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Dear Val:

Following up on the recent Sacramento River Watershed Monitoring Subcommittee meeting, I want to provide some additional information on the topic that I raised during the biological assessment discussions on what I feel should be a significant overall goal for biological assessment activities. Biological assessment should be used to address two key issues:

- Are the current main stem Sacramento River and main tributaries to the Sacramento River as well as downstream waters biological resources (desirable fish and other aquatic life, numbers, types and characteristics) currently significantly impaired by "toxics" discharged to the river waters, and
- What improvements could be expected in the biological resources within the main stem tributaries, main stem river and downstream in the Delta and San Francisco Bay as the result of controlling "toxics" input to the Sacramento River?

After the meeting a couple of people informed me that the issues that I raised in this regard are the bottom-line issues that should be addressed in this program if the Sacramento River "Toxics" Watershed management program is to produce significant results.

I have found that often those who develop monitoring/study programs are not involved to any significant extent in the interpretation and use of the data in policy formulation. This typically leads to a situation in which monitoring programs generate data that have little or no utility in addressing real issues of importance to the public. While the Toxics and the Monitoring Subcommittees have spent hours, if not days, discussing goals and objectives, thus far they have not come to grips with the real issues of what the monitoring program is supposed to accomplish. As it is being developed now, it will generate more data that will accumulate in the file cabinet and public policy will continue to be formulated on toxics issues based primarily on political considerations rather than incorporating readily available good science and engineering into policy formulation.

Issues that Need to Be Addressed

I want to continue to stress the importance of focusing the Sacramento River Toxics Watershed evaluation and management program on defining the impairment that exists today in

the designated beneficial uses of the Sacramento River, its tributaries and downstream water uses due to "toxics" discharged to the river. Also of importance are toxics precursors such as TOC that are discharged to the river that when the waters containing the TOC are used for domestic water supply, they create "toxics," i.e. trihalomethanes and other disinfection byproducts.

In addition, one of the issues that should be considered is what "toxics" are being discharged today to groundwaters in the Sacramento River Watershed or exist in groundwaters that are not being adequately remediated which impair the uses of these groundwaters and thereby place greater demands on surface water resources for water supply and other purposes.

With respect to surface water biological resource impairment by toxics, current data show that toxic chemicals are being discharged to some parts of the Sacramento River system that impair the beneficial uses of the waters near the point of discharge. There are, however, questions about whether the control of current direct discharge of toxics will result in a significant improvement of the designated beneficial uses of aquatic life resources (the numbers, types and characteristics of desirable forms of aquatic life) in the Sacramento River system and downstream thereof. An example of this type of situation is the Iron Mountain Mine discharge of copper and some other heavy metals to Keswick Reservoir. While the biological resources are being impaired in that reservoir due to this discharge, it does not appear that this impairment extends, as some claim, through the main stem of the Sacramento River, through the Delta into San Francisco Bay.

As you know, agricultural interests, pesticide manufacturers and the Cal EPA Department of Pesticide Regulation are questioning whether the control of organophosphorus pesticides from urban areas and agricultural discharges and aerial transport which are causing aquatic life toxicity throughout the Sacramento River and many of its tributaries through the Delta and into upper San Francisco Bay are significantly impairing the fish and other desirable biological resources in these areas. The pesticide users and manufacturers are asserting that the regulatory agencies and the public must prove that harm is being done to higher trophic level organisms, i.e. fish, due to *Ceriodaphnia* toxicity that has been found associated with organophosphorus pesticide use in the Sacramento River Watershed.

Another issue that should be addressed is whether further protection of groundwaters from pollution by agricultural and municipal sources through improper use of fertilizers and solid waste management activities (municipal landfills) and other solid waste land disposal activities which cause loss of groundwater resources due to the pollution by landfill leachate and/or nitrate from the fertilizer sources or use of septic tanks for wastewater disposal change to any significant extent the ground and surface water resources available to future generations.

Further, another issue that should be addressed is whether agricultural interests and urban areas through their stormwater and wastewater discharges should be required to control the trihalomethane precursors (TOC) in an effort to reduce the amount of trihalomethanes and other disinfection byproducts formed when Sacramento River and Delta waters are chlorinated for domestic water supply disinfection purposes.

Because of the importance of the Sacramento River system as a domestic water supply source for the region as well as the state, it is important to understand what reduced risk of acquiring enteric diseases through consumption of treated domestic water supplies and through contact recreation within the Sacramento River system would occur if the sources of human pathogens from domestic wastewater discharges and stormwater runoff from urban area, agricultural and rural lands were practiced to a certain degree.

These are some of the toxics issues that will ultimately need to be addressed as part of public policy development and implementation arising out of the Sacramento River Toxics Watershed evaluation and management program. Various stakeholders and regulatory agencies will need to address each of these and other related issues. The Toxics Program that is being developed now should be framed to provide the technical information needed so these issues can be addressed in a technically valid, cost-effective manner where the best possible science and engineering are incorporated into public policy formulation on each of them.

