Overview of Water Issues and Regulations Affecting the Electric Utility Industry

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Acknowledgements

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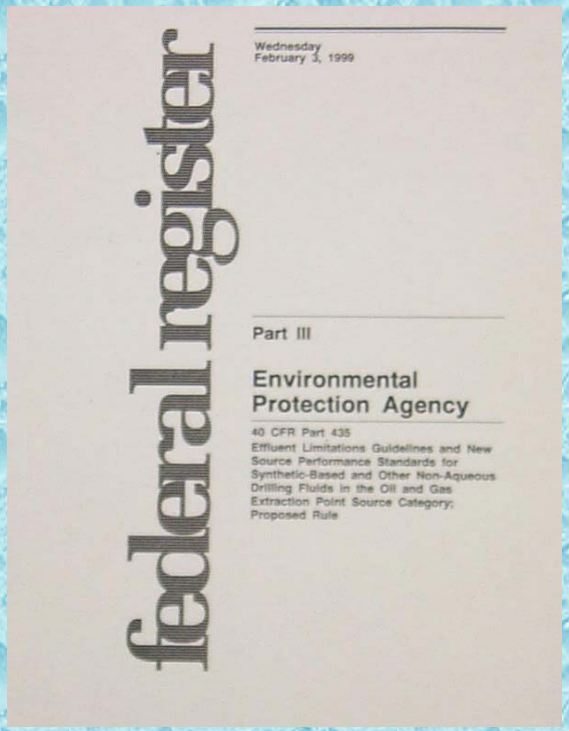
Water Regulatory Issues

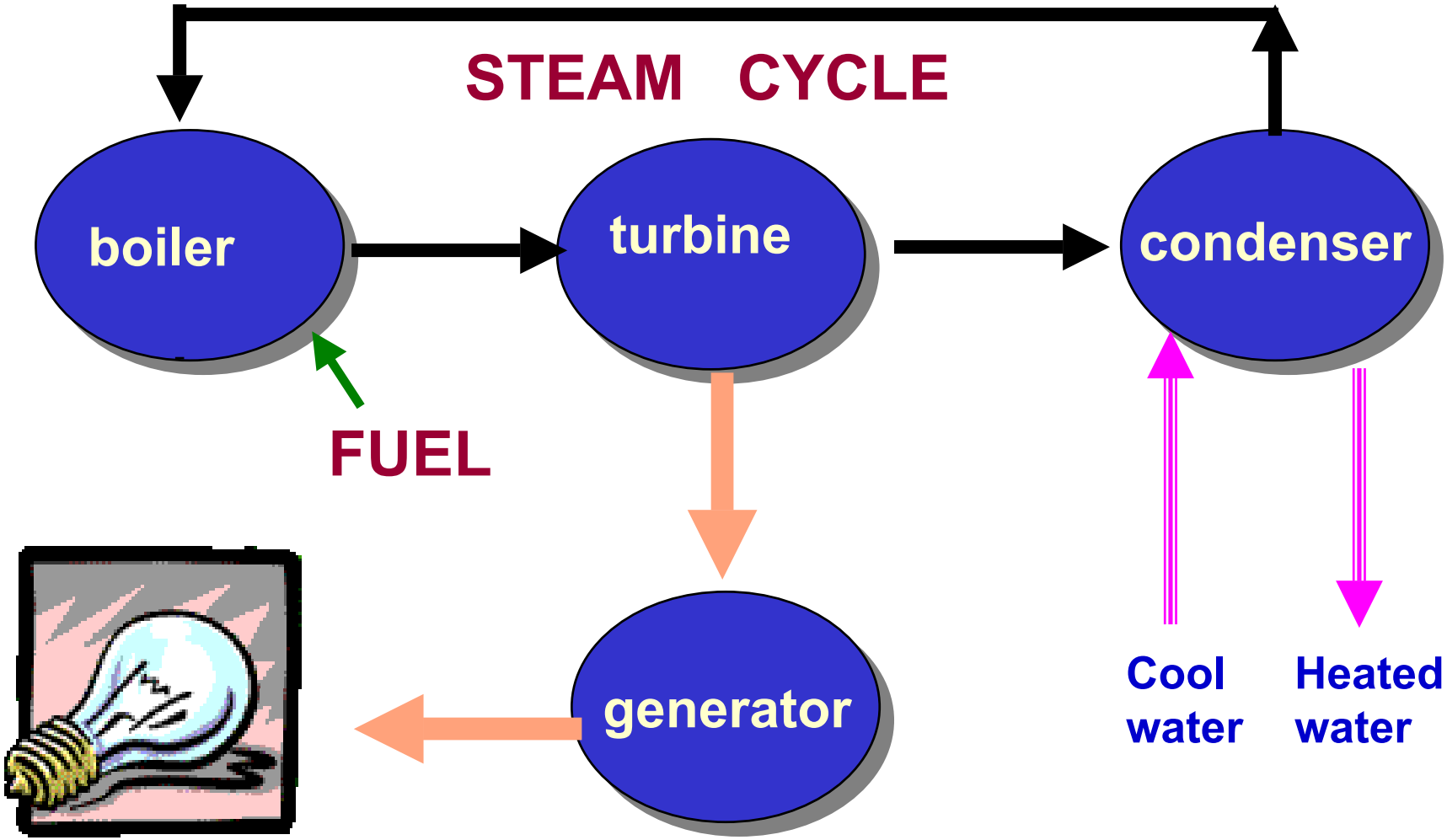
- Cooling water intakes
- Discharge Issues
  - Thermal discharges
  - Other discharges
  - Water quality standards
  - Total maximum daily loads (TMDLs)
  - Drinking water standards
  - Stormwater runoff



