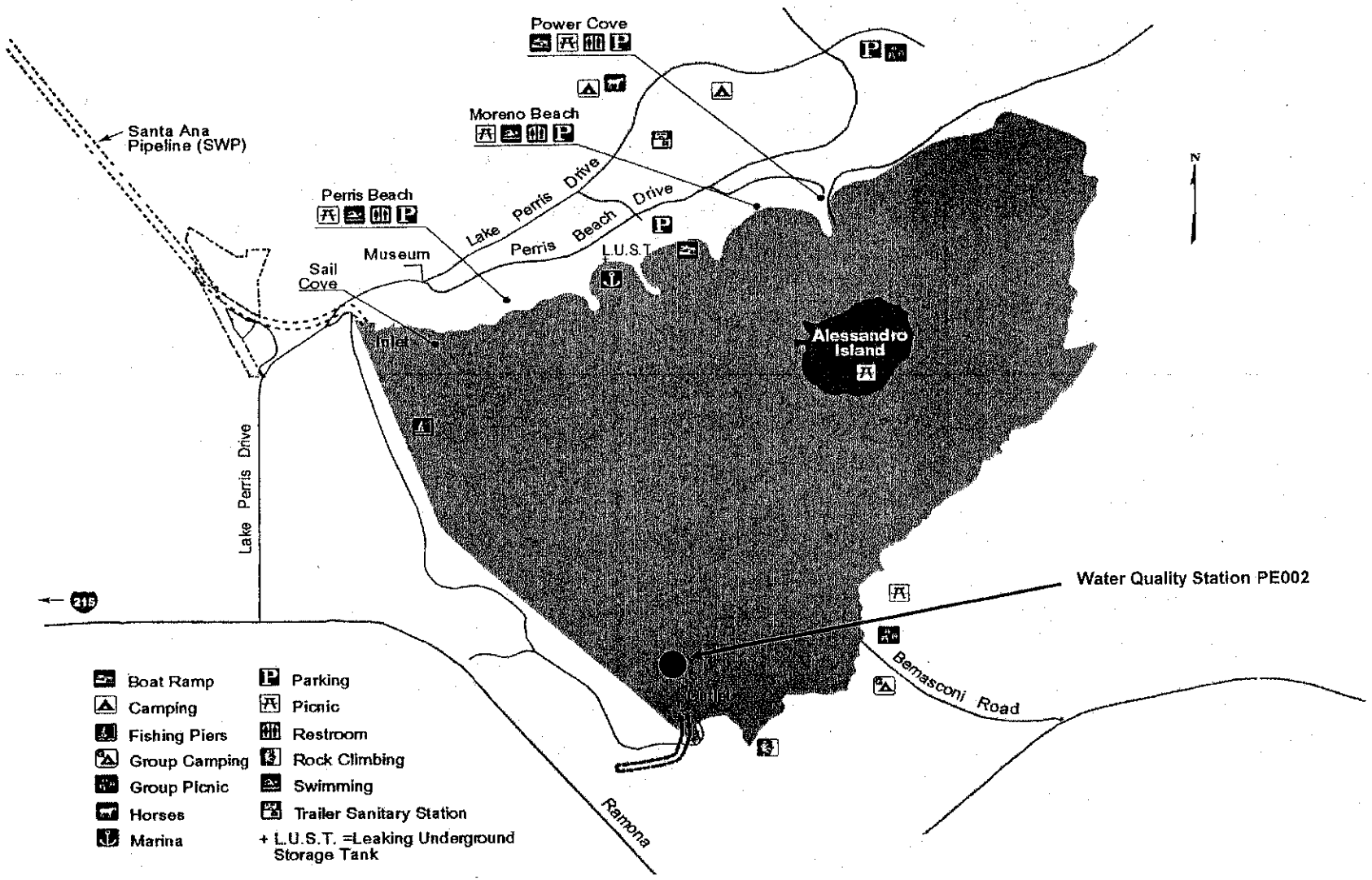


TABLE 2. DWR Water Quality Sampling Frequency at Representative Sites

Name	Pre-Treatment	Treatment	Post-Treatment (A)	Post-Treatment (B) -continuous
Aqueduct				
South Bay Aqueduct				
Sample location	Backsurge Pool	Patterson Check	Downstream	Santa Clara Terminal Tank
Milepost	3.27	9.4		42.1
Depth (m)	0.5	0.5	0.5	0.5
Time	Within 48 hrs of treatment	Based on calculated flow	Based on calculated flow	
Copper (dissolved) samples	Duplicate	Duplicate	Duplicate	One
Frequency	[1]Monthly	[1]Monthly	[1]Monthly	Quarterly
Coastal Branch Aqueduct				
Sample location	Above Treatment Zone	Badger Hill	Downstream	—
Sample depth	0.5	0.5	0.5	—
Milepost	0.1	4.3		—
Time	Within 48 hrs of treatment	Based on calculated flow	Based on calculated flow	—
Copper (dissolved) samples	Duplicate	Duplicate	Duplicate	—
Frequency	[1]Monthly	[1]Monthly	[1]Monthly	
East Branch California Aqueduct				
Sample location	Above Treatment Zone	Mid-point of treated section	Devil Canyon Afterbay	Devil Canyon Afterbay
Sample depth	0.5 m	0.5	0.5	0.5
Milepost	Variable	Variable	412.9	412.9
Time	Within 48 hrs of treatment	Based on calculated flow	Based on calculated flow	
Copper (dissolved) samples	Duplicate	Duplicate	Duplicate	One
Frequency	Per application	Per application	Per application	[2]Monthly
Forebay				
Clifton Court Forebay				
Sample location	Clifton Ct WQ Station	Within treatment zone	Banks WQ Station	Banks WQ Station
Sample depth	0.5	0.5 m	0.5	0.5
Time	Within 48 hrs of treatment	≤ 1 day post treatment	1-4 hrs after pumping resumes at Banks PP	
Copper (dissolved) samples	Duplicate	Duplicates at 3 locations	Duplicate	One
Frequency	Per application	Per application	Per application	[2]Monthly
Reservoirs				
Castaic Lake				
Sample location	Reservoir at outlet (CA002)	Sta CA004, CA005	Castaic outlet (discharge pipe) (hypolimnion)	Reservoir at outlet (CA002)
Sample depth	(0.5 m)	0.5 m	≤ 2 days post-treatment	(0.5 m)
Time	Within 48 hrs of treatment	≤ 1 day post-treatment	Duplicate	One
Copper (dissolved) samples	Duplicate	Duplicates at 3 locations	Per application	[3]Monthly
Frequency	Per application	Per application		
Perris Lake				
Sample location	Reservoir at outlet (PE002)	Within treatment zone	Perris at Outlet	Reservoir at outlet (PE002)
Sample depth	(0.5 m)	0.5 m	(Var - Depth of outlet tier)	(0.5 m)
Time	Within 48 hrs of treatment	≤ 1 day post-treatment	≤ 2 days post-treatment	
Copper (dissolved) samples	Duplicate	Duplicates at 3 locations	Duplicate	One
Frequency	Per application	Per application	Per application	[3]Monthly

[1]Monthly — Once monthly during copper application season
[2]Monthly — Ongoing monitoring
[3]Monthly — Current monitoring is quarterly

Last modified: 2/26/02

4.1.2 Sampling Frequency and Duration

- **Pre-Treatment:** Collect duplicate (2) samples at the Clifton Court water quality station within 48 hours of the aquatic pesticide application.
- **Treatment:** Within 1 day after the treatment, collect duplicate (2) samples from 0.5 m depth at three locations in the treatment zone.
- **Post-Treatment (A):** After the treatment and within 1 to 4 hours after pumping resumes at Banks Pumping Plant, collect duplicate (2) sample at the Headworks (Banks Water Quality Station).
- **Post-Treatment (B):** Collect one sample monthly at the Banks Water Quality Station.

4.2 South Bay Aqueduct (SBA)

4.2.1 Sampling Locations

SBA sampling stations are shown in **Figure 2**.

- **Backsurge Pool (MP 3.3):** Location of first application point on the SBA.
- **Patterson Check (MP 9.4):** Location of second application point about 6 miles below the Backsurge Pool.
- **Santa Clara Terminal Tank (MP 42.1):** Terminus of the SBA, located about 40 miles below first copper sulfate application point. Station provides real-time data with automated instruments that continuously measure turbidity, water temperature, pH, specific conductance, and algal fluorescence.

4.2.2 Sampling Frequency and Duration

Copper sulfate is applied about twice monthly during the algal growth season. The sampling described below will be conducted once monthly during one of the copper applications.

- **Pre-Treatment:** Collect duplicate (2) water samples at the Backsurge Pool within 48 hours prior to the start of the copper sulfate application. Sample from about the middle of the aqueduct at a depth of 0.5 m.
- **Treatment:** Collect duplicate (2) water samples from Patterson Check about 6 miles below the $CUSO_4$ application point and above the second application point. Sampling time is calculated based on flow in the SBA using DWR's Flow Times Program to calculate travel times. The $CUSO_4$ should

take approximately 2 hours to reach this point. Sample from about the middle of the aqueduct at a depth of 0.5 m.

- **Post-Treatment (A):** Collect duplicate (2) samples from downstream of the last application point and above the Santa Clara Terminal Tank (MP 42). Sampling time is calculated based on SBA flows using DWR's Flow Times Program to calculate travel times. The $CUSO_4$ should take approximately 16 to 72 hours to reach the end of the pipeline at Santa Clare Terminal Tank. Sample time is noted on the field data sheets.
- **Post-Treatment (B):** Collect one sample on a quarterly basis at the Santa Clara Terminal Tank on about the third Wednesday of February, May, August and November.

4.3 California Aqueduct - Coastal Branch (CBA)

4.3.1 Sampling Locations

Coastal Branch Aqueduct sampling stations are shown in **Figure 3**

- **Confluence of California Aqueduct (MP 0.1):** Location of application point for $CUSO_4$ at the confluence with the California Aqueduct.
- **Badger Hill Pumping Plant (MP 4.3):** Located about 4 miles below the $CUSO_4$ application point.

4.3.2 Sampling Frequency and Duration

Copper sulfate is applied about twice monthly during the algal growth season. The sampling described below will be conducted once monthly during one of the copper applications.

- **Pre-Treatment:** Collect duplicate (2) water samples at the MP 0.1 within 48 hours prior to the start of the copper sulfate application. Sample from about the middle of the aqueduct at a depth of 0.5 m.
- **Treatment:** Collect duplicate (2) water samples from Badger Hill Pumping Plant about 4 miles below the $CUSO_4$ application point. Sampling time is calculated based on a Flow Program to calculate water travel times in the aqueduct. Sample from about the middle of the aqueduct at a depth of 0.5 m.
- **Post-Treatment (A):** Collect duplicate (2) samples below the last $CUSO_4$ application point. Sampling time is calculated based on flow in the CBA using DWR's Flow Times Program to calculate travel times.

4.4 California Aqueduct – East Branch (CAEB)

4.4.1 Sampling Locations

Since 1999, $CUSO_4$ was applied to Pools 50 to 66 (MP 327 to 403) in the East Branch. Individual treatments are generally restricted to about 40 to 60 mile sections of the aqueduct. Sampling locations are shown in **Figure 4**.

- **Above Treatment Zone**
- **Mid-point of Treatment Zone:**
- **End of Treatment Zone:** At the end of the treated section or at Devil Canyon Afterbay.
- **Devil Canyon Afterbay (MP 412.9):** Below the most downstream copper sulfate application point. Station provides real-time data with automated instruments that continuously measure turbidity, water temperature, and specific conductance.

4.4.2 Sampling Frequency and Duration

- **Pre-Treatment:** Collect duplicate (2) water samples above the treatment zone within 48 hours prior to the start of the copper sulfate application. Sample from about the middle of the aqueduct at a depth of 0.5 m.
- **Treatment:** Collect duplicate (2) water samples at the mid-point of the $CUSO_4$ application. Sampling time determined by aqueduct flow. Sample from about the middle of the aqueduct at a depth of 0.5 m.
- **Post-Treatment (A):** Collect duplicate (2) samples at the end of the treatment zone or at Devil Canyon Afterbay. Sampling time determined by aqueduct flow.
- **Post-Treatment (B):** Collect one sample monthly at Devil Canyon Afterbay.

4.5 Castaic Lake

4.5.1 Sampling Locations

Sampling locations in Castaic Lake are shown in **Figure 5**.

- **Reservoir above outlet tower (CA002):** Located in the reservoir near the outlet tower near Castaic Dam.
- **Within Treatment Zone:** Variable in size and location depending on area treated with $CUSO_4$. Three sites will be sampled and GPS or a map used to record the locations.

- **Castaic Outlet Discharge (MWD Pipeline):** Representative of hypolimnetic water released from the lake and delivered to water treatment plants operated by MWD.

