**Comments on the Notes from the UPC Regulatory Committee December 1, 1998 Meeting**

December 18, 1998

Kelly Moran *et al.*

Dear Kelly *et al.*:

While I could not attend the December 1, 1998 meeting of the UPC Regulatory Committee because of a conflict with the Water Resources Control Board's BPTCP Advisory Committee meeting, I wish to provide comments on the draft notes from this meeting. The meeting was devoted to a topic area that I have worked on for about 30 years, where specifically for the past three years I have been involved in the OP pesticide toxicity issues in the Upper Newport Bay, Orange County watershed. As I have mentioned, the Santa Ana Regional Water Quality Control Board is being forced, through a US EPA Region 9 TMDL consent decree with an environmental group, to address these issues at a much greater rate than is generally occurring in other parts of the state.

I find that some of the discussion of regulatory issues associated with meeting standards, including narrative standards for toxicity, could lead to inappropriate conclusions regarding current regulatory approaches. The issue of the control of toxicity in aquatic systems is a topic I have worked on since the mid-1960s. Throughout this period, and today, the approach towards controlling toxicity is not well defined. The issue is not as stated/implied that there can be no toxicity. According to the way the US EPA implements the Clean Water Act, there can be no discharge of toxics in toxic amounts. This is not necessarily the same as no discharge of toxicity, especially when it comes to unregulated chemical constituents, such as those for which there are no water quality criteria upon which to base water quality standards and discharge limits.

The situation is even further confused because of the way the Congress and the US EPA have implemented the National Toxics Rule. The National Toxics Rule issues were evidently not discussed at the December 1, 1998 meeting. It is a key part of this issue. Basically, the US EPA through the 1987 amendments to the Clean Water Act is still focusing its efforts largely on the control of regulated potentially toxic constituents from NPDES-permitted wastewater sources. The Agency has not yet come to grips, nor does it appear that it will do so in the near future, with the control of toxics and, for that matter, even toxicity associated with NPDES-permitted urban area and highway stormwater runoff. The Agency also has not addressed control of toxicity associated with non-NPDES-permitted discharges such as runoff from communities below a certain population level, as well as agricultural runoff. At this time the cut off for regulation of urban stormwater is 100,000 - eventually likely 50,000 as stormwater Phase 2 regulations are implemented.

There has been considerable discussion about the appropriateness of using the US EPA toxicity tests on wastewater effluents as a regulatory tool. The basic problem has been one of trying to relate toxicity test results on NPDES-permitted effluents with adverse impacts on receiving waters. The Committee members interested in aquatic life toxicity issues should review the SETAC book,

Grothe, D.R., Dickson, K.L., Reed-Judkins, D.A., "Whole Effluent Toxicity Testing: An Evaluation of Methods and Prediction of Receiving System Impacts," Proceedings of the Pellston Workshop on Whole Effluent Toxicity, Society of Environmental Toxicology and Chemistry, Pensacola, FL, (1996).

It is important to be careful about stating what toxicity test results actually mean to the beneficial uses of a waterbody. This is an area that has been of concern to me. I have been a strong supporter of and have developed a number of toxicity tests over the years as a means of focusing pollution control programs on impacts of potentially toxic chemicals rather than on chemical concentrations where there is an attempt to try to extrapolate from chemical concentrations to impacts. It is well established that the latter cannot be done. As it stands now, toxicity measurements on discharges, such as a domestic wastewater to small streams have about a 75% reliability in predicting impacts under conditions where the toxicity is manifested to fish larvae and zooplankton. Under those conditions, it has been found that a toxic wastewater effluent to fish larvae and zooplankton typically shows a degraded fish population in the stream receiving the wastewater discharge. However, when the toxicity is manifested only to a restricted type of zooplankton, such as *Ceriodaphnia*, there is a lack of evidence that there is any relationship between adverse impacts and measured toxicity.

