

Independent Applicability of Chemical and Biological Criteria/Standards and Effluent Toxicity Testing—Part II: An Alternative Approach

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In the previous issue of TNEJ we discussed the significant problems associated with the adoption by the U.S. Environmental Agency (EPA) of the Independent Applicability Policy of developing technically valid cost-effective approaches for managing chemical contaminants in the nation's waters without significant unnecessary expenditures for contaminant control. This policy mandates that chemical specific criteria-standards must be achieved, even though biological effects-based testing, such as toxicity tests, of the waters in which there is an exceedance of the standard shows that the standard is overly protective and the contaminant of concern is non-toxic. In Part II we review some of the fundamental issues that should guide water pollution control programs in the US and present an alternative approach to the Agency's Independent Applicability Policy.

Objectives of US Water Pollution Control Programs

In 1972 Congress set forth as the overall objective of the country's water pollution control program the protection of designated beneficial uses of US waters. It specifically noted the water pollution control goal of achieving "fishable" and "swimmable" waters in the attainment of the ultimate goal of "zero pollutant" discharge. One of the fundamental problems at the foundation of EPA's approaches for implementing water pollution control programs is the agency's failure to make clear, and to recognize in implementation, the difference between "contaminants" and "pollutants."

By tradition in the water pollution control field and by law, "pollutants" are contaminants whose available-form concentrations are sufficient, and to which sensitive organisms receive a sufficient duration of exposure, to adversely impact the designated beneficial uses of a waterbody. A contaminant, on the other hand, is anything added to water, regardless of whether or not it has an impact. Any potentially toxic water contaminant may be present in available forms at concentrations below those that would cause adverse impacts on beneficial uses; under those circumstances, the contaminant would not be a "pollutant." The goal expressed in PL-92-500 is the protection of beneficial uses from pollutants, not to prevent the existence in water of contaminants that are not adversely affecting beneficial uses. The assumption that contaminants are necessarily pollutants, frequently made by environmental groups and some regulatory agencies, leads to unjustified unnecessary expenditures for control of contaminants beyond that needed to protect the designated beneficial uses of a waterbody.

Some water pollution control programs do not reflect an understanding and significance of the term, "designated beneficial uses." The designation of "beneficial uses" is an integral part of the design of federal water pollution control regulations;

it provides a focus and defines the object of "protection." Site-specific characteristics (e.g., habitat), priorities, and needs enter into the designation of beneficial uses. It seems logical that the highest priority should be given to protecting those forms of aquatic life that are of the greatest interest to the public, such as game fish-shellfish that can be sustained, and food organisms for those game fish-shellfish. It makes little sense, for example, to force communities to spend large amounts of money for additional wastewater treatment or stormwater runoff contaminant control that at best, because of habitat and other characteristics of the waterbody, will enable a few more carp or other rough fish to develop in the waterbody.

The approach (advocated by EPA representatives at the June 1993 EPA workshop held in San Francisco) of requiring that wastewater dischargers and sources of runoff spend the funds necessary to protect "water fleas" in the receiving waters for the discharge/runoff when it is acknowledged that such protection will not result in improvement in a desirable game-sportsfishery in the waterbody, would likely be considered inappropriate by many of the public.

We feel that it is time to get the public involved in making decisions regarding the degree to which potentially toxic contaminants should be controlled. Significant efforts should be made to involve the public in re-examination of the goals of the water pollution control programs in light of what is known about the aquatic chemistry and toxicology of those contaminants, and the economic and social situations that exist today and will likely exist over the foreseeable future. Questions such as the following should receive the public's attention:

- Should the public be forced to pay for controlling chemicals that are adverse for a short distance to water fleas when the characteristics of the receiving waters are such that fishable waters cannot be achieved because of lack of suitable habitat?
- Should the public be forced to pay for the cleanup of a chemically contaminated sediment when studies show that there is a

desirable sportfishery even under the potential influence of it?

- Should the public be forced to pay for additional wastewater treatment and control of contaminants from non-point sources to possibly achieve the ultimate in a sportfishery when a good desirable sportfishery already exists?

- Should the public be forced to pay for the control of contaminants in water or sediments that empirically correlate with altered enzyme activity or some other biochemical-physiological response, when there is no discernable linkage of that "response" to responses of desirable whole organisms?

