RECEIVED
JAN 07 2014
DIVISION OF WATER QUALITY

Attachment E – Notice of Intent

WATER QUALITY ORDER NO. 2013-0002-DWQ
GENERAL PERMIT NO. CAG990005

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item A. New Applicator (B.) Change of Information: WDID# 3 400207002

C. ☐ Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name County of San Luis Obispo - Department of Public Works and Transportation			
B. Mailing Address County Government Center Room 206			
C. City San Luis Obispo	D. County San Luis Obispo	E. State California	F. Zip 93408
G. Contact Person John Beaton	H. E-mail address jbeaton@co.slo.ca.us	I. Title Water Quality Manager	J. Phone (805)781-5109

III. BILLING ADDRESS (Enter Information *only* if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. E-mail address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Algaecide and aquatic herbicides are used to treat (check all that apply):

1. ☐ Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
   Name of the conveyance system: _____
2. ☐ Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
   Owner's name: _____
   Name of the conveyance system: _____
3. ☒ Directly to river, lake, creek, stream, bay, ocean, etc.
   Name of water body: Lopez Terminal Reservoir, Lopez Lake, Salinas Reservoir

B. Regional Water Quality Control Board(s) where treatment areas are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): Region 3
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: Algae

B. Algaecide and Aquatic Herbicide Used: List Name and Active ingredients

Copper sulfate
PAK®27 (sodium carbonate peroxyhydrate)

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

D. Types of Adjuvants Used: Citric acid (used when treating with copper sulfate)

VI. AQUATIC PESTICIDE APPLICATION PLAN

Has an Aquatic Pesticide Application Plan been prepared and is the applicator familiar with its contents?
☒ Yes ☐ No

If not, when will it be prepared? _____

VII. NOTIFICATION

Have potentially affected public and governmental agencies been notified? ☒ Yes ☐ No

VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?
☐ YES ☐ NO ☒ NA

IX. CERTIFICATION

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

A. Printed Name: John Beaton

B. Signature: _____ **Date:** December 31, 2013

C. Title: Water Quality Manager

XI. FOR STATE WATER BOARD STAFF USE ONLY

WDID:	**Date NOI Received:**	**Date NOI Processed:**
Case Handler's Initial:	**Fee Amount Received:** $	**Check #:**
☐ **Lyris List Notification of Posting of APAP**	**Date** _____	**Confirmation Sent** _____

County of San Luis Obispo
Department of Public Works

NPDES General Permit No. CAG 990005
Facility ID (WDID) 3 400207002

Aquatic Pesticide Application Plan for
Lopez Lake
Lopez Terminal Reservoir
Salinas Reservoir

Plan developed: 2001

Revised and submitted to the Water Quality Control Board: 2004, 2008, 2013, 2014

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Summary

Plan Submittal

In 2001, the State Water Resources Control Board (Board) established an "interim" National Pollutant Discharge Elimination System (NPDES) permit, Water Quality Order No. 2001-12-DWQ, to cover the use of aquatic pesticides that may be released to waters of the United States. The San Luis Obispo County Department of Public Works (Department) submitted a "Notice of Intent" (NOI), supporting documents, and the required fee to the Board and obtained coverage under the permit (WDID# 3 400207002) to treat for algae in Lopez Lake, Lopez Terminal Reservoir, and Salinas Reservoir. In 2004, the Board adopted Water Quality Order No. 2004-009-DWQ, establishing a new NPDES permit. Department submitted a NOI, the required fee, and an "Aquatic Pesticide Application Plan" (APAP) to the Board and obtained coverage under the new permit. The required annual reports were submitted to the Region 3 office every year. The APAP was updated in 2008 to include the use of PAK®27 (sodium carbonate peroxyhydrate) and a copy was submitted to the Region 3 office. In 2013, the Board adopted Water Quality Order No. 2013-0002-DWQ establishing a new permit for algae treatment. This update of the County's APAP incorporates the monitoring changes required under the new order.

Algae Control Practices

The Department operates Lopez Lake, Lopez Terminal Reservoir, and Salinas Reservoir. When needed, copper sulfate/citric acid or sodium carbonate peroxyhydrate (PAK®27) is used to control algae growth.

Description of Water Systems, Beneficial Uses, Treatment Areas

Lopez Lake

Lopez Lake is located in a 67 square mile watershed, approximately ten miles east of the City of Arroyo Grande, in San Luis Obispo County. The majority of the watershed is within the Los Padres National Forest. An aerial photograph of the lake can be seen in Figure 1.

Lopez Lake has a maximum surface area of 974 acres and a storage capacity of 51,800 acre-feet. Beneficial uses include recreation (including body contact), wildlife habitat, flood control, agricultural supply, and municipal and domestic water supply.

For monitoring purposes, Lopez Lake is partitioned into eleven sections, A through K, as shown in Figure 2. The intake structure, dam, and dam ogee are found in Section F. Treatment to control algae, when needed, is typically performed in Sections E, F, and G.

Figure 1: Lopez Lake

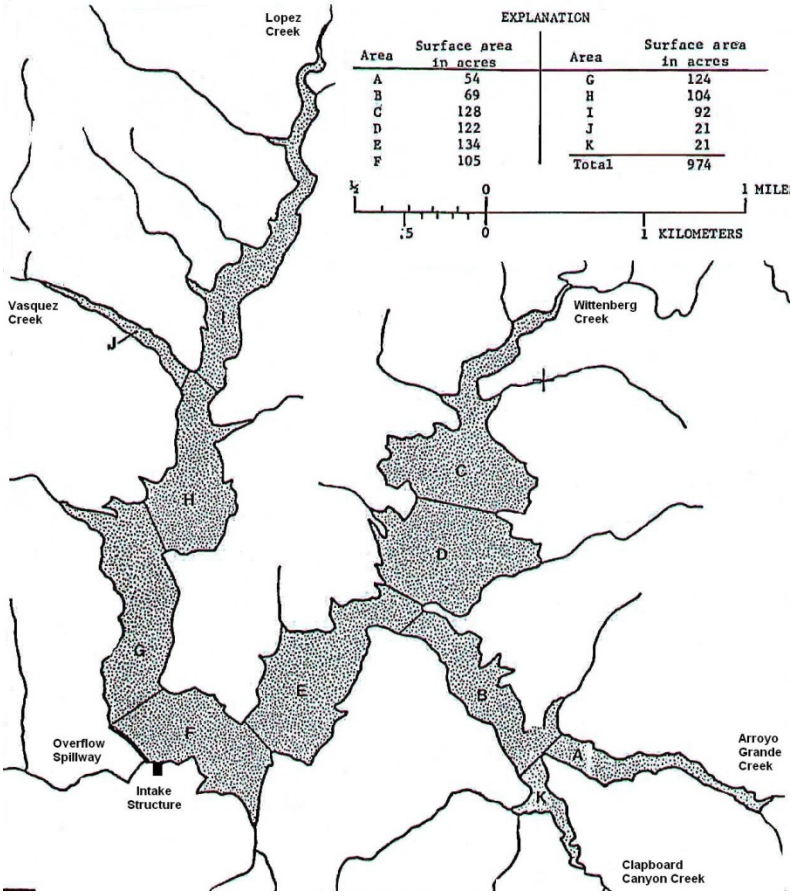

Figure 2: Lopez Lake Sections and Tributary Creeks
(The map scale is approximate.)