4.5.2 Sampling Frequency and Duration

- **Pre-Treatment:** Collect duplicate (2) water samples near the outlet tower (CA002) at a depth of 0.5 m prior to $CUSO_4$ application.
- **Treatment:** Within 24 hours of $CUSO_4$ application, collect (2) duplicate samples at three locations from 0.5 m depth in the treatment zone.
- **Post-Treatment (A):** Two (2) days after treatment, collect duplicate (2) samples from the Castaic Lake Outlet (MWD pipeline).
- **Post-Treatment (B):** Collect one monthly sample at CA002 from a depth of 0.5 m. Currently, DWR is monitoring the reservoir on a quarterly schedule for minerals, metals, nutrients, organic carbon, dissolved solids, and bromide.

4.6 Lake Perris

4.6.1 Sampling Locations

Lake Perris sampling locations are shown in **Figure 6**.

- **Reservoir at outlet (PE002):** Located in the southern section of the reservoir near the outlet.
- **Treatment Zone:** Variable in size and location depending on area treated with Copper sulfate. Three sites will be sampled and GPS or a map used to record the locations.
- **PE002 at Outlet Depth:** Located near the reservoir outlet. Samples will be collected at the outlet tier depth.

4.6.2 Sampling Frequency and Duration

- **Pre-Treatment:** Collect duplicate (2) water samples near the reservoir outlet (PE002) at a depth of 0.5 m prior to the start of the copper sulfate application.
- **Treatment:** Within 24 hours of $CUSO_4$ application, collect (2) duplicate samples at three locations from 0.5 m depth in the treatment zone.
- **Post-Treatment (A):** Two (2) days after treatment, collect duplicate (2) samples at PE002 from depth of outlet tier.
- **Post-Treatment (B):** Collect one monthly sample at PE002 from a depth of 0.5 m. Currently DWR is monitoring the reservoir on a quarterly schedule for minerals, metals, nutrients, and bromide.

5.0 BEST MANAGEMENT PRACTICES

5.1 Clifton Court Forebay

1. Licensing, pesticide, labeling and permits. Delta Field Division (DFD) currently has four-licensed Pest Control Advisors (PCA), six certified Qualified Applicators (QAC), and one licensed Qualified Applicator (QAL). A contractor who is a licensed applicator applies Komeen™ or Nautique™ using a helicopter. The aquatic pesticide use is consistent with the label instructions. Copper compounds (Komeen™ or Nautique™) have been applied to Clifton Court since 1995 to control aquatic weeds.

2. Notification requirements. The Byron-Bethany Irrigation District is notified prior to the treatment. A permit is filed and the County Agricultural Commissioner is notified.

3A. Preliminary site evaluation. The Forebay is surveyed by boat and from shore to determine when and if a chemical treatment is necessary. Based on aquatic weed growth patterns since 1995, we have determined that one or two aquatic pesticide treatments are required each year to control weed growth in the Forebay. In addition, we are continuously evaluating different chemical treatment options. In 1999 and 2000, a non-copper based pesticide was tested in experimental plots using Sonar™ (active ingredient is fluridone).

3B. Secondary site evaluations and pre-treatment monitoring are routinely done. The location of treatment sites in the Forebay is based on results of a plant survey conducted from a boat. The size and location of the treatment sites and pesticide application rates are determined by location, density, and species of aquatic weeds present. The location and number of acres to be treated are conveyed to the helicopter applicator.

3C. Alternate Control Measures. We have evaluated both mechanical and non-copper based chemicals in Clifton Court Forebay.

A mechanical harvester was used in 1995 but was ineffective at reducing weed density. After the harvester was used, aquatic weeds dispersed by fragmentation from one cove of less than 250 surface acres to more than 1000 acres.

In 1999, we tested a non-copper aquatic pesticide. We used the granular formulation of Sonar™ (SRP) in four10-acre test plots and after one month compared weed density to untreated controls. We found no significant reduction in aquatic plants within the Sonar™ treated plots. Although Sonar™ has been effective in a number of lakes, the short residence time in Clifton Court and high water movements combined to reduce its efficacy in the Forebay. In 2000, we treated one 50-acre test plot again using the granular Sonar™. Due to the high movement of the water and high wind conditions, it had little or no effect on the aquatic weeds.

Since 1995, DWR has used the copper complexed pesticides, Komeen™ and Nautique™. These products have proven to be effective at reducing the target aquatic weeds without adverse effects on non-target organisms. There are no alternatives to copper complexed products that are registered for use in California and effective in controlling aquatic weeds. If the Forebay was not treated, aquatic weeds would have severe impacts on the operation of Banks Pumping Plant and water deliveries in the State Water Project.

3D. Treatment. Prior to treatment, the radial gates that allow water to enter Clifton Court from Old River are closed. The Forebay elevation is also lowered to (-1.5 feet) to reduce surface area and thus increase exposure of the target aquatic weeds. The Forebay is isolated from the Delta and downstream water users for a period of 36 hours. Following the pesticide label instructions, water is held in the Forebay for a period of not less that 24 hours after the pesticide application is completed.

Prior to scheduling the helicopter, we receive a weather forecast from the DWR meteorologist, William Mork. Additionally, real-time data on wind direction and speed is collected at the DWR weather station located at the Forebay. To minimize pesticide drift, the aerial application is cancelled if continuous wind velocity exceeds 10 mph.

Clifton Court Forebay water quality is monitored on a real-time basis with automated equipment. The station at Clifton Court is equipped with sensors to measure water temperature, turbidity, pH, specific conductance, and algal biomass (flow-through fluorometry). Additional data is obtained near Banks Pumping Plant (about 3 miles from the treatment site). The Banks water quality station measures the same water quality parameters as Clifton Court. Continuous total and dissolved organic carbon is also measured at Banks.

No recreational boats are permitted on Clifton Court Forebay except during duck hunting season when no pesticide applications are done.

3E. Post-Treatment. The efficacy of the treatment is evaluated at about one week after the application. The aquatic weeds are surveyed both by boat and from the shore to determine the effectiveness of the treatment. Water quality conditions are also monitored closely at the Banks Pumping Plant water quality station.

4A. Minimize Treatment Area. The smallest practicable area is treated to minimize chemical cost, use and secondary impacts.

5.2 South Bay Aqueduct

1. Licensing, pesticide, labeling and permits. Delta Field Division (DFD) has four-licensed Pest Control Advisors (PCA), six Certified Qualified Applicators (QAC), and one Licensed Qualified Applicator (QAL). Copper sulfate has been used since the early 1970's to control filter clogging algae (*Cladophora*) and taste and producing

blue-green in the South Bay Aqueduct (SBA). The copper sulfate application is directed by a PCA or QAL and its use is consistent with label instructions.

2. *Notification requirements.* The Departments South Bay Water Contractor's, who also provide treated municipal water to customers, are notified prior to a treatment. The Contractors are Alameda County Flood Control and Water Management District, Zone 7; Alameda County Water District; and Santa Clara Valley Water District.

3A. *Preliminary site evaluation* is done to determine the timing of a copper sulfate application. Based on data since 1985, we have determined treatments are needed about twice monthly during the April to October algal growth season to control attached algae and taste and odor problems in the SBA. The exact schedule is based on visual inspection of the canal and requests from water contractors due to reduced filter runs and increased pH at their water treatment plants.

3B. *Secondary site evaluations and pre-treatment monitoring* are routinely done. The locations of treatment sites are determined by a visual inspection of the aqueduct. Copper sulfate application rate is determined by water flow rate in the canal. A computer program was developed to calculate application rates, duration, and travel times between the multiple application sites.

3C. *Alternate Control Measures.* We have evaluated both physical and mechanical methods to control algae.

Attempts were made in the 1980's to remove algae by scraping the canal lining. A boom truck was used to drag a large link belt. The method was ineffective in removing algae and resulted in damage to the concrete canal lining and causing mass loading of debris. The procedure was discontinued.

The canal has been drained about every 8 years since 1970. The main purpose of the draining is to remove accumulated silt that is deposited in the canal invert. When the canal was dewatered, attempts were made to manually scrape the algae from the concrete lining. These efforts were highly labor intensive and mostly ineffective. Attached algae recolonized the canal lining soon after removal. An ongoing program of algae control using copper sulfate is necessary to minimize the impacts on SBA water quality and quantity.

Copper sulfate has proven to be effective at reducing the target algae without adverse effects on non-target organisms. There are no alternatives to using the copper sulfate that are effective at controlling attached algae and registered for use in California. If the SBA was not treated, attached algae would severely impact deliveries to water contractors in the South Bay region.

3D. *Treatment.* Prior to treatment, the water contractors are notified. The copper is applied during daylight hours of maximum photosynthetic activity to optimize copper uptake by the algal community.

South Bay Aqueduct water quality is monitored continuously by automated instrumentation. The station at Del Valle Check (milepost 16.38) is equipped with sensors to measure water temperature, turbidity, pH, specific conductance, and algal biomass (flow-through fluorometry). Additional data are obtained at the canal terminus at Santa Clara Terminal Tank (Milepost 42, and about 0.5 miles from the end of the treated section). The Santa Clara Terminal Tank water quality station is equipped with the same types of water quality instruments as the Del Valle Check station.

There are limited recreational activities on the SBA and most sections are closed to public access with locked gates. Fishing is not permitted in the South Bay Aqueduct.

3E. Post-Treatment. The efficacy of the treatment is evaluated at about one week after the application. Aquatic weeds are surveyed to determine the effectiveness of the treatment at reducing attached *Cladophora* and taste and odor compounds.

5.3 California Aqueduct – Coastal Branch

1. Licensing, pesticide, labeling and permits. San Joaquin Field Division (DFD) has 10 licensed Pest Control Advisors (PCA), 22 Certified Qualified Applicators (QAC), and 3 Licensed Qualified Applicators (QAL). Copper sulfate has been used in the Coastal Branch Aqueduct since about 1985 to control clogging problems at trashracks and pumping plants caused by attached algae (*Cladophora*) and aquatic plants including Horned pondweed (*Zannichellia palustris* L.). The copper sulfate application is directed under the supervision of a PCA and its use is consistent with label instructions.

2. Notification requirements. Water users that could be impacted by the copper application are notified prior to a treatment. The notified water users are Berrenda Mesa Water District and the Central Coast Water Authority.

3A. Preliminary site evaluation is done to determine the timing of a copper sulfate application. Based on data since 1985, we have determined that treatments are needed about twice monthly during the April to October growth season to control attached algae and aquatic plants. Weekly treatments are sometimes necessary during the summer. The exact schedule is based on visual inspection of the canal, excess accumulation of plant material on trashracks, and reduced flows.

3B Secondary site evaluations and pre-treatment monitoring are routinely done. The decision to treat the canal with copper sulfate is made after visual inspection of the aqueduct. The copper sulfate application rate is determined by water flow rate in the canal. A computer program was developed to calculate application rates, duration, and travel time of the copper plume.

3C. Alternate Control Measures. We have evaluated physical and mechanical methods to control aquatic plants. Attempts were made from 1985 to 1990 to remove aquatic plants and algae by dragging a large chain along the canal. The method was ineffective in removing algae and weeds and resulted in damage to the concrete canal lining. This method is time consuming and requires a large expenditure of manpower. The procedure was mostly discontinued in 1990 unless aquatic plant conditions were severe and not reduced with copper sulfate.

Copper sulfate has proven to be effective at reducing the target aquatic plants and algae without adverse effects on non-target organisms. There are no alternatives to using the copper pesticides that are effective at controlling attached plants and registered for use in California. If the Coastal Branch Aqueduct was not treated, attached plants could severely impact deliveries to water users in the Central Coast region and the Berrenda Mesa Water District.

3D. Treatment. Prior to treatment, the water contractors are notified. Copper is applied during the daylight hours of maximum photosynthetic activity to optimize copper uptake by the aquatic plant community. There are no recreational activities in the Coastal Aqueduct and most sections are inaccessible to the public due to locked gates.

3E. Post-Treatment. The efficacy of the treatment is evaluated at about one week after the application. The effectiveness of the pesticide treatment is evaluated by the decreased accumulation of aquatic plants on trash racks and intake structures.

5.4 California Aqueduct – East Branch

1. Licensing, pesticide, labeling and permits. Southern Field Division (SFD) currently has two licensed Pest Control Advisors (PCA) and two certified Qualified Applicators (QAC). Off-flavor compounds, MIB and geosmin, produced by blue-green algae in the East Branch of the California Aqueduct have been controlled with copper sulfate since about 1991.

2. Notification requirements. Downstream water users are notified prior to a copper sulfate treatment.

3A. Preliminary site evaluation. A comprehensive early warning plan developed cooperatively between DWR and MWD minimizes the quantity of copper sulfate required to treat T&O and determine optimal timing of a copper sulfate application. The strategy involves ongoing weekly or bi-weekly monitoring of the taste and odor compounds MIB and geosmin in the aqueduct, SWP reservoirs, and at MWD's water treatment plants. Elevated levels of MIB or geosmin trigger additional high frequency monitoring at additional locations.

