

Urban Stormwater Runoff Water Quality Compliance/Cost Issues

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Dr. Tudor Davies, Director
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Dear Tudor:

I am contacting you as a follow up to discussions that I had with you and others at the US EPA Water Quality Standards meeting that was held in Philadelphia regarding the significant problems that have developed in California with regard to the US EPA's current regulatory approach for NPDES permitted urban area and highway stormwater runoff. At the Philadelphia meeting I provided you with a two-page summary of these problems. I found that apparently none of the US EPA senior staff, as well as the many others with whom I discussed this matter at the meeting, understood the situation that now exists in California with respect to the high cost that NPDES permitted stormwater runoff management agencies (the public) will ultimately have to bear in meeting current US EPA water quality requirements.

The US EPA, as part of implementing Phase II of its stormwater runoff water quality regulations, made a significant error in failing to conduct a proper economic analysis of the cost to the public to meet water quality standards in urban area stormwater runoff. It is obvious to anyone who has an elementary understanding of the characteristics of urban area stormwater runoff and the ability of the US EPA Phase II Six Minimum Control Measures to control regulated chemical constituents, pathogen indicator organisms, and aquatic life toxicity due to non-regulated constituents such as OP pesticides, that the Six Minimum Control Measures will not control the concentrations of constituents in urban area and highway stormwater runoff so that there is no more than one exceedance for a regulated constituent or characteristic of any magnitude every three years. Also, the conventional BMPs such as detention basins, grassy swales, filters, etc., cannot control the concentrations of these constituents in urban area and highway stormwater runoff waters so that they do not cause or contribute to water quality standards violations. There is no question that ultimately, under the current regulatory approach, advanced

wastewater treatment techniques will be needed to treat urban area and highway stormwater runoff in order to meet current worst-case-based water quality criteria/standards.

The costs for conventional BMP retrofit have been estimated for several communities in California to be on the order of \$1 to \$3 per person per day forever. The conventional BMPs, however, will not treat urban area and highway stormwater runoff sufficiently so that the runoff associated residual constituents do not cause violations of water quality standards. As I indicated in my two-page write-up, the estimated cost to fully comply with current water quality standards in the Los Angeles Region is in excess of \$50 billion.

While I was told by one of the senior US EPA staff that they do not believe these costs, I suggest that you and the other senior staff use your influence to have the US EPA administration fulfill its obligation to the public of doing a proper economic analysis of Phase I and Phase II regulatory requirements. I am confident that if the Agency does this analysis it will come to the same conclusion as has been developed in California, that the costs of full compliance with current regulatory requirements of ultimately having to meet water quality standards in urban area and highway stormwater runoff are so great as to mandate that the US EPA Water Quality Standards Branch and other branches of the Agency place a high priority on developing a regulatory approach that will ensure that public funds spent for controlling the concentrations of constituents in urban area and highway stormwater runoff are used in a technically valid, cost effective manner to address real significant water quality use impairments without unnecessary expenditures for chemical constituent and pathogen indicator organism control.

I was greatly disappointed to find that those who organized the Philadelphia Water Quality Standards meeting failed to include any discussion of these issues. In fact, the ANPRM meeting did not even include a representative of the public agencies on the panel discussion who are responsible to the public for regulating urban area and highway stormwater runoff management programs. This was a significant oversight on the part of the development of this panel that should be corrected in the next two ANPRM meetings.

When I discussed the California urban stormwater situation with individuals in other states, I could not find anyone outside of California who was aware of the problems that exist today. As a result of California communities obtaining early NPDES stormwater permits, regulatory issues are being faced in California now that will not be faced in a number of Midwest and eastern communities for at least five or more years. I find that many Midwest and eastern communities still do not have their first urban stormwater NPDES permit. On the other hand, many of the larger cities in California are well into their second five-year permit cycle. This, coupled with the activities of environmental activist groups in California of filing litigation against urban stormwater runoff water quality management agencies for failing to fully implement the program with particular reference to meeting water quality standards, places California communities in the forefront of the urban stormwater runoff water quality management problems that will ultimately be faced by communities throughout the country.

