IL50.

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Subject:	Comments on the ILRP draftr EIR
Attachments:	ILRPComREV.pdf

ILRP Comments
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Please find attached our comments on the ILRP draft EIR.

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ILRP Comments
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September 25, 2010

Comments on
Draft Program Environmental Impact Report for a Waste Discharge Regulatory Program for Irrigated Lands within the Central Valley Region
Submitted by

G. Fred Lee, PhD, AAEE Bd. Cert. Env. Eng., F.ASCE
Anne Jones Lee, PhD
G. Fred Lee & Associates
El Macero, California

In response to a request for comments on the Draft Program Environmental Impact Report for a Waste Discharge Regulatory Program for Irrigated Lands within the Central Valley Region we wish to submit these comments.

Overall we find that the five alternatives listed in the draft EIR are not necessarily appropriate for providing guidance for establishing the future direction of the Central Valley Irrigated Lands Regulatory Program (ILRP). Adoption or continuation of any of the five alternatives, including the current program, cannot be expected to achieve the regulatory goals of protecting the water quality/beneficial uses of Central Valley waterbodies that are impacted by discharges/runoff from irrigated lands. Based on my (G. Fred Lee) more than 40 years of experience in development and implementation of water quality programs some of which have been directed to agricultural sources of pollutants, whichever of those alternatives the Central Valley Regional Water Quality Control Board (CVRWQCB) may adopt, it will be challenged by environmental groups and, if not overturned at the state (State Water Resources Control Board-SWRCB) and federal (USEPA) levels, it will likely be found by the courts to fail to fulfill the regulatory requirement to protect the water quality of Central Valley waterbodies from adverse impacts of discharges from irrigated lands.

The CVRWQCB Monitoring and Reporting Program Order No. R5-2008-0005 for Coalition Groups under Amended Order No. R5-2006-0053 Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands Adopted in 2008 states:
"MRP OBJECTIVES
The Water Code mandates that monitoring requirements for a Waiver be designed to verify the

adequacy and effectiveness of the Waiver's conditions. One of the conditions of the Waiver is that discharges of waste from irrigated lands to surface waters of the State shall not cause or contribute to an exceedance of an applicable water quality standard."

This requirement means that, in accord with the Clean Water Act and the CWRWQCB, none of the water quality objectives (WQOs), including numeric and narrative objectives and covering all impairments of the designated beneficial uses of the state's waters, can be exceeded by any amount more than once in a three-year period. This requirement applies to all of the state's waters.

It is important to understand that just meeting all of the US EPA water quality criteria/ CVRWQCB water quality objectives for potentially toxic chemicals as required in the ILRP does not ensure protection of aquatic life from toxicity of the known potential pollutants as well as of chemicals for which there are no water quality criteria; a combination of potentially toxic chemicals in concentrations less than their respective toxic concentrations can cause toxicity by additive and/or synergistic effects. While additive and synergistic toxicity impacts are well-known to occur, the US EPA does not incorporate that information in its aquatic life criteria for potentially toxic chemicals that are used for the regulation of toxic chemicals based on numeric water quality standards. The CVRWQCB WQOs only consider a very limited number of additive impacts of mixtures and do not address synergistic impacts. This deficiency can be addressed to some extent through the appropriate measurement of aquatic life toxicity, and highlights the need to evaluate aquatic life toxicity in establishing compliance with water quality criteria/objective to protect aquatic life resources of the Central Valley waterbodies from the impacts of toxic chemicals in irrigated agriculture runoff/discharges. However the use of toxicity measurements will need to be greatly expanded from the current use to achieve this approach.

Comments on proposed alternatives identified in the draft ILRP EIR for governing the future direction of the ILRP follow.

Alternative 1 ("No Project" Alternative). This alternative of continuing the current regulatory program falls far short of adequately defining the occurrence and water quality impacts of irrigated lands discharges/runoff. The current program is based on the "Monitoring and Reporting Program Order No. R5-2008-0005 for Coalition Groups under Amended Order No. R5-2006-0053 Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands Adopted on 25 January 2008." A copy of that program is available at:
http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/waivers/r5-2008-0005_mrp.pdf.

We provided detailed comments (see attached list of papers and reports) on significant technical deficiencies in that monitoring program for the development of an information base upon which it would be possible to reliably evaluate the occurrence and significance of the discharge of pollutants from irrigated lands that cause violations of water quality standards in the state's waters and/or impairment of the beneficial uses of Central Valley waters in the case of nutrients, TOC, and other contaminants for which no numeric water quality objectives have been adopted.

Our comments on technical deficiencies in that monitoring program are available on our website, www.gfredlee.com, in the Surface Water Quality section, the Agricultural Impacts on Water Quality subsection. A copy of our specific comments on the then-final ILRP MRP is attached. Also attached is a discussion of some the issues that need to be considered in developing the ILRP to achieve the program requirements.

While some of the then-proposed water quality monitoring program deficiencies were corrected by the staff after receiving our comments, there were several major deficiencies that were allowed to be implemented in the current water quality monitoring/evaluation program the most important of which is the failure to adopt edge of the field and upstream monitoring. It appeared to us that the CVRWQCB took the position that it would ignore these deficiencies in order to reduce the cost of water quality monitoring/evaluation and thereby gain acceptance of the irrigated lands regulated community to participate even to a limited extent in the monitoring program. To now propose to continue what is obviously a significantly deficient monitoring/evaluation program as proposed in *Alternative 1* is not acceptable.

In our previous comments we stressed the need for monitoring at the edge-of-the-field and in nearby state waters to define the worst-case impacts of toxic and other chemicals discharged from agricultural activities. In some waterbodies the worst case impacts could be detrimental to fish spawning/rearing areas that would not be detected by the current downstream at a single monitoring location as practiced in the current monitoring program. This type of monitoring is also essential to evaluate the effectiveness of management practices to control WQO violations in the states waters. We also discussed the need to monitor downstream of the current monitoring locations to evaluate the impact of nutrients on downstream water quality.

The staff-recommended alternative analysis of costs and other impacts presented in the draft EIR does not reflect the true costs to achieve reasonably complete evaluation of the current water quality problems caused by irrigated agriculture discharges to surface and groundwaters. The deficiencies in the ability of the current water monitoring program to provide a proper description of the magnitude of the water quality problems caused by current agricultural discharges render the detailed analysis of these issues presented in the draft EIR unreliable. Without a technically solid assessment of water quality problems that arise at edge of the field and downstream, it is impossible to reliably estimate the control programs needed, much less the cost of implementation of control programs or their impacts on agricultural activities or water quality in the Central Valley. While a considerable amount of money has have been spent on limited aspects of the current downstream water quality monitoring, it is not possible to estimate the cost of a comprehensive water quality monitoring program that can detect essentially all the WQO violations that occur upstream, and for nutrients downstream, of the current water quality ILRP monitoring locations.

