Clean Water Act Section 316(b) Existing Facilities Proposed Rule
Internal Qs and As
March 28, 2011

1. **What facilities are affected by this rule?**

   This proposed rule affects existing (as opposed to new) power plants and manufacturing facilities that generate electricity or manufacture other goods, and that also withdraw at least 2 million gallons per day of cooling water, which they use to dissipate waste heat. Other than power plants, the industries most likely to be affected are manufacturers of aluminum, iron, steel, petroleum, paper, chemicals, and food processing.

2. **This rule affects new units but not new facilities. What is the difference?**

   A facility, whether it is a new or existing facility, is comprised of 1 or more units that generate electricity or manufacture goods.

   A new facility for purposes of 316(b) consists of 1 or more brand new units and is not affected by this rule. New facilities must comply with the 316(b) Phase I rule affecting new facilities issued in 2001. See Questions 23 and 24 below regarding requirements for some new units under this proposed rule.

3. **How many power plants and manufacturing facilities are covered by this rule? How many already comply with the requirements of the rule? How many of each of these are power plants vs. manufacturing facilities?**

   This rule covers roughly 1,260 existing facilities that each withdraw at least 2 million gallons per day of cooling water. EPA estimates that approximately 590 of these facilities are manufacturers, and the other 670 are power plants. Approximately 740 facilities already employ technologies that are likely to comply with the impingement requirements of the rule.

4. **How does this rule, along with other EPA rules, affect the utility industry?**

   EPA is working on other power plant rules to address additional health and environmental problems. To the full extent that the agency's legal obligations permit, EPA plans to take into account the combined effects of this rule and other EPA rules, and to approach these rulemakings in ways that allow the industry to make practical, integrated compliance decisions that minimize costs -- while still providing the public health and environmental protection promised by our environmental laws.

5. **How many fish and other organisms are killed through impingement and entrainment?**

   In order to compare different fish species of different ages from different regions of the U.S., EPA converts the number of eggs, larvae, and adults of varying ages of all species into an equivalent number of 1-year old fish. Based on this approach, EPA estimates that 2.1 billion fish, crabs, and shrimp are killed annually by impingement and entrainment. EPA was not able to estimate the numbers of other aquatic organisms killed by cooling water intakes, many of which comprise the foundation of aquatic food chains.

6. **Can you put these intake flows in perspective?**

   Yes. A facility that operates its cooling water intake structure at a rate of 95 MGD would fill an Olympic-sized swimming pool every 10 minutes.

7. **Can you point to an example of an ecosystem that has been severely damaged by industrial water cooling practices?**

   The Indian Point nuclear power plant is a 2,045 megawatt facility located in Westchester County, New York. The plant withdraws up to 2.5 billion gallons per day from the estuarine portion of the Hudson River, which is more than twice the average daily water consumption of New York City. The cooling water intake kills about 1 billion organisms annually, including shortnose sturgeon, an endangered species. Studies and sampling have predicted yearly reductions in several species of fish, including a 20 percent decline in striped bass, a 25 percent decline in bay anchovy, and a 43 percent decline in Atlantic tomcod. The Final Environmental Impact Statement (FEIS) prepared by the New York State Department of Environmental Conservation (NYSDEC) concluded these levels of mortality "could seriously deplete any resilience or compensatory capacity of the species needed to survive unfavorable environmental conditions."

8. **How is this proposed rule responding to the Supreme Court decision about costs and benefits?**

   In 2008, the U.S, Supreme Court agreed to review an earlier 316(b) rulemaking concerning large power plants limited to a single issue: whether section 316(b) authorizes EPA to consider costs and benefits in 316(b) rulemaking. In April 2009, in *Entergy Corp. v. Riverkeeper Inc,* the Supreme Court ruled that it is permissible under section 316(b) to consider costs and benefits in determining the best technology available to minimize adverse environmental impacts (BTA). The court left it to EPA's discretion to decide whether and how to consider costs and benefits in 316(b) actions. The Supreme Court also indicated that given the

absence of any specified statutory factors in 316(b) for determining BTA, EPA had wide discretion in what factors it considers in its rulemaking process.

