

## **G. Fred Lee & Associates**

---

27298 E. El Macero Dr.  
El Macero, California 95618-1005  
Tel. (530) 753-9630 • Fax (530) 753-9956  
e-mail: gfredlee@aol.com  
web site: <http://www.gfredlee.com>

November 8, 2005

### **Inadequate Approach for Implementation of the SJR OP Pesticide TMDL Compliance Monitoring**

William Jennings, Executive Director  
California Sportfishing Protection Alliance

Bill,

I wish to follow up on the CVRWQCB's October 21, 2005 adoption of the Basin Plan Amendment for control of diazinon and chlorpyrifos aquatic life toxicity in the San Joaquin River. In taking that action the Board ignored both your and my requests that before this Basin Plan Amendment is adopted, the details of the proposed approach of implementation be made available to the public for review in front of the Board. I am particularly disturbed that the staff, through Diane Beaulaurier, distorted my position with respect to inclusion of the details of the implementation approach in the Basin Plan. My written statement (see attached) submitted to the Board staff does not suggest/require that the details of the implementation approach be adopted as part of the Basin Plan Amendment.

In our telephone discussion of our written comments with Beaulaurier and Karkoski prior to the Board meeting, I indicated that the details of the monitoring associated with the implementation of the TMDL should be presented at the time of the Basin Plan review. In this way, those who understand the requirements of proper monitoring of OP pesticide caused aquatic life toxicity could evaluate whether this proposed approach would be adequate to implement the TMDL compliance monitoring. The comments on the adequacy/deficiencies in the proposed monitoring program could then be made available to the Board for their review. If this had been done it could have been shown that the staff's proposed approach for implementation/monitoring of the SJR OP pesticide TMDL compliance is likely to fail to provide the data needed to determine whether the OP pesticide as well as other pesticide caused aquatic life toxicity is under control in the San Joaquin River and its watershed.

At the CVRWQCB hearing, Beaulaurier again repeated the distortion of my position on the need to make the example implementation plan a part of the Basin Plan. Further, I was shocked to find that the Board ignored your verbal request to require that the staff provide the details of the proposed implementation plan monitoring program at the time of review of the proposed Basin Plan Amendment.

The staff, in response to my comments on the need to provide details of the proposed implementation monitoring program for the TMDL compliance for review stated,

*“The Amendment also describes the information that must be collected as part of any monitoring and reporting program (MRP) governing pesticide discharge from orchards and fields. The Central Valley Water Board believes these two elements of the Basin Plan Amendment provide the appropriate regulatory framework for assessing compliance with the Amendment. The MRP will be the vehicle used to provide any additional detail necessary.”*

The proposed approach of implementation of the TMDL based on the Ag Waiver monitoring approach is obviously fundamentally flawed if this TMDL is to be meaningfully implemented to start to protect aquatic life from pesticide caused aquatic life toxicity. Those knowledgeable in OP pesticide caused aquatic life toxicity know that the current Ag Waiver toxicity monitoring is essentially cosmetic compared to that needed to properly assess the occurrence of pesticide caused aquatic life toxicity. The October 20 reaction of the agricultural community to the proposed renewal of the Ag Waiver monitoring plan means that it will be very difficult to gain agricultural community cooperation in implementation of a monitoring program that could show that agricultural field discharges/runoff are causing violation of the Basin Plan requirements for control of OP pesticide caused aquatic life toxicity.

Further, while the proposed MRP for the renewal of the Ag Waiver program generally provides for the potential for developing an adequate monitoring program, the details of implementation of that program need to be defined. Based on past experience, there is reason to question whether the Board and staff will adequately implement the requirements to monitor impacts of ag runoff/discharges that cause aquatic life toxicity in the State’s waters for many years, if ever. The fact that the agricultural interests were able to cause the staff/Board to withdraw adoption of the updated MRP for the renewed Ag Waiver further supports the need to question whether an adequate OP pesticide aquatic life toxicity monitoring program will be developed in the foreseeable future.