Water from Lopez Lake is routinely released downstream to Arroyo Grande Creek where it provides for wildlife habitat, groundwater recharge, and agricultural water supply. Water is also piped from Lopez Lake to the Lopez Terminal Reservoir for eventual treatment and delivery as potable water.

Lopez Terminal Reservoir

The Lopez Terminal Reservoir is a surface-water impoundment that provides raw water to the Lopez Water-treatment Plant (WTP) for treatment and delivery as potable water to cities and communities in south San Luis Obispo County. Body contact and public access of any kind are prohibited for the Lopez Terminal Reservoir. A diversion channel surrounds the reservoir and prevents area runoff from entering the reservoir. Lopez Terminal Reservoir's only source is Lopez Lake and rainfall directly on the reservoir surface.

Lopez Terminal Reservoir is relatively shallow with a surface area of 37 acres and a capacity of 844 acre-feet of water. Water is kept in the Terminal Reservoir for approximately 40 days. During that time, natural UV radiation from sunlight helps reduce the risk from viral contamination due to body contact recreation at Lopez Lake. The detention also aids particle settling prior to treatment at the Lopez WTP.

The normal operation of the Lopez Terminal Reservoir calls for all reservoir water to be delivered to the WTP for treatment. Other than minor seepage of water through the earthen dam, evaporation, and extremely rare intentional releases, there are no releases "downstream" from the reservoir. 100% of the Lopez Terminal Reservoir water is delivered to the WTP and treated. The Lopez WTP has a treatment capacity of approximately 7 MGD and provides potable water to Arroyo Grande, Grover Beach, Oceano, Pismo Beach, and County Service Area 12.

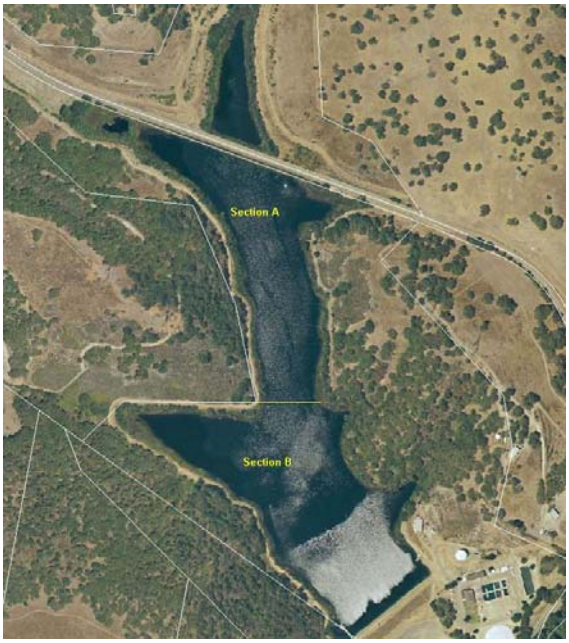

Figure 3: Lopez Terminal Reservoir

As seen in Figure 3, the Lopez Terminal Reservoir is partitioned into two sections, A and B. Section A contains the inlet structure through which water from Lopez Lake is delivered to the Lopez Terminal Reservoir. Section B contains the outlet structure (which delivers raw water to the water-treatment plant), the dam, and the dam ogee. Algae treatment most often occurs in Section B only, but can occur in any area of the Terminal.

Salinas Reservoir

Salinas Reservoir, also known as Santa Margarita Lake, has a surface area of 733 acres and a capacity of 23,843 acre-feet. It is fed by four tributaries as shown in Figure 4. Beneficial uses include wildlife habitat, municipal and domestic water supply, agricultural water supply, groundwater recharge, and recreation. The Santa Margarita Lake Recreation Area is located primarily on the south shore of the reservoir and provides a local spot for camping, fishing, hiking, and boating. No body contact recreation is allowed on the reservoir.

Water is routinely released from the reservoir downstream to the Salinas River. Water is also piped to a three-million gallon reservoir at the Santa Margarita Booster Station, just west of the community of Santa Margarita. From there, the water is pumped to the City of San Luis Obispo's Water-treatment Plant where it is treated and delivered as potable water to the City's customers.