Water Regulatory Issues (2)

- Wetlands
- Alternate sources of water
- Analytical detection levels
- Trading opportunities
- Air/water interactions
- Source water protection/watersheds
- Hydropower issues
- SPCC plans
- Fuel production impacts

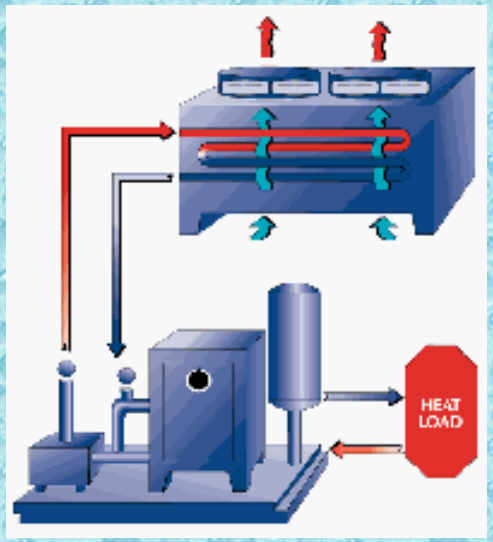
Electricity Generating Process



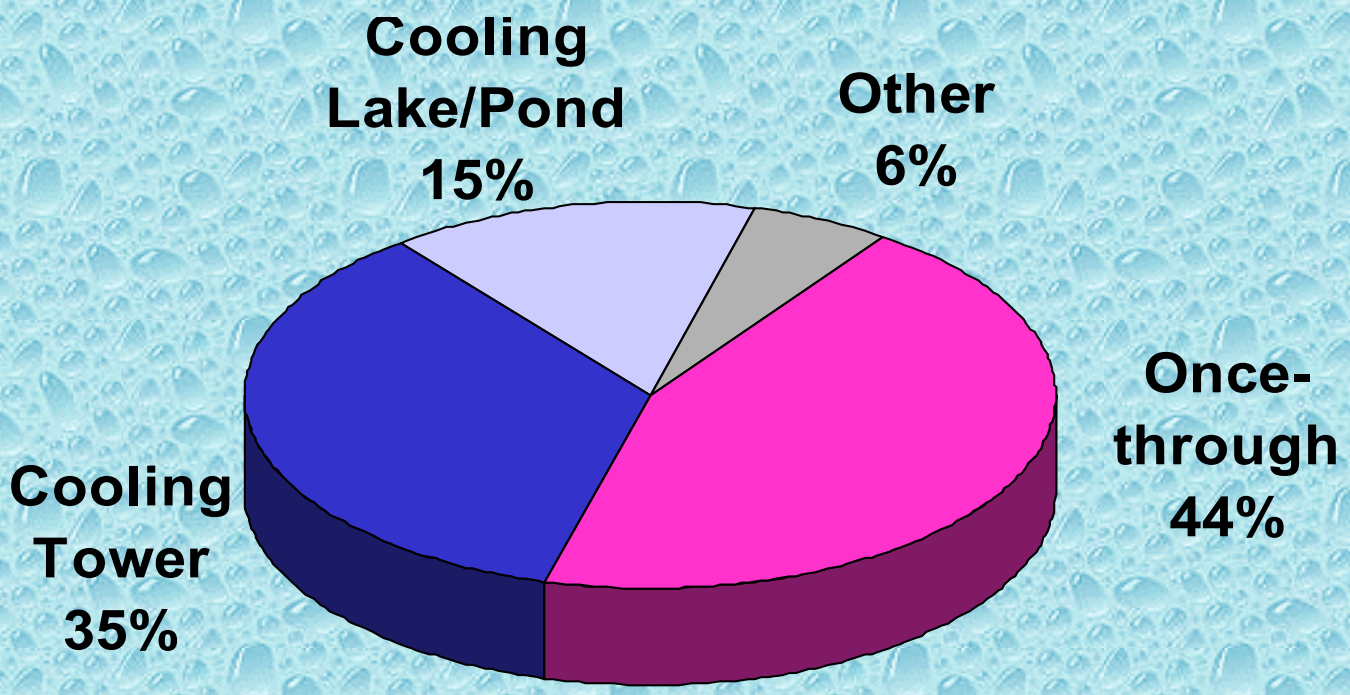
Types of Cooling Systems

- once-through

- closed-cycle
  - Wet cooling tower
  - Dry cooling tower



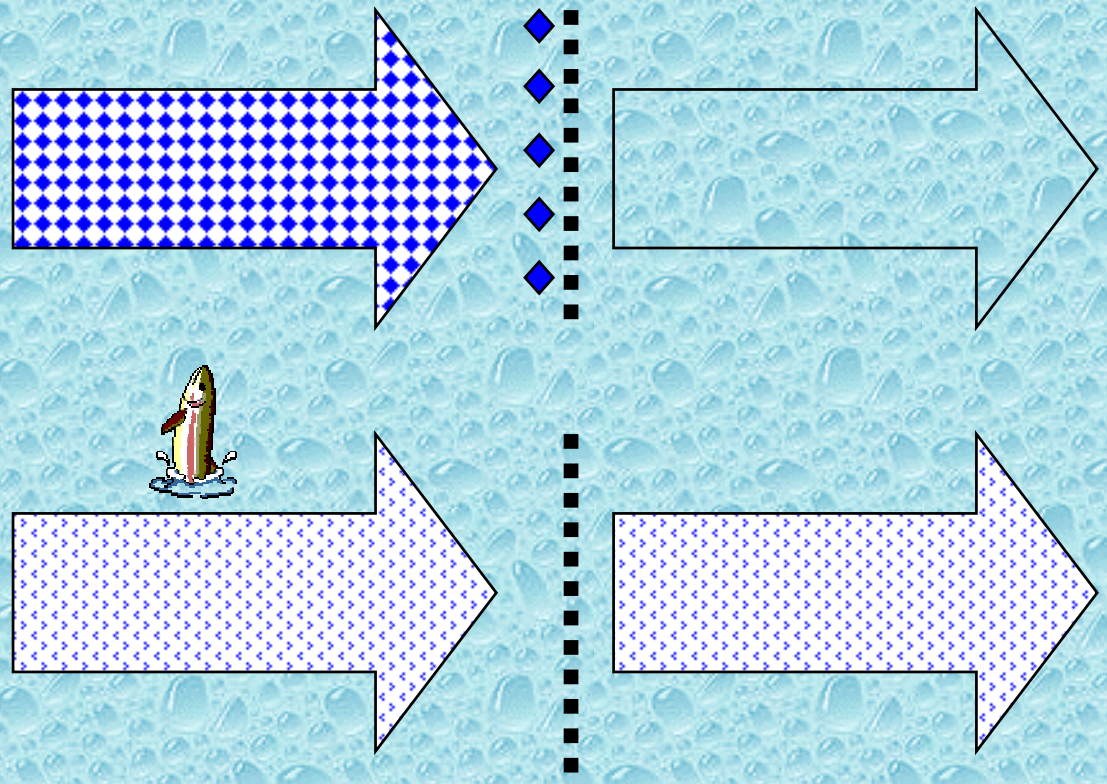
Type of Cooling System at Existing Utility Steam Electric Plants – Source: EEI, 1996