The technically valid approach that should have been adopted by the Board is to require that the staff develop the details of the SJR OP pesticide aquatic life toxicity TMDL implementation plan. This plan should be reviewed by the public in front of the Board. When finalized this plan should be implemented. If, at some time in the future, Ag Waiver water quality monitoring becomes credible for detecting pesticide caused aquatic life toxicity in the State’s waters, the then-ongoing TMDL implementation monitoring plan could be integrated with the Ag Waiver monitoring. As currently being implemented, the potential for integration of the SJR OP pesticide TMDL implementation plan with a truly functional Ag Waiver monitoring program is likely many years away. The implementation of the recently adopted SJR OP pesticide TMDL should not be delayed until the Ag Waiver monitoring program becomes adequate to reliably assess pesticide caused aquatic life toxicity in the Central Valley.

In October 2003 the CVRWQCB adopted the Basin Plan Amendment TMDL for Diazinon in the Sacramento and Feather Rivers. That Basin Plan Amendment also did not provide the details of the implementation monitoring program. It also tied the implementation monitoring to the Ag Waiver water quality monitoring program. At the time of adoption of that TMDL, I asked J. Karkoski at a public meeting what provisions were being made in the implementation program to insure that the toxicity of other pesticides such as the pyrethroid based pesticides would be included in the implementation program for urban areas such as in the city of Sacramento. He stated that the NPDES stormwater permit for Sacramento would include requirements to monitor aquatic life toxicity of urban creek sediments. Last spring when the city of Sacramento renewed NPDES stormwater permit was made available it was found that the city is not required to conduct urban creek sediment toxicity testing.

At the time that I questioned the adequacy of the then-proposed TMDL implementation plan to adequately monitor for toxicity due to the replacement pesticides, it was already well established based on studies that I had conducted in the late 1990s that the use of pyrethroid based pesticides was occurring and that there was a strong likelihood that stormwater runoff would cause toxicity in urban creek sediments.

As of now, a credible Sacramento and Feather River Diazinon TMDL implementation monitoring plan has not been implemented. Further, those responsible for Ag Waiver monitoring in the Sacramento Valley are in a state of denial on the occurrence of agriculturally used pesticide caused aquatic life toxicity in the Sacramento Valley. This state of denial is based on the grossly inadequate stormwater runoff aquatic life toxicity monitoring that is being conducted in the Ag Waiver water quality monitoring program.

One of the most significant problems with the current approach for implementation of the OP pesticide TMDL for the Sacramento and San Joaquin Rivers is that the public is not involved in reviewing the details of the adequacy of the monitoring program. Under the current approach the staff can propose a monitoring approach and get the Board executive officer and the discharger representative to agree to it without ever making it available for the Board and public review. This behind-the-scenes approach for establishing the details of a TMDL compliance monitoring can readily lead to an inadequate and unreliable implementation program.

I fully support your assessment at the October 21 Board meeting that the SJR OP pesticide TMDL has a B grade but the implementation has a D- grade. I understand that you plan to object to this TMDL as part of the SWRCB review. If you proceed with this action I will strongly support you. The SWRCB should return this Basin Plan Amendment to the Regional Board, requiring that the Board provide a near-term, definitive monitoring program to evaluate compliance with TMDL requirements, which is not tied to the highly nebulous Ag Waiver water quality monitoring program with its significant deficiencies in properly evaluating aquatic life toxicity caused by pesticides in the San Joaquin River.

Please contact me if you have questions or comments. Fred

## **Recommended SJR OP Pesticide TMDL Compliance Monitoring<sup>1</sup>**

G. Fred Lee, PhD, DEE and Anne Jones-Lee, PhD

gfredlee@aol.com www.gfredlee.com

October 4, 2005

In mid-September, the Central Valley Regional Water Quality Control Board (CVRWQCB) held a workshop concerning a proposed Basin Plan amendment for regulating diazinon and chlorpyrifos in the mainstem San Joaquin River (SJR). An issue of concern noted at that workshop was the lack of specificity for the compliance monitoring program that the Regional Board staff will propose associated with implementation of the diazinon and chlorpyrifos TMDLs. The CVRWQCB staff proposed deferring providing information on compliance monitoring until after adoption of the Basin Plan amendment. This delay is inappropriate because the method of assessing TMDL target compliance is a critical component of the TMDL. Detailed information on how compliance will be assessed should not be separated from the adoption of the TMDL into the Basin Plan. Without such information, it will not be possible to evaluate the adequacy of the proposed approach for controlling the aquatic life toxicity caused by the OP pesticides, diazinon, or chlorpyrifos, or the replacement of these chemicals by other pesticides that could cause aquatic life toxicity in the SJR.

