

Stormwater Runoff Science/Engineering Newsletter

Devoted to Stormwater-Runoff Water Quality Issues

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Volume 1 Number 3
October 8, 1998

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Preface to Volume 1, Number 3 Newsletter

This is the third issue of the Stormwater Runoff Science/Engineering Newsletter. The first issue was published in early June and the second in early July. If you have not received the previous issues or wish to review them again and have not saved them, they are available as downloadable files from: <http://members.aol.com/gfredlee/gfl.htm> in the Stormwater Science/Engineering Newsletter section. Future issues will be added to the web site within a week or so after publication. The attached Newsletter covers a number of new issues pertinent to regulating urban area and highway stormwater runoff that have developed during the past three months that will significantly impact the regulation of urban area and highway stormwater runoff water quality impacts. Unfortunately, many of these are contrary to using appropriate science and engineering in cost-effectively managing real, significant water quality use impairments of the receiving waters for the runoff.

This Newsletter initiates a new Newsletter feature where summaries of stormwater runoff water quality impact assessment and management research are presented. Dr. Michael Barrett of the for Research in Water Resources at the University of Texas at Austin has provided a discussion summary of some of this Center's research on highway stormwater runoff water quality impact management.

As in the past, the editor of the Newsletter is interested in receiving contributions from others that discuss issues pertinent to appropriately regulating urban area and highway stormwater runoff water quality impacts. Those interested in contributing to the Newsletter should contact Dr. Lee (gfredlee@aol.com), providing a preferably WordPerfect 6/7/8 file covering the contribution. Word 6/7 files can also be accepted. Because of problems with transmitting figures which lead to excessive download times, any figures that are included in the contribution should be condensed to small files.

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US EPA Water Quality Standards National Meeting

A US EPA Water Quality Standards national meeting was held in Philadelphia, PA on August 24-27, 1998. At this meeting the US EPA announced a number of new initiatives which will significantly impact the regulation of NPDES-permitted urban area and highway stormwater runoff. A summary of some of the key issues is presented herein. Additional discussion of these and other issues will be presented in subsequent Newsletters.

Purpose of the Meeting. At about yearly intervals for the past five years the US EPA Water Quality Standards Branch headquarters Washington DC has held what they call multi-regional meetings lasting several days to discuss the Agency's latest approaches/ thinking on changes in development and implementation of water quality standards. These meetings are useful in understanding new regulatory approaches for chemical constituents in aquatic systems. Approximately 400 individuals attended the Philadelphia meeting. This particular meeting was important since this meeting was the first time that the proposed details of several new regulatory initiatives were discussed. Also discussed was the Agency's proposed approach for implementing the National Water Quality Plan as well as the details of the Agency's Announced Proposed Rule Making (ANPRM) for revisions

of the basic water quality standards regulations. With respect to the latter, approximately a day and a half of the week-long meeting was devoted to a discussion of the July 7, 1998 Federal Register which presents the Agency's thinking on possible changes to the federal regulations for implementing water quality criteria into state water quality standards and NPDES discharge limits. Significant changes in water quality standards regulations are planned which could lead to a greater number of parameters being regulated by water quality standards and a tightening of regulatory requirements for existing parameters.

Understanding Urban Stormwater Runoff Water Quality Management Issues Facing California Cities and Departments of Transportation with NPDES Stormwater Runoff Permits. At the US EPA Philadelphia meeting, the author (Dr. Lee) discussed the problems that California cities are facing in meeting current urban stormwater runoff water quality regulatory requirements of ultimately having to treat stormwater runoff so that the residual constituents do not cause or contribute to violations of water quality standards at the point of discharge to surface waters. In order to convey this situation, a summary statement of these issues was made available to many of the participants at the Philadelphia meeting. Sections of this summary are presented below in order to provide background information to the Newsletter readers on the significant problems that NPDES stormwater runoff water quality managers and regulatory agencies face in developing technically valid, cost-effective stormwater runoff water quality management programs.