Total capacity = 569,000 MW

Commonly Considered Impacts from Cooling Water Intakes

- Impingement
  - Organisms are trapped on intake
- Entrainment
  - Organisms pass through intake



Note: Some but not necessarily all impinged and entrained organisms are killed.

Cooling Water Intake Structures

- §316(b) of the CWA requires location, design, construction, and capacity of intakes to reflect best technology available to minimize adverse environmental impact

EPA's Regulatory Schedule

Category	*Proposal Date*	*Final Rule Date*
Phase I - New facilities	8/10/00 - done	12/18/01- done
Phase II - Existing utility and non-utility power producers	4/9/02 - done	8/28/03
Phase III - Other existing facilities	6/15/03	12/15/04

Basic Principles of Phase I Proposal

- Two-track process
- Track I requires closed-cycle cooling for most facilities
- Track II allows companies to demonstrate that other measures short of closed-cycle cooling are acceptable
- EPA is currently being sued by both industry and environmental groups

Basic Principles of Phase II Proposal

- Different sets of requirements for water bodies with different presumed sensitivity
- Technology based standards for impingement mortality and/or entrainment
- % reductions compared to a baseline of:
  - Shoreline intake
  - No fish protection technology
  - May use mitigation methods as part of reduction package
- Several alternative ways of complying
  - Cost-to-cost variance
  - Cost-to-benefit variance
  - Install closed-cycle cooling

Overview of Phase II Requirements

- All facilities must reduce impingement mortality by 80-95% and some must reduce entrainment by 60-90%
- Requirements based on water body type

Mitigation

- Operator must demonstrate that suite of mitigation measures will maintain fish and shellfish to a level comparable to that resulting from the use of CWIS technologies
- Mitigation can be part of a compliance program or the entire program

Discharge Issues

- NPDES permits required

Thermal Discharges – §316(a) of CWA

- Utilities are the largest thermal dischargers
- Not too many new impacts, but controls could be ratcheted down if receiving streams are impacted by other pollutants
- Could lead to shut downs, seasonal restrictions, or retrofitting cooling towers
- Potential for additional impact demonstrations by utilities
- In some cases, heated discharges are beneficial

Other Discharges

- National effluent limitations guidelines at 40 CFR Part 423 place limits on:
  - Low-volume wastes (water purification regenerant, boiler blowdown, floor drains, scrubber water, etc.)
  - Metal cleaning wastes
  - Ash transport water
  - Coal pile runoff
  - Cooling water (chlorine)
  - Cooling tower blowdown

- Permits may place limits on other waste streams
- Establish numerical limits and monitoring and reporting requirements

Water Quality Standards (WQS)

- EPA continues to develop new water quality criteria for toxics, nutrients, microorganisms

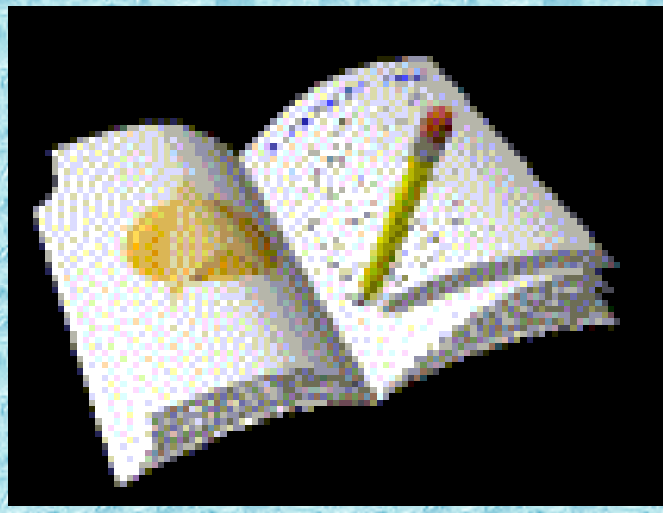
http://www.epa.gov/ost/standards/wqcriteria.html