We are not advocating inattention to gross and obvious pollution; clearly such problems should be cleaned up as rapidly as possible. Nor are we advocating that aquatic life toxicity in ambient water that could otherwise support a desirable sportfishery not be eliminated if a sportfishery were desired for the area. We are advocating that the funds available today for water pollution control programs be focused on real, discernable problems for which there is a fairly well-defined link between the additional contaminant control and benefits in designated beneficial uses.

A prioritized toxics control program should focus the funds available for the control of contaminants first on the most significant water quality problems caused by toxics. This requires additional evaluation of the characteristics of the waterbody receiving wastewater discharges or stormwater runoff. Wastewater dischargers and sources of runoff who choose not to participate in conducting the necessary studies should be required to implement worst-case based contaminant control programs. The focus of this program should be the protection of designated beneficial uses of ambient waters, with emphasis given to the numbers, types, and characteristics of desirable fish and other aquatic organisms and their wholesomeness for use as food by humans and other higher trophic level organisms.

A prioritized program should determine if the waters receiving discharge or runoff are toxic based on EPA's short-term chronic toxicity tests. If no toxicity is found under representative conditions, there should be no toxics control beyond that already in place. Periodic monitoring of the ambient waters of the discharge should be required.

Toxicity tests on aquatic plants such as algae should not be the basis for establishing programs for control of contaminants from point or non-point sources unless it can be demonstrated that there is a direct link between the results of the toxicity tests and the impact on desirable fish and shellfish populations in receiving waters.

Whole organism toxicity testing should be the basis for testing and regulatory programs. Results of enzymatic or other biological or physiological tests should not be used for regulatory purposes unless a clear relationship is found between whole organism testing and the biochemical-physiological response.

If toxicity is found in the waters receiving discharge/runoff, the next step should be to evaluate the potential benefits (in terms of improved sports and/or commercial fishery) that would result from proposed control programs. If the habitat characteristics of the receiving waters are such that it is not possible to develop a desirable sportfishery, there should be no need to control the cause of the toxicity until the habitat or other limiting factors have been addressed. If it is found, however, that the sportfishery could be improved by control of toxicity, then a toxics control program should be implemented.

In order to evaluate whether bioaccumulation of contaminants of concern to higher trophic levels including man is occurring in the receiving waters, fish, shellfish, and other desirable organisms (from a food point of view) should be analyzed for the chemicals of potential concern. If levels exceed FDA action levels, or a risk-based criteria/standard, then control is necessary. For risk-based standards, determination should be made of the change in the cancer or other health effect incidence that would occur as a result of control of the chemicals responsible for the excessive bioaccumulation.

EPA should not, under the current economic situation in the many states and in the United States continue to implement the Independent Applicability policy. Aquatic life toxicity tests and/or aquatic organism population evaluations in receiving waters should be considered definitive for regulatory purposes, irrespective of whether EPA water quality criteria, or criteria-equivalent standards, are exceeded in the waterbody. The exceedance of the water quality criteria should be used as a trigger for site-specific contaminant evaluation programs associated with altered numbers and types of desired organisms and/or aquatic life toxicity.

Site-specific water quality criteria or standards (objectives) should not be developed to address exceedances of the water quality criteria or standards if no toxicity to fish and shellfish larvae is found in the ambient waters, or if the numbers and types of desirable fish and shellfish in the receiving waters are appropriate for the habitat characteristics.

Results of ambient water toxicity evaluations should take precedence over the results of effluent toxicity tests. Dischargers and sources of runoff should not be required to achieve effluent toxicity limits if receiving water studies show no ambient water toxicity associated with the effluent or runoff.

We suggest that a program such as that described above be immediately implemented for the remainder of the 1990's. In the year 2000, a re-evaluation of these issues should be conducted and a determination should be made of the appropriate degree of control of chemicals beyond those set forth in this program in light of the economic, social, educational, and environmental needs of the country at that time. If at that time, the public determines that it is appropriate to use funds to achieve a greater degree of designated beneficial uses than would be achieved through this program, then such programs should be implemented.

While the suggested program is oriented toward aquatic life-related water quality criteria in the watercolumn, it is also applicable to sediment quality criteria, such as those being developed by EPA and several states. Notwithstanding the sediment quality criteria being proposed by EPA and the state of California's Water Resources Control Board, under no circumstances should chemical composition-based sediment quality criteria override the results of aquatic organism bioassays and/or aquatic organism assemblage analysis/evaluation. Properly developed chemical composition-based criteria can be useful in the identification of causes of aquatic life toxicity in sediments and help direct future pollutant control programs for sediment associated contaminants. They should not be used as the primary regulatory tool upon which sediment cleanup objectives are developed. □

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