Based on discussions with many individuals at the US EPA Philadelphia meeting, Dr. Lee found that no one with whom he discussed this matter, including several US EPA high-ranking staff, was aware of the significant problems that have developed in California in managing urban area and highway stormwater runoff water quality impacts. The California situation is not being faced in other parts of the country at this time. Some of the major eastern and midwestern cities still have not obtained their first stormwater NPDES permit. Based on discussions with US EPA staff, Dr. Lee found that there was a lack of understanding that there was a real problem in California in regulating urban stormwater runoff. These staff do not believe the high costs of fully implementing the BMP ratcheting-down process to ultimately meet water quality standards in the urban and highway stormwater runoff. They also stated that the US EPA was not under any timetable to enforce meeting water quality standards; however, they did not understand that the timetable will likely be set by the courts through environmental groups' litigation over failing to meet water quality standards in what they feel to be a timely manner. Dr. Lee was also told that meeting the standards did not mean achieving the strict numerical limits established by US EPA worst-case-based water quality criteria. Both the Water Quality Standards meeting and the ANPRM meeting failed to consider urban stormwater runoff water quality issues as a topic for discussion at these meetings.

Dr. Lee also discussed these issues with representatives from several state pollution control agencies and cities and found that no one is facing the problems that the California cities face of potentially having to meet worst-case-based water quality

standards in urban and highway stormwater runoff in three to ten years through a court-ordered judgement. Under the current regulatory approach, ultimately the current stormwater regulatory problems in California will become a national problem faced by cities throughout the country.

Flexibility in Water Quality Standards Implementation. One of the issues that the US EPA is exploring in the ANPRM is the possibility of allowing greater flexibility in implementing the water quality standards regulations. During the course of the meeting, environmental group representatives expressed their concerns about providing greater flexibility in implementing water quality standards. Some environmental groups are opposed to this greater flexibility since they claim that they do not have the resources to address the issues associated with its implementation. Dr. Lee has repeatedly found that some environmental group representatives make statements about water quality management issues that are not technically valid and reflect a lack of understanding about the basic science and engineering that should be used in regulating urban area and highway stormwater runoff water quality impacts in a protective - cost-effective manner. A significant problem that needs to be addressed is how can the urban stormwater discharge managers and regulatory agencies develop a review system that will enable the environmental group representatives and others to gain the technical expertise so that they can feel comfortable that providing flexibility in site-specific water quality standards application will be protective of the environment without unnecessary expenditure of public and private funds. Dr. Lee has found that support of environmental groups and the public can be highly cost-effective in achieving a more reasoned technically valid approach than the current adversarial approach. Without support, some environmental groups feel forced to use litigation or the threat of litigation to gain support of their activities.

One of the most significant deficiencies with the US EPA ANPRM review that took place in Philadelphia was the failure of the Agency staff and the Water Environment Federation, which is a co-sponsor of the ANPRM meeting, to become sufficiently familiar with the urban stormwater problems to understand the need to include a representative of the urban stormwater management community on the panel that opened the ANPRM discussions. Representatives of a state water quality management agency, industrial wastewater dischargers, POTWs and an NRDC attorney were on this panel. While urban stormwater runoff water quality managers face even greater problems than the industrial wastewater dischargers and POTWs in complying with worst-case-based water quality standards, there was no one on the panel to discuss these problems. Hopefully, this situation will be corrected at the Chicago, Illinois ANPRM meeting that the US EPA has scheduled for October 1998.

Regulating Potentially Toxic Heavy Metals Based on Ambient Water Dissolved Forms. All of the ANPRM panel members at the Philadelphia meeting, except the NRDC attorney, discussed the need for flexibility and local, site-specific application of water quality standards. One of the areas of discussion at the Philadelphia meeting concerning

flexibility in managing water quality was the appropriateness of the US EPA's position that potentially toxic heavy metals should be regulated based on ambient water dissolved forms. This issue is of particular importance to urban area and highway stormwater runoff water quality managers since if the regulations are based on ambient water dissolved forms of heavy metals, then the public will not be required to pay for removal of the particulate, non-toxic, non-available forms in stormwater runoff. The US EPA in May 1995 officially adopted the ambient water dissolved forms of potentially toxic metals as the appropriate regulatory approach. The NRDC attorney at the ANPRM meeting stated that one of the reasons that total recoverable metal water quality criteria/standards are needed is to protect sediment quality. The US EPA addressed this issue several years ago where it is the Agency's position that total recoverable metals is not a valid approach to address sediment quality issues. There are tools to assess whether a particular chemical constituent in a sediment is the cause of significant water quality impacts. These tools have been used by the US EPA and the Corps of Engineers in regulating contaminated dredged sediments since the late 1970s. They are based on biological effects-based testing approaches where sediment toxicity, excessive bioaccumulation, etc. are directly assessed for sediment-associated constituents. These issues will be discussed further in future issues of the Newsletter.