- WQS used to set NPDES permit limits
  - Need to consider mixing zone policies
  - May result in very strict limits
- May serve as CERCLA or RCRA clean up standards
- If WQS are set very low, the cost of complying can be quite high

Total Maximum Daily Loads (TMDLs)

- Maximum amount of a given pollutant that a water body can receive and still meet water quality standards
  - TMDLs are pollutant-specific
  - May need more than one TMDL for a given water body
- Based on the capacity of the water body, not on the sources of the pollutant

Final TMDL Regulations



- Adopted in 2000
- Controversial – EPA adopted this rule against the wishes of Congress
- Includes point sources and nonpoint sources
  - Air deposition from utilities
    - Nitrogen deposition in Chesapeake Bay watershed
    - Mercury in Great Lakes
- Strong potential for economic impact over 5-20 year time frame

2000 Rule – What's in a TMDL?

- Name of water body and pollutant
- Water quality standard that must be met
- Allowable pollutant load
- Load reduction needed and sources of pollutant
- Allocations for point and nonpoint sources
- Implementation plan

2000 Rule – Implementation Plan

- List of actions needed to reduce pollutant loadings
- Time line
- Reasonable assurance that implementation will occur
- Monitoring plan with milestones for measuring progress
- Plans for revising TMDL if suitable progress is not made

Actual Example of TMDL for Mercury in the Middle and Lower Savannah River

- Acceptable instream mercury = 2.8 ppt
- Using average annual flow and loading, final TMDL is 32.8 kg/year (2/28/01)
  - Current loading is 58.8 kg/year
  - Needed reduction is 26 kg/year
- Assumes that 99% of mercury comes from atmospheric sources
  - Load allocation (atmospheric sources) = 0.99 (32.8) = 32.6 kg/year
  - Wasteload allocation (NPDES sources) = 0.01 (32.8) = 0.3 kg/year

How Will Mercury TMDL Be Achieved?

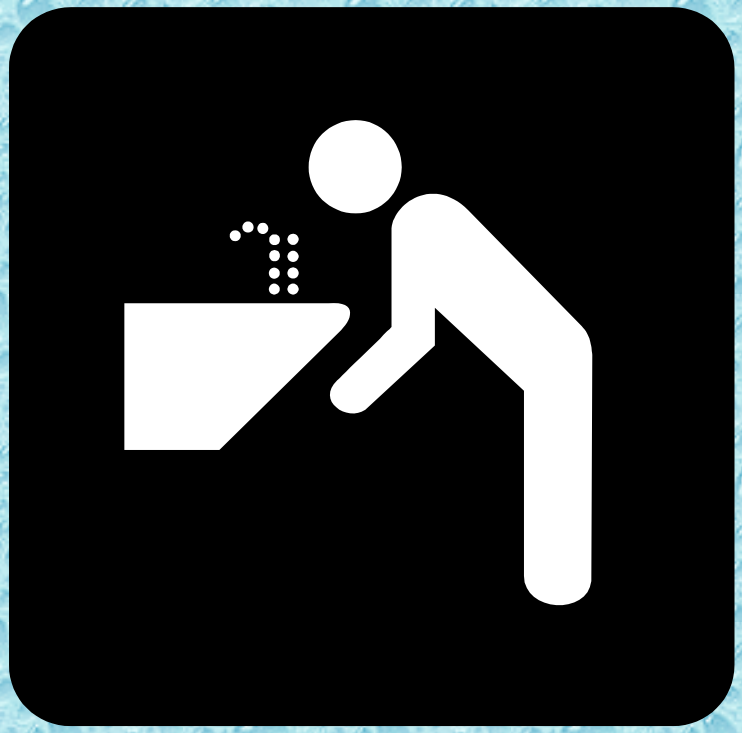
- Assumes that 44% reduction in atmospheric allocation will be met be 40%-50% reduction in mercury deposition by 2010 (CAA MACT controls)
- Assumes that NPDES permits will employ water quality based limits for mercury and some facilities will implement mercury minimization plans

