

FACT SHEET AND OVERVIEW

REGULATING COOLING WATER USE AT EXISTING POWER PLANTS: AN OVERVIEW OF THE DECISION BEFORE EPA

CLEAN AIR TASK FORCE – JANUARY 2004

Overview

On February 12, 2004, by court order, EPA Administrator Mike Leavitt must decide what America's power plants must do to reduce their water use for cooling. The implications of this rule are far-reaching, since power plants use almost as much water as agriculture, the nation's top water user, and because the discharge of hot water causes significant ecological damage.

Background: Cooling Water and Its Impacts

America's aging coal, oil and gas power plants are not only the nation's largest air polluter; they also use enormous quantities of water, mostly from the nation's rivers and bays, to cool down their massive boilers. For this purpose, power plants withdraw nearly a hundred *trillion* gallons per year, or roughly half of Lake Erie's volume, and discharge much of that water back into rivers, lakes and bays at temperatures much higher than the water body they came from. A single large power plant can utilize hundreds of millions or even billions of gallons of cooling water per day before discharging the heated effluent directly into a lake, river or ocean.

The environment is damaged by both water intake and discharge. This damage includes:

- ✓ ***Direct kills of fish and fish eggs through “impingement” and “entrainment” in water intake structures.*** As the nation's plants take in trillions of gallons a year, they kill the overwhelming majority of organisms in this massive volume by entraining them into the facility or impinging them on intake screens. This staggering mortality – trillions of fish, shellfish, plankton and other species at all life stages – has stressed and depleted aquatic, coastal and marine ecosystems for decades, and has contributed to the collapse of some fisheries. On New York's Hudson River, for example, a cluster of power plants were found to reduce nearly 80% of certain fish species in certain years. From Delaware to Florida to Texas, annual recreational and commercial fish losses from power plant intakes have been estimated at tens of millions per year.
- ✓ ***Discharge of water at temperatures as high as 60 degrees hotter than intake temperatures – threatening fish and aquatic ecosystems.*** Large temperature differences can help destroy vegetation, increase algae growth, deplete oxygen

and eliminate micro-organisms on which fish feed. EPA found that hot discharge water from the Brayton Point coal plant on the Massachusetts/Rhode Island border contributed to an 87% reduction in finfish such as winter flounder in Mt. Hope Bay – leading it to mandate a 94% reduction in water withdrawal.

- ✓ **Toxic chemical discharges.** To keep boilers and cooling systems free of mineral and microbial build up, power companies employ millions of gallons of chlorine and other chemicals. Discharge waters from these sources can contain a range of toxics, including chlorine, nickel and copper.
- ✓ **Competition with other water uses.** In regions like the South, population and water use have grown rapidly, placing increasing pressure on water resources, depleting groundwater and causing surface water drought. Power plant water use is a significant share of this water, draining half as much as all residential and commercial users combined.

The Decision Before EPA

The Clean Water Act requires all power plants – new and old -- to install the “best technology available” (BTA) for minimizing the adverse environmental impacts associated with cooling water intake structures.

Spurred by a lawsuit brought by several environmental groups in the mid-1990s, EPA agreed to promulgate national regulations for cooling water use after years of making determinations on a case-by-case basis. On February 12, EPA will issue its final regulations applying to existing plants.

In determining the “best technology available,” EPA considered the three basic types of cooling systems currently used by U.S. power plants:

- ✓ In a **once-through cooling system**, water is withdrawn directly from the source waterbody, diverted through a condenser where it absorbs heat from the boiler steam, and then discharged back into the source waterbody at elevated temperatures. Because once-through cooling systems do not re-circulate the cooling water, they can require as much as a billion gallons of water per day. Once-through cooling is used roughly 52% of power plants in the United States.
- ✓ In a **recirculating cooling system**, the cooling water is sent from the condenser to cooling towers, where the heat from the boiler steam dissipates through evaporation and convection. The cooling water is then recirculated through the condensers. Recirculating cooling, which is used by approximately 47% of U.S. power plants, generally reduce water usage by about 95% when compared with once-through cooling.

- ✓ **Dry cooling systems** run the boiler steam through radiator-like coils, where heat is transferred directly to the air by convection. Power plants that are equipped with dry cooling use very little water, particularly when compared with once-through cooling.

EPA was urged to mandate recirculating cooling, at minimum, for existing plants. A preliminary 2001 draft of the rule by EPA staff would have gone substantially in this direction and required installation of recirculating cooling at plants in sensitive ecosystems. Indeed, EPA's own figures suggest that mandating recirculating cooling on all plants was highly cost-effective and would result in increased power costs to average residential customers of well under a dollar per month.

However, after the intervention of OMB rule reviewer John Graham, the final proposal was significantly weakened.

For example:

- ✓ Under the official proposal, **no technology is mandated at all**. Instead, plant technologies are required to meet "performance standards" that are much weaker, hard to measure, and likely to be hard for government agencies and citizen groups to monitor
- ✓ The standards require as little as a 60% reduction in fish and shellfish mortality over once-through cooling. By contrast, recirculating technology typically results in up to a **98%** reduction. These standards would allow existing plants to kill 20 to 1000 times more fish per megawatt than new plants,
- ✓ In addition, even these improvements can be avoided if a plant demonstrates that its **net impacts** – including after the fact "restoration" of decimated fish populations -- are no greater than the EPA's nominal standards. This restoration requirement could be met by stocking a hatchery or building wetland. Such restoration measures are vague, unproven, and are rarely if ever intended to replace the number or variety of aquatic and marine animals killed by the water withdrawals
- ✓ Finally, plants can escape the requirements if they can demonstrate that costs of meeting the standards are higher or the site specific benefits are lower than EPA's **estimates** – **even if meeting the standards would still be cost-effective**. The net result is not only substantially less protection of the environment in the best case, but also the likelihood that well-financed power plant owners will be able to use the exemption process to avoid meeting even these minimal standards.

Conclusion

The way forward is clear. To protect America's rivers and other aquatic ecosystems, Administrator Leavitt should:

- √ Require all power plants to adopt recirculating cooling technologies over a reasonable period of time;
- √ Require case-by-case analysis to determine whether more stringent measures such as dry cooling measures, are required.