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September 11, 2003

Re: SWRCB/OCC Files A-1586, 1586(a), 1586(b), 1586(c), 1586(d), 1586 (e) or 1586(f)

Elizabeth Miller Jennings, Esq.
Senior Staff Counsel IV
SWRCB
P. O. Box 100
Sacramento, CA 96812-0100

Dear Attorney Jennings:

In response to your September 3, 2003, letter in which you state that interested parties may file written comments on the Petition A-1586, et al., I wish to submit the attached comments.

The DeltaKeeper petition on this matter made several references to my comments on the deficiencies in the Central Valley Regional Water Quality Control Board (CVRWQCB) draft Agricultural Waiver water quality monitoring program. I believe that my previous comments on the draft Agricultural Waiver water quality monitoring program are part of the administrative record that is to be forwarded to you by the CVRWQCB. Upon review of the CVRWQCB final Agricultural Waiver water quality monitoring program, I found that the CVRWQCB did not correct many of the significant deficiencies in the water quality monitoring program that I had discussed in my comments on the draft Agricultural Waiver water quality monitoring program. As a result, the currently adopted Agricultural Waiver water quality monitoring program will result in developing substantial water quality data that cannot be used to reliably evaluate the water quality characteristics and impacts of the irrigated agriculture stormwater runoff and tailwater/subsurface drain water discharges. Since the CVRWQCB did not address these issues, it will be necessary for the State Water Resources Control Board, as part of review of the petitions, to correct the significant problems with the current Agricultural Waiver water quality monitoring program.

As discussed in the attached comments, the current Agricultural Waiver water quality monitoring program will not adequately and reliably define the water quality impacts of irrigated agricultural runoff/discharges on the beneficial uses of Central Valley waterbodies. Further, this program will not provide the information needed to develop the revised Agricultural Waiver program within the timeframe that the CVRWQCB has established for implementing this program.

These comments are submitted in support of improving the quality of the science used to develop/implement the Agricultural Waiver water quality monitoring program. If there are questions or comments on the attached comments, please contact me.

Sincerely yours,

G. Fred Lee, PhD, DEE

GFL:ds
Encls.

Copy to CVRWQCB and the Petitioners

Comments on the Monitoring and Reporting Program for CVRWQCB Order No. R5-2003-0826 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands

Dated July 11, 2003

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September 11, 2003

On July 11, 2003, the Central Valley Regional Water Quality Control Board (CVRWQCB) adopted Order No. R5-2003-0826, covering a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands. This conditional waiver contains a Monitoring and Reporting Program for Watershed Groups, which in Section 4 Minimum Requirements includes Table 1 Constituents to be Monitored. I provided comments on the problems of the previous drafts (April 24/25, 2003, and June 24, 2003) on the monitoring parameter requirements. In reviewing the July 11, 2003, final agricultural waiver water quality monitoring program requirements, it is found that a number of the same problems are still present that were discussed previously in my comments on the earlier draft agricultural waiver water quality monitoring program requirements.

As discussed previously, a number of the monitoring parameters and proposed approaches will lead to inadequate, unreliable, and in some cases, uninterpretable data on the characteristics of stormwater runoff and tailwater/subsurface drain water discharges from irrigated agricultural areas in the Central Valley. In order to use the funds spent on agricultural waiver water quality monitoring in a technically valid, cost-effective manner, it is essential that revisions be made in the monitoring program parameters to work toward achieving reliable, meaningful data from the monitoring program mandated by the agricultural waiver program. Presented below are many of the same comments that were made on previous drafts on the list of required monitoring parameters. Background to these comments is presented in,

> Lee, G. F. and Jones-Lee, A., "Issues in Developing a Water Quality Monitoring Program for Evaluation of the Water Quality - Beneficial Use Impacts of Stormwater Runoff and Irrigation Water Discharges from Irrigated Agriculture in the Central Valley, CA," California Water Institute Report TP 02-07 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 157 pp, California State University Fresno, Fresno, CA, December (2002).
> http://www.gfredlee.com/Agwaivermonitoring-dec.pdf

Physical Parameters

In Table 1, under Physical Parameters, the staff have listed a number of chemical parameters as physical parameters. pH, electrical conductivity, dissolved oxygen, color, turbidity, TDS and TOC are chemical parameters.