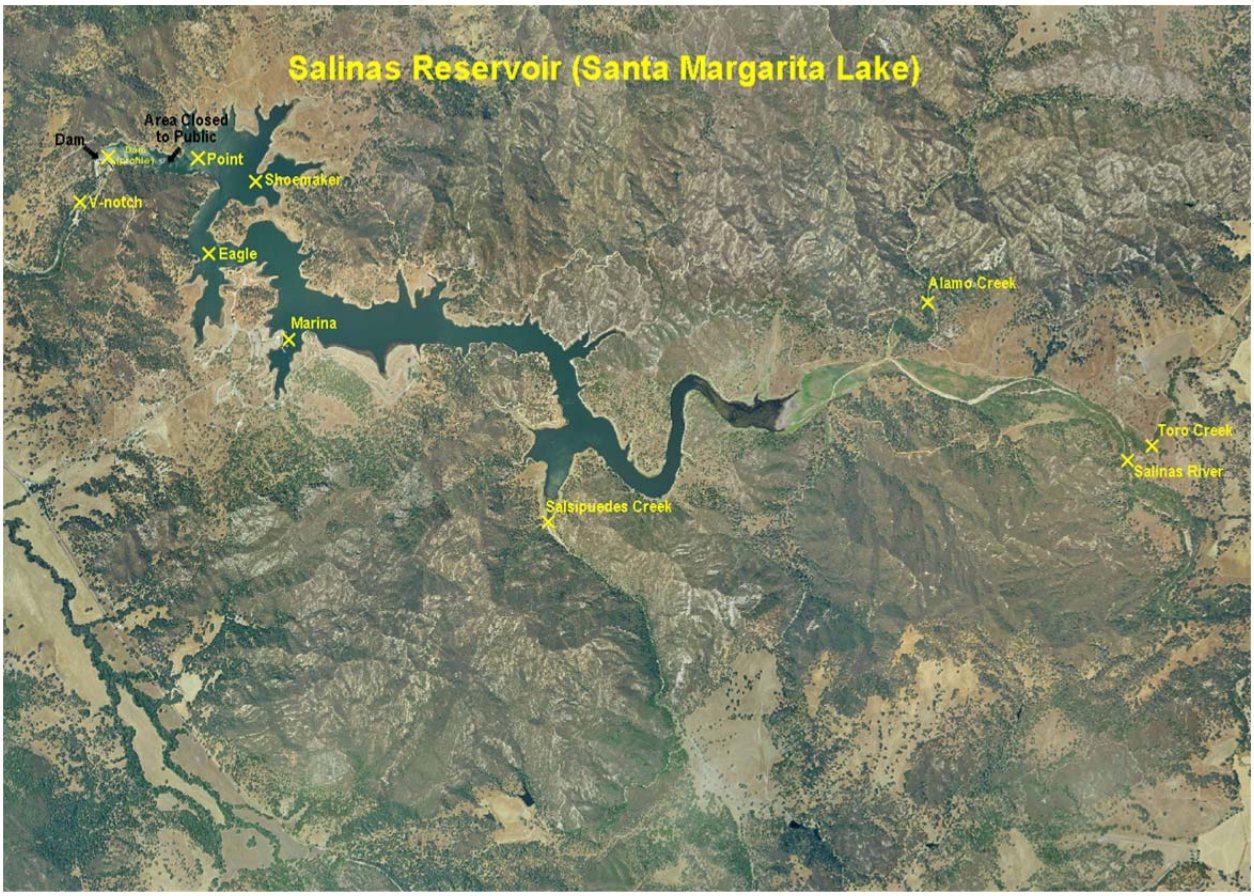

Figure 4: Salinas Reservoir and Tributaries

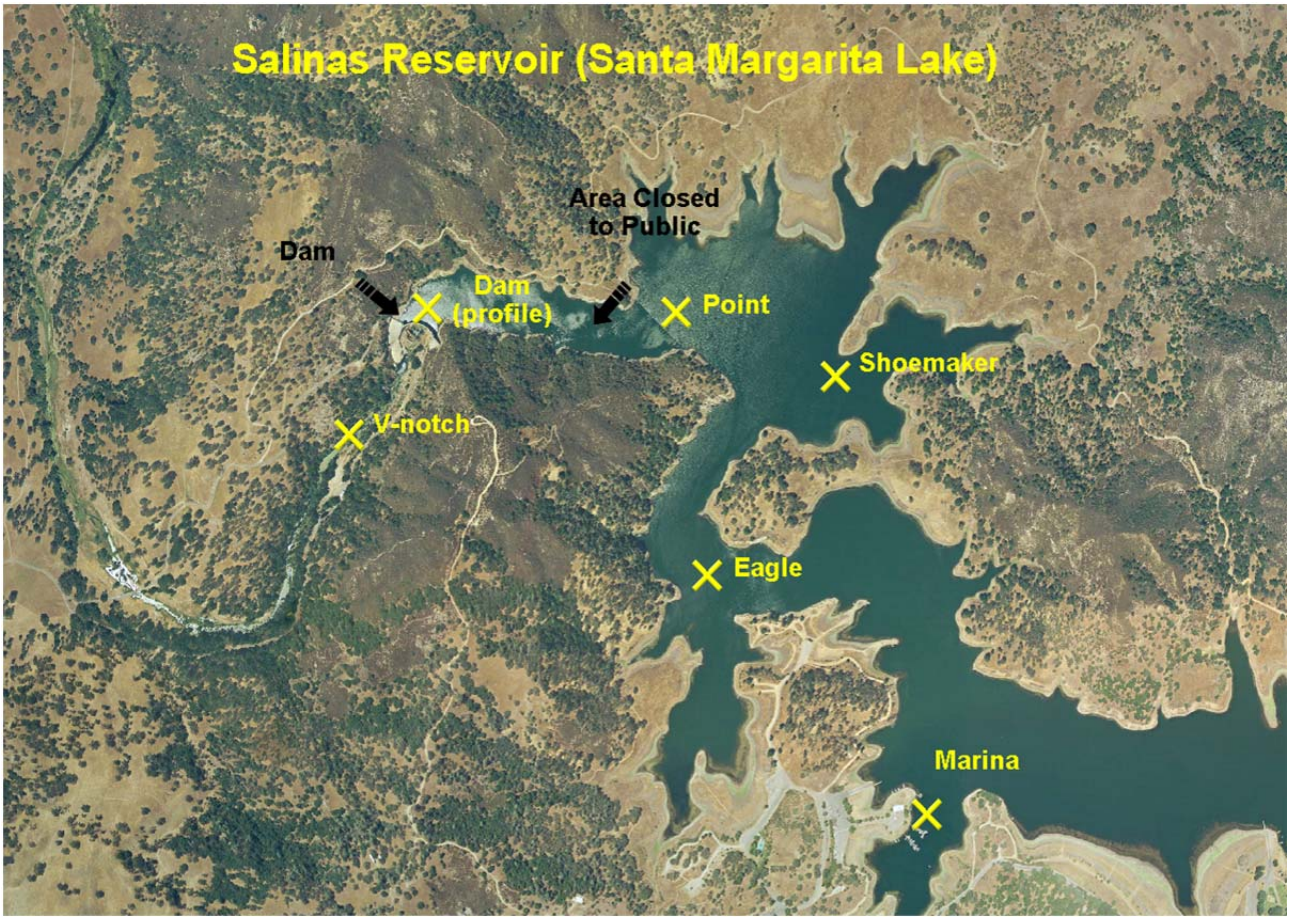

Figure 5: Salinas Reservoir Sample Sites

Algae Control

Routine Water Body Monitoring

Routine inspection, sampling, and analysis of the Salinas Reservoir, Lopez Lake, and Lopez Terminal occur year-round. Sample sites are located in each section of Lopez Lake (Figure 2), and Lopez Terminal (Figure 3) and at designated sites on the Salinas Reservoir (Figure 5). Over 150 types of analyses are performed. Analyses specifically associated with algae monitoring include algae identification and quantity, dissolved oxygen, odor, turbidity, pH, and visibility. These analyses are conducted weekly in the summer at Lopez Lake and Terminal, and monthly the remainder of the year. At Salinas Reservoir, these analyses are conducted monthly year-round. Microcystin analyses may be performed if there is an algal toxin concern. Algae related inspections, sampling, and analysis frequency is increased as needed, sometimes to daily, or even twice daily, especially in the Lopez Terminal.

