

*Hudson-Delaware Chapter of
the Society of Environmental
Toxicology & Chemistry*

***Total
Maximum
Daily Loads
in the Hudson-
Delaware Region***



*Prudence Hall
Thomas Edison State College
Trenton, New Jersey
September 13, 2002*



Agenda

8:30 – 9:00 am

Registration and Continental Breakfast

9:00 – 9:15 am

Introduction

Welcome and Logistics, W. Scott Douglas

Comments from the President, Chuck Shorten

2003 Annual Meeting, Lisa Baron and Jon Doi

9:15 – 9:45 am

Regulatory Overview of TMDLs

Rosella O’Conner, Regional TMDL Coordinator, USEPA Region II

TMDLs are required under Section 303(d) of the Clean Water Act. Section 303(d) requires States to submit lists of impaired waters and develop TMDLs. The TMDL regulations, implementing Section 303(d), have been in effect since 1985, but have been amended several times. In July 2000, EPA issued a Final Rule, but a Congressional rider on military/supplemental appropriations prohibited EPA from implementing the Rule. EPA is now in the process of issuing a new proposed rule to replace the 2000 Rule. This presentation will present an overview of the current requirements and the proposed direction of the new rule.

9:45 – 10:15 am

The TMDL Process in New Jersey

Thomas Amidon, Research Scientist, NJ Department of Environmental Protection

A Total Maximum Daily Load (TMDL) represents the load capacity of a receiving water for a particular pollutant – the amount of pollutant that a waterbody can assimilate without violating surface water quality standards. By allocating the load capacity among wasteload allocations for point sources, load allocations for nonpoint sources and a margin of safety to account for uncertainty, the TMDL functions as a regulatory tool to bring waters back into compliance with surface water quality standards. The analysis used to link pollutant sources to water quality can vary in complexity, but must account for critical conditions in some way. New Jersey’s 2002 Integrated List, re-proposed on August 5, includes five categories that represent a range of use attainment for each waterbody. The new Memorandum of Agreement currently being developed between USEPA Region 2 and NJDEP will specify a schedule for establishing TMDLs for impaired waterbodies listed on Category 5 of the 2002 Integrated List. Included in the schedule are expedited TMDLs for streams impaired by fecal coliform and lakes impaired due to eutrophication. The Department has developed simplified approaches to calculating these TMDLs, which are appropriate for the management of these impairments.

10:15 – 10:30 am

BREAK

10:30 – 11:00 am

Use of a Simplified Model in a TMDL

Joseph DiLorenzo, Ph.D., Senior Research Scientist, Najarian Associates

Simplified mathematical models are often used to estimate potential water quality impacts in aquatic systems. In some cases, such screening models provide managers with valuable tools for linking pollutant sources and the in-stream pollutant response – a critical step in establishing a TMDL. This presentation provides examples of how such models are being used to provide “first-cut” assessments of pollutant loading impacts in watershed characterization studies.

11:00 – 11:30 am

Incorporation of Biocriteria and Eutrophication in TMDLs for the Hudson-Delaware Region

Thomas Belton, Research Scientist, NJ Department of Environmental Protection

NJDEP-DSRT in conjunction with the Patrick Center for Environmental Research, Philadelphia Academy of Natural Science is performing a set of studies for developing New Jersey specific field and lab protocols to be used in characterizing eutrophication in streams using Periphyton (attached) algae. Biological response indicators are being developed as potential biocriteria (e.g., chlorophyll a, biomass, diatom community structure, etc.) to assess relationships between stressors (i.e., as measured by extant water quality criteria e.g., total phosphorus) and overt signs of eutrophication (e.g., algae and macrophyte blooms, low dissolved oxygen, fish kills, etc.). These indicators may be applied in a regulatory context as secondary narrative criteria for identifying nutrient impairment. Protocols are being developed for sample collection; the processing, analysis and presentation of data; and interpretation of the results with an eye towards: 1.) Adding procedures to NJDEP's routine biological-based water quality monitoring program; 2.) The development of quantifiable parameters to address New Jersey's narrative nutrient criteria and 3.) For potential use in nutrient-based TMDLs. Periphyton data will also be utilized in a separate ongoing Patrick Center study (Bioassessment Integration Study) which will attempt to combine and assess all NJDEP's biologically-based water quality monitoring data (i.e., aquatic macroinvertebrates; fish communities; periphyton; endangered species' and habitat characterization). Integrated biological indices may provide a systems analysis approach to describing biological communities, possibly forming the basis for new standards and criteria, stream classifications and designated uses for waterbodies in New Jersey.