When I discussed this matter with you I was told that the US EPA has no intentions of requiring, in the near future, that NPDES permitted urban area stormwater runoff will have to meet water quality standards in the runoff waters. While this may be the intent of the current US EPA administration, future administrations may have a different approach. Further, and most importantly, the US EPA will not likely control the time frame for urban area stormwater runoff compliance with water quality standards. This time frame will almost certainly be controlled by court orders as a result of litigation filed by environmental groups.. It is my assessment that these orders could come as soon as three to five years, i.e., associated with the next round of five-year NPDES permits, which begins in a couple of years. Further, urban stormwater managers could find similar situations as have been developing in California where the US EPA Region 9 enters into consent decrees with environmental groups, where inadequate time is allowed for the regulated community and the state and local regulatory agencies to develop the necessary technical information base needed to properly formulate technically valid TMDLs. It is appropriate for California urban stormwater management agencies to be highly concerned about the current regulatory approach, since they could readily find that within a few years they will be forced to spend millions to possibly billions of public dollars trying to comply with the highly inappropriate regulatory approach for urban area and highway stormwater runoff water quality management.

These issues came to a head last January, where, as a result of an environmental activist group's filing an appeal of the California Regional Water Quality Control Board's Orange County's second five-year stormwater NPDES permit to the State Water Resources Control Board. The basis for the appeal was the failure of the permit to explicitly require compliance with water quality standards in the permit as part of what is called the "receiving water language." In connection with review of this matter, the US EPA Region 9 has mandated that this language must be in each of the new and renewed permits. This situation has now come to the point in California where the US EPA Region 9 has had to take over the issuance and administration of urban area stormwater NPDES permits. The State of California Water Resources Control Board and its Regional Boards, as well as the urban stormwater runoff water quality management agencies (cities with greater than 100,000 population) that hold NPDES permits, are now in a BMP ratcheting down process where, as soon as a violation of a water quality standards in regulated stormwater runoff occurs, the NPDES permittee and the Regional Water Quality Control Board must initiate a revision of the stormwater management plan that includes BMPs that will eliminate the violations of water quality standards.

How this will actually play out is yet to be determined, since it is obvious that non-structural BMPs, such as the Six Minimum Control Measures set forth in the US EPA's Phase II draft regulations, cannot control a wide variety of chemical constituents and pathogen indicator organisms so that the stormwater runoff does not cause or contribute to water quality standards violations. It is also obvious that conventional stormwater management BMPs, such as detention basins, etc., which will cost the public \$1 to \$3 per day per person to implement and maintain, will not control the concentrations of constituents in urban area and highway stormwater runoff so that they do not cause or contribute to violations of water quality standards in the receiving waters for the runoff,

the BMP ratcheting down process could immediately have to go to advanced wastewater treatment methodology in order to meet worst-case-based water quality standards.

The impossibility of this situation is demonstrated by the Alameda, California County stormwater agency concluding that in order just to collect and store stormwater runoff to the San Francisco Bay from a two inch storm, that the county would have to construct 50 stormwater storage basins the size of the Oakland Coliseum on the shores of the San Francisco Bay. In addition, the county would have to construct, operate and maintain advanced treatment works to remove heavy metals, certain organics, OP pesticides, pathogen indicator organisms, etc., so that they do not cause or contribute to violations of water quality standards as the stormwater runoff from the county's urban areas enters the San Francisco Bay. It should be noted, however, that after intensive study the heavy metals and other potentially toxic constituents in the stormwater runoff have been found to be in nontoxic forms. The toxicity in this runoff is due to the OP pesticides, diazinon and chlorpyrifos, primarily used for residential structural and lawn and garden pest control.

The inability of conventional non-structural and structural BMPs to manage chemical constituents, pathogen indicator organisms, and aquatic life toxicity due to unregulated chemicals such as OP pesticides, has been reviewed by Dr. Jones-Lee and me in a paper we prepared last spring, "Stormwater Managers Beware of Snake-Oil BMPs for Water Quality Management." This paper is in press. It and other related papers are available from our website: <http://members.aol.com/gfredlee/gfl.htm>, in the Water Quality Evaluation and Management Stormwater Runoff section.

In the early 1990s the State Water Resources Control Board and the urban communities subject to stormwater runoff NPDES permits developed the State Stormwater Quality Task Force. The Task Force meetings are open to anyone interested and active in appropriate regulation of urban area and highway stormwater runoff. In addition to the regulated community representing many of the larger cities in California, the State and Regional Water Boards staff, the US EPA Region 9, and other regulatory agencies and others participate in the Task Force activities. The Task Force has been successful in developing approaches for appropriately regulating potential stormwater runoff water quality problems from a variety of sources, such as new construction, certain types of industrial or commercial facilities, through the development of consensus regulatory language that has been adopted by the State Water Resources Control Board.