If this program is to fulfill the regulatory requirements of the program, the future water quality monitoring/evaluation program for the ILRP must include comprehensive monitoring of representative edge-of-the-field discharges and waters downstream from the discharge for the full range of potential pollutants that are likely to be in the agricultural discharge/runoff or to develop downstream as a result of the discharge. Where the discharge of pollutants (constituents that impair designated beneficial uses of the state's waters) is found, the discharger(s) should

evaluate and implement to the extent economically possible/feasible control measures for the pollutants at the source. The monitoring and evaluation of the pollutant control programs must be comprehensive such that it can provide a reliable foundation for developing and assessing the economic feasibility of implementing the pollutant control program.

Alternative 2 — Third-Party Lead Entity includes third-party monitoring of surface waters and is expanded to include some groundwater quality monitoring. The expansion of the ILRP to include evaluation and potential control of pollution of groundwater by irrigated lands is an important step toward beginning to protect the groundwater resources of the Central Valley. In our previous comments on deficiencies in the ILRP we have repeatedly pointed out that the control of groundwater pollution should be part of the program. Our comments on groundwater pollution in the Central Valley by irrigated agriculture are available on our website in the Groundwater Quality Protection section at http://www.gfredlee.com/plandfil2.htm#gwprotection. A list of our papers and reports that address issues of groundwater pollution by irrigated agriculture is attached to these comments. As discussed in those writings, it has been well-established that irrigated agriculture cannot be practiced without causing groundwater pollution by salts and nitrate. The best that can be achieved is the minimization of groundwater pollution. This should be the goal of this part of the program.

The draft EIR does not provide adequate information on the characteristics of groundwater monitoring program to develop a reliable early warning monitoring program to detect management activities by agriculture to protect groundwater from further pollution. This approach is discussed in our reports concerning the protection of groundwater quality in the Central Valley. Without this information it is not possible to estimate the costs for implementation of the program.

The claim made by several agricultural representatives at the CVRWQCB September 22, 2010 meeting, that nitrate and salts do not pollute deeper groundwater because of depth to groundwater, is not technically valid. Examination of the groundwater pollution that has occurred in the Delano and McFarland areas of the Central Valley readily demonstrates the invalidity of their claim. Having grown up in Delano, G. Fred Lee is well-aware of the pollution of the area groundwater by agriculture-derived nitrate to the point that the nitrate MCLs were exceeded in water in municipal water supply wells. While some pollutants have limited ability to penetrate the unsaturated zones of aquifers, others, such as salts, nitrate and some pesticides, have limited attenuation in the unsaturated zone; it is only a matter of time before such chemicals in the surface soils pollutant the saturated zone (water table) of the aquifer.

Alternative 2 is deficient, however, in its not requiring early-warning monitoring for groundwater pollution. Without reliable monitoring of that type it is not possible to evaluate the effectiveness of the groundwater management plans.

Alternative 3 — Individual Farm Water Quality Management Program is based on "visual" monitoring. This is not a technically valid approach for controlling water pollution by irrigated agriculture. Evaluation of Farm Water Quality Management plans must be based on comprehensive water quality monitoring at the edge of the field and for nutrients downstream of

the discharges where nutrients are impacting water quality such as in the Delta.

Alternative 4—Direct Oversight with Regional Monitoring is a potentially feasible approach provided that adequate surface and groundwater quality monitoring/evaluation and control of pollutant discharges are achieved including comprehensive edge of the field and downstream monitoring.

Alternative 5 — Direct Oversight with Farm Monitoring has the potential of being effective provided that comprehensive monitoring programs are implemented. However based on the past experience where the CVRWQCB adopted.allowed water quality monitoring programs that were obviously technically deficient there is concern the needed programs would not be required. The cost of this approach would likely cause the approach to not be implementable by small farms. This approach could potentially be used by larger farming interests, but, again, there will be need for comprehensive surface and groundwater monitoring/evaluation and management.

Rather than adopt a single alternative, or a combination of the alternatives, the CVRWQCB needs to first implement a comprehensive water quality monitoring program for surface and groundwaters. With several years' data from such a program it would be possible to start to develop a draft EIR that could reliably assess and outline the cost and effectiveness of control programs for pollutants in surface and groundwaters.

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Comments on the TENTATIVE
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION
MONITORING AND REPORTING PROGRAM
ORDER NO. R5-2008-____ FOR COALITION GROUPS UNDER
AMENDED ORDER NO. R5-2006-0053
COALITION GROUP CONDITIONAL WAIVER OF WASTE DISCHARGE
REQUIREMENTS FOR DISCHARGES FROM IRRIGATED LANDS
Revision 26 November 2007

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The CVRWQCB staff's November 26, 2007 "Tentative" proposed revised Monitoring and Reporting Plan (MRP) for the CVRWQCB Irrigated Lands Conditional Waiver is a somewhat modified version of the staff's draft MRP issued on March 29, 2008. Lee and Jones-Lee in

> Lee, G. F., and Jones-Lee, A., "Comments on 'Working Draft - Draft Monitoring and Reporting Program -Order No. R5-2007-__for Coalition Groups under Amended Order No. R5-2006-0053 Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands' dated March 29, 2007," Report submitted to CVRWQCB, Sacramento, CA by G. Fred Lee & Associates, El Macero, CA, April 13 (2007).
> http://www.members.aol.com/LFandWQ/CommentsWorkingDraftMRP.pdf

provided detailed comments on some of the significant deficiencies in that draft MRP. In additional to comments on a number of technically invalid approaches proposed by the staff for monitoring parameters and related issues. The Lee and Jones-Lee April 13, 2007 comments focused on the unreliable approach that the staff had proposed for the basic monitoring approach of allowing the coalitions to satisfy the MRP requirements based on one grab sample per month at a downstream location. As Lee and Jones-Lee discuss, this monitoring approach cannot reliably provide the data needed to meet the MRP stated objective of detecting violations of CVRWQCB Basin Plan objective by agricultural runoff/discharges. Such a monitoring approach could readily fail to detect upstream adverse impacts of agricultural discharges that are not detected at downstream monitoring locations. It was pointed out that instead of a "hit and miss" MRP monitoring program, that in order to accomplish the MRP objectives it would be necessary to expand the monitoring program to include a highly focused upstream edge of the field monitoring program. If properly developed and implemented such a program would reliably detect agricultural runoff/discharges that cause violations of CVRWQCB Basin Plan water quality objectives. This information could more readily lead to the development of management practices that can control the water quality objective violations. A focused upstream monitoring program where studies are conducted at locations where there is the greatest potential for water quality objectives are likely to occur could save years of ineffective hit and miss downstream monitoring. While this approach could be somewhat more inexpensive than a hit and miss

monitoring approach, in the long term it will be more cost effective in controlling water quality impacts from agricultural discharges/runoff.