11:30 – 12:15 pm

LUNCH –

You may eat at your seat, or wander out to the State House Park

12:15 – 1:00 pm

Luncheon Speaker

Toxicity in NY Harbor Sediments: Do we know the cause?

Joy McGrath, Project Manager, Hydroqual

To assess whether or not a sediment contaminant is present at a level high enough to potentially cause toxicity, the contaminant concentration is compared to a sediment guideline. Sediment guidelines or effect levels can be based on bulk dry weight concentration or normalized to account for bioavailability. The Equilibrium Partitioning (EqP) approach that makes corrections to the bulk sediment to account for bioavailability is the preferred approach. In order to apply EqP guidelines, other sediment properties besides the chemical concentrations are required. For hydrophobic, non-ionic organic chemicals, the sediment organic carbon concentration is required. For metals, the sediment acid volatile sulfides (AVS) concentration is required. In addition to sediment properties, sufficient toxicological data must be available so that appropriate endpoints can be identified. The U.S. EPA has developed EqP sediment benchmarks for nonionic chemicals, dieldrin, endrin, metals mixtures and PAH mixtures. These guidelines will be used to determine if they can explain the observed toxicity in the NY Harbor. The data are those from the 1993-1994 RE-MAP investigation.

1:00 – 1:30 pm***Inclusion of Non-Point Source Loadings in TMDLs***

Maureen Krudner, USEPA Region II

The Total Maximum Daily Load (TMDL) is a tool for implementing water quality standards. It determines the amount of a specific pollutant that a waterbody can receive and assimilate without violating water quality standards. The TMDL is based on the relationship between the sources of pollutants and in-stream water quality conditions, therefore an understanding of the various sources and how they impact pollutant loads is important. The basic components of developing a TMDL will be presented with an emphasis on the issues in each component that are related to nonpoint source loads.

1:30 – 2:00 pm***The Use of Atmospheric Deposition Data in TMDLs***

John Reinfelder, Ph.D., Associate Professor, Rutgers University

Atmospheric deposition is increasingly recognized as an important non-point source of nutrients and organic and inorganic contaminants to aquatic ecosystems. As such, atmospheric deposition can contribute significantly to the total load of contaminants to lakes, streams, and coastal waters and should be considered in any effort to quantify or reduce these loads. Contaminant inputs to surface waters from atmospheric deposition are not easily estimated since the largest portion is usually associated with runoff of atmospheric deposition from the watershed. Thus biogeochemical interactions in the watershed play a major role in controlling the load of contaminants that atmospheric deposition actually delivers to a specific water body. In addition, atmospheric inputs represent a supply of new nutrients and contaminants with potentially greater bioavailability than chemical species already present in a system that are often bound to suspended particles or dissolved organic ligands. In this presentation, atmospheric deposition results from the New Jersey Atmospheric Deposition Network (NJADN) will be used in a preliminary evaluation of the importance of atmospheric deposition as a source of organic and inorganic contaminants to the Lower Hudson

River Estuary and Pinelands streams.

2:00 – 2:30 pm

The TMDL Experience in the Delaware River

Thomas Fikslin, Ph.D., Program Director, Delaware River Basin Commission

The Delaware River Basin Commission was one of the first agencies to establish a TMDL for conventional pollutants in the 1960's. Despite the success of this program, the Delaware River has been identified as exceeding of water quality standards for several toxic pollutants, including PCBs. The Delaware River Basin Commission recently completed TMDLs for several pollutants for the Delaware River. Dr. Fikslin served as the technical lead for this effort. He will describe the strategy employed, the issues encountered, and the outcomes of this multi-year effort.