The statement made in the first paragraph under the draft notes, *"Basically the presence of toxicity indicates a problem with water quality,"* is inappropriate. The presence of toxicity as is being measured which is only manifested with *Ceriodaphnia* does not indicate a problem; it indicates a potential problem that needs to be evaluated. There is no technical support; in fact the support appears to be just the opposite for indicating that *Ceriodaphnia* toxicity is necessarily related to an impairment of a designated beneficial use. This is one of the major areas of concern in appropriately regulating OP pesticide toxicity, and it will likely become the bottom-line issue, since we do not know what *Ceriodaphnia* toxicity by OP pesticides means to the beneficial use of any waterbody.

Further, it is going to be extremely difficult, if not impossible, to demonstrate cause and effect relationships between measured *Ceriodaphnia* toxicity and impairment of the beneficial use of a waterbody that is of concern to the majority of the public who could have to give up their termite control because of the *Ceriodaphnia* toxicity.

The statement *"[Note, toxicity precludes a beneficial use assumed for all waterbodies or for some waterbodies (?) what is that use called?]"* is misleading and confusing. The beneficial use of concern is the propagation of fish and other aquatic life. If the OP pesticide toxicity was manifested for game fish larvae, then there would be no issue about its control. OP pesticide toxicity from any source would be controlled. However, since it is manifested for what appears to be a highly restricted group of zooplankton with questionable significant linkage to higher trophic level organisms of concern to the public, there are going to be real problems defining a beneficial use impairment.

Recently, I sent to a number of the members of this committee, as well as others, my

discussion of the past three years' data for the work that we have been doing in Upper Newport Bay, Orange County, California. As far as I know, this is the most comprehensive discussion of the issues that have to be resolved if the toxicity control is to be based on a rational cause and effect relationship. The issues in Upper Newport Bay are no different than San Francisco Bay. As it turns out, the likelihood of significant adverse impacts to higher trophic level organisms in Upper Newport Bay due to OP pesticide toxicity is small based on what is known today. This will be especially true in San Francisco Bay where the concentrations of chlorpyrifos in the urban runoff seem to be much lower than those that we are finding in the Orange County tributaries. The chlorpyrifos concentrations are critical since it appears that at least for some marine zooplankton, such as *Mysidopsis bahia*, diazinon is nontoxic with an $LC_{50}$ of about 4,500 ng/L. However, chlorpyrifos is highly toxic to mysids and possibly several other marine organisms.

As discussed in my recently developed draft 205(j) report for the Orange County work, in order for there to be significant toxicity to marine zooplankton, zooplankters that are sensitive to diazinon and chlorpyrifos have to migrate from 30 ppt marine water into a lens of freshwater - seawater mixture and stay there for a day or two in order to receive a toxic exposure. In the case of San Francisco Bay, the levels of toxicity in the stormwater runoff to the Bay are significantly lower than what is being found in the Orange County/Upper Newport Bay studies, which means that the magnitude of this freshwater - seawater lens where there are toxic conditions is likely extremely small and highly transient.

I have recently completed my 205(j) project draft write-up 250-page report, which contains an expanded discussion of the regulatory issues that will need to be addressed to formulate OP pesticide toxicity control programs. While this report is still in draft form under review by the agencies, I can make a copy of the regulatory issues section available to anyone interested.

In the second page of the December 1st meeting notes, the statement, *"The test methods are intended to be indicative of the presence or absence of a problem, even though they do not mimic actual conditions."* is a somewhat loose interpretation of the situation. The test methods provide an assessment under the standardized conditions of toxicity to a specific organism. What is needed which is almost totally lacking is the coupling between the results of the test method and receiving water impacts. While, as discussed above, there is good correlation if the toxicity is in an effluent that is killing fish larvae, for OP pesticide toxicity to *Ceriodaphnia* in urban stormwater runoff, there is no database that supports the position that the toxicity is significantly adverse to the beneficial uses of the receiving waters. In fact, it is easier to develop a database that shows that it is unlikely that there is a real water quality problem in many waterbodies, such as Upper Newport Bay, San Francisco Bay, and the Sacramento River, due to the discharge of OP pesticide toxicity in urban area stormwater runoff.