Triggers for Algae Control

The need for algae control treatment is typically driven by potable water use concerns. Common treatment need triggers include intake screen clogging, filter performance

degradation, and elevated odor. A rapid decrease in visibility or a significant increase in algae, especially problematic algae, may also trigger a treatment need.

Total algae counts below 2000 org/ml are generally not a concern. When total algae counts reach 10,000 org/ml, or cyanobacteria counts reach 5000 org/ml, or water treatment plant performance degrades, or the raw water threshold odor number exceeds 10, the need for algae control is evaluated. The chief plant operator of the affected water treatment plant is consulted and odor, taste complaints, filter performance, and operational problems are examined. Historical experience and meteorological predictions (wind, temperature, amount of sunlight) are also considered in determining the need for algae treatment. The algae control alternatives described in the following section are evaluated and a consensus is reached. It is to preferable to treat algae before a significant algae bloom, as treatment of a large bloom requires more chemical and increases the risk of dissolved oxygen depletion due to dead algae decomposition.

Problematic algae can multiply rapidly. Examples include blue-green algae (cyanobacteria) like *Anabaena* and *Aphanizomenon*, filter clogging algae like *Fragilaria*, *Chroococcus*, and *Dinobryon*, and odor producing algae like *Pandorina*, *Ceratium*, *Synedra*, *Staurastrum*, and *Glendoinium*. Historically, these have been most successfully controlled by treatment with a combination of copper sulfate and citric acid, but every effort is made to produce acceptable water quality at the water treatment plants without the use of algaecides in the watershed.

Algaecide Alternatives

The San Luis Obispo County Public Works Department's mission is to provide public facilities and services that ensure health and safety and enhance the quality of life for the community. When managing water bodies, the Department attempts to economically maximize the safe and beneficial uses of the waters while minimizing adverse environmental impacts. As algae blooms can have significant adverse environmental impacts and reduce the safe beneficial uses of water bodies, the Department attempts to reduce the occurrence and magnitude of algae blooms. Algae bloom preventative measures include land use and stormwater management. Watershed inspections and water quality monitoring are performed to identify and assess potential contaminating activities which can lead to algae blooms. When algae blooms occur or are anticipated, key Department staff meet and review options. Staff typically includes the Water Quality Manager, the Water Systems Superintendent, the Assistant Superintendent, the Chief Plant Operator, and a Water Systems Chemist. Background water quality monitoring data and field inspection observations are reviewed, the impact on the associated treatment plant's ability to provide acceptable potable water is assessed, and the following options are evaluated:

Do Nothing

Algae levels are influenced by a number of chemical (nutrients) and environmental (sunlight, temperature, wind) factors. It is important to determine when control action is necessary and when it is not. The presence of some aquatic vegetation species may be a sign of a well-balanced, flourishing ecosystem. Applying algaecide can cause a

disruption in the ecological balance which may in turn cause algae blooms of problematic species. Careful monitoring of influencing factors and algal level trends can help avoid chemical treatment and the disruption of the natural cycle in algae levels.

Biological and Cultural Controls

A robust invertebrate (especially *Daphnia*) population can sometimes control algae levels by predation. Treatment with a copper based algaecide should be avoided when attempting to control algae through predation by invertebrates, as the copper is also toxic *Daphnia*. The introduction of non-native biological controls was deemed to be undesirable.

Given the size, shape, and operation of the three water bodies, the use of plantings, for nutrient and/or light control was deemed to be impractical.

Source Change

Because the Lopez Terminal Reservoir receives water directly from Lopez Lake, a change in the intake in use at Lopez Lake may provide acceptable control of the algae population in the Lopez Terminal. There are 6 intakes at Lopez Lake, set at 15 foot intervals from 15 feet to 90 feet in depth. The highest algae levels are typically found at the upper elevations of the Lopez Lake. Switching to a deeper intake can reduce the amount and type of algae being fed into the Lopez Terminal Reservoir. The Salinas and Lopez Terminal Reservoirs also have multiple intakes which can be used to select the water of “best” quality for delivery to the associated water treatment plants. By changing the intake level, chemical treatment can often be avoided.

Mechanical and Sonic Controls

Physical removal of floating and attached filamentous algae can be effective in controlling intake screen clogging, but is labor intensive and often impractical.

Use of sonic devices was pilot tested at the Lopez Terminal Reservoir and deemed to be ineffective.

Algaecide

The algaecide most often used by San Luis Obispo County staff is a copper sulfate/citric acid solution. The treated waters typically have high pH, alkalinity, and hardness. The addition of citric acid to the copper sulfate allows for increased effectiveness at a lower dose.

Sodium carbonate peroxyhydrate (PAK®27) is also used. Sodium carbonate peroxyhydrate breaks down into water, oxygen, and sodium carbonate. It has been shown to be specific to cyanobacteria or blue-green algae, with no effect on other aquatic life when applied at the recommended dose.

Decision Process

Non-algaecide options are given preference in the evaluation process. The cost of algaecide application is compared to treatment plant chemical and labor costs. Other considerations include the potential for adverse receiving waters impact, possible algal

toxin production, and consumer complaints. If application of an algaecide is the ultimately selected option, the APAP requirements are reviewed and a sampling and treatment plan is prepared (including the algaecide type, dose, and application area). The plan is signed by the decision makers, sampling and operations staff are assigned, and the plan is implemented.

Algaecide Use Best Management Practices

Storage

To minimize the risk of an aquatic pesticide spill, all chemicals are stored on pallets in their original containers (50 pound bags) and in a secured, cool, dry, and covered building. Only the amount of chemical needed for one treatment is placed onboard the application vessel, a customized barge.

Handling

Workers are required to wear the personal protective equipment specified in the manufacturer's safety data sheet when handling, mixing, and applying the chemicals.

Solution Preparation

The copper sulfate/citric acid solution is prepared on the application barge by adding approximately two parts copper sulfate pentahydrate and one part citric acid to a drum into which application area water is continuously pumped. The prepared solution is simultaneously pumped out of the drum at a constant rate through the spray applicators into the application area.

Sodium carbonate peroxyhydrate is dry broadcast and no solution preparation is required.

