Stormwater Runoff Water Quality Science/Engineering Newsletter
Devoted to Urban/Rural Stormwater Runoff
Water Quality Management Issues

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This issue of the Newsletter is devoted to presentation of Dr. G. Fred Lee and Dr. Anne Jones Lee's comments on the US EPA's draft Strategy for Water Quality Standards and Criteria: Strengthening the Foundation of Programs to Protect and Restore the Nation's Waters. This draft strategy is available at www.epa.gov/waterscience/standards. Dr. G. F. and Anne Jones-Lee's comments below focus on the problems that the US EPA needs to address in implementing a strategy for water quality standards and criteria for developing a more technically valid, cost-effective approach for improving/maintaining the beneficial uses of the nation's waters. Many of the issues discussed are pertinent to appropriately regulating urban area highway and agricultural area stormwater runoff water quality impacts.

Comments on US EPA Draft Strategy For Water Quality Standards and Criteria

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Dear Fred,

In response to the US EPA's request for comments on Draft Strategy for Water Quality Standards and Criteria, we wish to provide the following comments:

Background to Comments

As discussed in the appended information on Dr. G. Fred Lee and Dr. Anne Jones-Lee's academic backgrounds and professional experience, Dr. Lee has over 40 years of experience in water quality criteria and standards development and their implementation. This experience has

included advising the US EPA and other government agencies at the international, national, state and local levels, industry, and environmental groups on water quality criteria/standards development and their implementation. They have published extensively on this topic. Their recent papers and reports are available on their website, www.gfredlee.com

Problems With US EPA's Current Criteria/Standards Development and Implementation Approaches

In December 2001, in response to the US EPA's request for comments on the TMDL program, I (Lee 2001) provided comments on the problems with several aspects of this program. The focal point of these comments was on problems with how the US EPA develops and implements water quality criteria/standards that are used as the basis for defining a Clean Water Act 303(d) "impaired" waterbody that leads to the development and implementation of a TMDL to achieve the water quality standard. The comments presented below are based in part on the original TMDL comments that were submitted last December. They are applicable to the US EPA's request for comments on its Draft Strategy for Water Quality Standards and Criteria.

On Page iii, the Executive Summary states that this Draft Strategy contains a Vision for the future:

> *"All waters of the United States will have water quality standards that include the highest attainable uses, combined with water quality criteria that reflect the current and evolving body of scientific information to protect those uses. Further, standards will have well-defined means for implementation through Clean Water Act Programs."*

This vision is deficient in one of the most important aspects, namely, that the water quality criteria/standards should be developed and implemented in such a way as to achieve the vision in the most technically valid, **cost-effective** manner. The US EPA throughout its existence has failed to properly incorporate cost-effective associated issues in the implementation of water quality criteria into standards and discharge limits. This has led to a situation as discussed below, where overregulation has repeatedly occurred and continues to occur as a result of inadequate attention to cost-effectiveness of a particular standard/regulatory approach. The issues of concern are; Does it achieve the desired goal in the most economically feasible manner? Does it avoid significant overregulation of constituents which are not adverse to the beneficial uses of waterbodies, i.e., are present in nontoxic, non-available forms? These issues need to be addressed in this strategy.

Page iv, item 3, states:

> ***"Strengthen and maintain the scientific foundation** of water quality programs. These actions focus on developing and enhancing criteria for pollutants which cause the major impairments and threats to the Nation's water quality and continue to lead cutting-edge scientific advances in such areas as nutrient, biological, and waterborne microbial criteria."*

The statement about the cutting edge of scientific advances is inappropriate when referring to nutrient criteria. As discussed below, the US EPA's approach for developing nutrient criteria is not cutting-edge, it is largely technically invalid and will result in massive unnecessary expenditures for nutrient control unless it is significantly modified with respect to national default ecoregion nutrient criteria. For example, as discussed below, there is need to focus nutrient control on algal available nutrients/phosphorus, not total phosphorus, as the US EPA is recommending.

The focus of this statement seems to be on developing additional criteria. It is important that the US EPA not continue to add new criteria/standards without correcting the significant deficiencies in the existing criteria/standards. Provided below is a discussion of several major problem areas with current water quality criteria and state standards, based on these criteria, for several groups of potential pollutants. These problems should be addressed by the US EPA as part of its development of an improved strategy for water quality criteria standards.

