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 Stormwater Runoff Water Quality Science/Engineering Newsletter presents updates on several topics that have been covered in previous Newsletters and announcements.

StormCon Conference

The 2004 StormCon conference will be held July 26-29, 2004, at the Desert Springs Marriott in Palm Desert, California. This is the third annual conference program devoted to stormwater runoff water quality assessment and management. In addition to conference presentations, the conference includes several workshops including a California Stormwater Quality Association (CASQA) workshop on municipal management practices handbooks. Information on this conference is available at www.stormcon.com.

***Stormwater* Magazine**

Forester Communications publishes *Stormwater* magazine. This magazine presents information on stormwater runoff water quality issues and their management. It is now in its fifth year of publication. The July/August 2004 issue contains an article by G. F. Lee and Anne Jones-Lee devoted to Regulating Water Quality Impacts of stormwater runoff. To sign up for a complimentary subscription to *Stormwater* go to www.stormh20.com.

Change in CASQA Website Location

The California Stormwater Quality Association (CASQA) has changed its website to http://www.casqa.org. The CASQA California BMP handbooks are available at http://www.cabmphandbooks.com. Information about these BMP handbooks was presented in Newsletter NL 6-6, available at www.gfredlee.com.

Freshwater Fish Tissue Chemical Data

Newsletter NL 7-4 was devoted to a review of approaches used to regulate the excessive bioaccumulation of hazardous chemicals, such as PCBs, dioxins, mercury, legacy organochlorine pesticides, etc., in edible aquatic life. As discussed in that Newsletter, excessive bioaccumulation of hazardous chemicals is one of the most significant water quality problems associated with some urban area and rural stormwater runoff. The US EPA has recently released second-year data from the National Study of Chemical Residues in Lake Fish Tissue, a national four-year study to assess the condition of lakes and reservoirs in the lower 48 states. The study provides the first national estimate for 268 persistent, bioaccumulative, and toxic (PBT) chemicals and will help the US EPA track reductions of these chemicals in freshwater fish. The US EPA is analyzing the fish samples for mercury, arsenic, polychlorinated biphenyls (PCBs), and dioxins/furans, along with many pesticides and other organic chemicals, such as phenols and chlorobenzenes. Chemical analysis of all fish samples should be complete by the end of 2004.

US EPA plans to finish statistical analysis of the cumulative four-year fish tissue data set in 2005 and produce a final report in 2006. More information about the fish tissue study is available at www.epa.gov/waterscience/fishstudy.

Bioaccumulation and Aquatic System Simulator (BASS)

Newsletter NL 7-4 was devoted to providing information on current approaches for estimating bioaccumulation of potentially hazardous chemicals in edible fish and other organisms. The US EPA has been developing a modeling approach (BASS) to relate water concentrations of these chemicals to fish tissue residues.

According to the US EPA,

> *"… the BASS bioaccumulation and Aquatic System Simulator has been under continuous development at the Ecosystems Research Division (ERD) of the USEPA National Exposure Research Laboratory (NERL) since the mid 1990s. Although originally developed to predict the bioaccumulation of organic industrial chemicals and pesticide in fish within a community/ecosystem framework, it has also been developed to simulate ecological exposures and responses of age-structured fish species and communities to organo-metallic compounds such as methyl mercury and to non-chemical stressors such as invasive/exotic species, fisheries management practices (stocking and harvesting), and various physical habitat alternations."*

A training course in the use and application of the BASS bioaccumulation and community model was held June 23-25, 2004. If you wish further information on the BASS modeling and/or the acquisition of the software, contact Craig Barber:

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AQUATOX Update

US EPA's Office of Water has released an enhanced version of AQUATOX, a user-friendly simulation model for aquatic ecosystems. It will help users evaluate and illustrate the causal links between the chemical and physical environment and the living systems that inhabit our waters. AQUATOX can predict the fate of pollutants and their effects on the ecosystem. While it has been available for several years, the enhanced Release 2 allows a more complete and realistic representation of the ecosystem. AQUATOX is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments.