This past spring, as a result of the US EPA Region 9 mandating that the "Receiving Water Language" section of new or renewed NPDES permits explicitly state that the stormwater discharge is subject to meeting water quality standards, the Task Force organized several new work groups, including a Stormwater Science Work Group that I chair. This Work Group has as its primary objective developing guidance to the regulated community and the regulatory agencies on how best to implement the BMP ratcheting down process to ultimately achieve water quality standards in the stormwater runoff. One of the first tasks that is being undertaken by the Task Force Stormwater Science Work Group is a compilation of potential stormwater runoff compliance problems and the costs

of achieving compliance. As discussed above, this issue should have been address by the US EPA as part of promulgating the proposed Phase II regulations. It is my intent as Work Group Chair to try to get all stakeholders involved in reliably assessing the full range of compliance problems and the true costs of addressing these problems in accord with current regulatory requirements of ultimately having to meet water quality standards.

A key component of this effort should be devoted to properly adjusting the worst-case-based water quality criteria/standards so that they more appropriately regulate real water quality use impairments than is occurring today. This past spring Dr. Anne Jones-Lee (my wife) and I developed a paper, "Appropriate Application of Water Quality Standards to Regulating Urban Stormwater Runoff," which discusses the significant problems with using US EPA worst-case-based water quality criteria/standards to appropriately regulate urban area and highway stormwater runoff. While at this time this paper is in press, a preprint copy of this paper and other papers on this topic is available from our website in the Water Quality Evaluation and Management Stormwater Runoff section.

In an effort to stimulate a discussion of appropriate adjustment of worst-case-based water quality criteria/standards for regulating urban area and highway stormwater runoff, Dr. Jones-Lee and I have initiated a Stormwater Science Newsletter, which is designed to discuss these issues. The first two issues of this Newsletter are available from our website. This Newsletter is not a Task Force activity. It provides an opportunity for all interested parties to discuss these issues. This Newsletter is an email-based Newsletter, where, at this time, there are over 750 individuals on the email mailing list. We would welcome any contribution that you or others in the US EPA would like to make to the Newsletter. If you would like to be placed on the email mailing list to receive future editions of the Newsletter, please let me know. If you wish, I can email you copies of the papers and other referenced materials that are available from my website.

The primary reason that I attended the Philadelphia Water Quality Standards meeting was to learn what steps are being taken by the Agency to address the highly significant problems that exist with the current approach for regulating urban area and highway stormwater runoff associated constituents. Much to my dismay, I found that the Agency management is ignoring these issues and is proposing to further expand the regulated constituents using the same fundamentally flawed approach as exists today. As you know, I have worked on water quality standards development and implementation throughout my almost 40-year career. Further, I have done extensive research on this topic during the 30 years that I held university graduate level environmental engineering/science teaching and research positions. In the early 1970s I was an invited peer reviewer for the National Academies of Science and Engineering "Blue Book" of Water Quality Criteria. In the late 1970s I was part of the American Fisheries Society's Water Quality Section Review Panel that developed the comprehensive review of the US EPA "Red Book" Water Quality Criteria. In the early to mid 1980s I was an invited US EPA peer reviewer for the approach that the Agency has adopted for developing the "Gold Book" Water Quality Criteria. I also served as a US EPA invited peer reviewer for several of the "Gold Book" criterion documents. I am, therefore, highly familiar with how

the current US EPA water quality criteria are developed and, most importantly, how they should be implemented.

While the Agency staff and management frequently tout the success of the Agency's current numeric chemical specific worst-case-based water quality criteria, and standards based on these criteria, a critical review of these issues by those who are familiar with the aqueous environmental chemistry of the regulated constituents and the potential impacts on aquatic life shows that the current regulatory approach is significantly over-regulating many constituents in domestic and industrial wastewaters. The current so-called "success" of this approach is only successful if the wise use of public funds for water pollution control is ignored. The facts are that POTW managers, with few exceptions, have simply passed on to the public the excessive costs of management of chemical constituents in the treated wastewaters. Until recently there was limited incentive for POTW managers to oppose the over-regulation arising out of the independent application of worst-case-based water quality criteria/standards, since the funds for the additional treatment works was largely provided by the federal government, and, therefore, did not have to be directly borne by the local community. A similar situation has occurred for industrial wastewater discharges, where the costs are passed on in the cost of goods, and the transfer of jobs to other countries.