Flow. In order to reliably estimate potential pollutant loads, flow measurements must be made continuously, not intermittently at the time of sampling, as proposed. The intermittent time-of-sampling flow measurements can readily lead to significant errors in estimating the loads of a potential pollutant. The flow reporting units are traditionally "cfs," in lower case. Lower case is used in the text for abbreviation of "cubic feet per second," and it should be used in the table, as well.

pH, DO and Temperature. Specifying that pH, DO and temperature be measured, without providing guidance as to the time of day when the measurements are to be made, is an inappropriate approach. For many waterbodies, especially agricultural drains, it would be expected that the time of day and the depth within the agricultural drain at which measurements are made will influence the pH, temperature, and dissolved oxygen values.

A recent example of the importance of making DO measurements in the early morning in an agricultural discharge dominated waterbody occurred on August 5, 2003, in Old River near the Tracy Blvd. bridge. A large fish kill was observed at about noon. The DO at the time was about 3 mg/L; however, DWR had a continuous monitoring station in this area, which showed that from midnight to about 8:00 AM, the DO was near zero, and was likely the cause of the fish kill.

The CVRWQCB Basin Plan water quality objectives for pH and dissolved oxygen specify a concentration that should not be exceeded at any time or location in the waterbody. Since pH can change by several units from early morning to late afternoon, and DO can change by several mg/L from early morning to late afternoon, it is essential that, if compliance with the water quality objective for pH is to be evaluated, measurements at about 4:00 PM should be specified. If compliance with the water quality objective for DO is to be assessed, then measurements between 6:00 and 8:00 AM should be specified. These are typical times when these parameters will be at their maximum for pH, and minimum for DO. Allowing a discharger to measure pH and DO when it is convenient to them, or when the values are at their least or greatest, for pH and DO, respectively, leads to unreliable assessments of compliance with water quality objectives.

The time of day when temperature measurements are made is important and must be specified. Since, often, temperature change over a short period of time is a critical factor, the minimum temperature in early morning and maximum temperature in late afternoon should be measured. Further the temperature profile in the water column should be measured to determine if thermal stratification is occurring.

EC and TDS. Electrical conductivity is highly dependent on temperature. Some instruments attempt to correct for temperature. Others do not. This leads to the development of data where

the electrical conductivity is dependent on the time of day, because the temperature can change with the time of day. Electrical conductivity should be corrected to 20 or 25°C, either automatically through temperature compensation in the conductivity instrument, or through determining, through laboratory studies, how EC for a particular water changes with temperature. The temperature of the corrected value should be included with the data.

With respect to requiring measurements of TDS and EC, a note should be added that indicates that after measuring TDS and EC on a particular water over a year or so, it will be possible to develop a factor that relates EC at 20°C to TDS. This then eliminates the need for further more expensive measurements of TDS in future monitoring.

Color. There are two forms of color: true color and apparent color. True color is obtained by filtering the sample, thereby removing turbidity. A list of monitoring parameters, such as Table 1, must specify whether true or apparent color is to be monitored. If it is true color, then the filter pore-size should be specified. Otherwise, essentially meaningless data will be generated.

Drinking Water Parameters

In Table 1, under Drinking Water, *E. coli* and Total Organic Carbon are listed. These are appropriate parameters. *E. coli* is important with respect not only to drinking water, but also to contact recreation. Also, dissolved organic carbon should be added to this list. The listing of chloroform, bromoform, dibromochloromethane and bromodichloromethane in this table will cause those doing the monitoring to waste funds making measurements of these parameters unless there are domestic wastewater discharges upstream of the monitoring location. These parameters are trihalomethanes (THMs) formed from the addition of chlorine as part of disinfecting water supplies. They would not be expected to be present in agricultural runoff, and even if they were present, they would not be an important parameter in the Central Valley that would justify spending funds for obtaining data on them, since THMs are rapidly lost from surface waters through volatilization and do not persist for long distances in surface waters.