3B. Secondary site evaluations and pre-treatment monitoring are routinely done. The decision to treat the canal with copper sulfate is made after evaluating the

results of taste and odor analysis by CLSA. The copper sulfate application rate is determined by water flow rate in the canal. A computer program was developed to calculate application rates, duration, and travel time of the copper plume.

3C. Alternate Control Measures. We have evaluated physical and mechanical methods to control aquatic plants. Mechanical removal such as dragging a large chain with a crane along the aqueduct has been evaluated. The method would be expensive, labor intensive and result in potential damage to the concrete canal lining. In addition, the chain could not be used upstream of any water turnouts. The procedure would break off large amounts of attached algae that could plug the water intakes.

Another potential method would be to lower the water level and control the algae by desiccation. The major drawback is that a longer period of 2-3 weeks would be necessary. A drawdown of that length of time would be difficult due to demands on water conveyance and pumping.

Copper sulfate has proven to be effective at reducing the target aquatic plants and algae without adverse effects on non-target organisms. There are no alternatives to using the copper pesticides that are effective at controlling attached plants and registered for use in California. If the California Aqueduct - East Branch was not treated, attached blue-green production of taste and odor products would severely affect the quality of water delivered to Metropolitan Water District.

3D. Treatment. Prior to treatment, the water contractors are notified. Copper is applied during the daylight hours of maximum photosynthetic activity to optimize copper uptake by the aquatic plant community. There are limited recreational activities in the California Aqueduct and most sections are inaccessible to the public due to locked gates.

3E. Post-Treatment. The efficacy of the treatment is evaluated at about one week after the application. The effectiveness of the pesticide treatment is evaluated by CLSA of taste and odor compounds.

4A. Minimize Treatment Area. Only those specific sections or "pools" of the aqueduct where the attached blue-green algae occur are treated to minimize cost, use and secondary impacts.

5.5 Castaic Lake

1. Licensing, pesticide, labeling and permits. Southern Field Division (SFD) currently has two licensed Pest Control Advisors (PCA) and two certified Qualified Applicators (QAC). Copper sulfate has been used intermittently since 1994 to control phytoplanktonic blue-green algae and diatoms in the drinking water supplied from Castaic Lake. Blue-greens produce the taste and odor (T&O) compounds MIB and geosmin as well as algal toxins. High diatom abundance clog filters in water

treatment plants and reduce filter run times. Copper sulfate is applied according to label instructions by a licensed helicopter applicator.

2. Notification requirements. The Metropolitan Water District of Southern California (MWD), Department of Fish and Game, and the Department of Parks and Recreation are notified prior to the treatment. A permit is filed with the County Agricultural Commissioner.

3A Preliminary site evaluation. A comprehensive early warning plan developed cooperatively between DWR and MWD minimizes the quantity of copper sulfate required to treat T&O events in Castaic Lake. The strategy involves ongoing weekly or bi-weekly monitoring of the taste and odor compounds MIB and geosmin in the reservoir and at MWD's water treatment plants. Elevated levels of MIB or geosmin trigger additional high frequency monitoring at multiple locations and depths in the reservoir. In addition to the Closed Loop Stripping Analysis (CLSA), phytoplankton abundance and composition is determined microscopically.

Early detection of increasing levels of MIB and geosmin provides a Castaic Lake to be treated early before populations of blue-green algae reach maximum growth. The result is that much lower quantities of copper sulfate are applied to successfully reduce the biomass of blue-green algae and control the T&O event

3B. Secondary site evaluations and pre-treatment monitoring are routinely done. Multiple sampling locations and depths are used to establish the location of the treatment zone is based on concentrations of MIB and geosmin from CLSA analysis and phytoplankton abundance from microscopic counts at multiple sampling locations. Since the spatial distribution of phytoplankton is heterogeneous, we are able to map the areas of highest T&O production and treat those areas by aerial application.

3C. Alternate Control Measures. Copper sulfate has proven to be effective at reducing the target phytoplankton without adverse effects on non-target species. There are no alternatives to copper sulfate that are effective at controlling planktonic blue-green algae and diatoms and registered for use in California. If Castaic Lake were not treated, taste and odor compounds, and filter clogging algae would have severe impacts on the quality of water deliveries to MWD from the State Water Project. The early warning plan of high frequency monitoring has greatly reduced the quantity of copper applied to Castaic Lake.

3D. Treatment. Prior to treatment, MWD is notified and the reservoir is shut down to recreational users during the day of application.

Prior to scheduling the helicopter, we receive a weather forecast and monitor wind direction and speed. To minimize pesticide drift, the aerial application is cancelled if continuous wind velocity exceeds 10 mph.

3E. Post-Treatment. The efficacy of the treatment is continuously evaluated after the copper sulfate application. Samples are analyzed for T&O compounds to determine the effectiveness of the treatment. Water quality conditions are also monitored closely in the reservoir.

4A. Minimize Treatment Area. The smallest practicable area is treated to minimize chemical cost, use and secondary impacts.

5.6 Lake Perris

1. Licensing, pesticide, labeling and permits. Southern Field Division (SFD) currently has two licensed Pest Control Advisors (PCA) and two certified Qualified Applicators (QAC). Taste and odor problems were first reported in Lake Perris in the late 1970's. Major off-flavor events in Lake Perris are common due to the shallow depth of the lake and high concentrations of bio-available nitrogen and phosphorus. The blue-greens, *Synechococcus*, *Pseudoanabaena*, and *Anabaena* were isolated as the primary contributors to off-flavor incidents in Lake Perris. Copper sulfate is applied according to label instructions by a licensed helicopter applicator.

2. Notification requirements. The Metropolitan Water District of Southern California (MWD), Department of Fish and Game, and the Department of Parks and Recreation are notified prior to the treatment. A permit is filed with the County Agricultural Commissioner.

3A. Preliminary site evaluation. A comprehensive early warning plan developed cooperatively between DWR and MWD minimizes the quantity of copper sulfate required to treat T&O events in Lake Perris. The strategy involves ongoing weekly or bi-weekly monitoring of the taste and odor compounds MIB and geosmin in the reservoir and at MWD's water treatment plants. Elevated levels of MIB or geosmin trigger additional high frequency monitoring at multiple locations and depths in the reservoir. In addition to the Closed Loop Stripping Analysis (CLSA), phytoplankton abundance and composition is determined microscopically.

Early detection of increasing levels of MIB and geosmin provides a Lake Perris to be treated early before populations of blue-green algae reach maximum growth. The result is that much lower quantities of copper sulfate are applied to successfully reduce the biomass of blue-green algae and control the T&O event

3B. Secondary site evaluations and pre-treatment monitoring are routinely done. Multiple sampling locations and depths are used to establish the location of the treatment zone is based on concentrations of MIB and geosmin from CLSA analysis and phytoplankton abundance from microscopic counts at multiple sampling locations. Since the spatial distribution of phytoplankton is heterogeneous, we are able to map the areas of highest T&O production and treat those areas by aerial application.

3C. Alternate Control Measures. Copper sulfate has proven to be effective at reducing the target phytoplankton without adverse effects on non-target species. There are no alternatives to copper sulfate that are effective at controlling planktonic blue-green algae and diatoms and registered for use in California. If Lake Perris were not treated, taste and odor compounds, and filter clogging algae would have severe impacts on the quality of water deliveries to MWD from the State Water Project. The early warning plan of high frequency monitoring has greatly reduced the quantity of copper applied to Lake Perris.

3D. Treatment. Prior to treatment, MWD is notified and the reservoir is shut down to recreational users during the day of application.

Prior to scheduling the helicopter, we receive a weather forecast and monitor wind direction and speed. To minimize pesticide drift, the aerial application is cancelled if continuous wind velocity exceeds 10 mph.

3E. Post-Treatment. The efficacy of the treatment is continuously evaluated after the copper sulfate application. Samples are analyzed for T&O compounds to determine the effectiveness of the treatment. Water quality conditions are also monitored closely in the reservoir.

4A. Minimize Treated Area. The smallest practicable area is treated to minimize chemical cost, use and secondary impacts.

6.0 FIELD PROCEDURES

This section includes brief descriptions of field procedures used for this program. Detailed equipment and procedure descriptions are described in the Water Quality Field Manual for the State Water (**Attachment A**).

6.1 Sample Storage, Preservation and Holding Times

Sample containers are pre-cleaned according to United States Environmental Protection Agency (U.S. EPA) specification for the appropriate methods. **Table 3** lists the sample container, storage and preservation requirements for this QAPP. Additional information is presented in **Attachment B**, Bryte Chemical Laboratory Quality Assurance Manual (Appendix A, pg. A-1).

Table 3. Sample Storage and Preservations Requirements

Reference Parameters	Methods	Holding Time	Container(s)	Preservation	Storage
Copper-dissolved	EPA 200.8 *by ICP-MS*	6 months	Acid Washed polypropylene bottle	HNO_3 pH<2	

ICP-MS = Inductively coupled plasma - Mass spectrometry

6.2 Documentation

Additional details on documentation are presented in **Attachment A**, Field personnel record the following information:

- Name(s) of field personnel;
- Site/ sampling location identification;
- Date and time of sample collection;
- All field measurements, such as pH, temperature, conductivity and dissolved oxygen (when applicable);
- Observation of weather and conditions that can influence sample results; and
- Any problems encountered during sampling.

6.3 Sample Identification Scheme

All samples must be uniquely identified to ensure that results are properly reported and interpreted. Samples must be identified such that the site, sampling location, sample date and time, matrix, sampling equipment and sample type (normal field sample or QC sample) can be distinguished by a data reviewer or user. Additional details on documentation are presented in **Attachment A** and **Attachment B**, (Appendix C, pg. C-1).

6.4 QC Sample Collection

Field blanks and field duplicates are collected at a frequency of approximately 1 per 20 normal samples. Matrix spikes are collected at frequency of approximately 1 pair per 20 normal samples. Additional details on documentation are presented in **Attachment A,** (pages 75-80).

6.5 Field measurements

For all water bodies sampled, pH, electrical conductivity, temperature, and dissolved oxygen are measured prior to collecting samples for laboratory analyses. Field instrument calibration and operation of the instruments are presented in **Attachment A** of this QAPP.

6.6 Record keeping and Sample Handling Procedure

All data collected in the field are recorded on sample field sheets. Pertinent field information, including (as applicable), width, depth, flow rate of the stream, surface water conditions and location of tributaries are recorded on the field sheets. Chain

of custody record is completed subsequent to sample collection. Additional details on documentation are presented in **Attachment A.**

7.0 SAMPLE CUSTODY AND DOCUMENTATION

Sample possession during all sampling efforts is traceable from the time of collection until results are reported and verified by the laboratory and samples are disposed of. Sample custody procedures provide a mechanism for documenting information related to sample collection and handling.

7.1 Documentation Procedures

The field coordinator is responsible for ensuring that the field sampling team adheres to proper custody and documentation procedures. A master sample logbook is maintained for all samples collected during each sampling activity.

Field personnel record the following information:

- Keep an accurate written record of sample collection activities on the field form and logbook.
- Ensure that all entries are legible, written in waterproof ink and contain accurate and inclusive documentation of the field activities.
- Date and initial daily entries
- Note errors or changes using a single line to cross out the entry and date and initial the change.
- Complete the chain of custody forms accurately and legibly.

7.2 Chain-of-Custody Form

A chain-of-custody form is completed after sample collection, and prior to sample shipment or release. The chain-of-custody form, sample labels, and field documentation are crossed checked to verify sample identification, number of containers, sample volume, and type of containers.

Information to be included in the chain of custody forms includes:

- Sample identification;
- Date and time of collection;
- Samplers' initials;
- Analytical method(s) requested;
- Sample volume;
- QC sample identification;
- Signature blocks for release and acceptance of samples; and
- Any comments to identify special conditions or requests.

7.3 Sample Shipments and Handling

All sample shipments are accompanied by the chain-of-custody form, which identifies the content. Samples are either shipped or delivered by the sampler to the DWR's Bryte Chemical Laboratory in West Sacramento. The samples are transported on ice to the laboratory. Additional details on sample shipping and handling are presented in **Attachment A**, (pages 73-74) and **Attachment B**, (Section 4, pg. 9).

7.4 Laboratory Custody Procedures

Sample Custody Procedures are described in **Attachment B**, (Section 5, pg. 11).

8.0 FIELD INSTRUMENT CALIBRATION PROCEDURES

Several types of instruments are used by DWR to monitor and evaluate physical parameters in water. To ensure that the instruments are operating properly and producing accurate and reliable data, routine calibration is performed prior to and during use. Calibration is performed at a frequency recommended by the manufacturer. Field calibration is performed at least once per day, prior to instrument use. If field calibration reveals that the instrument is outside established accuracy limits, the instrument should be serviced in the field. Additional details on field instrument calibration are presented in **Attachment A**, Water Quality Field Manual for the State Water Project.

