WATERSHED MANAGEMENT/TMDLs

ISSUE STATEMENT

A principal strategic objective of EPA is to use a watershed approach through the implementation of Total Maximum Daily Loads (TMDLs) and watershed-integrated National Pollutant Discharge Elimination System (NPDES) permits to achieve protection of water resources. This action creates a growing number of new, complex research needs. Research is needed to:

• Understand how to effectively manage stormwater runoff
• Couple watershed and air quality models to address TMDLs and endangered species protection where atmospheric deposition is a major source of pollutants such as nitrogen, mercury and other heavy metals
• Derive, allocate, and implement complex TMDLs (involving, for example, thermal, selenium, and arsenic)
• Derive regional TMDLs and secondary standards
• Establish watershed protective water quality trading programs
• Build and maintain a web-based watershed management issue knowledge center

DRIVERS

Significant improvement in the state of waters throughout the county has been achieved since the Clean Water Act was passed in 1972 as a result of implementation of the NPDES; however the NPDES only addresses point sources of pollution. Tens of thousands of impaired waterbodies are subject to nonpoint source loadings of pollutants. Examples of principal nonpoint sources are atmospheric deposition, agricultural runoff, and stormwater runoff. EPA has espoused a watershed-based approach to remove these impairments. The major regulatory mechanism is the TMDL which integrates both point and nonpoint loadings. States are required to calculate, allocate and implement TMDLs for impaired waters. Other federal agencies such as the U.S. Forest Service (USFS) and the U.S. Fish and Wildlife Service (USFWS) have also adopted watershed approaches. In addition to TMDLs, endangered species protection can also drive watershed management actions. Water quality trading is a non-regulatory driven method that can potentially be used to achieve environmentally effective and cost efficient watershed management. Waterbody impairments that are likely to be of concern to the electric power industry include: mercury, nitrogen, selenium, arsenic, sulfur, acidity, thermal and PCBs. Recent events have included efforts to promulgate regional TMDLs and secondary standards. In regions where there are many impaired waters subject to fairly uniform atmospheric deposition, regulatory agencies have started to derive and implement regional TMDLs. Secondary air quality standards, historically set at the same levels as primary standards, have become a major regulatory driver for EPA. The Agency is considering development of secondary standards for sulfur dioxide and nitrogen dioxide based on acidic deposition effects. Both the derivation of regional TMDLs and secondary air quality standards are extremely complex and there are major questions about how to derive them in a manner that is technically and scientifically sound.

RESULTS

The most widely used EPRI product on this topic is the Watershed Analysis Risk Management Framework (WARMF) which is now in the public domain and distributed by USEPA (http://www.epa.gov/athens/wwqtsc/html/warmf.html). WARMF has been the basis of numerous studies where EPRI partners included: Northeast Utilities, TVA, Public Service Company of New Mexico, First Energy, Duke Energy, Minnesota Power, Arizona Public Service, Salt River Project, AEP, Hoosier, USEPA, USDOE, Los Alamos National Laboratory and Sandia National Laboratory. Other key products have been TMDL Technical Evaluation Framework (EPRI Report 1015580) and Applicability of Regional Total Maximum Daily Loads (TMDLs) for Atmospheric Deposition of Contaminants: Mercury and Nitrogen (EPRI Report 1015581).

Power company environment, generation, and planning staff will extract information from EPRI technical reports, peer reviewed...
open literature scientific journal papers, EPRI issue briefs, and EPRI presentation material. This information is disseminated to community water resource stakeholders and government agencies. Electric power companies have used results to address impaired water, endangered species and water quality trading issues. Electric power companies also use results to guide design and siting of new generation. In addition, EPRI will continue to facilitate broader use and awareness of the results by presenting webcasts; briefing key stakeholders, including the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS) and state agencies; developing materials for the trade press/media; and continuing service on various government, academic, and professional organization advisory panels.

PLAN

EPRI’s research will contribute to the understanding of how air deposition and water quality are linked, and how regional TMDLs can be developed to accurately account for loadings from point and non-point sources. The elements of this research include:

- Linkage of state-of-the art atmospheric and watershed models to assess the ecological impacts of single atmospheric emission point sources. The linked models should be able to address nitrogen, sulfur, alkalinity, mercury, selenium, aluminum, arsenic, bioaccumulation and endangered species
- Establish a network of watershed sites in diverse environments to test linked atmospheric and watershed models
- Illustrate how to test alternative emission management strategies for the watershed network above to address waterbody impairment, endangered species and terrestrial community health issues. These strategies should include water quality trading opportunities
- Evaluate the scientific foundations of proposed methodologies for regional TMDLs and secondary air quality standards.
- Develop and test scientifically sound methodologies for derivation of regional TMDLs and secondary air quality standards
- Establish and maintain a web-based knowledge center(s) for watershed management, TMDLs, and water quality trading
- Rigorously evaluate and test the concept of critical loads
- Provide a national assessment of surface water vulnerability to acidification
- Provide a national assessment of effect of current levels of atmospheric deposition of mercury on mercury levels in fish
- Evaluate the effect of sulfate deposition on mercury methylation.
- Incorporate ecological asset management into water quality trading and watershed management approaches

RISK

Without scientifically sound and proven TMDL and water quality methodologies, electric power companies are vulnerable to:

- Economic growth impacts resulting from impaired waterbody imposed limitations on community growth and development
- Poorly informed and thus potentially expensive environmental regulations
- Financial risks associated with non-compliance fines, lost capacity, etc.
- Adversarial relations with customers and water resource stakeholders
- Inability to meet growing demand for electricity, resulting in both economic and reliability losses
Water & Ecosystems - Watershed Management TMDLs

- Emphasis on watershed approach to protecting waterbodies

Regulators

- Complex TMDLs – Regional TMDLs
- Atmospheric deposition, secondary standards, endangered species

EPRI Program

- Maintain watershed / TMDL knowledge center
- Link air and watershed models
- Create network of experimental watersheds and evaluate alternative management strategies
- Methodologies for regional TMDLs and secondary air quality standards
- Evaluate critical load concept
- National assessment of acidic deposition and mercury effects
- Water quality trading demonstrations

Power Plants

- Siting, licensing and permitting power plants under TMDL, endangered species and secondary constraints