2:30 – 2:45 pm

BREAK

2:45 – 3:15 pm

Muddying the Waters: The role of sediment toxicity in a TMDL for NY/NJ Harbor

W. Scott Douglas, Program Manager, NJDOT Office of Maritime Resources

The States of NY and NJ are negotiating agreements regarding the calculation and implementation of a TMDL for the NY/NJ Harbor. Given the size, complexity, environmental and economic importance of the Harbor estuary, this process is likely to be both technically and politically challenging. The NY/NJ Harbor Estuary Program will serve as a focal point for the technical discussions necessary to perform this work, as well as provide a forum for public participation and interagency cooperation. The Contaminant Assessment and Reduction Project, or CARP will have a large role in the TMDL process for the Harbor. CARP has embarked on what is arguably the largest and most technically advanced contaminant assessment and modeling program ever attempted. The CARP model will provide the basis for TMDL calculations for both the harbor and will support TMDLs in adjacent waterbodies throughout the region. Sediment contamination, and specifically sediment toxicity, is widespread in the Harbor, yet there is considerable debate on how to incorporate this into a TMDL. The current strategies available for including sediment toxicity in a TMDL will be discussed. A plan for needed research and development of numerical guidelines, toxicity identification evaluations and the definition of remedial goals will be proposed.

3:15 – 3:45 pm

Risk Assessment in TMDLs: An Industrial Perspective

Steve Brown, Ph.D., Senior Scientist, Rohm and Haas
Steve Washburn, Principal, Environ Corporation

This will be a facilitated discussion

According to EPA, even after 30 years of regulatory-driven water pollution control efforts, approximately 40% of the assessed waters in the U.S. are still too polluted to be classified as “fishable and swimmable” (ref. CWA 1972). The Total Maximum Daily Load (TMDL) program is intended to help rectify this problem. TMDLs are meant to represent the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. For the TMDL program to achieve the goal of meeting water quality standards, potentially significant point and non-point sources must be identified and accurately quantified on a system-specific watershed (and airshed)-wide basis, reliable models must be developed to calculate the TMDL and evaluate the effect of these sources on water quality, and load allocations accounting for both point and non-point sources must be assigned. This is not a trivial matter, either technically or economically. The challenge will likely lead (cumulatively) to improved databases regarding sources of “pollution”, enhanced fate and transport (mass balance) models, and perhaps even to the development of diagnostic tools for determining causal relationships between stressors and biological communities. Each of these steps would improve our understanding of the complex relationships between environmental stressors and ecological receptors. However, to successfully achieve water quality standards and “fishable and swimmable” conditions, the TMDL program must also incorporate watershed-based risk assessments, as suggested by EPA guidance. Such risk assessments should use watershed-specific data to evaluate the likelihood that TMDLs will lead to measurable improvements in biological conditions in aquatic environments. These watershed risk assessments must consider and weigh the relative effects of both chemical and non-chemical factors, such as physical habitat impairment resulting from watershed development and subsequent erosion and sedimentation (e.g., burial of fish spawning habitat, loss of aquatic macrophytes).

4:00 pm

Adjourn

About the Speakers

Rosella O'Connor

Rosella O'Connor has been the EPA Regional TMDL coordinator for New York, New Jersey, Puerto Rico and the Virgin Islands for over ten years. As TMDL coordinator, she has been involved in the development and approval of 303(d) lists and TMDLs. Rosella has been involved in the development of TMDLs for metals in NY-NJ Harbor, nitrogen in Long Island Sound, and phosphorus in the New York City Drinking Watershed Reservoirs. Previous to her EPA experience, Rosella worked at Malcolm Pirnie Consulting Engineers performing water quality assessments and modeling, and at Manhattan College developing bioaccumulation models for toxic pollutants.

Thomas Amidon

Thomas Amidon is a Research Scientist for the New Jersey Department of Environmental Protection, where he provides technical support and guidance to the watershed program, including the development of Total Maximum Daily Loads. He obtained his B.S. in Biology from the Pennsylvania State University in 1987 and his M.S. in Engineering Science from the State University of New York at Buffalo in 1993, where he also worked as a Research Assistant for the Great Lakes Program.

Joseph DiLorenzo, Ph.D.

Dr. Joseph DiLorenzo is a senior research scientist at Najarian Associates, Eatontown, New Jersey. He has nearly 20 years of experience in applying and developing mathematical models for estuarine and coastal waterways. He obtained a bachelors degree in physics from the Polytechnic Institute of Brooklyn, a Masters degree in physical oceanography from the Johns Hopkins University and a Ph.D. in coastal oceanography from the Marine Sciences Research Center at Stony Brook, New York. Currently, he is a member of the Model Evaluation Group for the Contamination Assessment and Reduction Project of the New York-New Jersey Harbor Estuary Program.