### **Need for Information on the Proposed TMDL Compliance Monitoring**

The Regional Board should specify the initially proposed characteristics of the SJR OP Pesticide TMDL compliance monitoring program. This would include the anticipated compliance points for the monitoring program, parameters to be measured, analytical methods and their sensitivity for reliably detecting the regulated chemicals, frequency of measurements, etc. With such information it will be possible to evaluate whether the proposed compliance monitoring could be expected to be adequate for detecting significant violations of the requirements set forth in the TMDL.

### **Dormant Pesticide Applications**

One of the issues of concern regarding compliance monitoring is the application of dormant-spray pesticides to orchards just prior to major stormwater runoff events. In order to adequately monitor for potential discharges from dormant spray applications there is need to develop a technically valid approach for determining worst-case violations of the use of these pesticides. Agricultural interests will likely be able to control stormwater runoff of these pesticides during low to moderate runoff events. However, as Lee (2005) indicated in his comments on the draft DPR proposed regulations governing dormant application of the OP pesticides, there will be runoff events associated with large storms, when violations of the TMDL goal will likely occur following application. It is under such conditions that there is the greatest potential for high concentrations of OP and other pesticides to be present in runoff from fields, even when the DPR proposed required application restrictions are followed. In order to

---

<sup>1</sup> Reference as Lee, G. F., and Jones-Lee, A., "Recommended SJR OP Pesticide TMDL Compliance Monitoring," Submitted to William Jennings California Sportfishing Protection Alliance, Report of G. Fred Lee and Associates El Macero, CA October (2005).

provide a technically valid assessment of compliance with the TMDL target goals, the compliance monitoring should specifically include monitoring immediately after major runoff events when there is the greatest likelihood of failure to comply with TMDL targets.

### **Non-Dormant Applications**

The runoff/discharges following application of chlorpyrifos and/or other pesticides in the spring, summer and fall should be monitored to determine whether violations of chlorpyrifos the water quality objective occur. As part of developing the application protocol for non-dormant pesticides an examination should be made of the conditions that have in the past led to aquatic life toxicity or violations of the TMDL target goals for non-dormant pesticide. The compliance monitoring regimen should include periodic examination of how pesticides are being used in the San Joaquin River watershed. This information should be used to guide development and implementation of the ongoing TMDL compliance monitoring program.

### **Monitoring Methodology**

The TMDL compliance monitoring should include determination of the total amount of aquatic life toxicity measured in a sample and how much of that toxicity can be accounted for based on the concentrations of diazinon and chlorpyrifos found in the sample. This type of monitoring was used in the studies we conducted in the mid-to-late-1990's in the Upper Newport Bay—Orange County California stormwater runoff monitoring for the Santa Ana Regional Water Quality Control Board. Reports on those studies are available at <http://www.gfredlee.com/punbay2.htm>. These interactive studies involved working closely with the laboratory doing the toxicity testing to determine the total toxicity in the sample; when a sample showed enough toxicity to kill several of the test organisms in one to two days, the study plan called for follow up testing on that sample.

TMDL compliance monitoring should similarly incorporate a requirement that for each sample that shows potentially significant short-term toxicity, a fairly complete GC analysis of the sample be conducted to determine the amounts of the OP pesticide and carbamate pesticides present in the sample. With that information and by conducting additional toxicity testing on a refrigerated stored sample of the water of concern in a dilution series with and without piperonyl butoxide (PBO) at 100 µg/L, it is possible to determine how much of the toxicity may be caused by the OP pesticides (diazinon and chlorpyrifos). The inclusion of PBO in some of the test samples is part of a directed toxicity identification evaluation (TIE) procedure designed to determine whether the toxicity found is likely due to an OP pesticide.