The issue of regulating potentially toxic heavy metals based on dissolved vs. total recoverable metals has become an important issue in the US EPA Region 9's proposed approach for implementation of the California Toxics Rule (CTR). In August 1997, the US EPA Region 9 proposed the CTR which contains the water quality criteria for toxics that must be adopted in order to implement the National Toxics Rule requirements. The Agency proposed to use ambient water dissolved forms of potentially toxic heavy metals in implementation of the CTR. The Fish and Wildlife Service and National Marine Fisheries Service (Services), as part of the Endangered Species Act review of the CTR criteria, objected to the US EPA's proposed approach of regulating potentially toxic heavy metals based on ambient water dissolved forms. Dr. Lee, as part of his Stormwater Science Work Group activities, conducted a review of the Services' draft comments where he found that the Services are correct in the CTR under-regulating selenium and mercury under worst-case conditions. However, he also found that the Services' technical support for requiring the regulation of potentially toxic heavy metals based on total recoverable heavy metals was invalid. Dr. Lee's comments on the Services' draft opinion are available from his web site in the Water Quality Wastewater section under Water Quality Criteria Development and Use as: Lee, G.F. and Jones-Lee, A., "Comments on Fish and Wildlife Service and National Marine Fisheries Service Draft 'Opinion' on the Deficiencies in the US EPA Region 9 California Toxics Rule," Submitted to Water Management Division, US EPA Region IX, San Francisco, CA, September (1998).

Regulating Impacts of Stormwater Flow on Aquatic Life Habitat. One of the new issues that surfaced at the Philadelphia meeting is that the US EPA is concerned about urban stormwater runoff flow impacts on aquatic life habitat. The organizers of the meeting

had the manager of the Montgomery County, MD stormwater management program make a presentation at the Water Quality Standards meeting on the impact of flow due to urbanization on erosion in small streams. Based on discussions, the erosion issue is more important than the water quality issues associated with chemical constituents. The US EPA announced that it will initiate a new regulatory initiative as part of the "Water Quality Criteria and Standards Plan – Priorities for the Future" released in June 1998 in which biological assessments will be used to determine whether increased flows in local streams associated with urbanization of an area are degrading aquatic life habitat quality.

Development of Nutrient Criteria/Standards. In June 1998, the US EPA released a draft regulation in the Federal Register covering the Agency's proposed approach for controlling excessive fertilization of the nation's waters. It has been recognized for many years, that excessive fertilization of waters which is manifested as excessive growths of aquatic plants, planktonic and attached algae, and floating and attached macrophytes, is one of the most significant water quality problems in the US and the rest of the world. The US EPA and its predecessor organizations through the 1960s and 1970s did extensive research on aquatic plant nutrient control. The focus of this research was on phosphorus as a cause of excessive growth of aquatic plants. This research program was terminated in the late 1970s by the US EPA with the funds shifted to developing programs for managing rodent carcinogens on the Priority Pollutant list, such as the chlorinated solvents and other chlorinated chemicals. For a period of approximately 20 years, the excessive fertilization water quality problems, which to many are far more significant to the public than the rodent carcinogen problem, was ignored by the Agency.

Based on the June 1998 Federal Register, the Agency is now entering into a crash program to develop chemical-specific nutrient (nitrogen and phosphorus compound) water quality criteria that can be implemented as state standards to control excessive fertilization of waterbodies. As proposed now, these standards would be implemented in much the same way as the toxics standards for heavy metals and organics where an exceedance of a standard would represent a violation of an NPDES permit. The Agency is proposing to allow regionally developed nutrient standards which reflect waterbody type (lakes, rivers, estuaries) and local climatic and other factors. The Agency, however, has made it clear that if the states and local entities do not develop nutrient-based water quality standards within the Agency's timetable, the Agency will impose its standards on the state.

This issue is of particular importance to urban area and highway stormwater runoff water quality management agencies since the concentrations of nitrogen and phosphorus in most NPDES-permitted stormwater runoff are sufficient to cause violations of worst-case-based nutrient criteria/standards. This could cause the public to have to begin to pay for massive nutrient control programs that, while possibly justified for some waterbodies, will likely have little impact on the excessive fertilization of many waterbodies since the primary source of nutrients controlling this fertilization is domestic wastewater discharges and/or unregulated agricultural and other non-point source runoff.

