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Development of Impaired Waterbodies List

December 30, 1997

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Dear Hope:

I have recently received the December 23, 1997 "Staff Report on the Regional Water Quality Assessment, Clean Water Act 305(b) Report, and 303(d) List Update." I have been concerned for some time about the approach being used by the US EPA and the states to develop lists of "impaired" waterbodies. As you know, once a waterbody is listed as impaired, this sets off a regulatory process that can cost the public and private interests large amounts of money in water quality management activities. It is, therefore, important that any listing of a waterbody as impaired be properly done, where the impairment represents a real use impairment of concern to the public, who must ultimately pay for the water quality management programs that arise from such listing.

As I am sure you appreciate, the current approach for developing these lists is not necessarily technically valid. To list a waterbody as use impaired because an overly-protective water quality objective is exceeded more than once in three years is strongly contrary to the public's interests. While I am a strong supporter of listing those waterbodies where there is a real, demonstrated use impairment, such as for Upper Newport Bay, excessive fertility, excessive sediment, poor sanitary quality and excessive bioaccumulation of hazardous chemicals that cause edible organisms to be considered unsuitable for human food, I am concerned about any listing which is solely based on exceedance of US EPA water quality criteria (state objectives). I have worked on water quality criteria/standards and their implementation relative to water quality use impairment for over 35 years. I was involved as a US EPA peer reviewer of the approach that was used to develop the US EPA water quality criteria development approach that became the "Gold Book" criteria of 1987. I am, therefore, familiar with how these criteria were developed, and the inappropriateness of mechanically using them as water quality objectives which cannot be exceeded more than once in three years without violating an NPDES permit.

Beginning in the 1980s, I have seen how the US EPA tried to simplify the regulatory approach to focus on chemical concentrations rather than chemical impacts. Those with an understanding of aquatic chemistry, aquatic toxicology and water quality know that many of the chemical constituents of concern, such as heavy metals, and many of the organics, exist in a variety of chemical forms, only some of which are toxic/available. I know from having served on the US

EPA peer review panel for criteria development and for several criterion documents that the "Gold Book" criteria and now California Toxics Rule criteria were never intended to be mechanically implemented as water quality objectives. Using the US EPA criteria as water quality objectives readily leads to over-regulation of many chemical constituents. While this approach is generally protective, in most situations, it tends to be over-protective, especially for potentially toxic chemicals, and therefore wasteful of public and private funds in construction of treatment works that are far more expensive than those needed to protect the designated beneficial uses of a waterbody.

There are some regulated constituents, such as chromium VI, where the US EPA criterion is under-protective for some forms of ambient water aquatic life. The US EPA in developing the chromium VI chronic criterion chose not to include certain key data which are recognized as reliable measures of chromium VI toxicity, since they were not developed in accord with the strict procedures required to be included in the database that is used to develop a criterion value. Because of the aqueous environmental chemistry of chromium VI, it does not enter into many of the types of reactions that tend to detoxify many potentially toxic heavy metals and organics. As a result, meeting the US EPA chronic water quality criterion does not protect some key forms of aquatic life from chromium VI toxicity.

I have recently sent you a copy of the comments that I submitted to the State Water Resources Control Board on these issues as part of review of the California Toxics Rule implementation policy approach proposed by the State Board staff. As discussed in these comments, unfortunately, over the last 15 years there has been a disconnect between those who develop the criteria and those who develop the policies for their implementation. This saddles the states and, in California, the regional boards, with having to implement overly-protective criteria as water quality objectives. Basically, the US EPA is persisting with a technically invalid approach of focusing on chemical concentrations rather than chemical impacts for potentially toxic chemicals. There is no need for this approach. Far more technically valid, cost-effective water pollution control programs could be developed if the programs focused on controlling chemical impacts rather than concentrations.

Another significant problem with the US EPA's current regulatory approach of focusing on chemical concentrations relative to water quality criteria/standards is that it does not adequately or reliably address the vast arena of unregulated or under-regulated chemical constituents in ambient waters which are toxic, such as the organophosphate and many other pesticides used in urban and agricultural areas. As you know through our studies of San Diego Creek as it enters Upper Newport Bay, where we focused on assessing toxicity rather than potentially toxic chemicals, we found potentially significant amounts of toxicity that could readily be adverse to the beneficial use of San Diego Creek and Upper Newport Bay. Through TIE procedures, we have identified several of the chemicals responsible for part of this toxicity. They are part of the unregulated constituents (organophosphate pesticides, diazinon and chlorpyrifos) that are not adequately considered under the US EPA's current chemical concentration-based approach for water pollution control.