The wording on the second page about *C. dubia* being sensitive to hardness, etc., may not be correct. According to my information, *C. dubia* is sensitive to salinity (TDS). Whenever the TDS is above about 2,000 mg/L, the water is toxic to *C. dubia*.

The statement is made, *"The bottom line is that EPA believes that the use of C. dubia in laboratory test conditions is an appropriate test for toxicity problems."* That statement applies to wastewater effluents. It does not apply to stormwater runoff. If the US EPA believed that, they would not continue to ignore, as they have been routinely doing for several years, the toxicity of urban area stormwater runoff to *C. dubia* caused by OP pesticides. Key members of the US EPA administration with whom I have discussed this matter are still not convinced that this is a problem that they need to address in order to protect the designated beneficial uses of the nation's waters.

The statement is made in the third paragraph of the second page,

*"In the unlikely event that a Regional Board attempted to amend its basin plan to indicate that a toxicity test failure was not a 'problem,' EPA staff indicated that it would be unlikely that EPA would approve such a change, were a Regional Board to propose it."*

First of all, the US EPA, Washington, D.C. has not formulated a policy on interpretation of the significance of *C. dubia* toxicity as it relates to stormwater runoff. Further, it is important to understand that the state of California, as part of implementing the California Toxics Rule, has proposed to require the control of toxicity that is significantly adverse to the beneficial use of a waterbody. I would be surprised that the US EPA would not approve that approach as it applies to urban area and agricultural stormwater runoff.

On the second page is a discussion about the US EPA Independent Application Policy. I have recently sent out a draft discussion of this issue that I prepared on behalf of the State Stormwater Quality Task Force Executive Committee discussing the ANPRM and in particular the Independent Application Policy. If anyone wishes to receive a copy of this draft statement, they should contact me.

The Independent Application Policy is a bureaucratically simplistic approach to try to force states to adopt an ill-conceived program developed by the US EPA in the early 1990s of focusing on chemical concentrations of regulated constituents rather than on the impacts of constituents on the beneficial uses of a waterbody. I attended a US EPA ANPRM national meeting that was held in Philadelphia at the end of August, and I can assure the Committee that there is widespread understanding that that Policy, which was adopted without public review, was a serious mistake on the part of the Agency that is now causing the Agency to lose credibility among the regulated community and the public.

An example is the San Francisco Bay copper situation, where the inputs of copper in urban area stormwater runoff have been repeatedly demonstrated to be nontoxic to aquatic life. In order to control copper to meet runoff standards in stormwater runoff, the Bay area residents will have to spend over $1 billion treating stormwater runoff. Such expenditures would have to be made to address "administrative" exceedances of overly protective water quality objectives arising out of the US EPA's Independent Application Policy. Unless the Independent Application Policy is changed to a more technically valid approach, these expenditures would have to be

made, even though repeated testing over several years has shown, using the same organism that was used to develop the national criteria for copper, that the Bay waters are nontoxic to this organism.

I would be interested in learning more about the origin of the statement in the notes, *"Recent U.S. EPA studies of a creek ecosystem in Ohio suggest that the EPA should retain the current policy."* I know of only one study of this type in Ohio, and it is not very recent. That study does not support the use of Independent Application. If there is some other study, then those who made that statement should come forth with a reference to a source of information so the appropriateness of the study can be evaluated. This study was not mentioned at the ANPRM Independent Application Policy session that I attended in late August, 1998. I know of no place where there is justification for requiring the control of potentially toxic constituents, such as copper derived from automobile brake pads, even though appropriately conducted toxicity tests repeatedly show that there is no toxicity in the runoff waters or the receiving waters, including their sediments due to the copper.