Thomas Belton

Mr. Belton is a Research Scientist in the Division of Science and Research within the New Jersey Department of Environmental Protection. He has a BA in Classical Languages from St. Peters College, attended both the University of Pennsylvania and City University of New York for Graduate work in Biology and has an MA in Biological Oceanography from the City College of New York. Mr. Belton's chief responsibility at NJDEP is to develop watershed-based assessment tools for NJDEP's watershed management initiatives. In addition, he provides technical support and co-chairs several technical committees associated with several National Estuaries in New Jersey including the Toxics Work Groups for both the New York-New Jersey Harbor and the Delaware National Estuary Programs. He is a co-principal investigator on a number of research projects including fish contamination studies; the development of algae as bioindicators of cultural eutrophication; investigations into atmospheric contaminant deposition on sensitive Pine Barren forests and pond communities; and multimedia modeling of groundwater to surface water discharges from septic systems. Results of Mr. Belton's research on contaminants in fish tissue formed the basis for consumption advisories and fishing bans that are

currently in effect in New Jersey.

Joy McGrath

Joy McGrath, a Project Manager at HydroQual, Inc. (an environmental consulting firm in Mahwah, New Jersey, USA) specializes in the development of sediment quality criteria with a particular focus on polycyclic aromatic hydrocarbons (PAHs) and metals. She is a co-author of the US. EPA's draft Equilibrium Partitioning Sediment Benchmarks document for PAH mixtures. She is currently working on applying these types of guidelines to sites contaminated with PAHs from petroleum sources.

Maureen Krudner

Maureen Krudner has worked for EPA Region 2 for the past 14 years. She is currently a member of the Water Programs Branch where she is responsible for providing technical support to the NPDES, TMDL and Non-point Source programs related to quantification of nonpoint source pollution and similar wet weather sources. Up until last month, Ms. Krudner was part of EPA's New York City Watershed Team where she worked on nonpoint source control programs to protect NYC's unfiltered drinking water supply.

John Reinfelder, Ph.D.

Dr. Reinfelder is an Assistant Professor in the Department of Environmental Sciences, Rutgers, The State University of New Jersey. He received his Ph.D. in Oceanography in 1993 from the Marine Sciences Research Center at the State University of New York at Stony Brook.

Dr. Reinfelder's research interests include trace metal biogeochemistry in aquatic systems, mercury cycling, and phytoplankton physiology. His current research is focused on atmospheric trace metal deposition in coastal waters and watersheds, trace metal accumulation in marine plankton, and inorganic carbon accumulation in marine diatoms.

Thomas Fikslin, Ph.D.

Thomas J. Fikslin is the head of the Modeling and Monitoring Branch and the Director of the Estuary Toxics Management Program for the Commission. The branch is responsible for conducting and coordinating monitoring activities within the Delaware River Basin, as well as the development and implementation of hydrodynamic and water quality models for toxic and conventional pollutants. Previously, he worked with the U.S. Environmental Protection Agency, Region II for 19 years. From 1986 to 1989, he served as the Assistant Director of the U.S. EPA Region II laboratory in Edison, NJ. From 1979 to 1986 he directed the toxicity testing and microbiology section of the Region II laboratory. From 1974 to 1979, he was involved in the NPDES permitting of power plants, specializing in impacts to aquatic life. Dr. Fikslin received a Master of Science in Biological Sciences from the University of Delaware, and was awarded a Doctor of Philosophy in Ecology and Evolution from Rutgers University.

W. Scott Douglas

Mr. Douglas holds a Masters degree in Environmental Toxicology and a Bachelors degree in Zoology from the University of Vermont. Since graduation from UVM in 1989, he has worked in two environmental testing firms in northern NJ and founded his own environmental assessment firm in 1997. His experience ranges from NJ effluent discharge monitoring to Superfund site assessments, to testing of dredged materials for ocean disposal. Currently, Mr. Douglas serves as the Dredging Program Manager for the Office of Maritime Resources, in the NJ Department of Transportation. In this position he serves as a liaison between the State and federal agencies and the private sector for dredged material, beneficial use, and contaminated sediment issues. He serves on the Harbor Estuary Program's CARP, Toxics, and HARS Remediation workgroups and is a member of the US Army Corps of Engineers dredged materials management team for the NY District. Current projects include the Sediment Decontamination Technology Demonstration Program, Port Jersey Channel Deepening Project, Claremont Channel Improvement Project, Pennsylvania Mines Reclamation Demonstration Project, among others. Mr. Douglas is former President of the HDC-SETAC and currently serves as Chapter Secretary. Mr. Douglas is a member of the steering committee for the SETAC Pellston Workshop on Sediment Quality Guidelines held in Montana this past summer.