TOC. While the US EPA has developed drinking water TOC concentration limits to control excessive THM formation, in order to regulate TOC discharges it is necessary to have these TOC limits adopted into the Basin Plan. It is known from past monitoring that both the mainstem and many of the tributaries of the Sacramento and San Joaquin Rivers have excessive TOC compared to the US EPA guideline values. As discussed by Lee and Jones-Lee (2003) in their report,

> Lee, G. F. and Jones-Lee, A., "Issues that Need to Be Considered in Evaluating the Sources and Potential Control of TOC that Leads to THMs for Water Utilities that Use Delta Water as a Water Supply Source," Report of G. Fred Lee & Associates, El Macero, CA, May 27 (2003), http://www.gfredlee.com/TOC_update.pdf,

TOC measurements should be accompanied by planktonic algal chlorophyll and BOD measurements in order to determine the refractory versus labile TOC present in the samples. Agricultural interests and other dischargers of TOC should only be required to control TOC that is refractory – i.e., can reach a domestic water supply water treatment plant and thereby influence THM formation in the treated water supply. Some of the TOC discharged by agricultural and other sources in the Central Valley will, at times, not reach a domestic water supply intake, as a

result of its degradation in transport from the source to the intake. These issues are reviewed by Lee and Jones-Lee (2003).

Pesticides

In Table 1, under Pesticides, the organophosphorus and carbamate pesticides should be monitored, using low-level detection limit analytical procedures. Conventional procedures do not measure several of these parameters with sufficient sensitivity to determine if they are present at concentrations that are potentially adverse to aquatic life.

The July 11, 2003, final monitoring program persists with requirements for measuring the organochlorine "legacy" pesticides, such as DDT, toxaphene, chlordane, dieldrin, etc., in water. As discussed by Lee and Jones-Lee (2002a), the approach that should be followed is to collect fish once during the year from the waterbody being sampled, and measure whether the fish tissue has excessive concentrations of these pesticides. As part of these measurements, PCBs should also be analyzed, since previous work on fish tissue residues from agricultural drain fish have shown that some of them have excessive PCBs. Based on a review that Drs. Lee and Jones-Lee conducted last fall (Lee and Jones-Lee, 2002a) of the existing PCB fish tissue data, there are agricultural areas where PCBs have bioaccumulated in fish to excessive levels. Therefore, PCBs should be included in the chemicals that are examined as part of the agricultural waiver monitoring program.

Trying to measure organochlorine legacy pesticides and PCBs using chemical methods is a waste of time and money, since the analytical methods do not have the sensitivity to measure them at critical levels that can bioaccumulate to excessive levels in fish tissue, which represents a health threat to those who use the fish as food.

Another parameter that needs to be measured in fish, for at least some samples, is dioxins and furans. There are a variety of sources, including agricultural sources, of dioxins, which should be evaluated.

With respect to monitoring for pyrethroid pesticides and herbicides, large amounts of money could be spent attempting to monitor for these parameters, which would generate little or no useful data. The monitoring for these types of pesticides and herbicides should be based on their use in the watershed. Further, adequate sensitivity should be used to measure the pyrethroid pesticides at potentially toxic concentrations.

The proposed prioritization that was given to requiring that pesticide monitoring be delayed until the second phase is inappropriate. Appropriate pesticide monitoring should be part of the first phase of the monitoring program, where pesticides that have been used or are currently being used in a watershed are monitored as part of the Phase I efforts. This is based on the fact that toxicity measurements are not an effective screen for pesticide-caused aquatic life toxicity, except at high levels of pesticides. Pesticides, such as diazinon and chlorpyrifos, can be present in water at toxic levels and not cause toxicity to aquatic life in the standard tests specified in the monitoring requirements. The US EPA's approach for developing water quality criteria for potentially toxic substances involves estimating the "safe" concentration of the substance which should not cause toxicity to about 95 percent of aquatic life forms. This "safe"

concentration (water quality criterion) is considerably less than the concentration that causes toxicity in a standard toxicity test.