Several of the coalition representative objected to initiating a focused upstream edge of the field monitoring claiming that such an approach is more than required in the agricultural coalition.

William Thomas stated an email to the TIC of August 13, 2007 in response to an email from Lee and Jones-Lee regarding the need to expand the MRP to include upstream focused monitoring to accomplish the MRP stated objectives,

> "Thanks for the explanation and I do agree that this is the forum for a far ranging discussion on any scientific issue and it does have some timely reference because we are trying to finalize a new MRP which offers greater flexibility to the coalitions to advance to the board their own long range notion of a monitoring program which reflects their local situation. The global picture however is that we have made fundamental agreements as to what this waiver would entail and the relative obligations of the coalitions who are the parties bearing the costs and actually doing the water quality efforts and those can't be changed unilaterally unless the regional board wants to go back to the original drawing board. The emerging MRP is true to that structure because it will be the coalitions who propose the amendments to the once a month structure if they wish to do so. The coalitions have to guard against governmental creep where programs morph into things which were not envisioned and agreed to."

Basically some of the agricultural coalition representatives claimed that the MRP only needs to require monitoring program independent of its reliability and adequacy in accomplishing the overall purpose of the CVRWQCB Irrigated Lands water quality management program of controlling adverse impacts of irrigated lands runoff/discharges. Those agricultural interests that expose this approach want to continue to practice agricultural activities without controlling the adverse water quality impacts of runoff/discharges. Such an approach is obviously contrary to the public's interests and for that matter agricultural interests since their credibility as a responsible

Lee and Jones-Lee comments on the grossly inadequate proposed hit and miss one sample per month at a downstream location stimulated the TIC to discuss this issue. This discussion lead to the potential modification of the MRP as presented in the November 2007 "Tentative" revised MRP to allow the coalitions to adopt a basic agricultural waiver monitoring program that could include an upstream edge of the field focused monitoring program. The currently proposed MRP greatly strengthens the wording around the need for the coalitions to adopt an MRP that will present a documented program that will clearly accomplish the objectives of the MRP of reliably determining the water quality violations associated with irrigated agricultural runoff/discharges that occur at any location in a coalition's area of responsibility. Based on Dr. G. Fred Lee of 40 years of conducting studies of agricultural runoff/discharges it will not be possible to accomplish this requirement with just a hit and miss downstream once a month grab sampling program. This will require upstream focused edge of the field monitoring programs.

The proposed MRP places the responsibility for reviewing the adequacy of the coalitions monitoring program to meet the MRP requirements on the CVRWQCB Irrigated Lands staff and the Executive Officer. If this review is conducted in a technically valid manner, then implementation of this MRP will be effective beginning to adequately define the water quality objective violations that occur in the Central Valley associated with irrigated agriculture

runoff/discharges. If however the staff are not allowed to fully require the coalitions to conduct an appropriate MRP the irrigated lands conditional waiver will continue to be large ineffective in developing the information needed to begin to effectively control the adverse impact of Central Valley irrigated agriculture.

An alternative to the proposed approach of requiring that the staff being responsible for performing critical reviews of the adequacy of the coalitions proposed MRP, it would be appropriate for the CVRWQCB to appoint an independent advisory board that would have the responsibility of advising the Board on the whether a coalitions proposed MRP can be expected to develop the needed information in a reasonable period of time. This advisory panel would consist of individuals who are experts on water quality evaluation/ management issues. This approach would be a peer review process that could result a review process that would be subject to less political pressure than could occur in internal staff review.

One of the most significant deficiencies in the current MRP is that it repeatedly specifies that the requirements of the MRP apply to agricultural discharges and runoff in the "Coalitions Group Boundaries." Thus far the coalitions monitoring programs and apparently could continue in the future to the monitoring location and if water quality objectives are detected at that location upstream of that location. This approach could result in the failure to evaluate the impact of agricultural runoff/discharges that occur downstream of the coalitions boundaries. As discussed in our previous comments to the CVRWQCB on deficiencies on the agricultural conditional waiver program several of the pollutants discharged by irrigated agriculture in the Central Valley, there are several pollutants discharged by irrigated agricultural activities upstream of the downstream monitoring location that are adverse to water quality a considerable distances downstream of the monitoring location. Irrigated agricultural activities in the Central Valley are the source of nutrients (N and P) that adversely impact water quality in the Delta and in water supply water reservoirs located in the San Francisco Bay area and southern California. Also runoff from irrigated agricultural lands is apparently responsible for excessive bioaccumulation of organochlorine legacy pesticides such as DDT.

Issues in Regulating Water Quality Impacts from Irrigated Agricultural Runoff and Discharges in the Central Valley of California

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February 4, 2009

Introduction

The Central Valley of California is one of the most productive irrigated-agriculture areas in the US. Irrigation practices in the Central Valley, however, result in the transport of a variety of pollutants to the state's waters through stormwater runoff, and tailwater and subsurface drainwater discharges. Pollutants from these sources are causing significant water quality problems in the Central Valley streams, rivers, Sacramento San Joaquin Delta (Delta), and in water supply reservoirs downstream of the Delta. The California State Water Resources Control Board (SWRCB) and the Central Valley Regional Water Quality Control Board (CVRWQCB) are implementing an Irrigated Agriculture Conditional Waiver from Waste Discharge Requirements ("Ag Waiver") program through which discharges/runoff from irrigated agriculture that cause violations of the Regional Board's Basin Plan objectives (water quality objectives (WQOs)-standards) are to be controlled.