Regulating Heavy Metals. The approach for regulating heavy metals in wastewater discharges and stormwater runoff is a prime example of the inappropriate approach for cost-effectively controlling water quality impairments due to heavy metals that has been followed in the US since the early 1980's. In the 1960's, when toxicity tests were first starting to be used to evaluate the toxicity of wastewater discharges, it was found that, often, elevated concentrations of heavy metals in some discharges, but not all, were in nontoxic forms. This finding was in accord with what would be predicted based on the aquatic chemistry of heavy metals, where heavy metals exist in a variety of chemical forms, only some of which are available/toxic to aquatic life. This situation was sufficiently well-known so that by the early 1970's, the National Academies of Science and Engineering, as part of developing their Blue Book of Water Quality Criteria (NAS/NAE, 1973), concluded that heavy metals in wastewater discharges could not be reliably regulated based on chemical concentrations. A toxicity test approach was required to determine whether the heavy metals, either alone or in combination with other metals or other substances, were in a toxic/available form.

The National Academies of Science and Engineering Blue Book Criteria were adopted by the US EPA (1976) in their 1976 Red Book Criteria, which were the first official water quality criteria that developed out of the Clean Water Act. The US EPA's Red Book adopted the National Academies' recommended approach for regulating heavy metals based on toxicity tests.

In the early 1980's the US EPA abandoned the approach recommended by the National Academies of Science and Engineering of focusing on toxic/available forms of metals, and adopted a policy of assuming that the worst-case national water quality criteria were appropriate for regulating heavy metals in all waters based on total recoverable metals – i.e., those that are measurable after strong acid digestion. While it was understood by many Agency personnel that this approach was inappropriate, the Agency was trapped again by the situation of having to develop regulations without adequate funds to develop technically valid, cost-effective approaches. While there was an attempt to develop a more appropriate definition of heavy metals that are to be regulated by the national water quality criteria through what was proposed

to be a dilute nitric acid digestion procedure, the Agency did not have the funds necessary to develop this procedure to the point where it could be incorporated into the regulatory approach that was adopted in the mid-1980s as part of what has become known as the "Gold Book" of Water Quality Criteria (US EPA, 1987). Rather than going to Congress and acquiring the necessary funds to develop technically valid approaches, the Agency proceeded with an obviously technically invalid approach.

In the mid-1980s, as part of revising the Clean Water Act to its current form, the administration and Congress broadened the scope of the Act without addressing the significant problems associated with overregulation of some constituents and misdirected regulation of others, and persisted with the inadequate funding at the federal and state level to enable the development of a more appropriate approach. This has been a chronic problem with both Republican and Democratic administrations and legislatures. Some relief from the overregulation of heavy metals was provided under the Clinton administration, where ambient water dissolved metals were adopted as the regulatory approach (US EPA, 1995). Focusing on dissolved metals at that time was not based on any new information. It was well-established in the 1960s and 1970s that particulate forms of heavy metals in the water column were nontoxic. The same situation applies to many other constituents; however, the Agency has not addressed this issue. This issue should be addressed as part of the revised criteria standard strategy that is currently under development.

Regulation of Toxics

The problems with the approaches in developing and implementing water quality criteria that were being adopted in the early 1980s by the US EPA administration were recognized as situations that could lead to inappropriate regulation (overregulation). Lee, *et al.* (1982) and Lee and Jones (1987) discussed alternative approaches which focused financial resources available on first defining those constituents which adversely impact the beneficial uses of a waterbody, and then controlling them to the extent necessary to protect these uses.

These problems, while recognized, were not addressed, primarily because the regulations that were developed were not being enforced by either the US EPA or many of the states. Many of the states' water pollution personnel understood the inappropriateness of the US EPA's approach, which evolved out of the Clean Water Act, and chose not to adopt US EPA criteria as the basis for developing water quality standards. This ultimately led to the National Toxics Rule, where, through the revised Clean Water Act, Congress mandated that states had to use US EPA criteria for toxics, or the US EPA would impose them on the states. By the early 1990s, all states had adopted US EPA criteria for "toxics." California, however, soon found, through court action, that the regulations adopting the US EPA criteria were determined to be invalid since California state law requires an evaluation of economic impact of the water pollution control regulations. Since the State Water Resources Control Board did not comply with these regulations, the courts determined that the regulations must be voided. This set up a situation where, for many years, California did not have water quality criteria/objectives for "toxics." Finally, in 2000, the US EPA Region 9 imposed what became known as the California Toxics Rule criteria (US EPA, 2000). These are the US EPA criteria for "toxics" that were originally

adopted in the mid-1980s, unless updated by subsequent releases, such as the US EPA (1996, 1999) updates of the criteria.