In order to evaluate for toxicity at less than the levels that can be reliably assessed in a standard laboratory toxicity test, data are needed that would show whether diazinon, chlorpyrifos and a number of the carbamate pesticides are present at toxic levels. The measurement of these pesticides should be done with analytical methods that have a reliable quantitation limit (detection limit) of less than 0.1 times the LC_{50} for the test organism in the US EPA OPP Ecotoxicity Database that was used to register the pesticide. The issues of properly measuring pesticides and interpretation of the data from the water column, sediments and fish tissue are discussed in detail by Lee and Jones-Lee (2002a):

> Lee, G. F. and Jones-Lee, A., "Organochlorine Pesticide, PCB and Dioxin/Furan Excessive Bioaccumulation Management Guidance," California Water Institute Report TP 02-06 to the California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 170 pp, California State University Fresno, Fresno, CA, December (2002a). http://www.gfredlee.com/OClTMDLRpt12-11-02.pdf

If fish in a particular agricultural discharge dominated waterbody contain excessive concentrations of organochlorine "legacy" pesticides, PCBs and/or dioxins, then the sediments from that waterbody and upstream should be assessed through the use of US EPA (2000) standardized bioaccumulation testing procedures. Lee, et al. (2002) have demonstrated the use of this approach for evaluating the bioavailable PCBs and organochlorine pesticides in city of Stockton Smith Canal waterway sediments.

Metals

Both total and dissolved metals should be monitored. While only the dissolved metals are regulated in the water column, the total metals are of importance because they can contribute to excessive metal concentrations in sediments.

Mercury should be analyzed in fish tissue from the waterbody being monitored to determine if there is a mercury source in the watershed that is leading to excessive mercury bioaccumulation in fish tissue. It is recommended that methylmercury be measured in waterbodies where the fish taken from the waterbody have been found to contain excessive mercury residues in edible tissue. Information on regulating mercury in water, fish tissue and sediments has recently been reviewed by Lee (2003).

Nutrients

With respect to nutrients (on page 8 of Table 1), ammonia must be added to this list so that it is possible to calculate the organic nitrogen concentration from the ammonia and the TKN concentrations. Ammonia is also a toxicant that could be important in both the water column and sediments, and should be measured. In addition, ammonia is a source of oxygen demand that needs to be measured.

Phosphorus measurements should include both total phosphorus and soluble orthophosphate measurements. This information is essential to properly determining whether the phosphorus data are related to algal available P.

There is no reason to measure potassium. Any funds spent on measuring potassium will be a waste of money. Potassium is not a limiting nutrient in aquatic systems. There is always adequate potassium to meet algal and other aquatic plant needs.

The appropriateness of prioritization to Phase II for certain water quality parameters, such as nutrients, is questionable. The additional cost to include nutrients in Phase I is small compared to the overall cost of the monitoring. Except for a few parameters, the cost of analysis is largely associated with sample collection. Nutrients from agricultural sources are causing major water quality problems in Central Valley waterbodies; however, since there are only narrative guidelines for "Biostimulatory Substances," there is need for the CVRWQCB to define what constitutes excessive biostimulation and the relationship to nutrients. These issues are discussed in the report,

> Lee, G. F. and Jones-Lee, A., "Review of Management Practices for Controlling the Water Quality Impacts of Potential Pollutants in Irrigated Agriculture Stormwater Runoff and Tailwater Discharges," California Water Institute Report TP 02-05 to California Water Resources Control Board/Central Valley Regional Water Quality Control Board, 128 pp, California State University Fresno, Fresno, CA, December (2002b). http://www.gfredlee.com/BMP_Rpt.pdf

As part of monitoring nutrients, planktonic algal chlorophyll, pheophytin and Secchi depth should be included as monitoring parameters. These parameters are needed to begin to evaluate the nutrient data.