Drs. G.F. Lee and A. Jones-Lee have done extensive research and have been involved in many nutrient management programs in the US and other countries over the past 40 years. They have published extensively on these issues. Several of their papers and reports are available from their web site. Drs. Lee and Jones-Lee, as part of reviewing the US EPA's proposed approach for developing nutrient-based water quality criteria/standards, have developed a comprehensive discussion of the inappropriateness of the US EPA's proposed approach which is available on their web site as: Lee, G.F. and Jones-Lee, A., "Comments on 'National Strategy for the Development of Regional Nutrient Criteria' Developed by the US EPA Office of Water, June 1998," Comments submitted to US EPA, Washington, D.C., G. Fred Lee & Associates, El Macero, CA, August (1998).

Basically, they recommend that the Agency abandon its numeric, chemical-specific, nutrient-specific criteria/standard approach and focus on managing the excessive fertilization problems on a site-specific basis for each waterbody. This is the valid approach for determining the appropriate nutrient loads to a waterbody to protect the beneficial uses without significant unnecessary expenditures for nitrogen and/or phosphorus control. Several of the speakers at the Philadelphia Water Quality Standards meeting also were critical of the US EPA's proposed approach for developing a program for managing the excessive fertilization of the nation's waters.

There are several other issues, such as regulating sanitary quality of waters, that evolved from the Philadelphia meeting that are pertinent to urban area and highway stormwater runoff water quality management. They will be discussed in future issues of the Newsletter.

Urban Area and Highway Stormwater Runoff Water Quality Research

This is a new section of the Newsletter that focuses on current research being done on urban area and highway stormwater runoff water quality impact assessment and management. The first contribution to this section is by Dr. Michael Barrett from the University of Texas at Austin's Center for Center for Research in Water Resources (CRWR). Others doing research on urban area and highway stormwater runoff water quality management are urged to submit summaries of their work for inclusion in future Newsletter issues.

Stormwater Research at the University of Texas at Austin

By

Michael Barrett, Ph.D., P.E.

The lure of better jobs and a higher standard of living has resulted in an unprecedented migration of people to urban areas in all parts of the world. The construction of homes, offices, factories, retail centers, and streets to serve the high population density in these areas increases impervious cover, radically altering the hydrology of urban watersheds. The impervious cover increases the amount and rate of

stormwater runoff, which results in an increased threat of flooding and causes erosion of the beds and banks of urban waterways. In addition, runoff from urban areas carries increased loads of constituents that may adversely impact receiving water quality.

The Center for Research in Water Resources (CRWR) was established in 1963 to centralize water-related research efforts of The University of Texas at Austin. CRWR has developed a comprehensive program to investigate the hydrologic impacts of urbanization. The stormwater program has several focuses:

Stormwater Monitoring: CRWR has an active field-monitoring program to collect samples of stormwater runoff. The samples are analyzed in laboratory facilities at CRWR to determine the types and amounts of constituents contained in runoff.

Computer Modeling: CRWR is a national leader in the development of map based computer models to estimate the impacts of stormwater runoff and nonpoint source pollution.

Stormwater Treatment: CRWR has developed guidelines to improve the performance of stormwater treatment systems and can evaluate prototype designs in a testing facility at the Center.

The results of studies in these areas have been published in conference proceedings, peer reviewed journals, and in a CRWR Technical Report series. Many of the technical reports are available for download in PDF format at the CRWR web site: <http://www.ce.utexas.edu/centers/crwr/index.html>.

Stormwater Monitoring

The CRWR stormwater monitoring program has focused on the characterization and treatment of highway runoff. The Center conducted a five-year project (1991-1995) to assess the environmental impact of highway construction and use on water quality and quantity in the Austin area. As part of this study, researchers monitored 35 artificial rainfall events using a specially designed rainfall simulator on Austin's Loop 1 freeway (for a picture see: <http://www.ce.utexas.edu/centers/crwr/projects/monitoring.html>). The simulator provided data on runoff constituents, and the controlled nature of the experiments allowed the identification of constituent specific buildup and washoff processes.

This site and two other freeway sites were also monitored during natural storm events to determine the effects of traffic density and surrounding land use on runoff water quality. The impact of highway construction was evaluated by collecting water quality samples in a small creek upstream and downstream of the construction corridor. A summary of the research and conclusions from the highway runoff study are contained in CRWR Online Report 95-2. Detailed reports of the various project aspects are also available on the web site.