Priority Pollutant List. The 1972 Federal Water Pollution Control Act (i.e., Clean Water Act) mandated that the US EPA must develop a list of "priority pollutants" and develop national water quality criteria for each of the pollutants which would protect fish and aquatic life in all waters. Congress, however, did not fund the Agency adequately to carry out this mandate. Finally, when the Agency could not develop what became known as the "Priority Pollutant List" in accord with the timeframe allowed, environmental groups filed suit to force the Agency to promulgate a list of Priority Pollutants. This was done in the mid-1970s, where the Agency's attorneys and environmental group attorneys, with limited technical input and without public peer review, promulgated what are now known as the Priority Pollutants. Priority Pollutants include many of the heavy metals that are of primary concern because of their toxicity to aquatic life.

A review of the Priority Pollutant list shows that it was not properly developed, and its primary focus is on what are known as rodent carcinogens – i.e., those halogenated organic constituents that cause cancer in rats at high concentrations. Unfortunately, large amounts of public resources have been devoted to and continue to be devoted to analyzing for and then developing control programs for many of the rodent carcinogens, especially the chlorinated solvents, which have been found to cause cancer in rodents at high concentrations over extended periods of time. There are still, 20 years after the first adoption, serious technical questions about the appropriateness of the Agency's approach for defining the water quality criteria for chlorinated solvents.

An example of inappropriate regulation is the situation that exists where the chlorinated solvents and the chlorinated compounds, such as the trihalomethanes that are formed during drinking water and wastewater disinfection, are regulated in wastewater discharges at drinking water acceptable concentrations. There is no technical validity for this approach. These chemicals are not toxicants to aquatic life. They do not bioaccumulate, and they are rapidly lost to the atmosphere. Their persistence in surface waters is quite limited. The removal of these constituents from domestic wastewaters can be expensive and is totally unnecessary. Rarely could a water supply face a problem of having excessive trihalomethanes in its treated waters because of the concentrations of these constituents in a domestic wastewater discharge. Any water utility that faces this type of problem has its intake too close to a city sewage discharge, and faces far greater problems than the rodent carcinogens, such as chloroform or low molecular weight chlorobromo compounds. The regulation of municipal and industrial wastewater discharges – and, for that matter, agricultural runoff and urban stormwater runoff – should be based on controlling constituents that are or could be significantly adverse to the beneficial uses of the receiving waters for the discharge. The presence of a chemical , such as a trihalomethane in a wastewater, that if, in a treated drinking water, would exceed a maximum contaminant level (MCL), should not be the basis for limiting the concentration in a wastewater discharge unless that discharge causes increased concentrations or increased cost of treatment to a water utility.

The natural assimilative capacity of waterbodies for trihalomethanes should be used to avoid unnecessary expenditures for their control.

The Priority Pollutant list has been strongly detrimental to properly defining the constituents that are significantly adverse to the beneficial uses of waterbodies. Those not familiar with how this list was developed generally assume that 120 or so chemicals on this list are all the chemicals that could be adverse to the beneficial uses of a waterbody that need to be examined for in a water pollution control investigation. Those familiar with the situation know that there are over 75,000 chemicals in use today, where only about 200 of these are regulated. Further, about 1,000 new chemicals are developed each year. There is an urgent need to greatly expand the arena of potentially detrimental or hazardous chemicals that are considered/evaluated for their impacts on the beneficial uses of waterbodies. This expansion should include substantial funding to search for new/unrecognized hazardous or deleterious chemicals.

Sediment Quality Guidelines

An area of extreme importance in developing appropriate regulatory approaches is the development of sediment quality assessment methodology. In the early 1980s, a "Pellston" type workshop was held in Colorado where experts in sediment quality evaluation spent a week discussing this topic. At the end of the week-long workshop, the group discussed the issue of how sediment quality should be regulated. While there were some there representing the US EPA, who advocated chemical specific numeric sediment quality criteria, the overwhelming majority of the group concluded, as reflected in the final workshop proceedings, that a biological effects based approach should be used where toxicity, potential for bioaccumulation, etc. and organism assemblage information should be the approaches used to determine whether the sediments contained excessive concentrations of chemicals. Shortly after this workshop, the US EPA organized its own workshop, where it controlled who attended, so that the workshop participants would conclude that chemical specific numeric sediment quality criteria should be developed by the Agency. It was evident that, going into the initial workshop, the US EPA had already made its mind up that it was going to follow what is then and now recognized as a technically invalid approach for assessing the water quality significance of chemical constituents in aquatic sediments.