Rather than the current numeric chemical specific criteria/standards approach being a success, it is in fact a significant failure to cost effectively use public funds for water pollution control. This chemical specific approach has caused the country to adopt the bureaucratically simple, but often technically invalid, approach of focusing water pollution control programs on controlling chemical concentrations rather than using funds wisely to control chemical impacts. As an individual who has published more than 600 papers and reports over 40 years devoted largely to incorporating aquatic chemistry into water quality management programs, I find that the chemical concentration approach adopted in the 1980s and perpetuated under the current administration, largely ignores the aqueous environmental chemistry of constituents that are being regulated. It has been known since the 1960s that chemical constituents exist in aquatic systems in a variety of forms, only some of which are toxic/available. While the Agency has taken some steps toward adjusting the worst-case criterion/standard for some of the characteristics of the chemicals, which affects its toxicity/availability, such as hardness, dissolved forms of certain metals, etc., the Agency has failed to make the primary adjustment that should have been made years ago of basing the implementation of the worst-case-based criteria /standards on toxic/available forms. This is the adjustment of the criteria/standards that needs to be made to make their implementation technically valid and cost effective. With respect to urban area and highway stormwater runoff, if appropriately conducted studies show that the heavy metals or organics are in nontoxic forms, then these constituents should be regulated based on an adjustment of the criteria/standards for toxicity/availability.

Since the late 1980s there has been a general understanding among professionals who are experts in assessing the water quality impacts of chemical constituents that there is an urgent need for the Agency to aggressively pursue correcting the significant over-

regulation that was occurring in how the worst-case-based criteria are being implemented into discharge limits. The issues are all well-known and openly discussed, yet, thus far, none of the US EPA administrations has been willing to address these issues in a meaningful way. This situation has arisen primarily because the over-regulation has been passed on to the public in terms of increased wastewater treatment costs and increased price of goods and loss of jobs. For the Agency to now try to perpetuate this failed approach for regulating chemical constituents, which largely ignores how chemical constituents impact water quality, by applying this approach to urban stormwater runoff is strongly contrary to the public's interests.

As discussed in papers that Dr. Jones-Lee and I have developed, the current worst-case-based criterion and the standards based on these criteria, when used in the current regulatory approach, significantly over-regulate chemical constituents in urban area and highway stormwater runoff. The short-term pulses of elevated concentrations of regulated chemical constituents, which, in urban area and highway stormwater runoff are largely in non-available/non-toxic forms, are not properly addressed by current US EPA water quality criteria and state standards based on these criteria. The current criteria and their implementation approach to state standards and discharge limits were never intended to be mechanically applied to situations such as those associated with urban area and highway stormwater runoff. Rather than devoting all of the Water Quality Standards resources to expanding the regulatory arena, as is being done currently, the US EPA should be devoting substantial resources to correcting the over-regulation that will occur when the current regulatory approach is applied to urban area and highway stormwater runoff associated constituents. There is an urgent need to focus this approach on controlling real significant water quality use impairments caused by constituents in urban area and highway stormwater runoff. I urge the US EPA management to aggressively work on developing a regulatory approach for urban area and highway stormwater runoff that will be protective without significant unnecessary expenditures for chemical constituent and pathogen indicator organism control. If there is any way that I can be of help in this regard, please contact me.

These comments are being made by me as an individual concerned about appropriately regulating urban area and highway stormwater runoff, so as to protect the beneficial uses of the receiving waters for the runoff without unnecessary expenditures for runoff associated constituent control. If there are questions about them, or if there is a desire for further documentation of issues, please let me know.

Sincerely yours,

Fred

G. Fred Lee, PhD, PE, DEE

GFL/jk

Copy to: Carol Browner
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Reference as: "Lee, G.F., 'Urban Stormwater Runoff Water Quality Compliance/Cost Issues,' letter to Dr. T. Davies, Office of Sci. & Tech., US EPA, Washington, D.C., September (1998)."

➡ Return to Stormwater [Publication List](#)

➡ Return to [Water Quality Evaluation and Management](#) Page

➡ Return to [Landfills and Water Quality Management](#) Home Page