Dosage Determination

Copper sulfate dosage is based upon the algae species being treated, the quantity of algae observed, and historical experience. The manufacturer's copper sulfate dosage recommendations generally range from about 0.25 to 2.0 mg/L (0.7 – 5.3 lbs/AF) in the treatment area, dependent on the algae species and the alkalinity of the treated water. Operations staff can calculate the recommended dosage by entering data in key fields of the spreadsheets shown in Figure 6 and Figure 7. The manufacturers recommended dosage for commonly encountered algae is calculated and displayed. The spreadsheet also calculates the theoretical maximum dissolved copper level in the treatment area for comparison against the hardness influenced dissolved copper limit for any adjacent receiving waters. The spreadsheet notes if there is a potential for a copper exceedance in adjacent receiving waters (assuming all copper remains in a dissolved form – highly unlikely) and calculates a recommended maximum dose at which the receiving water dissolved copper limit should not be exceeded.

The manufacturer's recommended dosage for sodium carbonate peroxyhydrate is dependent on the cyanobacteria count and the application surface acres:

Recommended pounds sodium carbonate peroxyhydrate =
[(cyanobacteria count+2500)/333.33] x surface acres

Copper Sulfate/Citric Acid Dose Calculator

Receiving Water Hardness (mg/L as $CaCO_3$)	350
Receiving Water Dissolved Copper Limit (ug/L)	26.1
Application Surface Area (Acres)	18.5
Application Area Depth (Feet)	2
Application Area Volume (Acre Feet)	37
Application Area Water Weight (Pounds)	1.01E+08

Treatment Area Depth (Feet)	24
Treatment Area Volume (Acre Feet)	444
Treatment Area Water Weight (Pounds)	1.21E+09

Note: "Copper Sulfate" refers to copper sulfate pentahydrate

		Application Area				Treatment Area			
Class	Genera	Target Copper Sulfate Dose (mg/L)	Target Copper Sulfate Dose (lbs)	Target Citric Acid Dose (lbs)	Target Dissolved Copper Dose (ug/L)	Calculated Dissolved Copper Dose (ug/L)	Receiving Water Cu Limit Compliance Concern?	Recommended Maximum Copper Sulfate Dose (lbs)	Recommended Maximum Citric Acid Dose (lbs)
Cyanophyceae (Blue-Green)	Anabaena	0.25	25.1	12.6	64	5	No	124.0	62.0
Chlorophyceae (Green)	Ankistrodesmus	1.50	150.8	75.4	381	32	Possibly	124.0	62.0
Cyanophyceae (Blue-Green)	Aphanizomenon	0.25	25.1	12.6	64	5	No	124.0	62.0
Diatomaceae (Diatoms)	Asterionella	0.25	25.1	12.6	64	5	No	124.0	62.0
Protozoa (Flagellates)	Ceratium	0.50	50.3	25.1	127	11	No	124.0	62.0
Protozoa (Flagellates)	Chlamydomonas	1.00	100.6	50.3	254	21	No	124.0	62.0
Chlorophyceae (Green)	Chlorella	1.00	100.6	50.3	254	21	No	124.0	62.0
Protozoa (Flagellates)	Dinobryon	0.25	25.1	12.6	64	5	No	124.0	62.0
Diatomaceae (Diatoms)	Fragilaria	0.25	25.1	12.6	64	5	No	124.0	62.0
Protozoa (Flagellates)	Glenodinium	0.50	50.3	25.1	127	11	No	124.0	62.0
Chlorophyceae (Green)	Gloeocystis	0.50	50.3	25.1	127	11	No	124.0	62.0
Cyanophyceae (Blue-Green)	Microcystis (Anacystis)	0.25	25.1	12.6	64	5	No	124.0	62.0
Chlorophyceae (Green)	Mougeotia	0.05	5.0	2.5	13	1	No	124.0	62.0
Cyanophyceae (Blue-Green)	Oscillatoria	0.50	50.3	25.1	127	11	No	124.0	62.0
Protozoa (Flagellates)	Pandorina*	1.50	150.8	75.4	381	32	Possibly	124.0	62.0
Chlorophyceae (Green)	Scenedesmus	1.50	150.8	75.4	381	32	Possibly	124.0	62.0
Chlorophyceae (Green)	Staurastrum	1.00	100.6	50.3	254	21	No	124.0	62.0
Diatomaceae (Diatoms)	Stephanodiscus	0.50	50.3	25.1	127	11	No	124.0	62.0
Diatomaceae (Diatoms)	Synedra	0.50	50.3	25.1	127	11	No	124.0	62.0
Chlorophyceae (Green)	Tetraedron	1.00	100.6	50.3	254	21	No	124.0	62.0
Chlorophyceae (Green)	Zygnema	0.50	50.3	25.1	127	11	No	124.0	62.0