Computer Modeling

Computer models can be used to investigate changes in the quality and quantity of stormwater runoff associated with urbanization. These models also offer the potential to estimate constituent loads associated with various land uses and to assess the benefit of "best management practices" and regulatory actions. The primary type of model developed at CRWR to address stormwater runoff problems is based on the GIS software ArcView.

CRWR is at the forefront in the development of GIS based computer models, which allow a better spatial characterization of the watershed. CRWR recently completed a GIS based model for the City of Austin, Texas that will be used as part of the City's watershed master plan process. The Center also has developed GIS stormwater loading models for the Corpus Christi, Texas, National Estuary Program and is currently developing a model for the Tillamook Bay NEP in Oregon.

The Center is also developing GIS based packages to support other software systems. For instance, CRWR-PrePro is a system of ArcView scripts and associated controls that has been developed to extract hydrologic, topographic and topologic information from digital spatial data of a hydrologic system and to preprocess these data for input into non-GIS modeling packages. CRWR-PrePro is able to prepare an input file for the Hydrologic Modeling System (HMS) developed by the Hydrologic Engineering Center (HEC) of the United States Army Corps of Engineers. Starting with a DEM and a SCS curve number grid, CRWR-PrePro delineates streams and watersheds, calculates parameters for each of them, determines their interconnectivity, and prepares an input file for HMS that includes the computed hydrologic parameters.

Researchers at CRWR led by Dr. David Maidment, CRWR Director, have compiled GIS Hydro '98 (<http://www.crrw.utexas.edu/gis/gishyd98/GisHyd98.htm>) to document the full scope of GIS based hydrologic modeling at the Center.

Stormwater Treatment

The Center conducted a 2-year study of the effectiveness of various runoff control technologies for treating stormwater runoff. These included sand filter systems and vegetated controls. A grassed swale was constructed in an outdoor channel to investigate the impacts of swale length, water depth, and season of the year on removal efficiency. Swales were found to provide effective treatment all year. Two vegetated strips treating highway runoff in the Austin, Texas, area also were monitored to determine removal capabilities. Reductions in constituent loads in the filter strips were comparable to that obtained with more complex structural controls.

The sedimentation/filtration system exhibited excellent potential pollutant removal for runoff captured in the system; however, maintenance requirements may be very high. Controlled laboratory experiments indicate that with sufficient detention time,

sedimentation offers comparable treatment to systems that incorporate filtration. A runoff control treatment facility located at CRWR allows researchers to test the efficacy of various filter media to aid in designing better stormwater runoff controls. A summary of the results of this study is contained in CRWR Online Report 97-3.

CRWR is currently developing a Technical Guidance Manual for the Texas Natural Resource Conservation Commission. This manual will provide information on BMP design and performance to developers subject to proposed rules intended to prevent stormwater pollution of the Edwards Aquifer in Central Texas.

Additional information about these and other research projects conducted at CRWR are available on the CRWR web site. For additional information, please contact Michael Barrett, Associate Director of the Center, PRC #119, University of Texas, Austin, TX 78712 or by email at mbarrett@mail.utexas.edu.

Selected Publications

Barrett, M.E., Malina, J. F., Jr., and Charbeneau, R. J., 1998, "An evaluation of the performance of geotextiles for temporary sediment control," *Water Environment Research*, Vol. 70, No. 3, pp. 283-290.

Barrett, M.E., Malina, Jr., J.F., Charbeneau, R.J., and Ward, G.H., 1998, Characterization of highway runoff in Austin, Texas area, *ASCE Journal of Env. Eng.*, Vol. 124, No. 2, pp. 131-137.

Maidment, D.R., 1996, "Spatial hydrologic modeling," in *Issues and Directions in Hydraulics*, Nakato & Ettema editors, Balkema, Rotterdam.

Barrett, M. E., Keblin, M. V., Walsh, P. M., and Malina, J. F., Jr., 1998, Performance comparison of highway BMPs, in *Watershed Management: Moving from Theory to Implementation*, Denver, CO, May 3-6, 1998, pp. 401- 408.

Maidment, D.R., 1996, GIS and Hydrologic Models of Non-Point Source Pollution in Subsurface Water, *Application of GIS to the Modeling on Non-Point Source Pollutants in the Vadose Zone*, Soil Science Society of America Special Publication 48, pp. 163-174.

