Initial Study & Mitigated Negative Declaration

Use of Copper to Control Algae and Aquatic Vegetation in District Facilities

California Environmental Quality Act Initial Study and Mitigated Negative Declaration

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CEQA Initial Study & Mitigated Negative Declaration

Table of Contents

List of Figures

List of Tables

List of Appendices

Limitations

The services used to prepare this document were performed consistent with the agreement with Henry Miller Reclamation District and Central California Irrigation District and were rendered in a manner consistent with generally accepted professional consulting principles and practices using the level of care and skill ordinarily exercised by other professional consultants under similar circumstances at the same time the services were performed. No warranty, express or implied, is included. This document is solely for the use of our client. Any use or reliance on this document by a third party is not authorized and is at such party's sole risk.

LIST OF ACRONYMS AND ABBREVIATIONS

AB ..... Assembly Bill

AHAL..... Aquatic Herbicide Application Log

APAP ..... Aquatic Pesticide Application Plan

BLM..... Biotic Ligand Model

BMP ..... Best Management Practice

CARB ..... California Air Resources Board

CCID ..... Central California Irrigation District

CDFW ..... California Department of Fish and Wildlife

CEQA..... California Environmental Quality Act

CIMIS ..... California Irrigation Management Information System

CNDDB ..... California Natural Diversity Database

CO..... Carbon Monoxide

CTR..... California Toxics Rule

Cu^{2+} ..... Cupric Ion

CVP..... Central Valley Project

District(s)..... Central California Irrigation District and/or Henry Miller Reclamation District

DO..... Dissolved Oxygen

DOC ..... Dissolved Organic Carbon

DPR ..... California Department of Pesticide Regulation

EC50 ..... Median Effect Concentration

ECOS..... Environmental Conservation Online System

FCWD ..... Firebaugh Canal Water District

GSA ..... Groundwater Sustainability Agency

HMRD ..... Henry Miller Reclamation District #2131

IPaC ..... Information for Planning and Conservation

IPM..... Integrated Pest Management

IS/MND ..... Initial Study and Mitigated Negative Declaration

kWh..... Kilowatt Hours

LC50 ..... Median Lethal Concentration

LD50 ..... Median Lethal Dose

LOC	Level of Concern
MMRP	Mitigation Monitoring and Reporting Program
NAHC	Native American Heritage Commission
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOAEC	No Observed Adverse Effect Concentration
NOAEL	No Observed Adverse Effect Level
NPDES	National Pollutant Discharge Elimination System
NR	Not Reported
NTU	Nephelometric Turbidity Units
O_3	Ozone
PCA	Pest Control Adviser
Permit	NPDES Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications
PM2.5	Fine Particulate Matter (less than 2.5 µm in diameter)
PM10	Respirable Particulate Matter (less than 10 µm in diameter)
PPE	Personal Protective Equipment
PRESCRIBE	Pesticide Regulation's Endangered Species Custom Realtime Internet Bulletin Engine
PSIS	Pesticide Safety Information Series
QAC	Qualified Applicator Certificate
QAL	Qualified Applicator License
RQ	Risk Quotient
RWL	Receiving Water Limit
RWQCB	Regional Water Quality Control Board
SC	Specific Conductance
SDS	Safety Data Sheet
SIP	Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries in California (“State Implementation Plan”)
SLCC	San Luis Canal Company
SJRECWA	San Joaquin River Exchange Contractors Water Authority
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District

SO_2..... Sulfur Dioxide

SWRCB..... State Water Resources Control Board

USBR ..... U.S. Bureau of Reclamation

USEPA..... U.S. Environmental Protection Agency

USFWS ..... U.S. Fish and Wildlife Service

USGS..... U.S. Geological Survey

WWEP ..... Well Water Exchange Program

1. INTRODUCTION

Central California Irrigation District (herein referred to as “CCID” or “District”) maintains and operates a system of approximately 231 miles of conveyances within Fresno, Merced, and Stanislaus Counties, covering a service area of approximately 143,000 acres. The adjacent Henry Miller Reclamation District #2131 (herein referred to as “HMRD” or “District”) maintains and operates approximately 59 miles of main canals, 98 miles of lateral canals, and a further 113 miles of surface ditches, servicing 45,000 acres comprised of over 300 agricultural landowners. To maintain flow rates in within their conveyance systems, the Districts use Integrated Pest Management (IPM) techniques to control algae and aquatic weeds that adversely impact the operations of both Districts. The Districts propose to apply algaecides and/or aquatic herbicides that contain copper to water within their conveyance systems to control algae and aquatic vegetation on an as-needed basis to efficiently deliver irrigation and reclaimed water.

In 2014, the Districts obtained coverage from the State Water Resources Control Board (SWRCB) under the Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications (“Permit”) to apply algaecides and aquatic pesticides. Currently, the Districts’ Permit coverage does not authorize the use of copper-containing algaecides and/or aquatic herbicides. The Districts now seek Permit coverage to apply algaecides and/or aquatic herbicides that contain copper to water within their respective conveyance systems to control algae and aquatic vegetation on an as-needed basis to efficiently deliver irrigation water.

This document was prepared in a manner consistent with Section 21064.5 of the California Public Resources Code and Article 6 of the California Environmental Quality Act (CEQA) Guidelines (14 California Code of Regulations).

This Initial Study, Environmental Checklist, and evaluation of potential environmental effects were completed in accordance with Section 15063 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.

2. PROJECT DESCRIPTION

2.1. Project Background

CCID is located in the San Joaquin Valley of Central California. The District extends into portions of Fresno and Merced counties in the south, and Stanislaus County in the north, covering a service area of approximately 143,000 acres and 1,600 farms. Primary crops grown in the District include alfalfa, corn, cotton, rice, tomatoes, walnuts, and wheat.

HMRD is a special district that was formed in Fiscal Year 2000 to operate and maintain canals and drains for the San Luis Canal Company (SLCC) within Merced and Fresno Counties. The District encompasses 45,000 acres comprised of over 300 landowners who grow crops including tomatoes, nut trees, corn, alfalfa, and cotton.

CCID and SLCC make up two of the four entities that comprise the San Joaquin River Exchange Contractors Water Authority (SJRECWA). The mission of SJRECWA is to effectively protect its water rights and Exchange Contract with the U.S. Bureau of Reclamation (USBR), which supplies the four districts with irrigation water.

Efficient irrigation water conveyance is critical to the functions of CCID and HMRD. However, the Districts' conveyances (i.e., canals and drains) are prone to infestation by several floating and submersed aquatic weeds including pondweeds (sago, American, horned), water primrose, parrot's feather, South American spongeplant, and planktonic and filamentous algae. The presence of this vegetation can slow or stop the flow of water in a conveyance, reducing its design capacity. Clogs at conveyance structures such as weirs and control gates may cause water to back up behind those clogs and could result in over-topping of canal banks, canal breaks, and associated damages.

Many producers have taken steps to conserve water and maximize irrigation efficiency by using sprinklers, drip, and micro-irrigation systems that require water to be free and clear of algae or nuisance vegetation that could clog filter systems, sprinklers or drip lines. In 2018 and 2019, significant algae growth throughout many sections of the District's canal system required producers to assign labor staff to mechanically remove mats and pieces of filamentous algae to prevent clogging of irrigation turnouts. Depending on the crop, irrigation events typically last between four and 24 hours and workers may need to be on-site during the entire irrigation event if algae growth is significant. CCID supplementally provided grants to farmers funding traveling screens to keep irrigation turnouts free from algae and aquatic weeds.

To maintain flow rates in within their conveyance systems, the Districts use IPM techniques to control algae and aquatic weeds that adversely impact operations. As such, the Districts have determined the need to use algaecides and aquatic herbicides, including those that contain copper, on an "as-needed" basis to achieve algae and aquatic weed control necessary for efficient water conveyance.

Depending on weed or algae type and density, and their location within the conveyance systems, algaecides and/or aquatic herbicides containing copper may be applied at locations throughout the Districts' conveyance systems. Applications may be made if the Districts' IPM thresholds are met or expected to be met based on weed or algae density, weed growth or

predicted growth, water demand, water and air temperature and forecasted temperature, or water level in the system. Some years, algaecides and/or aquatic herbicides may not be used if thresholds are not met.

The “Project” is defined as the Districts’ application of copper-containing algaecides and/or aquatic herbicides to their conveyance systems to control algae and aquatic vegetation on an as-needed basis to efficiently deliver irrigation water. Applications may be made throughout the irrigation supply conveyance systems. The Districts make no algaecides and/or aquatic herbicide applications to areas outside their respective conveyance systems.

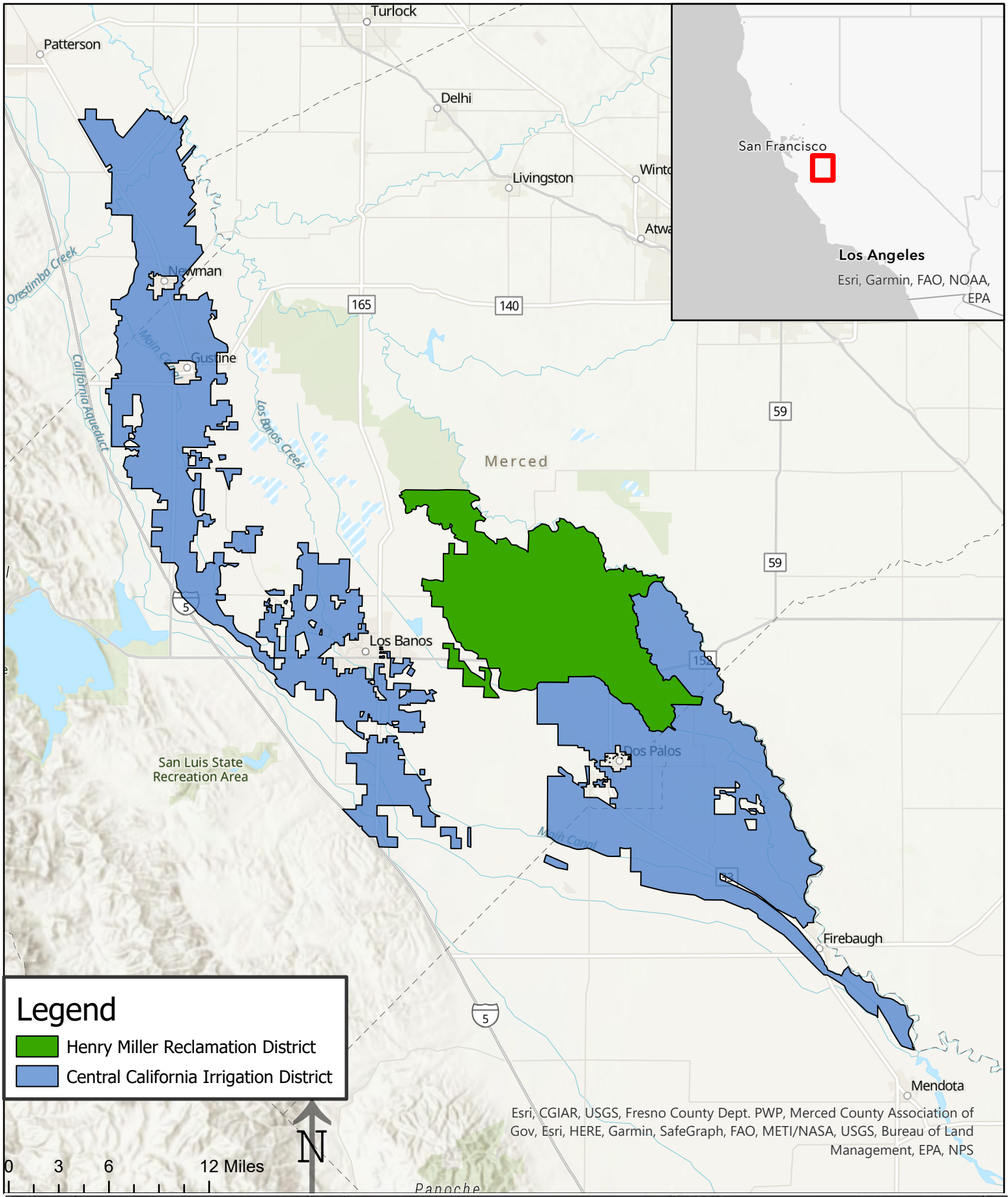
2.2. Environmental Setting

2.2.1. Project Location and Infrastructure

The Districts’ footprints are dominated by agriculture, with some conservation areas used as wildlife refuges or duck clubs. CCID services approximately 143,000 acres of farmland over 1,600 working farms in the Central Valley. Combined with HMRD’s 45,000 adjacent acres serving 300 landowners, the total area served by the Districts includes approximately 188,000 acres of irrigated land in Fresno, Merced, and Stanislaus Counties. Major cities near the Districts include Mendota, Firebaugh, Dos Palos, South Dos Palos, Los Banos, Gustine, and Newman. Refer to **Figure 1**.

HMRD is located approximately five miles north of the City of Dos Palos and 10 miles northeast of the City of Los Banos. HMRD maintains and operates approximately 59 miles of main canals, 98 miles of lateral canals, and a further 113 miles of surface ditches in Merced and Fresno Counties. Main canals include the Arroyo/San Juan Canal, Delta Canal, Midway/San Pedro Canal, and Temple Santa Rita Canal. Three wildlife refuges are adjacent to the District. The District also maintains drainage channels that drain via Mud and Salt Sloughs to the San Joaquin River.

CCID maintains and operates approximately 231 miles of conveyances, beginning at the Mendota Pool. The primary canals are the 62.1-mile Outside Canal and the 70.9-mile Main Canal. The Main Canal delivers water to the Poso, Colony, Parsons, and Laguna Canals. CCID has regulating reservoirs at the end of the Colony and Laguna systems to capture and recover the systems fluctuating canal flows. The Main Canal, north of Los Banos, has an approximately 40-acre regulating reservoir to balance and store the canal’s fluctuating flows. CCID has 21 drain low lift return pumps and 65 deep wells to supplement its USBR supply of irrigation water. To the east of the District runs the San Joaquin River, and irrigated agriculture dominates the area. Land to the west is characterized by rolling foothills.



DATE	DESCRIPTION	INIT.

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PROJECT: HMRD/CCID - Use of Copper to Control Algae and Aquatic Vegetation

FIGURE: 1

DESCRIPTION: Project Location Map

DATE: 5 May 2021

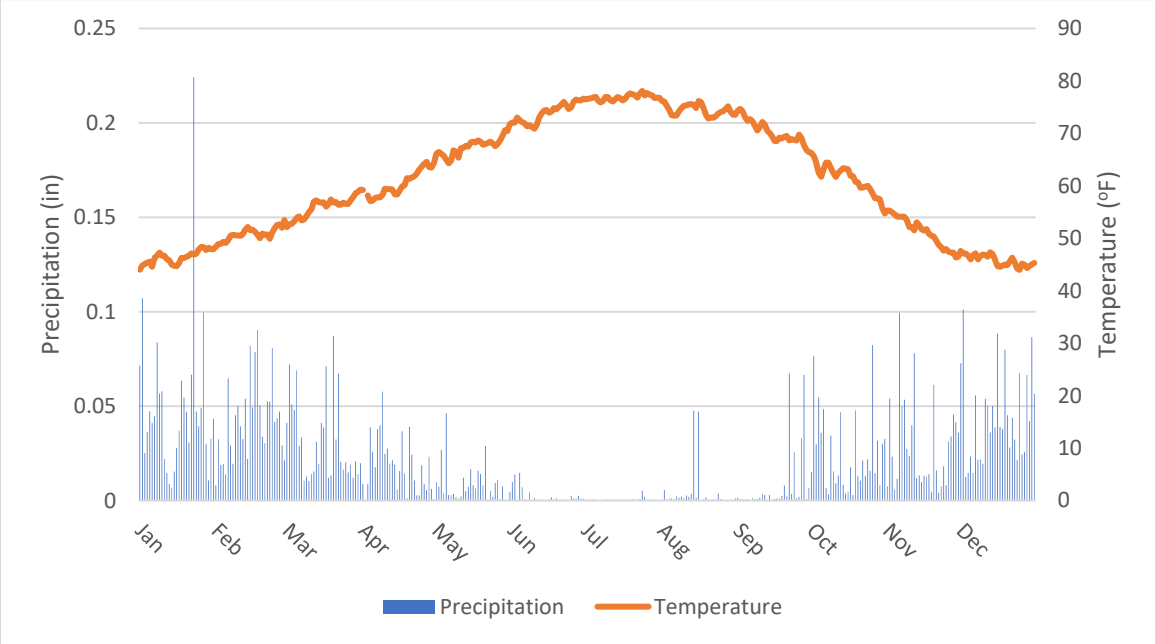
2.2.2. Water Rights and Hydrology

In most years HMRD and CCID receive surface water from USBR under long standing exchange contract. Water stored in the Shasta Reservoir flows south down the Sacramento River and into the Sacramento-San Joaquin River Delta. The water in the Delta is then pumped by the Jones Pumping Plant into the Delta Mendota Canal, which flows southwesterly to the Mendota pool. HMRD supply flows north in the San Joaquin River from the pool to a diversion point at Sack Dam. In years with low runoff and a shortage of Central Valley Project (CVP) supplies, the Exchange Contractors can opt to use San Joaquin River Water rights in lieu of their CVP Exchange Contract.

In 2019, a Well Water Exchange Program (WWEP) allowed landowners within the HMRD service area to irrigate land they own in certain west side CVP districts and the Grasslands Groundwater Sustainability Agency (GSA) boundary. Groundwater pumped by private landowners via WWEP is discharged into existing HMRD conveyance facilities. Both CCID and HMRD rely on groundwater monitoring and annual analysis by Kenneth D. Schmidt and Associates to determine the groundwater pumping that can be sustained by the aquifer.

Much of the Central Valley of California, including the Districts' service area, experience a Mediterranean climate. As typical with Mediterranean climates, precipitation is generally limited to the fall and winter months. Local precipitation data was obtained from the California Irrigation Management Information System (CIMIS) to assess the Districts' hydrology. Data from CIMIS Stations 7, 56, 92, and 124 representing the Firebaugh/Telles, Los Banos, Kesterson, and Panoche areas, respectively, were obtained to represent typical weather conditions in the project area. Average daily temperature and precipitation data from the years 2000 through 2020 is presented in **Figure 2** below.

Figure 2. Average Daily Temperature and Precipitation in Project Area (2000-2020)



Source: CIMIS, 2021

Water may leave the Districts' irrigation system at the end of the canals, at interties to other canal systems, by intentional spills or deliveries to drains or creeks within the Districts. Typically, water that leaves the irrigation supply system is picked up by drain pumps and returned to either the Districts' systems, a neighboring irrigation district, or downstream producers who draw irrigation water from creeks or drains. Additionally, the Districts operate recovery pumps to return tailwater or unused water in drains to their irrigation systems for reuse. In some areas of the Districts, tile drain sumps draw unused water below the root zone of crops away from fields and irrigate the San Joaquin River Improvement Project; tile drain water is not reused for irrigation purposes. The Districts may use groundwater from their wells to supplement the surface water supplies.

2.2.3. Water Quality

The conductivity, pH, dissolved oxygen, turbidity, and hardness of various CCID and HMRD canals was measured by Blankinship and Associates staff during water quality monitoring conducted between May 2018 and August 2021, the combined details of which are presented in **Table 1**.

Specific conductance ranged from 143 to 900 uS/cm (average = 378.7 uS/cm) for CCID and from 50 to 892 uS/cm (average = 460.1 uS/cm) for HMRD, while dissolved oxygen levels ranged from approximately 6 to 10 mg/L (average = 8.8 mg/L) for CCID and from approximately 7 to 12 mg/L (average = 8.0 mg/L) for HMRD. pH values ranged from 6.5 to 8.4 (average = 7.6) and 7.4 to 11.1 (average = 9.0) for CCID and HMRD, respectively. Turbidity measurements ranged from 11 to 153 Nephelometric Turbidity Units (NTU) (average = 42.3 NTU) for CCID and from 6 to 201 NTU (average = 60.0 NTU) for HMRD.

In water samples collected from four locations within the project area in May 2021, alkalinity ranged from 102 to 127 mg $CaCO_3$/L (average = 114.5 mg $CaCO_3$/L) for samples collected within the CCID footprint and from 96 to 127 mg $CaCO_3$/L (average = 98.9 mg $CaCO_3$/L) for samples collected within the HMRD footprint. Dissolved organic carbon (DOC) levels also measured in May 2021 ranged from 3.4 to 5.0 mg/L (average = 4.2 mg/L) for CCID and from 3.2 to 3.4 mg/L (average = 3.3 mg/L) for HMRD.

Based on this data, the average conductivity, dissolved oxygen, pH, turbidity, alkalinity, and DOC for both Districts is estimated to be 419.4 uS/cm, 8.4 mg/L, 8.3, 51.2 NTU, 106.7 mg $CaCO_3$/L, and 3.8 mg/L, respectively.

Table 1. Water Quality Characteristics Within Project Area (2018-2021)

Sample Date	DO (mg/L)	SC (uS/cm)	pH	Turbidity (NTU)	Alkalinity (mg $CaCO_3$/L)	DOC (mg/L)
5/15/2018	8.6	225.0	7.5	30.8	NR	NR
5/16/2018	9.2	324.0	7.7	43.7	NR	NR
5/21/2018	8.1	331.0	7.5	58.0	NR	NR
5/22/2018	9.0	288.5	8.0	43.0	NR	NR
5/24/2018	7.8	349.0	8.4	75.4	NR	NR
6/20/2018	8.1	306.5	7.8	23.7	NR	NR
6/21/2018	6.3	450.0	7.7	166.5	NR	NR
6/27/2018	8.5	372.9	7.8	71.1	NR	NR

Sample Date	DO (mg/L)	SC (uS/cm)	pH	Turbidity (NTU)	Alkalinity (mg $CaCO_3$/L)	DOC (mg/L)
7/23/2018	7.1	319.0	7.8	37.7	NR	NR
7/27/2018	6.6	389.0	7.6	50.5	NR	NR
5/6/2019	8.6	425.0	6.5	55.3	NR	NR
5/10/2019	10.3	372.0	6.8	17.2	NR	NR
5/11/2019	8.9	346.0	7.3	21.4	NR	NR
5/13/2019	7.9	410.0	7.1	37.9	NR	NR
5/15/2019	8.5	363.0	8.4	19.7	NR	NR
5/16/2019	8.6	371.0	9.7	67.9	NR	NR
5/17/2019	10.2	171.5	7.7	18.9	NR	NR
5/20/2019	10.8	146.0	7.8	13.7	NR	NR
5/22/2019	9.3	165.0	9.9	73.9	NR	NR
5/29/2019	10.2	178.0	7.3	11.2	NR	NR
5/30/2019	8.5	102.5	8.5	38.9	NR	NR
5/31/2019	7.7	533.5	9.9	167.0	NR	NR
6/3/2019	8.1	134.8	8.0	100.9	NR	NR
6/6/2019	7.8	219.0	6.9	87.2	NR	NR
9/12/2019	10.3	411.0	9.8	14.8	NR	NR
9/16/2019	8.2	411.0	9.8	41.6	NR	NR
9/17/2019	8.6	409.0	9.5	36.9	NR	NR
5/6/2020	NR	546.3	8.1	25.1	NR	NR
5/11/2020	11.5	690.0	8.3	24.4	NR	NR
8/13/2020	7.4	452.5	9.7	29.0	NR	NR
8/17/2020	8.4	351.0	9.1	132.0	NR	NR
9/1/2020	8.3	460.0	8.5	6.3	NR	NR
9/4/2020	8.0	592.2	7.8	17.1	NR	NR
9/8/2020	7.1	570.0	7.9	12.7	NR	NR
9/11/2020	8.6	666.0	8.1	29.9	NR	NR
9/18/2020	8.5	694.0	7.8	27.9	NR	NR
5/25/2021	NR	NR	NR	NR	106.7	3.8
5/27/2021	10.9	625.0	8.0	18.7	NR	NR
6/1/2021	9.6	900.0	7.5	24.2	NR	NR
8/4/2021	8.2	587.0	8.5	37.0	NR	NR
8/5/2021	6.8	743.5	8.7	38.0	NR	NR
8/6/2021	7.2	793.5	8.5	42.3	NR	NR
8/10/2021	9.1	624.5	9.6	44.3	NR	NR
Average:	8.4	419.4	8.3	51.2	106.7	3.8

Notes:

1) Abbreviations: Dissolved Organic Carbon (DOC), Dissolved Oxygen (DO), Specific Conductance (SC), Not Reported (NR)
2) Average values are provided when multiple locations were sampled on the same date. Source: Internal data.

2.3. Regulatory Setting

The Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications ("Permit") was adopted on March 5, 2013 and became available on December 1, 2013. The Districts have applied for and been granted coverage under the Permit since 2014. The Districts have each developed and implemented an Aquatic Pesticide Application Plan (APAP) and submitted annual reports to the SWRCB. The Permit was last amended on July 27, 2016 (SWRCB, 2016a). In addition to other conditions and provisions, the Permit requires compliance with the following:

- Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries in California ("State Implementation Plan" or "SIP"; SWRCB, 2005)
- California Toxics Rule (CTR) (40 CFR § 131.38, 2018)
- Central Valley Regional Water Quality Control Board (RWQCB) Basin Plan (Central Valley RWQCB, 2018)

The SIP assigns limitations for CTR priority pollutants, including algaecides and/or aquatic herbicides containing copper. Further, the SIP prohibits discharges of priority pollutants in excess of applicable water quality criteria or receiving water limit (RWL) outside the mixing zone.

Although the SIP prohibits the discharge of copper in excess of the RWL into receiving waters, Section 5.3 of the SIP allows for short-term or seasonal exceptions if determined to be necessary to implement control measures either (1) for resource or pest management conducted by public entities to fulfill statutory requirements, or (2) regarding drinking water conducted to fulfill statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code. Exceptions may also be granted for draining water supply reservoirs, canals, and pipelines for maintenance, for draining municipal storm water conveyances during cleaning or maintenance, or for draining water treatment facilities during cleaning or maintenance. The Districts have concluded that they meet one or more of the criteria for gaining a Section 5.3 SIP exception.

Permittees who elect to use a SIP exception must satisfactorily complete several steps, including preparation and submission of an application and CEQA requirements. Consistent with Section IX.C.1.a. of the Permit, entities may be added to Attachment G of the Permit if they have qualified for a SIP Section 5.3 exception. Accordingly, the Districts intend to submit the Exception request to the SWRCB, along with this document, once the CEQA process is complete. After a public comment period, the Districts may be granted a short-term or seasonal exemption from meeting the RWL for dissolved copper, and Attachment G of the Permit would be revised to list the District's exemption.

2.3.1. Discretionary Approvals

The SWRCB must approve the Districts' application for a SIP Section 5.3 exception to the CTR criterion for copper. The Districts will submit the following documents to the SWRCB for acceptance:

a) A detailed description of the proposed action which includes the method of competing the action;
b) A time schedule;
c) A discharge and receiving water quality monitoring plan that specifies monitoring prior to application events, during application events and after completion (e.g. Background, Event and Post Event sampling consistent with the Districts' respective APAPs) with the appropriate quality control procedures;
d) CEQA documentation including notifying potentially affected public and government agencies; and
e) Any necessary contingency plans.

Upon completion of each seasonal or short-term application of algaecides and/or aquatic herbicides that contain copper, the Districts shall provide certification by a qualified biologist that the receiving water beneficial uses have been restored.

2.3.2. NPDES Permit Notifications

At least 15 days prior to the first application of algaecides and/or aquatic herbicides, including those containing copper, the Districts will send an annual notification to potentially affected public and governmental agencies. The Districts may also post the notification on their respective websites. The notification must include the following information:

1) A statement of the District's intent to apply algaecide and/or aquatic herbicide(s);
2) Name of algaecide and/or aquatic herbicide(s);
3) Purpose of use;
4) General time period and locations of expected use;
5) Any water use restrictions or precautions during treatment; and
6) A phone number that interested persons may call to obtain additional information from the District.

The Districts typically send the annual notification to the following agencies: California Department of Fish and Wildlife (CDFW); Fresno, Merced, and Stanislaus County Agricultural Commissioners; U.S. Fish and Wildlife Service (USFWS); and National Marine Fisheries Service (NMFS), as applicable.

2.4. Standard Operating Procedures

The Districts each implement an IPM program for algae and aquatic weed control that involves regular scouting by staff for algae and aquatic weed presence in the conveyance system to determine if the locations and densities exceed or are likely to exceed treatment thresholds. If algae or aquatic weeds are present in locations and densities that exceed thresholds above

which control is needed, the District(s) may make applications of copper-containing algaecides and/or aquatic herbicides on an “as-needed” basis to achieve the algae and aquatic weed control necessary to efficiently convey irrigation water.

The approaches outlined below are supplemented by the following components of the Districts’ algae and aquatic vegetation management program, as well as Best Management Practices (BMPs) from the Districts’ APAPs. These would be implemented before, during and after the use of algaecides and/or aquatic herbicides that contain copper:

1) District personnel that make algaecide and/or aquatic herbicide applications are themselves, or are under the direct supervision of, a California Department of Pesticide Regulation (DPR)-licensed Qualified Applicator Certificate or License holder (QAC/QAL). Expertise and training used by these personnel mitigate potentially significant impacts.
2) A written recommendation is prepared by a DPR-licensed Pest Control Adviser (PCA). A PCA undergoes 40 hours of training every 2 years on issues including health and safety and prevention of exposure to sensitive receptors. The written recommendation prepared by the PCA is based on site-scouting and results of the Districts’ algae and aquatic vegetation monitoring activities, and must evaluate the proximity of people and occupied buildings, health and environmental hazards and restrictions, and must include a certification that alternatives and mitigation measures that substantially lessen any significant adverse impact on the environment have been considered and if feasible, adopted.
3) All District personnel applying algaecides and/or aquatic herbicides review and strictly adhere to the product label which has clear and specific warnings that alert users to hazards that may exist. Examples of specific product labels are included in **Appendix A**.
4) All District personnel applying algaecides and/or aquatic herbicides review and consult the product label and Safety Data Sheet (SDS) (examples provided in **Appendix A**) and the DPR Worker Health and Safety Branch Pesticide Safety Information Series (PSIS). The PSIS, label and the SDS have specific information that describes precautions to be taken during the use of the algaecides and/or aquatic herbicides.
5) District personnel are familiar with and implement the DPR PSIS N-series that mitigates potentially significant impacts. For example, the PSIS series and product label describe the personal protective equipment (PPE) needed for the safe handling of algaecides and/or aquatic herbicides, including protective eyewear, disposable coveralls, and gloves, as appropriate.
6) District personnel consult U.S. Environmental Protection Agency (USEPA) Endangered Species Bulletins (if applicable) and DPR’s Pesticide Regulation's Endangered Species Custom Realtime Internet Bulletin Engine (PRESCRIBE) to identify potential presence of special status species. If required or recommended product use limitations are identified by these sources, District personnel implement the use limitations as appropriate to prevent potentially adverse impacts to special status species known to occur near the project area.
7) The condition of the conveyance being treated is field-evaluated to confirm that the application is necessary, feasible, and can be conducted safely and according to the product label. This evaluation considers target algae or weed species, level of infestation, water and flow conditions, alternate control methods, and amount of algaecide and/or aquatic herbicide to be applied.