Figure 6: Copper Sulfate/Citric Acid Dose Calculator Example

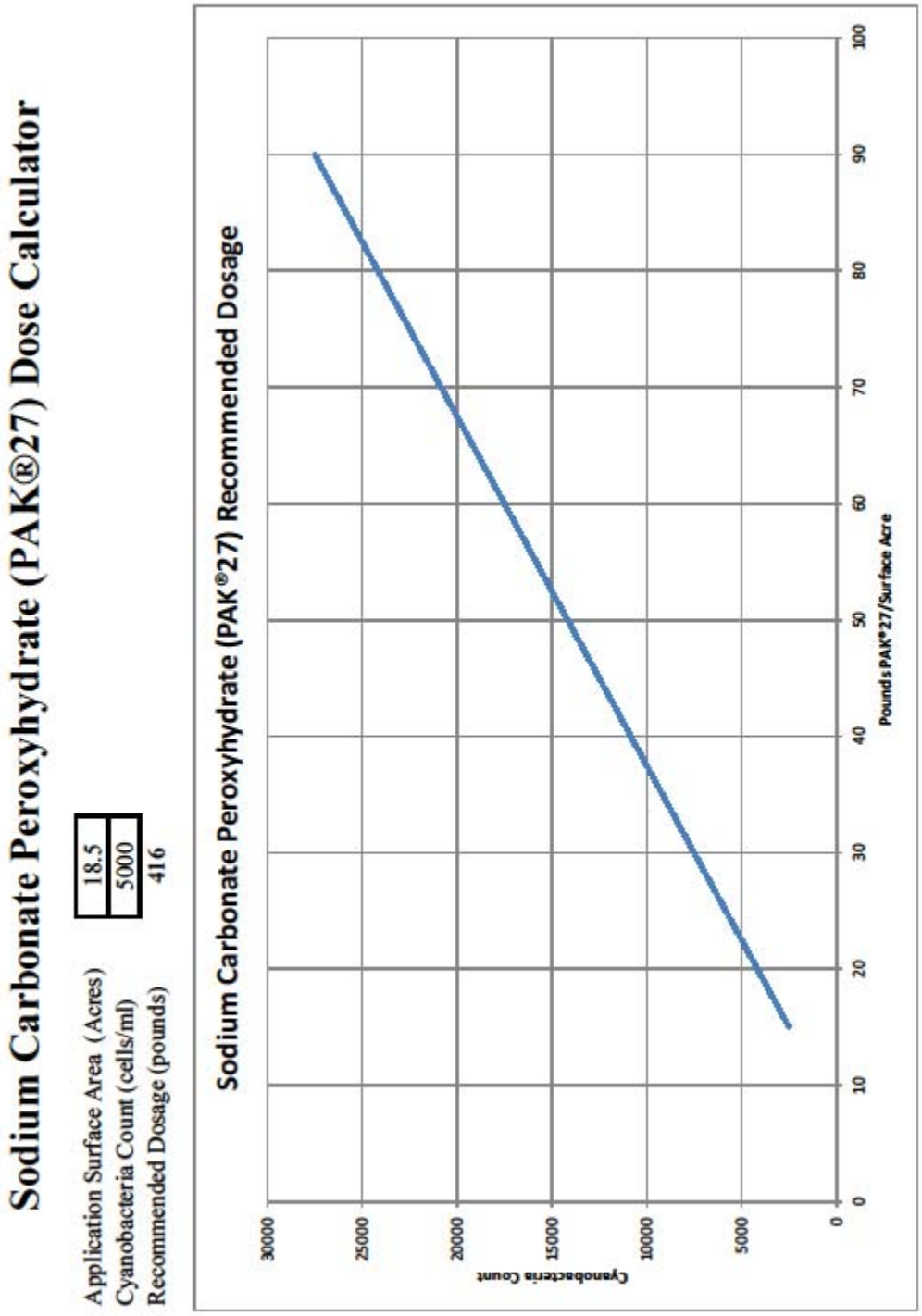

Figure 7: Sodium Carbonate Peroxyhydrate Dose Calculator Example

Treatment Area Precautions, Gates, and Control Structures

No public access is allowed on Lopez Terminal Reservoir. All Lopez Terminal Reservoir water is typically delivered to the Lopez Water Treatment Plant for treatment and distribution as potable water. Inflow to the Lopez Terminal Reservoir is continuously monitored and controlled by operations staff to prevent spillway overflow to Arroyo Grande Creek. On the exceedingly rare occasions when the Lopez Terminal Reservoir is overflowing its spillway, no algae treatments are allowed. Prior to a Lopez Terminal Reservoir algaecide application, workers inspect and confirm there is no flow over the reservoir spillway or through the single reservoir drain valve. Water is continuously delivered to the water treatment plant, even during algae treatment events. There are no other gates or control structures on the reservoir.

Park rangers are notified when an application event will take place on Lopez Lake or Salinas Reservoir and advised to restrict public access to the treatment area for 48 hours. Water is continuously released downstream from Lopez Lake and Salinas Reservoir. There are no other gates or control structures. Application area, rate, and dosage are controlled to ensure no adverse impact to any receiving waters.

Spill Prevention

The copper sulfate/citric acid algaecide solution is prepared on the application barge while in the application area. The solution is prepared at the same rate at which it is applied, thereby minimizing the risk of a solution spill.

Only the amount of algaecide to be used in the application is loaded on the application barge. No chemicals are permitted to remain on the application barge after a treatment.

Application

The algaecides are applied per the manufacturer's instructions. The copper sulfate/citric acid algaecide solution is applied from a barge using a custom aqueous spray applicator. Sodium carbonate peroxyhydrate is applied in a granular form using a broadcast spreader. Both algaecides are applied in a serpentine or spiral pattern, taking care to limit application to the designated application area only.

Workers apply algaecides in the same direction as the prevailing wind (if present) so that they are not exposed directly or through drift. Application is not allowed during unfavorable wind conditions.

Fish Kill Prevention Measures

The risk of a fish kill is minimized by:

- applying algaecide according to the manufacturer's instructions and this APAP,
- only treating a portion of the affected water body at any given time so that fish can have a safe haven outside the treatment area, and
- treating algae before their levels increase to a point where treatment could pose a danger of dissolved oxygen depletion below minimum acceptable levels.

Coordination with Potentially Affected Agencies and Parties

Every calendar year, prior to the first algaecide application, potentially affected public agencies are notified. Notified agencies include the Central Coast Regional Water Quality Control Board (RWQCB), the California Department of Fish and Wildlife (CDFW), County Flood Control and Water Conservation Zone 3 (Zone 3) representatives, County Parks staff at Lopez Lake and Salinas Reservoir, and the City of San Luis Obispo. The notification is also posted on the Department's website. The notification includes:

- a statement of the Department's intent to apply algaecide if needed;
- name of algaecide(s);
- purpose of use;
- general time period and locations of expected use;
- any water use restrictions or precautions during treatment; and
- a phone number that interested persons may call to obtain additional information.

Immediately prior to an algaecide application at Lopez Lake or Salinas Reservoir, County Parks personnel are notified and requested to restrict public access to the treatment area during treatment and for 48 hours afterwards.

Arroyo Grande Creek is the ultimate receiving water for Lopez Lake and the potential receiving water for Lopez Terminal Reservoir. If a copper exceedance in Arroyo Grande Creek were to occur, the RWQCB, the CDFW, and the Zone 3 representatives would be contacted. The RWQCB, the CDFW, and the City of San Luis Obispo would be contacted if there is a copper exceedance into the Salinas River.

Training

All algaecide application and sampling is performed by state certified Water Treatment Operators and certified lab staff who have been trained in all aspects of this APAP including the proper use, handling, and application of algaecide per the manufacturer's recommendations. Training takes place before individual participates in any sampling or algaecide application, and annually thereafter. Training records are kept for a minimum of three years, typically longer.