9.0 ANALYTICAL PROCEDURES AND CALIBRATION

9.1 Bryte Chemical Laboratory

The Bryte Chemical Laboratory's primary role within the Department of Water Resources is to provide analytical, chemical, and biological laboratory services to DWR. All samples collected as part of this Plan will be analyzed by Bryte Laboratory.

9.2 Analytical Procedure

Dissolved copper samples will be analyzed by ICP-MS using EPA Method 200.8. Details of this procedure are found in **Attachment C**, EPA Method 200.8 Using ELAN 6000 ICP-MS. The reporting limit for the method is 0.001 mg/L. Details on *acceptable quality control limits* and *laboratory control sample recovery* are presented in **Attachment B** (Appendix F, pg. F-4 and F-5).

9.3 Data Reduction, Validation, and Reporting

The final step in analyzing samples is to review the data collected prior to reporting. The analytical data generated within the laboratory are extensively checked and cross-checked for their accuracy, precision and completeness. The validation process consists of data generation, reduction review and finally reporting results to the submitter. A data validation flow chart is presented in **Attachment B** (Figure 2, pg 19)

The primary responsibility for the generation of accurate data rests with the analyst. The analyst performs the data calculation functions and is responsible for the initial examination of the finished data. All data reduction steps applied to the raw data are outlined in the appropriate analytical SOPs. Each analyst reviews the quality of their work based on the following guidelines:

- The appropriate SOP has been followed.
- Sample preparation is correct and complete.
- Analytical results are correct and complete.
- Blank correction procedures followed, if applicable.
- QC samples are within established QC limits.
- All documentation is complete which includes analysis report, QC form and QC charts.

The QC procedures outlined in the analytical SOP are used for the preliminary validation of the results along with any historical data if available. When applicable, correlation checks are used to validate the data, such as anion-cation balances, specific conductance vs. dissolved solids, dissolved solids vs. calculated dissolved solids, BOD vs. suspended solids, COD or TOC, etc. After data reduction and validation steps are computed, the analyst dates and signs the required forms.

The data package is then forwarded to the Quality Assurance Officer, who evaluates the data along with all pertinent QC results such as laboratory control standards, matrix spikes, surrogates, duplicates, blind duplicates and blind performance evaluation samples and laboratory performance records, as well as historical records to help form a basis for acceptance of data.

After the data package has been reviewed and accepted, it is then forwarded to the Data Control Section. A review is conducted according to a set of guidelines and structured to ensure the following:

- All analyses requested have been completed.
- Documentation is correct and complete.
- All calculations are reviewed and rechecked.
- If any problem arises with the data, they are returned to the analyst for correction and/or re-analysis.

- After review, the data package is signed by the reviewer.

The data package is then submitted to the senior staff for the final review and validation. The final acceptance is based on the following criteria:

- Calibration data reviewed.
- Appropriate methodologies are used.
- QC samples within established guidelines.
- Comparison of historical data when available.
- Correlation checks are reviewed (i.e. anion-cation balance, electrical conductivity (EC) vs total dissolved solids (TDS), etc., when applicable.
- Evaluation of data in general by comparability, assessment and reasonableness of sample types, (i.e. wastewaters, surface waters, ground waters, etc.).
- Ensures all analytical work requested has been completed.

After the final validation by the senior staff the data package is returned to the Accounting Section for incorporation into the final analysis report. The final report is copied, released to the submitter and later placed in laboratory archives.

Errors or problems that may occur are documented and transmitted to the appropriate section. The cause of the errors is then addressed either by further training or re-evaluation of the analytical method SOPs to ensure quality data is generated at the analyst level.

9.4 Analytical Laboratory QC Samples

Internal quality control is the routine activities and checks such as calibrations, duplicate analysis, spiked samples, etc. included in normal procedures to control accuracy and precision of the measurement process. It determines whether the laboratory operations are within acceptable Quality Control guidelines during data generation.

9.4.1 Blanks

Field Blanks are check samples which monitor contamination originating from the collection, transport, and storage of environmental samples. Laboratory prepared blank water is supplied to field personnel for processing in the same manner as samples; this includes field filtration and addition of preservatives.

Travel Blanks are prepared in the laboratory from ultra-pure water. They are supplied to field personnel with each batch of empty sample bottles and are returned with the collected samples. Travel blanks are routinely used for volatile organic samples to determine

whether sample transport has had contamination effects on the samples collected.

Method Blanks are prepared from laboratory blank water, substituted for samples and analyzed with every sample set. Method blanks are used to determine the level of contamination that exists in the analytical procedure. Contamination may or may not lead to elevated concentration levels, or false positive data. Ideally the concentration of an analyte in the method blank is below the method detection level for the analyte. However, for some analytical methods, elimination of blank contamination is extremely difficult, therefore, each analytical SOP has a method blank level of acceptance. If the acceptance contamination level is exceeded, the sample set is re-analyzed.

9.4.2 Calibration Standards

Calibration standards are routinely run with every sample set. Calibration standards must fall within certain quality control limits before any sample results can be accepted. The limits are found in the particular analytical method SOP being used. If the calibration standards are unacceptable, the sample results are rejected, corrective action steps taken and the samples re-analyzed.

9.4.3 Check Standards

The check standard is usually a midrange calibration standard that is used to monitor the analytical method. The check standard is analyzed every ten samples to provide evidence that the laboratory is performing the method within accepted QC guidelines. As long as check standard results fall within established control limits the analysis can continue. If check standard results fall outside the control limits, the data are suspect and the procedure is stopped. The analyst checks the analytical procedure for error step by step. Once the procedure is again acceptable, re-analysis of samples begin with the last check standard that was within acceptable control limits.

9.4.4 Laboratory Control Sample (LCS/LCSD)

When one is available, the Laboratory Control Sample is analyzed routinely to verify the analytical method is in control and to also serve as a second source verification for the calibration standards of all routine analyses. The concentration of the LCS is within the working range of the analytical method and does not require extensive pretreatment, dilution or concentration prior to analysis. The sources include but are not limited to quality control samples, EPA, commercially prepared samples or samples

prepared in-house with different sources than those used in the calibration standards. Recovery data from the LCS are compared to the control limits that are established for those analytes monitored by the LCS. Before any data can be accepted, the analytes of interest must fall within their expected control limits. If, for any reason, the results fall outside those limits, the sample results are unacceptable. Correction steps are taken and filed with the QA/QC officer. After the corrective action has been proven effective and the LCS is within the specified control limits, the samples are then re-analyzed.

9.4.5 Internal Standards

An internal standard is used for the quantitation of organic compounds by Gas Chromatography (GC) or a combination of gas chromatography and mass spectrometry (GC/MS). The internal standard is similar in analytical behavior to the compounds of interest and is added to all samples, standards and blanks. Usually more than one internal standard is added to each sample to evaluate the measurement of the sample throughout the entire time of analysis. The internal standards help determine the individual response factors (RF) which are used to calculate the concentrations of the organic compounds of interest.

$$RF = (A_s)(C_{is})/(A_{is})(C_s)$$

where:
A_s = Area for reference analyte to be measured
A_{is} = Area for the internal standard
C_{is} = Concentration of the internal standard (µg/L)
C_s = Concentration of the reference analyte to be measured (µg/L)
$C_s = (A_s/A_{is})(C_{is}/RF)$
where:
C_a = Concentration of the analyte in sample in µg/L.
A_a = Peak area of the analyte
RF = Response Factor

The monitoring of the internal standards area counts and retention times are also used as a continuing check on system performance. An average retention time/area count is established for each internal standard. In any analytical run in which the internal standard retention time/area count falls outside the established criteria, the run is aborted, the cause is corrected and the sample is re-analyzed.

9.4.6 Surrogate Compounds

Surrogate compounds are used in the analysis of organic compounds by gas chromatography (GC) and/or by a combination of gas

chromatography and mass spectrometry (GC/MS) in conjunction with the internal standards mentioned above. Like the internal standard, the surrogate compounds are similar in analytical behavior to the compounds of interest and are added to all samples, standards and blanks. A known amount of surrogate is added to monitor the analytical performance of the method. The results of the surrogate compounds must fall within the established quality control criteria for recoveries and retention times for the analytical method. This helps to ensure the data generated meet quality assurance objectives for that analytical method.

9.4.7 Sample Duplicates

Duplicates are environmental samples divided into two separate aliquots analyzed independently to determine the repeatability or precision of the analytical SOP. The difference in the duplicate results must be within established control limits to insure the generated data meet the quality assurance objectives for the particular analytical method.

9.4.8 Matrix Spike/Matrix Spike Duplicates

A spiked environmental sample is used to describe the precision and accuracy of an analytical measurement. One out of every twenty samples or one per batch is spiked with a known concentration of the analyte of interest, then analyzed in a normal manner. The percent recovery and relative percent difference (RPD) are calculated and the results must fall within established control limits to ensure the generated data meets the quality assurance objectives for the particular analytical method used.

9.4.9 Performance Evaluation Samples

Performance Evaluation Samples are routinely issued to the analyst to monitor both the analyst's work and analytical procedure SOP. Both the Laboratory QA Officer and senior staff reviews the recorded results. If any problems occur, follow-up corrective action is taken. Performance Evaluation Samples may be in the form of blanks, previously analyzed environmental samples, split samples or standard reference materials such as EPA, USGS, etc.

Additional Internal Quality Control Checks used by Bryte Laboratory are described in **Attachment B** (pgs. 21- 24).

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 942360001
(916) 653-5791

March 24, 2004

Mr. James Maugan
Division of Water Quality
State Water Resources Control Board
Post Office Box 100
Sacramento, California 95812-0100

Dear Mr. Maugan:

As you requested on March 24, 2004, enclosed are copies of the following documents to fulfill the requirements for a Section 5.3 exception:

1. Notice of Determination – letter sent to Jarma Bennett on February 19, 2004.

2. Mitigated Negative Declaration --- *Application of Copper to the State Water Project to Control Aquatic Weeds and Algal Blooms* (January 2004).

3. Quality Assurance Project Plan (QAPP) – *Monitoring Plan for Copper in the State Water Project: Algae and Aquatic Weed Control Program (February 27, 2002).*

The QAPP was submitted for General Permit No. CAG990003 and includes information requested in the March 19, 2004 SWRCB Letter – Update on Aquatic Pesticide General Permits. Items 1 and 3 are discussed in the QAPP. The contingency plan (Item 5) is described in the Best Management Practices section of the QAPP. The remaining items are addressed in the attached CEQA document.

If you have any questions, please contact Jeff Janik of my staff at (916) 653-5688 or by email at jjanik@water.ca.gov.

Sincerely,

Larry Joyce for

Dan Peterson, Chief
Environmental Assessment Branch
Division of Operations and Maintenance

Enclosures

Material Safety Data Sheet

Material Name: Copper Sulfate Pentahydrate

ID: C1-121A

* * * Section 1 - Chemical Product and Company Identification * * *

Chemical Name: Copper Sulfate Pentahydrate
Product Use: For Commercial Use
Synonyms: Copper Sulfate Crystals, Blue Copper, Blue Stone, Blue Vitriol, Copper (II) sulfate, Cupric Sulfate, Copper Sulfate Fine 200, Fine 100, Fine 30, 20, Small, Medium, Large, FCC IV, and Very High Purity

Supplier Information

Chem One Ltd. (Importer of record)
8017 Pinemont Drive, Suite 100
Houston, Texas 77040-6519

Phone: (713) 896-9966
Fax: (713) 896-7540
Emergency # (800) 424-9300 or (703) 527-3887

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

* * * Section 2 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
7758-99-8	Copper (II) Sulfate Pentahydrate	> 99

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Copper (7440-50-8) and inorganic compounds, as Cu, Copper (7440-50-8) dusts and mists, as Cu and Copper fume, Cu.

Component Information/Information on Non-Hazardous Components

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

* * * Section 3 - Hazards Identification * * *

Emergency Overview

Copper Sulfate Pentahydrate is a blue crystalline or powdered, odorless solid. Potentially fatal if swallowed. May cause irritation to the eyes, respiratory system and skin. Fire may produce irritating, corrosive and/or toxic fumes. Firefighters should use full protective equipment and clothing.

Hazard Statements

HARMFUL OR FATAL IF SWALLOWED. Can cause irritation of eyes, skin, respiratory tract and, in extreme cases, burns. Avoid contact with eyes and skin. Avoid breathing dusts. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Keep from contact with clothing and other combustible materials.

Potential Health Effects: Eyes

Exposure to particulates or solution of this product may cause redness and pain. Prolonged contact may cause conjunctivitis, ulceration and corneal abnormalities.

Potential Health Effects: Skin

This product can cause irritation of the skin with pain, itching and redness. Severe overexposure can cause skin burns. Prolonged exposure may cause dermatitis and eczema.

Potential Health Effects: Ingestion

Harmful or fatal if swallowed. May cause gastrointestinal irritation with symptoms such as nausea, vomiting, and diarrhea. Ingestion may cause degeneration of liver, kidney, or renal failure. Persons who survive ingestion may develop granulomatous lesions of the kidney. Ingestion of large amounts may lead to convulsions, coma or death.