Oxygen Demand Parameters

There is need to monitor oxygen demand parameters such as $BOD_{10,}$ ammonia, chlorophyll and pheophytin in any situation where there is a DO concentration below the water quality objective at the sampling location and downstream. BOD_{10} should be added to the list of monitoring parameters.

Bioassessment

Bioassessment is a useful tool in water quality investigations in the right setting. However, it must be done correctly. It will be difficult to use bioassessment reliably in Central Valley waterbodies to evaluate the impacts of agricultural runoff/discharges on receiving water beneficial uses. There are no suitable reference waterbodies against which bioassessment data on an agricultural drain or agricultural discharge dominated waterbody can be evaluated. Large amounts of funds could be spent on conventional bioassessment measurements, yet gain little in definitive useful information. Lee and Jones-Lee (2002c) have discussed how bioassessment could potentially be used in evaluating the water quality impacts of agricultural runoff/discharges. Of particular concern is the approach of monitoring upstream and downstream of an agricultural discharge for assessing altered organism assemblages associated

with the discharge. Also, short-term measurements should be made of benthic/epibenthic organism assemblages that address the impacts of toxic pulses in agricultural runoff/discharges.

Monitoring Locations and Duration

Monitoring should be required at river mainstem, basin, drain and representative edge-of-field locations. The monitoring at each location must be ongoing in perpetuity. One or two years of monitoring at a location is insufficient to properly characterize the water quality at that location, due to year-to-year variation in climate and agricultural practices. The comprehensive monitoring program must be initiated immediately, if the data needed to develop the revised final agricultural waiver monitoring program is to be available in the timeframe that the CVRWQCB has established.

Managed Wetlands

Managed wetlands discharges in the Central Valley are sources of pollutants that need to be monitored for impacts on receiving water quality.

Importance of Providing Adequate Funding to Implement the Agricultural Waiver Monitoring Program

Agricultural interests, the CVRWQCB/SWRCB and environmental interests do not have the funds needed to properly implement the proposed agricultural waiver monitoring program. Major additional funding must become immediately available if this proposed agricultural waiver program and its associated monitoring program are to be accomplished in the required time frame.

Evaluation of the Water Quality Significance of Exceedance of a Water Quality Objective

Since the CVRWQCB chemical-specific numeric water quality objectives are based on worst-case (most toxic and available) conditions, it is necessary, in accordance with the Clean Water Act, to adjust the water quality objectives for site-specific conditions. Lee and Jones-Lee (2002c) have provided guidance on how this should be done. In the absence of site-specific studies, the worst-case-based water quality objectives will have to be used to regulate agricultural discharges/runoff. The funding of this program should include funding to cover the site-specific adjustments of water quality objectives.

Need for Guidance for Implementing Narrative Water Quality Objectives

The use of the CVRWQCB narrative water quality objectives, such as for nutrients (biostimulatory substances), sediments, etc., requires that additional site-specific information be developed through a site-specific evaluation of the regulatory requirements for the constituent(s) of concern. It is important to develop funding to accomplish the needed site-specific studies. These issues are discussed in Lee and Jones-Lee (2002b,c).

Review of the Adequacy of the CVRWQCB Implementation of the Agricultural Waiver Water Quality Monitoring Program

The agricultural waiver water quality monitoring program will place a significant additional work load on the CVRWQCB staff far beyond the resources available for review of watershed group monitoring program submissions. Without the funding to properly implement

the program, it will not accomplish the program objectives of regulating real significant water quality – beneficial use impairment in the most technically valid, cost-effective manner.

Monitoring Data Availability and Agricultural Waiver Needs

In order for the public to gain confidence in the agricultural waiver program implementation, the public must have full, ready access to all submissions on this agricultural waiver monitoring program. There is need to establish a process whereby the public has ready access to the submissions of the watershed groups and the proposed actions by the CVRWQCB Executive Officer on the watershed waiver/monitoring submissions.