Algae Treatment Monitoring Program

Sample Collection and Contamination Prevention

All sampling and analyses are performed by, or under the supervision of, San Luis Obispo County Water Quality Laboratory (WQL) staff. The WQL is certified under the California Environmental Laboratory Accreditation Program (ELAP) for the chemical and bacteriological analysis of source water, recreation water, groundwater, potable water, and wastewater. As part of our invasive mussel prevention plan, each water body (Lopez Lake, Lopez Terminal Reservoir, and Salinas Reservoir) has dedicated sampling and field monitoring equipment, maintained by WQL staff. Sampling and field monitoring equipment are rinsed between samples to prevent cross contamination. Samples are collected in laboratory provided sample containers. Each sample is individually labeled with the site information, sampler name, collected date and time,

and preservative (if any). Immediately upon collection, the sample bottles are placed in an ice chest with blue ice. A chain of custody sheet accompanies each sample and similarly documents sample collection information and additionally, field monitoring results. The samples are transported to the WQL the same day as collected. Upon receipt by the laboratory, the samples are inspected for integrity, measured for receipt temperature and logged into the laboratory information management system.

Laboratory Certification and Laboratory Procedures

All laboratory analyses are performed by the County's WQL. In the event that the WQL is unable to perform the required analyses, the analyses are subcontracted to another laboratory certified under the ELAP to perform the testing. All quality assurance procedures and quality control measurements for the field and laboratory analyses, as defined in the laboratory's Quality Assurance Manual, are followed.

Equipment Calibration and Maintenance

All monitoring and analysis instruments and devices used by the Department to fulfill the prescribed monitoring program are properly maintained and calibrated as necessary to ensure their continued accuracy.

Background or Pre-treatment Monitoring

A field inspection is performed and background monitoring samples are collected upstream of the intended treatment area or in the treatment area just prior (up to 24 hours in advance of) the algaecide application. If the treatment area is in the Salinas Reservoir, a background sample will also be collected at the v-notch site below the dam. "Upstream" of a treated area in the Salinas Reservoir is the adjacent area further removed from the dam. If the treatment area is in Lopez Lake, a background sample will also be collected from the stilling pool below the dam that flows into Arroyo Grande Creek. In Lopez Lake, "upstream" of a section is the adjacent section located further away from the dam outlet structure. Section A is the "upstream" location for Section B in the Lopez Terminal Reservoir. The "Influent to Terminal" is the upstream sample site for Lopez Terminal Section A.

Background or pre-treatment monitoring includes a visual assessment of weather conditions (sunlight, wind, precipitation, etc.) and of treatment area water body appearance (sheen, color, algal mats, etc.). Measurement of visibility (Secchi disk), temperature and dissolved oxygen are recorded. Algae count, pH, conductivity, odor, and turbidity samples are collected. If copper sulfate algaecide will be used, hardness and dissolved copper samples are also collected for analysis. Samples are collected with a Kimmerer sampler with the sample depth (typically 3 feet) documented on the worksheet.

Treatment Event Monitoring

Treatment event visual inspection and monitoring sample collection occurs immediately downstream of the treatment area in flowing waters or immediately outside the treatment area in non-flowing waters. Treatment event sampling occurs immediately after the treatment event, but after sufficient time has elapsed to allow the treated water

to exit the treated area (typically 2 hours). The Department's anticipated treatment areas in Lopez Lake, Lopez Terminal Reservoir, and Salinas Reservoir are, for all practical purposes, non-flowing or static. Downstream sites for Lopez Lake include the stilling pond below Lopez Dam and the lake section adjacent to the treatment area, but closer to dam outlet structure. Downstream sites for Salinas Reservoir include the v-notch sample site below the dam and the reservoir sampling site adjacent to the treatment area but closer to the dam outlet structure. Event monitoring for Lopez Terminal takes place in the untreated adjacent section, 100 feet past the Terminal Section A/B boundary. Visual water body inspection, field monitoring, and monitoring sample collection are the same as that described in the "Background or Pre-Treatment Monitoring" section above.

Post-treatment Event Monitoring

Post treatment samples are collected in the treatment area within one week after treatment. In addition to the treatment area sample(s), post-treatment event sampling includes the stilling pond below Lopez Dam for Lopez Lake treatment events, and the v-notch site below Salinas Dam for Salinas Reservoir treatment events. All inspections, field measurements, and sampling are the same as that described in the "Background or Pre-treatment Monitoring" section above.

Compliance Determination

Pre-event, event, and post-event monitoring is used to determine if the residual algaecides exceeded a receiving water limitation and if the discharge of residual algaecides caused or contributed to an exceedance of the "no toxics in toxic amount" narrative toxicity objection in the permit. Compliance status is determined and documented for every treatment event.

Receiving Water Limits

Sodium Carbonate Peroxyhydrate

When used per the manufacturer's directions, sodium carbonate peroxyhydrate (PAK®27) is not persistent in the environment and readily decomposes to soda ash (sodium carbonate) and hydrogen peroxide which will subsequently decompose to water and oxygen when exposed to soils, sediments, and surface or ground waters. Currently, there are no receiving water limits for sodium carbonate peroxyhydrate or its degradation products.

Dissolved Copper

Application of copper sulfate/citric acid releases dissolved copper, the active ingredient, into the treated water. The receiving water limit for chronic dissolved copper is based upon the receiving water hardness as determined by the following formula:

Freshwater dissolved copper chronic limit in ug/L =

$$0.960 \times \exp[0.8545 \times \ln(\text{hardness}) - 1.702]$$

For Lopez Lake and Lopez Terminal Reservoir, the average water hardness is approximately 350 mg/L as $CaCO_3$, resulting in a chronic dissolved copper limit of 26 ug/L. Salinas Reservoir has an average hardness of 180 mg/L giving a chronic dissolved copper limit of 15 µg/L. (Actual receiving water limitations are calculated for each copper sulfate/citric acid treatment event.) Given the insolubility of copper carbonate and the 240 mg/L average alkalinity at Lopez Lake and Lopez Terminal Reservoir, dissolved copper is not expected to be persistent in those waters. Salinas Reservoir alkalinity averages 110 mg/L.

Dissolved Oxygen

The RWQCB Basin Plan lists minimum dissolved oxygen levels ranging from 2.0 mg/L to 7.0 mg/L, dependent on the identified beneficial use. Measured dissolved oxygen levels in Lopez Lake, Lopez Terminal reservoir, and Salinas Reservoir can vary significantly, depending on the location (especially depth), time of year, air temperature, wind, algae levels, etc. Algaecide treatment should not reduce dissolved oxygen levels more than 15% below background levels.

Temperature

Algaecide treatment should not result in a receiving water temperature alteration that affects the water body's identified beneficial uses.

Turbidity

Algae treatment should not increase background turbidity more than 20%.

pH

Where the receiving water background pH is greater than 6.5, algaecide treatment should not reduce the pH below 6.5.