Potential Health Effects: Inhalation

May irritate the nose, throat and respiratory tract. Symptoms can include sore throat, coughing and shortness of breath. In severe cases, ulceration and perforation of the nasal septum can occur. If this material is heated, inhalation of fumes may lead to development of metal fume fever. This is a flu-like illness with symptoms of metallic taste, fever and chills, aches, chest tightness and cough. Repeated inhalation exposure can cause shrinking of the lining of the inner nose.

HMIS Ratings: Health Hazard: 2* Fire Hazard: 0 Physical Hazard: 1
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Immediately flush eyes with large amounts of room temperature water, occasionally lifting the lower and upper lids, for at least 15 minutes. If symptoms persist after 15 minutes of irrigation, seek medical attention.

* * * Section 4 - First Aid Measures (Continued) * * *

First Aid: Skin

Remove all contaminated clothing. For skin contact, wash thoroughly with soap and water for at least 20 minutes. Seek immediate medical attention if irritation develops or persists.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Have victim rinse mouth thoroughly with water, if conscious. Never give anything by mouth to a victim who is unconscious or having convulsions. Contact a physician or poison control center immediately.

First Aid: Inhalation

Remove source of contamination or move victim to fresh air. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Get immediate medical attention.

First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically. Basic Treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by non-rebreather mask at 10 to 15 L/minutes. Monitor for shock and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport. Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal. Advanced Treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious. Start an IV with lactated Ringer's SRP: "To keep open", minimal flow rate. Watch for signs of fluid overload. For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors if hypotensive with a normal fluid volume. Watch for signs of fluid overload. Use proparacaine, hydrochloride to assist eye irrigation.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point: Not flammable
Method Used: Not applicable
Upper Flammable Limit (UEL): Not applicable
Lower Flammable Limit (LEL): Not applicable
Auto Ignition: Not applicable
Flammability Classification: Not applicable
Rate of Burning: Not applicable

General Fire Hazards

Copper Sulfate Pentahydrate is not combustible, but may decompose in the heat of a fire to produce corrosive and/ or toxic fumes.

Hazardous Combustion Products

Sulfur oxides and copper fumes.

Extinguishing Media

Use methods for surrounding fire.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self-contained breathing apparatus. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

NFPA Ratings: Health: 2 **Fire:** 0 **Reactivity:** 1 **Other:**
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Stop the flow of material, if this can be done without risk. Contain the discharged material. If sweeping of a contaminated area is necessary use a dust suppressant agent, which does not react with product (see Section 10 for incompatibility information).

Clean-Up Procedures

Wear appropriate protective equipment and clothing during clean-up. Shovel the material into waste container. Thoroughly wash the area after a spill or leak clean-up. Prevent spill rinsate from contamination of storm drains, sewers, soil or groundwater.

Evacuation Procedures

Evacuate the area promptly and keep upwind of the spilled material. Isolate the spill area to prevent people from entering. Keep materials which can burn away from spilled material. In case of large spills, follow all facility emergency response procedures.

Special Procedures

Remove soiled clothing and launder before reuse. Avoid all skin contact with the spilled material. Have emergency equipment readily available.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling, when used as a pesticide. Do not breathe dust. Avoid all contact with skin and eyes. Use this product only with adequate ventilation. Wash thoroughly after handling.

Storage Procedures

Keep in original container in locked storage area. Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Empty containers may contain residual particulates; therefore, empty containers should be handled with care. Do not cut, grind, weld, or drill near this container. Never store food, feed, or drinking water in containers that held this product. Keep this material away from food, drink and animal feed. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Do not store this material in open or unlabeled containers. Limit quantity of material stored. Store in suitable containers that are corrosion-resistant.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Exposure Guidelines

A: General Product Information

Follow the applicable exposure limits.

B: Component Exposure Limits

The exposure limits given are for Copper & Inorganic Compounds, as Cu (7440-50-8), Copper fume as Cu or Copper dusts and mists, as Cu.

ACGIH:	1 mg/m^3 TWA (dusts & mists)
	0.2 mg/m^3 TWA (fume)
OSHA:	1 mg/m^3 TWA (dusts & mists)
	0.1 mg/m^3 TWA (fume)
NIOSH:	1 mg/m^3 TWA (dusts & mists)
	0.1 mg/m^3 TWA (fume)
DFG MAKs	1 mg/m^3 TWA Peak, 2•MAK 15 minutes, average value, 1-hr interval (copper and inorganic copper compounds)
	0.1 mg/m^3 TWA Peak, 2•MAK15 minutes, average value, 1-hr interval (fume)

Engineering Controls

Use mechanical ventilation such as dilution and local exhaust. Use a corrosion-resistant ventilation system and exhaust directly to the outside. Supply ample air replacement. Provide dust collectors with explosion vents.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132). Please reference applicable regulations and standards for relevant details.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields (or goggles) and a face shield, if this material is made into solution. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

Personal Protective Equipment: Skin

Wear chemically-impervious gloves, made of any waterproof material, boots and coveralls to avoid skin contact. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

* * * Section 8 - Exposure Controls / Personal Protection (Continued) * * *

Personal Protective Equipment: Respiratory

If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following NIOSH Guidelines for Copper dust and mists (as Cu) are presented for further information.

Up to 5 mg/m^3: Dust and mist respirator.

Up to 10 mg/m^3: Any dust and mist respirator except single-use and quarter mask respirators or any SAR.

Up to 25 mg/m^3: SAR operated in a continuous-flow mode or powered air-purifying respirator with a dust and mist filter(s).

Up to 50 mg/m^3: Air purifying, full-facepiece respirator with high-efficiency particulate filter(s), any powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter(s) or full-facepiece SCBA, or full-facepiece SAR.

Up to 100 mg/m^3: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA, or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s), or escape-type SCBA.

NOTE: The IDLH concentration for Copper dusts and mists (as Cu) is 100 mg/m^3.

Personal Protective Equipment: General

Wash hands thoroughly after handling material. Do not eat, drink or smoke in work areas. Have a safety shower or eye-wash fountain available. Use good hygiene practices when handling this material including changing and laundering work clothing after use. Discard contaminated shoes and leather goods.

* * * Section 9 - Physical & Chemical Properties * * *

Physical Properties: Additional Information

The data provided in this section are to be used for product safety handling purposes. Please refer to Product Data Sheets, Certificates of Conformity or Certificates of Analysis for chemical and physical data for determinations of quality and for formulation purposes.

Appearance:	Blue crystals or powder	**Odor:**	Odorless
Physical State:	Solid	**pH:**	3.7-4.2 (10% soln.)
Vapor Pressure:	20 torr at 22.5 deg C	**Vapor Density:**	8.6
Boiling Point:	560 deg C (1040 deg F) [decomposes]	**Freezing/Melting Point:**	150 deg C (302 deg F)
Solubility (H2O):	31.6 g/100 cc (@ 0 deg C)	**Specific Gravity:**	2.28 @ 15.6 deg C (H2O = 1)
Softening Point:	Not available	**Particle Size:**	Various
Molecular Weight:	249.68	**Bulk Density:**	Not available
		Chemical Formula:	CuSO4*5H2O

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Copper Sulfate Pentahydrate is hygroscopic, but stable when kept dry, under normal temperature and pressures.

Chemical Stability: Conditions to Avoid

Avoid high temperatures, exposure to air and incompatible materials.

Incompatibility

Copper Sulfate causes hydroxylamine to ignite and the hydrated salt is vigorously reduced. Solutions of sodium hypobromite are decomposed by powerful catalytic action of cupric ions, even as impurities. . Copper salts, including Copper Sulfate may react to form explosive acetylides when in contact with acetylene or nitromethane. Contact with reducing agents, can cause a vigorous reaction, especially in solution. This product can corrode aluminum, steel and iron. Copper Sulfate Pentahydrate is incompatible with magnesium, strong bases, alkalines, phosphates, acetylene, hydrazine, and zirconium.

Hazardous Decomposition

Sulfur oxides and Copper oxides.

Hazardous Polymerization

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute and Chronic Toxicity

A: General Product Information

Acute toxicity is largely due to the caustic (alkaline) properties of this material. Harmful or fatal if swallowed. Product is an eye and skin irritant, and may cause burns. Product is a respiratory tract irritant, and inhalation may cause nose irritation, sore throat, coughing, and chest tightness and possibly, ulceration and perforation of the nasal septum.

Chronic: Long term skin overexposure to this product may lead to dermatitis and eczema. Prolonged or repeated eye contact may cause conjunctivitis and possibly corneal abnormalities. Chronic overexposure to this product may cause liver and kidney damage, anemia and other blood cell abnormalities.

B: Component Analysis - LD_{50}/LC_{50}

Copper Sulfate Pentahydrate (7758-99-8)

Oral-rat LD_{50}: = 300 mg/kg; Intraperitoneal-Rat LD_{50}: 18,700 mg/kg; Intraperitoneal-rat LD_{50}: 20 mg/kg; Subcutaneous-rat LD_{50}: 43 mg/kg; Intravenous-rat LD_{50}: 48900 µg/kg; Unreported-rat LD_{50}: 520 mg/kg; Oral-mouse LD_{50}: 369 mg/kg; Intraperitoneal-Mouse LD_{50}: 33 mg/kg; Intraperitoneal-mouse LD_{50}: 7182 µg/kg; Intravenous-mouse LD_{50}: 23300 µg/kg

B: Component Analysis - TDLo/LDLo

Copper Sulfate Pentahydrate (7758-99-8)

Oral-man LDLo: 857 mg/kg; Oral-Human LDLo: 50 mg/kg: Behavioral: somnolence (general depressed activity); Kidney, Urethra, Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Blood: hemorrhage; Oral-Human TDLo: 11 mg/kg: Gastrointestinal: gastritis; Gastrointestinal: hypermotility, diarrhea, nausea or vomiting; Oral-Human TDLo: 272 mg/kg: liver, kidney, Blood effects; Oral-Human LDLo: 1088 mg/kg; Oral-child : 150 mg/kg: Kidney, Urethra, Bladder: changes in tubules (including acute renal failure, acute tubular ; necrosis); Blood: other hemolysis with or without anemia; unknown-Man LDLo: 221 mg/kg; Oral-Woman TDLo: 2400 mg/kg/day: Gastrointestinal tract effects; DNA Inhibition-Human: lymphocyte 76 mmol/L; Oral-woman LDLo: 100 mg/kg: Vascular: Blood pressure lowering not characterized in autonomic section; Liver: hepatitis (hepatocellular necrosis), diffuse; Kidney, Urethra, Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Oral-Human LDLo: 143 mg/kg: Pulmonary system effects, Gastrointestinal tract effects ;Oral-rat TDLo: 915 mg/kg/1 year-intermittent: Cardiac: changes in coronary arteries; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol; Oral-rat TDLo: 157 mg/kg/6 weeks-intermittent: Endocrine: changes in adrenal weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases; Oral-rat TDLo: 7530 mg/kg/30 days-intermittent: Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels:- multiple enzyme effect; Oral-rat TDLo: 2 gm/kg/20 days-intermittent: Liver: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: phosphatases, Enzyme inhibition, induction, or change in blood or tissue levels; Intraperitoneal-rat TDLo: 791 mg/kg/18 weeks-intermittent: Nutritional and Gross Metabolic: weight loss or decreased weight gain; Intraperitoneal-rat TDLo: 7500 µg/kg: female 3 day(s) after conception: Reproductive: Fertility: other measures of fertility; Subcutaneous-rat TDLo: 12768 µg/kg: male 1 day(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct; Intratesticular-rat TDLo: 3192 µg/kg: male 1 day(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct; Oral-mouse TDLo: 3 gm/kg/8 weeks-continuous: Blood: changes in spleen; Immunological Including Allergic: decrease in cellular immune response, decrease in humoral immune response; Oral-mouse TDLo: 2 gm/kg/3 weeks-continuous: Blood: changes in spleen; Immunological Including Allergic: decrease in cellular immune response, decrease in humoral immune response; Subcutaneous-mouse LDLo: 500 µg/kg; Subcutaneous-mouse TDLo: 12768 µg/kg: male 30 day(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct; Intravenous-mouse TDLo: 3200 µg/kg: female 8 day(s) after conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus), Specific Developmental Abnormalities: Central Nervous System, cardiovascular (circulatory) system; Intravenous-mouse TDLo: 3200 µg/kg: female 7 day(s) after conception: Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); Oral-Dog, adult LDLo: 60 mg/kg; Intravenous-guinea pig TDLo: 2 mg/kg; Subcutaneous-Guinea Pig, adult LDLo: 62 mg/kg; Oral-Pigeon LDLo: 1000 mg/kg; Oral-Domestic animals (Goat, Sheep) LDLo: 5 mg/kg; Oral-Bird-wild species LDLo: 300 mg/kg; Intravenous-frog LDLo: 25 mg/kg; Parenteral-chicken TDLo: 10 mg/kg: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Endocrine: tumors; Oral-pig TDLo: 140 mg/kg: female 1-15 week(s) after conception, lactating female 4 week(s) post-birth: Reproductive: Effects on Newborn: biochemical and metabolic; Intravenous-hamster TDLo: 2130 µg/kg: female 8 day(s) after conception: Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants), Specific Developmental Abnormalities: Central Nervous System, body wall

* * * Section 11 - Toxicological Information (Continued) * * *

Carcinogenicity

A: General Product Information

Copper Sulfate Pentahydrate (7758-99-8)

Cytogenetic Analysis-Rat/ast 300 mg/kg

B: Component Carcinogenicity

Copper dusts and mists, as Cu (7440-50-8)

EPA: EPA-D (Not Classifiable as to Human Carcinogenicity - inadequate human and animal evidence of carcinogenicity or no data available)

Epidemiology

No information available.