The San Joaquin River (SJR) is one of the largest rivers in California and is one of the primary recipient waterways for discharges/runoff from Central Valley irrigated agriculture. Lee and Jones-Lee (2007a,b) discussed the 12 pollutants responsible for Clean Water Act (CWA) section 303(d) "listings" for the SJR for violations of water quality standards/objectives; 8 of those are pollutants derived from runoff/discharges from irrigated agriculture in the SJR watershed. Such listings trigger the development of total maximum daily loads (TMDLs) for the violating pollutants. Owing to these violations, the CVRWQCB has slated the following parameters for TMDL development in the SJR: selenium and boron that occur naturally in some Central Valley soils; salinity derived from soil leaching and accumulation of salts from irrigated agriculture; two organophosphorus pesticides, diazinon and chlorpyrifos, used for pest control in crop production; oxygen-demanding substances (nutrients that develop into algae) that contribute to low dissolved oxygen (DO) conditions in the Stockton Deep Water Ship Channel (DWSC); legacy pesticides (DDT, dieldrin, toxaphene, etc.) formerly used for pest control; unknown-caused aquatic life toxicity; and fecal coliforms (*E. coli).* TMDLs may also be needed to control the following irrigated agricultural discharge-related contaminants: nutrients (N and P compounds) that lead to excessive algae and aquatic weeds; currently used pyrethroid-based pesticides; elevated pH; low DO; TOC/DOC that leads to trihalomethane formation during domestic drinking water disinfection; excessive sediment associated with soil erosion; and sediment toxicity due to unknown causes.

Several of the SJR tributaries also have significant water quality problems due to agricultural discharges. The SJR and Sacramento River join to form the Sacramento San Joaquin Delta, which, as discussed by Lee and Jones-Lee (2007c) contains pollutants that violate WQOs. Many are the same as those noted above for the SJR as being from agricultural discharges to the Delta and tributaries to the SJR. The Sacramento River has 2006 303(d) TMDL listings [http://www.swrcb.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml] that include mercury, and "unknown toxicity" which could be derived from agricultural sources.

In order to define and address these water quality problems, the CVRWQCB has developed an Ag Waiver Monitoring and Reporting Plan (MRP) as part of the Ag Waiver program. The goal of the MRP is to cause agricultural interests to monitor agricultural drains and other waterbodies that receive substantial amounts of runoff/discharges to determine if violations of WQOs attributable to agricultural runoff/discharges are occurring at those locations. The current CVRWQCB Ag Waiver MRP implementation plan requires that if a WQO violation attributed to irrigated agricultural runoff/discharges occurs more than once every three years, the agricultural sources must attempt to develop management plans to prevent future violations. This approach is tantamount to that which has traditionally been applied to point-source discharges, such as publicly owned treatment works (domestic wastewater treatment plants) and industrial wastewaters, whereby discharger are required to not cause violations of US EPA water quality criteria and state standards (in California - water quality objectives) based on those criteria.

Lee and Jones-Lee (2007c) discussed issues that affect the potential effectiveness of the MRP to adequately and reliably define the magnitude and location of the WQO violations, and water quality impacts, caused by Central Valley irrigated agricultural runoff/discharges. They highlighted key shortcomings including that the monitoring and reporting program needs to be significantly expanded to include upstream monitoring locations, and to include greater frequency of monitoring, additional monitoring parameters, targeted event-based monitoring, and especially edge-of-the-field monitoring, to fully define the water quality impacts of irrigated agriculture in the Central Valley. They also discussed how irrigated agriculture in the Central Valley is being over-regulated for some chemicals, and under-regulated for others.

The Lee and Jones-Lee (2007c) comments followed the comprehensive report they developed (Lee and Jones-Lee, 2002a) on behalf of the CVRWQCB that discussed issues that need to be considered in developing an adequate water quality monitoring/water quality evaluation program for assessing water quality/beneficial-use impacts of runoff and discharges from irrigated agriculture. More recently, at the fall 2008 CALFED Science Conference, J. Swanson of the CVRWQCB Irrigated Lands Program discussed the characteristics of the current Ag Waiver program, the MRP as it is being implemented, and their recent findings (Swanson, 2008a,b).

In light of Ag Waiver and MPR undertakings and recent findings, this report revisits key issues that should be considered in regulating runoff/discharges from irrigated agriculture in the Central Valley of California. It is based on the senior author's more than 40 years of experience in investigating the water quality impacts of agricultural runoff/discharges in various areas of the US and over the past 20 years in the Central Valley of California. Lee and Jones-Lee have developed papers and reports pertinent to the appropriate, technically sound regulation of potential pollutants in runoff/discharges from nonpoint sources. This report contains references

to those reports with internet links for their download. While the focus of this discussion is the Central Valley of California, many of the issues discussed are applicable to other locations as well, and, as discussed by Lee and Jones-Lee (2008a), are also pertinent to assessing and managing water quality impacts from urban-area and highway stormwater runoff.

Water Quality Criteria Issues: Application of US EPA Water Quality Criteria.
Lee and Jones-Lee (2002a) discussed pitfalls and limitations in the use of US EPA worst-case-based water quality criteria in the evaluation and regulation of nonpoint-source runoff/discharges. The mechanical application of such criteria/objectives for this purpose, as is now being done in the CVRWQCB Ag Waiver MRP, can lead to over-regulation of such discharges/runoff.

In the 1972 amendments to the Federal Water Pollution Control Act, the "Clean Water Act" (CWA), the US Congress mandated that the US EPA develop national water quality criteria that would be protective in all waters. It had been long-known and well-established that many potential pollutants, such as heavy metals, phosphorus, and many organics, exist in aquatic systems in a variety of chemical forms, only some of which are toxic/available to aquatic life or other beneficial uses of the water. For example, it was understood in the 1960s that, unlike many of the dissolved forms, particulate forms of heavy metals and those that are complexed with organics are not toxic. It also was becoming clear that for many contaminants, impact is a function of the duration of organism exposure. Nevertheless, to meet that all-encompassing CWA objective, criteria were developed for the most toxic/available forms of the subject chemicals; they were established to be protective when organisms were exposed to the available forms for chronic durations (i.e., worst-case conditions). State regulations then became comparisons of such worst-case-based numeric criteria to total concentrations of chemicals in ambient waters for regulatory purposes, an approach that presumes that the subject potential pollutants are in their most toxic/available forms and that organisms stand to be exposed for chronic durations.

As the national water quality criteria began to be used and misused by states in their regulations, the US EPA (1993) finally updated its regulation of heavy metals to focus only on dissolved forms. However that adjustment did not address the fact that not all dissolved forms of heavy metals are toxic largely due to their complexation with organics in natural waters. The US EPA also recognized that application of the worst-case-based water quality criteria in regulations could readily lead to overregulation of potential pollutants; its Water Quality Criteria Handbook (US EPA, 1994) provides guidance on the site-specific adjustment of criteria for application to potentially toxic chemicals such as heavy metals.

