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Governor

30 April 2010

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ALGAE AQUATIC MANAGEMENT PLAN FOR THE CALIFORNIA RICE COMMISSION

Thank you for the submittal of the California Rice Commission Algae Aquatic Toxicity Management Plan (AMP) on 27 April 2010. The submission of this management plan was required by the CRC Monitoring and Reporting Program (MRP).

Central Valley Water Board staff reviewed the AMP and determined it is acceptable. Staff also agrees the CRC has met the requirements of the conditional waiver by its actions taken in this and previous AMPs. The CRC took steps to identify the toxicant and to determine if rice discharges are the source. Monitoring results show no contribution to the algae toxicity from rice discharges. Therefore, I am removing the requirement for the AMP under the Irrigated Lands Regulatory Program. Should algae toxicity be found during the assessment monitoring in 2012, the Central Valley Water Board will reassess the need for a new management plan.

Thank you for the time and effort the CRC has put into complying with the Irrigated Lands Regulatory Program. Your activities to promote and protect water quality in the Sacramento Valley are appreciated by the Central Valley Water Board.

If you have questions, please contact Margaret Wong at 916-464-4857 or Susan Fregien at 916-464-4813.

Original signed by Pamela Creedon

Pamela C. Creedon
Executive Officer

cc: Ms. Summer Bundy, CH2MHill

California Environmental Protection Agency



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TO: Susan Fregien
Sr. Environmental Scientist
Monitoring & Implementation Unit
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FROM: Margaret Wong
Water Resources Control Engineer
Monitoring & Implementation Unit
Irrigated Lands Regulatory Program

DATE: 30 April 2010

SIGNATURE: Original signed by Margaret Wong

REVIEW OF ALGAE AQUATIC TOXICITY MANAGEMENT PLAN

Summary

On 1 March 2010, the California Rice Commission (CRC) submitted a draft Algae Aquatic Toxicity Management Plan (AMP) to the Central Valley Water Board. The AMP examined the monitoring results for the 2009 season and proposed recommendations based on those results. After review and informally emailing a list of corrections to be made, the CRC submitted a final AMP on 27 April 2010. This memorandum summarizes the monitoring results and reviews the final AMP.

2009 Monitoring Results

The AMP covers the four primary sites, CBD5, BS1, CBD1 and SSB. Algae toxicity testing was required at these four sites during the months of May, June and July, which correspond with peak pesticide use. Concurrent with the algae toxicity testing, propanil, triclopyr, and clomazone were analyzed. These three herbicides were detected during 2008 monitoring under the 2008 Management Plan.

Algae toxicity testing was also required at the three secondary sites, F, G and H, under assessment monitoring. The toxicity tests were performed from April to September 2009, with concurrent pesticide monitoring. Tables 1 and 2 show the algae toxicity testing results for the primary and secondary sites, respectively, in the 2009 season. The percent growth as compared to the control is based on cell count, not absorbance as used in the AMP.

Table 1. 2009 Algae Toxicity Test Results, Primary Sites

Month	Sampling Dates	Senastrum 96-Hour % Growth, as compared to control ¹				Statistically significant toxicity (based on % growth)			
		CBD5	BS1	CBD1	SSB	CBD5	BS1	CBD1	SSB
May	5/13/2009	108%	102%	84%	88%	No	No	Yes	Yes
June	6/2/2009	364%	251%	164%	179%	No	No	No	No
July	7/7/2009	708%	532%	388%	147%	No	No	No	No

¹ percent control = [(sample cell count)/(control cell count)] x 100

Table 2. 2009 Algae Toxicity Test Results, Secondary Sites¹

Month	Sampling Dates	Selenastrum 96-Hour %growth, as compared to control ²			Statistically significant toxicity (based on % growth)		
		F	G	H	F	G	H
April	4/28/2009	100%	85%	101%	No	Yes	No
May	5/12/2009	109%	100%	102%	No	No	No
June	6/3/2009	204%	447%	692%	No	No	No
July	7/8/2009	1120%	903%	662%	No	No	No
August	8/25/2009	625%	231%	421%	No	No	No
September	9/15/2009	508%	321%	283%	No	No	No

¹ Site F is upstream site for CBD5, Site G is upstream site for BS1, and Site H is upstream site for SSB.

² percent control = [(sample cell count)/(control cell count)] x 100

Algae toxicity testing for April and May were performed with ethylenediaminetetraacetic acid (EDTA) in the algal media. From June through August, the algae toxicity tests were performed without EDTA in the algae media. There is a wide variance between the percent growth compared to the control for the EDTA and non-EDTA addition to the media. Although the non-EDTA toxicity tests showed no statistically significant toxicity compared to the control, there are no past data to confirm that these percent growth numbers are "normal". For example, In June the percent growth ranged from 204% to 692% when compared to the control. The 204% may have algae toxicity, but would be masked by the high cell count in the sample compared to the control.

Table 3 shows the pesticides monitored for each program, the application period, and the detection limit or minimum reportable limit in µg/L. Monitoring was required during the application and release period. Table 4 shows the results from the pesticide monitoring in conjunction with the algae toxicity test and the total copper results. It should be noted that dissolved copper is the best indicator of possible toxicity since it is the portion that is available to the organism.