Neurotoxicity

Has not been identified.

Mutagenicity

Human and animal mutation data are available for Copper Sulfate Pentahydrate; these data were obtained during clinical studies on specific human and animal tissues exposed to high doses of this compound.

Teratogenicity

There are no reports of teratogenicity in humans. Animal studies indicate that a deficiency or excess of copper in the body can cause significant harm to developing embryos. The net absorption of copper is limited and toxic levels are unlikely from industrial exposure.

Other Toxicological Information

Individuals with Wilson's disease are unable to metabolize copper. Thus, persons with pre-existing Wilson's disease may be more susceptible to the effects of overexposure to this product.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Harmful to aquatic life in very low concentrations. Copper Sulfate Pentahydrate is toxic to fish and marine organisms when applied to streams, rivers, ponds or lakes.

B: Ecotoxicity

Copper Sulfate Pentahydrate (7758-99-8)

LC_{50} (*Lepomis machochirus* bluegill) wt 1.5 g = 884 mg/L at 18°C, static bioassay (95% confidence limit 707-1,100 mg/L) (technical material, 100% (about 25% elemental copper); LC_{50} (*Leopmis cyanellus*, Green Sunfish) = 1.1 g, 3,510 µg/L at °C; LC_{50} (*Pimephales promelas*, Fat-head minnow) = 1.2 g, 838 µg/L at 18°C; LC_{50} (*Crassius auratus*, Goldfish) = 0.9 g, 1380 µg/L at 18°C; LC_{50} (*Crassius auratus*, Goldfish) = 0.1-2.5 mg/L; LC_{50} (*EEL*) = 0.1-2.5 mg/L; LC_{50} (*Salmo gairdneri*, Rainbow trout) = 1.6 g, 135 µg/L at 18°C; LC_{50} (*Salmo gairdneri*, Rainbow trout) 48 hours =0.14 ppm; LC_{50} (*Daphnia magna*) no time specified = 0.182 mg/L; LC_{50} (*Salmo gairdneri*, Rainbow trout) no time specified = 0.17 mg/L; LC_{50} (*Lepomis machochirus*, Blue gill) no time specified = 1.5 g, 884 µg/L at 18°C; LC_{50} (Stripped Bass) 96 hours = 1 ppm or lower; LC_{50} (Prawn) 48 hours = 0.14; LC_{50} (Shrimp) 96 hours = 17.0 ppm copper; LC_{50} (Blue Crab) 96 hours = 28 ppm copper; LC_{50} (Oyster) 96 hours = 5.8 ppm copper; LC_{50} (*Viviparus bengalensis* snail) 96 hours = 0.060 ppm copper (at 32.5°C; 0.066 ppm copper static bioassay); LC_{50} (*Viviparus bengalensis* snail) 96 hours = 0.09 ppm copper (at 27.3°C; 0.066 ppm copper static bioassay); LC_{50} (*Viviparus bengalensis* snail) 96 hours = 0.39 ppm copper (at 20.3°C; 0.066 ppm copper static bioassay)

Environmental Fate

If released to soil, copper sulfate may leach to groundwater, be partly oxidized or bind to humic materials, clay or hydrous oxides of iron and manganese. In water, it will bind to carbonates as well as humic materials, clay and hydrous oxides of iron and manganese. Copper is accumulated by plants and animals, but it does not appear to biomagnify from plants to animals. In air, copper aerosols have a residence time of 2 to 10 days in an unpolluted atmosphere and 0.1 to greater than 4 days in polluted, urban areas.

* * * Section 14 - Transportation Information (Continued)* * *

International Air Transport Association (IATA)

For Shipments by Air transport: We classify this product as hazardous (Class 9) when shipped by air because 49 CFR 173.140 (a). "For the purposes of this subchapter, miscellaneous hazardous material (Class 9) means a material which presents a hazard during transportation, but which does not meet the definition of any other hazard class. This class includes: (a) Any material which has an anesthetic, noxious, or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties."

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s. (cupric sulphate)
Hazard Class: 9
UN: UN 3077
Packing Group: III
Passenger & Cargo Aircraft Packing Instruction: 911
Passenger & Cargo Aircraft Maximum Net Quantity: No Limit
Limited Quantity Packing Instruction (Passenger & Cargo Aircraft): Y911
Limited Quantity Maximum Net Quantity (Passenger & Cargo Aircraft): 30 kg
Special Provisions: A97
ERG Code: 9L
Limited Quantity Shipments: Such shipments must be marked with the proper shipping name, UN number, and must be additionally marked with the words LIMITED QUANTITIES or LTD. QTY. The total weight of each outer packaging cannot exceed 30 kg (66 lb.) . For a shipment by air the class 9 label will be required

International Maritime Organization (I.M.O.) Classification

For shipments via marine vessel transport, the following classification information applies.

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Cupric sulfate)
Hazard Class: class 9
UN #: UN3077
Packing Group: III
Special Provisions: 274, 909, 944
Limited Quantities: 500g.
Packing Instructions: P002, LP02
Packing Provisions PP12
EmS: Fire F-A Spill S-F
Stowage and Segregation: Category A
Marine Pollutant: This material is considered a severe marine pollutant by the IMO and shipments of the material must carry the marine pollutant mark label. Refer to IMO Amendment 31-02 Chapter 2.10.
Limited Quantity Shipments: Inner packaging less than 500 g (17.6 oz) will not need to be in a UN-approved box and will not need a Marine Pollutant marking. Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (3077) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg (66l) .

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

Copper Sulfate Pentahydrate (CAS # 7758-99-8) is listed as a Priority and Toxic Pollutant under the Clean Water Act.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

A: General Product Information

This product is a registered pesticide.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

All wastes must be handled in accordance with local, state and federal regulations or with regulations of Canada and its Provinces. This material can be converted to a less hazardous material by weak reducing agents followed by neutralization. Do not reuse empty containers. Do not rinse unless required for recycling. If partly filled, call local solid waste agency or (1-800-CLEANUP or equivalent organization) for disposal instructions. Never pour unused product down drains or on the ground.

Pesticide Disposal

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticides, spray mixtures, or rinsate is a violation of U.S. Federal and Canadian Law. If these wastes cannot be disposed of by use, according to product label instruction, contact your U.S. State, or Canadian Province Pesticide or Environmental Control Agency, or the hazardous waste representative at the nearest U.S. EPA Regional Office, or the offices of Environment Canada for guidance.

* * * Section 14 - Transportation Information * * *

NOTE: The shipping classification information in this section (Section 14) is meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

US DOT Information

Shipping Name: Environmentally Hazardous Substance, solid, n.o.s. (cupric sulfate)
Hazard Class: 9 (Miscellaneous Hazardous Material)
UN/NA #: UN 3077
Packing Group: III
Required Label(s): Class 9 (Miscellaneous Hazardous Materials)
RQ Quantity: 10 lbs (4.54 kg)[Cupric Sulfate]
Additional Shipping Information: Cupric Sulfate is a Severe Marine Pollutant (49 CFR 172.322) and requires the marine pollutant mark for vessel transportation. Because Copper Sulfate is listed as a Severe Marine Pollutant as found in Appendix B to 172.101and when shipped by vessel, each inner package which exceeds 500 g (17.6 oz) will need a marine pollutant marking, UN-certified package, marked with the Proper Shipping Name, UN Number will be required when shipped by vessel, when each inner package exceeds 500 g (17.6 oz).
Limited Quantity Shipments: Inner packagings less than 500 g (17.6 oz) will not need to be in a UN-approved box and will not need a Marine Pollutant marking. Such shipments need not be marked with the Proper Shipping Name of the contents, but shall be marked with the UN Number (3077) of the contents, preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg (66 lb). For a shipment by air the Class 9 label will be required.
Domestic Transportation Exception:
49 CFR 172.504(f)(9) Domestic transportation, a Class 9 placard is not required. A bulk packaging containing a Class 9 material must be marked with the appropriate identification number displayed on a Class 9 placard, an orange panel or a white-square-on-point display configuration as required by subpart D of this part. 49 CFR 172(d)(3) allows the use of the Class 9 placard to replace the marine pollutant marking for domestic shipments.

* * * Section 15 - Regulatory Information (Continued)* * *

US Federal Regulations (continued)

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4):

Copper Compounds (7440-50-8)

SARA 313: final RQ = 5000 pounds (2270 kg) Note: No reporting of releases of this substance is required if the diameter of the pieces of the solid metal released is equal to or greater than 0.004 inches.

Cupric Sulfate (7758-98-7)

CERCLA: final RQ = 10 pounds (4.54 kg)

C: Sara 311/312 Tier II Hazard Ratings:

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Copper Sulfate Pentahydrate	7758-99-8	No	No	No	Yes	Yes

State Regulations

A: General Product Information

California Proposition 65

Copper Sulfate Pentahydrate is not on the California Proposition 65 chemical lists.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substance lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Copper	7440-50-8	Yes	No	Yes	No	Yes	Yes
Copper, fume, dust and mists	N/A	No	Yes	No	Yes	No	Yes
Copper Sulfate Pentahydrate	7758-99-8	No	No	No	No	Yes	Yes

Other Regulations

A: General Product Information

When used as a pesticide, the requirements of the U.S. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), or requirements under the Canadian Pest Control Act, are applicable.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Copper Sulfate Pentahydrate	7758-99-8	Excepted	No	Yes

Although this compound is not on the TSCA Inventory, it is excepted as a hydrate of a listed compound, Copper Sulfate (CAS # 7758-98-7), per 40 CFR 710.4 (d)(3) and 40 CFR 720.30 (h)(3). Under this section of TSCA, any chemical substance which is a hydrate of a listed compound is excepted.

C: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Copper Sulfate Pentahydrate	7758-99-8	1 percent

ANSI Labeling (Z129.1):

DANGER! MAY BE FATAL IF SWALLOWED. CAUSES SKIN AND EYE IRRITATION. HARMFUL IF INHALED. Keep from contact with clothing. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing dusts or particulates. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, faceshields, suitable body protection, and NIOSH-approved respiratory protection, as appropriate. **FIRST-AID:** In Case of Contamination of Skin or Clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. In Case of Contamination of Eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue to rinse eye. If Inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth to mouth, if possible. If Ingested: Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person. Call a poison control center or doctor for treatment advice. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In the event of a medical emergency, you may also contact

* * * Section 15 - Regulatory Information (Continued) * * *

The National Pesticide Information Center at 1-800-858-7378. **IN CASE OF FIRE:** Use water fog, dry chemical, CO_2, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

Labeling Information for Pesticide Use of Product:

DANGER! HAZARD TO HUMANS AND DOMESTIC ANIMALS.

DANGER: CORROSIVE: Causes eye damage and irritation to the skin and mucous membrane. Harmful or fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not breathe dust or spray mist. May cause skin sensitization reactions to certain individuals.

PERSONAL PROTECTIVE EQUIPMENT: Applicators and other handlers must wear long-sleeved shirt and long pants, chemical-resistant gloves, made of any water-proof material, shoes, plus socks and protective eyewear. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this solutions of this product. Do not reuse such contaminated items. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for reusable items exist, wash using detergent and hot water. Keep and wash PPE separately for other laundry.

USER SAFETY RECOMMENDATIONS: Persons using this product should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if contaminated by the pesticide. Wash contaminated clothing thoroughly and put on clean clothing. Remove PPE immediately after use with this product. Wash outside of gloves and other equipment before removing. After removal of PPE, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS: This product is toxic to fish. Direct application of Copper Sulfate to water may cause a significant reduction in populations of aquatic invertebrates, plants and fish. Do not treat more than one-half of lake or pond at one time in order to avoid depletion of oxygen from decaying vegetation. Allow 1 to 2 weeks between treatments for oxygen levels to recover. Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. However, fish toxicity generally decreases when the hardness of the water increases. Do not contaminate water by cleaning of equipment of disposal of wastes. Consult local State Fish and Game Agency before applying this product to public waters. Permits may be required before treating such waters.