8) After field evaluation, notice is given by water operators to growers. Growers are given the opportunity to postpone water deliveries in the event that sensitive crops or commodities, such as organic crops, are present. Water operators generally do not make adjustments to the turnout gates during the application, and until copper-treated water is no longer present in the irrigation system.
9) The location(s) at which applications of copper would be made is continuously staffed until the application is complete. Staff performing conveyance inspections are in regular cell phone or radio contact with staff making the application. In the event that a spill or leak to a non-target area is discovered during application, the application will be stopped, if feasible. For example, water delivery to the lateral may be reduced or stopped to increase freeboard, and lessen or stop subsequent leakage. Growers on an affected lateral may be asked to irrigate additional fields to lower the water level and lessen or stop discharge. Generally, the application is not restarted until after the spill or leak is fixed.
10) As required by the Permit, water quality monitoring is conducted. Staff evaluate post-treatment efficacy and continue monitoring algae or aquatic vegetation density, type, location, and water quality.

These actions are intended to minimize and/or prevent water treated with copper-containing algaecides and/or aquatic herbicide from leaving the Districts' respective irrigation facilities.

3. ENVIRONMENTAL CHECKLIST

This document was prepared in a manner consistent with Section 21064.5 of the California Public Resources Code and Article 6 of the State CEQA Guidelines (14 California Code of Regulations).

This Initial Study, Environmental Checklist, and evaluation of potential environmental effects were completed in accordance with Section 15063 of the State CEQA Guidelines to determine if the proposed Project could have 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.

Mitigation measures will be implemented to reduce the potentially significant impacts to less-than-significant levels.

3.1. Project Information

1. Project Title:	Use of Copper to Control Algae and Aquatic Vegetation in District Facilities
2. Lead Agency Name and Address:	Central California Irrigation District 1335 West I Street Los Banos, CA 93635 Henry Miller Reclamation District 11704 West Henry Miller Avenue Dos Palos, CA 93620
3. Contact Person and Phone Number:	Jarrett Martin CCID General Manager (209) 826-1421 John Wiersma HMRD General Manager (209) 387-4237
4. Project Location:	Within CCID and HMRD facilities in Fresno, Merced, and Stanislaus Counties, California
5. Project Sponsor's Name and Address:	See #2 above

6. General Plan Designation:	Agriculture (Fresno County, 2000; Merced County, 2016; Stanislaus County, 2015)
7. Zoning:	Agriculture
8. Description of Project:	See **Section 2**
9. Surrounding Land Uses and Planning:	Agriculture, Open Space, Commercial, Low-Density Residential, City, Urban Transition, Industrial
10. Other Public Agencies Whose Approval is Required:	See **Sections 2.3.1** and **2.3.2**
11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1?	Yes (See **Section 3.4.18**)

3.2. 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/Forestry Resources	☐ Air Quality
☒ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology/Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☒ Hydrology/Water Quality	☐ Land Use/Planning	☐ Mineral Resources
☐ Noise	☐ Population/Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities/Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

3.3. Determination (To be completed by 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.

DocuSigned by: John Wiersma 37A3...C04DA...	11/30/2021 | 7:33 AM PST
Signature	Date
John Wiersma	Henry Miller Reclamation District (#2131)
Printed Name	For
DocuSigned by: Jarrett Martin 3...534F4...	11/30/2021 | 2:56 PM PST
Signature	Date
Jarrett Martin	Central California Irrigation District
Printed Name	For

3.4. Evaluation of Environmental Impacts

3.4.1. Aesthetics

Except as provided in Public Resources Code Section 21099, would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Discussion

Items a) through c): *No Impact*

The Project does not remove any existing natural resource or structure. There are no designated or eligible state scenic highways within the Districts' footprints (Caltrans, 2019). The nearest stretch of designated state scenic highway is the Interstate 5, from Highway 152 in Merced County to the Stanislaus County line, which comes within one quarter-mile of CCID's Outside Canal at its closest point. Because the Project will take place entirely within Districts' existing facilities, there will be no impact to trees, rock outcroppings, historic buildings, or other scenic resources within the state scenic highway or in other locations outside the Project area.

The Project is not in an urbanized area and does not conflict with any applicable zoning or other regulations governing scenic quality. The visual quality of the Districts' conveyance systems and facilities and the surrounding landscape will not be negatively impacted by Project activities. To the contrary, the Project may enhance the visual quality of the Districts' conveyance systems by limiting the presence and density of nuisance algae and aquatic weed growth.

Item d): ***No Impact***

Project activities are generally limited to daylight hours, therefore no artificial light sources are needed and no substantial new light or glare is produced. No new structures or landscape features will be created as a result of the project that would adversely affect day or nighttime views in the area.

The Project is not expected to result in any significant impacts to aesthetic resources or scenic vistas. Therefore, no mitigation measures are proposed.

3.4.2. Agriculture and Forestry 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. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on 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) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

Items a) through e): *No Impact*

The Project is limited to activity within existing irrigation conveyances and facilities owned and operated by the Districts. No additional facilities will be created as part of the Project, and no existing facilities will be modified in a manner that could result in the loss or conversion of existing farmland or forest/timberland. The Project will not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use; conflict with existing zoning or agricultural use, or a Williamson Act contract; conflict with zoning related to forest land or timberland; result in the conversion of forest land or conversion of forest land to non-forest use, or otherwise involve changes to the existing environment which could result conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use.

The Project will benefit agricultural producers who rely on the consistent delivery of irrigation water the Districts. Application of copper-containing products facilitates efficient irrigation practices by providing irrigation water to producers that is suitable for use in irrigation systems that promote principles of water conservation like micro-sprinklers, drip-lines, and other water-efficient irrigation techniques. By promoting water-efficient irrigation techniques, the Project could potentially aid and increase water conservation by reducing the amount of water loss caused by clogged irrigation turnouts and allow for an expansion of agricultural use on land that would otherwise remain fallow due to lack of available water during times of drought. Further, copper-containing algaecides and aquatic herbicides are regularly used to control aquatic weeds and algae in water storage and conveyance systems and when used in accordance with product labels, require no irrigation restrictions. Copper is frequently used as a fungicide and bactericide on agricultural crops and, depending on the formulation of copper, is among the few pesticides that are permitted for use on crops with organic certifications (USEPA, 2009).

The Project is not expected to result in any significant impacts to agriculture or forestry resources. Therefore, no mitigation measures are proposed.

3.4.3. Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) 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?	☐	☐	☐	☒
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	☒

Discussion

Items a) and b): *No Impact*

The Project area lies within the San Joaquin Valley Air Basin (SJVAB), which includes the counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and a portion of Kern County. Project activities may occur within Fresno, Merced, and Stanislaus Counties. The SJVAB is managed by the San Joaquin Valley Air Pollution Control District (SJVAPCD), which currently has air quality management plans for PM2.5, PM10, Ozone, and Carbon Monoxide. The California Air Resources Board (CARB) provides annual updates on attainment status for ten State criteria pollutants and seven National criteria pollutants in each of the State's 15 Air Basins. The most recent available information comes from the February 2021 update.

Table 2. San Joaquin Valley Air Basin Ambient Air Quality Standard Attainment Status

Pollutant	State Designation	National Designation
Ozone (O_3)	Nonattainment	Nonattainment (8-Hr)
Respirable Particulate Matter (PM10)	Nonattainment	Attainment
Fine Particulate Matter (PM2.5)	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Unclassified (Merced Co) / Attainment (Fresno, Stanislaus Co)	Unclassified/Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified/Attainment
Sulfur Dioxide (SO_2)	Attainment	Unclassified/Attainment
Lead	Attainment	Unclassified/Attainment
Visibility Reducing Particles	Unclassified	No National Standard
Sulfates	Attainment	No National Standard
Hydrogen Sulfide	Unclassified	No National Standard

Source: CARB, 2021

The Project will not conflict with or obstruct implementation of any of the current SJVAPCD management plans. The application of copper-containing aquatic herbicides and/or algaecides requires the use of pick-up trucks or other service vehicles for purposes of transporting materials to locations where they are needed. Pick-up trucks are also used for purposes of site reconnaissance and water quality monitoring before, during, and after applications of algaecide and/or aquatic herbicides. Short-term vehicle emissions will be generated during algaecide and/or aquatic herbicide application. Algaecide and/or aquatic herbicide are generally brief in duration and occur on an “as-needed” basis throughout the year. Consequently, emission generation will be minor. Existing conditions and current practices used for making applications of other aquatic herbicides are nearly identical to those for making applications of copper-containing algaecides and/or aquatic herbicides; as such, the Project is not expected to result in a cumulatively considerable net increase in nonattainment pollutants. The frequency and duration of applications may decrease slightly by using copper-based products as part of the Districts’ IPM approach to algae and aquatic vegetation management.

Items c) and d): *No Impact*

Algaecide and/or aquatic herbicides containing copper will be applied by the Districts personnel. Applications will take place in the Districts’ conveyance systems. Applications are typically brief in duration (<8 hours) and made infrequently (i.e., every two to eight weeks during summer months). Applications are not made near schools, health care facilities, or day care facilities, thereby reducing or eliminating exposure to these sensitive receptors. Similarly, there will be no objectionable odors that affect a substantial number of people as a result of the application of copper-containing algaecides and/or aquatic herbicides.

The Project is not expected to result in any significant impacts to air quality. Therefore, no mitigation measures are proposed.

3.4.4. Biological Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife 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 Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (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

Item a): *Less Than Significant with Mitigation Incorporated*

A list of special status species was compiled using records from CDFW's California Natural Diversity Database (CNDDB), and USFWS' Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) (CNDDB, 2021; USFWS, 2021). Location-specific species information for Project counties is available from ECOS IPaC. Special status species data from CNDDB was obtained for the United States Geological Survey (USGS) 7.5 x 7.5-minute quadrangles that the Districts fall within (i.e., core quads) as well as the peripheral quadrangles (i.e., border quads). This approach was used to identify species that might be located in the surrounding areas, but not necessarily reported to CNDDB as a sighting within the boundaries of the project area. Data was queried from the CDFW and USFWS databases for these quads and combined into one table. Once this list was compiled, a preliminary assessment of the Project area was performed to characterize the actual habitats present on-site and the likelihood of special status species occurrence and interaction with treated water.

A summary of the listed species, their conservation status, and whether or not they were considered for evaluation of potential impact is presented in **Appendix B, Table B-1**. Species habitat and rationale for removal from further consideration is presented in **Table B-1** and more detailed species life history information can be found in **Appendix B**.

There are four special status species that could have habitat in or near Project facilities and potentially be affected by proposed Project activities through exposure to copper-containing water: the giant garter snake (*Thamnophis gigas*), two-striped gartersnake (*Thamnophis hammondii*), western pond turtle (*Actinemys marmorata*), and slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*). The reptile species could be exposed via ingestion of aquatic prey items exposed to copper and direct consumption of copper-treated drinking water. A quantitative ecological risk assessment was conducted for these species to evaluate potential impacts from management of algae or aquatic vegetation with copper-containing materials. Details of the risk assessment process, endpoint and exposure data, and estimations of risk for the three potentially affected special status species are presented in **Appendix C**. A summary is presented below, followed by a description of the qualitative assessment performed for the slender-leaved pondweed.

A quantitative assessment of a risk involves the calculation of a risk quotient (RQ) by comparing the estimated exposure with the concentration associated with a toxicity endpoint.

Toxicity endpoints routinely used by USEPA (2020) in calculating risk assessments for animals include the median lethal dose (LD50), median lethal concentration (LC50), or median effect concentration (EC50) for acute assessments and the No Observed Adverse Effect Level (NOAEL) or Concentration (NOAEC) for chronic assessments. There are limited to no toxicity data available for various taxonomic groups like reptiles for many chemicals. As a result, avian (bird) toxicity endpoints were used in place of specific toxicity values for reptile species in this assessment.

Once an RQ is calculated, it is compared to the Level of Concern (LOC) to determine whether an adverse effect for a given species is likely to occur. Risk is present when the RQ exceeds the LOC. Exposure is not considered to pose a risk when the RQ is lower than the LOC.

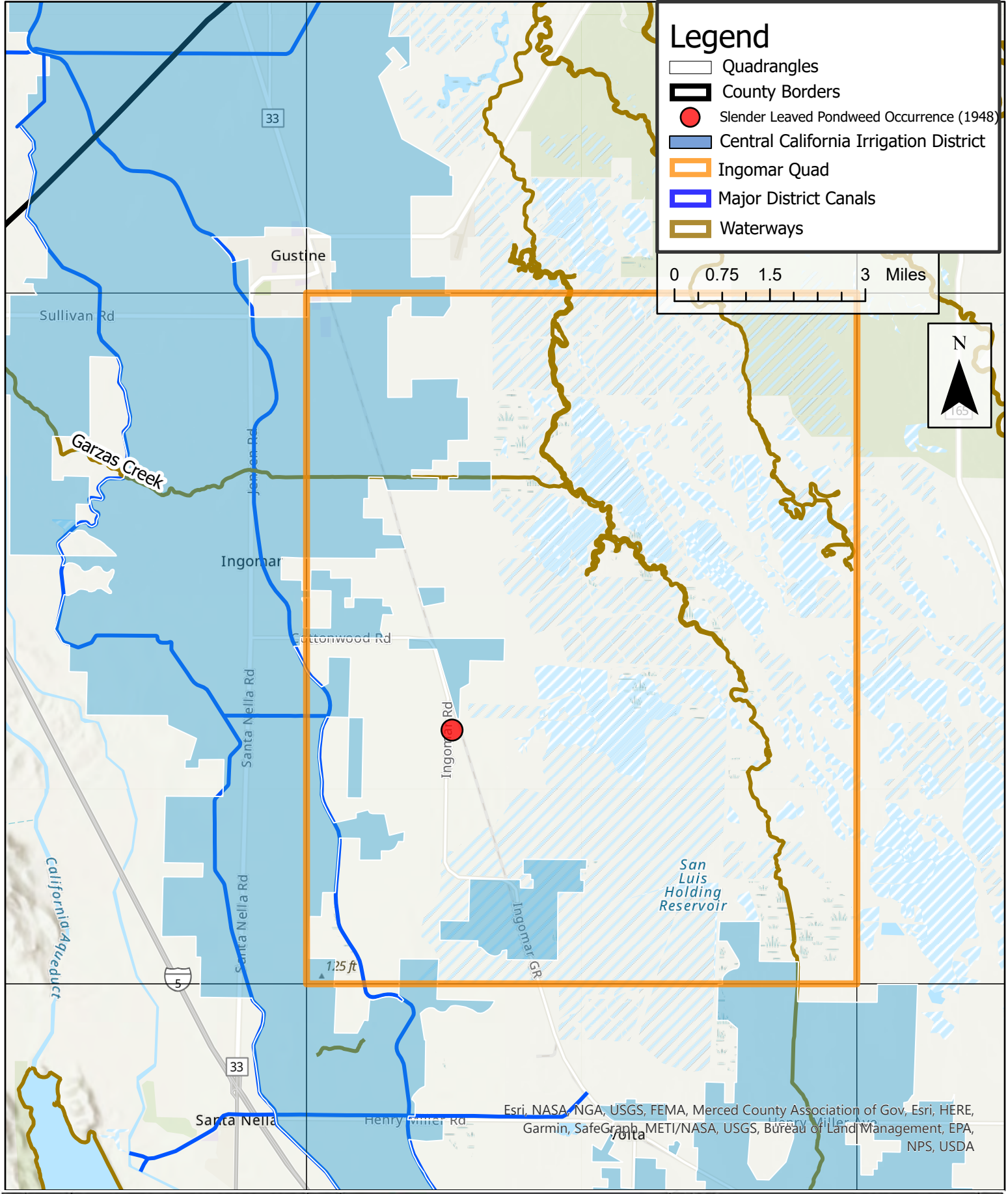
For evaluation of risk to the giant garter snake, two-striped gartersnake, and western pond turtle, application of and exposure to copper-containing algaecides or aquatic herbicides at the maximum label application rate of 1 mg/L was estimated to result in the accumulation of approximately 37.1 milligrams of copper in aquatic prey items (mg Cu/kg-dry weight) based on a 24-hour (acute) exposure period. After incorporation of food and water intake rates normalized to body weight, daily exposure to copper was estimated to be approximately 0.36, 0.41, and 0.31 milligrams of copper per kilogram body weight per day for the giant garter snake, two-striped gartersnake, and western pond turtle, respectively, resulting in an RQ of approximately 0.004, 0.005, and 0.003, respectively. Because none of the RQs exceed the acute threatened or endangered species LOC for terrestrial animals of 0.1, copper applied to Districts' facilities for algae or aquatic vegetation control does not appear to pose acute risk to the giant garter snake, two-striped gartersnake, or western pond turtle.

In support of these findings, the California Department of Fish and Game (now "Wildlife") conducted a study on the effects of oral and dermal exposure to copper (ethylenediamine complex) on two species of garter snakes and did not observe any acute adverse effects (Hosea et al., 2004).

A qualitative assessment was performed for the slender-leaved pondweed. Slender-leaved pondweed is a pondweed species with narrow leaves, generally found in slow-moving or static water environments like lakes, ponds or drainage ditches (Hellquist et al., 2012). Although many formulations of copper-containing algaecides and/or aquatic herbicides are regarded as less effective for species such as pondweeds, at least one product currently registered for use in California is labeled for use as a pondweed management tool. Label language indicates that following a prolonged exposure period (i.e., at least 3 hours) variable control may be obtained for pondweed species, especially in waters with higher alkalinity (>50 mg $CaCO_3$/L) (SePRO, 2018). Based on sampling data from May 2021, the average alkalinity of waters within the project area is 105.3 mg $CaCO_3$/L.

Because the slender-leaved pondweed may not be readily identifiable prior to application of copper-containing algaecides and/or aquatic herbicides and because of its susceptibility to damage from exposure to certain copper-based formulations, risk will be mitigated by preventing the discharge of treated waters within the Ingomar quad. Refer to **Mitigation Measure BIO-1** for a description of how the Districts intend to avoid impacts to slender-leaved pondweed. See **Figure 3** for locational information on the Ingomar quad relative to Districts conveyances and boundaries. The Districts will use the Aquatic Herbicide Application Log (AHAL), **Figure 4**, to document if discharges associated with an application of copper-containing materials could occur in the Ingomar quad, and will ensure no spill of treated water to Garzas Creek or surface water drains.

BIO-1. To prevent possible adverse impacts to slender-leaved pondweed, the Districts will not discharge copper-treated water from irrigation supply canals to Garzas Creek or surface water drains in the Ingomar quad.



DATE	DESCRIPTION	INIT.

BLANKINSHIP & ASSOCIATES, Inc.
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PROJECT:
HMRD/CCID - Use of Copper to Control Algae and Aquatic Vegetation

FIGURE:	DESCRIPTION:	DATE:
3	Bio-1 Mitigation Measure Map	11/15/2021

Fig 4. Aquatic Herbicide Application Log

For Client Use Only

****IMPORTANT** To Be Completed EVERY TIME an Aquatic Herbicide Application is Made**

App. Start: Time _____ Date _____

App. End: Time _____ Date _____

Application Location _____

Agency _____ Personnel _____

Air Temperature (Fº) _____ Wind Speed (mph) _____ Target Weeds _____

Treatment Area Size (choose one):

☐ Acres _____ ☐ Linear Feet _____

Herbicide #1 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Herbicide #2 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Adjuvant #1 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Adjuvant #2 Used _____ Rate/Target Conc. _____ Units _____ Total Amt. Applied _____ Units _____

Method of Application _____ Application Made (Circle One) **With** water flow / **Against** water flow / **Not Applicable**

COPPER ONLY

For Applications of Copper-Containing Algaecides and/or Aquatic Herbicides ONLY, Complete the Following:

Could discharges to Garzas Creek or other surface water drains occur in the Ingomar USGS Quad due to this application? (Circle One)
yes / no

If Yes, was copper-treated water prevented from discharging to Garzas Creek and surface water drains in the Ingomar Quad? (Circle One)
yes / no

Waterbody Type (Circle One) lined canal / unlined canal / creek / drain / ditch / basin / reservoir / lake / pond or list Other: _____

Water Flow (ft/sec, cfs) _____ Water Depth (ft) _____ Water Temperature (Fº) _____

Percent Weed Cover _____ Water Sheen (Circle One) yes / no

Water Color (Circle One) none / blue / green / brown Water Clarity (Circle One) poor / fair / good

Please enter any other information regarding the application in the space provided below:

I (sign name) _____ certify that the APAP has been followed.

3.4.5. Cultural Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☒
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☐	☒

Discussion

Items a) through c): *No Impact*

Pursuant to §15064.5, a substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be material impaired. Further, the significance of an historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that conveys its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

The Project would not require any construction, demolition, or ground disturbing activity and would not demolish, destroy, relocate, or alter historical or architectural resources, nor would it disturb human remains. The Project is not expected to result in significant impacts to cultural resources.

3.4.6. Energy

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☐	☒
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Discussion

Item a): *No Impact*

Project activities do not include significant consumption of energy resources, therefore no significant environmental impacts due to wasteful, inefficient or unnecessary consumption of energy resources are expected. The Project is limited to the application of copper-containing products to the District's conveyance system for purposes of algae and/or aquatic vegetation control. A very small amount of energy may be used to charge deep cycle marine batteries used to power pumps used for application. Typically, deep cycle marine batteries with a capacity of approximately 100 amp hours will take less than 2 kilowatt hours (kWh) to reach a full charge. In comparison, the average U.S. household consumes about 11,000 kWh per year, or about 30 kWh per day (EIA, 2019). Note that these batteries and charging cycles are an existing condition because they are currently used by Districts staff to apply non-copper products for algae and/or aquatic vegetation control activities.

Item b): *No Impact*

Project activities do not conflict with or obstruct state or local plans for renewable energy or energy efficiency. The application of copper-containing products would not interfere with the local and state plans and infrastructure related to renewable energy and energy efficiency.

3.4.7. Geology and Soils

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Directly or indirectly cause 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 direct or indirect 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?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

Discussion

Items a) through f): *No Impact*

The Project consists of the application of algaecides and/or aquatic herbicides that contain copper to the Districts' conveyance systems. The Project does not include any new structures, ground disturbances, or other elements that could expose persons or property to geological hazards. There would be no soil erosion, loss of topsoil, risk of landslide, lateral spreading, subsidence, liquefaction, or collapse due to Project activities. Since no new structures are part of Project activities, there is no risk to life or property if expansive soils were located in the area. The Project would not require installation of septic or other wastewater disposal systems. No paleontological resource, site, or unique geologic feature will be affected as a result of the Project because the Project is limited to the application of copper-containing materials to control algae and/or submersed aquatic vegetation in Districts' facilities.

3.4.8. Greenhouse Gas Emissions

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Discussion

Items a) and b): *Less Than Significant Impact*

The Project requires the use of pick-up trucks or other service vehicles for purposes of transporting algaecides and/or aquatic herbicides to their place of use. A pickup truck or pickup truck towing a trailer may be used to make targeted applications of algaecides and/or aquatic herbicides to areas with high levels of infestation. Pick-up trucks are also used for purposes of site reconnaissance before, during, and after application of algaecides and/or aquatic herbicides. For some applications, small gas-powered equipment may be used to pump liquid algaecides and/or aquatic herbicides into conveyances or facilities. Applications are typically brief in duration (<8 hours) and made infrequently (i.e., zero to a few times per month during the summer).

The use of vehicles and application equipment described above are not expected to conflict with or violate greenhouse gas emission standards. Current algae and aquatic vegetation

management practices conducted are consistent with those of the proposed project, including use of pickup trucks for application, scouting, and transportation. Project activities are expected to be similar to or may lead to a reduction in greenhouse gas emissions generated compared to current practices based on the levels of algae and/or aquatic vegetation control with the active ingredients applied to date, and the Districts' anticipation that control will improve with the use of copper-containing materials. Additionally, Project alternatives like mechanically removing algae and/or aquatic vegetation would involve the use of an excavator, backhoe, dump trucks, tractors, and/or other heavy equipment; this equipment could potentially generate a considerable quantity of greenhouse gas emissions compared to the proposed Project.

Although short-term vehicle emissions will be generated during algaecide and/or aquatic herbicide application; these emissions will be minor and will not create additional greenhouse gas emissions that would have a significant impact on the environment. To minimize impacts, all equipment will be properly tuned and meet current emissions standards, and unnecessary idling will be minimized.

As a result, project activities are not expected to be cumulatively considerable.

3.4.9. Hazards and Hazardous Materials

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
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 or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

Discussion

Items a) and b): *Less Than Significant Impact*

The Project would involve handling copper-containing products which may be regulated hazardous materials when reportable quantities, as described in 40 CFR Subtitle B, Chapter I, Subchapter C, are transported. Acute exposure to humans of the undiluted, formulated product can cause eye, skin, and respiratory irritation, and can be harmful if swallowed. Refer to the product SDSs presented in **Appendix A**. Use of these materials could create a potential for spills that could affect worker safety and the environment. The spills could potentially occur at the Districts' storage facilities, during transport, or at the site of application. The Districts' staff handle, store, and transport copper-containing products and dispose of containers in accordance with federal, state, and county requirements and manufacturer's recommendations. Containers are recycled by the manufacturer or distributor when possible.

The Districts conduct safety meetings and safe handler training annually and prior to the application season to review information with staff on emergency response to accidental releases of material. Staff who mix, load, apply, transport or dispose of copper-containing products are trained to contain spilled material and spill kits are available at sites of storage, use or disposal. Spill kits generally include booms for containment, and absorbent materials such as vermiculite, diatomaceous earth, kitty litter, or spill "pigs" or "pillows" to prevent released material from creating a hazard to the environment or public. Spills would be reported, as required, and affected material would be properly disposed of or decontaminated.

By following the manufacturer's label and SDS directions, and federal, state and county transportation, handling and disposal requirements, the Districts will minimize the risk of any spill, upset or accident conditions that would cause a hazard to the public or the release of hazardous materials into the environment.

Item c): *No Impact*

Under normal operation, there is very little to no risk associated with copper application due to emission of hazardous emissions or material handling. In addition, anticipated copper injection or application sites are not located within one-quarter mile of a school.

Item d): *No Impact*

The Project area, the area within the Districts' conveyance systems that may receive application of copper-containing algaecides or aquatic herbicides, is not located on a site that is listed on any hazardous materials site lists compiled pursuant to Government Code Section § 65962.5 (DTSC, 2021).

Item e): *No Impact*

Small portions of the Project area are located within airport land use compatibility plans for the following three public airports: Los Banos Municipal Airport, Firebaugh Airport, and William Robert Johnston Municipal Airport (Fresno County ALUC, 2018; Merced County ALUC, 2012); however, the Project does not result in a safety hazard for people residing or working in or around the airport and will not generate excessive noise. Further discussion on noise impacts is provided in **Section 3.4.13**.

Item f): *No Impact*

No public roadways would be affected by the Project; therefore, Project activities would not impair implementation of or physically interfere with adopted emergency response plans or emergency evacuation plans.

Item g): *No Impact*

The Project will not expose people or structure, either directly or indirectly, to a significant risk of loss, injury or death involving wildlife fires. The Project will not increase fire hazards at the Project sites. Facilities where applications are made are managed by the Districts to be free from tall grass and potential fire fuel. Truck access and parking near application sites is done in such a manner so as to minimize or eliminate muffler contact with combustible materials such as dry grass.

3.4.10. Hydrology and Water Quality

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☒	☐	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☐	☐	☐	☒
i) Result in a substantial erosion or siltation on- or off-site;	☐	☐	☐	☒
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☐	☒
iii) 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; or	☐	☐	☐	☒
iv) Impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Discussion

The Districts implement an IPM program for algae and aquatic weed control pursuant to the NPDES Aquatic Weed Permit. The IPM program involves the scouting of algae and aquatic weed locations and densities, establishment of thresholds above which control is needed, and making applications of algaecides and/or aquatic herbicides on an "as-needed" basis to achieve the algae and aquatic weed control necessary to efficiently convey water.

Depending on algae or aquatic weed presence, algaecides and/or aquatic herbicides containing copper may be applied as necessary between the months of March and November. Some years, copper-containing products may not be applied. Treatments may be made throughout the Districts' conveyance systems.

Applications of copper-containing products will be done over a short duration (<8 hours) and not all conveyances are necessarily treated at the same time, for the same length of time, or treated during every application. Depending on weed or algae presence, some conveyances may not get treated at all while others may require multiple treatments during the same season.

When applied during algaecide and/or aquatic herbicide treatment, copper dissipation from the water column occurs by way of multiple processes including dilution, sorption, and precipitation. Due to processes such as advection, diffusion, and dispersion and because label language prohibits application of copper-containing algaecides and aquatic herbicides to more than half of a water body, dilution is presumed to be a major dissipation process after initial application (Calomeni et al., 2017). In addition to static waterbodies, these processes occur in flowing water systems where untreated water is present and moving into the treatment area after treatment.

Copper in the water column occurs as dissolved ions and as part of inorganic and organic complexes. Unlike organic chemicals, copper does not degrade over time, instead transforming from one form to another based on environmental properties such as pH, alkalinity, temperature, ionic strength, and organic carbon content. Many such physiochemical characteristics influence copper speciation, associated bioavailability, and resultant toxicity to aquatic organisms. The form of copper most commonly associated with aquatic toxicity is the free cupric ion (Cu^{2+}) (USEPA, 2009). The likelihood and magnitude of toxicity to aquatic receptors exposed to the cupric ion is typically greater in waters characterized by low levels of hardness, pH, ionic strength, and dissolved organic carbon than in hard waters with higher pH, ionic strength, and dissolved organic carbon. Copper bioavailability in water is also influenced by the presence of biotic ligands such as algae and the gill membranes of fish. When used as an algaecide, application to water containing higher density algae blooms is associated with lower bioavailability and risk of copper toxicity to non-target aquatic receptors than application to water containing lower density algae blooms (Franklin et al., 2002).

In addition to using a hardness-based approach to quantifying dissolved copper water quality criteria or the Permit's RWL, USEPA suggests the use of another model, described below, to analyze and/or predict toxicity of bioavailable copper in the water column. In the 2007 revision of Aquatic Life Ambient Freshwater Quality Criteria-Copper, USEPA (2007) recommended the Biotic Ligand Model (BLM) as a tool for assessing toxicity and deriving freshwater quality criteria for copper. The BLM supplements USEPA's previously published recommendation of using the

hardness-based estimation and better accounts for the reduction in copper bioavailability that results from competitive binding of copper to other molecules in the water column.