In an invited review Lee and Jones-Lee (1996) discussed issues that need to be considered in the use of US EPA worst-case-based water quality criteria and standards/objectives based on them to protect the beneficial uses of waterbodies without significant over-regulation of wastewater discharges and stormwater runoff. In describing approaches that should be taken to reliably use those criteria, they recommended, in keeping with the US EPA-allowed approach, that when a worst-case-based numeric water quality criterion/state standard was found to be exceeded in an ambient water, specific-studies be undertaken to adjust that criterion/standard to reflect the site-specific conditions that impact the toxicity/availability of the chemical(s) of concern. Such

adjustment would be especially important in the regulation of runoff/discharges from irrigated agriculture owing to the typically high particulate levels in such discharges and the high costs of controlling some of the pollutants from those sources, including nutrients (N and P compounds), and organic carbon.

The site-specific Water Quality Handbook guidance for studies to adjust worst-case-based water quality criteria to consider organic complexing of heavy metals that creates non-toxic forms has been followed in a variety of situations. Work in the San Francisco Bay and New York Harbor, for example, has demonstrated that the national criteria for copper can be relaxed and still protect aquatic life from toxic conditions. Jones-Lee and Lee (2008) and the authors' Stormwater Runoff Water Quality Newsletter Volume 10, Number 9 [available at http://www.gfredlee.com/Newsletter/swnewsV10N9.pdf] reviewed that work.

As noted above, the current CVRWQCB Ag Waiver MRP implementation plan is based on application of worst-case-based water quality objectives. Without proper adjustment their use presents a significant problem for the appropriate regulation of sources such as agricultural and urban stormwater runoff in which substantial amounts of the chemicals are present in unavailable forms. Those types of runoff/discharges typically contain elevated concentrations of particulates from erosion and plant debris such as crop residues, and total organic carbon and dissolved organic compounds, all of which tend to detoxify contaminants rendering them non-toxic/unavailable. Further, aquatic organisms would typically receive short-term, episodic exposure to contaminants from those sources, which also lessens the potential for impact.

Specific Regulatory Issues in Ag Waiver Program

Legacy Pesticides. The current US EPA guidance for site-specific adjustment of worst-case-based criteria does not address several issues critical to the technically valid, cost-effective regulation of runoff/discharges from irrigated agriculture. For example, organochlorine legacy pesticides, such as DDT, dieldrin, and toxaphene, are being regulated in the CVRWQCB Ag Wavier program based on their total concentrations in the water column. These chemicals are of concern because of their tendency to accumulate in the flesh of edible fish, where they can accumulate to levels that pose a threat to the health of people who consume the fish. It has been known for decades that the excessive bioaccumulation of these chemicals in edible fish cannot be reliably assessed or regulated based on their concentrations in the water. Instead, as discussed by Lee and Jones-Lee (2002b, 2007c) the regulation of legacy pesticides should be based on the measurement of the concentrations of those chemicals in edible tissue of fish relative to public health guidelines. This approach accounts for the myriad factors controlling bioaccumulation to define whether or not these chemicals are causing a water quality problem in a particular waterbody. It also enables the reliable evaluation of the sources of the legacy pesticides that are causing water quality problems.

Sediments, as well, may be a source of legacy pesticides and other chemicals that tend to bioaccumulate in edible fish. However, as discussed by Lee and Jones-Lee (2002b), it is not possible to mechanically translate concentrations of legacy pesticides and PCBs (which have many of the same chemical characteristics as legacy pesticides) in a sediment to concentrations in fish tissue. The bioavailability of the sediment-associated chemicals needs to be determined using US EPA-recommended bio-uptake procedures. Lee et al. (2002) described the use of such

procedures in the evaluation of the uptake of PCBs by the freshwater worm, *Lumbriculus variegates*, in their investigation of the bioavailability of PCBs in Smith Canal sediment in the city of Stockton slough.

Nutrients. While the CVRWQB Ag Waiver MRP requires that agricultural coalitions monitor for nutrients (N and P compounds), there are no numeric water quality objectives that can be used to reliably evaluate the occurrence or significance of WQO violations. While the CVRWQCB Basin Plan contains a narrative water quality objective for nutrients in its "biostimulatory substance" objective, the CVRWQCB has not provided guidance on how to implement that objective. This means that two of the most important pollutants (N and P compounds) in irrigated agricultural discharges/runoff are not now regulated in the CVRWQCB Ag Waiver program.

Lee and Jones-Lee (2002c; 2005; 2006a,b) provided guidance on the evaluation of nutrient concentration data for assessing whether a nutrient concentration at a particular monitoring location is adversely impacting water quality at the monitoring location or downstream of it. As they discuss, site-specific evaluation of nutrient impacts at a monitoring point and downstream must be made to establish nutrient criteria for a particular waterbody. In an effort to stimulate greater attention to this aspect of water quality management in the Delta, and draw on the expertise and experience of professionals involved in this issue, they worked with the California Water and Environmental Modeling Forum (CWEMF) to present the "Delta Nutrient Water Quality Modeling Workshop" in Sacramento on March 25, 2008. During the course of that workshop nutrient-related water quality problems in the Delta and in domestic supply reservoirs that receive Delta water were described and discussed to better define the impact of nutrients on Delta water quality. Lee and Jones-Lee (2007d; 2008b,c) provide a synopsis of the Delta Nutrient Water Quality Modeling Workshop and a summary of nutrient-related water quality problems in the Delta. Additional information on evaluating and managing the excessive fertilization of waterbodies is available on Drs. Lee and Jones-Lee's website, www.gfredlee.com in the "Excessive Fertilization" section [http://www.gfredlee.com/preclaim2.htm].

TOC. Lee (2004) contains a summary of the author's experience investigating the occurrence and impacts of total organic carbon (TOC) in natural waters. TOC is an operationally defined parameter that quantifies the amount of organic carbon in a water, independent of its reactivity or ability to affect water quality. This parameter is used by water treatment works to estimate the amount of organic matter from algae and other sources in a raw water that may react with chlorine to increase the chlorine needed for treatment and to produce trihalomethanes (THMs), a suspected human carcinogen. Information exists on critical concentrations of TOC above which domestic water treatment works face the development of THM levels that violate drinking water MCLs, and face additional expenditures for supplementary or alternative treatment to prevent violations in the finished water. However, the CVRWQCB has not adopted a WQO that can be used to determine if a TOC source is contributing to a THM violation.