The US EPA is reviewing the Independent Application Policy as part of the ANPRM. It is my assessment that this policy is doomed to be terminated because of its lack of technical validity and the gross over regulation that arises out of it.

The discussion on TMDLs is also somewhat loose and inappropriate. It appears that no one involved in the December 1, 1998 meeting is familiar with the TMDL situation that has been developing in Orange County, California. There is mention on page 3 about nutrient TMDL situations in Texas. One of the earliest TMDLs was for nutrients in Colorado which occurred almost 20 years ago. More recently, the US EPA Region 9 trapped the Santa Ana Regional Water Quality Control Board into developing a nutrient TMDL for tributaries of Upper Newport Bay.

With respect to toxicity, as discussed in my correspondence, the Santa Ana Regional Board must, in accord with a consent decree signed by US EPA Region 9 and an environmental group, develop TMDLs for pesticides and toxicity for tributaries of Upper Newport Bay by 2002. My recently developed draft 205(j) report discusses aspects of this situation.

The discussion about the rice pesticide situation in the Central Valley region is somewhat misleading. This has been a highly political situation where the Regional Board did not take action to require that the rice pesticides be controlled in accord with California Fish and Game recommended limits to control the potential for chronic toxicity to aquatic life for certain of the rice pesticides.

The question is asked, *"Have TMDLs previously addressed urban runoff sources (especially urban areas that have been issued NPDES permits)?"* Two TMDLs have been approved which involved urban stormwater runoff associated constituents in Orange County--one for nutrients and another for sediments. A third is being developed now for pathogens. The fourth will be developed in two years for “pesticides” and “toxicity.”

On the bottom of page 3 and top of page 4 is a discussion of someone's concept as to how the TMDL process will apply to chlorpyrifos and diazinon where it is suggested that this would involve developing a site-specific objective. While what is meant by a site specific objective is not defined, if it means a site specific water quality objective, i.e., a numeric concentration limit for diazinon and chlorpyrifos, then I wish to comment that that is not likely the process that will lead to TMDL development. I have recently discussed this issue with the Santa Ana Regional Water Quality Control Board staff on how they plan to implement the TMDLs for pesticides and pesticide-caused toxicity in the Upper Newport Bay watershed. It is clear that the issue of a site-specific objective is not planned. What will be done is to follow the traditional TMDL process of identifying the major sources of toxicity and diazinon and chlorpyrifos and then assigning an arbitrary percentage reduction that must be achieved within Phase 1, likely a five-year period.

In Orange County only about five pounds of the 50,000 pounds per year of diazinon and chlorpyrifos applied in residential areas needs to leave the point of application in stormwater runoff for the whole year to cause the toxicity levels measured. What needs to be done is to better understand how pesticides that are used for various purposes in residential areas leave the property.

As I have indicated, while I thought that this process might take a rational approach toward proceeding down a path which would conclude that the OP pesticide toxicity is either significant or non-significant to the beneficial uses of Upper Newport Bay, it is now clear that this is not going to occur. There will be arbitrary percent reductions ordered out of the Santa Ana Regional Board's TMDL process for certain uses of these pesticides for urban residential, agricultural and commercial nurseries. Large commercial nurseries that have been found to be important sources of OP pesticides, especially diazinon, in the Upper Newport Bay system will have to be curtailed.

If Phase 1 reductions in allowed discharges of toxicity and diazinon and chlorpyrifos do not eliminated the toxicity in urban stormwater runoff, then Phase 2 reductions will be implemented in about five to ten years from now. If this does not eliminate the toxicity in stormwater runoff as it enters Upper Newport Bay, then further TMDL limits will be imposed which will require a further ratcheting down of uses of OP pesticides in residential areas. All of this will likely take place without ever demonstrating that the OP pesticides are causing real significant water quality problems to the Upper Newport Bay or its tributaries.