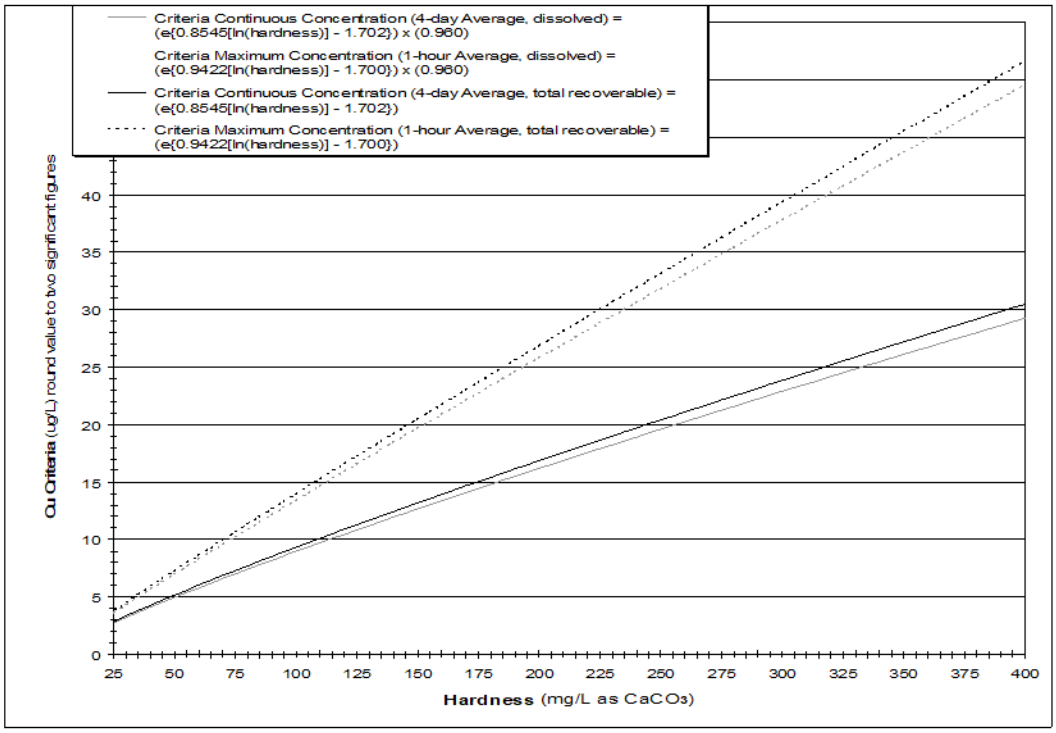
Using the BLM to predict copper speciation, a total of 27 graphs have been generated to illustrate how variations in water quality parameters including pH, alkalinity, hardness, and DOC influence the concentration of bioavailable Cu^{2+}. See **Appendix D**. Generally, an increase in one or more of these water parameters lowers the concentration of the Cu^{2+} species, thereby lowering the bioavailability of copper. Copper speciation trends most applicable to water in the Districts' conveyances are illustrated in **Graphs 6, 13, 14, and 15** in **Appendix D**.

Item a): *Less Than Significant with Mitigation Incorporated*

As previously discussed, the Districts intend to obtain coverage for residual algaecide discharges under the Aquatic Weed Permit, which requires compliance with the Basin Plan, SIP and the CTR. Discharges of copper-containing materials may exceed the hardness-adjusted RWL for dissolved copper as described in the permits Basin Plan, SIP and CTR. As allowed by the Permit and the SIP, the Districts intend to use this CEQA analysis to support the request for an exception under Section 5.3 of the SIP to allow applications of copper-containing algaecides and/or aquatic herbicides that exceed CTR water quality criteria for a short-term or seasonal basis within the treatment area after application or in receiving waters.

Applications of copper-based algaecides and/or aquatic herbicides according to label direction typically require concentrations of copper between 500 and 1,000 ug/L metallic copper. RWLs for dissolved copper as described in the Permit, CTR (40 CFR § 131.38, 2018) and by the Central Valley RWQCB (Central Valley RWQCB, 2018) are hardness dependent. Refer to **Figure 5**. The Districts' water varies in hardness throughout the season and depending on the water source (e.g., surface water or groundwater).

Figure 5. Copper Criteria vs. Hardness Graph



Source: SWRCB, 2016b

Based on the relation of copper criteria to hardness, the Permit defined copper concentration criteria for a continuous dissolved concentration (4-day average) would be:

$$\text{Continuous Dissolved Copper Concentration} = e^{\{0.8545[\ln(\text{hardness})]-1.702\}} \times (0.960)$$

For example, data collected between 2018 and 2021 indicates that the average alkalinity of water within Districts conveyances is approximately 107 mg $CaCO_3$/L with an average pH of 8.3 and an average DOC of 3.8 mg/L. Based on the equation above and assuming that hardness is equal to alkalinity, the associated continuous dissolved concentration (4-day average) water quality criteria for copper in District conveyances is 9.5 ug/L.

These water quality criteria may be exceeded at and downstream of the point of algaecide and/or aquatic herbicide introduction into the conveyance. Accordingly, because label application rates likely exceed the CTR water quality criteria, the Districts are seeking to obtain a SIP exception.

Receiving waters for the purpose of determining exceedance of the dissolved copper RWL are considered to be untreated portions of Districts' facilities or, natural surface waters, drains or creeks where treated water could be discharged or delivered outside the Districts' irrigation supply systems . Compliance with the Permit requires implementation of a monitoring and reporting program. This program requires the Discharger to collect and analyze water quality samples to determine compliance with applicable RWLs.

Between 2020 and 2021, applications of copper-containing algaecides and/or aquatic herbicides were made to conveyances owned and maintained by the Firebaugh Canal Water District (FCWD) at the maximum labeled application rate of 1 mg/L. The FCWD conveyance system abuts the southwest boundary of CCID, and also diverts and delivers irrigation water from the Mendota Pool, which is of similar quality as that found within the HMRD-CCID systems. Refer to **Table 3**.

Table 3. Average Water Quality Characteristics of the FCWD and HMRD-CCID Conveyance Systems

Parameter	FCWD Water	HMRD-CCID Water
Hardness (mg $CaCO_3$/L)	108[1]	107[2]
pH[1]	7.9	8.3
Conductivity (uS/cm)[1]	545	439
Turbidity (NTU)[1]	36	50
Temperature (°C)[1]	17	22
Dissolved Oxygen (mg/L)[1]	9.6	8.3

Notes:

1) Based on internal sampling data from 2018 to 2021.
2) No hardness data were available. Value shown is average alkalinity based on 2021 sampling. Alkalinity was assumed to be equal to hardness.

Results from FCWD post-application monitoring performed after each treatment indicated that the highest concentration of copper measured 7 days after treatment was 4.7 ug/L, corresponding to a half-life of 0.91 days or approximately 22 hours. Due to similarity in water quality parameters, it is reasonable to anticipate a similar dissipation profile when copper-containing algaecides and/or aquatic herbicides are applied to HMRD-CCID conveyances as that observed in FCWD conveyances. Based on a half-life of 0.91 days, the residual copper concentration in Districts' facilities may exceed the RWL for approximately 6.1 days following algaecide and/or aquatic herbicide application.

When used according to label directions by qualified personnel, impacts of copper-containing algaecides and/or aquatic herbicides have no significant impact. The Districts will implement the following mitigation measure for applications of copper to continue operating without a significant impact and reduce any future potentially significant impacts to less than a significant level:

HWQ-1. The Districts will comply with the Aquatic Pesticide Application Plan (APAP) and the Permit. Monitoring and reporting described in the APAP will include the Permit-required surface water sampling and analysis, a quality control and quality assurance plan, as well as several time-sensitive reporting requirements if adverse impacts to water quality or non-target organisms are detected. The water quality sampling and annual reporting required by the APAP and Permit will assess the impact, if any, that the project may have on water quality and beneficial uses of the water in and downstream of Districts' facilities. Additionally, consistent with SIP exception requirements, the Districts will arrange for a qualified biologist to assess the extent of restoration of receiving

water beneficial uses, as compared to pre-project conditions, after the use of copper-containing algaecides and/or aquatic herbicides.

Item b): *No Impact*

The Project will not involve any construction activities or require the use of groundwater and therefore there is no impact on groundwater recharge or supplies that may impede the sustainable groundwater management of the basin.

Items c) and d): *No Impact*

The project does not involve construction of any structures or activities that would alter drainage patterns, increase erosion or siltation on- or off-site, increase runoff amount or rate, create or contribute additional runoff, or impact flood flows. The project would not risk release of pollutants due to project inundation in a flood hazard, tsunami or seiche zone.

Item e): *No Impact*

Project activities are not expected to result in any conflict with or obstruction to implementation of a water quality control plan. As discussed, the SIP and CTR specifically allow for dischargers to request the Section 5.3 Exception the Districts are pursuing through preparation of this analysis. Project activities will have no impact on local sustainable groundwater management plans.

3.4.11. Land Use and Planning

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

Discussion

Item a): *No Impact*

The Project does not involve any construction of structures, canals, roads, etc., so no established communities in the Project area will be physically divided.

Item b): *No Impact*

The Project would not conflict with land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. As such, the Project would not cause a significant environmental impact due to a conflict. Therefore, no impact will occur.

3.4.12. Mineral Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be a 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

Items a) and b): *No Impact*

The Project involves the application of algaecides and/or aquatic herbicides that contain copper to the Districts' conveyance systems and has no impact on the availability of any known mineral resource, or result in the loss of a locally-important mineral resource recovery site.

3.4.13. Noise

Would the project result in:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) For a project located within the vicinity of a private airstrip or 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?	☐	☐	☐	☒

Discussion

Item a): *No Impact*

Project activity occurs in rural and agriculturally-dominated areas that commonly have machinery operating that include tractors, planters, harvesters, generators, groundwater and irrigation pumps and heavy trucks. Application equipment includes the use of pick-up and flatbed trucks, and in some cases a small generator. The incidental noise and vibration generated by the use of such equipment is temporary and inconsequential and thus will have no impact.

Item b): *No Impact*

Project activities would not generate groundborne noise or vibration, thus no person could be exposed to groundborne noise or vibration.

Item c): *No Impact*

Select segments of Districts facilities (i.e., the Project area) are located in the vicinity (<2 miles) of two private airports: NASA Crows Landing Airport and Dos Palos Airport. Small portions of the Project area are also located within airport land use compatibility plans for the following three public airports: Los Banos Municipal Airport, Firebaugh Airport, and William Robert Johnston Municipal Airport (Fresno County ALUC, 2018; Merced County ALUC, 2012). This notwithstanding, the Project will not result in excessive noise levels for people residing or working within these areas.

3.4.14. Population and Housing

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned 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 people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

Items a) and b): *No Impact*

No unplanned population growth due to direct or indirect effects will occur due to the Project. No new homes, roads, other infrastructure are part of the proposed Project. No displacement of existing homes or people will occur. Therefore, no impact to population or housing will occur.

3.4.15. Public Services

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) 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?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

Discussion

Item a): *No Impact*

No new homes, business areas, roads or other infrastructure would be created. The Project would not alter or require the construction of new schools, parks, governmental facilities, or other public facilities, nor would it increase the need for police or fire services, or other public service infrastructure. Therefore, no impact will occur.

3.4.16. Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the 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

Items a) and b): *No Impact*

Project activities are limited to the application of copper-containing algaecides and/or aquatic herbicides to the Districts' conveyance systems. The Project would not 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. Project activities do not include construction of or modification to recreational facilities or require the construction or

expansion of recreational facilities which might have an adverse physical effect on the environment.

3.4.17. Transportation

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b) Would the project conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

Discussion

Items a) and b): *No Impact*

The Project involves the use of light duty trucks that will not cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the rural county roads in the Project area. Generally, activity related to the Project is limited to one or two vehicles at any given time. The Project will not conflict with known programs, plans, ordinances, or policies addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. If Project activities increase the efficacy of the Districts' algae and aquatic vegetation management programs, overall miles traveled by staff for purposes of management activities may decrease. Given the potential frequency for "as-needed" application of copper-containing algaecides or aquatic herbicides, Project activities would not lead to a substantial increase in vehicle miles traveled relative to existing conditions. Therefore, no impact will occur.

Item c): *No Impact*

The Project would not include the construction or modification of roads or changes to current roadway uses; therefore, Project activities would not increase hazards due to a geometric design feature or incompatible uses. Therefore, no impact will occur.

Item d): *No Impact*

The Project does not involve construction of facilities or activities that would influence or adversely impact emergency access. As such, no impact will occur.

3.4.18. Tribal Cultural Resources

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

Discussion

Items a) and b): *No Impact*

The Project involves the application of copper-containing algaecides and/or aquatic herbicides to the Districts' facilities. No excavation or other earthwork are part of the proposed Project. Project activities are not expected to cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code § 21074.

To confirm the protection of tribal cultural resources in the Project area, a request was submitted to the Native American Heritage Commission (NAHC) in order to obtain contact list of Native American tribes in the area on April 16, 2021. The request was made consistent with the requirements of Assembly Bill (AB) 52, which established a "tribal cultural resources" category for CEQA project consideration and consultation process for California tribes.

Letters of notification were sent to each of the tribes on the contact list on or about May 24, 2021. The letters were sent to establish contact and notify tribes to submit their request for consultation, as needed. Letters were sent via United States Postal Service Certified Mail, and follow-up emails were also sent as needed when email addresses were available for the tribal group. Notifications were sent to the following groups:

- Amah Mutsun Tribal Band
- Big Sandy Rancheria of Western Mono Indians
- Calveras Band of Mi-Wuk Indians
- Chicken Ranch Rancheria of Me-Wuk Indians
- Dumna Wo-Wah Tribal Government
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- Nashville Enterprise Miwok-Maidu Nishinam Tribe
- North Fork Mono Tribe
- North Fork Rancheria of Mono Indians
- North Valley Yokuts Tribe
- Picayune Rancheria of Chukchansi Indians
- Santa Rosa Rancheria Tachi Yokut Tribe
- Southern Sierra Miwuk Nation
- Tule River Indian Tribe
- Toulumne Band of Mewuk Indians
- Wilton Rancheria
- Wuksache Indian Tribe/Eshom Valley Band

Per AB 52, tribes have 30 days to respond and request further project information and request formal consultation. One group, Wilton Rancheria, requested consult on the project by email. Several follow-up emails were sent in response in an attempt to organize a consultation by email, phone, or Zoom (video conference), but no additional response was made by the Wilton Rancheria.

No ground-disturbing activities or construction activities are part of the project. Introduction of copper-containing algaecides and/or aquatic herbicides to water in Districts' facilities would not cause a substantial adverse change in the significance of tribal cultural resources, therefore no impacts would occur to tribal cultural resources.

3.4.19. Utilities and Service Systems

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) 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?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion

Items a) and b): *No Impact*

The Project involves application of copper-containing algaecides and/or aquatic herbicides to the Districts' facilities and would not require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities. The application rate is calculated based on the volume of water (e.g., cubic feet per second in flowing water or acre-feet in static water) to be treated in order to achieve a desired concentration of copper. Because the copper-containing algaecides and/or aquatic herbicides do not require dilution prior to application, Project implementation would not rely on existing water supplies; therefore, there would be no impact to the water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.

Items c) through e): *No Impact*

The Project will not discharge to a wastewater treatment plant and does not generate solid waste in excess of state or local standards, or capacity of the local infrastructure to accommodate solid waste. Containers used to store and transport algaecides and/or aquatic herbicides are typically returned to the vendor for reuse or recycling.

3.4.20. Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Discussion

Items a) through d): *No Impact*

The scope of the Project is limited to applications of copper-containing algaecides and/or aquatic herbicides within Districts' facilities. The Project would not impair the ability to follow any emergency response or evacuation plan, exacerbate wildfire risks, require installation or maintenance of associated fire protection or utility infrastructure, or result in runoff, post-fire slope instability, or drainage changes that would expose people or structures to significant risks. Therefore, the Project will have no impact on wildfires.

3.4.21. Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially 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, substantially 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

Item a): *Less Than Significant with Mitigation Incorporated*

The Project involves the use of copper-based algaecides and/or aquatic herbicides applied to Districts' facilities at concentrations that temporarily exceed CTR water quality objective for dissolved copper. Significant evidence suggests that, when used according to label directions by qualified personnel, CTR exceedance is short-term and impacts of these algaecides and/or aquatic herbicides are less than significant. Further, the Districts will implement mitigation measure **HWQ-1** to reduce any potential impacts to water quality to a less than significant level.

A site-specific assessment of the fate and toxicity of copper and the resulting potential for risk to the giant garter snake, two-striped gartersnake and western pond turtle was completed, as described in **Section 3.4.4** (Biological Resources) and **Appendix C**. The exposure to these receptors due to the application of copper-containing material does not result in risk above the

LOC. As such, the project is not anticipated to adversely impact the habitat or population of the giant garter snake, two-striped gartersnake, or western pond turtle.

The Districts intend to avoid impacts to slender-leaved pondweed by implementation of Mitigation Measure **BIO-1**. **Figure 3** contains locational information on the Ingomar quad relative to conveyances and boundaries. The Districts will use the AHAL, **Figure 3**, to track if discharges of copper-treated water could occur in the Ingomar quad, and, if so, will document that no spill of treated water to Garzas Creek or surface water drains occurred.

Item b): *Less Than Significant Impact*

The cumulative impacts of continued application of copper-based algaecides and/or herbicides are not precisely known. Available evidence indicates that of the application of copper-based algaecides and/or aquatic herbicides are not cumulatively significant. Studies examining the relationship between sediment copper concentration and toxicity support the conclusion that sediment-bound copper is not bioavailable. Deaver and Rodgers (1996) compared limnetic water and copper-amended sediment toxicity to *Hyalella azteca*, an epibenthic detritivore sentinel species, and found that sediment concentrations were not predictive of copper toxicity across various water and sediment conditions. The limnetic water LC50 of the free cupric ion, however, varied by <4% in the sediment-toxicity tests, indicating that the form of copper associated most strongly with toxicity (i.e., the bioavailable fraction) in its aquatic phase rather than sediment-bound copper. These results are corroborated by those of Suedel et al. (1996) which showed that copper toxicity to several aquatic organisms, including fish, water fleas, a midge, and an amphipod species, were correlated with overlying (limnetic) water concentration rather than sediment or pore water concentration. As noted in this Initial Study and Mitigated Negative Declaration (IS/MND) and its appendices, copper-containing algaecides and/or aquatic herbicides rapidly dissipate and/or form inorganic and organic complexes that reduce its bioavailability shortly after application, particularly when applied to hard water such as in Districts' facilities.

Toxicity studies have also been conducted using water and sediment samples from copper herbicide application sites. Gallagher et al. (2005) collected water and sediment samples from a 20,234-hectare lake treated for 10 years in some areas with Komeen©, a product formulated with chelated copper applied annually at copper concentrations of 1 mg Cu/L. This rate of application is similar to the rate and application interval to what the Districts anticipate using. The Gallagher study also looked at untreated areas to assess copper bioavailability to *H. azteca* and *Ceriodaphnia dubia*. No statistical differences in response of either *H. azteca* or *C. dubia* to treated (16.3-18.0 mg Cu/kg) and untreated (0.3 mg Cu/kg) sediments were observed when compared to control sediments. In a 10-day exposure study by Huggett et al. (1999), sediments were collected from Steilacoom Lake in Washington and amended with $CuSO_4$ (800-2,000 mg Cu/kg dry weight) to assess copper bioavailability to *H. azteca*, *Chironomous tentans*, and *C. dubia*. When comparing the NOAECs derived under these experimental conditions (906-2,010 mg Cu/kg) with the current concentrations of copper in the lake sediment (180-1,110 mg Cu/kg), it is apparent that the sediment-bound copper in the lake is not bioavailable to the species.

Mitigation measure **HWQ-1** has been incorporated into the Project. This mitigation reduces the impact to a less than significant.

Item c): *No Impact*

The Project would not have environmental effects which would cause substantial adverse effects to humans, either directly or indirectly.

4. MITIGATION MEASURES

4.1. Summary of Mitigation Measures

Implementation of **BIO-1** and **HWQ-1** avoid and/or mitigate significant environmental effects of the application of copper-containing algaecides and/or aquatic herbicides.

BIO-1. To prevent possible adverse impacts to slender-leaved pondweed, the Districts will not discharge copper-treated water from irrigation supply canals to Garzas Creek or surface water drains in the Ingomar quad.

HWQ-1. The Districts will comply with their Aquatic Pesticide Application Plan (APAP) and the Permit. Monitoring and reporting described in the APAP will include the Permit-required surface water sampling and analysis, a quality control and quality assurance plan, as well as several time-sensitive reporting requirements if adverse impacts to water quality or non-target organisms are detected. The water quality sampling and annual reporting required by the APAP and Permit will assess the impact, if any, that the project may have on water quality and beneficial uses of the water in and downstream of Districts' facilities. Additionally, consistent with SIP exception requirements, the Districts will arrange for a qualified biologist to assess the extent of restoration of receiving water beneficial uses as compared to pre-project conditions after the use of copper-containing algaecides and/or aquatic herbicides.

4.2. Mitigation Monitoring and Reporting Program

CEQA requires agencies to adopt mitigation monitoring and reporting program (MMRP) when measures are necessary to mitigate or avoid significant effects on the environment. To maintain compliance with mitigation measures over the course of the Project, this MMRP would be implemented by the Districts to track the water quality resulting from application of copper-containing material, and to verify that mitigation measures are followed. Records shall be kept by Districts' and/or their consultant's water quality staff and reviewed annually. Examples of the records to be kept include annual reports and annual information collection data for the Aquatic Weed NPDES Permit. Upon review, the Districts may consult with the SWRCB and/or RWQCB, and subject matter experts regarding the addition, discontinuation, or modification of mitigation measures, including application techniques, product choice or application timing and rate to allow for effective algae and/or aquatic vegetation control while meeting MMRP and NPDES Permit objectives.

Mitigation Measure **BIO-1** will be implemented to avoid impacts to slender-leaved pondweed through pre-planning of application activity that could result in copper-treated water being discharged to surface water drains or Garzas Creek in the Ingomar Quad. Districts will track applications and document that no copper-treated water discharges of treated water occurred using the AHAL, and any deviations from implementation of avoidance measure **BIO-1** will be noted in the NPDES annual report.

Mitigation measure **HWQ-1** will be accomplished by implementation of the Districts' APAPs that requires surface water sampling, analysis, visual monitoring, and reporting as a condition of the

NPDES Aquatic Weed Permit issuance. Each year copper-containing products are applied to the Districts' facilities, a qualified biologist will assess pre- and post-project conditions, and if applicable, will certify, through an expression of professional opinion regarding those facts or findings which are the subject of the certification, that the beneficial uses of the receiving waters have been restored. The APAP requires an annual report be prepared and submitted to the SWRCB annually on March 1 of the year following applications.

Implementation of the mitigation measure as described above, the completion of and compliance with the APAP, submission of the Aquatic Weed NPDES Permit annual report, and the assessment of biological resources according to SIP requirements meets the CEQA mitigation monitoring and reporting requirements as described in California Public Resources Code § 21081.6.

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Appendix A

Example Product Labels and Safety Data Sheets

Captain® XTR

Liquid Copper Algaecide

SPECIMEN

SePRO

For use in still or flowing aquatic sites including: golf course, ornamental, fish, irrigation and fire ponds and aquaculture including fish and shrimp; fresh water lakes, ponds, and fish hatcheries; potable water reservoirs, rivers, streams, bays and coves; and crop and non-crop irrigation and drainage systems (canals, laterals and ditches) and chemigation systems.

Active Ingredient	
Copper Ethanolamine Complex†	
(Mixed CAS#'s 82027-59-6 & 14215-52-2)	28.2%
Other Ingredients	71.8%
TOTAL	100.0%

†Metallic copper equivalent = 9.1%

Keep Out of Reach of Children

DANGER / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Refer to inside of label booklet for additional precautionary information and *Directions for Use* including *First Aid* and *Storage and Disposal*.

NOTICE: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read *Terms and Conditions of Use, Warranty Disclaimer, Inherent Risks of Use* and *Limitation of Remedies* inside label booklet. If terms are unacceptable, return at once unopened.**

®Captain and Littora are registered trademarks of SePRO Corporation

SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032, U.S.A.

EPA Reg. No. 67690-9
FPL20131205

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

KEEP OUT OF REACH OF CHILDREN

DANGER / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Corrosive. Causes irreversible eye damage. Causes skin irritation. Harmful if swallowed. Harmful if absorbed through skin. Harmful if inhaled. Do not get in eyes, on skin, or on clothing. Avoid breathing mist or spray vapor. When handling, wear protective eyewear, clothing, and chemical-resistant gloves as described under the section of this label pertaining to Personal Protective Equipment (PPE). Wash skin thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

For applications in waters destined for use as drinking water, those waters must receive additional and separate potable water treatment. Do not apply more than 1.0 ppm as metallic copper in any waters.

FIRST AID	
If in 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 rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a 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 a poison control center or doctor. • Do not give anything to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.	

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are barrier laminate, butyl rubber ≥ 14 mils, or nitrile rubber ≥ 14 mils. If you want more options, follow the instructions for category A on an EPA chemical-resistant category selection chart.

Mixers, loaders, applicators and other handlers must wear the following:

- Coveralls worn over short-sleeved shirt and short pants;
- Socks and chemical resistant footwear;
- Chemical-resistant gloves (such as nitrile or butyl rubber);
- Protective eyewear (such as goggles, safety glasses, or face shield); and
- A chemical-resistant apron when mixing and loading or cleaning equipment.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash the outside of gloves before removing.
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish and aquatic invertebrates. Waters treated with this product may be hazardous to aquatic organisms. Treatment of aquatic weeds and algae can result in oxygen loss from decomposition of dead algae and weeds. This oxygen loss can cause fish and invertebrate suffocation. To minimize this hazard, do not treat more than ½ of the water body to avoid depletion of oxygen due to decaying vegetation. Wait at least 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State or local agency with primary responsibility for regulating pesticides before applying to public waters, to determine if a permit is required.

Certain water conditions including low pH (≤ 6.5), low dissolved organic carbon (DOC) levels (3.0 mg/L or lower), and "soft" waters (i.e. alkalinity less than 50 mg/L), increases the potential acute toxicity to non-target aquatic organisms. Do not use in waters containing trout or other fish species that are highly sensitive to copper if the alkalinity is less than 50 ppm. Fish toxicity generally decreases when the hardness of water increases. Captain XTR must not be used in ornamental ponds containing Koi.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Read all directions for use carefully before applying this product. Use only according to label directions.

Do not apply this product in a way that concentrate will contact workers or other persons, either directly or through drift; only protected handlers may be in close proximity to the mixing area or application equipment while in use.

Obtain Required Permits: Consult with appropriate state or local pesticide and/or water authorities before applying this product in or around pubic waters. Permits and posting or treatment notification may be required by state, Tribal, or local public agencies.

PRODUCT INFORMATION

Captain XTR is a chelated copper formulation that is effective in controlling a broad range of green and blue-green (cyanobacteria) algae, including filamentous, planktonic and macrophytic. Captain XTR is also an effective herbicide on submersed weed species with susceptibility to copper. The ethanolamines in Captain XTR reduce the precipitation of copper with carbonates and bicarbonates in the water.

Use the lower concentrations/rates in softer water (<50 ppm alkalinity) or when treating species with greater susceptibility to Captain XTR; use higher concentrations/rates in harder water (>50 ppm alkalinity) and when treating heavier infestations and/or less susceptible species.

Treatment Notes

Performance of Captain XTR is enhanced under certain conditions. It is recommended to consult a SePRO Aquatic Specialist for guidance in implementing a treatment program to achieve optimal results. The following apply to the use of Captain XTR to achieve optimum effectiveness:

- Treat when growth first begins to appear (if possible) or when target vegetation is actively growing.
- Apply in a manner that will ensure even distribution of Captain XTR within the treatment area.
- Use a high-pressure surface spray application to break up dense floating algal mats.
- In heavily infested areas, a second application may be necessary. Retreat areas if regrowth begins to appear or if seasonal control is desired. Repeating application of Captain XTR too soon after initial application may have no effect.

Precautions and Restrictions

- Do not apply Captain XTR directly to, or otherwise permit it to come into contact with any desirable plants as injury may result.
- Do not apply in such a way that concentrated Captain XTR comes in contact with crops, ornamentals, grass or other desirable plants.
- Wash spray equipment thoroughly before and after each application.
- Contents may cause bluing where marcite has been etched.

Spray Drift Management

A variety of factors including weather conditions (e.g., wind direction, wind speed, temperature, relative humidity) and method of application (e.g., ground, aerial, airblast, chemigation) can influence pesticide drift. The applicator must evaluate all factors and make appropriate adjustments when applying this product.

Droplet Size

Apply only as a medium or coarser spray (ASAE standard 572) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.

Wind Speed

Do not apply at wind speeds greater than 15 mph. Only apply this product if the wind direction favors on-target deposition (approximately 3 to 10 mph), and there are no sensitive areas within 250 feet downwind.

Temperature Inversions

If applying at wind speeds less than 3 mph, the applicator must determine if a) conditions of temperature inversion exist, or b) stable atmospheric conditions exist at or below nozzle height. Do not make applications into areas of temperature inversions or stable atmospheric conditions.

Other State and Local Requirements

Applicators must follow all state and local pesticide drift requirements regarding application of copper compounds. Where states have more stringent regulations, they must be observed.

Equipment

All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers or surrogates.

Additional requirements for aerial applications:

- The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.
- Release spray at the lowest height consistent with efficacy and flight safety. Do not release spray at a height greater than 10 feet above the crop canopy unless a greater height is required for aircraft safety.
- When applications are made with a crosswind, the swath must be displaced downwind. The applicator must compensate for this displacement at the up and downwind edge of the application area by adjusting the path of the aircraft upwind.

Additional requirements for ground boom application:

Do not apply with a nozzle height greater than 4 feet above the crop canopy.

APPLICATION INFORMATION

For aquatic weed control (including algae and vascular plants), do not exceed a concentration of 1.0 ppm copper during any single application; wait a minimum of 14 days between retreatments. (When treating aquaculture ponds when fish are present, do not exceed a concentration of 0.4 ppm during any single application when targeting nuisance algae; wait a minimum of 10 days between treatments.)

Application Methods and Rates

Surface Spray/Injection Algaecide Application

For effective control, proper rates of Captain XTR should be maintained for a minimum of three hours. The application concentrations/rates in **Table 1** are based on static or minimal flow situations. Where significant dilution occurs from untreated waters or loss of water, within a three hour period, Captain XTR may have to be metered in (refer to the *Drip System or Metering Pump Application for Flowing Water Treatments* section of this label).

Identify the algae growth present as one of the following types: planktonic (suspended), filamentous (matforming), or macrophytic algae (chara/nitella).

Determine the surface acreage (1 acre = 43,560 ft.²) and average depth of infested area.

Refer to chart below to determine gallons of Captain XTR to apply per surface acre.

TABLE 1
Captain Application Rates
(Gallons per surface acre)

Algae Type or Species	Dose Rates		Treatment Comments
	PPM Copper	Gallons per Acre Foot	
Planktonic (Suspended)	0.2 - 1.0†	0.6 - 3.0	Apply lower rates for light infestations. Use higher rates on heavy blooms and where algae masses are clumped and accumulated.
Filamentous (Mat-forming)	0.2 - 1.0†	0.6 - 3.0	Apply lower rates for early season applications, light infestations or treatment of regrowth. Apply higher rates on surface mats and species such as *Pithophora, Cladophora, Lyngbya,* and *Hydrodictyon.*
Macrophytic (Chara/Nitella/ Starry Stonewort)	0.4 - 1.0	1.2 - 3.0	Apply lower rates for new infestations or early season growth. Apply higher rates on older, established calcified plants. Apply as close to plant growth as possible.