While the agency tried for a number of years to develop the equilibrium partitioning approach, it finally found, as a number of us commented in the early 1990s, that this approach, while having considerable technical theoretical base, could not address the complexity of the variety of reactions that govern how chemical constituents in sediments impact aquatic life and other beneficial uses of waterbodies. Finally, in the late 1990's, the US EPA had to abandon this approach as unreliable for developing sediment quality criteria that could become sediment quality standards.

Another problem with the Agency's approach in trying to develop a regulatory approach for sediment quality is that there has been a group within the US EPA who have tried to give credence to the Long and Morgan co-occurrence based approaches for estimating sediment quality. It has been well established for over 20 years that the total concentration of a constituent

in sediments, or the sum of all constituents in the sediments, is not a technically valid basis for evaluating potential impact. The co-occurrence based approach is obviously not valid since it relies on the total concentration of a constituent and some biological effect that someone measured at some location that has nothing to do with the constituent of concern. While Ed Long and others, such as McDonald, attempt to find databases that will support their position, that the co-occurrence based approach is valid, is obvious when a broad, unbiased database is used that it has no validity. It has been found, based on the application of this approach to the NOAA Status and Trends database, that flipping a coin is more reliable in predicting sediment toxicity than is the exceedance of a co-occurrence guideline value. However, there are some within the US EPA who still persist in trying to use this approach. Most recently, US EPA Region 9, as part of developing a TMDL for sediment contamination in the Upper Newport Bay and Lower Newport Bay waterbodies and watersheds have relied on co-occurrence based approaches to determine excessive concentrations of constituents in sediments. The US EPA headquarters needs to immediately put a stop to this approach. It is technically invalid, it is not a reliable way to evaluate sediment quality, and it certainly should have nothing to do with TMDLs.

In the summer of 2000, the US EPA headquarters released a draft sediment quality guideline document that made it clear that chemically-based approaches were not reliable and that the evaluation of sediment quality should be based on biological effects based approaches, such as sediment toxicity measurements. Unfortunately, with the change in administration, that document has not been finalized. The US EPA, as part of implementing the Strategy for Water Quality Standards and Criteria, should finalize that document and adopt it as the approach that is to be used to evaluate sediment quality. It is important to note, as discussed by Lee and Jones-Lee (1993,1996, and 2000) that the approach that was advocated in this draft write up is the approach that the US EPA and the Corps of Engineers have been using since the late 1970s to regulate dredged sediments. Rather than measuring the concentration of a chemical, and then trying, and usually failing, to predict whether that chemical is toxic to aquatic life in a sediment, the US EPA and Corps adopted toxicity and bioaccumulation tests to estimate the potential impacts of contaminated sediments. This approach screens not only for a chemical, but the combined effects of various chemicals whose concentrations are both measured and unmeasured. This is a far more technically valid approach than the chemically-based approach.

Failure of the US EPA headquarters to act positively and firmly on developing a technically valid, cost-effective sediment quality regulatory approach could readily result in massive waste of public and private funds in inappropriate assessment of sediment quality. Such an assessment could result in TMDLs which will lead to a large number of Superfund like programs for sediment cleanup. Further, it could readily lead to inappropriately developed NPDES permits to limit the discharge of a constituent because a co-occurrence or some other chemically-based approach found that the concentration in a sediment potentially impacted by the discharge exceeded a chemically-based guideline value.

Regulation of Nutrients. An example of a technically invalid approach is the US EPA's current efforts toward developing nutrient criteria, where the Agency is focusing on total phosphorus

rather than algal-available phosphorus. Basically, the Agency staff responsible for this approach have ignored the substantial agriculture and water quality research which demonstrates that substantial parts of the total phosphorus are in non-algal-available forms, and they do not, even over extended incubation periods, convert to algal-available forms. These issues have been recently reviewed by Lee and Jones-Lee (2002). It would be a serious error on the part of the US EPA to develop nutrient criteria based on total P or total N, which are to be applied to runoff from agricultural and urban areas. Such programs could result in massive expenditures for phosphorus control from agricultural and urban sources which will have little or no impact on the eutrophication-related water quality of waterbodies receiving the runoff.