Lee and Jones-Lee (2003, 2004) discussed the importance of evaluating and considering the refractory (non-reactive) aspects and nature of TOC in developing regulatory programs for excessive TOC in Delta waters that are used for domestic water supply. As they discussed, some of the TOC in Delta tributary and Delta waters is due to algae and other organic compounds that

are degradable – non persistent. Regulatory programs for TOC should be based on the TOC that persists in Delta waters and thus can contribute to excessive THMs in a treated water supply. To accomplish this, the CVRWQCB needs to amend the Basin Plan for TOC to incorporate appropriate TOC regulations.

Mercury. The bioaccumulation of mercury in edible fish to excessive levels is one of the most significant causes of water quality impairment in Central Valley waterbodies. The CVRWQCB has not addressed this issue as part of its Ag Waiver MRP despite the fact that runoff/discharges from irrigated agriculture can contain mercury in concentrations that can contribute to the excessive bioaccumulation of mercury in Central Valley waterbody fish. The CVRWQCB is not requiring that irrigated agricultural runoff/discharges, receiving waters, or receiving water fish be monitored for mercury to determine if irrigation water contributes to excessive mercury in Central Valley fish. Lee and Jones-Lee (2008d,e) have discussed these issues in connection with the use of Putah Creek water for irrigation of crop lands near the Yolo Bypass.

DO and pH

Aquatic plant photosynthesis and waterbody respiration can have significant impacts on the dissolved oxygen and pH levels in a waterbody, and the diel changes (over a 24-hr period) in those parameters. These impacts can cause or contribute to violations of WQOs for those parameters and can adversely affect beneficial uses of waters. As discussed by Lee and Jones-Lee (2007c) and in prior comments to the CVRWQCB cited therein, the Ag Waiver MRP still does not advance a technically valid approach for evaluating whether aquatic plant photosynthesis stimulated by nutrients in agricultural runoff/discharges leads to violations of Basin Plan WQOs for pH and DO. Such violations should be regulated under the WQO for excessive "biostimulatory substances," or the WQOs should be changed to avoid violations of the pH and DO WQOs. In order to properly evaluate WQO violations for DO and pH it will be necessary to require that the monitoring be conducting in early morning to examine for low DO and in the late afternoon for pH violations.

Sediment Quality Evaluation

As required by the California legislature's Bay Protection and Toxic Clean Up Program, the SWRCB staff is developing sediment quality objectives (SQOs) for assessment and control of sediment-associated pollutants. While thus far their focus has been on the sediments in coastal marine and enclosed bay areas, it has recently expanded to the sediments of the Sacramento San Joaquin Delta. Eventually it is expected that the SQOs will be applied to the sediments of all of the state's waterbodies. The SWRCB staff has used a multi-component, "triad" approach for developing SQOs that incorporates information on sediment toxicity, benthic organism assemblages, and the chemical characteristics of the sediments. While this approach is sound in theory, the SWRCB staff has used the total concentrations of selected chemicals in sediments for the "chemical characteristics" portion of the assessment. It has been well-known since the mid-1970s that the total concentration of a chemical, or a group of chemicals, in a sediment is not a reliable indicator of the potential impact of that chemical on aquatic life or other beneficial uses of waterbodies. The incorporation of that parameter in sediment evaluation skews the result of the other more reliable aspects of the triad assessment in undeterminable ways, rendering the resultant assessment unreliable. The inclusion of this technically invalid component can readily lead to inappropriate sediment quality evaluation which can, in turn, lead to inappropriate

sediment classification, remediation, and source control requirements. Such unreliable SQOs could ultimately affect the regulation of Central Valley agriculture by leading to unreliable requirements for control of chemical constituents in runoff/discharge waters that accumulate in downstream sediment and contribute to violations of SQOs.

Lee (2008) discussed the technical issues surrounding the approaches that the SWRCB staff and board have adopted for sediment quality evaluation. Based on his more than 30 years of work on the nature and sediment/water-quality/beneficial-use impacts of sediment-associated chemicals, Lee recommends that sediment quality evaluation be based on sediment toxicity and alterations in benthic organism assemblages that are caused by chemicals in the sediments. The chemical component of the sediment quality evaluation should be based, not on total concentrations, but rather on properly conducted toxicity identification evaluations (TIEs) that determine the cause of observed toxicity. The total concentration of a chemical or group of chemicals should not be part of the evaluation. Additional information on these issues is available at www.gfredlee.com in the "Contaminated Sediment" section [http://www.gfredlee.com/psedqual2.htm].

Development of Management Practices

Lee and Jones-Lee (2002c) developed a report for the SWRCB/CVRWQCB that described management practices for controlling water quality impacts of potential pollutants in irrigated agriculture stormwater runoff and tailwater discharges in other areas of the US and discussed their potential effectiveness in the Central Valley of California. They reported that while some management approaches have shown some success in controlling pollutants in agricultural land runoff in other areas of the US, some conditions characteristic of the Central Valley, including weather and agricultural practices, raise questions about the effectiveness of those practices for controlling pollutants in this area. It will be important that a data base be developed to describe and track the approaches that are undertaken for controlling the runoff/discharges of each of the major types of potential pollutants, characteristics of the area in which the management approach is applied, and the results of the practice in reducing the discharge and most importantly in improving receiving water quality characteristics.

As discussed by Lee and Jones-Lee (2002d) the evaluation of any of the "best management practices" (BMPs) programs should include a comprehensive evaluation of the impact of the practice on the water quality characteristics of the waters receiving the BMP-"treated" runoff/discharge. The parameter of "percent removal of constituents of concern" from a discharge or runoff, especially the percent removal of the total concentration of a constituent, can provide misleading assessments of benefit; that parameter may have little relevance for assessing the impact of the action on water quality/beneficial uses of public waters. Lee and Jones-Lee (2002a; 2006a,b) discussed the characteristics of receiving-water studies that are essential to adequately define the impact of irrigated land runoff/discharges on receiving water quality at the point of discharge and downstream. For example, the regulation of nutrient discharges from agricultural and urban sources requires comprehensive studies of the downstream impacts of nutrients on water quality, including domestic water supplies, located at considerable distances downstream of the point of discharge. The water quality impact studies should be conducted for several years prior to implementing the management practice, and continued for several years after implementation of the management practice to account for variability in climate, agricultural practices and other factors that influence pollutant runoff and its impacts. It is only

through these types of studies that a proper evaluation can be made of potential water quality benefits that can be realized through specific management practices.

In their review of potential management practices for controlling water quality impacts of Central Valley irrigated agriculture, Lee and Jones-Lee (2002d) noted that the evaluation of the potential effectiveness of various types of management practices for contaminants in urban stormwater runoff is considerably ahead of that for those pollutants of concern in agricultural runoff/discharges. The experience with evaluation and management of contaminants in urban stormwater runoff can be of value to those concerned with evaluation and management of water quality impacts of agricultural discharges/runoff.