† For planktonic and filamentous algae, Captain XTR may be applied up to 1.0 ppm when growth conditions require higher rates and for difficult to control species.

For dense infestations of filamentous algae or where the species of *Hydrodictyon*, *Cladophora* or *Pithophora* are present, apply the higher rate in the rate range. Filamentous algae species are easier to control before floating to the water's surface (when they are forming on the pond/lake bottom). An adjuvant, such as d-limonene or similar surfactant, may be added for enhanced control of floating mats or difficult to control species of algae. Follow surfactant labeling instructions for application rates and use directions.

For planktonic (suspended) algae and freefloating filamentous algae mats, application rates should be based on treating to depths where algae are present (e.g. the upper 3 to 4 feet of water). For dense infestations and in certain other situations, it may be necessary to calculate rates based on the depth of known algae infestation (e.g. > 4 feet) or require treating the entire water column in the target area. To calculate the application rate per surface acre, multiply the application rate in Table 1 (0.6 to 3.0 Gallon per Acre Foot) by the average depth of infestation, or average water depth if infestation reaches the entire water column.

As a surface or subsurface application, Captain XTR may be applied diluted or undiluted, whichever is most suitable to ensure uniform coverage of the area to be treated. Dilution with water may be necessary at the lower application rates. Dilute the required amount of Captain XTR with enough water to ensure even distribution in the treated area with the type of equipment being used. For best results, dilute Captain XTR in water to provide a minimum spray mix of 20 to 50 gallons per acre; in areas with heavy infestations of filamentous algae, a total tank mix of > 50 gallons per acre may be necessary; break up floating algae mats before spraying or while application is being made.

Submersed Plant Control Applications

Captain XTR can be applied to control hydrilla (Hydrilla verticillata), egeria (Egeria densa), and other aquatic weeds with susceptibility to copper. Apply Captain XTR at a rate to achieve 0.75 to 1.0 ppm copper (2.3 to 3.0 Gallons Captain XTR/Acre foot). In heavily infested areas, a second application after the 14 day retreatment interval may be necessary.

TANK MIXES WITH OTHER AQUATIC ALGAECIDES AND HERBICIDES

Captain XTR may be mixed with other herbicides or algaecides registered for aquatic use provided that no labeling prohibits such mixing. Captain XTR can be tank mixed with other herbicides to improve efficacy; and to control algae in areas where heavy algae growth may cover target submersed plant species and interfere with herbicide exposure. Do not exceed any labeled rate or dose of any of the products in the combination. Observe the most restrictive of the labeling limitations and precautions of all products used in mixtures. To ensure compatibility, a jar test is recommended before field application of any tank mix combination. It is recommended to consult with SePRO Corporation for latest tank mix recommendations.

NOTE: Tank mixing or use of Captain XTR with any other product which is not specifically listed on the Captain XTR label shall be at the exclusive risk of the user, applicator and/or application adviser, to the extent allowed by applicable law.

Captain XTR and Endothall

Captain XTR may be applied as a tank mix or simultaneously injected or used with the dipotassium salt of endothall (e.g. Cascade®) or the mono (N,N-dimethylalkylamine) salt of endothall (e.g. Teton®) to broaden the weed control spectrum and/or reduce injection times or rates in canals, ditches, and laterals. In flowing canals, apply Captain XTR via drip or injection at a rate of 0.1 to 1.0 ppm (See Table 2) in conjunction with Teton (0.05 – 2.0 ppm) or Cascade (0.35-3.0 ppm) for a minimum of one hour.

Hydrilla Control – Captain XTR + Diquat Tank Mix
Captain XTR can be mixed with diquat (diquat dibromide) in a 2:1 ration of Captain XTR:Diquat (e.g. 4 gallons Captain XTR and 2 gallons diquat [e.g. Littora®- 2 lbs a.i./gallon] per acre in waters with average depth of 4 feet). Lower rates of Captain XTR may also enhance the activity of diquat. Captain XTR should be applied at a minimum of 0.1 ppm in combination with diquat. Higher rates may be needed in areas with dense weeds.

Drip System or Metering Pump Application for Flowing Water Treatments
For Use in Potable Water, Canals, Ditches, and Irrigation and Drainage Systems
For optimal control, apply Captain XTR as soon as algae begin active growth or interfere noticeably with normal delivery of water (clogging of lateral headgates, suction screens, weed screens, and siphon tubes). Delaying treatment could perpetuate the problem causing massing and compacting of plants. Heavy infestations and low flow may cause poor distribution resulting in unsatisfactory control. Under these conditions repeated applications or increasing water flow rate during application may be necessary.

Prior to treatment it is important to accurately determine water flow rates. In the absence of weirs, orifices, or similar devices, which give accurate waterflow measurements, volume of flow can be estimated by the following formula:

Cubic feet per second (cfs) = average width (feet) **x** average depth (feet) **x** average velocity† (feet/second) **x** 0.9

† The velocity can be estimated by determining the length of time it takes a floating object to travel a defined distance. Divide the distance (feet) by the time (seconds) to estimate velocity (feet/seconds). This measure should be repeated 3 times at the intended application site and then calculate the average velocity.

After accurately determining the water flow rate in cfs or gallons/minute, find the corresponding Captain XTR rate in Table 2 or use the below formula.

cfs **x** desired concentration of copper (ppm) = quarts/hour of application

TABLE 2
Captain Application Rates For Flowing Water

Water Flow Rate		PPM Copper	Captain Rate	
CFS	Gal/min.		Quart/ hr.	mL / min.
1	450	0.2 - 1.0	0.2 - 1.0	3.2 - 15.7
2	900	0.2 - 1.0	0.4 - 2.0	6.3 - 31.5
3	1,350	0.2 - 1.0	0.6 - 3.0	9.5 - 47.3
4	1,800	0.2 - 1.0	0.8 - 4.0	12.6 - 63.0
5	2,250	0.2 - 1.0	1.0 - 5.0	15.8 - 78.5
10	4,500	0.2 - 1.0	2.0 - 10.0	31.5 - 157.7
100	45,000	0.2 - 1.0	20 - 100.0	315 - 1,577

Calculate the amount of Captain XTR needed to maintain the drip rate for a treatment period of 3 hours by multiplying either:

Quarts / hr x 3; Milliliters / Minute x 180; or **Fluid ounces / Minute x 180**

Rates will target 1.0 ppm copper concentration in the treated water for the treatment period. Lower concentrations may be used on highly susceptible algae species or if longer exposure times are maintained. Introduction of the chemical should be made in the channel at weirs or other turbulence-creating structures to promote the dispersion of the chemical. For injection periods longer than three hours (180 minutes), calculate the amount of Captain XTR needed by multiplying the rate by the desired time in minutes or hours, as appropriate.

Use a drum or tank equipped with a valve or other volume control device that can be calibrated to maintain a constant drip rate. Use a stopwatch and appropriate measuring container to set the desired drip rate. Readjust accordingly if the canal flow rate changes during the treatment period. A small pump or other metering device may be used to meter Captain XTR into the water more accurately. Application can be made using diluted or undiluted material.

Results can vary depending upon species and density of algae and vegetation, desired distance of control and flow rate, and impact of water quality on efficacy. Periodic maintenance treatments may be required to maintain seasonal control. It is recommended to consult a SePRO Aquatic Specialist to determine optimal use rate, location of treatment stations and treatment period under local conditions.

Slug Application Method for Flowing Irrigation Canals with no Functioning Potable Water Intakes
Do not use this method of application in flowing canals with functioning potable water intakes at or downstream from the application site.

For optimal control, apply Captain XTR as soon as algae begin active growth or interfere noticeably with normal delivery of water. Heavy infestations and low flow may cause poor distribution resulting in unsatisfactory control. Under these conditions repeated applications or increasing water flow rate during application may be necessary. Apply Captain XTR into the irrigation canal or lateral at 0.05 (6.4 fluid ounces) to 0.55 gallons (70 fluid ounces) per CFS as a slug or dump application (see above for determining CFS). Depending upon water hardness, alkalinity, velocity and algae conditions, a slug application is typically required every 5 to 30 miles. High water hardness or alkalinity levels may require the use of higher rates within the rate range above to achieve control. When velocity levels are higher (>1 foot per second) distance between drop stations for slug applications can be increased.

Chemigation System Application
Captain XTR may be applied for the maintenance of chemigation systems. To control algae in chemigation systems Captain XTR should be applied continuously during water application. For continuous addition application apply 0.91 - 9.1 gallons of Captain XTR per 1,000,000 (one million) gallons of water (0.3 - 3.0 gallons of Captain XTR per acre-foot of water). This will produce a concentration of 0.1 to 1.0 ppm of copper. Do not exceed 1.0 ppm of copper or 0.91 gallons of Captain XTR per 100,000 gallons of water. For additional guidance regarding specific calibrations or application techniques contact application equipment manufacturer, supplier, or pest control advisor. It is not necessary to agitate or dilute Captain XTR in the supply tank before application to chemigation systems.

TABLE 3
Application Rates for Chemigation Systems

Copper Concentration (ppm)	Amount of Captain			
	Per Acre-foot		Per Million Gallons	
	Gallons	Liters	Gallons	Liters
0.1	0.3	1.1	0.9	3.4
0.2	0.6	2.3	1.8	6.8
0.3	0.9	3.4	2.8	10.6
0.4	1.2	4.5	3.7	14.0
0.5	1.5	5.7	4.6	17.4
0.6	1.8	6.8	5.5	22.8
0.7	2.1	7.9	6.4	24.2
0.8	2.4	9.1	7.3	27.6
0.9	2.7	10.2	8.3	31.4
1.0	3.0	11.3	9.1	34.4

CHEMIGATION SYSTEM APPLICATION

- Apply Captain XTR only through sprinkler and drip irrigation systems including: center pivot, lateral move, end tow, side (wheel) roll, traveler, big gun, solid set, or hand move; flood (basin), furrow, border or drip (trickle) systems.
- Crop injury, lack of effectiveness, or illegal pesticide residues in the crop can result from non-uniform distribution of treated water.
- If you have questions about calibration, contact your SePRO Aquatic Specialist, State Extension Service, equipment manufacturer, or other experts.
- Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place (refer to the *Chemigation Systems Connected to a Public Water Supply* section of this label).
- A person knowledgeable of the chemigation system and responsible for its operation or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise. The injection system should be inspected, calibrated, and maintained before application of Captain XTR begins.

Chemigation Systems Connected to a Public Water Supply

- Public water system means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.
- Chemigation systems connected to public water systems must contain a functional, reduced-pressure zone, back flow preventer (RPZ) or the functional equivalent in the water supply line upstream from the point of pesticide introduction. There shall be a complete physical break (air gap) between the flow outlet end of the fill pipe and the top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe.
- The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection.
- The pesticide injection pipeline must contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
- The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops or in cases where there is no water pump, when the water pressure decreases to the point where pesticide distribution is adversely affected.
- Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
- Do not apply when wind speed favors drift beyond the area intended for treatment.

Sprinkler Chemigation Requirements

- The system must contain a functional check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from back flow.
- The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
- The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
- The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
- The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
- Systems must use a metering pump, such as a positive displacement injection pump (e.g.. diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.
- Do not apply when wind speed favors drift beyond the area intended for treatment.

Floor (Basin), Furrow and Border Chemigation Requirements

- Systems using a gravity flow pesticide dispensing system must meter the pesticide into the water at the head of the field and downstream of a hydraulic discontinuity such as a drop structure or weir box to decrease potential for water source contamination from back flow if water flow stops.
- Systems utilizing a pressurized water and pesticide injection system must meet the following requirements:
  - The system must contain a functional check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from back flow.
  - The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
  - The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
  - The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
  - The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
  - Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

Drip (Trickle) Chemigation Requirements

- The system must contain a functional check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from back flow.
- The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.
- The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.
- The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.
- The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
- Systems must use a metering pump, such as a positive displacement injection pump (e.g.. diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.
Pesticide Storage: Store in a cool dry place. Do not store near feed or foodstuffs. In case of leak or spill, use absorbent materials to contain liquids and dispose in a manner consistent with the pesticide disposal instructions.
Pesticide Disposal: 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. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
Container Handling
Nonrefillable Container. DO NOT reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying; then offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures approved by state and local authorities.
Triple rinse containers small enough to shake (capacity ≤ 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.
Triple rinse containers too large to shake (capacity > 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Repeat this procedure two more times.
Pressure rinse as follows: Empty the remaining contents into application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank, or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Refillable Container. Refill this container with pesticide only. **DO NOT** reuse this container for any other purpose. Triple rinsing the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller.
Triple rinse as follows: To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10% full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.
When this container is empty, replace the cap and seal all openings that have been opened during use; return the container to the point of purchase or to a designated location. This container must only be refilled with a pesticide product. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn-out threads and closure devices. Check for leaks after refilling and before transport. **DO NOT** transport if this container is damaged or leaking. If the container is damaged, or leaking, or obsolete and not returned to the point of purchase or to a designated location, triple rinse emptied container and offer for recycling, if available, or dispose of container in compliance with state and local regulations.

TERMS AND CONDITIONS OF USE

If terms of the following *Warranty Disclaimer, Inherent Risks of Use* and *Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, to the extent consistent with applicable law, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use,* and *Limitation of Remedies*.

WARRANTY DISCLAIMER

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of this product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. To the extent consistent with applicable law, all such risks shall be assumed by buyer.

LIMITATION OF REMEDIES

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

(1) Refund of purchase price paid by buyer or user for the product bought, or
(2) Replacement of amount of the product used.

To the extent consistent with applicable law, SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer, Inherent Risks of Use,* and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or this *Limitations of Remedies* in any manner.

NOTES

SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032, U.S.A.

SAFETY DATA SHEET

Captain® XTR Algaecide

Section 1. Identification

GHS product identifier : Captain® XTR Algaecide

Other means of identification : Not available.

EPA Registration No. : 67690-9

Relevant identified uses of the substance or mixture

Aquatic Algaecide.

Supplier's details : SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm E.S.T.
www.sepro.com

Emergency telephone number (with hours of operation) : **INFOTRAC - 24-hour service 1-800-535-5053**

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms : Exclamation mark

Signal word : Warning

Hazard statements : Harmful if swallowed.
Causes serious eye irritation.
Causes skin irritation.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response : IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Ingredient name	%	CAS number
Copper Triethanolamine Complex	14.9	82027-59-6
Copper Monoethanolamine Complex	13.3	14215-52-2
Proprietary ingredient 1	10 - 30	-
Proprietary ingredient 2	10 - 30	-
Proprietary ingredient 3	10 - 30	-
Proprietary ingredient 4	30 - 60	-

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Continue to rinse for at least 20 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Causes skin irritation.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No known significant effects or critical hazards.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No known significant effects or critical hazards.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
metal oxide/oxides

Special protective actions for fire-fighters : No special measures are required.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures.

Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Proprietary ingredient 1 Proprietary ingredient 2	**ACGIH TLV (United States, 3/2012).** TWA: 5 mg/m³ 8 hours. **ACGIH TLV (United States, 2/2010).** STEL: 15 mg/m³ 15 minutes. STEL: 6 ppm 15 minutes. TWA: 7.5 mg/m³ 8 hours. TWA: 3 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 15 mg/m³ 15 minutes. STEL: 6 ppm 15 minutes. TWA: 8 mg/m³ 10 hours. TWA: 3 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 6 mg/m³ 8 hours. TWA: 3 ppm 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8. Exposure controls/personal protection

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or supplied air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Blue. [Dark]

Odor : Ammoniacal. [Slight]

Odor threshold : Not available.

pH : 10 to 10.5

Melting point : Not available.

Boiling point : 100°C (212°F)

Flash point : Open cup: >93.3°C (>199.9°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : <1 (Butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 2.3 kPa (17 mm Hg) [room temperature]

Vapor density : 3.5 [Air = 1]

Relative density : 1.2

Solubility : Miscible in water.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : 198.89°C (390°F)

SADT : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Section 10. Stability and reactivity

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis. Strong acids and nitrites.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Captain® XTR Algaecide	LD50 Dermal LD50 Oral	Rabbit Rat	>2000 mg/kg 590 mg/kg	- -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Captain® XTR Algaecide	Eyes - Severe irritant Skin - Severe irritant	Rabbit Rabbit	- -	0.1 ml 0.5 ml	- -

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Captain® XTR Algaecide	skin	Guinea pig	Not sensitizing

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Proprietary ingredient 2	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

There is no data available.

Aspiration hazard

There is no data available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation, Eye.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Section 11. Toxicological information

Skin contact : Causes skin irritation.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No known significant effects or critical hazards.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : No known significant effects or critical hazards.

Potential delayed effects : No known significant effects or critical hazards.

Long term exposure

Potential immediate effects : No known significant effects or critical hazards.

Potential delayed effects : No known significant effects or critical hazards.

Potential chronic health effects

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

There is no data available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Proprietary ingredient 1	Acute EC50 609.98 mg/L Fresh water	Crustaceans - *Ceriodaphnia dubia* - Neonate	48 hours
	Acute LC50 11800 mg/L Fresh water	Fish - *Pimephales promelas*	96 hours
	Chronic NOEC 16 mg/L Fresh water	Daphnia - *Daphnia magna*	21 days
Proprietary ingredient 2	Acute EC50 80 mg/L Fresh water	Algae - *Isochrysis galbana*	96 hours
	Acute LC50 >100 mg/L Marine water	Crustaceans - *Crangon crangon* - Adult	48 hours
	Acute LC50 170 mg/L Fresh water	Fish - *Carassius auratus*	96 hours
Proprietary ingredient 3	Acute EC50 4.53 mg/L Fresh water	Crustaceans - *Ceriodaphnia dubia* - Neonate	48 hours

Section 12. Ecological information

Persistence and degradability

There is no data available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Proprietary ingredient 2	-1.31	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN1760	UN1760	UN1760
UN proper shipping name	CORROSIVE LIQUID, N.O.S.(Alkanolamines)	CORROSIVE LIQUID, N.O.S. (Alkanolamines). Marine pollutant (Copper Monoethanolamine Complex, Copper Triethanolamine Complex)	CORROSIVE LIQUID, N.O.S.(Alkanolamines)
Transport hazard class(es)	8 	8 	8 
Packing group	III	III	III
Environmental hazards	No.	Yes.	No.
Additional information	- **FOR PACKAGES SIZES GREATER THAN ONE GALLON**	-**FOR PACKAGES SIZES GREATER THAN ONE GALLON**	-**FOR PACKAGES SIZES GREATER THAN ONE GALLON**

Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Commerce control list precursor: Proprietary ingredient 1

United States inventory (TSCA 8b): Not determined.

Clean Water Act (CWA) 307: Copper Monoethanolamine Complex; Copper Triethanolamine Complex

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Proprietary ingredient 2	10 - 30	No.	No.	No.	Yes.	No.
Proprietary ingredient 3	10 - 30	No.	No.	No.	Yes.	No.

Section 15. Regulatory information

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Copper Monoethanolamine Complex Copper Triethanolamine Complex	14215-52-2 82027-59-6	13.3 14.9
Supplier notification	Copper Monoethanolamine Complex Copper Triethanolamine Complex	14215-52-2 82027-59-6	13.3 14.9

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2

New York : None of the components are listed.

New Jersey : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2; Copper Monoethanolamine Complex; Copper Triethanolamine Complex

Pennsylvania : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2; Copper Monoethanolamine Complex; Copper Triethanolamine Complex

California Prop. 65

No products were found.

International regulations

International lists : **Australia inventory (AICS)**: Not determined.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: Not determined.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Listed

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 3 * **Flammability :** 1 **Physical hazards :** 0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Health : 3 **Flammability :** 1 **Instability :** 0

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Section 16. Other information

History

Date of issue mm/dd/yyyy	:	08/28/2018
Date of previous issue	:	06/08/2016
Version	:	2
Revised Section(s)	:	14
Prepared by	:	SePRO Corp.
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Nautique®

Aquatic Herbicide

SPECIMEN

SePRO

FOR USE IN POTABLE AND NON-POTABLE WATER SOURCES IN STILL OR FLOWING AQUATIC SITES INCLUDING LAKES, RESERVOIRS, AND PONDS, SLOW-FLOWING OR QUIESCENT WATER BODIES, CROP AND NON-CROP IRRIGATION AND DRAINAGE SYSTEMS (CANALS, DITCHES, AND LATERALS), GOLF COURSE, ORNAMENTAL, SWIMMING, AND FIRE PONDS AND FISH, SHRIMP AND OTHER AQUACULTURE.

Active Ingredients	
Copper Ethylenediamine Complex† (CAS# 13426-91-0)	13.2%
Copper Triethanolamine Complex† (CAS# 82027-59-6)	14.9%
Other Ingredients	71.9%
TOTAL	100.0%

†Metallic Copper equivalent = 9.1%

Keep Out of Reach of Children

DANGER/PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Refer to inside of label booklet for additional precautionary information and directions for use including first aid and storage and disposal.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read *Warranty Disclaimer* and *Misuse* statements inside label booklet. If terms are unacceptable, return at once unopened.**

Nautique is a registered trademark of SePRO Corporation.

SePRO Corporation
11550 North Meridian Street, Suite 600,Carmel, IN 46032 U.S.A.

EPA Reg. No. 67690-10
FPL20180531

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children

DANGER/PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Corrosive. Causes irreversible eye damage. Causes skin burns. May be fatal if absorbed through skin. Harmful if swallowed. Harmful if inhaled. Do not get in eyes, on skin or on clothing. Avoid breathing spray or mist vapor. When handling, wear protective eyewear, clothing and chemical-resistant gloves as described under the section of this label pertaining to Personal Protective Equipment (PPE). Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Wash skin thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

FIRST AID	
If in 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 rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
If swallowed	• Call a 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 a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053.**	

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

For applications in waters destined for use as drinking water, those waters must receive additional and separate potable water treatment. Do not apply more than 1.0 ppm as metallic copper in any waters.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are barrier laminate, butyl rubber ≥14 mils, or nitrile rubber ≥14 mils. If you want more options, follow the instructions for category A on an EPA chemical-resistant category selection chart.

Mixers, loaders, applicators and other handlers must wear the following:

- Coveralls (such as Tyvek suit or similar) worn over long-sleeved shirt and long pants;
- Socks and chemical resistant footwear;
- Chemical-resistant gloves (such as nitrile or butyl rubber);
- Protective eyewear such as goggles, safety glasses, or face shield; and
- A chemical-resistant apron when mixing and loading or cleaning equipment.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash the outside of gloves before removing.
- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling Nautique. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish and aquatic invertebrates. Waters treated with this product may be hazardous to aquatic organisms. Treatment of aquatic weeds and algae can result in oxygen loss from decomposition of dead algae and weeds. This oxygen loss can cause fish and invertebrate suffocation. To minimize this hazard, do not treat more than ½ of the water body to avoid depletion of oxygen due to decaying vegetation. Wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State or local agency with primary responsibility for regulating pesticides before applying to public waters, to determine if a permit is required.

Certain water conditions including low pH (<6.5), low dissolved organic carbon (DOC) levels (3.0 mg/L or lower), and "soft" waters (i.e. alkalinity less than 50 mg/L), increases the potential acute toxicity to non-target aquatic organisms. Do not use in waters containing trout or other fish species that are highly sensitive to copper if the alkalinity is less than 50 ppm. Fish toxicity generally decreases when the hardness of water increases. This product must not be used in ornamental ponds containing Koi.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Read all directions for use carefully before applying this product. Use only according to label directions.

Do not apply this product in a way that concentrate will contact workers or other persons, either directly or through drift; only protected handlers may be in close proximity to the mixing area or application equipment while in use.

Obtain Required Permits: Consult with appropriate state or local pesticide and/or water authorities before applying this product in or around public waters. Permits and posting or treatment notification may be required by State, Tribal or local public agencies.

PRODUCT INFORMATION

Nautique controls a variety of submersed, floating, and emergent aquatic weeds and algae in potable and non-potable water sources in still or flowing aquatic sites including lakes, reservoirs, and ponds, slow-flowing or quiescent water bodies, crop and non-crop irrigation and drainage systems (canals, ditches, and laterals), golf course, ornamental, swimming, and fire ponds and fish, shrimp and other aquaculture.

Nautique is formulated with dual chelating agents. This aids in copper uptake by aquatic plants and reduces the precipitation of copper with carbonates and bicarbonates in the water. Nautique has a broad spectrum of activity to weed species that are susceptible to copper.

Treatment Notes
Performance of Nautique is enhanced under certain conditions. It is recommended to consult a SePRO Aquatic Specialist for guidance in implementing a treatment program to achieve optimal results. The following apply to the use of Nautique to achieve optimum effectiveness:

- Treat when growth first begins to appear (if possible) or when target vegetation and algae are actively growing.
- Apply in a manner that will ensure even distribution of the chemical within the treatment area.
- Aquatic weeds typically drop below the surface within 3 to 14 days after treatment. The complete results of treatment will be observed 1 to 4 weeks post-treatment in most cases.
- In heavily infested areas a second application may be necessary. Retreat areas if regrowth begins to appear and seasonal control is desired. Repeating application of Nautique too soon after initial application may have no effect.

Precautions and Restrictions

- Do not apply Nautique directly to, or otherwise permit it to come into contact with any desirable plants as injury may result. Do not apply in such a way that concentrated Nautique comes in contact with crops, ornamentals, grass or other desirable plants.
- Wash spray equipment thoroughly before and after each application.

Spray Drift Management
A variety of factors including weather conditions (e.g., wind direction, wind speed, temperature, relative humidity) and method of application (e.g., ground, aerial, airblast, chemigation) can influence pesticide drift. The applicator must evaluate all factors and make appropriate adjustments when applying this product.

Droplet Size
Apply only as a medium or coarser spray (ASAE standard 572) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.

Wind Speed
Do not apply at wind speeds greater than 15 mph. Only apply this product if the wind direction favors on-target deposition (approximately 3 to 10 mph), and there are no sensitive areas within 250 feet downwind.

Temperature Inversions
If applying at wind speeds less than 3 mph, the applicator must determine if a) conditions of temperature inversion exist, or b) stable atmospheric conditions exist at or below nozzle height. Do not make applications into areas of temperature inversions or stable atmospheric conditions.

Other State and Local Requirements
Applicators must follow all state and local pesticide drift requirements regarding application of copper compounds. Where states have more stringent regulations, they must be observed.

Equipment
All aerial and ground application equipment must be properly maintained and calibrated using appropriate carriers or surrogates.

Additional requirements for aerial applications:
- The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.
- Release spray at the lowest height consistent with efficacy and flight safety. Do not release spray at a height greater than 10 feet above the water surface unless a greater height is required for aircraft safety.
- When applications are made with a crosswind, the swath must be displaced downwind. The applicator must compensate for this displacement at the up and downwind edge of the application area by adjusting the path of the aircraft upwind.

Additional requirements for ground boom application:
Do not apply with a nozzle height greater than 4 feet above the water surface.

APPLICATION INFORMATION

For aquatic weed control (including vascular plants and algae), do not exceed a concentration of 1.0 ppm copper during any single application. Wait at least 10 to 14 days between treatments. When treating aquaculture ponds when fish are present, do not exceed a concentration of 0.4 ppm during any single application when targeting nuisance algae; wait a minimum of 10 days between retreatments.

Target Species
Nautique is a chelated copper formulation that provides effective control of floating, submersed, and emergent aquatic plants having sensitivity to copper including:

Brazilian elodea (*Egeria densa*)	Naiad
Coontail	Pondweed spp.(e.g., sago, American)[1]
Curlyleaf pondweed	Salvinia spp. (e.g. giant and common)
Duckweed	Starry stonewort[1]
Elodea	Thinleaf pondweed
Eelgrass (Vallisneria)[1]	Watermilfoil, Eurasian[1]
Horned pondweed[1]	Water hyacinth
Hydrilla	Water lettuce
Macroalgae (Chara, Nitella)	Widgeon grass

[1] Variable control may be obtained, especially in waters with higher alkalinity, and repeat applications may improve control.

Application Methods
Nautique can be applied directly as a surface spray, subsurface through trailing weighted hoses, by aerial application, or by metering/drip in flowing water. Tank mixing or using in combination with other aquatic herbicides and algaecides can broaden the spectrum of control. Surfactants, sinking agents, polymers (except CA), penetrants, or other adjuvants may be combined with Nautique to improve the retention time, sinking, and distribution of the herbicide. Nautique inverts easily using either tank mix or multi-fluid mixer techniques. For submersed plants, invert applications should be made through weighted hoses dragged below the water surface; for heavy infestations, direct application is preferable.

When treating moving water, apply the spray solution counter to the flow of water (unless metering Nautique into flowing water – see the *Flowing Water Treatment* section of this label). Nautique can be applied diluted or undiluted, whichever is most suitable to insure uniform coverage of the area to be treated. Dilution with water may be necessary at the lower application rates and when targeting floating or emergent vegetation. Dilute the required amount of Nautique with enough water to ensure even distribution in the treated area with the type of equipment being used. For best results, dilute Nautique in water to provide a minimum spray mix of 20 to 50 gallons per acre; in areas with heavy weed infestations, a total tank mix of >50 gallons per acre may be necessary.

For effective control, proper Nautique concentrations should be maintained for a minimum of three (3) hours. The rates in Table 1, *Nautique Application Rates,* are based on static or minimal flow situations. Where significant dilution occurs from untreated waters or loss of water within a three (3) hour period, Nautique may have to be metered in (refer to the *Flowing Water Treatment* section of this label).

Use the lower rates for treating soft water (less than 50 ppm alkalinity) or when targeting species with greater susceptibility to Nautique. Use the higher rates for treating less susceptible species, heavier infestations, and/or treating hard water (above 50 ppm alkalinity). Surface applications may be made from shore into shallow water along the shoreline.

Application Rates
Application rates in Table 1 are based on minimal water flow in ponds, lakes, reservoirs, and irrigation conveyance or drainage systems. Treatments that extend chemical contact time with target vegetation will generally result in improved efficacy. In conveyance systems where significant water flow results in rapid off-site movement of Nautique, consult Table 2 and the *Flowing Water Treatment* section of this label for application instructions.

Application rates are calculated by using the following formula to obtain the appropriate Nautique dose/rate:

Gallons of Nautique per surface acre = desired concentration of metallic copper (ppm) x average depth of water (feet) x 3.0

TABLE 1: Application Rates

Relative Plant Density	ppm copper††	Gallons Per Surface Acre – Depth in Feet†				Liters Per Surface Hectare – Depth in Meters†			
		1	2	3	4	0.5	0.75	1.0	1.25
Low Density	0.4	1.2	2.4	3.6	4.8	9.6	14.4	19.2	24.0
	0.5	1.5	3.0	4.5	6.0	12.0	24.1	36.1	48.2
	0.6	1.8	3.6	5.4	7.2	14.9	29.8	44.7	59.6
Medium Density	0.7	2.1	4.2	6.3	8.4	17.2	34.4	51.6	68.8
	0.8	2.4	4.8	7.3	9.6	19.5	39.0	58.5	78.0
High Density	0.9	2.7	5.4	8.1	10.8	21.8	43.6	65.4	87.2
	1.0	3.0	6.0	9.0	12.0	24.1	48.2	72.3	96.4

† For depths greater than 4 feet (1.25 meters) add rates given for the sum of the corresponding depths in the chart
†† Use 0.4ppm copper only in aquaculture when fish are present for suppression of algae or in low density situations.