Urban Stormwater Runoff A somewhat chaotic situation exists today in regulating chemical constituents in urban stormwater runoff. The national regulations adopted by the US EPA in 1990 require the control of pollution in the receiving waters for the runoff to the maximum extent practicable using best management practices. Pollution is defined as an impairment of the beneficial uses of these waters. It is US EPA policy that since urban stormwater runoff is regulated as a "point source," under the NPDES permit program, ultimately urban stormwater runoff will need to achieve the control of constituents in the runoff so that they do not cause or contribute to violations of water quality standards at the point of discharge by any amount more than once every three years. This has led to the BMP ratcheting-down process where the regulatory agencies and the stormwater dischargers must apply ever-increasingly more effective BMPs to work toward achieving compliance with water quality standards. However, treating urban stormwater runoff to comply with water quality standards will cause the community served by the urban stormwater sewer system on the order of five to ten dollars per person per day, to purchase the land and to construct and operate the stormwater collection and treatment system so that the exceedance of a water quality standard does not occur more frequently than once every three years.

The current BMP ratcheting-down process will obviously fail to achieve water quality standards in urban stormwater runoff. The cost of compliance is too great. There are also significant technical questions about the need for this degree of control which is based on not exceeding a worst-case based water quality criterion/standard in the stormwater runoff at the point of discharge. While this issue is well understood, the US EPA administrations over the last ten years have failed to address it. The Agency should place as a high priority developing a technically valid, cost-effective national policy for regulating the water quality impacts of urban stormwater runoff on the beneficial uses of the receiving waters. The same problem exists with respect to many stormwater runoff constituents from agricultural sources. This problem also needs to be addressed as part of this strategy for water quality standards and criteria.

Independent Application. One of the most inappropriate approaches that was adopted by the US EPA under the previous Bush administration was the "Independent Application" policy, where chemically-based, numeric water quality standards had to be met, even though toxicity testing or aquatic organism assemblage information showed that the chemicals of concern in a particular discharge were in nontoxic/non-available forms. This is part of the bureaucratic mentality that has prevailed through the Agency upper management, through both Democratic and Republican

administrations, that leads to gross overregulation and stymies attempts to conduct studies to determine whether constituents in a particular discharge are adverse to the beneficial uses of a waterbody. The Agency, in its Draft Strategy, claims that it is a leader in developing biological criteria/assessment approaches. The Agency, however, has failed to properly incorporate these approaches into the regulatory requirements where biological information can be readily used to override chemically-based approaches. Biologically-based approaches will not be properly used until the independent application policy is abandoned.

Lee and Jones-Lee (1995a) have discussed the problems with the independent application policy. These are understood by the previous administration, where discussions were being held about the potential for changing the independent application policy as part of the ANPRM (Announced Proposed Rule-Making for revised water quality standards). The current Bush administration should actively support the ANPRM to begin to address the significant problems that exist in appropriately regulating water pollution control in the US.

The issue of developing appropriate water quality criteria to regulate water pollution control without unnecessary expenditures is a long-standing problem. Various US EPA administrations, and especially the senior staff, have repeatedly made claims about the great success that has been achieved through the water quality criteria approach adopted by the Agency in the early 1980s as they were applied to point source wastewater discharges. The facts are, however, that the regulation of point source discharges, through the worst-case-based criteria has, in many instances, resulted in significant overregulation and unnecessary public expenditures for water pollution control.

As part of correcting the significant deficiencies in the current criteria and standards development and implementation approach, the US EPA needs to immediately abandon the ill-conceived independent applicability policy, where an exceedance of a worst-case-based water quality standard represents a condition that requires that a TMDL be developed, even though other studies show that the constituents of concern (which cause the exceedance) are in nontoxic, non-available forms. There is no justification for regulating organics or other constituents in urban or highway stormwater runoff, or constituents from other sources which are clearly demonstrated to be in nontoxic forms, just because the concentrations exceed a worst-case-based water quality criterion/standard. It should never be necessary for the public/dischargers to have to spend $500,000 conducting site-specific adjustments of the water quality criteria in accord with US EPA (1994) recommended approaches to demonstrate what is well-known regarding the lack of toxicity/availability. As discussed by Lee and Jones-Lee (1995b), water quality criteria should not be used as pass/fail values which, if exceeded, lead to a 303(d) listing and a TMDL. They should be used as guidelines to potential water quality problems, where there is adequate funding made available to determine if the exceedance of a criterion/standard represents an impairment of the beneficial uses of the waterbody. Adoption of this approach will go a long way toward addressing the significant problems that exist today with the US EPA's criteria/standards program.