The US EPA Clean Water Act, and the Porter-Cologne Water Quality Control Act both define pollution in terms of impairment of the designated beneficial uses of a waterbody. Unfortunately today, the US EPA in the implementation of the Clean Water Act, and many others, use "chemical constituents" and "pollutant" synonymously. Such an approach ignores that many chemical constituents exist in a variety of chemical forms, only some of which are toxic/available. The non-toxic, non-available forms are not pollutants, since they do not impair the beneficial uses of the water. It is important to stop using the term "pollutant" as a generic term for chemical constituents, unless it has been demonstrated that the constituent is in fact a pollutant in a particular waterbody. By focusing on chemical impacts, rather than concentrations, the burden should be placed on dischargers to investigate whether the exceedance of a water quality standard/objective represents pollution - use impairment of the waterbody.

Even the presence of toxic available forms of a chemical constituent, such as in stormwater runoff from an urban area, does not mean that the toxicity in the runoff waters will be adverse to the beneficial uses of the receiving waters. The duration of exposure relationships used by the US EPA in implementing its water quality criteria into state standards (one-hour average and four-day average) tends to significantly over-estimate the actual toxicity that will occur in a waterbody receiving a toxic discharge. For each type of organism there is a critical magnitude of toxicity/duration of exposure relationship that must be exceeded before there is a toxic effect on the organism. Therefore, there can readily be toxic discharges which are not adverse to aquatic life because the toxicity does not persist for a sufficient duration and extent to be adverse to the beneficial uses of the waterbody receiving the toxic discharge.

I am suggesting to the regional board 305(b) and 303(d) list coordinators that they may wish to consider subdividing the listed waterbodies where the reason for listing is based on exceedance of a water quality objective into three categories. One of these would be where there is an exceedance of a water quality objective, where after extensive study it has been found that there is no known use impairment associated with that exceedance. The known use impairment for potentially toxic constituents would be one in which there is substantial evidence that the numbers, types and/or characteristics of desirable forms of aquatic life in the waterbody have been altered due to the presence of the chemical above the water quality objective. Another example of a use impairment for potentially toxic chemicals is one in which the concentrations of potentially hazardous chemicals in edible fish and other aquatic life tissue exceed health advisories for the use of the organisms as food.

The category for waterbodies with an exceedance of a water quality criterion, where after extensive study it is found that there is no real water quality use impairment of concern to the public, would be characterized to have an "administrative" exceedance related to the overly-protective nature of the US EPA water quality criteria and state standards based on these criteria.

A second category would be for those waterbodies where there is an exceedance of a water quality objective, but there is no information as to whether there is a real water quality use impairment. This category should be designated as one needing further study in which the

dischargers and the public would provide the funds to conduct the needed studies to determine whether the exccedance is an administrative exceedance, or one associated with a real water quality use impairment that needs to be corrected through the implementation of pollutant control programs.

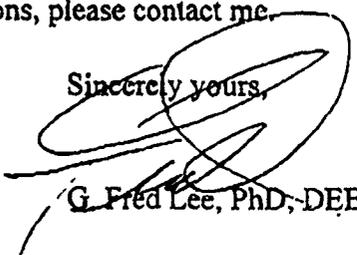
The third category would be those waterbodies where the exccedance of a water quality criterion/objective is associated with a known real water quality use impairment. This category of waterbodies should be designated as water quality limited, where there is need for a waste load allocation and a TMDL. The TMDL, however, for the constituents of concern, should not be focused on the total concentration of the constituents, but instead focus on limiting those forms of the constituents that actually cause use impairments of the waterbody.

The problems with the US EPA's approach of focusing on chemical concentrations rather than chemical impacts have been understood since the early 1980s. However, thus far no regulatory agency has been willing to address this problem in a meaningful way. Members of the current US EPA administration understand these problems and are attempting to address them. However, there are some powerful groups who are opposed to changing the current bureaucratically simple to administer, but technically invalid approach of labeling all chemical constituents whose concentration exceeds a water quality objective "pollutants," independent of their chemical form and duration of exposure of receiving water organisms to excessive concentrations. Subdividing the lists of "impaired" waterbodies into these subcategories would provide an incentive to conduct the studies needed to determine whether there are real water quality use impairments associated with the exceedance of a water quality objective. Eventually, adopting the herein suggested approach would develop the database that would help the US EPA drop its Independent Applicability Policy in favor of biological effects-based approaches. This would greatly improve the reliability of the impaired waterbody listing process or what is occurring today.

We have published extensively on the topic of the deficiencies in the US EPA regulatory approach. Our recent papers and reports on this issue are available from our web site (<http://home.pacbell.net/gfredlee/index.html>).

While, because of financial constraints for covering travel support I will not be able to attend the January 23 hearing devoted to the Board's review of the revised 305(b) and 303(d) list of impaired waterbodies within the Santa Ana Region, I will be happy to answer questions that you, other members of the Board staff or the Board have on these comments. If you or others have questions or comments on my suggestions, please contact me.

Sincerely yours,



G. Fred Lee, PhD, DEE

Copy to: SA WRQCB members
G. Thibeault

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