Free-Floating Plants
Apply Nautique using a foliar spray at a rate of 8 - 12 gallons/acre for control of water hyacinth, duckweed, and salvinia, and up to 4 - 6 gallons/acre for control of water lettuce (do not exceed 3 gallons/acre foot). Add Nautique and the appropriate surfactant to a minimum of 20 to 50 gallons per acre with water. Use an adequate spray volume to ensure good coverage of the plant. Apply Nautique to the area where the greatest concentration of foliage is located in a manner that will optimize herbicide contact on leaf surfaces.

Tank Mix
For a broader spectrum of control, Nautique may be mixed with other herbicides or algaecides registered for aquatic use provided that no labeling prohibits such mixing. Do not exceed labeled rate or dose of any of the products in the combination. Observe the most restrictive of the labeling limitations and precautions of all products used in mixtures. To ensure compatibility, a jar test is recommended before field application of any tank mix combination. It is recommended to consult with SePRO Corporation for latest tank mix recommendations.

NOTE: Tank mixing or use of Nautique with any other product which is not specifically listed on the Nautique label shall be at the exclusive risk of the user, applicator and/or application adviser, to the extent allowed by applicable law.

- **Nautique + Sonar® A.S. Tank Mix (Except California)** - Nautique can be mixed with Sonar A.S. to broaden the submersed weed control spectrum of either product alone and be applied as a uniform surface spray or injected under the water's surface. For best results, apply this tank mix at a minimum of 0.5 ppm Nautique and a low to moderate rate of Sonar A.S. Lower concentrations may be effective on more susceptible species.
- **Nautique + Diquat Tank Mix** - For best results, apply Nautique/diquat (e.g. Littora®) combinations in a 2:1 ratio of Nautique:Diquat. Do not exceed maximum labeled rates for any product. For hydrilla control and control of other species with high sensitivity to copper, lower rates of Nautique may also enhance the activity of diquat. Nautique must be applied at a minimum of 0.1 ppm in combination with diquat. Higher rates may be needed in areas with dense weeds.
- **Nautique + Endothall Tank Mix** - For best results apply Nautique at a minimum rate of 1 gallon per acre foot, in combination with a low rate of endothall.

  Nautique may be applied as a tank mix or simultaneously injected or used with the dipotassium salt of endothall (e.g. Cascade®) or the mono (N,N-dimethylalkylamine) salt of endothall (e.g. Teton®) to broaden the weed control spectrum and/or reduce injection times or rates in canals, ditches, and laterals. In flowing canals, apply Nautique via drip or injection at a typical use rate of 0.1 to 1.0 ppm in conjunction with low rates of Teton or Cascade for a minimum of one hour. Use longer application times for areas with denser weeds.
- **Tank Mix Adjuvants/Surfactants** - The addition of a surfactant is recommended to improve efficacy on floating and emergent plants. **Silicone surfactants are not recommended for floating plants as they generally can cause the plant to sink causing the spray solution to be washed off the plant.** Observe all cautions and restrictions on the labels of both products used in this mixture. Adjuvants/surfactants may also enhance performance on other species. Consult manufacturer recommendations.

Flowing Water Treatment
Drip System or Metering Pump Application for Canals, Ditches, and Laterals
For optimal control, Nautique should be applied as soon as submersed macrophytes or algae begin active growth or interfere with normal delivery of water (clogging of lateral head gates, suction screens, weed screens, and siphon tubes). Delaying treatment could perpetuate the problem causing massing and compacting of plants. Heavy infestations and low flows may result in pooling or uneven product distribution resulting in unsatisfactory control. Under these conditions repeated applications or increasing the water flow rate during application may be necessary.

To achieve desired control with Nautique herbicide in flowing waters, a minimum exposure period of three hours should be maintained at a concentration of 0.5 to 1.0 ppm. Other factors to consider include: plant species and density of infestation and water temperature and hardness. Longer contact times and the highest rates may be required for less susceptible species and in difficult treatment conditions (e.g. less susceptible weed species, dense weed beds, hard water).

1. Treatment with Nautique requires accurate calculations of water flow rates. Devices that provide accurate flow measurements such as weirs or orifices are the preferred method; however, the volume of water to be treated may also be estimated using the following formula:

   Cubic feet per second (cfs) = average width (feet) x average depth (feet) x average velocity (feet/second) x 0.9

   The velocity can be estimated by determining the length of time it takes a floating object to travel a defined distance. Divide the distance (feet) by the time (seconds) to estimate velocity (feet/seconds). This measure should be repeated 3 times at the intended application site and then calculate the average velocity.
2. After accurately determining the water flow rate in cubic feet per second(s) (cfs) or gallons/minute, find the corresponding drip rate in Table 2. For flow rates not listed in the table, multiply the flow rate by the recommended amount of Nautique in 1 cfs for application rates or use the below formula.

cfs X desired concentration of metallic copper (ppm) = quarts/hour of application

TABLE 2: Drip or Injection Application Rates For Flowing Water

Water Flow Rate		PPM Copper	Nautique Drip Rate	
cfs	gal/min.		Quart/ hr	ml / min
1	450	0.5 - 1.0	0.5 - 1.0	7.9 - 15.7
2	900	0.5 - 1.0	1.0 - 2.0	15.7 - 31.5
3	1,350	0.5 - 1.0	1.5 - 3.0	23.6 - 47.3
4	1,800	0.5 - 1.0	2.0 - 4.0	31.5 - 63.0
5	2,250	0.5 - 1.0	2.5 - 5.0	39.4 - 78.8
10	4,500	0.5 - 1.0	5.0 - 10.0	78.8 – 157.7
100	45,000	0.5 - 1.0	50 - 100	789 - 1,577

Calculate the amount of Nautique needed to maintain the drip rate for a treatment period of 3 hours by multiplying **quart(s)/hour by 3 or milliliters/minute by 180.** For longer injection periods, multiply dosage rate by desired time in minutes or hours as appropriate.

Rates will target up to 1.0 ppm copper concentration in the treated water for the treatment period. Lower concentrations may be used on susceptible plant species or if longer exposure/injection times are maintained. Introduction of Nautique should be made in the channel at weirs or other turbulence-creating structures to promote the dispersion of the chemical.

Use a drum or tank equipped with a valve or other volume control device that can be calibrated to maintain a constant drip rate. Use a stopwatch and appropriate measuring container to set the desired drip rate. Readjust accordingly if the canal flow rate changes during the treatment period. A small pump or other metering device may be used to meter Nautique into the water more accurately. Application can be made using diluted or undiluted material.

Results can vary depending upon species and density of vegetation, desired distance of control and flow rate, and impact of water quality on Nautique and efficacy. Periodic maintenance treatments may be required to maintain seasonal control (every 2 to 6 weeks). In addition, Nautique can be used in a rotational program with other herbicides labeled for flowing water for an integrated management approach. It is recommended to consult a SePRO Aquatic Specialist to determine optimal use rate location of treatment stations and duration of treatment period under local conditions.

Slug Application Method for Flowing Irrigation Canals with no Functioning Potable Water Intakes
Do not use this method of application in flowing canals with functioning potable water intakes at or downstream from the application site.
For optimal control, apply Nautique as soon as plants begin active growth or interfere noticeably with normal delivery of water. Heavy infestations and low flow may cause poor distribution resulting in unsatisfactory control. Under these conditions repeated applications or increasing water flow rate during application may be necessary. Apply Nautique into the irrigation canal or lateral at 0.05 (6.4 fluid ounces) to 0.55 gallons (70 fluid ounces) per CFS as a slug or dump application (see above for determining CFS). Depending upon water hardness, alkalinity, velocity and plant conditions, a slug application is typically required every 5 to 30 miles. High water hardness or alkalinity levels may require the use of higher rates within the rate range above to achieve control. When velocity levels are higher (>1 foot per second) distance between drop stations for slug applications can be increased.

Irrigation Ponds or Reservoirs
When applying to irrigation ponds or reservoirs, it is best to hold water for a minimum of 3 hours before irrigating to ensure proper exposure of Nautique at targeted rates to plants. If water is to be continually pumped from the treated system during application, application techniques (drip, injection, or multiple spray applications) should be made to compensate for dilution of Nautique within the targeted area.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.
Pesticide Storage: Store in a cool dry place. Do not store near feed or foodstuffs. In case of leak or spill, use absorbent materials to contain liquids and dispose in a manner consistent with the pesticide disposal instructions.
Pesticide Disposal: 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. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
Non-refillable Container Handling (rigid, 5 gallons or less): Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank, treatment area, or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat the procedure two more times. Then offer for recycling (if available) or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.
Non-refillable Container Handling (rigid, larger than 5 gal): Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank, treatment area, or store rinsate for later use or disposal. Repeat this procedure two more times. Then offer for recycling (if available) or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.
Container Handling (bulk): Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Warranty Disclaimer: SePRO Corporation warrants that this product conforms to the chemical description on the product label. Testing and research have also determined that this product is reasonably fit for the uses described on the product label. To the extent consistent with applicable law, SePRO Corporation makes no other express or implied warranty of fitness or merchantability nor any other express or implied warranty and any such warranties are expressly disclaimed.

Misuse: Federal law prohibits the use of this product in a manner inconsistent with its label directions. To the extent consistent with applicable law, the buyer assumes responsibility for any adverse consequences if this product is not used according to its label directions. In no case shall SePRO Corporation be liable for any losses or damages resulting from the use, handling or application of this product in a manner inconsistent with its label.

For additional important labeling information regarding SePRO Corporation's Terms and Conditions of Use, Inherent Risks of Use and Limitation of Remedies, please visit *http://seprolabels.com/terms* or scan the image below.

SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032, U.S.A.

SAFETY DATA SHEET

Nautique® Aquatic Herbicide

Section 1. Identification

GHS product identifier : Nautique® Aquatic Herbicide

Other means of identification : Not available.

EPA Registration No. : 67690-10

Relevant identified uses of the substance or mixture

Aquatic plant herbicide.

Supplier's details : SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm E.S.T.
www.sepro.com

Emergency telephone number (with hours of operation) : **INFOTRAC - 24-hour service 1-800-535-5053**

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (dermal) - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
RESPIRATORY SENSITIZATION - Category 1A
AQUATIC HAZARD (ACUTE) - Category 1
AQUATIC HAZARD (LONG-TERM) - Category 1

GHS label elements

Hazard pictograms : Skull and crossbones, Health hazard, Environment

Signal word : Danger

Hazard statements : Toxic in contact with skin.
Harmful if swallowed.
Causes serious eye irritation.
Causes skin irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Very toxic to aquatic life with long lasting effects.

Section 2. Hazards identification

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. In case of inadequate ventilation wear respiratory protection. Avoid accidental release to the environment. Avoid breathing vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace.

Response : Collect spillage. IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or physician. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN: Take off immediately all contaminated clothing. Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Ingredient name	%	CAS number
Proprietary ingredient 3	30 - 60	-
Proprietary ingredient 1	10 - 20	-
Proprietary ingredient 2	5 - 10	-
Copper Triethanolamine Complex	14.9	82027-59-6
Copper Ethylenediamine Complex†	13.2	13426-91-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention.

Section 4. First aid measures

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. In the event of any complaints or symptoms, avoid further exposure.

Skin contact : Wash with plenty of soap and water. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 20 minutes. Get medical attention. If necessary, call a poison center or physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : May cause allergy or asthma symptoms or breathing difficulties if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Toxic in contact with skin. Causes skin irritation.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No known significant effects or critical hazards.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : This material is very toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
metal oxide/oxides

Special protective actions for fire-fighters : No special measures are required.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). May be harmful to the environment if released in large quantities. Collect spillage.

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid accidental release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Separate from acids. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Proprietary ingredient 1	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** TWA: 10 ppm 8 hours. **NIOSH REL (United States, 6/2009).** TWA: 25 mg/m³ 10 hours. TWA: 10 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 25 mg/m³ 8 hours. TWA: 10 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Section 8. Exposure controls/personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or supplied air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Purple. [Dark]

Odor : Ammoniacal.

Odor threshold : Not available.

pH : 12.03 [Conc. (% w/w): 1% in water]

Melting point : Not available.

Boiling point : Not available.

Flash point : Closed cup: >108°C (>226.4°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not flammable.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Section 9. Physical and chemical properties

Vapor density	:	Not available.
Relative density	:	1.2
Solubility	:	Not available.
Solubility in water	:	Not available.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	>198.89°C (>390°F)
SADT	:	Not available.
Viscosity	:	Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : Reactive or incompatible with the following materials: Strong acids and nitrites.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Nautique® Aquatic Herbicide	LC50 Inhalation Vapor LD50 Dermal LD50 Oral	Rat - Male, Female Rabbit - Male, Female Rat - Male, Female	2.1 mg/L 700 mg/kg 0.68 g/kg	4 hours - -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Nautique® Aquatic Herbicide	Skin - Severe irritant Eyes - Severe irritant	Rabbit Rabbit	- -	- -	- -

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Nautique® Aquatic Herbicide	skin	Guinea pig	Not sensitizing

Mutagenicity

There is no data available.

Section 11. Toxicological information

Carcinogenicity

There is no data available.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

There is no data available.

Specific target organ toxicity (repeated exposure)

There is no data available.

Aspiration hazard

There is no data available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : May cause allergy or asthma symptoms or breathing difficulties if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Toxic in contact with skin. Causes skin irritation.

Ingestion : Harmful if swallowed. Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
wheezing and breathing difficulties
asthma

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : No known significant effects or critical hazards.

Potential delayed effects : No known significant effects or critical hazards.

Long term exposure

Potential immediate effects : No known significant effects or critical hazards.

Potential delayed effects : No known significant effects or critical hazards.

Section 11. Toxicological information

Potential chronic health effects

General : Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

There is no data available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Proprietary ingredient 1	Acute EC50 100 mg/L Fresh water	Algae - *Chlorella pyrenoidosa*	96 hours
	Acute LC50 46 mg/L Fresh water	Daphnia - *Daphnia magna*	48 hours
	Acute LC50 220 mg/L Fresh water	Fish - *Pimephales promelas*	96 hours
	Chronic NOEC 160 µg/l Fresh water	Daphnia - *Daphnia magna*	21 days
Copper Triethanolamine Complex	Acute EC50 55.7 mg/L Fresh water	Daphnia - *Daphnia magna* - Mature	48 hours
	Acute LC50 26 µg/l Fresh water	Fish - *Oncorhynchus mykiss*	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Proprietary ingredient 1	-7.02	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid

Section 13. Disposal considerations

dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN2735	UN2735	UN2735
UN proper shipping name	AMINES, LIQUID, CORROSIVE, N.O.S. (1,2-diaminoethane). Marine pollutant (Copper Ethylenediamine Complex†) RQ (1,2-diaminoethane)	AMINES, LIQUID, CORROSIVE, N.O.S.(1,2-diaminoethane). Marine pollutant (1,2-diaminoethane, Copper Triethanolamine Complex)	AMINES, LIQUID, CORROSIVE, N.O.S.(1,2-diaminoethane)
Transport hazard class(es)	8 	8 	8 
Packing group	III	III	III
Environmental hazards	No.	Yes.	No.
Additional information	The marine pollutant mark is not required when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes. **Reportable quantity** 33333.3 lbs / 15133.3 kg [3331.5 gal / 12611.1 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The environmentally hazardous substance mark may appear if required by other transportation regulations.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations :

TSCA 8(a) CDR Exempt/Partial exemption: Not determined

Commerce control list precursor: Proprietary ingredient 2

United States inventory (TSCA 8b): Not determined.

Clean Water Act (CWA) 307: Copper Triethanolamine Complex

Clean Water Act (CWA) 311: Proprietary ingredient 1

Clean Air Act (CAA) 112 regulated toxic substances: Proprietary ingredient 1

Section 15. Regulatory information

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
Proprietary ingredient 1	10 - 20	Yes.	-	-	-	-

SARA 304 RQ : 33333.3 lbs / 15133.3 kg [3331.5 gal / 12611.1 L]

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Proprietary ingredient 1	10 - 20	Yes.	No.	No.	Yes.	No.
Copper Ethylenediamine Complex†	13.2	No.	No.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Copper triethanolamine complex	82027-59-6	14.9
Supplier notification	Copper triethanolamine complex	82027-59-6	14.9

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2

New York : The following components are listed: Proprietary ingredient 1

New Jersey : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2; Copper Triethanolamine Complex; Copper Ethylenediamine Complex†

Pennsylvania : The following components are listed: Proprietary ingredient 1; Proprietary ingredient 2; Copper Triethanolamine Complex

California Prop. 65

No products were found.

Section 15. Regulatory information

International regulations

International lists : **Australia inventory (AICS)**: Not determined.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: Not determined.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Listed

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 3 * **Flammability :** 1 **Physical hazards :** 0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Health : 3 **Flammability :** 1 **Instability :** 0

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

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Version : 4
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Prepared by : KMK Regulatory Services Inc.

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Appendix B

Special Status Species List and Species Descriptions

1. Approach

A list of special status species was compiled using records from the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB), and the U.S. Fish and Wildlife Service's (USFWS) Environmental Conservation Online System (ECOS) Information for Planning and Conservation (IPaC) (CNDDB, 2021; USFWS, 2021). Location-specific species information for project counties is available from ECOS IPaC. Special status species data from CNDDB was obtained for the 19 United States Geological Survey (USGS) 7.5 x 7.5-minute quadrangles that the Districts fall within (i.e., core quads) as well as the 29 peripheral quadrangles (i.e., border quads). This approach was used to identify species that might be located in the surrounding areas, but not necessarily reported to CNDDB as a sighting within the boundaries of the Project area. Data was queried from the CDFW and USFWS databases for these quads and combined into one table. Once this list was compiled, a preliminary assessment of the Project area was performed to characterize the actual habitats present on-site and the likelihood of special status species occurrence and interaction with treated water.

A summary of the listed species, their conservation status, and whether they were considered for evaluation of potential impact is presented in **Table B-1**. Species habitat and rationale for removal from further consideration is presented in **Table B-1** and more detailed species life history information can be found below.

Table B-1. Species and Habitat Summary

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Amphibians	California red-legged frog	*Rana draytonii*	FT, SSC	Lowland foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation.	X		
Amphibians	California tiger salamander	*Ambystoma californiense*	FT, ST	Herbaceous wetland, temporary pool; Grassland/ herbaceous, Savanna, Woodland - Hardwood; benthic, burrowing in or using soil.	X		
Amphibians	foothill yellow-legged frog	*Rana boylii*	SE, SSC	Partly-shaded shallow streams & riffles with a rocky substrate in a variety of habitats; need at least some cobble-sized substrate for egg-laying.	X		
Amphibians	northern leopard frog	*Lithobates pipiens*	SSC	Near permanent or semi-permanent water in a variety of habitats with shoreline cover, submerged and emergent aquatic vegetation	X		
Amphibians	western spadefoot	*Spea hammondii*	SSC	Lowlands to foothills; grasslands, open chaparral, pine-oak woodlands. Prefers shortgrass plains, sandy or gravelly soil. Fossorial. Breeds in temporary rain pools and slow-moving streams.	X		
Birds	bald eagle	*Haliaeetus leucocephalus*	FDR, SE, SFP	Ocean shore, lake margins, and rivers; nests in large, old-growth, or dominant live trees with open branches	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Birds	bank swallow	*Riparia riparia*	ST	Riparian/lowland; Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.		X (1)	
Birds	burrowing owl	*Athene cunicularia*	SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation.	X		
Birds	California condor	*Gymnogyps californianus*	FE, SE, SFP	Chaparral, valley and foothill grassland in mountain ranges of moderate altitude.	X		
Birds	golden eagle	*Aquila chrysaetos*	SFP	Rolling foothills, mountain areas, sage-juniper flats, and desert; cliff-walled canyons and large trees in open areas provide nesting habitat	X		
Birds	least Bell's vireo	*Vireo bellii pusillus*	FE, SE	Summer resident of Southern California; riparian forest, scrub, and woodland in vicinity of water or in dry river bottoms.	X		
Birds	loggerhead shrike	*Lanius ludovicianus*	SSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub & washes.	X		
Birds	mountain plover	*Charadrius montanus*	SSC	Short grasslands, freshly plowed fields, newly sprouting grain fields, & sometimes sod farms; prefers grazed areas and areas with burrowing rodents.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Birds	northern harrier	*Circus hudsonius*	SSC	Coastal salt & freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas.	X		
Birds	song sparrow ("Modesto" population)	*Melospiza melodia*	SSC	Fresh-water marshes and riparian thickets.	X		
Birds	southwestern willow flycatcher	*Empidonax traillii extimus*	FE, SE	Riparian woodland with thick understory and nearby flowing or pooled water.	X		
Birds	Swainson's hawk	*Buteo swainsoni*	ST	Cropland/hedgerow, Desert, Grassland/herbaceous, Savanna, Woodland - Mixed.		X (2)	
Birds	tricolored blackbird	*Agelaius tricolor*	SE, SSC	Freshwater and brackish marshes of cattails, tule, bulrushes and sedges; cropland/hedgerow, grassland/herbaceous.		X (3)	
Birds	western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT, SE	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.		X (2)	
Birds	yellow rail	*Coturnicops noveboracensis*	SSC	Freshwater marshlands; summer resident in eastern Sierra Nevada in Mono County.	X		
Birds	yellow-headed blackbird	*Xanthocephalus xanthocephalus*	SSC	Nests in freshwater emergent wetlands with dense vegetation and deep water; often along borders of lakes or ponds.		X (1)	
Fish	Delta smelt	*Hypomesus transpacificus*	FT, SE	Sacramento-San Joaquin Delta; seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Fish	hardhead	*Mylopharodon conocephalus*	SSC	Low- to mid-elevation streams in the Sacramento-San Joaquin drainage, clear, deep pools with sand-gravel-boulder bottoms and slow water velocity	X		
Fish	Sacramento splittail	*Pogonichthys macrolepidotus*	SSC	Lakes, Slow-moving Rivers with Vegetated Floodplain, Tidal Estuarine Marsh	X		
Fish	San Joaquin roach	*Lavinia symmetricus ssp. 1*	SSC	Tributaries to the San Joaquin River from the Cosumnes River south.	X		
Fish	steelhead - Central Valley DPS	*Oncorhynchus mykiss irideus pop. 11*	FT	Sacramento River and San Joaquin Rivers and their tributaries	X		
Fish	steelhead - south-central California coast DPS	*Oncorhynchus mykiss irideus pop. 9*	FT	Coastal basins from the Pajaro River south to, but not including, the Santa Maria River.	X		
Invertebrates	Conservancy fairy shrimp	*Branchinecta conservatio*	FE	Endemic to the grasslands of the northern two-thirds of the Central Valley; found in large, turbid pools.	X		
Invertebrates	longhorn fairy shrimp	*Branchinecta longiantenna*	FE	Endemic to the eastern margin of the Central Coast mountains in seasonally astatic grassland vernal pools.	X		
Invertebrates	monarch butterfly	*Danaus plexippus*	FC	Milkweed and flowering plants.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Invertebrates	valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	Occurs in the Central Valley of California; associated with blue elderberry (*Sambucus mexicana*); prefers to lay eggs in elderberries.	X		
Invertebrates	vernal pool fairy shrimp	*Branchinecta lynchi*	FT	Vernal pools	X		
Invertebrates	vernal pool tadpole shrimp	*Lepidurus packardi*	FE	Vernal pools and swales in the Sacramento Valley	X		
Mammals	American badger	*Taxidea taxus*	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	X		
Mammals	Fresno kangaroo rat	*Dipodomys nitratoides exilis*	FE, SE	Alkali sink-open grassland habitats in western Fresno County.	X		
Mammals	giant kangaroo rat	*Dipodomys ingens*	FE, SE	Annual grasslands on the western side of the San Joaquin Valley, marginal habitat in alkali scrub; sandy loam soils for burrowing.	X		
Mammals	Nelson's antelope squirrel	*Ammospermophilus nelsoni*	ST	Western San Joaquin Valley from 200-1200 ft elevation; areas with widely scattered shrubs, forbs and grasses in broken terrain with gullies and washes	X		
Mammals	pallid bat	*Antrozous pallidus*	SSC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Mammals	riparian (=San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	FE, SSC	Riparian areas along the San Joaquin, Stanislaus, & Tuolumne Rivers; need areas with mix of brush & trees	X		
Mammals	riparian brush rabbit	*Sylvilagus bachmani riparius*	FE, SE	Riparian areas on the San Joaquin River in Northern Stanislaus County; dense thickets of wild rose, willows, and blackberries.	X		
Mammals	San Joaquin kit fox	*Vulpes macrotis mutica*	FE, ST	Annual grasslands or grassy open stages with scattered shrubby vegetation; need loose-textured sandy soils for burrowing, and suitable prey base.	X		
Mammals	Townsend's big-eared bat	*Corynorhinus townsendii*	SSC	Mesic habitats, roosts in the open, hanging from walls and ceilings.	X		
Mammals	Tulare grasshopper mouse	*Onychomys torridus tularensis*	SSC	Hot, arid valleys and scrub deserts in the southern San Joaquin Valley.	X		
Mammals	western mastiff bat	*Eumops perotis californicus*	SSC	Semi-arid to arid habitats including conifer and deciduous woodlands, coastal scrub, grasslands, & chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels	X		
Mammals	western red bat	*Lasiurus blossevillii*	SSC	Along riparian and agricultural areas in broadleaf tree communities throughout the Central Valley.	X		
Plants	alkali milk-vetch	*Astragalus tener var. tener*	CRPR-1	Alkali areas of floodplains; vernal pools.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Plants	alkali-sink goldfields	*Lasthenia chrysantha*	CRPR-1	Vernal pools	X		
Plants	Arburua Ranch jewelflower	*Streptanthus insignis ssp. lyonii*	CRPR-1	Coastal scrub	X		
Plants	big tarplant	*Blepharizonia plumosa*	CRPR-1	Valley and foothill grassland; dry hills & plains in annual grassland; clay to clay-loam soils; usually on slopes and often in burned areas.	X		
Plants	brittlescale	*Atriplex depressa*	CRPR-1	Alkaline clay soils in chenopod scrub, meadows, vernal pools, and valley and foothill grassland	X		
Plants	California alkali grass	*Puccinellia simplex*	CRPR-1	Meadows and seeps, chenopod scrub, valley and foothill grasslands, vernal pools, lake margins.	X		
Plants	chaparral harebell	*Campanula exigua*	CRPR-1	Rocky sites in chaparral	X		
Plants	chaparral ragwort	*Senecio aphanactis*	CRPR-2	Chaparral, cismontane woodland, coastal scrub	X		
Plants	Colusa grass	*Neostapfia colusana*	FT, SE, CRPR-1	Vernal pools	X		
Plants	Coulter's goldfields	*Lasthenia glabrata ssp. coulteri*	CRPR-1	Coastal salt marshes, playas, vernal pools.	X		
Plants	Delta button-celery	*Eryngium racemosum*	SE, CRPR-1	Riparian scrub, seasonally inundated floodplain on clay.	X		
Plants	diamond-petaled California poppy	*Eschscholzia rhombipetala*	CRPR-1	Valley and foothill grassland; alkaline, clay slopes and flats.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Plants	Earlimart orache	*Atriplex cordulata var. erecticaulis*	CRPR-1	Valley and foothill grassland.	X		
Plants	fleshy (=succulent) owl's clover	*Castilleja campestris ssp. Succulenta*	FT, SE, CRPR-1	Vernal pools.	X		
Plants	Greene's tuctoria	*Tuctoria greenei*	FE, CRPR-1	Vernal pools in open grasslands.	X		
Plants	hairy orcutt grass	*Orcuttia pilosa*	FE, SE, CRPR-1	Vernal pools.	X		
Plants	Hall's bush-mallow	*Malacothamnus hallii*	CRPR-1	Chaparral	X		
Plants	Hall's tarplant	*Deinandra halliana*	CRPR-1	Cismontane woodland, chenopod scrub, valley and foothill grassland.	X		
Plants	heartscale	*Atriplex cordulata var. cordulata*	CRPR-1	Saline or alkaline soils in chenopod scrub, valley and foothill grassland.	X		
Plants	Heckard's pepper-grass	*Lepidium latipes var. heckardii*	CRPR-1	Grassland, vernal pools	X		
Plants	hispid salty bird's-beak	*Chloropyron molle ssp. hispidum*	CRPR-1	Meadows and seeps, playas, valley and foothill grassland	X		
Plants	Hoover's cryptantha	*Cryptantha hooveri*	CRPR-1	Valley and foothill grassland, inland dunes.	X		
Plants	Hoover's eriastrum	*Eriastrum hooveri*	CRPR- 4	Chenopod scrub, valley and foothill grassland, pinyon and juniper woodland.	X		
Plants	Hoover's spurge	*Euphorbia hooveri*	FT, CRPR-1	Vernal pools	X		
Plants	Hospital Canyon larkspur	*Delphinium californicum ssp. interius*	CRPR-1	Cismontane woodland, chaparral, coastal scrub.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Plants	Keck's checker-mallow	*Sidalcea keckii*	FE, CRPR-1	Cismontane woodland, valley and foothill grassland.	X		
Plants	Lemmon's jewelflower	*Caulanthus lemmonii*	CRPR-1	Pinyon-juniper woodland, valley and foothill grassland.	X		
Plants	lesser saltscale	*Atriplex minuscula*	CRPR-1	Chenopod scrub, valley and foothill grassland.	X		
Plants	Lime Ridge navarretia	*Navarretia gowenii*	CRPR-1	Chaparral	X		
Plants	Lost Hills crownscale	*Atriplex coronata var. vallicola*	CRPR-1	Chenopod scrub, valley and foothill grassland, vernal pools.	X		
Plants	marsh sandwort	*Arenaria paludicola*	FE, SE, CRPR-1	Marshes and swamps; sandy soil.	X		
Plants	Merced monardella	*Monardella leucocephala*	CRPR-1	Valley and foothill grassland.	X		
Plants	Munz's tidy-tips	*Layia munzii*	CRPR-1	Chenopod scrub, valley and foothill grassland.	X		
Plants	palmate-bracted bird's-beak	*Chloropyron palmatum*	FE, SE, CRPR-1	Chenopod scrub, valley and foothill grassland.	X		
Plants	Panoche pepper-grass	*Lepidium jaredii ssp. album*	CRPR-1	Valley and foothill grassland.	X		
Plants	prairie wedge grass	*Sphenopholis obtusata*	CRPR-2	Cismontane woodland, meadows, and seeps; open moist sites, along rivers and springs.	X		
Plants	prostrate vernal pool navarretia	*Navarretia prostrata*	CRPR-1	Coastal scrub, valley and foothill grassland, vernal pools, meadows and seeps.	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Plants	recurved larkspur	*Delphinium recurvatum*	CRPR-1	Chenopod scrub, valley and foothill grassland, cismontane woodland; on alkaline soils.	X		
Plants	San Joaquin spearscale	*Extriplex joaquinana*	CRPR-1	Chenopod scrub, alkali meadow, playas, valley and foothill grassland.	X		
Plants	San Joaquin Valley Orcutt grass	*Orcuttia inaequalis*	FT, SE, CRPR-1	Vernal pools	X		
Plants	San Joaquin woollythreads	*Monolopia congdonii*	FE, CRPR-1	Chenopod scrub, valley and foothill grassland.	X		
Plants	Sanford's arrowhead	*Sagittaria sanfordii*	CRPR-1	Marshes and swamps; shallow, standing fresh water and sluggish waterways		X (4)	
Plants	shining navarretia	*Navarretia nigelliformis ssp. radians*	CRPR-1	Cismontane woodland, valley and foothill grassland, vernal pools.	X		
Plants	showy golden madia	*Madia radiata*	CRPR-1	Valley and foothill grassland; cismontane woodland; chenopod scrub; mostly on adobe clay in grassland or among shrub.	X		
Plants	slender-leaved pondweed	*Stuckenia filiformis ssp. alpina*	CRPR-2	Marshes and swamps. Shallow, clear waters of lakes and drainage channels			X
Plants	spiny-sepaled button-celery	*Eryngium spinosepalum*	CRPR-1	Vernal pools, valley and foothill grassland.	X		
Plants	subtle orache	*Atriplex subtilis*	CRPR-1	Valley and foothill grassland; alkaline soils.	X		
Plants	vernal pool smallscale	*Atriplex persistens*	CRPR-1	Vernal pools	X		

Taxon	Common Name	Scientific Name	Status	Habitat	Not Present in Project Area; Species Eliminated from Further Consideration	Potentially present in project area; Species Eliminated from Further Consideration for Reasons Given (see numbered notes)	Potentially Present in Project Area and Potential Exposure will be Considered
Plants	Wright's trichocoronis	*Trichocoronis wrightii var. wrightii*	CRPR-2	Marshes and swamps, riparian forest, meadows and seeps, vernal pools.	X		
Reptiles	blunt-nosed leopard lizard	*Gambelia sila*	FE, SE, SFP	Resident of sparsely vegetated alkali and desert scrub habitats; seeks cover in mammal burrows, under shrubs, or structures such as fence posts	X		
Reptiles	coast horned lizard	*Phrynosoma blainvillii*	SSC	Most common in lowlands along sandy washes with scattered low bushes; open areas for sunning.	X		
Reptiles	giant gartersnake	*Thamnophis gigas*	FT, ST	Prefers freshwater marsh and low gradient streams, has adapted to drainage canals and irrigation ditches.			X
Reptiles	Northern California legless lizard	*Anniella pulchra*	SSC	Sandy or loose loamy soils under sparse vegetation.	X		
Reptiles	San Joaquin coachwhip	*Masticophis flagellum ruddocki*	SSC	Open, dry habitats with little or no tree cover; San Joaquin Valleyvalley grassland and saltbush scrub; mammal burrows for refuge and oviposition sites	X		
Reptiles	two-striped gartersnake	*Thamnophis hammondii*	SSC	Marshes, riparian, wetland; found in or near permanent fresh water; often along streams with rocky beds and riparian growth.			X
Reptiles	western pond turtle	*Actinemys marmorata*	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.			X

Sources: CNDDB, 2021; USFWS, 2021

Table B-1 Numbered Notes:

1) These species may forage for emergent aquatic insects over water. These insects may be temporarily impacted by copper. Given the large amount of potential foraging area, the emergent aquatic insects from a treated waterbody or receiving water would likely only contribute an insignificant percentage of the total diet. Therefore, no risk due to copper exposure is anticipated.
2) Species not likely to have any exposure to copper-containing prey items as its target prey base consists of terrestrial species.
3) Project activity will not affect foraging or nesting.
4) Sanford's arrowhead is not a submerged aquatic plant; therefore, exposure to copper treated water is indirect, if any. Exposure will only occur through root uptake of soil water. Copper concentration in root zone water is not expected to be sufficient to cause impair growth or cause death.