Barrett, M. E., Malina, J. F., Jr., and Charbeneau, R. J., 1997, Water Quality Effects of Highway Construction and Operation, in *Proceedings of WEFTEC '97*, Vol. 4: Surface Water Quality & Ecology I & II, 70th Annual Conference of the Water Environment Federation, Chicago, IL, pp.463-472.

Barrett, M. E., Smith, P., and Malina, J. F., Jr., 1997, Performance of permanent runoff controls, in *Proceedings of ASCE Water Resources Planning and Management Division 24th Annual Conference: Aesthetics in the Constructed Environment*, Houston, Texas,

April 7-10, 1997, pp.193-198.

Announcements

The US EPA and USDA have published: "Clean Water Action Plan: Restoring and Protecting America's Waters." EPA -840-R-98-001, February (1998). Available from: National Center for Environmental Publications and Information, 1-800-490-9198 (toll free), PO Box 42419, Cincinnati, OH, 45242, Fx: (513) 489-8695. Also available on internet (<http://www.epa.gov/cleanwater>) or (<http://www.nhq.nrcs.usda.gov/cleanwater>). This publication provides overall guidance on developing a national policy on non-point source pollution.

The US Fish and Wildlife Service and National Marine Fisheries have released: "Draft Biological/Conference Opinion on the Environmental Protection Agency's Proposed Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (April 10, 1998) and letter to Ms. Felicia Marcus, Administrator (1-1-98-F-21). May be available from the US EPA Region 9 web site or US EPA Region 9.

The US EPA publishes "Nonpoint Source News-Notes," c/o Terrene Institute, 4 Herbert Street, Alexandria, VA 22305. All issues of News-Notes are accessible on the NPS Information Exchange on the EPA's web site. The Terrene Institute should be contacted to be placed on the mailing list for "Nonpoint Source News-Notes."

The US EPA publishes: "EPA Watershed Events: A Bulletin on Sustaining Water Resources and Ecosystems." To be added to the mailing list, send your name and address to: Melissa Bowen, Tetra Tech, Inc. 10306 Eaton Place, Ste 340, Fairfax, VA 22030, em: bowenme@tetrattech-ffx.com.

The US EPA has published: "Water Quality Standards Regulation; Proposed Rule," 40 CFR Part 131; Federal Register, July 7 (1998). Should be available from the US EPA's web site. This is an important Rule that is designed to address some of the under- and over-regulation of chemical constituents as they may impact the beneficial uses of waterbodies. All individuals interested in appropriately regulating chemical constituents based on water quality criteria/standards should review this Draft Rule and comment on its provisions as it may impact their interests.

References

Jones-Lee, A., and Lee, G.F., "Evaluation Monitoring as an Alternative to Conventional Water Quality Monitoring for Water Quality Characterization/Management," Proceedings, National Water Monitoring Conference, Monitoring: Critical Foundations to Protect Our Waters, National Water-Quality Monitoring Council, July (1998).

Comments on the Newsletter

The Editor welcomes comments on the water quality issues discussed in this Newsletter. Send comments to G. Fred Lee at gfredlee@aol.com.

Urban Stormwater Runoff Water Quality Management : Challenge of the 2000's

G. Fred Lee, PhD, PE, DEE Anne Jones-Lee, PhD

August 1998

Current Regulatory Requirements

The implementation of the US EPA urban-area stormwater runoff water quality management program has recently established some new, potentially highly significant regulatory requirements for management of chemical constituents and pathogen-indicator organisms in NPDES-permitted urban-area and highway stormwater runoff. In January 1998, the US EPA reaffirmed its previously adopted position that NPDES-permitted urban stormwater runoff shall not cause or contribute to exceedance of a water quality standard for any constituent by any magnitude more than once every three years. In those areas where mixing zones are not allowed for stormwater runoff, that requirement becomes an end-of-discharge-pipe requirement. The implementation of these requirements could ultimately cost the US public hundreds of billions of dollars. Urban stormwater runoff from residential and commercial areas and highways contains a variety of chemical constituents and pathogen-indicator organisms that will cause stormwater runoff from those areas to violate US EPA worst-case-based water quality criteria and state water quality standards based on those criteria.