You can download AQUATOX Release 2 and accompanying documentation at http://www.epa.gov/waterscience/models/aquatox/.
According to the US EPA, CD-ROMs and hard copies of the documentation will soon be available from the National Service Center for Environmental Publications (NSCEP) at 1-800-490-9198 or from the Water Resources Center at 202-566-1729.

Hardness Correction for Metals Toxicity

Recently a situation has developed where it has been found that there is a significant difference in the water quality criterion for copper in a freshwater system depending on the method used to determine the hardness of the water. The hardness of water has been defined for many years as the amount of soap-consuming (precipitating) constituents in water. Originally hardness was determined by titrating the sample of water with a standard castile soap. The procedure involved adding the standard soap to a sample of water in a bottle and shaking it. The endpoint was reached when the addition of soap to the sample of water resulted in a persistent foam – i.e., the standard soap solution had interacted with all of the hardness constituents.

Some years ago this approach was replaced by a titration with a standardized EDTA solution. Several years ago, those responsible for developing Standard Methods for the Examination of Water and Wastewater concluded that Standard Methods should recommend that the standard hardness definition be changed from soap-consuming constituents to the sum of the calcium and magnesium concentrations in the water. Standard Methods now has the recommendation that the concentrations of calcium and magnesium be determined individually, and then summed to determine the hardness of the water. For some waters, the concentrations of calcium and magnesium determined by calculation (i.e., the sum of the measured constituents) versus those determined by EDTA titration, are similar. However, in some waters there is a significant amount of constituents that interact with EDTA and therefore are defined, by tradition, as hardness constituents. Of concern are the divalent metals.

In most situations, whether hardness is determined by summing the calcium and magnesium measured individually or by EDTA titration makes little difference in the use of the data; however, one of the primary uses of hardness data today is in the equations (hardness slope) that are used to adjust the US EPA water quality criterion for several heavy metals for hardness. The criterion correction is related to the fact that as the hardness of the water increases, the toxicity of a number of heavy metals decreases. In one situation it was found that there was about a 10 µg/L difference in allowable copper discharge from a POTW to an effluent-dominated stream, depending on the method used for determining the hardness of the water. This difference can be sufficiently significant so that additional treatment of the effluent would be needed to achieve compliance with water quality standards.

The author (G. F. Lee) consulted Charles Delos, an Environmental Scientist in the Health and Ecological Criteria Division of the US EPA headquarters in Washington, D.C. Mr. Delos is responsible for leading the development of water quality criteria, especially copper criteria. In contacting Mr. Delos, one of the issues of concern with respect to the hardness correction was whether it is really hardness that is responsible for the change in toxicity of metals, or whether it is a combination of hardness constituents (such as calcium, magnesium, etc.) and/or alkalinity (i.e., carbonate/bicarbonate species). For many waters, the hardness and alkalinity increase proportionately, since both calcium/magnesium and alkalinity are derived from the dissolution of limestone (dolomite). His response to questions raised by G. F. Lee on which method should be used to determine hardness as applied to the hardness correction for heavy metal criteria is as follows:

"The hardness equations were developed mostly from tests where hardness and alkalinity varied together, both also possibly varied with pH. Consequently, people like Gary Chapman say that hardness is a surrogate also for alkalinity and pH. Based on how the equations were obtained, hardness could thus represent the effects of Ca, Mg, CO_3, pH, plus anything that tends to correlate with these parameters in the toxicity tests underlying the equations."

In his remarks, Mr. Delos concluded,

"… the hardness slope represents a mixture of influences. So what is the best way to measure hardness? It would seem that you can't go wrong in using whatever methods were used in the tests underlying the derivation of the hardness slope. Since the hardness slope is based on the combination of different studies done by different people in different laboratories, it might not be single method. In any case, I do not know what method or methods were used."

Basically, it can be concluded, at least for now, that it is uncertain which method (titration versus calculation of the sum of the calcium and magnesium concentrations) is best for determination of hardness as applied to correcting heavy metal toxicity for hardness (alkalinity, etc.)