Table B-1 Status Abbreviations:

FDR - Federally Delisted (Recovered)
FE - Federally Listed as Endangered
FT - Federally Listed as Threatened
FC - Federal Candidate
ST - State Listed as Threatened
SE - State Listed as Endangered
SFP - State Fully Protected
SSC - CDFW Species of Special Concern
CRPR-1 - California Native Plant Society (CNPS) Rare Plant Rank 1, threatened or extinct in CA
CRPR-2 - CNPS Rare Plant Rank 2, rare, threatened or endangered in CA, but more common elsewhere.
CRPR-4 - CNPS Rare Plant Rank 4, plants of limited distribution

2. Species Information

Life history information for species potentially present in the project area is presented below.

2.1. Birds

Bank swallow (*Riparia riparia*)
The bank swallow is a State Threatened species. Bank swallows breed in eroded vertical banks of friable soil along ocean coasts, rivers, streams, lakes, reservoirs, and wetlands (American Ornithologists' Union, 1998 in Garrison, 1999; Cramp et al., 1988 in Garrison, 1999; Turner and Rose, 1989 in Garrison, 1999). They require vertical banks, cliffs, and bluffs in alluvial, friable soils for nesting. Bank swallows forage while flying and consume flying or jumping insects and occasionally eat terrestrial and aquatic insects or larvae (Garrison, 1999). They feed over lakes, ponds, rivers and streams, meadows, fields, pastures, and bogs. They occasionally feed over forests and woodlands (Gross, 1942 in Garrison, 1999; Stoner, 1936 in Garrison, 1999; Turner and Rose, 1989 in Garrison, 1999). During the breeding season, they generally forage within 200 meters of their nests for feeding the nestlings (Mead, 1979 in Garrison, 1999; Turner, 1980 in Garrison, 1999).

Based on 2021 CDFW surveys for bank swallow nesting habitat and the species' nesting requirements, there does not appear to be any suitable habitat within 200 meters of Districts' facilities. Application of copper-containing products to water may result in adverse impact to exposed aquatic invertebrates (e.g., juvenile aquatic insects). As a result, there may be a minor and temporary reduction in food source production immediately following application of copper-containing algaecides and/or aquatic herbicides. No impact is anticipated for insects which emerged from the water prior to the application of copper-containing products. Because bank swallow colonies are typically located in areas with sufficient insect resources (Garrison, 1999), their reproductive success is unlikely to be impacted by a small reduction in food source production following application of copper-containing algaecides or aquatic herbicides. Therefore, no risk is anticipated.

Swainson's Hawk (*Buteo swainsoni*)
Swainson's hawks forage in open stands of grass-dominated vegetation, sparse shrublands, and small, open woodlands. They have adapted well to foraging in agricultural areas (e.g., wheat and alfalfa), open grassland, and shrub steppe (Bechard et al., 2020). In Central Valley, CA, they forage in row, grain, and hay crop agriculture, particularly during and after harvest, when prey are both numerous and conspicuous. They also are attracted to flood irrigation, primarily in alfalfa fields, when prey take refuge on field margins, and to field burning, which forces prey to evacuate (J.A. Estep pers. comm. in Bechard et al., 2020). During breeding season, Swainson's hawks mainly feed on vertebrates, including mammals, birds, and reptiles (Schmutz et al., 1980 in Bechard et al., 2020; Bednarz, 1988 in Bechard et al., 2020). Invertebrates (especially grasshoppers and dragonflies) are commonly eaten at other times (McAtee, 1935 in Bechard et al., 2020; Sherrod, 1978 in Bechard et al., 2020; Jaramillo, 1993 in Bechard et al., 2020). Swainson's hawks do not prey on species likely to be exposed to herbicides in irrigation facilities, so the risk posed from algaecides and/or aquatic herbicides for the control of algae or aquatic weeds in Districts facilities is insignificant.

Tricolored blackbird (*Agelaius tricolor*)
Tricolored blackbird is a State Threatened species and Species of Special Concern. Breeding habitat of tricolored blackbirds includes large marshes (Payne, 1969 in Beedy and Hamilton, 1999). Nesting colonies are generally in emergent aquatic vegetation, but may also be found in trees along streams, weed patches, and grain and alfalfa fields, mustard, safflower, thistle, along irrigation ditches, or in trees along a river (Orians, 1960, 1961). In the Central Valley of California, breeding colonies were described where nests were placed in cattail-bulrush in dry and irrigated pasture; cattail in dry grassland, along a creek, rice and wheat fields, or dry and irrigated pasture; and in blackberry in dry grassland and along a creek (Crase and DeHaven, 1977). Tricolored blackbirds forage in cultivated row crops, orchards, vineyards, and heavily grazed rangelands, but these are considered low-quality forage habitats. High quality forage areas included irrigated pastureland, lightly grazed rangeland, dry seasonal pools, mowed alfalfa fields, feedlots, and dairies (Beedy and Hamilton, 1997 in Beedy and Hamilton, 1999). Nestling tricolored blackbirds consume 86% animal matter on a volumetric basis, 11.2% plant matter, and 2.7% grit. The animal matter was primarily insects (79% of total diet) with the majority being beetles (61% of total diet). Plant matter was split evenly between cultivated grains such as oats, wheat and miscellaneous plant matter (Crase and DeHaven, 1977).

Project activities will take place directly within Districts' facilities for the control of algae and/or aquatic weeds; they will not affect foraging or nesting habitats. Furthermore, since tricolored blackbirds are unlikely to feed directly from Districts' conveyances or facilities, they will have minimal to no exposure to copper-containing products applied. Therefore, no risk is anticipated.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
The western yellow-billed cuckoo is both Federally Threatened and State Endangered. Yellow-billed cuckoos were extirpated north of the Sacramento Valley by the 1950s. Breeding is now restricted to isolated sites in the Sacramento, Amaragosa, Kern, Santa Ana, and Colorado River valleys in California (Hughes, 1999). Western populations suffered catastrophic range reductions in the twentieth century due to loss of riparian habitat through clearing for agriculture, flood control, and urbanization. In southern California, western yellow-billed cuckoos prefer desert riparian woodlands (Hughes, 1999). Nests are commonly placed in willows, but cottonwoods are used extensively for foraging. They are also found in orchards adjacent to river bottoms for 2–3 weeks prior to breeding, then moves into riparian areas to breed. Breeding lasts from mid-May into October (Hughes, 1999). Western yellow-billed cuckoos feed primarily on large insects, such as caterpillars, katydids, cicadas, grasshoppers, and crickets, and occasionally on small frogs, arboreal lizards, and the eggs and young of birds. Fruit and seeds are rarely eaten in the summer, but more frequently in winter. They forage in open areas, woodland, orchards, and adjacent streams (Hughes, 1999). Yellow-billed cuckoos have an estimated foraging area of approximately 50 acres. Because its target prey base consists of terrestrial species, the feeding habits of the cuckoo will greatly limit its exposure to copper-containing algaecides or aquatic herbicides applied to Districts' facilities.

Yellow-Headed Blackbird (*Xanthocephalus xanthocephalus*)
The yellow-headed blackbird is a Species of Special Concern (breeding) that occurs primarily as a migrant and summer resident in California from April to early October, breeding from mid-April to late July (Twedt and Crawford, 1995 in Shuford and Gardali, 2008). Breeding habitat for yellow-headed blackbirds is largely limited to marshes with tall emergent vegetation such as cattails and bulrush (Orians and Willson, 1964 in Shuford and Gardali, 2008). During breeding, the adult diet consists primarily of insects while nestlings are fed aquatic insects such as

metamorphosized naiad and teneral damselflies (Willson, 1996). Yellow-headed blackbirds typically forage within their breeding territories if resource abundance is high, but often in agricultural fields otherwise (Shuford and Gardali, 2008). Although the project area is unlikely to serve as suitable breeding habitat, it is possible that breeding could occur in other sites near the project area. Direct application of copper-containing products to water may impact exposed aquatic invertebrates including juvenile aquatic insects and result in a minor and temporary reduction in food source production. No impact is anticipated for insects which emerged from the water prior to the application of copper-containing products. Districts facilities are unlikely to support extensive populations of aquatic insects or invertebrates due the regular maintenance activities performed during and after the irrigation season (including removal of accumulated sediment and chaining), and the intermittent/seasonal presence of water. Because of their sizeable foraging range and the fact that the project area itself likely serves as poor quality foraging ground, yellow-headed blackbirds are unlikely to be impacted by a short-term reduction in food source production following application of copper-containing algaecides or aquatic herbicides. Therefore, no risk is anticipated.

2.2. Plants

Sanford's arrowhead (*Sagittaria sanfordii*)
Sanford's arrowhead is a rhizomatous monocot that is native and endemic to California (CalFlora, 2021). It is an aquatic perennial herb that occurs in freshwater wetlands, marshes, swamps, and other assorted shallow freshwater (CNPS, 2021). Sanford's arrowhead is a member of the water plantain family; it is an obligate wetland plant. Its habitat includes the margins of wetland areas such as streams, rivers, ponds, or drainage channels. It is native to California and is endemic (limited) to California alone. It is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.2: rare, threatened, or endangered in CA and elsewhere.

Generally, copper is described as a contact herbicide because it expresses herbicidal activity only on the parts of the plant it touches. Because Sanford's arrowhead is not a submerged aquatic plant, exposure to copper will only occur through root uptake of soil water. Chloroplasts, which are responsible for carrying out the photosynthetic processes required for plant growth and survival, are the most vulnerable sites of copper toxicity (Costa et al., 2018) and are not naturally found in plant root cells. Therefore, adverse impacts to rooted, emergent vegetation such as the Sanford's arrowhead are not anticipated.

Slender-leaved pondweed (*Stuckenia filiformis ssp. alpina*)
Slender-leaved pondweed is a rhizomatous perennial monocot that is native to California and is included in the CNPS Inventory of Rare and Endangered Plants on list 2B.2: rare, threatened, or endangered in California; common elsewhere (CalFlora, 2021). It occurs as a submerged species in calcareous, saline, or brackish shallow to deep waters of slow-moving or static waterbodies like ponds, lakes, streams, ditches, drainage channels, and coastal inshore waters, typically at lower elevations (Haynes and Hellquist, 2020; Hellquist et al., 2012). In California, its blooming period spans from May to July. The entire plant with leaves, mature fruiting stems and intact fruit are needed for positive identification of the slender-leaved pondweed (New York Cultural Heritage Program, 2021). Frequently encountered pondweeds in the San Joaquin Valley similar in appearance to slender-leaved pondweed include sago pondweed (*Stuckenia pectinata*) and horned pondweed (*Zannichellia palustris*). Based on aquatic plant sampling in Districts' conveyances, it is likely that these two pondweeds and/or other aquatic plants (e.g.,

Elodea canadensis or *Egeria densa*) are the dominate species in the canals, drains and surface waterbodies in the Districts.

CNDDB data for the occurrence of slender-leaved pondweed indicates the species was encountered in 1948 within the Ingomar quadrangle in Merced County (CNDDB, 2021). The locational information was scored as "low" quality in the Calflora database due to the occurrence being from a secondary source, an herbarium specimen was non-specific description of where it was found (e.g., from a "drainage ditch" located "5 miles north of Volta") (Calflora, 2021). This notwithstanding, and because it is presumed extant, it is possible that the pondweed could be exposed to copper-treated water downstream of the project area.

Although most formulations of copper-containing algaecides and/or aquatic herbicides are regarded as ineffective for species such as pondweeds, at least one product currently registered for use in California is labeled for use as a pondweed management tool. Label language indicates that following a prolonged exposure period (i.e., at least 3 hours) variable control may be obtained for pondweed species, especially in waters with higher alkalinity (>50 mg $CaCO_3$/L) (SePRO, 2018). Based on sampling data from May 2021, the average alkalinity of waters within the project area is 105.3 mg $CaCO_3$/L. Because the slender-leaved pondweed may not be readily identifiable prior to application of copper-containing algaecides and/or aquatic herbicides and because of its susceptibility to damage from exposure to certain copper-based formulations, risk will be mitigated by restricting the discharge of treated waters within the Ingomar quad. Refer to **Mitigation Measure BIO-1** for how the Districts intend to avoid adverse impacts to slender-leaved pondweed.

2.3. Reptiles

Giant garter snake (*Thamnophis gigas*)
The giant garter snake is a State and Federally Threatened species. Giant garter snakes occur in streams and sloughs, usually with mud bottom (Stebbins, 2003 in NatureServe, 2021). One of the most aquatic of garter snakes; inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the California Central Valley (USFWS, 2016). Giant garter snake habitat consists of: 1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; 2) emergent, herbaceous wetland vegetation (e.g., cattails, bulrushes) for escape cover and foraging habitat during the active season; 3) grassy banks and openings in waterside vegetation for basking; and 4) higher elevation uplands for cover and refuge from flood waters during the snake's inactive season (USFWS, 2016). Its diet consists primarily of fish and adult and juvenile amphibians (Kucera, 2014). Their habitat requirements and feeding habits indicate giant garter snakes may consume prey items exposed to algaecides and/or aquatic herbicides applied to the irrigation conveyances. Additionally, the species could have direct exposure to treated water if Districts facilities were used for dispersal or movement during an application. Refer to **Appendix C** for a summary of exposure and risk analysis for the giant garter snake.

Two-striped gartersnake (*Thamnophis hammondii*)
The two-striped gartersnake is a California Species of Special Concern. Two-striped gartersnakes in California may show seasonal habitat differences. In summer they occupy streamside sites; in winter, they occupy nearby uplands. During the day this gartersnake often basks on streamside rocks or on densely vegetated stream banks. When disturbed it usually

retreats rapidly to water. They are a highly aquatic species and forage primarily in and along streams taking fishes, especially trout and sculpins and their eggs, and amphibians and amphibian larvae. Small mammals and invertebrates such as leeches and earthworms are also taken (Kucera, 2000). The habitat requirements and feeding habits of the gartersnake indicate that it may consume prey items exposed to copper-containing algaecides and/or aquatic herbicides applied to Districts' conveyances, as well has have direct exposure to treated water. A summary of exposure and risk analysis for the two-striped gartersnake is presented in **Appendix C**.

Western pond turtle (*Actinemys marmorata*)
The western pond turtle historically existed from Washington to British Columbia to northern Baja California, west of the Cascade-Sierra crest (Ernst et al., 1994) and is currently a California Species of Special Concern. They occupy a wide variety of wetland habitats including lakes, ponds, reservoirs, rivers and streams, stock ponds, and sewage treatment lagoons (Holland, 1994). Optimal habitat has adequate emergent basking sites, emergent vegetation, refugia in the form of banks, submerged vegetation, mud, rocks, and logs (Holland, 1994). Populations are in decline mainly due to habitat destruction. The species diet consists of a variety of food items including algae, various plants, snails, crustaceans, isopods, insects, fish, and frogs (Bury, 1986). Their habitat requirements and feeding habits indicate western pond turtle may consume prey items exposed to algaecides and/or aquatic herbicides applied to irrigation conveyances, as well has have direct exposure to treated water. Refer to **Appendix C** for a summary of exposure and risk analysis for the western pond turtle.

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Appendix C

Copper Species-Specific Risk and Ecological Toxicity Data

1. Background

1.1. Copper Exposure and Toxicity in Terrestrial Versus Aquatic Animals

Copper is a naturally occurring, essential micronutrient for all organisms. Copper homeostasis is tightly regulated through a complex system of copper transporters and chaperone proteins (Gaetke et al., 2014) and most organisms have homeostatic mechanisms to process excess copper or to manage the deficiency of copper levels (USEPA, 2009). Copper exposure in terrestrial animals such as birds, reptiles and mammals primarily occurs through dietary intake. While exposure to high levels of copper in the diet can interfere with the ability to maintain homeostasis in terrestrial animals, animals with repeated exposure to copper concentrations which do not cause irreversible adverse impacts may undergo enzymatic adaptation and ultimately develop tolerance for greater levels of exposure (USEPA, 2009).

Aquatic animals such as fish are exposed to copper through both the dietary and direct uptake routes and are more susceptible to copper-induced toxicity than terrestrial animals. Copper toxicity in fish is primarily caused by its rapid binding to the gill membranes (USEPA, 2009). Copper accumulation in this way causes damage to the gill membranes and interferes with osmoregulatory processes. When exposed to sublethal concentrations of copper, many fish and mobile aquatic invertebrates exhibit an avoidance response, preferring areas within the waterbody that have lower concentrations of dissolved copper (Folmar, 1976, 1978).

1.2. Copper Fate in Aquatic Systems and Influence on Aquatic Toxicity

When applied during algaecide and/or molluscicide treatment, copper dissipation from the water column occurs by way of multiple processes including dilution, sorption, and precipitation. Due to processes such as advection, diffusion, and dispersion and because label language prohibits application of copper-containing algaecides and aquatic pesticides to more than half of a water body, dilution is presumed to be a major dissipation process after initial application (Calomeni et al., 2017). When very small portions of water bodies are treated with copper (e.g., 3% by volume), dilution is expected to occur at a faster rate than in water bodies where large portions are treated (e.g., 50% by volume).

Copper in the water column occurs as dissolved ions and as part of inorganic and organic complexes. Unlike organic chemicals, copper does not degrade over time, instead transforming from one form to another based on environmental properties such as pH, alkalinity, temperature, ionic strength, and organic carbon content. Many such physiochemical characteristics influence copper speciation, associated bioavailability, and resultant toxicity to aquatic organisms. The form of copper most commonly associated with aquatic toxicity is the free cupric ion (Cu^{2+}) (USEPA, 2009). The likelihood and magnitude of toxicity to aquatic receptors exposed to the cupric ion is typically greater in waters characterized by low levels of hardness, pH, ionic strength, and dissolved organic carbon than in hard waters with higher pH, ionic strength, and dissolved organic carbon. Copper bioavailability in water is also influenced by the presence of biotic ligands such as algae and the gill membranes of fish. When used as an algaecide, application to water containing higher density algae blooms is associated with lower bioavailability and risk of copper toxicity to non-target aquatic receptors than application to water containing lower density algae blooms (Franklin et al., 2002).

2. Risk Assessment Process Overview

For contaminants frequently considered in ecological risk assessments, regulatory agencies, such as USEPA, a risk quotient (RQ) is often calculated as a method to identify high- or low-risk scenarios. The RQ is calculated by comparing the estimated exposure concentration (EEC) with the concentration associated with a toxicity endpoint. Toxicity endpoints routinely used by USEPA (2020) in calculating RQs for screening-level risk assessments for animals include the median lethal dose (LD50), median lethal concentration (LC50), or median effect concentration (EC50) for acute assessments and the No Observed Adverse Effect Level (NOAEL) or Concentration (NOAEC) for chronic assessments.

Risk Quotient (RQ) = Exposure / Toxicity

Once an RQ is calculated, it is compared to the Level of Concern (LOC) to determine whether an adverse effect for a given species is likely to occur. Risk is present when the RQ exceeds the LOC. Exposure is not considered to pose a risk when the RQ is lower than the LOC. USEPA (2020) uses the following LOCs for endangered animal species in regulatory decision-making:

- Terrestrial animal (birds and mammals) acute risk LOC = 0.1
- Terrestrial animal (birds and mammals) chronic risk LOC = 1.0
- Aquatic animal acute risk LOC = 0.05
- Aquatic animal chronic risk LOC = 1.0

Specific details regarding the estimation of risk in the giant gartersnake, two-striped gartersnake, and western pond turtle from exposure to water following application of copper-containing algaecides and/or aquatic herbicides in District conveyances are presented below.

2.1. Giant Gartersnake, Two-Striped Gartersnake, and Western Pond Turtle Risk Estimation

For many pesticides, there are limited to no toxicity data available for various taxonomic groups. For example, database and literature searches for copper toxicity testing of reptiles did not yield any useable studies. As a result, avian (bird) toxicity endpoints were used in place of specific toxicity values for reptile species. The uncertainty involved with using avian endpoint data to estimate risk to a reptile species does not require the application of an additional safety factor (USEPA, 2004). The endpoints used to estimate risk of copper to the giant gartersnake, two-striped gartersnake, and western pond turtle were found in USEPA's (2019) OPP database (**Table C-1**). The most sensitive acute endpoint for birds was 357.9 mg copper sulfate pentahydrate/kg body weight, equal to approximately 91.1 mg metallic copper/kg body weight.

Table C-1. Copper Avian Oral Toxicity Studies Considered

Species	A.I. (Purity)	Study Duration	LD50 (mg A.I./kg-bw)	LD50 (mg Cu/kg-bw)
Bobwhite quail (*Colinus virginianus*)	Copper citrate (5.03%)	14 d	2,236	242.1
Bobwhite quail (*Colinus virginianus*)	Copper sulfate, pentahydrate (99%)	14 d	368	93.7
Bobwhite quail (*Colinus virginianus*)	**Copper sulfate, pentahydrate (99%)**	**14 d**	**357.9**	**91.1**
Mallard duck (*Anas platyrhynchos*)	Copper triethanolamine formulation (54.8%)	NR	> 2000	> 603.1

General Notes: Data obtained from USEPA (2019). The bolded study was used to derive a reptilian endpoint for risk assessment.
Abbreviations: A.I. - Active ingredient (A.I.), Median lethal dose (LD50), Not reported (NR)

In this assessment, only oral exposure was considered for the giant gartersnake, two-striped gartersnake, and western pond turtle because little or no dermal and inhalation toxicity data exist for ecological receptors. Therefore, the sole exposure pathway that could be evaluated in the assessment of risk for these receptors is through oral exposure. The giant gartersnake, two-striped gartersnake, and western pond turtle were assumed to eat and drink solely from copper-treated water in the District's conveyance system.

Aquatic prey items were assumed to bioaccumulate copper following application of copper-containing algaecides and/or aquatic herbicides. Aquatic prey items were assumed to be exposed to a static water body treated at a rate of 1 mg copper/L for 24 hours. Copper dissipation was assumed not to occur.

The rate and magnitude of copper bioaccumulation in organisms varies between species based on factors such as metabolic need, feeding mode, and exposure concentration and duration. Similarly, the bioavailability of copper compounds in treated water and subsequently accumulated within exposed receptors varies widely based on the species and exposure conditions (USEPA, 2007). Examples of the differential bioaccumulation patterns in a variety of ecological receptors are provided later in this appendix.

Biomagnification (i.e., transfer of copper from lower trophic levels to higher trophic levels within a food web) was presumed to occur when copper-exposed fish were consumed by predators such as the snake and the turtle. Per USEPA (2007), inorganic metal compounds rarely biomagnify across three or more trophic levels. Due to the relatively small number of metals and predator-prey relationships evaluated in the literature, in addition to the site-specific nature of copper bioavailability, the ability to make generalizations regarding anticipated toxicity resulting from dietary exposure to copper is limited (USEPA, 2007) and a simplified approach was used for this assessment.

The juvenile common carp (*Cyprinus carpio*) was used to represent fish and other aquatic prey items potentially exposed to copper via uptake of treated water in the treated water body. Whole body bioaccumulation patterns in the common carp were estimated based on data provided by Delahaut et al. (2020). Aquatic prey items were assumed to be exposed to a constant concentration of copper equal to the application rate for the duration of the exposure scenario without consideration of copper dissipation from the water column.

A standard food intake factor (multiplier used to calculate food intake based on metabolic rate, dietary preferences, and metabolizable energy content of the diet) and water intake rate multiplier used to water intake based on metabolic need and body weight) were used to estimate the amount of copper the snakes or turtle might consume by feeding on aquatic prey items such as fish and drinking copper-treated water. Due to the limited availability of data on body weight of the two-striped gartersnake, the body weight of the common garter snake was used as a surrogate in the calculation of food and water intake rates.

All food items were assumed to be consumed within the treatment area. The food intake rate used in exposure calculations was approximately 4.4 grams of dry weight per day for the giant gartersnake, 1.2 grams of dry weight per day for the two-striped gartersnake, and 4.2 grams of dry weight per day for the western pond turtle. The methodology for estimating these values was provided by Nagy (2001).

The methodology for estimating water intake rates is contained in USEPA's (1993) Wildlife Exposure Factors Handbook. The concentration of copper in drinking water was assumed to be equal to the application rate, and water intake was assumed to occur only within the treatment area. The water intake rate used for exposure calculations in the current assessment was approximately 0.040 liters per day for the giant gartersnake, 0.017 liters per day for the two-striped gartersnake, and 0.044 liters per day for the western pond turtle.

Daily copper exposure was estimated using the sum of exposure via consumption of aquatic prey items exposed to copper and via consumption of copper-treated drinking water. Exposure was divided by the lowest LD50 to calculate an RQ which was subsequently compared to the LOC to assess the extent of risk.

Application of copper-containing algaecides at the maximum label application rate (1 mg/L) was estimated to result in the accumulation of approximately 37.1 milligrams of copper per kilogram dry weight of aquatic prey item based on a 24-hour (acute) exposure period. After incorporation of food and water intake rates normalized to body weight, daily exposure to copper was estimated to be approximately 0.36, 0.41, and 0.31 milligrams of copper per kilogram body weight per day for the giant gartersnake, two-striped gartersnake, and western pond turtle, respectively, resulting in an RQ of approximately 0.004, 0.005, and 0.003, respectively. Because none of the RQs exceed the acute threatened or endangered species LOC for terrestrial animals of 0.1, copper applied to District conveyances for algae control does not appear to pose acute risk to the giant gartersnake, two-striped gartersnake, or western pond turtle.

In support of these findings, the California Department of Fish and Game (now "Wildlife") conducted a study on the effects of oral and dermal exposure to copper (ethylenediamine complex) on two species of garter snakes and did not observe and acute adverse effects (CDFG, 2004).

3. Summary of Bioaccumulation Studies

Edwards et al., 1998
The uptake of copper in common nettle (*Urtica dioica*) and earthworms (*Eisenia fetida*) from a contaminated dredge spoil was measured. In the aerial portions of the common nettle, the biological absorption coefficient (concentration in plant tissue ÷ concentration in soil) was 0.072

to 0.265. In root tissue, the biological absorption coefficient was 0.075 to 0.303. To determine the uptake of copper in earthworms, contaminated soil was brought into the laboratory and earthworms introduced for 28 days. Soil copper levels were 16 times higher in the contaminated soil than in control soil, but the concentrations in the earthworms only differed by 2.6 times. The earthworms did absorb copper from the contaminated soils, but not to an extent reflecting the level of contamination.

Gintenreiter et al., 1993
Copper concentrations in the tissues of the gypsy moth (*Lymantria dispar*) increased from earlier to later developmental stages, but the trend was not smooth. Fourth instars showed a decrease when compared to 3rd instars, and adults had lower concentrations than pupae. Concentration factors were 2 to 5. Copper concentrations were passed from one generation to the next.

Gomot and Pihan, 1997
Bioconcentration of copper was evaluated in two subspecies of terrestrial snails, *Helix aspersa aspersa* and *Helix aspersa maxima*. These snails showed a tendency to accumulate copper in excess of the amount available from its diet. The subspecies exhibited different bioconcentration factors for different tissues. For the foot, *H.a. aspersa* had factors ranging from 2.3 to 13.2, whereas *H.a. maxima* had factors ranging from 1.7 to 10.2. For the viscera, *H.a. aspersa* had factors ranging from 2.1 to 9.1, whereas *H.a. maxima* had factors ranging from 1.9 to 9.0. Differences in the bioconcentration factor appear to be more related to the other components of the diet, not the copper concentration in the diet.

Gomot de Vaufleury and Pihan, 2000
Copper concentrations were measured in terrestrial snails (*Helix aspersa*). Differences were demonstrated among laboratory and field values. However, no soil or vegetation samples for the laboratory and field sites were analyzed for copper, so it is not possible to determine whether copper was accumulated at rates above background or whether they reflect some fraction of background levels.