California is at the forefront of regulatory activity for NPDES-permitted urban-area and highway stormwater runoff because many of its cities and metropolitan areas with populations over 100,000 obtained early NPDES stormwater discharge permits. Many of the larger cities in California are now well-into the second five-year permit period. As part of their entering that second period, the US EPA has established that NPDES-permitted urban-area and highway stormwater runoff water quality managers in California initiate a BMP ratcheting-down process that has as its goal the control of chemical constituents and pathogen-indicator organisms in the stormwater runoff so the runoff-associated constituents do not cause violations of water quality standards. Under current regulatory requirements, this BMP ratcheting-down process is to take place over a 5- to possibly 10-year period. The exact time-table has not been established and will likely be determined by the courts through litigation filed by environmental groups who feel that NPDES-permitted stormwater management agencies are not making satisfactory progress toward controlling water quality standards violations in the stormwater runoff.

Problems with/Costs of Achieving Water Quality Standards in Urban Stormwater Runoff

The traditional approach for water quality management of urban stormwater runoff involves the development of conventional BMPs such as detention basins, grassy swales, filters, etc. The cost of retrofitting established urban areas with these types of BMPs is being found to be on the order of one- to three-dollars per person per day, in perpetuity, for the urban population served by the stormwater management system. It is now clear through several engineering studies that such conventional stormwater runoff BMPs, however, will not treat urban stormwater runoff sufficiently so that the residual constituents in the treated runoff do not cause violations of water quality standards. This means that in order to achieve current regulatory requirements, which are now beginning to be implemented in California and will soon be implemented nationwide, advanced wastewater treatment technologies will have to be used to treat NPDES-permitted urban-area and highway stormwater runoff. A recent estimate of the cost of retrofitting for this type of collection and treatment in the Los Angeles, CA area is on the order of \$50 billion. The cost nationwide will be hundreds of billions of dollars.

While urban-area stormwater runoff is often reported to be a major cause of impairment of the water quality of the nation's waters, when critically examined there are significant questions about whether potentially toxic heavy metals and organics that cause exceedance of worst-case-based water quality criteria/standards in urban-area residential and highway stormwater runoff, cause real, significant water quality use-impairment in the waters receiving the stormwater runoff. The heavy metals and regulated organics in urban-area stormwater runoff have been found in several studies to be in non-toxic, unavailable forms. Under those conditions, an exceedance of water quality standards can be characterized as an "administrative exceedance" that is an artifact of the use of US EPA worst-case-based water quality criteria as state standards as discharge limits for urban area and highway stormwater runoff. There is need to critically examine the real water quality use-impairments caused by urban-area and highway stormwater runoff in order to develop water quality management programs that will protect designated beneficial uses of the receiving waters for the runoff without significant, unnecessary expenditures for control of chemical constituents and pathogen-indicator organisms.

California Storm Water Quality Task Force

The state of California urban-area and highway stormwater runoff water quality managers and the State Water Resources Control Board developed a Storm Water Quality Task Force in which the regulated community, regulatory agencies and other interested parties/individuals are working together to develop technically valid, cost-effective approaches for implementing urban-area and highway stormwater runoff water quality management requirements. The Task Force has a number of committees and work groups, including a Stormwater Science Work Group, a BMP Work Group, a Watershed Work Group, a Public Information Committee and a Regulatory Activities Committee, which are addressing aspects of water quality management of urban-area and highway

stormwater runoff. Information on the Task Force is available from its web site (<http://www.blymer.com/swqtf>). The Task Force meets every two months. Those interested in attending these meetings and participating in Task Force activities should contact T. Grant (tgrant@dpw.co.la.ca.us) in order to be placed on the mailing list..

Stormwater Science Work Group

Dr. G. Fred Lee chairs the Stormwater Science Work Group of the Storm Water Quality Task Force. The objective of this Work Group is to provide guidance to the Task Force on appropriate approaches for implementing the BMP ratcheting-down process. The Work Group is developing a number of reports on various aspects of this process for review by the Task Force. Information on the activities of the Stormwater Science Work Group is available from Dr. Lee's web site (<http://members.aol.com/gfredlee/gfl.htm>). Also available at that web site are papers and reports that Drs. Lee and Jones-Lee have developed on issues pertinent to water quality aspects of urban-area and highway stormwater runoff, including impact-evaluation and management.

Stormwater Quality Impact Evaluation/Management Short Course

Drs. G. Fred Lee and Anne Jones-Lee and Mr. Scott Taylor have developed a two-day short course on impact and evaluation/management of urban-area and highway stormwater runoff water quality. That short course reviews basic issues pertinent to the reliable evaluation of water quality impacts/use-impairment of urban-area and highway stormwater runoff. It also covers some of the issues that should be considered in the selection and implementation of technically valid, cost-effective BMPs to manage real water quality problems associated with urban-area stormwater runoff. The course can be taught at any location at which there are at least 20 participants. An announcement of the first offering of this course is presented below. Further information on the details of the course is available from Dr. Lee (gfredlee@aol.com) as well as from his web site (<http://members.aol.com/gfredlee/gfl.htm>).