Steven Brown, PhD

Dr. Brown is a Senior Scientist in the Toxicology Department at Rohm and Haas Company, one of the world's largest manufacturers of specialty chemicals serving a broad range of markets. Dr. Brown received his B.S. (Biology) and M.S. (Aquatic Biology) from Central Michigan University, and his Ph.D. (Aquatic Ecology and Toxicology) from The University of Mississippi. Dr. Brown has worked professionally in the area of aquatic ecology, ecotoxicology and risk assessment since 1985. Prior to joining Rohm and Haas in 1998, Dr. Brown served on the faculty at the University of Maryland's Chesapeake Biological Laboratory, and prior to that worked in private consulting and commercial toxicity testing. Dr. Brown has conducted research and published on strictly ecological issues (e.g., whole-stream metabolism and energy flow, macrobenthic invertebrate-wading bird feeding relationships in the Florida Keys, stream recovery following the eruption of Mount St. Helens), and on ecotoxicological relationships (e.g., effects of sediment contaminants and natural environmental gradients on benthic communities in the Gulf of Mexico, hierarchical effects of sediment-associated copper on stream macrobenthos). Dr. Brown is Associate Editor of the Journal of Aquatic Ecosystem Stress and Recovery, and serves as a reviewer for the Journal of Environmental Toxicology and Chemistry, and Estuaries. He has also contributed to book chapters resulting from SETAC "Pellston" workshops. Dr. Brown has been a SETAC member since 1987, and served on the Board of Directors for the Chesapeake-Potomac Regional Chapter. Dr. Brown provides ecotoxicological and risk assessment-related product support for Rohm and Haas businesses, and helps address corporate environmental and remediation issues. Dr. Brown has participated in discussions regarding efforts to establish a TMDL for PCBs in the Delaware River Estuary, and is chairing the organizing committee for an upcoming symposium focused on results from recent studies which will be used to inform the TMDL modeling process.

Steve Washburn

Mr. Washburn is a Principal at ENVIRON Corporation. He has over fifteen years of consulting experience in risk-based engineering and risk assessment, with special emphasis on site remediation and air-related issues. His experience at hazardous waste or industrial sites includes remedial design, remedy selection, human health and ecological risk assessment, the development of site investigation strategies, and litigation support. He has conducted risk assessments and remedy evaluations at Superfund and RCRA sites across the U.S. He has provided expert testimony in the areas of risk assessment, incineration, and hazardous waste management. Mr. Washburn was selected by U.S. EPA to serve on the external expert peer review panels for the *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities*, and for the multimedia, multi-pathway, and multiple receptor risk assessment (3MRA) model developed for the Hazardous Waste Identification Rule (HWIR). He was one of nine scientists selected by the American Society for Testing and Materials (ASTM) to provide training to state regulatory agencies on Risk-Based Corrective Action (RBCA) at petroleum hydrocarbon sites, and assisted in the development of RBCA programs in over ten states. Mr. Washburn has been designated by the U.S. Army Environmental Center as a Subject Matter Expert (SME) in the areas of risk assessment and decision analysis, and has assisted in the technical peer review of over a dozen active and inactive Army installations. He was also a member of the Risk Assessment Subcommittee of the Pennsylvania Science Advisory Board, which was established to encourage brownfields development in Pennsylvania. Mr. Washburn has an M.S. in Chemical Engineering from the Massachusetts Institute of Technology and a B.S.E. in Chemical Engineering from Princeton University.



SETAC is an international professional society of 4,000 environmental chemists, toxicologists, and ecologists from academia, government, and private industry. The Hudson-Delaware Chapter of SETAC was founded in 1987 to help further the greater goals of SETAC in the greater New York-Philadelphia Metropolitan Area. SETAC promotes learned discourse and education on all aspects of environmental toxicology and chemistry.



The Office of Maritime Resources, created in 1995 by Governor Christine Todd Whitman, is charged with interagency support and policy development for all aspects of maritime resources for the State of New Jersey. In 1999, OMR was formally housed within the Department of Transportation. OMR is responsible for the implementation of the Joint Dredging Plan for NY/NJ Harbor. OMR supports technology research and development, investigates innovative dredged material management technologies, and promotes policy to balance development and protection of marine ecosystems and the growth of New Jersey's Maritime Transportation System.

NOTES

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