Use of the Monitoring Data for Agricultural Waiver and CEQA Development

There is a major disconnect between the timing of the proposed agricultural waiver monitoring program and the need for information as part of developing the "revised-tentatively finalized" agricultural discharge regulatory program. If adequate monitoring is not done in a timely manner, it will not be possible to reliably define the conditions that are to be included in a revised final agricultural waiver program that is to be developed in about two years. Applicable waiver conditions should be established based on reliable data that characterize water quality that is significantly influenced by agricultural tailwater and subsurface drain discharges and stormwater runoff. Further, reliable data are needed to support the implementation of management practices for controlling the agricultural discharges/runoff. The current disconnect between when the agricultural waiver monitoring program results will be available and the development of the "revised-tentatively finalized" agricultural discharge regulatory program should be resolved.

Need for Agricultural Waiver Water Quality Monitoring Technical Advisory Panel

The agricultural waiver water quality monitoring program developed by the Central Valley Regional Water Quality Control Board will generate a substantial amount of data on the characteristics of agricultural stormwater runoff, tailwater and subsurface drain water and other waters of the Central Valley. In order to utilize these data in a water quality evaluation and regulatory program, there is need to develop guidance on data interpretation with respect to water quality – beneficial use impairment. At the CVRWQCB July 11, 2003, agricultural waiver meeting, I suggested that the CVRWQCB appoint a technical advisory panel to assist the Regional Board and its staff in developing the details of the agricultural waiver water quality monitoring program and guidance with respect to the use of the data generated in the agricultural waiver regulatory program. This approach was supported by the CVRWQCB at the July board meeting.

Lee and Jones-Lee (2002c) have discussed many of the issues that need to be considered in interpreting/utilizing the results of a nonpoint source and point source water quality monitoring program, with respect to assessing the impacts of the constituents measured on the beneficial uses of waterbodies. They point out that, for many of the parameters of concern in agricultural drainage/runoff, it is not possible, from the current Basin Plan requirements, to relate the concentrations found to impairment of beneficial uses of waterbodies. While an exceedance of a chemical-specific numeric water quality objective is defined for regulatory purposes as an impairment of beneficial use, in fact, based on how the criteria and standards are developed to be protective under worst-case conditions, there are situations where an exceedance of a numeric

worst-case criterion does not represent a significant impairment of the beneficial uses of the waterbody. For example, for those constituents that are of importance because of their potential to cause aquatic life toxicity, there are situations where concentrations above the criterion value can be present in water without adverse impacts on the numbers, types and characteristics of aquatic life in the waterbody at the point of measurement and downstream thereof. Many of the constituents of concern exist in a variety of chemical forms, only some of which are toxic/ available. The chemical analytical methods used do not distinguish between the toxic/available forms and the inert forms. This should be done through a site-specific Evaluation Monitoring program of the type described by Jones-Lee and Lee (1998).

In order to cost-effectively manage agricultural stormwater runoff and tailwater/ subsurface drain water discharges, it is suggested by Lee and Jones-Lee (2002c) that the Regional Board appoint a technical advisory panel that would develop a representative set of agricultural waiver monitoring data from existing information that would cover the expected concentration range of data that would likely be generated in the agricultural waiver water quality monitoring program for various types of situations from agricultural land stormwater runoff or agricultural tailwater and subsurface drain water discharges. This advisory panel would then work with the Regional Board staff in conducting a review of the use of these data in the agricultural waiver water quality management program. This exercise would show the need for developing additional guidance on the use of agricultural waiver monitoring data in the agricultural waiver water quality regulatory program. Further, it would better define the additional monitoring needed to properly interpret the data to comply with the narrative water quality objectives in the Basin Plan.

Failure to adopt this approach will lead to data generated in the agricultural waiver water quality monitoring program that are of limited utility in the agricultural waiver water quality management program. Attempts to use the data without considering the site-specific characteristics of how chemicals impact the beneficial uses of water, can lead to overregulation of agricultural discharges/runoff beyond that needed to protect the designated beneficial uses of waterbodies receiving such runoff.

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