The statement is made that TMDLs are in force through NPDES permits. What should also be said in connection with this statement is that TMDLs are the only mechanism available today for potentially requiring that non-NPDES-permitted sources of pollutants will have to be controlled. It is not clear how that is going to work out in the long-term. However, there is the potential for controlling agricultural inputs of pesticides and, for that matter, urban non-NPDES-permitted sources of pesticides through the TMDL process.

The bottom line issue in this situation is that we do not know how urban area stormwater

runoff pesticide toxicity will be regulated. There is little doubt that there will be controls on use of urban pesticides for some types of applications. I cannot believe that the use of diazinon on lawns will be a long-lived practice. It is going to be a lot harder, however, to prevent the use of diazinon and chlorpyrifos for termite control. One of the areas that needs immediate attention is an understanding of how the use of diazinon and chlorpyrifos for termite control, which represents one of the primary large-scale uses in Orange County by commercial applicators, leads to stormwater runoff toxicity. Can diazinon and chlorpyrifos be used for this purpose and not cause sufficient runoff of OP pesticides to cause aquatic life toxicity? If this can be done, either now or through changes in formulation, then these pesticides will likely continue to be used for that purpose.

There will likely be severe restrictions on OP pesticide use on lawns and gardens. There will also likely be severe restrictions on agricultural use. Further, the kind of situation that I found last August in the Upper Newport Bay watershed, where some of the waters downstream of two commercial nurseries had upwards of 30 toxic units of diazinon, will come under control through the wastewater discharge NPDES-permit independent of whether there are any adverse impacts on the beneficial uses of the receiving waters for the runoff.

Any curtailment of the use of the OP pesticides diazinon and chlorpyrifos will result in the substitution of another OP or other type pesticide for the same purpose. While there will be some gains in non-pesticide pest control, pesticides will continue to be used as a primary means of pest control for many years. Unfortunately, neither the US EPA nor DPR properly screen pesticides as part of labeling for environmental impacts. The net result is that whatever is used in place of the diazinon and chlorpyrifos could cause significant environmental problems of equal or even greater magnitude than either diazinon or chlorpyrifos. An issue that the UPC needs to address is how to establish a pesticide screening process so that potential environmental impacts are properly evaluated before large-scale use of diazinon and chlorpyrifos substitutes occurs.

Previously I have mentioned that propetamphos is used in residential areas as an alternative to diazinon and chlorpyrifos. According to DPR data 5,000 pounds of propetamphos are used each year in Sacramento. In 1990, which is the latest data available, approximately 9,000 pounds of propetamphos were used in Orange County in residential areas for structural pest control. Its use is restricted to use by commercial applicators. Further, I have recently learned that the conventional GC scan for OP pesticides does not detect propetamphos. This means that this pesticide could be present in urban stormwater runoff and not thus far been detected by the methods used.

All urban pesticide studies must, as part of the standard procedure, incorporate the UCD Aquatic Toxicology Laboratory procedure of running a series of toxicity tests at various dilutions of the stormwater runoff with and without PBO in order to estimate the total toxicity present in the sample, as well as that part of the toxicity that is not due to OP pesticides. Through this approach it will be possible to determine whether there are pesticides like propetamphos that are responsible for some of the toxicity present in urban stormwater runoff.

One of the issues that was not addressed at the December 1, 1998 meeting that needs to continue to be brought in in connection with reviewing the regulation of OP pesticides is that at least for three years or so, the control of urban pesticides will be under the jurisdiction of DPR unless environmental groups are able to convince the courts that the MAA signed by DPR and the WRCB will not be effective. I will be surprised if the courts will overturn that MAA and require that action be taken more rapidly than three years. However, year four or so from now, the situation can change drastically where DPR will have had its five years of voluntary control which then will obviously have failed to control urban pesticide stormwater runoff aquatic life toxicity. As far as I know DPR has not begun to address the urban pesticide problem and may not plan to do so.

I have discussed many of these issues in detail in previous correspondence provided to the UPC. These discussions are available on my web site (http://members.aol.com/gfredlee/gfl.htm) in the Water Quality - Pesticide section.

Fred