If there are elevated concentrations of potentially toxic heavy metals relative to US EPA water quality criteria, their toxicity can be evaluated through the addition of EDTA to the sample. If some/all of the toxicity disappears upon the addition of EDTA, it is likely that one or more of the heavy metals is the cause of at least some of the toxicity found in the sample. This approach was used by Lee and Taylor (2001a) to find that the heavy metals

in the urban and rural stormwater runoff was not the cause of the aquatic life toxicity found in this runoff.

It is important to measure diazinon and chlorpyrifos concentration with adequate sensitivity to detect their presence at potentially toxic levels considering the additive toxicity of diazinon and chlorpyrifos and other OP and carbamate pesticides. The US EPA 8141 Special Low-Level gas chromatographic procedures with an increased evaporation step in order to achieve higher sensitivity can be used for this purpose. The University of California, Davis Aquatic Toxicology Laboratory has been using ELISA procedures which have a lower detection limit for diazinon of about 30 ng/L and for chlorpyrifos of about 50 ng/L.

Through a sample dilution series (e.g., 100%, 50%, 33%, 25%, 20%, 16.6%, 12.5% and, for highly toxic samples, 6.25%) of the sample should be tested in the presence and absence of PBO in the sample, it should be possible to detect whether pyrethroid pesticides present in the sample are contributing to the aquatic life toxicity in the sample. Use of this approach in our Orange County Upper Newport Bay studies revealed that there was a substantial amount of toxicity caused by unmeasured/unidentified chemicals or conditions that needed to be addressed through further TIE studies (Lee and Taylor (2001b).

The US EPA methods (US EPA, 2002a,b,c) should be used for the toxicity testing done using *Ceriodaphnia* and for some samples, fathead minnow larva. For samples that could involve discharges to marine/estuarine waters, the toxicity testing should be conducted with mysids after adjusting the salinity of the freshwater to 20 parts per thousand using sodium chloride.

### **Sediment Toxicity**

The OP pesticide TMDL compliance monitoring should include sediment toxicity testing using the US EPA (2002d) procedure using *Hylella azeteca* as the test organism. Only the acute testing procedure should be conducted since the chronic testing procedure has been found by Weston (2005) to be unreliable.

### **Aquatic Life Toxicity Monitoring for Non-TMDL Pesticide Situations**

The recommended TMDL compliance monitoring program presented herein is also applicable to all aquatic life toxicity monitoring in stormwater runoff, and fugitive water and tail water discharges. Monitoring programs that only measure water column toxicity without the follow up monitoring recommended herein fails to provide the information needed to provide magnitude of the toxicity and its potential cause.

### **References**

Lee, G. F., "Comments on DPR Proposed Revision of Dormant Pesticide Application Requirements," Report of G. Fred Lee & Associates, El Macero, CA, Aug 1 (2005).  
<http://www.members.aol.com/annejlee/DPR-DormantSprayReg.pdf>

Lee, G. F. and Taylor, S., "Results of Heavy Metal Analysis Conducted During 2000 in the Upper Newport Bay Orange County, CA Watershed," Report of G. Fred Lee & Associates, El Macero, CA (2001a).

<http://www.members.aol.com/apple27298/Heavy-metals-319h.pdf>

Lee, G. F. and Taylor, S., "Results of Aquatic Toxicity Testing Conducted During 1997-2000 within the Upper Newport Bay Orange County, CA Watershed," Report of G. Fred Lee & Associates, El Macero, CA (2001b).

<http://www.members.aol.com/apple27298/295-319-tox-paper.pdf>

US EPA, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Marine and Estuarine Organisms," US Environmental Protection Agency, Washington, D.C. (2002a). <http://www.epa.gov/OST/WET/disk1/>

US EPA, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms," Fifth Edition, US Environmental Protection Agency, Office of Water, Washington, D.C. (2002b).

<http://www.epa.gov/OST/WET/disk2/>

US EPA, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms," EPA-821-R-02-013, US Environmental Protection Agency, Office of Water, Washington, D.C. (2002c).

<http://www.epa.gov/OST/WET/disk3/>

US EPA. "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates." Second Edition, U.S. Environmental Protection Agency, EPA/600/R-99/064, Washington, D.C. (2000d).

<http://www.epa.gov/ost/cs/freshfact.html>

Weston, D., Presentation to the CVRWQCB TIC Rancho Cordova, CA (2005).