Problems with TMDLs

The National Research Council's (NRC) review of the problems with the US EPA's TMDL program is appropriate with respect to discussing the significant technical deficiencies in this program. There is no question about the fact that waterbodies are placed on the 303(d) list of impaired waterbodies inappropriately, and that the TMDL goals, which are typically water quality standards, can be inappropriate goals for solving real significant water quality use impairment problems in a technically valid, cost-effective manner. Also, and most importantly, there is inadequate time and inadequate funding available to support the development of TMDLs as they are being administered through the US EPA and state regulatory agencies. It is unfortunate that the NRC panel, for political reasons, was not able to discuss the significant basis for many of the problems with the TMDL program, which relate to Congress failing to adequately fund the US EPA to develop and implement this program.

The 1972 Clean Water Act approach for regulating chemical constituents is only technically valid if Congress and/or the states, as well as the regulated community, provide the funds necessary to develop the site-specific criteria/standards needed to properly classify a waterbody as impaired, based on exceedance of the standard, and to serve as the TMDL goal for managing beneficial use impairments of the waterbody. For aquatic life-related beneficial uses, it should be assessed in terms of the numbers, types and characteristics of aquatic life in the waterbody relative to the waterbody's habitat characteristics. Without substantial biological assessment work, it is not possible to determine whether a waterbody's beneficial uses are, in fact, impaired, or impaired due to chemical constituents or altered habitat characteristics. The funding necessary to develop the site-specific biological and chemical information to properly develop and implement TMDLs is woefully lacking. Further, even if the funding were available, the ability to develop this information in the totally inadequate timeframe that the US EPA Regions have locked stakeholders in the region where a TMDL has been adopted, into, would preclude development of a technically valid, cost-effective TMDL and its appropriate allocation to stakeholders/dischargers.

The US EPA needs to critically reevaluate the criteria/standards program to specifically address gaining adequate funding to properly develop and implement national water quality criteria, site-specific water quality criteria, appropriate 303(d) listing of waterbodies (which includes biological assessment of impairment of uses if the issue of concern is potential aquatic life toxicity), and the development of a flexible timeline for TMDL development and implementation that considers the variety of factors that influence how a chemical constituent impacts the beneficial uses of a waterbody.

The first step in the TMDL process must be an assessment of the appropriateness of the water quality standards that were used to establish the 303(d) listing and the standards that are used as TMDL goals to correct the water quality impairment. Since a considerable part of the TMDL program is directed toward nonpoint source constituent sources such as agricultural runoff and, while classified as a point source for administrative purposes, urban runoff, both of which frequently contain substantial amounts of nontoxic, non-available forms of constituents, it is important that the US EPA and the states focus TMDL programs on controlling toxic available

forms, as opposed to total concentrations of constituents. This focus requires significant changes in how the US EPA develops and implements water quality criteria into state standards, NPDES permits, and as a basis for 303(d) listing and TMDL goals to avoid the over and underregulation that is occurring today.

One of the most significant problems that needs to be addressed is the failure of the Agency to adequately consider toxic forms of available constituents in implementing pollution control programs. While the Agency finally (after 20 years) adopted ambient water-soluble metals as the basis for regulating metals that are potentially toxic to aquatic life, the Agency has not made the similar correction for particulate forms of many other constituents. In addition to particulate forms of metals being non-available, the same is true for many organics and nutrients.

Antidegradation

A major problem exists in the interpretation of what is meant by degradation in connection with the antidegredation policy of the US EPA and in many states. Degradation should be related to pollution—i.e., an impairment of the beneficial uses of waterbodies. Pollution for potentially toxic substances is manifested as significantly reduced number, type, and characteristics of desirable forms of aquatic life. For bioaccumulatable chemicals, degradation would be bioaccumulation of the chemical to sufficient concentrations in a host organism to be adverse to that organism or higher trophic level organisms. The mere presence of a chemical at increased concentrations should not be interpreted as a degradation of water quality unless that increased concentration represents an actual impairment of beneficial uses. Concentrations of nontoxic, non-available forms of constituents can, as well as those that are well below any critical level, occur without adverse impacts on the beneficial uses of a waterbody. This issue needs to be clearly spelled out in the antidegradation policy.

Timelines for Implementation of the Strategy.

Attachment 2 of the Draft Strategy presents a Work Plan which includes timelines. A review of the proposed timelines shows that several are out of synch with national needs. One of the most important of which is 1.d. Revise WQS Handbook. As scheduled now, this is not to be completed until 2008. There is an immediate, urgent need to revise the handbook with respect to site-specific adjustment of water quality criteria/standards for waterbody characteristics associated with developing appropriate TMDL goals.