STORAGE AND DISPOSAL: PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Open burning and dumping is prohibited. Do not re-use empty containers. Keep pesticide in original container. Do not put concentrate or dilutions of concentrate in food r drink containers. Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use, according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance. Completely empty bag of product into application equipment. Dispose of empty bag in a sanitary landfill or by incineration, or if allowed by State and local authorities, by burning. If burned, avoid smoke.

DIRECTIONS FOR USE: It is a violation of Federal Law to use this product inconsistent with its labeling. Do not apply this product in a way that will contaminate workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For requirements specific to your State, consult the agency responsible for your pesticide regulations.

AGRICULTURAL USE REQUIREMENTS: Use this product only in accordance with its labeling and with the Worker Protection Standard, CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. The Standard contains requirements for the training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. These requirements only apply to uses of this product that are covered under the Worker Protection Standard. Do not apply this product in a way that will contaminate workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. Do not allow worker entry into treated areas during the restricted interval (REI) of 24 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water, is" Coveralls, waterproof gloves, shoes, plus socks and protective eyewear.

* * * Section 15 - Regulatory Information (Continued) * * *

Labeling Information for Pesticide Use of Product (continued):

GENERAL USE INSTRUCTIONS: Water hardness, temperature of the water, the type and amount of vegetation to be controlled and the amount of water flow, are to be considered in using Copper Sulfate to control algae. Begin treatment soon after plant growth has started. If treatment is delayed until a large amount of algae is present, larger quantities of Copper Sulfate will required. Algal growth is difficult to control with Copper Sulfate when water temperatures are low or when water is hard. Larger quantities of Copper Sulfate will be required to kill and control algae in water which is flowing than in a body of stagnant water. If possible, curtail the flow of water before treatment and hold dormant until approximately three days after treatment or until the algae have begun to die. When preparing a Copper Sulfate solution in water, the mixing container should be made of plastic or glass, or a painted, enameled, or copper-lined metal container. It is usually best to treat algae on a sunny day when the heavy mats of filamentous algae are most likely to be floating on the surface, allowing the solution to be sprayed directly on the algae. If there is some doubt about the concentration to apply, it is generally best to start with a lower concentration and to increase this concentration until the algae are killed.

ENDANGERED SPECIES RESTRICTION: It is a violation of Federal Law to use any pesticide in a manner that results in the death of an endangered species or adverse modification to their habitat. The use of this product may pose a hazard to certain Federally Designated species known to occur in specific areas. Contact the EPA for information on these areas. Obtain a copy of the EPA Bulletin specific to your area. This bulletin identifies areas within specific State counties where the use of this pesticide is prohibited, unless specified otherwise. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE.

EPA REG. NO. 56576- EPA EST. NO. 52117-MX-001

* * * Section 16 - Other Information * * *

Other Information

Chem One Ltd. ("Chem One") shall not be responsible for the use of any information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this Information. In no event shall Chem One be responsible for damages of any nature whatsoever resulting from the use of this product or products, or reliance upon this Information. By providing this Information, Chem One neither can nor intends to control the method or manner by which you use, handle, store, or transport Chem One products. If any materials are mentioned that are not Chem One products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed. Chem One makes no representations or warranties, either express or implied of merchantability, fitness for a particular purpose or of any other nature regarding this information, and nothing herein waives any of Chem One's conditions of sale. This information could include technical inaccuracies or typographical errors. Chem One may make improvements and/or changes in the product (s) and/or the program (s) described in this information at any time. If you have any questions, please contact us at Tel. 713-896-9966 or E-mail us at Safety@chemone.com. Revision date: 05/31/01

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration

Contact: Sue Palmer-Koleman, PhD **Contact Phone:** (713) 896-9966

Revision log

07/24/00 4:24 PM SEP Changed company name, Sect 1 and 16, from Corporation to Ltd.
07/27/00 2:49 PM SEP Added "Fine 200, FCC IV, Very High Purity" to synonyms, Section 1
08/23/00 3:15 PM SEP Added "Copper Sulfate Crystals" to synonyms, Section 1
05/31/01 9:31 AM HDF Checked exposure limits; made changes to Sect 9; overall review, add SARA 311/312 Haz Ratings.
06/01/01 7:28 AM HDF Added text to label information from EPA Approved Label
07/24/01 4:31 AM CLJ Add Shipments by Air information to Section 14, Changed contact to Sue, non-800 Chemtrec Num.
09/18/01 11:34 AM SEP Added Domestic Transportation Exception, Sect 14
10/05/01 3:30 PM SEP Deleted Alternate Shipping Name, Sect 14
02/15/02 11:01 AM: HDF Revision of SARA Chronic Hazard Rating to "Yes".
2/21/02 4:21 PM HDF Added more information on Marine Pollutant Markings and Limited Quantity Shipments
9/16/03: 3:45 PM HDF Addition of chronic health hazard information. Addition of inhalation hazard information, Section 3. Section 4. expansion of information on Information for Physicians. Up-graded Section 10 Reactivity Information. Up-dated DFG MAK exposure limits. Up-Dated entire Section 14 Transportation Information to include IATA, IMO and current Canadian transport information.

This is the end of MSDS # C1-121A

Material Safety Data Sheet

Transportation and Medical Emergency Phone: 1-800-535-5053
(INFOTRAC)
General Phone: 317-580-8282

EPA Reg. Number: 67690-10
Effective Date: 2/28/03

Nautique* Aquatic Herbicide

SePRO Corporation Carmel, IN 46032

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: Nautique* Aquatic Herbicide

COMPANY IDENTIFICATION:
SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032
www.sepro.com

2. COMPOSITION / INFORMATION ON INGREDIENTS

Copper as Elemental**.....9.1%
Inert Ingredients, Total, Including.....90.9%
Ethylenediamine CAS # 000107-15-3

**One gallon contains 0.91 pounds of elemental copper from a mixed ethylenediamine/triethanolamine/copper complex (1 liter contains 110.0 grams copper).

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

3. HAZARDOUS IDENTIFICATIONS

EMERGENCY OVERVIEW
Dark purple liquid with a slight ammoniacal odor. May cause severe eye irritation with corneal injury, even blindness. May be absorbed through the skin in harmful amounts. Corrosive to the skin.
EMERGENCY TELEPHONE NUMBER:
(800) 535-5053

POTENTIAL HEALTH EFFECTS: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

EYES: Corrosive to eyes. Corneal injury may be severe, extensive, and, if not treated promptly, could result in permanent impairment of vision. Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, marked excess redness and swelling of the conjunctiva, and chemical burns of the eye.

SKIN: Corrosive to skin. Avoid contact. May cause local discomfort or pain, severe excess redness and swelling, tissue destruction, fissures, ulceration, and possibly bleeding into the injured area. Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material. LD_{50} for skin absorption in rabbits is 700 mg/kg.

INGESTION: May be toxic if swallowed. May cause burns of the mouth and throat, abdominal pain, nausea, vomiting, diarrhea, dizziness, weakness, thirst, collapse, and possible coma. The nature and severity of these signs and symptoms will be dependent on the amount swallowed. Aspiration into the lungs may occur during ingestion or vomiting, resulting in lung injury. Oral LD_{50} for rats is 680 mg/kg.

INHALATION: Vapors may be irritating and may cause excessive tear formation, burning sensation of the nose and throat, coughing, wheezing, shortness of breath, nausea and vomiting. Extremely high vapor concentrations may cause lung damage. Some individuals may develop asthma. Inhalation LC_{50} for rats is 2.1 mg/L.

SYSTEMIC (OTHE RTARGET ORGAN) EFECTS:
No relevant information found.

CANCER INFORMATION: No relevant information found.

TERATOLOGY (BIRTH DEFECTS): No relevant information found.

REPRODUCTIVE EFFECTS: No relevant information found.

4. FIRST AID

EYE: Immediately flush eyes with flowing water while holding eyelid away from eyeball. Continue washing for at least 15 minutes. Do not remove contact lenses if worn. Get prompt medical attention.

SKIN: Immediately flush skin thoroughly with water for at least 15 minutes while removing contaminated clothing and shoes. Wash thoroughly with soap and water. Get medical attention if irritation persists. Wash clothing before reuse. Discard contaminated leather articles such as shoes and belt.

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INGESTION: Do not induce vomiting. Get immediate medical attention. If patient is fully conscious, give 1 or 2 glasses of water or milk.

INHALATION: Remove to fresh air. Give artificial respiration if not breathing. If breathing is difficult, oxygen may be given by qualified personnel. Obtain medical attention.

NOTE TO PHYSICIAN: Corrosive. May cause stricture. If lavage is performed, suggest endotracheal and/or esophagoscopic control. If burn is present, treat as any thermal burn after decontamination. No specific antidote. Supportive care. Treatment is based on the judgment of the physician in response to reactions of the patient. Prolonged or repeated inhalation may aggravate preexisting asthma, liver and kidney disease. Corrosive to eyes and skin. Causes irreversible eye damage.

5. FIRE FIGHTING MEASURES

FLASH POINT: Not determined
METHOD USED: Not applicable

FLAMMABLE LIMITS:
LFL: Not applicable
UFL: Not applicable

EXTINGUISHING MEDIA: All-purpose foam is preferred.

FIRE AND EXPLOSION HAZARDS: Keep unnecessary people away; isolate the hazard area and deny unnecessary entry. Highly toxic fumes are released in fire situations.

FIREFIGHTING EQUIPMENT: Wear positive-pressure, self-contained breathing apparatus and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO TAKE FOR SPILLS AND LEAKS: Ventilate area. Avoid breathing vapors. Wear respiratory protection and avoid contact with skin, eyes or clothing. Use absorbent material such as sweeping compound, oil absorbent, or lime to contain and clean up small spills and dispose as waste in a chemical disposal container. Wash spill area with water containing a strong detergent, absorb it, and place in chemical disposal container. Report large spills to INFOTRAC and consult SePRO Corporation for assistance. Prevent runoff.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Utilize good personal hygiene practices and exercise normal liquid handling procedures. Store below 95°F (35°C) whenever possible. Decomposes at temperatures above 400°F (200°C). Average shelf life under proper storage conditions in the original sealed containers is 2 years. Store in a clean, dry area. Keep out of reach of children. Harmful if swallowed, absorbed through the skin, or inhaled. Avoid breathing of spray mist or contact with skin, eyes, or clothing.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

These precautions are suggested for conditions where the potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINES:
Ethylenediamine: ACGIH TLV and OSHA PEL are 10 ppm or 25 mg/M^3, TWA.
Proprietary Ingredient: ACGIH TLV is 5 mg/M^3, TWA

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

RESPIRATORY PROTECTION: Use a NIOSH approved full-face air-purifying respirator. For emergency response or for situations where the atmospheric level is unknown, use a NIOSH approved positive-pressure self-contained breathing apparatus.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as face shield, gloves, boots, apron, or full body suit will depend on operation. Use gloves, impervious to this material, at all times. Safety shower should be located in immediate work area. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse. Items, which cannot be decontaminated, such as shoes, belts, and watchbands, should be removed, destroyed, and disposed.

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Nautique* Aquatic Herbicide

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EYE/FACE PROTECTION: Use chemical goggles. Eye wash fountain should be located in immediate work area. If vapor exposure causes eye discomfort, use a NIOSH approved full-face respirator for vapors.

APPLICATORS AND ALL OTHER HANDLERS: Refer to the product label for personal protective clothing and equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT: Not determined
SOLUBILITY IN WATER: Soluble
VAPOR PRESSURE: Approximately the same as water
SPECIFIC GRAVITY: 1.2
APPEARANCE: Dark purple liquid
ODOR: Slight ammoniacal
pH: Not determined

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

INCOMPATIBILITY: (Specific materials to avoid) Strong acids and nitrites. Should not be used in water where the pH is less than 6.0 due to the possible breakdown of the copper chelate, which could form copper ions, which would precipitate. Should not be applied to water when temperature of the water is below 60°F (15°C).

HAZARDOUS DECOMPOSITION PRODUCTS: Decomposes above 390°F (200°C). May form oxides of carbon and nitrogen.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION

MUTAGENICITY: No relevant information found.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL DATA: No relevant information found.

13. DISPOSAL CONSIDERATIONS

DISPOSAL: Responsibility of proper waste disposal rests with the owner of the waste. Consult with local and environmental authorities. Contaminated materials should be placed in sealed drums and shipped to an approved chemical dump for disposal in accordance with all federal, state and local regulations.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION INFORMATION:

FOR PACKAGE SIZES ONE GALLON OR LESS AND ALL MODES OF TRANSPORTATION (air, land, vessel):
This material is not regulated.

FOR PACKAGES SIZES GREATER THAN ONE GALLON AND ALL MODES OF TRANSPORTED (air, land, vessel):
Copper based pesticides, liquid, toxic (mixed copper ethylenediamine/triethanolamine complex).
DOT Hazard Class: Class 6.1

15. REGULATORY INFORMATION

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

U.S. REGULATIONS

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund

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Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An Immediate Health Hazard

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA 701): (4 = Extreme; 3 = High; 2 = Moderate; 0 = Insignificant)

Health	3
Flammability	0
Reactivity:	1

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in Section 1 of the MSDS.