TMDL Impacts to Utilities

- Initial burden is on states
- Utilties can watch what is going on at state and watershed level to identify either national or local problems
- Controls on point sources may affect some facilities
- Controls on nonpoint sources will affect power plant emissions and runoff from coal mining areas

Drinking Water Standards

- EPA continues to develop new maximum contaminant levels (MCLs)
- MCLs are often used as CERCLA and RCRA clean up standards



Various Standards for Mercury (ppb)

WQS	Freshwater	0.77 avg	1.4 max
	Saltwater	0.94 avg	1.8 max
	Human health	0.05	
MCL		2.0	
GLI	WQS	0.9 avg	1.7 max
	Human health	0.0018	
	wildlife	0.0013	

Stormwater Runoff

- Stormwater runoff must be covered under an NPDES permit
  - May be covered under main facility's permit
    - e.g., coal pile runoff
  - May need a separate stormwater permit
    - In most cases, states use general permits

Wetlands

- Many regulatory initiatives on wetlands
  - Nationwide permits
  - Mitigation banking
- Could affect ability of utilities to install, maintain, or repair power lines or expand ancillary facilities at power plants
- There have been and continue to be precedential court decisions
- Need to follow developments to avoid costly or time-delaying rules

Alternate Sources of Water

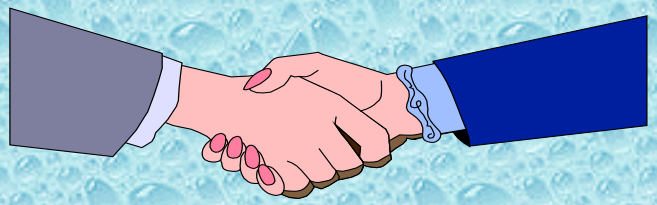
- Most areas of the country have limited surface water resources
- New facilities may need to look for alternate water supplies
  - Treated sewage
  - Non-potable groundwater
  - Industrial effluent
  - Produced water from oil and gas industry

- Need to make sure alternate water supply does not create corrosion or fouling issues
- May need more extensive wastewater treatment at power plant before discharge is allowed

Analytical Detection Levels

- WQS and permit limits may be set at a level below the capability of existing analytical methods
- Leads to problems with determining compliance
  - How to interpret or average non-detectable result
- Variety of different detection levels
  - MDLs (method detection limits)
  - PQLs (practical quantitation limits)
  - MLs (minimum limits)
- DOE and the industry should keep track of EPA interpretations of detection levels and new analytical methods with lower detection levels

Trading Opportunities

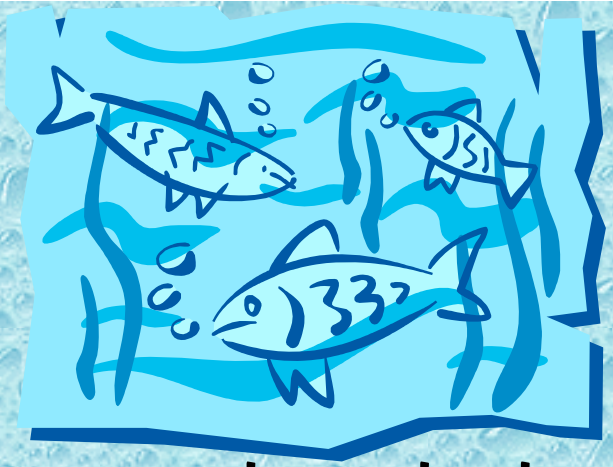


- Effluent trading
  - 1996 EPA policy supported trading
  - In an effluent trading program, one source removes more of a pollutant than required
  - It trades the excess quantity to a second source, which avoids the cost of installing and operating additional treatment
  - Trading must be approved by a regulatory agency
  - Little or no trading occurred at power plants
- April 2002 – new EPA policy for water quality trading places greater emphasis on trading