Groundwater Quality Impacts

Lee and Jones-Lee (2007e,f,g) discussed the current state of groundwater quality protection from impacts of activities on land surface; particular attention was given to waste disposal practices permitted in the state by regulatory agencies and agricultural activities. As they discussed while California's Porter-Cologne Water Quality Act explicitly requires the protection of groundwater quality, the CVRWQCB, other regional boards, and the SWRCB continue to permit land surface activities, such as waste disposal, that will lead to groundwater pollution.

Experts in the topic report that it is not possible to practice irrigated agriculture in the Central Valley without polluting groundwaters with nitrate and salts; the best that can be achieved is a reduction in the amount of groundwater pollution by nitrate. Lee and Jones-Lee (2007e,f,g) discussed this finding and summarized suggested approaches for reducing the magnitude of nitrate pollution, including altering fertilization practices and the management of irrigation water.

Another group of chemicals that has impacted groundwater quality is pesticides used in irrigated agriculture. As discussed by Lee and Jones-Lee (2007e,f; 2009) the California Department of Pesticide Regulation (DPR) has been attempting to work toward eliminating groundwater pollution by pesticides through the evaluation of the potential of a new or expanded-use pesticide to cause groundwater pollution based on the structural characteristics of the pesticide and the geological characteristics of the area to which it would be applied. While its adoption of this approach has been impeded by pesticide users, DWR has adopted a modified approach to require such information be provided as part of pesticide registration (Lee and Jones-Lee, 2007e,f).

The regional boards should adopt a more effective process to evaluate the potential of a proposed or permitted land-surface activity to lead to groundwater pollution. As part of permitting an activity, the permittee should be required to conduct a comprehensive, pro-active monitoring program that would detect incipient groundwater pollution before widespread pollution occurs. The requirement of the Porter-Cologne Act to provide protection of groundwater quality needs to be met through the development of an implementable, statewide approach for protection of groundwater quality.

Designated Beneficial Uses

One of the foundations of the Clean Water Act is the focus of regulation for discharges/sources on the prevention of adverse impacts on designated beneficial uses of receiving waters. Water

quality criteria/objectives were intended for the protection of specific beneficial uses, such as domestic water supply, propagation of aquatic life, wholesomeness of edible fish, and recreation. When the designated beneficial uses were assigned to waterbodies in the mid-1970s in accord with the requirements of the CWA, limited attention was given to whether the designated uses assigned could actually be attainted. The US EPA recognized that regulation of contaminants based on the mechanical comparison of worst-case-based water quality criteria/objectives to ambient water concentrations, without attention to contaminant availability and the sensitivity of the designated beneficial uses of waterbodies, can lead to over-regulation of runoff discharges with the attendant wasteful spending on unnecessary management. In addition to developing the Water Quality Standards Handbook to address contaminant availability discussed above, the US EPA developed guidance on "Use-Attainability Analysis" to address the beneficial use component of criteria application and the need to consider the attainability of designated uses for receiving waters. Several years ago, the Agency periodically held water quality standards workshops that addressed use-attainability analysis as some states were making the process of updating and changing the designated uses of waterbodies far more difficult than was necessary. Some states, with US EPA approval, have developed approaches by which they can change the designated beneficial uses of parts of waterbodies to more appropriately reflect the actual beneficial uses that can be attained.

One of the issues of concern in implementing the CVRWQCB Ag Waiver Program MRP for detection of violations of water quality objectives is that the designated beneficial uses of a number of waterbodies that serve as agricultural drains have not been clearly defined. The significance of the exceedance of a numeric, worst-case-based WQO in a particular ag drain, channel, or other waterbody cannot be reliably evaluated absent appropriate designated beneficial use designation. This is of particular concern to agriculture in California since the SWRCB includes "domestic water supply" in the use-designation of every waterbody, even when a waterbody is not used for domestic water supply and does not contribute potential pollutants that could impair the use of downstream waters for domestic water supply. It is not technically justifiable to force agricultural interests control concentrations of chemicals and pathogen indicators to meet drinking water MCLs when the receiving waters are not, and cannot be reasonably expected to be, used for domestic water supply.

Another designated-use-related problem faced for ag drains and other waterbodies in which the flow is dominated by irrigated agriculture drainage/runoff, is their classification for "aquatic life propagation" through the "tributary rule." That "rule" requires that tributaries to waterbodies classified for aquatic life propagation meet WQO's protective of that use. In applying that rule for ag drains, inadequate attention is given to the potential impact of those sources on the propagation of aquatic life in the downstream waters of concern.

There is confusion in the CVRWQCB irrigated lands program on the designated beneficial uses of several waterbodies in the Central Valley whose designated beneficial uses have apparently not been classified. In resolving this issue it is important that the CVRWQCB and SWRCB consider the real value of creating and maintaining a given ag drain or other waterbodies whose flow is dominated by agricultural runoff/drainage, as an aquatic life resource. Obviously if a waterbody is a spawning area for anadromous fish then the applicable water quality criteria/objectives should protect the aquatic life propagation use. However, if the primary

beneficial use of a drainage-way or an otherwise dry or uninhabitable stream-course is the drainage of runoff from agricultural lands, and the water contributes little or nothing to the aquatic life-related beneficial uses of downstream waters, there is no technical justification for the classification of the drainage-way or drainage-dominated watercourse for aquatic life-related beneficial uses. If there are political or social reasons for greater control of those waters, those reasons should be acknowledged.

Some potential guidance on this issue is available in the current federal regulatory approach for implementing the Use Attainability Analysis (UAA).