Table 3. 2009 Pesticide Monitoring Required, Primary and Secondary Sites

Herbicide	Program ¹	Application Period	Site	Detection (MRL)
Glyphosate	MRP	March (preplant)	Secondary	5 µg/L
Carfentrazone ethyl	MRP	April-June	Secondary,	0.10 µg/L
Clomazone	MRP, AMP	April-May	Primary, secondary	1.0 µg/L
Pendimethalin	MRP	March-April	Secondary	0.20 µg/L
Penoxsulam	MRP	April-June	Secondary	20.0 µg/L
Propanil	AMP	May-July	Primary	0.05 µg/L
Triclopyr	AMP	May-June	Primary	0.05 µg/L

¹ MRP = monitored in accordance with MRP Order R5-2009-0809; AMP = monitored in accordance with Algae Aquatic Toxicity Management Plan

Table 4. 2009 Pesticide Monitoring Results, Primary and Secondary Sites

Date & Location	Pesticide Detections (conc, µg/L)	Algae Tox (% growth as compared to the control) ¹	Total Copper Conc.	1 Hr Ave. Toxicity Copper Conc. ²	
April	CBD5	Clomazone 0.51	--	8.6	No
	BS1	Clomazone 0.39	--	3.9	No
	F	Clomazone 0.23	100%	35	Yes
	G	Clomazone 0.75	85%	4.2	No
May	CBD5	Clomazone 6.9	108%	10	No
	BS1	Clomazone 2.3	102%	4.8	No
	CBD1	Clomazone 2.8	84%	4	No
	SSB	Clomazone 1.74	88%	3.5	No
	F	Clomazone 5.6	109%	26	Yes
	G	Clomazone 2.5	100%	17	Yes
	H	Clomazone 0.84	102%	3.8	No
June	CBD5	Clomazone 2.6, Propanil 1.9, Triclopyr 0.71	364%	11	No
	BS1	Clomazone 2.5	251%	7.6	No
	CBD1	Clomazone 4.0	164%	8.2	No
	SSB	Clomazone 1.8	179%	5.5	No
	F	Propanil 47	204%	11	No
	G	Clomazone 2.9	447%	6.6	No
	H	Clomazone 3.6	692%	5.8	No
July	CBD5	Propanil 0.38	708%	6.4	No
	CBD1	Propanil 0.065	388%	5.5	No
	SSB	Propanil 0.25	147%	5.3	No

¹ percent control = [(sample cell count)/(control cell count)] x 100

² 1 hour average toxicity copper concentration exceedance is based on dissolved copper. Copper analyses for 2009 were for total copper. A "Yes" indicates an exceedance is possible, but not definite.

There is no apparent relationship between algae toxicity and pesticide concentrations. The change from EDTA to no EDTA in the algal media has skewed the percent growth compared to the control. Control algae counts with EDTA have been reduced from 1×10^6 cells or more after 96 hours to about half that number for the algal media without EDTA. There is no way of comparing past algae toxicity with the present toxicity tests.

Of the three herbicides detected, only propanil was found at levels that may be of concern. Monitoring by the registrant found a concentration of 11 µg/L a week later at CBD5, the downstream monitoring site. The CRC voluntarily submitted a draft Propanil Management Plan on 14 December 2009 that has been reviewed.

Recommendations by the CRC

The CRC proposes to suspend additional algae toxicity testing and herbicides analysis under the AMP. Assessment phase monitoring which requires three species toxicity testing and herbicide screening at primary and assessment sites would commence in 2012.

The CRC also recommends further review of the algae toxicity testing in the Central Valley when funding resources become available.

Staff conclusions and recommendations

Staff agrees there is no correlation between algae aquatic toxicity and rice pesticides detected during the same sampling event. Concentrations of rice pesticides detected are below published algae toxicity levels. The CRC has worked with Central Valley Water Board staff to try different strategies to identify the cause of algae toxicity, but no monitoring to date has shown the cause to be solely due to rice operations.

I recommend work on the AMP be suspended until 2012 when assessment monitoring restarts at the primary sites. CRC MRP R5-2010-0805 requires an updated rice pesticide matrix be submitted to the Central Valley Water Board by 1 November 2011. The matrix report will include pesticides being used on rice fields and any changes in rice operations, application methods and irrigation practices that may affect the application rates and/or time of pesticide application. Information in this report would be used to determine the pesticides to be monitored in 2012.

Minor edits

Minor editorial comments are as follows for the draft received 1 March 2010: These corrections should be made and the AMP resubmitted for approval by the Executive Officer.

- Page 5 - Summary of Algae Toxicity Tests, 2007-2009 should be labeled Table 4 and referenced in the paragraph above as Table 4.
- Tables 5 and 7 should list SSB as the sampling name rather than SS1 to be consistent with other tables and the text.
- Table 9 - needs to be labeled.
- Tables 9 and 10 - Change 2008 to 2009 for both tables.
- Tables 9 and 10 - Change % survival as compared to control to represent cell count. Tables 1,2 and 4 in this report show % survival, compared to the control, based on cell numbers, not absorbance.¹
- Conclusions and Proposals - misspelled "previous" in text.

¹ The algae toxicity test is based on growth, or cell numbers, compared to the control. Although absorbance is an acceptable method to count the number of cells, the relationship between absorbance and cell count is affected when the control absorbance is low. AQUA-Science typically reports the % difference compared to control using the absorbance. If the cell count is used, which is calculated by their calibration curve, then % compared to the control using cell number is larger than % compared to the control using absorbance. This discrepancy occurred from June to September when EDTA was added to the test media and control cell numbers fell.