The Role of Biological Assessment in Watershed Water Quality Management

At the last Monitoring Subcommittee meeting there was considerable time devoted to Biological Subcommittee activities as they are pertinent to the Monitoring Subcommittee's responsibilities. There was considerable discussion among various participants as to who is going to do what and what is needed from the Biological Subcommittee by the Monitoring Subcommittee. In an effort to focus the discussions on issues, I suggested during the meeting that one of the key areas that needs to be addressed by the Biological Subcommittee is whether it is possible to use biological assessment approaches involving the enumeration of the types of critters in the main tributaries and the main stem of the Sacramento River and Delta in providing information that can help formulate policy on the control of toxics that could affect fish and other aquatic life resources in the Sacramento River Watershed waters as well as downstream thereof. There is no question that biological assessment approaches are powerful tools that can and should be extensively used for wadeable streams. However, for large rivers there is still considerable question as to whether biological assessment techniques have been developed to the point where they can be used to guide public policy formulation.

I have been involved in biological assessment work in one way or another for over 20 years as it relates to water quality evaluation and management programs and have published on this topic as it relates to the use of instream flow methodology to determine the potential benefits of controlling wastewater discharges to a certain degree on the beneficial uses of streams and small-to-moderate sized river systems. This approach has been demonstrated to be highly effective in determining the degree of wastewater treatment needed prior to discharge for five different Colorado Front Range streams from Fort Collins, Loveland, Colorado Springs and Pueblo. However, similar information is not, to my knowledge, available for large river systems.

During the meeting I tried to introduce the concept of getting the Biological Subcommittee to define a minimum monitoring program for a particular site on the main stem of the Sacramento River and its major tributaries that should be conducted to provide reliable, adequate, biological assessment information on these waterbodies. It became clear that while some biological information has and is being gathered in the Sacramento River Watershed, it is not in a form that is usable. The basic issue is whether the biological assessment quantification of some types of critters in wadeable streams above and below a point of potential stream insult can be used for larger rivers. The overall goal of the assessment should be to answer the question I raised of whether the main stem of the Sacramento River's designated beneficial uses, outside of a few points of insult such as discharges from Iron Mountain Mine, are being significantly impaired by current toxic discharges.

It is important in interpreting biological assessment data to distinguish between physical habitat alterations and toxics impacts. There is no question that habitat alterations such as channelization, mine waste management and discharges, agricultural activities, construction of dams, etc. have significantly damaged and changed the biological resources of the Sacramento River and downstream. The likelihood of making major changes in the physical characteristics of the Sacramento River Watershed that have adversely affected biological resources in the near-term is small to non-existent. There is a potential, however, to cause "toxics" dischargers to control their discharges if it can be determined that such control would have a significant benefit to the biological resources of the major tributaries and main stem of the Sacramento River and/or downstream thereof. There is obvious need for information on what the biological resources of this river would be like considering the physical habitat insults if there were no toxic discharges, i.e. heavy metals concentrations that exceed water quality objectives, pesticides that cause toxicity to some forms of aquatic life, etc. Does the presence of these toxics really impair the uses of the river of concern to the public who ultimately must pay for any remediation-control programs?

It is important to assess to the extent possible what incremental improvements would occur as a result of controlling certain toxic inputs to a certain degree, i.e. load response relationships. Toxic load response relationships should be developed for major tributaries and main stem as well as Delta and downstream waterbodies in order to address the issue of what the public will obtain in the way of improved biological resources and other beneficial uses associated with the expenditures that will have to be made for controlling input of toxics. These are very practical, important questions that must be addressed if this Sacramento River Toxics program is going to produce meaningful results. The monitoring programs being developed must be geared to develop the database upon which the answers to these questions can begin to be formulated.

Suggested Approach

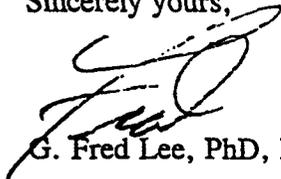
I suggest that the Toxics, Monitoring and Biological Subcommittees define the specific questions that need to be answered through monitoring (data acquisition). Then these subcommittees should determine what data are needed to answer these questions beyond that which already exists. An important component of formulating a program of this type is to

carefully determine how each of the monitored parameter data that are proposed for acquisition will, in fact, be used in public policy formulation. I have found it useful for those who are developing such programs to consider how the public policy that could develop from such data could be impacted by additional data. This approach often defines not only the types of data that are needed, but also the characteristics of the data in terms of their quality and comprehensiveness.

In the mid-1970s I had a US EPA contract to develop a guidance document on monitoring toxics for the US-Canadian Great Lakes. In 1989 when I moved back to California, Dr. Jones-Lee and I updated that guidance document to broaden the scope from just the Great Lakes to all types of waterbodies. This resulted in a report, "Guidance for Conducting Water Quality Studies for Developing Control Programs for Toxic Contaminants in Wastewaters and Stormwater Runoff." This report addresses many of the types of issues that need to be addressed in the development of a monitoring program for toxics in the Sacramento River Watershed ranging from monitoring parameter selection, development and evaluation of appropriate analytical procedures and data management and evaluation as it is pertinent to public policy formulation. I can make copies of this report for anyone who is interested.

I hope these comments are of some value in helping the subcommittees focus on issues that will ultimately need to be addressed. If you or others have questions about them, please contact me.

Sincerely yours,



G. Fred Lee, PhD, DEE

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