According to Dr. Thomas J. Gardner of the US EPA National Water Quality Standards Branch Washington DC (Gardner, 2008 – personal communication):

> *"The most recent thinking from EPA on UAAs can be found here: UAAs and Other Tools for Managing Designated Uses, March 2006 http://www.epa.gov/waterscience/standards/uaa/index.htm (Click on "Case Studies" and then "Download all the case studies" (.pdf)) I would also click on the "Improving the Effectiveness of the UAA Process" memo The EPA Guidance from 1986 can be found at: Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses (EPA 440/4-86-037, 038, 039): http://www.epa.gov/waterscience/library/wqstandards Here is the Interim Economics guidance from 1995, which relates to 40 CFR 131.10 (g) (6) Interim Economic Guidance for Water Quality Standards: Workbook (1995): EPA 823/B-95-002 //www.epa.gov/waterscience/library/wqstandards*
>
> *Available CSO guidance also contains useful information about UAAs: Guidance: Coordinating CSO Long Term Planning with WQS Reviews (EPA-833-R-01-002): http://www.epa.gov/npdes/pubs/wqs_guide_final.pdf/ Many States have developed UAA guidance: For example, Colorado has developed Recreational Use classification guidance; Kansas has developed an Aquatic Life UAA Protocol."*

Overall Recommended Approach

The first step in beginning to more appropriately regulate the real, significant water quality impairments caused by Central Valley irrigated agricultural runoff/discharges is to develop and implement a sound, comprehensive water quality monitoring/evaluation program in the Central Valley. As discussed by Lee and Jones-Lee (2007c) such a program must include much more than the currently prescribed one-grab-sample-per-month at a downstream location. It must include focused, upstream, event-based monitoring and edge-of-the-field monitoring/evaluation specifically targeted to identify and assess those agricultural practices/activities and locations that are likely to contribute discharges/runoff that cause WQO violations.

The focus of this monitoring/evaluation program should be on providing detailed information on selected watersheds that are representative of the types of agricultural areas in the Central Valley. The monitoring program should be carried out for several years, until there is reasonable certainty that the occurrence, location, and magnitude of violations of WQOs in Central Valley watersheds that have substantial amounts of irrigated agricultural runoff/discharges have been defined.

The second phase of the recommended approach is a detailed evaluation of the actual water quality impairments that would be expected to be caused by given WQO violations, and those which are in fact being caused by WQO violations, so as to distinguish administrative exceedances of WQOs from real water quality concerns. As discussed above, mechanical comparison of the worst-case-based, numeric national criteria/water quality standards and WQOs to concentrations in receiving water will lead to excessive over-regulation of agricultural discharges/runoff. Jones-Lee and Lee (1998) described an Evaluation Monitoring approach that is a more technically sound alternative for defining water quality issues that need to be addressed. It shifts the focus of monitoring from the total concentrations of potential pollutants to the water quality impairments that that are caused by actual pollutants, i.e., those constituents that cause a beneficial-use-impairment. Employment of this approach will identify situations in which a WQO "exceedance" is simply an artifact of the worst-case nature of the WQOs and indicates that the WQO needs a site-specific adjustment. It will importantly, also reveal water quality impairments that were not know to exist owing to the limitations of the numeric WQO approach.

In the 1990s Lee and Taylor (2001a,b) studied stormwater runoff from various watersheds in the Upper Newport Bay - Orange County, CA area to evaluate the need to develop management practices (BMPs) for a new toll road in that watershed. Of particular concern was the potential for the heavy metals in stormwater runoff from highways and streets to cause aquatic life toxicity in the receiving waters. As expected, they found that the concentrations of several heavy metals in the highway runoff exceeded the worst-case-based water quality criteria, indicating that those chemicals had the potential to cause toxicity in the waters receiving the stormwater runoff. A focused, stormwater runoff event-based monitoring program conducted at the edge-of-the-highway and in nearby receiving waters showed that receiving waters were toxic to certain forms of aquatic life. However, the results of toxicity identification evaluations (TIEs) revealed that the toxicity was not caused by the heavy metals that exceeded the WQOs, but was rather due to organophosphate and pyrethroid-based pesticides that were used in urban and agricultural areas in the Upper Newport Bay watershed. The mechanical application of WQOs for water quality management in that situation would have resulted in massive expenditures for the construction of the detention basins and filters planned for the treatment of heavy metals, a non-problem, while missing the real cause of the toxicity, the pesticides that would not have been removed by the planned management practice. The evaluation monitoring approach showed that the construction of the detention basins and filters would not prevent the pesticide toxicity from occurring.

Agricultural interests and other dischargers that find that the discharges/runoff from their lands are being overregulated by imposition of worst-case-based water quality criteria/standards or inappropriate designation of a waterbody's designated beneficial uses should be prepared to contribute significant funding to support the studies needed to establish site-specific objectives and/or update the designated beneficial uses to reflect the actual beneficial uses of ag drains. Without such support and such studies, agricultural runoff/discharges will likely be over-regulated and significant funds could be spent controlling chemicals that are not impairing the beneficial uses of waterbodies receiving the runoff/discharges.

Conclusion

The current mechanical approach for regulating runoff/discharges from irrigated lands being

implemented in the Ag Waiver program should be revised to consider how the WQOs that are being used were developed and how they should be used to protect appropriately designated beneficial uses of waterbodies that are impacted by runoff/drainage from irrigated lands, without significant over-regulation of those discharges. Failure to take a more technically valid approach could result in serious damage to the economic viability of irrigated agriculture in the Central Valley with little or no improvement in the true water quality/beneficial uses in some Central Valley waterbodies. Funds to implement this program should be derived from irrigated agriculture and the public.

About the Authors

G. F. Lee has been involved in the development, evaluation, and implementation of water quality criteria and state standards since the early 1960s. A summary of his experience is provided at http://www.gfredlee.com/exp/wqexp.htm. During the 1960s while he held the position of Professor of Water Chemistry and Director of the Water Chemistry Program at the University of Wisconsin, Madison he served as an advisor to the Wisconsin Department of Natural Resources on the development and implementation of water quality criteria and standards. During that time and subsequently he has served as an advisor to numerous governmental agencies including municipalities, industry, and environmental/citizen groups on water quality criteria issues. In the early 1970s Dr. Lee served as an invited peer reviewer for the National Academies of Science and Engineering's "Blue Book of Water Quality Criteria - 1972." In the late 1970s, he served as an invited member of the American Fisheries Society Water Quality Panel that conducted a review of the US EPA's 1976 Red Book of Water Quality Criteria. In the early to mid-1980s he served as a US EPA invited peer reviewer for the 1986 Gold Book of Water Quality Criteria development approach and for several of the specific chemical criteria. Drs. Lee and Jones-Lee have published extensively on the development of water quality criteria and their implementation into state standards to appropriately regulate water quality impacts without significant over-regulation of wastewater and other discharges. Many of those publications are available on their website, www.gfredlee.com in the Surface Water section, http://www.gfredlee.com/pwwqual2.htm#criteria.

The reference list provided in the draft ILRP EIR is deficient in failing to provide full disclosure or comments that have been submitted to the CVRWQCB on the problems with the existing monitoring providing the information needed to reliably determine the pollution of the states waters in the Central Valley by irrigated agriculture. Attached is a list of our previous comments on the deficiencies in this monitoring program.

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