Dust Suppressants

The readers of this Newsletter may recall that Newsletter 7-1 was devoted to issues related to the use of chemicals to suppress dust at construction sites and on dirt roads. In that Newsletter G. F. Lee mentioned that he was a member of an expert panel organized by the US EPA through the Department of Civil and Environmental Engineering at the University of Nevada, Las Vegas, that reviewed the issues pertinent to the potential environmental impacts of chemicals used as dust suppressants. This activity arose out of the Times Beach, Missouri, situation where waste chemical manufacturing still bottoms were used as dust suppressants in Times Beach, and it was subsequently found that these waste manufacturing chemicals contained high levels of dioxins.

Recently, Dr. Tom Piechota has indicated that the final version of the report that evolved out of the expert panel meeting of two years ago has now been published by the US EPA. This report,

Potential Environmental Impacts of Dust Suppressants: "Avoiding Another Times Beach," An Expert Panel Summary, Las Vegas, Nevada, May 30-31, 2002,

can be downloaded from http://www.epa.gov/nerlesd1/cmb/pdf/dust.pdf.

Newsletter NL 7-1 presented a discussion of the approach that Drs. G. F. Lee and Anne Jones-Lee recommend for screening the chemicals (sometimes, wastes) that are used as dust suppressants on roads and properties.

Screening New Chemicals for Environmental Impacts

The Toxic Substances Control Act (TSCA) was adopted in the late 1970s in response to a need to screen new or expanded-use chemicals for potential environmental impacts. As discussed in a previous Newsletter (NL 7-3, devoted to unrecognized environmental pollutants), over two million chemicals have been developed, and several hundred thousand are used in large quantities, yet only about 100 to 200 of these are regulated with respect to potential human health and environmental impacts. The US EPA has announced the availability of a document

entitled, "Questions and Answers for the New Chemicals Program (Q&A)." This document is based on questions directed to the US EPA TSCA program, and their answers, that have accumulated over the years. The general program description is available on the New Chemicals website at www.epa.gov/oppt/newchems/.

EnviroMapper for Water

The US EPA Office of Water has recently released a new version of EnviroMapper for Water, which is available at http://www.epa.gov/waters/enviromapper/. EnviroMapper for Water provides a Web-based mapping connection to a wealth of water data. According to the US EPA, it can be used to view and map data such as the uses assigned to local waters by your state (fishing, swimming, etc.), waters that are impaired and do not support their assigned uses, the reasons why waters are impaired, water quality monitoring information, closures of swimming beaches, and the location of dischargers. Maps can be viewed at the national, regional, state or local levels. This latest release of EnviroMapper for Water (version 3.0) features several new layers of water data including US EPA's national water quality database STORET, National Estuary Program study areas, and the location of nonpoint source projects. Other enhancements make it easier to locate and view these data, and instructions are included describing how to incorporate the resulting map into your own Web page. For more information, the US EPA contact is Tommy Dewald at dewald.tommy@epa.gov, or (202) 566-1178.

National Beaches Conference

One of the most important problems associates with urban area and rural stormwater runoff is the impact of this runoff on the sanitary quality of the receiving waters. Frequently such runoff contains greatly elevated concentrations of several pathogen indicator organisms. The US EPA has developed a "beaches" program to work toward improving beach (contact recreation) water quality. Newsletter NL 2-2 presented several abstracts from the US EPA West Coast Regional Beach Conference that was held in August 1999 that discussed the nature of this problem and the US EPA's program to address it.

The US EPA will hold a National Beaches Conference in October 2004 in San Diego, California. According to the US EPA, the conference will provide a forum to share information and ideas about implementing a successful recreational beach program. Some of the topics that may be covered include:

- Water quality monitoring and public notification programs
- Epidemiological studies
- Volunteer monitoring
- Education and public outreach
- Rapid indicator techniques
- Analytical methods for bacteria
- TMDLs for bacteria
- Pollution control projects
- Regulatory protection
- Case studies of successful projects.

Information on the conference is available at http://www.tetratech-ffx.com/beaches/index.cfm.