Short-Course

◀ Urban Stormwater Water Quality Impact and Management Issues ▶

With Emphasis on BMP Ratcheting Down Process

Date and Location:(9:00-4:30 each day)

November 18-19, 1998
Santiago Oaks Regional Park
2145 North Windes Dr.,
Orange, CA (714) 538-4400

Cost: \$25.00 to cover cost of refreshments-soft drinks and coffee and luncheon sandwiches

Course Organizer:

Dr. G. Fred Lee, PE (TX), DEE
G. Fred Lee & Associates
El Macero, CA
Ph: (530) 753-9630
Fx: (530) 753-9956
Emgfredlee@aol.com

Course Instructors:

G. Fred Lee, PhD, PE, DEE, G. Fred Lee & Associates, El Macero, CA

Scott Taylor, PE, Robert Bein, William Frost and Associates, Irvine, CA

Dr. Lee and Mr. Taylor have extensive experience in urban area and highway stormwater runoff water quality impact evaluation and management.

Objective of the Course: To provide an introduction to the basic water quality issues that are pertinent to understanding and evaluating the water quality impact and cost-effective management of urban area and highway stormwater runoff water quality. The goal of the course is to provide an introduction to technically valid cost effective urban area and highway stormwater runoff water quality management.

Who Should Attend Individuals interested in urban area and highway stormwater runoff water quality impact evaluation and management, including engineers, natural and social scientists, planners, attorneys and others.

Course Major Topics Areas

- Water quality characteristics of urban area street and highway stormwater runoff
- Current regulatory requirements - BMP ratcheting down process to achieve water quality standards/objectives,
- Urban area street and highway stormwater runoff water quality impact assessment and management - addressing over regulation and excessive costs
- Technical basis of regulatory requirements - water quality criteria/standards development and appropriate use in regulating urban stormwater runoff associated constituents
- Why current worst case based water quality criteria over regulate stormwater runoff
 - Technically valid cost effective regulation of urban stormwater runoff water quality impacts
 - Evaluation Monitoring to define water quality impacts and select BMPs
- BMP selection, operation, maintenance and efficacy evaluation
- US EPA new regulatory initiatives for urban area stormwater runoff

Course Registration and Additional Information

The course will be offered if 20 individuals register for the course. It is important to register by contacting Dr. G. Fred Lee at 27298 E. El Macero Dr., El Macero, CA 95618. Tel: 530 753-9630; Fx: 530 753-9956; em: gfredlee@aol.com. The registration/attendance will be limited to 50 participants with first preference given to public agencies staff until November 13, 1998. A registration form is attached. Contact Dr. Lee for additional information on the course content, organization, local arrangements and registration forms. The registration form is available from Dr. Lee upon request.

**Registration for Stormwater Science/Engineering Short-Course
November 18-19, 1998; Orange County, CA**

Those interested in attending the Stormwater Science/Engineering Short-Course that is being offered by Dr. G. Fred Lee and Scott Taylor should submit this form to Dr. Lee.

Name: _____ Position: _____

Affiliation: _____

Mailing Address: _____

Telephone: _____ Fax : _____

E-mail: _____

Years of Professional Experience in Water Quality Related Activities: _____

Undergraduate degree major: _____ Yr of Degree: _____

Graduate degree major: _____ Yr of Degree: _____

Are you involved in urban area and/or urban area stormwater runoff water quality management?
If so, explain your involvement.

Have you examined the course outline? It is available at Dr. Lee's web site:
<http://members.aol.com/gfredlee/gfl.htm>? _____

Please summarize your interest in taking the course.

Please submit this form as soon as possible. Course registration is limited to 50 participants with preference give to governmental agency personnel. A minimum enrollment of 20 individuals is required by November 13, 1998 to avoid cancellation. Dr. G. Fred Lee, em: gfredlee@aol.com; fax: 530-753-9956; or 27298 E. El Macero Drive, El Macero, CA 95618-1005. Please send a check made out to G. Fred Lee and Associates in the amount of \$25.00 to cover break refreshment and lunch sandwiches. If there are questions about the course, please contact Dr. Lee (Ph: 530-753-9630).