Chemical Name	CAS Number	List
Proprietary Ingredient	Proprietary	PA1
Ethylenediamine	000107-15-3	NJ1 NJ2 NJ3 PA1 PA3

NJ1=New Jersey Special Health Hazard Substance (present at > or = to 0.1%).
NJ2=New Jersey Environmental Hazardous Substance (present at > or = to 1.0%).
NJ3=New Jersey Workplace Hazardous Substance (present at > or = to 1.0%).
PA1=Pennsylvania Hazardous Substance (present at > or = to 1.0%).
PA3=Pennsylvania Environmental Hazardous Substance (present at > or = to 1.0%).

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

OSHA HAZARD COMMUNICATION STANDARD: This product is a "hazardous Chemical" as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA, which may require reporting of releases:

Chemical Name	CAS Number	RQ	% in Product
Ethylenediamine	000107-15-3	5000	20.7%

16. OTHER INFORMATION

MSDS STATUS: Revised
Replaces MSDS Dated: 6/25/98
Replaces MSDS Dated: 10/10/02

The information herein is given in good faith, but no warranty, express or implied, is made. Consult SePRO Corporation for further Information.

Griffin

MATERIAL SAFETY DATA SHEET

Komeen® **Date Prepared: September 3, 1997**

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Product Name: Komeen®

HAZARDS CLASSIFICATION (0-minimal, 1-slight, 2-moderate, 3-serious, 4-severe)

NFPA: HEALTH-2 FIRE-1 REACTIVITY-0

HMIS: HEALTH-2 FIRE-1 REACTIVITY-0

MANUFACTURER

Company Name: Griffin Corporation

Address: PO Box 1847, Rocky Ford Road
Valdosta, GA 31603-1847

EMERGENCY PHONE NUMBERS

Griffin Corporation: (800) 237 1854

Chemtrec: (800) 424 9300

2. COMPOSITION/ INFORMATION ON INGREDIENTS

Component Name	% by Wt.	CAS#	ACGIH TLV	OSHA PEL
Elemental Copper *	8%	Not available	Not determined	Not determined
Inert ingredients	92%			

*derived from copper-ethylenediamine complex and copper sulfate pentahydrate.
Components not precisely identified are proprietary or not hazardous.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Dark Purple liquid that may cause moderate irritation to the eyes and skin. See below for route-specific details.

POTENTIAL HEALTH EFFECTS

Inhalation: Toxic if inhaled.

Eye Irritation: Considered to be a moderate irritant. Avoid eye contact with the product by using chemical safety glasses or goggles. May cause redness, swelling, and discharge, but is reversible.

Skin Irritation: Slight skin irritant.

Skin Absorption: Slightly toxic dermally.

Ingestion: Moderately toxic by ingestion.

4. FIRST AID MEASURES

Inhalation:	Remove victim to fresh air. If not breathing, give artificial respiration preferably mouth-to-mouth. Get professional medical attention.
Eye Contact:	Hold eyelids open and flush with water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention if irritation persists.
Skin Contact:	Remove contaminated clothing and shoes. Wash with plenty of soap and water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention if irritation persists.
Ingestion:	If ingested, contact physician or call Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flash Point & Method:	Not determined
Flammable Limits:	Not determined
Autoignition Temperature:	Not determined

FIRE FIGHTING HAZARDS & PROCEDURES

General Hazard:	Prevent human exposure to fire, smoke, fumes or products of combustion.
Extinguishing Media:	Not determined
Fire Fighting Equipment:	Wear protective clothing and self-contained breathing apparatus.
Hazardous Combustion Products:	Decomposes above 200°C.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures:	Cover the spill with an absorbent material such as sweeping compound or lime. Sweep up and place in suitable (fiberboard) containers for later disposal.

7. HANDLING AND STORAGE

Storage Temperature:	Store below 35°C (95°F). Decomposes above 200°C. Average shelf life under proper storage conditions is 2 years.
General Information:	Store in a clean, dry area. Do not store near feed, food or within the reach of children.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Ventilation:	Provide local exhaust ventilation and/or general dilution ventilation to meet published exposure limits.
Respiratory Protection:	Wear dual cartridge respirator for dusts and mists.
Eye Protection:	Wear protective eyewear to prevent contact with this substance.
Protective Clothing:	Wear rubber gloves.

9. PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	No appreciable vapor pressure. Open containers can lose small amounts of water by volatilization.
Density:	1.22
Solubility in Water:	Soluble in water and alcohols.
pH:	9.62
Boiling Point:	215°F. Loses water and decomposes at high temperatures.
Melting Point:	Not determined
Odor:	Odorless
Color:	Dark purple
Physical State:	Liquid

10. STABILITY AND REACTIVITY

General:	This material is stable under normal conditions.
Conditions to Avoid:	Should not be used where pH of water is below 6 due to the possibility that the copper chelate may dissociate and release copper ions which could subsequently be precipitated as insoluble copper salts. Should not be applied when water temperature is below 60°F.
Hazardous Decomposition:	Decomposes above 200°C.
Hazardous Polymerization:	Material is not known to polymerize.

11. TOXICOLOGICAL INFORMATION

ACUTE

Inhalation:	Acute inhalation LC_{50} = 0.81 mg/L (rat - 4 hour).
Eye Irritation:	Considered to be a moderate irritant. Avoid eye contact.
Skin Irritation:	Considered to be a slight irritant to the skin. Material is a non-sensitizer to the skin.
Skin Absorption:	Acute dermal LD_{50} > 2,000 mg/kg.
Ingestion:	Oral LD_{50} = 498 mg/kg.

12. ECOLOGICAL INFORMATION

For detailed ecological information, write to the address listed in Section 1 of this MSDS or call 912/242-8635 and ask for Regulatory Affairs.

13. DISPOSAL CONSIDERATIONS

Comply with appropriate disposal regulations. Landfill solids at permitted sites. Use registered transporters.

14. TRANSPORT INFORMATION

Department of Transportation (DOT) / International Air Transport Association (IATA) / International Maritime Organization (IMO):

Classification:	Copper Based Pesticide, Liquid, Toxic (Copper-Ethylenediamine Complex 8%)
Class:	6.1
Identification Number:	UN 3010
Packing Group:	III

15. REGULATORY INFORMATION

OSHA:	This product is considered hazardous under the OSHA Hazardous Communication Standard 29 CFR 1910.1200.
TSCA:	All product components are on the TSCA Chemical Inventory.
CERCLA:	Releases of this material to air, land, or water are not reportable to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to the state and local emergency planning committees under the Superfund Amendments and Reauthorization Act (SARA) Title III Section 304.
RCRA:	When a decision is made to discard this material as supplied, it does not meet RCRA's characteristic definition of ignitability, corrositivity, or reactivity, and is not listed in 40 CFR 261.33.
SARA TITLE III	
311/312 Hazard Categories:	This product has been reviewed according to the EPA "Hazard Categories" and is categorized as an acute health hazard (40 CFR 370.41).
313 Reportable Ingredients:	This product does not contain any material listed in Section 313 above de minimis concentrations.

16. OTHER INFORMATION

REVISION SUMMARY

This Material Safety Data Sheet replaces the one dated 06/20/96. Revisions have been made in the following sections: 2.

Komeen® is a registered trademark of Griffin Corporation.

The information in this MSDS relates to this specific material. It may not be valid for this material if used in combination with any other materials or in any process. It is the users' responsibility to satisfy themselves as to the suitability and completeness of this information for their own particular use.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Product Name: Komeen®

HAZARDS CLASSIFICATION (0-minimal, 1-slight, 2-moderate, 3-serious, 4-severe)

NFPA: HEALTH-2 FIRE-1 REACTIVITY-0

HMIS: HEALTH-2 FIRE-1 REACTIVITY-0

MANUFACTURER

Company Name: Griffin Corporation

Address: PO Box 1847, Rocky Ford Road
Valdosta, GA 31603-1847

EMERGENCY PHONE NUMBERS

Griffin Corporation: (800) 237 1854

Chemtrec: (800) 424 9300

2. COMPOSITION/ INFORMATION ON INGREDIENTS

Component Name	% by Wt.	CAS#	ACGIH TLV	OSHA PEL
Elemental Copper *	8%	Not available	Not determined	Not determined
Inert ingredients	92%			

*derived from copper-ethylenediamine complex and copper sulfate pentahydrate.
Components not precisely identified are proprietary or not hazardous.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Dark Purple liquid that may cause moderate irritation to the eyes and skin. See below for route-specific details.

POTENTIAL HEALTH EFFECTS

Inhalation: Toxic if inhaled.

Eye Irritation: Considered to be a moderate irritant. Avoid eye contact with the product by using chemical safety glasses or goggles. May cause redness, swelling, and discharge, but is reversible.

Skin Irritation: Slight skin irritant.

Skin Absorption: Slightly toxic dermally.

Ingestion: Moderately toxic by ingestion.

4. FIRST AID MEASURES

Inhalation:	Remove victim to fresh air. If not breathing, give artificial respiration preferably mouth-to-mouth. Get professional medical attention.
Eye Contact:	Hold eyelids open and flush with water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention if irritation persists.
Skin Contact:	Remove contaminated clothing and shoes. Wash with plenty of soap and water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention if irritation persists.
Ingestion:	If ingested, contact physician or call Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flash Point & Method:	Not determined
Flammable Limits:	Not determined
Autoignition Temperature:	Not determined

FIRE FIGHTING HAZARDS & PROCEDURES

General Hazard:	Prevent human exposure to fire, smoke, fumes or products of combustion.
Extinguishing Media:	Not determined
Fire Fighting Equipment:	Wear protective clothing and self-contained breathing apparatus.
Hazardous Combustion Products:	Decomposes above 200°C.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures:	Cover the spill with an absorbent material such as sweeping compound or lime. Sweep up and place in suitable (fiberboard) containers for later disposal.

7. HANDLING AND STORAGE

Storage Temperature:	Store below 35°C (95°F). Decomposes above 200°C. Average shelf life under proper storage conditions is 2 years.
General Information:	Store in a clean, dry area. Do not store near feed, food or within the reach of children.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Ventilation:	Provide local exhaust ventilation and/or general dilution ventilation to meet published exposure limits.
Respiratory Protection:	Wear dual cartridge respirator for dusts and mists.
Eye Protection:	Wear protective eyewear to prevent contact with this substance.
Protective Clothing:	Wear rubber gloves.

9. PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	No appreciable vapor pressure. Open containers can lose small amounts of water by volatilization.
Density:	1.22
Solubility in Water:	Soluble in water and alcohols.
pH:	9.62
Boiling Point:	215°F. Loses water and decomposes at high temperatures.
Melting Point:	Not determined
Odor:	Odorless
Color:	Dark purple
Physical State:	Liquid

10. STABILITY AND REACTIVITY

General:	This material is stable under normal conditions.
Conditions to Avoid:	Should not be used where pH of water is below 6 due to the possibility that the copper chelate may dissociate and release copper ions which could subsequently be precipitated as insoluble copper salts. Should not be applied when water temperature is below 60°F.
Hazardous Decomposition:	Decomposes above 200°C.
Hazardous Polymerization:	Material is not known to polymerize.

11. TOXICOLOGICAL INFORMATION

ACUTE

Inhalation:	Acute inhalation LC_{50} = 0.81 mg/L (rat - 4 hour).
Eye Irritation:	Considered to be a moderate irritant. Avoid eye contact.
Skin Irritation:	Considered to be a slight irritant to the skin. Material is a non-sensitizer to the skin.
Skin Absorption:	Acute dermal LD_{50} > 2,000 mg/kg.
Ingestion:	Oral LD_{50} = 498 mg/kg.

12. ECOLOGICAL INFORMATION

For detailed ecological information, write to the address listed in Section 1 of this MSDS or call 912/242-8635 and ask for Regulatory Affairs.

13. DISPOSAL CONSIDERATIONS

Comply with appropriate disposal regulations. Landfill solids at permitted sites. Use registered transporters.

14. TRANSPORT INFORMATION

Department of Transportation (DOT) / International Air Transport Association (IATA) / International Maritime Organization (IMO):

Classification:	Copper Based Pesticide, Liquid, Toxic (Copper-Ethylenediamine Complex 8%)
Class:	6.1
Identification Number:	UN 3010
Packing Group:	III

15. REGULATORY INFORMATION

OSHA:	This product is considered hazardous under the OSHA Hazardous Communication Standard 29 CFR 1910.1200.
TSCA:	All product components are on the TSCA Chemical Inventory.
CERCLA:	Releases of this material to air, land, or water are not reportable to the National Response Center under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to the state and local emergency planning committees under the Superfund Amendments and Reauthorization Act (SARA) Title III Section 304.
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