2.b. lists as the schedule for "stormwater and related wet weather issues" and "contaminated sediment issues" TBD (to be determined). The Agency should place as high priority immediate attention to developing appropriate regulatory approaches for urban and agricultural stormwater runoff. Many of the criteria standards that are available for regulating constituents in stormwater runoff from urban and agricultural areas focus on total concentrations of constituents. It is well established that much of the particulate forms of potential pollutants in this runoff are in nontoxic, non-available forms. Further, as discussed herein, there is immediate need for a clear, technically valid, cost-effective approach for regulating contaminated sediments to avoid the over and underregulation that is occurring now, based on using chemical concentration based approaches.

3.b., devoted to nutrient criteria, indicates that the review of the state's nutrient plans will be completed by 2004. This schedule is out of synch with what is happening in many states with respect to developing nutrient management plans based on nutrient criteria/standards. Some states will not have started to effectively develop nutrient criteria/standards until 2004. This timeline needs to be significantly adjusted to allow adequate time for states and the stakeholders involved to develop site-specific nutrient criteria that will appropriately regulate excessive fertilization without unnecessary expenditures for nutrient control. The US EPA and the states will need to provide substantial funding to develop appropriate site-specific nutrient criteria. Without this funding, many states will be forced to default to the US EPA's technically invalid national ecoregion-based default nutrient criteria.

3.g., concerned with waterborne microbial disease, needs to include work on developing regulatory approaches for viral and protozoan caused diseases associated with contact recreation.

References

Lee, G.F. "Comments on US EPA TMDL Program," submitted to US Environmental Protection Agency, Washington D.C. December (2002).

Lee, G. F. and Jones, R. A., "Assessment of the Degree of Treatment Required for Toxic Wastewater Effluents," Proc. Int. Conf. on Innovative Biological Treatment of Toxic Wastewaters, US Army Construction Engineering Research Laboratory, Champaign, IL, pp 652-677 (1987).

Lee, G. F. and Jones-Lee, A., "Sediment Quality Criteria: Numeric Chemical- vs. Biological Effects-Based Approaches," Proc. Water Environment Federation National Conference, Surface Water Quality & Ecology, pp. 389-400, (1993).

Lee, G. F. and Jones-Lee, A., "Independent Applicability of Chemical and Biological Criteria/Standards and Effluent Toxicity Testing," *The National Environmental Journal*, 5(1):60-63, (1995), Part II, "An Alternative Approach," 5(2):66-67 (1995a).

Lee, G. F. and Jones-Lee, A., "Appropriate Use of Numeric Chemical Water Quality Criteria," *Health and Ecological Risk Assessment*, 1:5-11, Letter to the Editor, Supplemental Discussion, 1996, 2:233-234 (1995b).

Lee, G. F. and Jones-Lee, A., "Evaluation of the Water Quality Significance of the Chemical Constituents in Aquatic Sediments: Coupling Sediment Quality Evaluation Results to Significant Water Quality Impacts," In: WEFTEC '96, Surface Water Quality and Ecology I & II, Vol 4, pp 317-328, Proc. Water Environ. Fed. Annual Conference (1996).

Lee, G. F. and Jones-Lee, A., "Water Quality Aspects of Dredging and Dredged Sediment Disposal," In: Handbook of Dredging Engineering, Second Edition, McGraw Hill, pp. 14-1 to 14-42 (2000).

Lee, G. F. and Jones-Lee, A., "Developing Nutrient Criteria/TMDLs to Manage Excessive Fertilization of Waterbodies," Proceedings Water Environment Federation, TMDL 2002 Conference, Phoenix, AZ November (2002).

Lee, G. F., Jones, R. A., and Newbry, B. W., "Alternative Approach to Assessing Water Quality Impact of Wastewater Effluents," *Journ. Water Pollut. Control Fed.* 54:165-174 (1982).

NAS/NAE, "Water Quality Criteria of 1972," National Academies of Science and Engineering, EPA/R3-73-033, US Environmental Protection Agency, Washington, D.C. (1973).

NRC, Assessing the TMDL Approach to Water Quality Management, National Research Council, National Academy Press, Washington, D.C. (2001).

US EPA, Quality Criteria for Water, US Environmental Protection Agency, Washington, D.C. (1976).

US EPA, "Quality Criteria for Water 1986," EPA 440/5086-001, US Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. (1987).

US EPA, "Water Quality Standards Handbook: Second Edition," US Environmental Protection Agency, Office of Water, EPA-823-B-94-005, Washington, D.C. (1994).

US EPA, "Stay of Federal Water Quality Criteria for Metals; Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance Revision of Metals Criteria; Final Rules," *Federal Register*, 60(86):22228-22237, US Environmental Protection Agency, Washington, D.C., May 4 (1995).