Opportunities for Trading in a §316(b) Context

- Most trading programs allow trades of individual pollutants between 2 or more participants
- §316(b) deals with biological measures (fish) not pollutants
- Need innovative trading programs
  - Fish for fish
  - Pollutants for fish

Trading of Fish for Fish



- Partner A reduces entrainment to a greater extent than required by its permit
- Partner B has no cost-effective way to meet its entrainment reduction target but pays Partner A to use its excess credit
- Same scenario would work for impingement
- Example: Partner A restores more wetlands than required by permit and sell the excess credit to Partner B.
- These ideas are discussed by EPA in the preamble to the Phase II proposal

Trading of Pollutants for Fish

- A facility has no cost-effective way to meet its entrainment reduction target but offers to pay for reduction of point source or nonpoint source pollution in the same watershed
- Could be done through a formal trade or a voluntary contribution to a state reclamation fund
  - example: clean up acid mine drainage so water quality in mountain streams improves in exchange for expanded impingement and entrainment allowances
  - EPRI-funded project with Allegheny Energy Supply looking at trades for acid mine drainage mitigation for relaxed thermal discharge requirements

Air/Water Interactions

- Air emissions can travel great distances and then have water pollution impact
  - Nitrogen in Chesapeake Bay
  - Mercury in Savannah River
- EPA's Great Waters Program
- Acid Deposition Control Program
- Air/Water Interface Work Plan
- utilities should be carefully following these programs

Source Water Protection/Watersheds

- SDWA requires development of source water protection areas around drinking water intakes or wellheads
- EPA is pushing hard for watershed protection programs under CWA
- Utility activities could be affected by these programs
- Utilities should keep track of national trends and developments in these areas

Hydropower Issues

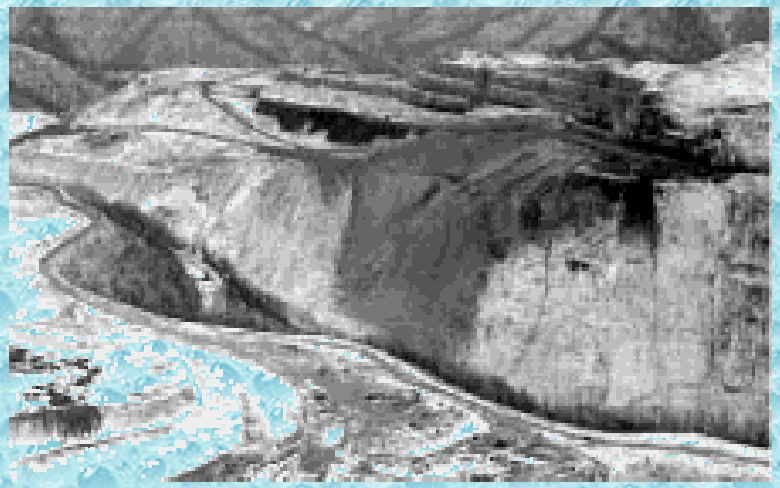
- Trade-offs between storing water for power generation at peak times vs. minimum flows for fish protection and maintenance of downstream water quality standards
  - Salmon in Columbia River
- Barriers to fish migration

SPCC Plans

- New spill prevention control and counter measure regulations passed July 17, 2002
  - Any facility in operation before August 17, 2002 *and* having experienced a reportable release must prepare a plan in accordance with the new rule within six months and implement the plan within one year
  - A facility going into operation after August 16 2002 through August 18, 2003 must implement the plan by August 18, 2003.
  - Existing facilities required to have a current SPCC plan and that have not experienced a reportable release must revise the current plan within six months of the new *five-year* expiration period of the existing plan.

Fuel Production Water Impacts

- Coal
  - Mountain top mining
  - Acid mine drainage



- Oil and gas
  - Offshore discharges
  - Coal bed methane water discharges in Rocky Mts.

Conclusions

- Water is fundamentally important to power production
- Utilities must consider water quality and quantity
- There is a wide array of regulations affecting water use at power plants