Other Limits

Algaecide treatment should not result in floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses. The treatment should not produce taste or odor-producing substances that adversely affect beneficial uses. Treatment should not result in coloration of the receiving water that causes nuisance or adversely affects beneficial uses.

Toxic Pollutants

Receiving waters should remain free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life post-treatment.

Corrective Actions

Exceedance of Copper Receiving Water Limit

If the dissolved copper limit is exceeded in the treatment or post-treatment event sample, the Department will:

- initiate additional investigations into the cause of the exceedance,
- implement appropriate best management practices to reduce the algaecide concentration in future treatment events to be below the receiving water limitation, and
- evaluate the appropriateness of using alternative products.

Revision of Algae Control Measures.

If any of the following situations occur, the Department will review and, as necessary, revise the evaluation and selection of control measures to ensure that the situation is eliminated and not repeated in the future:

a) An unauthorized release or discharge associated with the application of algaecide (e.g., spill, leak, or discharge not authorized by this or another NPDES permit) occurs.
b) The Department becomes aware, or the State Water Board concludes, that the control measures are not adequate or sufficient for the discharge to meet applicable water quality standards.
c) Any monitoring activities indicate that the Department failed to:
    1) follow the label instructions for the product used;
    2) use the minimum amount of algaecide per application and the minimum optimum frequency of algaecide applications that are necessary for an effective control program consistent with reducing the potential for development of resistance and the algaecide product label requirements;
    3) perform regular maintenance activities to reduce leaks, spills, or other unintended discharges of algaecides associated with the application of algaecides covered under the permit; or
    4) maintain algaecide application equipment in proper operating condition by adhering to any manufacturer's conditions and industry practices, and by calibrating, cleaning, and repairing such equipment on a regular basis to ensure effective algaecide application and algae and aquatic weed control.

If the Department determines that changes to the control measures are necessary to eliminate any situation identified above, the Department will make such changes within 60 days. The Department will implement the corrective action before any further discharge of the algaecides and their residues is allowed.

Reporting

General Monitoring and Reporting Requirements

The Department will comply with all permit "Standard Provisions" related to monitoring, reporting, and recordkeeping.

Upon direction of the State Water Board or the RWQCB, the Department will submit information as specified.

The Department will report to the State Water Board and RWQCB any toxic chemical release data that are reported to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act" of 1986.

Adverse Incident to Threatened or Endangered Species or Critical Habitat

If the Department becomes aware of an adverse incident to a federally-listed threatened or endangered species or its federally-designated critical habitat, that may have resulted from the Department's algaecide application, the Department will immediately notify the National Marine Fisheries Service (NMFS) Santa Rosa office by phone at (707) 575-6050 in the case of an anadromous or marine species, or the U.S. Fish and Wildlife Service (FWS) at (916) 414-6600 in the case of a terrestrial or freshwater species. This notification must be made by telephone immediately when the Department becomes aware of the adverse incident and must include at least the following information:

1) the caller's name, telephone number, and e-mail address;
2) applicator name and mailing address;
3) the name of the affected species;
4) how and when the Department became aware of the adverse incident
5) description of the location of the adverse incident;
6) description of the adverse incident, including the U.S. EPA pesticide registration number for each product applied in the area of the adverse incident; and
7) description of any steps that have been taken or will be taken to alleviate the adverse impact to the species.

Electronic Annual Report

The Department will submit an annual "Self-monitoring Report" to the RWQCB consisting of the previous calendar year's activities by March 1st of each year. The report will consist of a summary the past year's activities, and certify compliance with all requirements of the Permit. The annual report will contain an executive summary discussing compliance or violation of the Permit and the effectiveness of the APAP, and a summary of monitoring data, including the identification of water quality improvements or degradation as a result of the algaecide application. Per the RWQCB's direction, the Department will electronically submit the required annual report.

Non-compliance 24 Hour Oral Report and Five-day Written Report

Within 24 hours from the time the Department becomes aware of the circumstances, the Department will orally report to the State Water Board and RWQCB any noncompliance,

including any unexpected or unintended effect of an algaecide use that may endanger health or the environment. The report will include the following information:

a) the caller's name and telephone number;
b) applicator's name and mailing address;
c) Waste Discharger Identification number (3 400207002);
d) the name and telephone number of a contact person;
e) how and when the Department became aware of the noncompliance;
f) description of the location of the noncompliance;
g) description of the noncompliance identified and the U. S. EPA pesticide registration number (024401 for copper sulfate pentahydrate, 128860 for PAK®27-sodium carbonate peroxyhydrate) for each product the Department applied in the area of the noncompliance; and
h) description of any steps that the Department has taken or will take to correct, repair, remedy, cleanup, or otherwise address any adverse effects.

If the Department is unable to notify the State Water Board and the RWQCB within 24 hours, the Department will do so as soon as possible and also proved the rationale for why the Department was unable to provide the notification within 24 hours.

If not waived by the State Water Board or the RWQCB, the Department will also provide a written report within five days from the time the Department becomes aware of the noncompliance. The written report will contain the following:

a) date and time the Department contacted the State Water Board and RWQCB notifying them of the noncompliance and any instructions received from the State and/or Regional Board;
b) a description of the noncompliance and its cause, including exact date and time and species affected, estimated number of individual and approximate size of dead or distressed organisms (other than the pests to be eliminated);
c) location of incident, including the names of any water affected and appearance of the waters (sheen, color, clarity, etc.);
d) magnitude and scope of the affected area (e.g. aquatic square area or total stream distance affected);
e) algaecide application rate and intended use site;
f) description of the habitat and the circumstances under which the noncompliance activity occurred (including any available ambient water data for aquatic algaecides applied);
g) laboratory tests performed, if any, and timing of tests (a summary of the test results to be provided within five days after they become available);
h) if applicable, an explanation of why the Department believes the noncompliance could not have been caused by exposure to the algaecides from the Department's application; and
i) actions to be taken to prevent recurrence of adverse incidents.

Record Keeping

The Department will maintain an algaecide application log containing at a minimum:

1. date of application;
2. location of application;
3. name of applicator;
4. type and amount of algaecide used;
5. application details, such as flow, level of water body, time application started and stopped, algaecide application rate and concentration;
6. visual monitoring assessment;
7. date, site, and time of all sampling and field measurements;
8. name of person performing the sampling and field monitoring;
9. name of individual performing the analyses;
10. analytical techniques or methods used;
11. analytical results; and
12. certification that the applicator(s) followed the APAP.

The Department will retain records of algaecide application logs, all monitoring information, including all calibration and maintenance records, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report, or application.