US EPA, "1995 Updates: Water Quality Criteria Documents fore the Protection of Aquatic Life in Ambient Water," EPA-820-B-96-001, US Environmental Protection Agency, Office of Water, Washington, D.C. (1996).

US EPA, "National Recommended Water Quality Criteria – Correction," US Environmental Protection Agency, Office of Water, EPA 822-Z-99-001, Washington, D.C., April (1999).

US EPA, "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule," US Environmental Protection Agency, Region 9, *Federal Register* 40 CFR Part 131, Vol. 65, No. 97, [FRL-6587-9], RIN 2040-AC44, San Francisco, CA, May 18 (2000).

Summary of
G. Fred Lee's and Anne Jones-Lee's
Academic Background and Professional Experience

Dr. G. Fred Lee is President of G. Fred Lee & Associates, which consists of Drs. G. Fred Lee and Anne Jones-Lee as the principals in the firm. They specialize in addressing advanced technical aspects of water supply water quality, water and wastewater treatment, water pollution control, and solid and hazardous waste impact evaluation and management.

After obtaining a bachelor's degree at San Jose State University in 1955, a Master of Science Degree in Public Health from the University of North Carolina in 1957 and a PhD from Harvard University in 1960 in Environmental Engineering and Environmental Sciences, Dr. Lee taught graduate level university environmental engineering and environmental science courses for 30 years at several major U.S. universities. During this time, he conducted over $5 million of research and published over 500 papers and reports. Dr. Anne Jones-Lee was a university professor for a period of 11 years in environmental engineering and environmental sciences. Their combined environmental engineering, aquatic chemistry, aquatic biology, toxicology and public health expertise and experience enable them to address complex problem areas in water quality and solid and hazardous waste impact evaluation and management.

Dr. Lee was active as a part-time consultant during his 30-year university teaching and research career. Drs. G.F. Lee and A. Jones-Lee have been full-time consultants since 1989. Dr. Lee has extensive experience in developing approaches that work toward protection of water quality without significant unnecessary expenditures for chemical constituent control. He has been active in developing technically valid, cost-effective approaches for the evaluation and management of chemical constituents in domestic and industrial wastewater discharges and urban stormwater runoff since 1960.

Dr. Lee has extensive experience in developing water quality criteria for a variety of inorganic and organic constituents. He served as a peer reviewer for the National Academies of Science and Engineering for the Bluebook of Water Quality Criteria, published in 1973. He was a member of the American Fisheries Society review panel for the critique of the US EPA Red Book of Water Quality Criteria of 1976. During the early 1980s, he was a US EPA peer reviewer for the Agency's current approach for developing water quality criteria, as well as for several of the criterion documents. He is frequently involved in the review of water quality criteria in connection with their application to specific situations.

Further information on Dr. Lee's experience and expertise is available at http://www.gfredlee.com.

Surface and Groundwater Quality Evaluation and Management
and
Municipal Solid & Industrial Hazardous Waste Landfills
http://www.gfredlee.com

Dr. G. Fred Lee and Dr. Anne Jones-Lee have prepared professional papers and reports on the various areas in which they are active in research and consulting including domestic water supply water quality, water and wastewater treatment, water pollution control, and the evaluation and management of the impacts of solid and hazardous wastes. Publications are available in the following areas:

- **$** Landfills and Groundwater Quality Protection

- **$** Water Quality Evaluation and Management for Wastewater Discharges, Stormwater Runoff, Ambient Waters and Pesticide Water Quality Management Issues, TMDL Development, State Stormwater Quality Task Force – Task Force Activities

- **$** Impact of Hazardous Chemicals – Superfund, LEHR Superfund Site Reports

- **$** Contaminated Sediment – Aquafund, BPTCP

- **$** Domestic Water Supply Water Quality

- **$** Excessive Fertilization/Eutrophication

- **$** Reuse of Reclaimed Wastewaters

- **$** Watershed Based Water Quality Management Programs:
  Sacramento River Watershed Program,
  Delta – CALFED Program,
  Upper Newport Bay Watershed Program,
  San Joaquin River Watershed DO and OP Pesticide TMDL Programs

A Stormwater Runoff Water Quality Science/Engineering Newsletter is periodically distributed via email to approximately 7,500 individuals interested in this area. To be placed on the Newsletter email list, contact gfredlee@aol.com.

Questions or comments on these comments on the EPA's Draft Strategy for Water Quality Standards and Criteria should be directed to G. Fred Lee at gfredlee@aol.com.