Han et al., 1996
Shellfish accumulated copper in natural and aquaculture ponds in Taiwan. The sediments in the aquaculture ponds were finer grain and contained 4X concentrations of copper. Five mollusks were collected, but only purple clams (*Hiatula diphos*) and hard clams (*Meretrix lusoria*) were collected from both environments. The relative accumulation in each environment did not show a consistent pattern for both species indicating that the concentration in the shellfish was not controlled only by total copper concentrations in the sediments.

Haritonidis and Malea, 1999
Copper concentrations in green algae (*Ulva rigida*) (2.2 ± 0.2 µg/g dry weight) collected from Thermaikos Gulf, Greece were less than seawater concentrations (1.5 ± 0.08 µg/L) and sediment (2.7 ± 0.5 µg/g dry weight). This suggests that copper will not bioconcentrate in algae.

Harrahy and Clements, 1997
Bioaccumulation factors were calculated for the benthic invertebrate, *Chironomus tentans*, to be 16.63 and 12.99 during two uptake tests. However, depuration was rapid. Copper concentrations were similar to background within four days. The authors caution that the

bioaccumulation factors presented may be related to bioavailability that is driven by sediment characteristics.

Hendriks et al., 1998
Bioaccumulation ratios were determined for zebra mussels (*Dreissena polymorpha*), a freshwater aquatic species, from the Rhine-Meuse Delta in the Netherlands. For copper, the ratio between mussels and suspended solids was 0.31 indicating tissue concentrations did not exceed environmental concentrations and that copper had not bioaccumulated

Janssen and Hogervorst, 1993
Concentration factors were calculated for nine terrestrial arthropod species inhabiting the forest litter layer in a clean reference site and a polluted site in the Netherlands: pseudoscorpion (*Neobisium muscorum*), harvestman (*Paroligolophus agrestis*), carabids (*Notiophilus biguttatus* and *Calathus melanocephalus*), mites (*Pergamasus crassipes*, *P. robustus*, and *Platynothrus peltifer*), dipluran (*Campodea staphylinus*), and collembolan (*Orchesella cincta*). No significant differences in copper accumulation were observed between the sites.

Khan et al., 1989
Bioconcentration factors in grass shrimp (*Palaemonetes pugio*), an aquatic species, were determined for two populations, one from an industrialized site and another from a relatively pristine site. Levels of copper measured in shrimp from the industrialized site were greater than from the pristine site, but the industrialized site showed a concentration factor of 0.07, whereas the pristine site showed a concentration factor of 1.1 when compared to sediment concentrations.

Marinussen et al., 1997a
Earthworms (*Dendrobaena veneta*) were exposed to soils containing various levels of copper. Earthworm tissue concentrations increased proportionally to the soil copper concentrations up to 150 ppm. Above 150 ppm in the soils, tissue concentrations leveled off at about 60 ppm.

Marinussen et al., 1997b
Soil, containing 815 ± 117 ppm Cu, was collected from a contaminated site in the Netherlands. Earthworms (*Dendrobaena veneta*) were introduced to the soil in the laboratory. Earthworms appeared to reach equilibrium with the soil exhibiting tissue concentrations of *c.* 60 ppm through 56 days of exposure. At 112 days exposure, the tissue concentrations increased to *c.* 120 ppm. The authors did not have an explanation for this anomaly. After being transferred to uncontaminated soil, the earthworms eliminated the copper according to a two-compartment model with the half-life times being, $t_{1/2\text{-}1}$ = 0.36 d and $t_{1/2\text{-}2}$ = 37 d.

Morgan and Morgan, 1990
Earthworms (Lumbricus rubellus) were collected from an uncontaminated site and four metalliferous mine sites. Copper concentrations in soil and in tissues were measured. The worms were held under clean conditions to allow eliminate soil from their alimentary canal. The concentrations of copper in earthworm tissues reflected the concentrations in the soil. The authors conclude that there was no evidence that copper was sequestered in earthworms.

Morgan and Morgan, 1999
Copper concentrations in earthworm (*Aporrectodea caliginosa* and *Lumbricus rubellus*) tissue were lower than in their ingesta. This suggests that copper does not bioaccumulate in earthworms.

Neuhauser et al., 1995
Overall, copper did not bioconcentrate in earthworm in contaminated soil, but showed a slight tendency to bioconcentrate when soil copper concentrations were low.

Pyatt et al., 1997
Appreciable concentrations (0.3 – 4.6%) of copper were measured in all tissues of the freshwater snail (*Lymnaea stagnalis*), whereas no measurable quantities of copper were found in food or water. The authors conclude that bioaccumulation occurred.

Svendsen and Weeks, 1997a, 1997b
There is an inverse relationship between the bioconcentration factors and soil concentrations under laboratory conditions for the earthworm *Eisenia andrei* and under field conditions for the earthworm *Lumbricus rubellus*. Bioconcentration factors ranged from 4.0 using control soil and 0.30 using soil amended with 339 ppm copper under laboratory conditions. Bioconcentration factors in the field ranged from 4.1 under control conditions to 0.4 when the soil plots contained 231 ppm copper.

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Appendix D

Copper Speciation Graphs from the Biotic Ligand Model

1. Biotic Ligand Model Copper Speciation Graphs for Varying Water Parameters

In addition to using a hardness-based equation to quantify water quality criteria or receiving water limits, the USEPA suggests the use of another model, described below, to analyze and/or predict toxicity of bioavailable copper in the water column. In the 2007 revision of Aquatic Life Ambient Freshwater Quality Criteria-Copper (USEPA, 2007), the USEPA recommended the Biotic Ligand Model (BLM) as a more accurate approach for assessing toxicity and deriving freshwater quality criteria for copper. The BLM supplements USEPA's previously published recommendation of using the hardness-based estimation and better accounts for the reduction in copper bioavailability that results from competitive binding of copper to other molecules in the water column.

The BLM was developed to predict copper toxicity to aquatic organisms in relation to water quality parameters including pH, hardness, alkalinity, and dissolved organic carbon (DOC). According to the BLM, copper bioavailability is strongly influenced by these parameters. The free cupric ion (Cu^{2+}) is the primary driver of copper bioavailability and toxicity in aquatic ecosystems (USEPA, 2007).

In order to derive freshwater quality criterion for copper, the BLM uses ten water quality inputs: temperature; pH; dissolved organic carbon (DOC); major cations including calcium (Ca), magnesium (Mg), sodium (Na), potassium (K); major anions including sulfate (SO_4), chloride (Cl); and alkalinity. Copper may be measured for comparison with site-specific criteria, but it is not required as an input to the model to determine copper freshwater quality criteria. The BLM-based water quality criterion for copper may be more or less stringent than the hardness-based criteria depending on the water quality parameters. However, it is more accurate than hardness-based criteria because it is based on copper bioavailability to aquatic species.

The BLM may also be used to predict copper toxicity and speciation in varying water conditions. When the model is run in toxicity prediction mode, it predicts the concentration of dissolved copper that produces a particular endpoint (e.g., LC50, EC50, EC20) for the selected aquatic species. When run in speciation prediction mode, the model can determine the various forms (e.g., $CuCO_3$, Cu^{2+}, copper bound to DOC) and concentrations of copper in the water when known copper concentration in water is input in the model.

Using the Biotic Ligand Model in copper speciation prediction mode, a total of 27 graphs have been generated to illustrate how variations in water quality parameters including pH, alkalinity, and dissolved organic carbon (DOC) influence the concentration of bioavailable Cu^{2+}. See **Table D-1** and **Graph 1** through **Graph 27** below. Generally, an increase in one or more of the three water parameters lowers the concentration of the Cu^{2+} species, thereby lowering the bioavailability of copper.

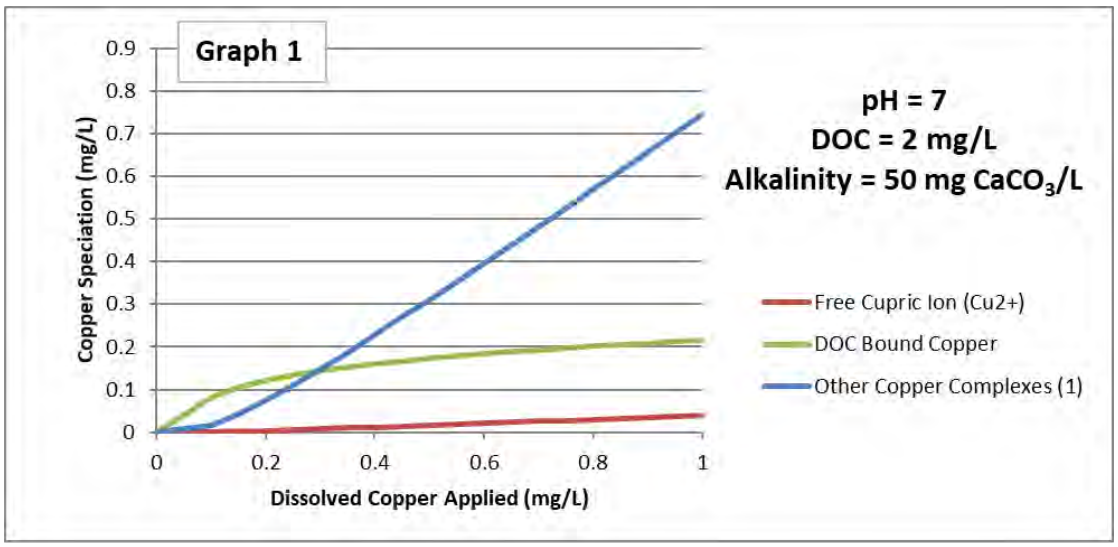
Copper speciation trends most applicable to water in Henry Miller Reclamation District and Central California Irrigation District facilities are illustrated in **Graphs 6, 13, 14, and 15** .

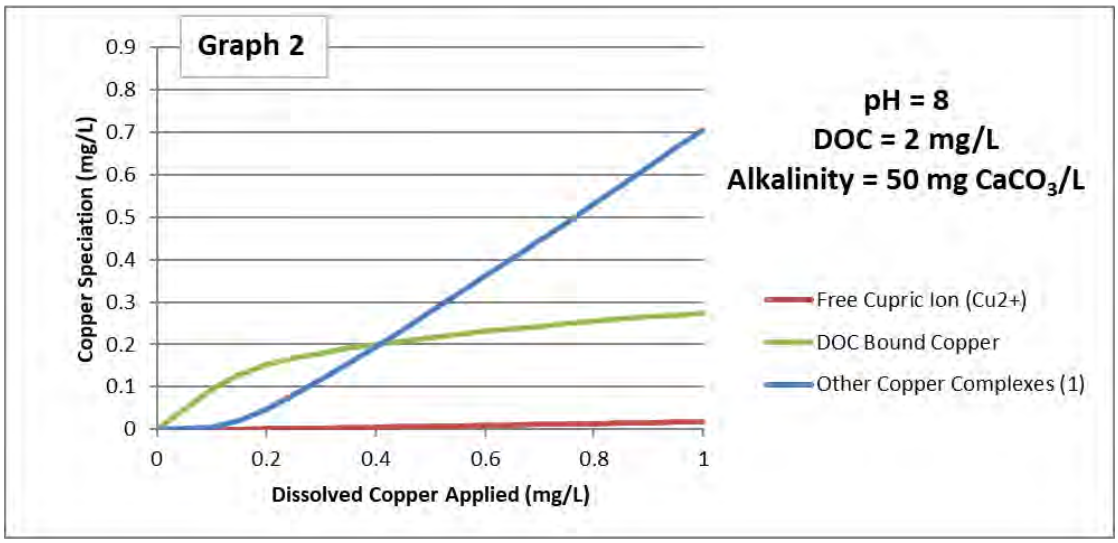
Table D-1. BLM Input Parameters Used to Generate Graphs 1-27

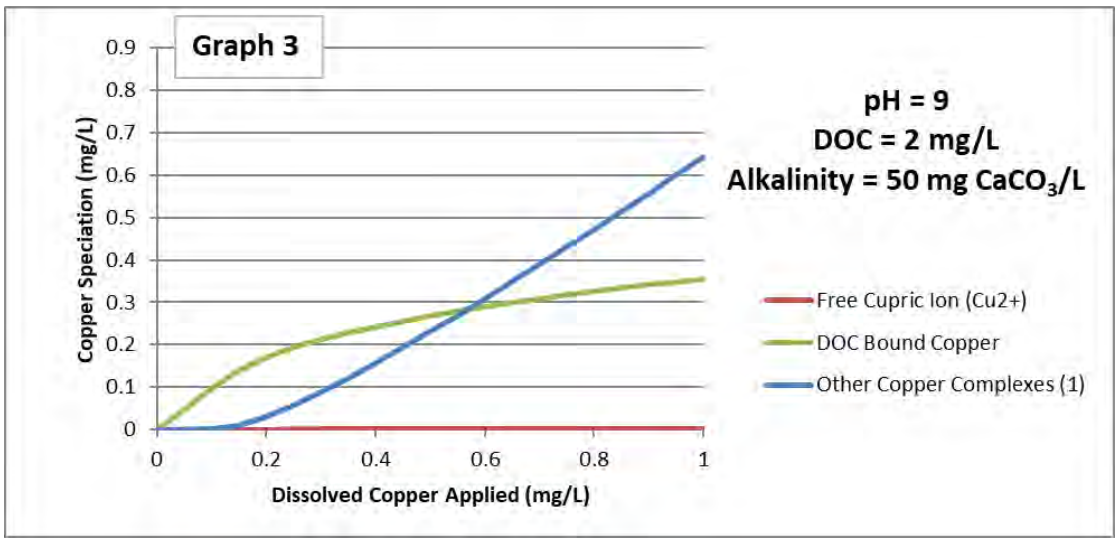
Graph #	DOC (mg/L)	pH	Alkalinity (mg $CaCO_3$/L)
1	2	7	50
2	2	8	50
3	2	9	50
4	2	7	100
5	2	8	100
6	2	9	100
7	2	7	200
8	2	8	200
9	2	9	200
10	4	7	50
11	4	8	50
12	4	9	50
13	4	7	100
14	4	8	100
15	4	9	100
16	4	7	200
17	4	8	200
18	4	9	200
19	6	7	50
20	6	8	50
21	6	9	50
22	6	7	100
23	6	8	100
24	6	9	100
25	6	7	200
26	6	8	200
27	6	9	200

General Notes:

1) Copper speciation was modeled using Biotic Ligand Model (BLM) software, version 3.41.2.45 (see https://www.windwardenv.com/biotic-ligand-model/).
2) DOC is the dissolved organic carbon capable of complexing with copper cations, rendering them non-bioavailable. The humic acid content of DOC was assumed to be 10% consistent with guidance provided in the BLM User's Guide.
3) Temperature was assumed to be 25°C. Hardness and alkalinity, both expressed as $CaCO_3$, were assumed equal. Calcium concentration inputs were estimated based on assumed hardness. All other parameter inputs (Mg, Na, K, SO_4, Cl, and S) were assumed to be negligible (1.00E-15 mg/L).

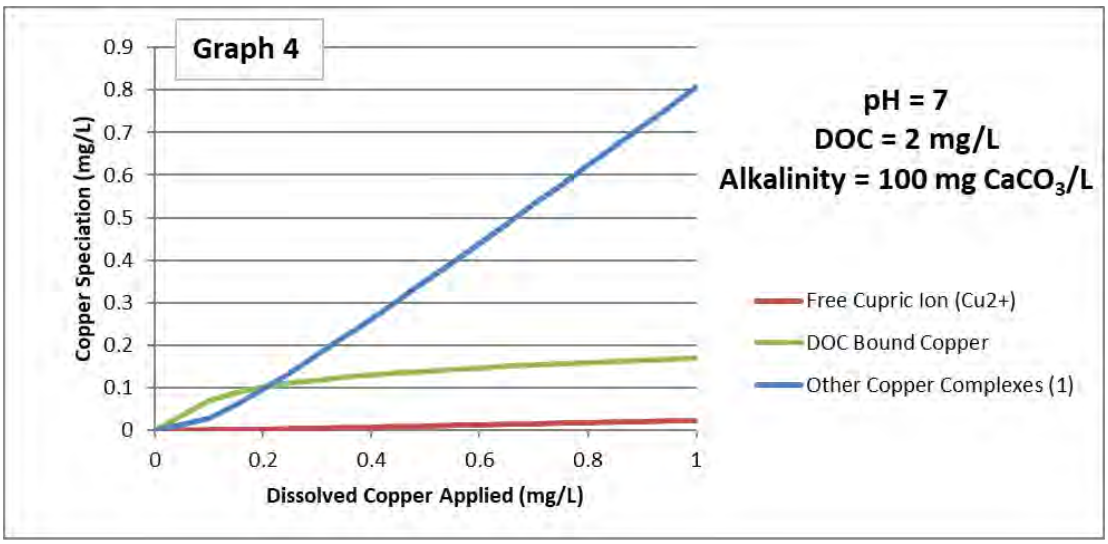


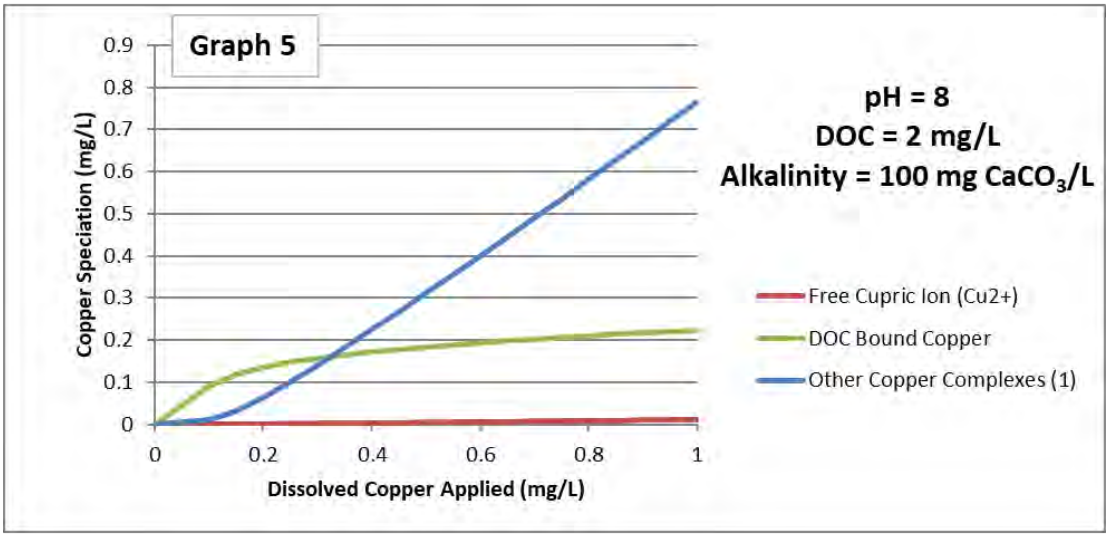


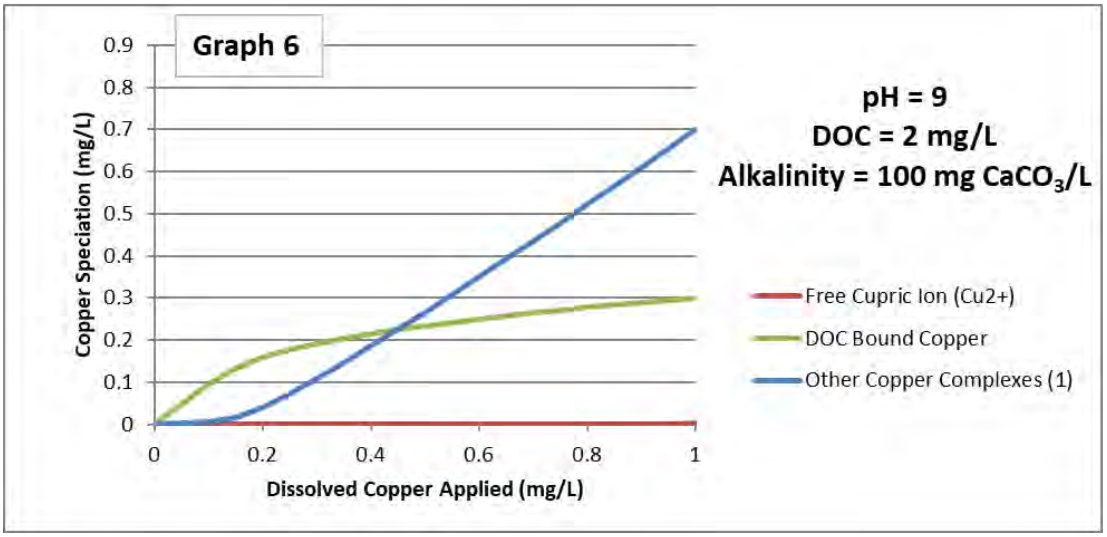


Notes:

1) "Other Copper Complexes" is the copper not accounted for by "Free Cupric Ion" and "DOC Bound Copper" species. It exists as various copper-ligands and/or copper salts, including but not limited to: $CuCO_3$, $CuHCO^{3+}$, and $Cu(OH)_2$.







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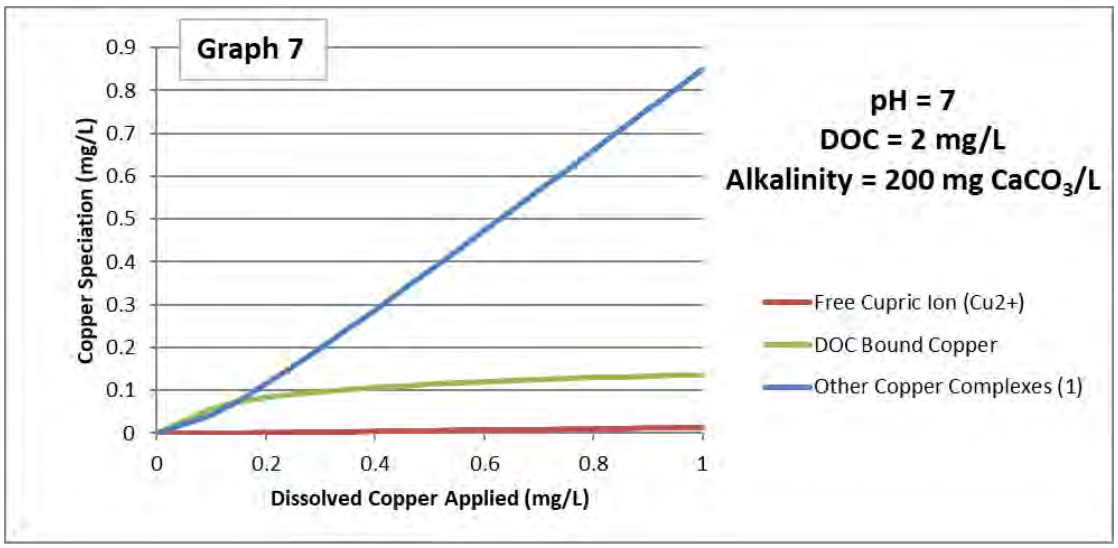

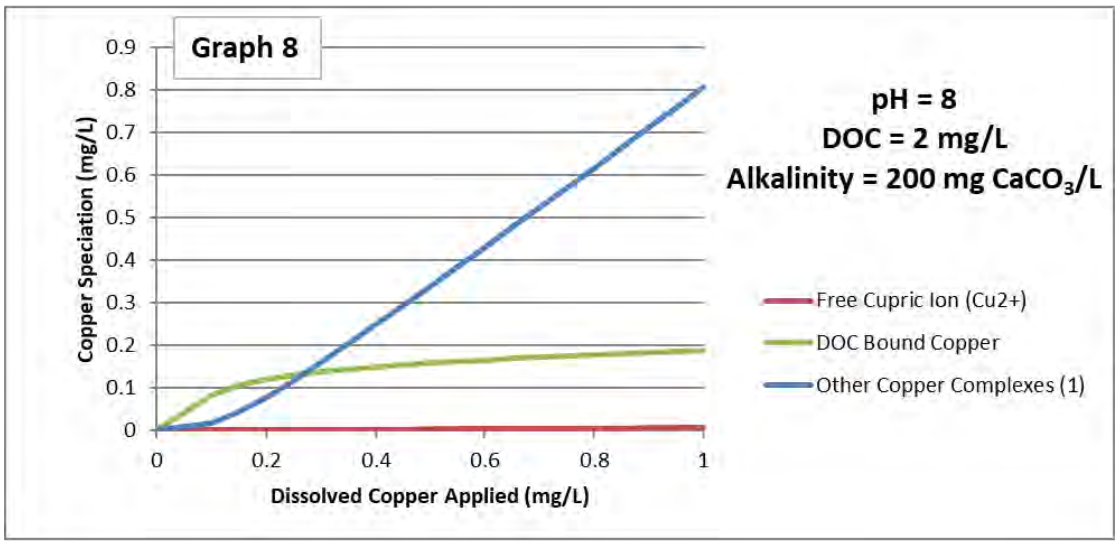

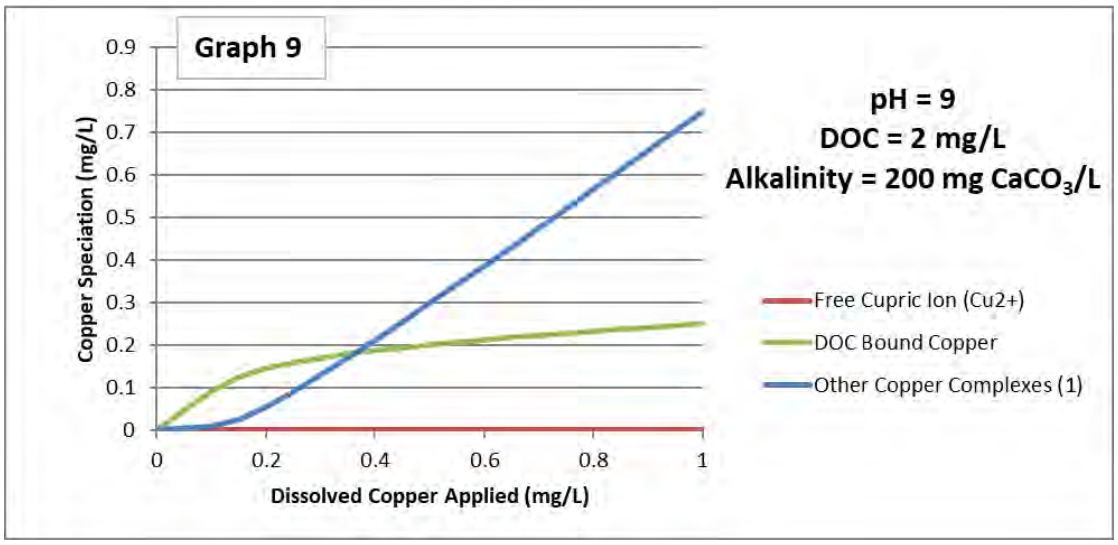

Notes:

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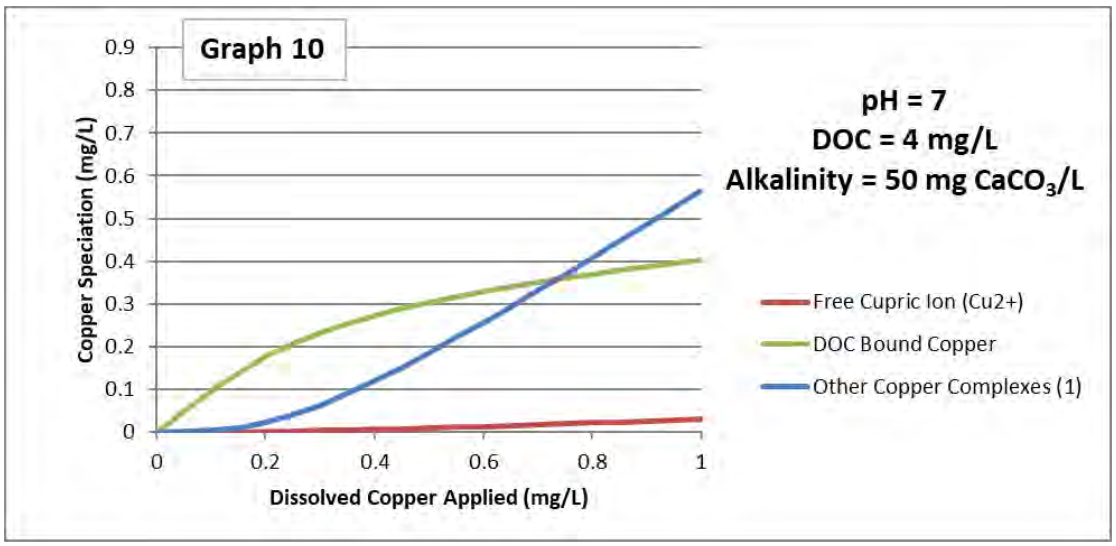

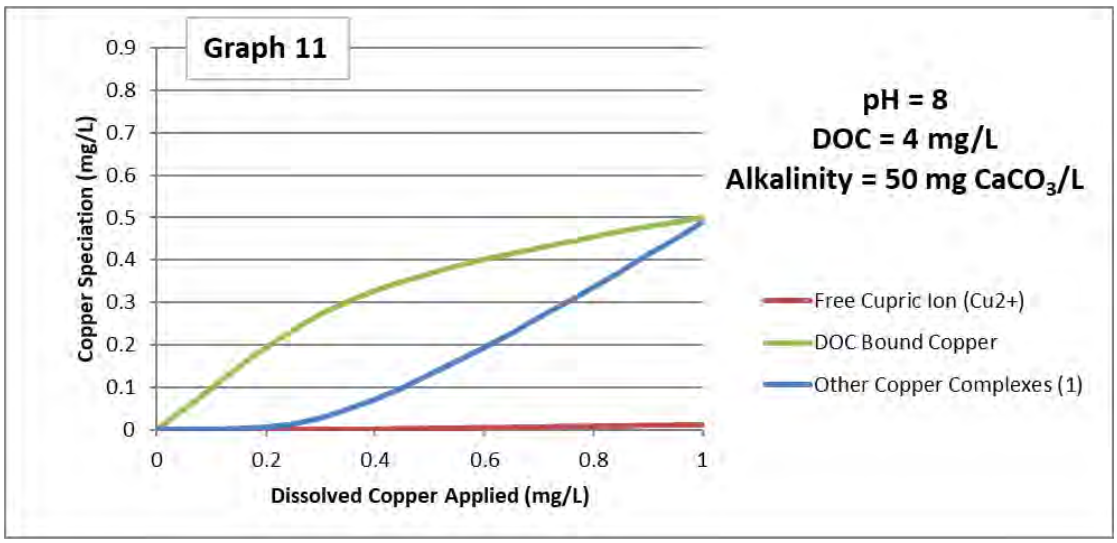

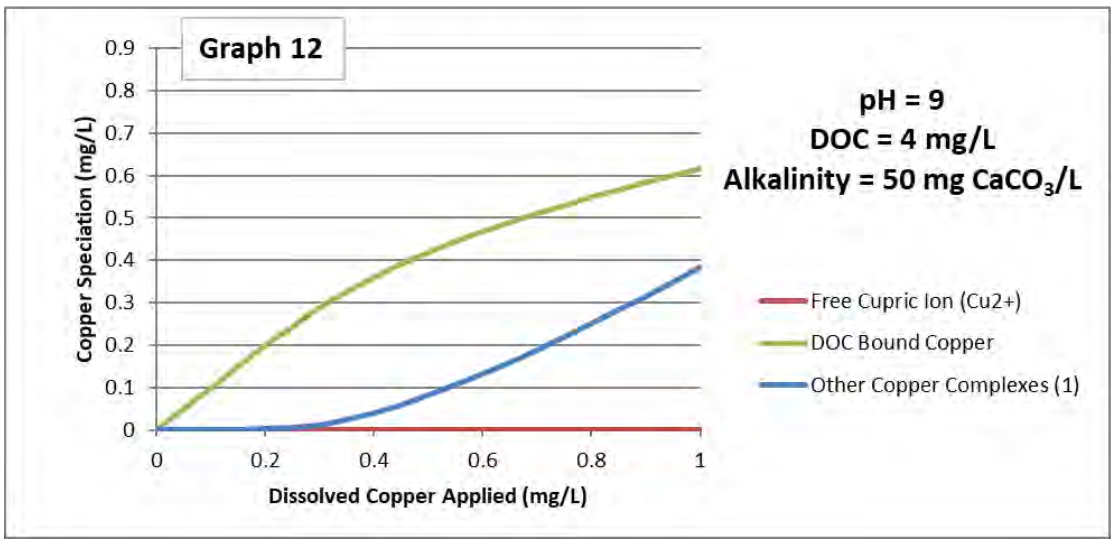

Notes:

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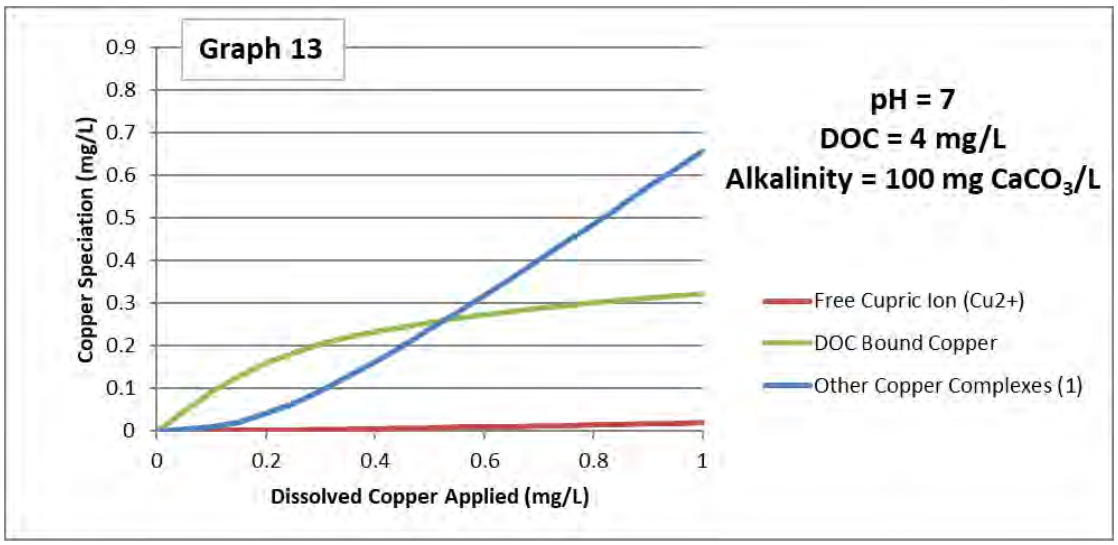

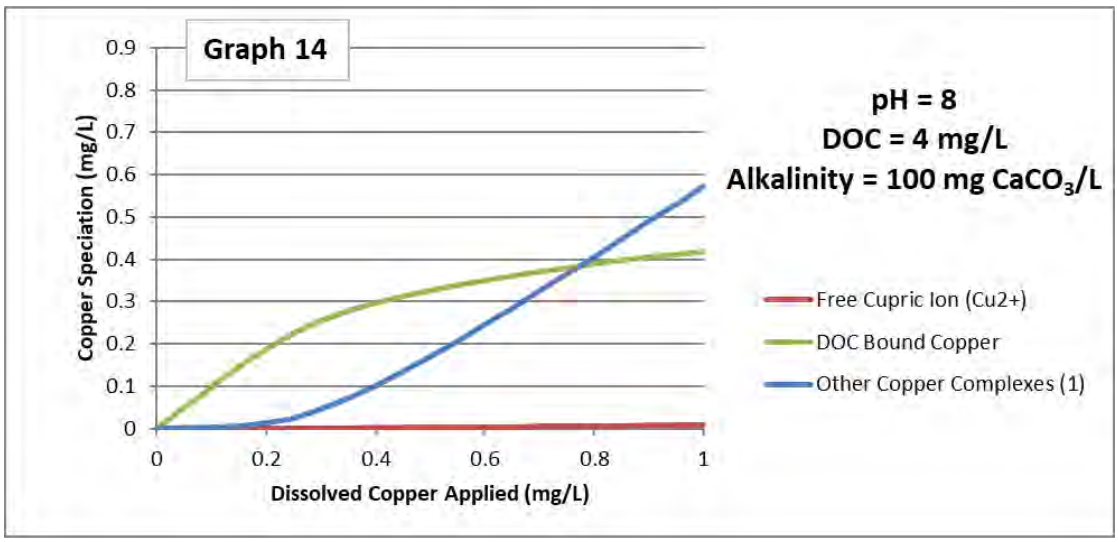

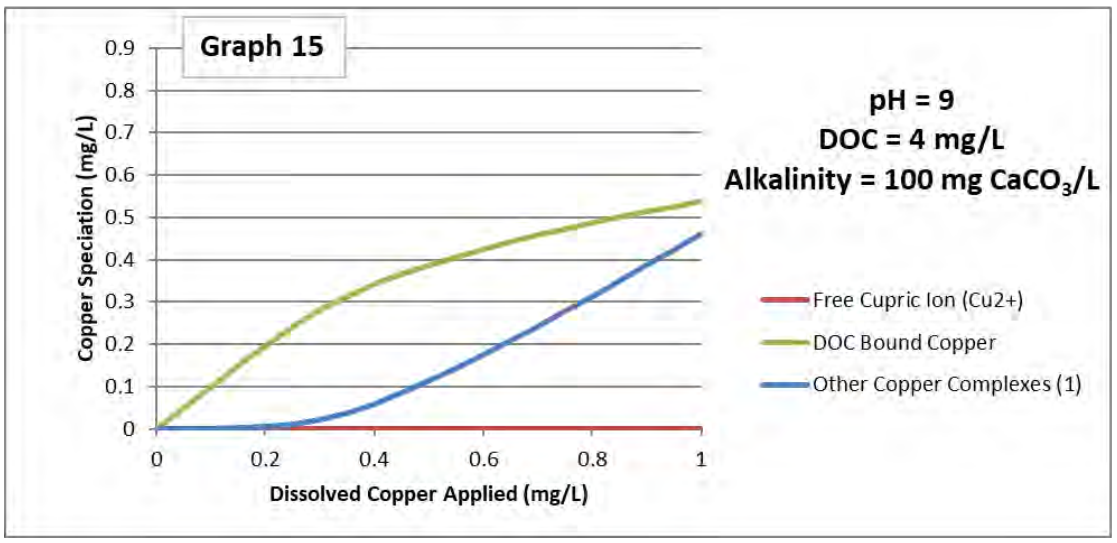

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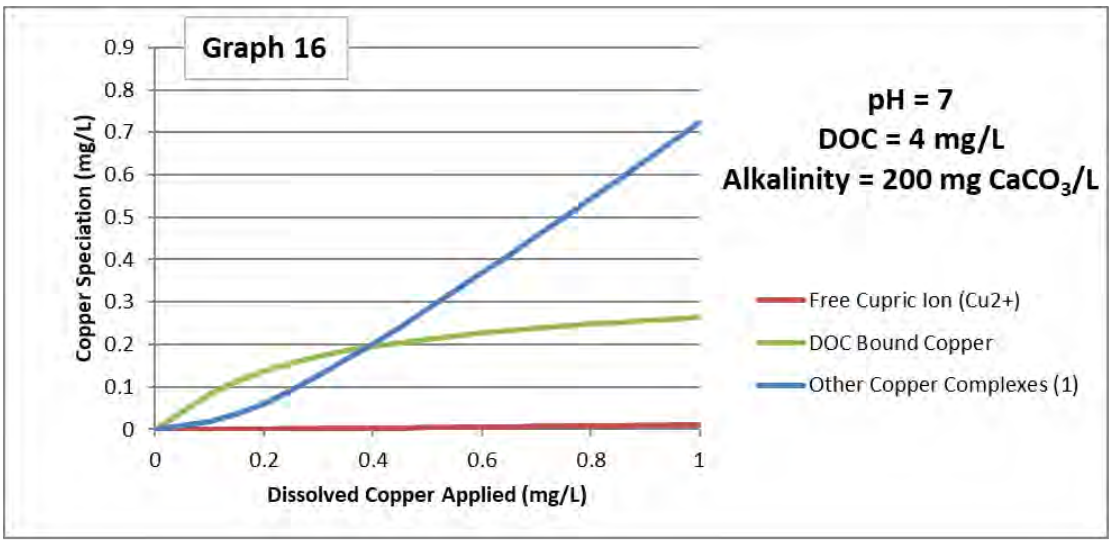

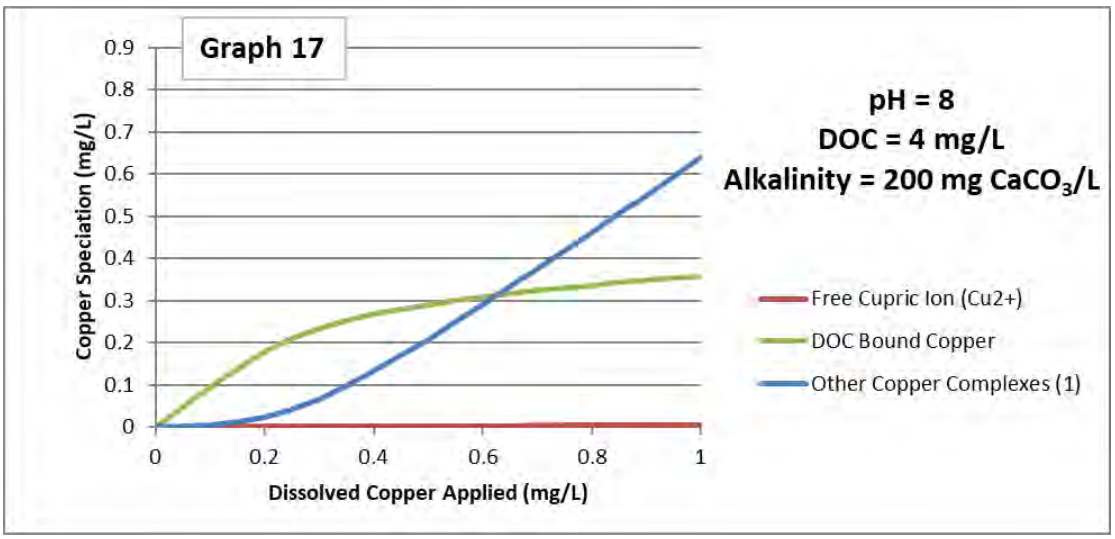

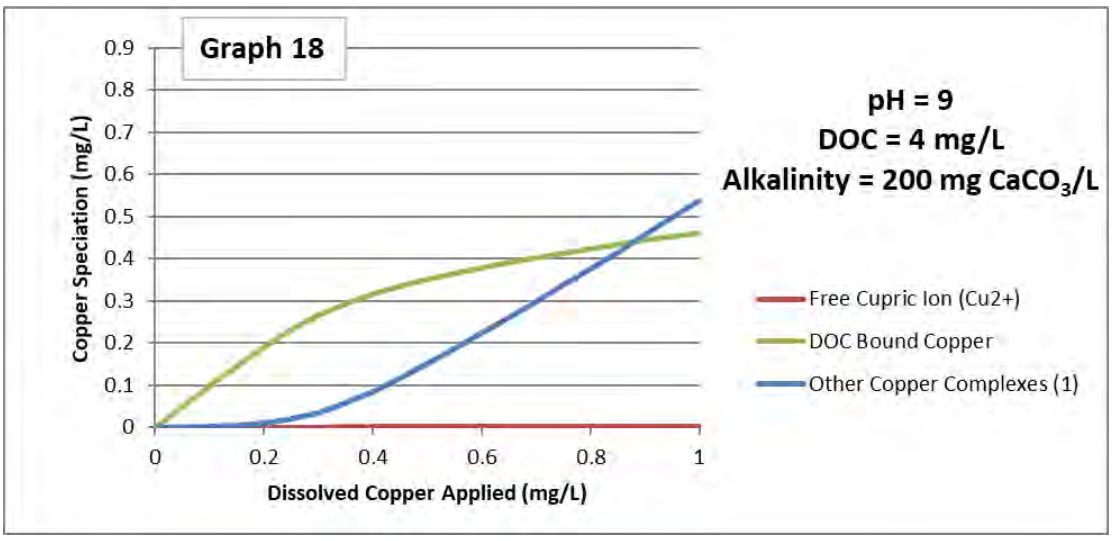

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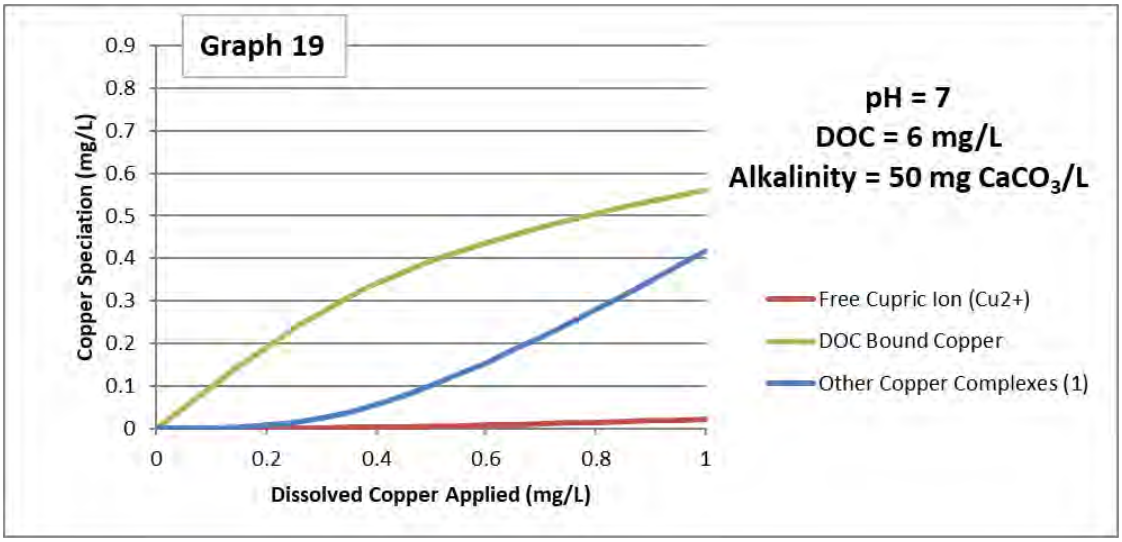

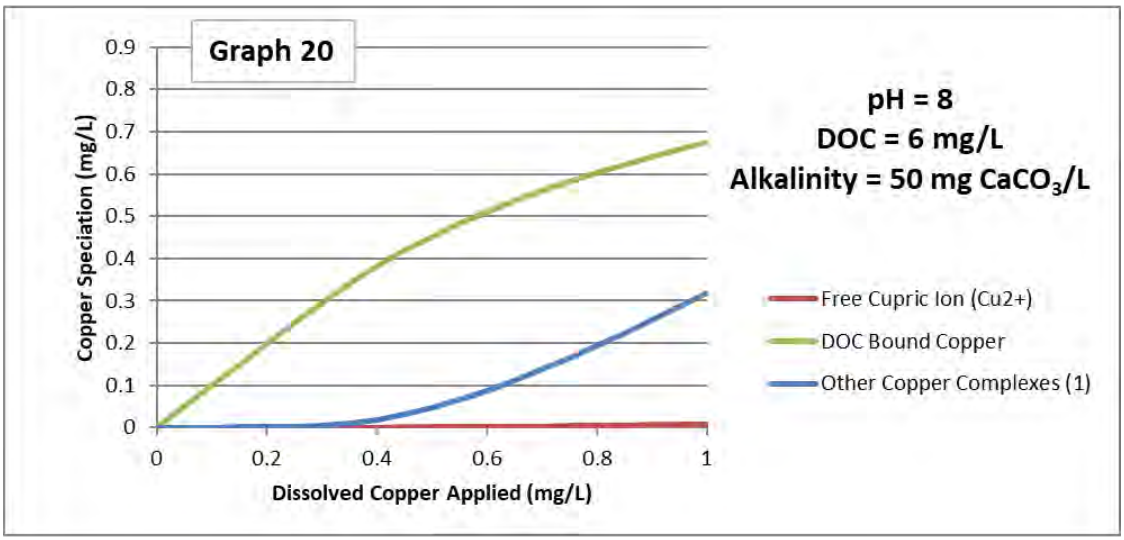

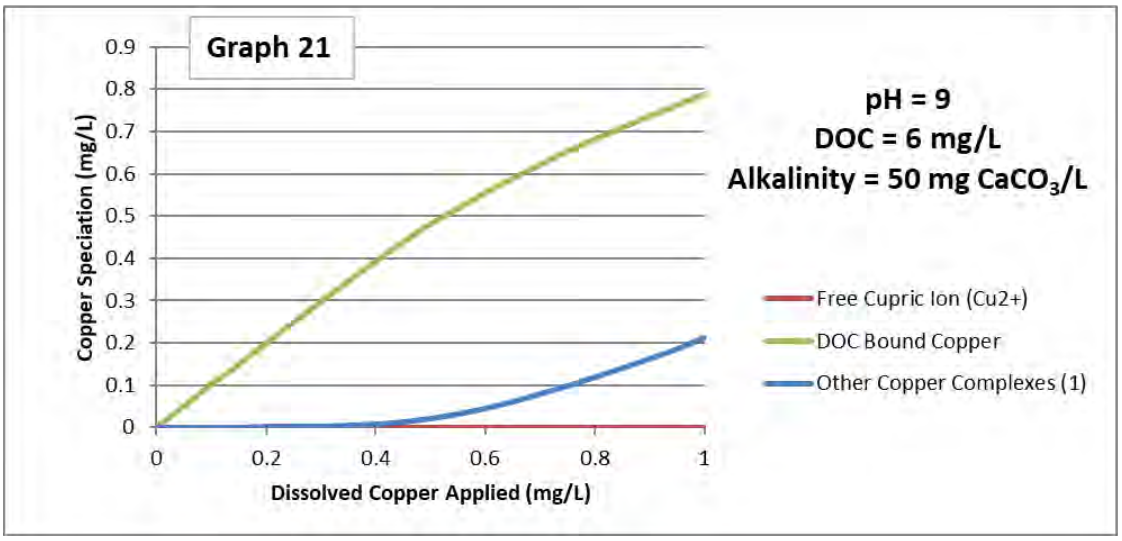

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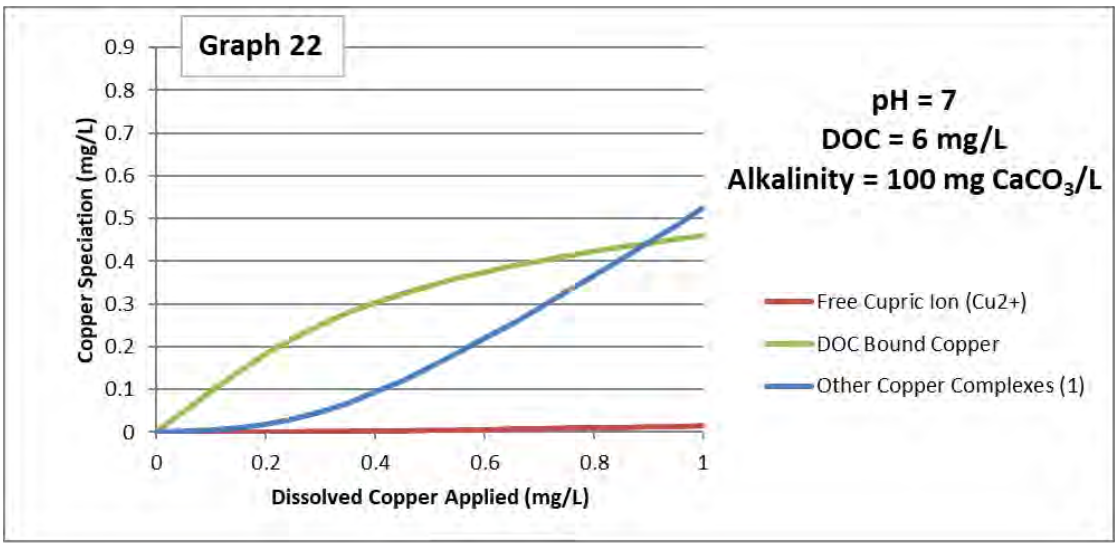

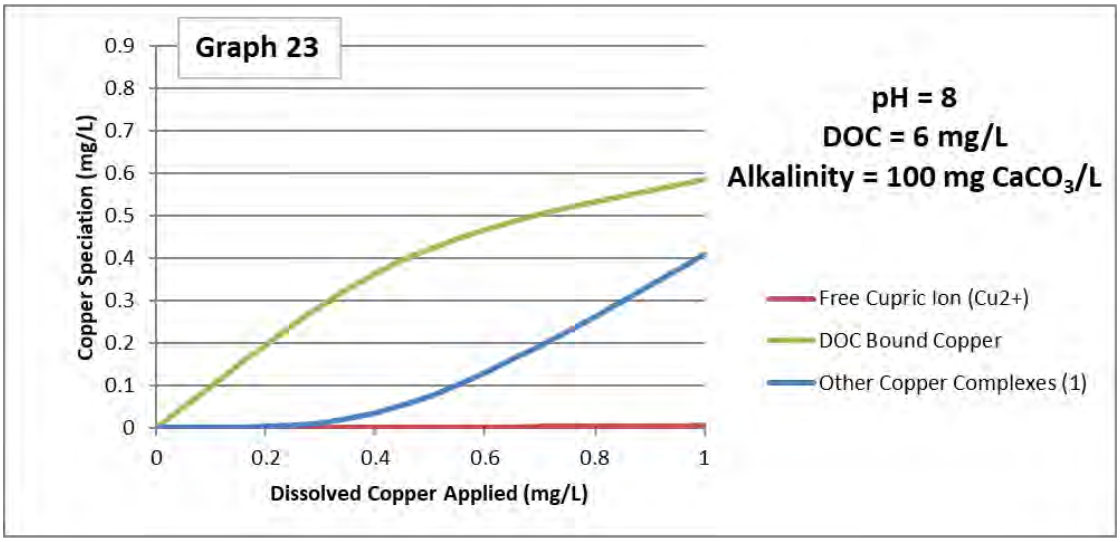

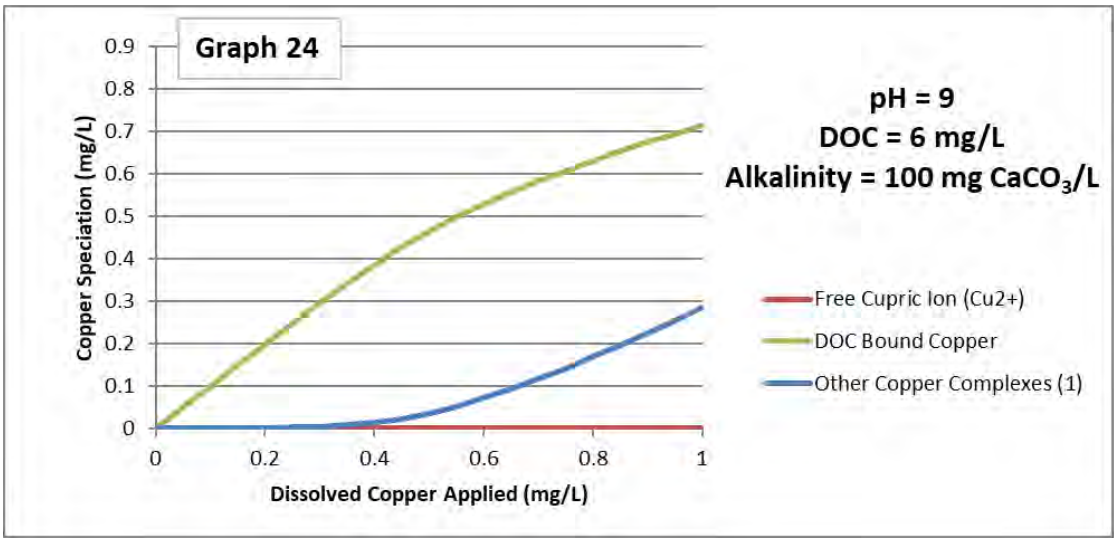

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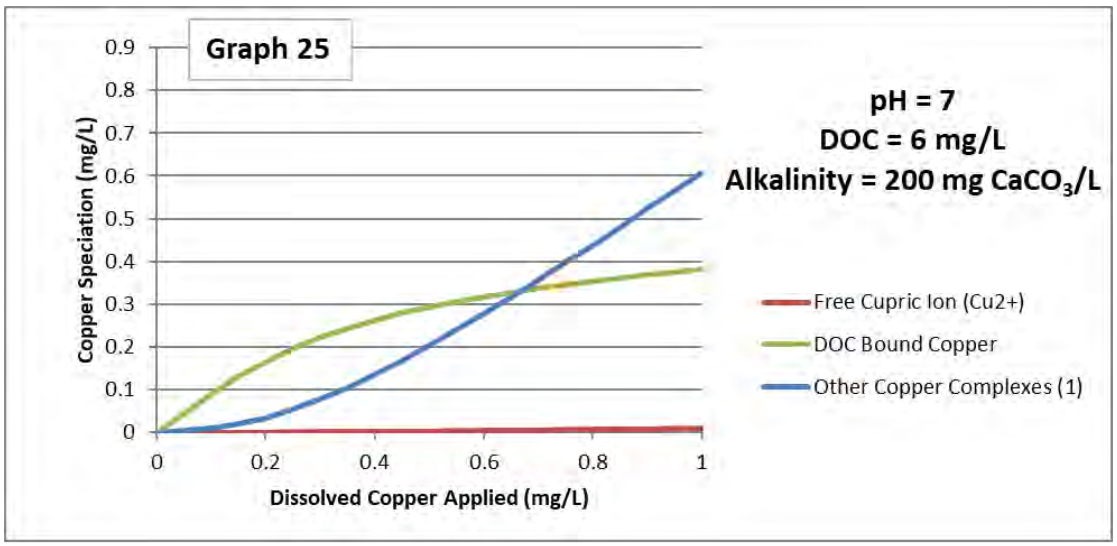

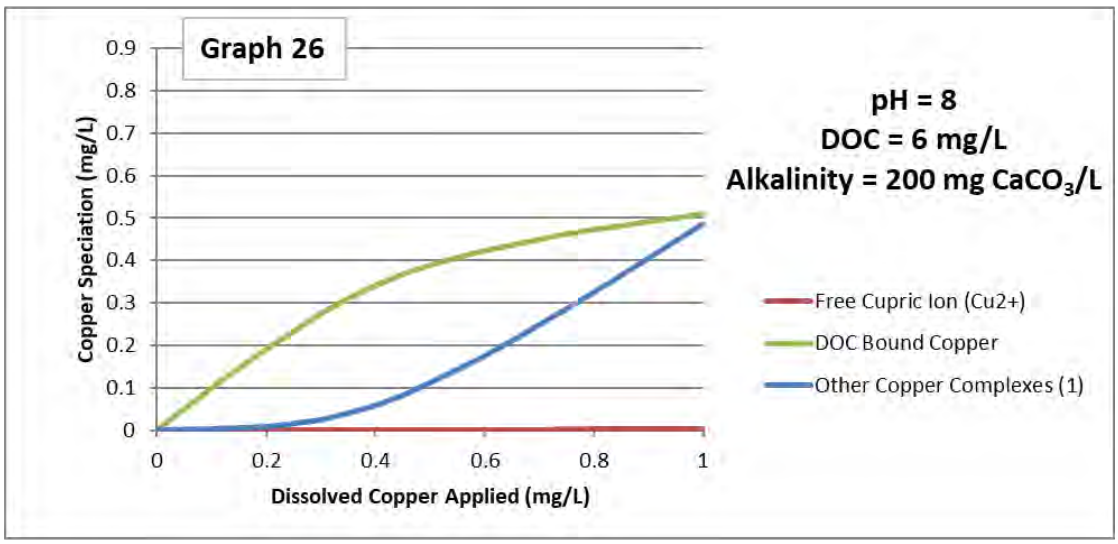

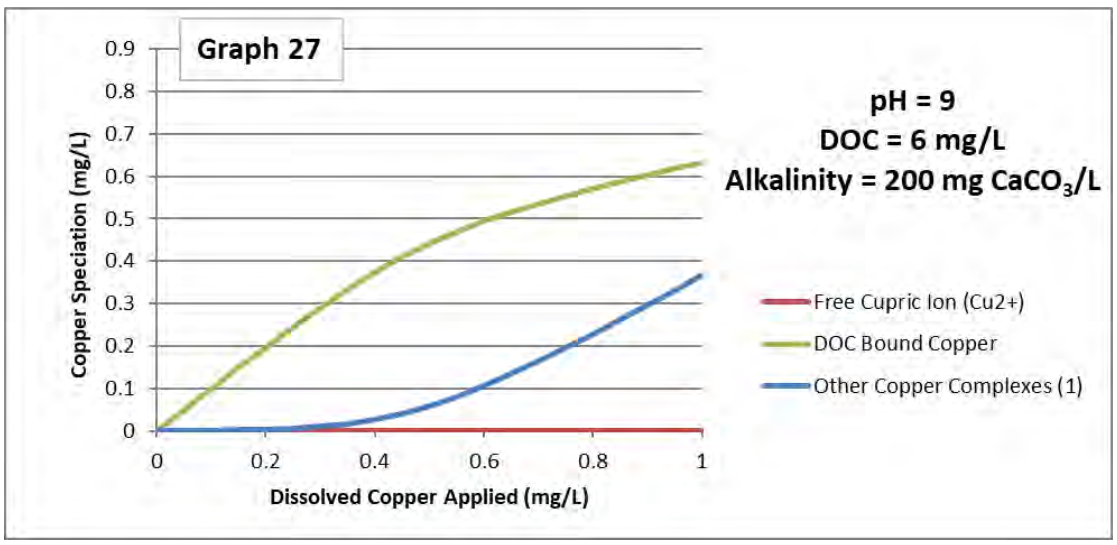

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2. References

U.S. Environmental Protection Agency (USEPA). 2007. Aquatic Life Ambient Freshwater Quality Criteria – Copper. 2007 Revision. Office of Water. Washington D.C.