EPA has decided that it should not establish uniform entrainment controls because whether a particular entrainment technology can be used may depend on site-specific factors such as energy reliability, air pollution impacts, land availability, and age of facility. Consequently, BTA entrainment controls will be established on a case-by-case basis by the Permitting Authority. In the site-specific process, after considering a broad range of factors, the Permitting Authority will decide whether the costs of such controls are not justified by the benefits.

9. What are the costs and benefits of the proposed rule?

The rule as proposed will annually save about 615 million fish and shellfish at a cost of $384 million annually. The saved fish and shellfish benefit commercial and recreational fishing, and, in the case of forage fish, benefit the ecosystem generally. Healthier aquatic ecosystems provide a number of cultural and social benefits to the affected communities.

10. What are the types of impingement technologies that might be used to comply with today's proposed rule? What are their costs?

A facility can comply with the proposed rule's impingement requirement by reducing the intake velocity of the facility's cooling water to 0.5 feet/second. By doing so, small fish can swim away from the intake and not be drawn into the facility. Another technology that can be used to comply is a traveling screen with a fish friendly handling and return system. This technology employs smooth woven mesh screens that rotate up and out of the water. It also employs a low pressure wash to remove fish and return them to the water outside the facility. The costs of impingement controls will vary by the size of the facility. For example, the total cost for a 100 million gallon per day (MGD) facility for impingement controls is about $500,000, and the total costs for a 200 MGD facility is about $650,000.

11. What kinds of entrainment technologies are there? What are the costs of entrainment controls?

Closed-cycle cooling or cooling towers are the most effective entrainment technology, reducing entrainment by about 95%. Less effective and available technologies (and sometimes less costly) are variable speed pumps, reduced operation of the facility during the peak fish spawning season, and fine mesh screens (regarding fine mesh screen, see Question 30 below). The costs of entrainment controls will vary by the size of the facility, and the type of entrainment technology. For example, annual costs of closed-cycle cooling at a

100 MGD facility is estimated to be about $3 million. The annual cost at a 200 MGD facility is estimated to be about $6 million.

12. Has EPA performed a cost-benefit analysis on this rule? Approximately how much would it cost for a company to install the best available technology to address this problem?

Yes, EPA prepared a cost-benefit analysis for the proposed rule. Costs of the rule at a particular location will depend greatly on the size of the facility. Some facilities will incur no cost to comply because their existing technology already meets the proposed rule's requirements. Other facilities will incur costs. For specific costs, see Questions 10 and 11 above.

13. Did EPA consider the state of the economy before issuing this rule? How many facilities will be impacted? Will some have to shut down?

EPA considered the state of the economy before issuing the rule, and carefully performed an economic impact analysis that considered effects on the regulated industries and on household energy costs. EPA estimates that thirteen of over 1,200 facilities might close as an impact of the proposed rule. Most of the facilities projected to close are peaking facilities that operate only part of the year when electricity demand is at its "peak." The closure estimate for these peaking facilities is in large part a result of the fact that these facilities only generate revenue part of the year. It is likely that many of these facilities will continue to remain open once the rule is implemented.

The estimated costs to a household's electric bill once the rule is fully implemented over a number of years would be less than $2 per year on average.

14. What impact will the proposed rule have on energy reliability?

The proposed regulation would have a negligible effect on the capacity of the electricity generating sector – less than a quarter of a percent. The site-specific approach for entrainment controls will expressly consider energy reliability on a localized basis.

15. What are the requirements of this proposed rule?

There are three components to the proposed regulation. First, most facilities would be subject to an upper limit on how many fish can be killed by the facility. The facility would determine which technology would be best suited to meeting this limit. Alternately, the facility could reduce their intake velocity to 0.5 feet per second. At this rate, most of the fish can swim away from the cooling water intake of the facility. Second, facilities that withdraw very large amounts of

water--at least 125 million gallons per day--would be required to conduct studies to help their permitting authority determine whether and what site-specific entrainment mortality controls, if any, would be required. This process would include public input. Third, new units at an existing facility that are built to increase the generating capacity of the facility would be required to reduce the intake flow to a level similar to a closed cycle, recirculation system. Closed cycle systems are the most effective at reducing entrainment. This can be done by incorporating a closed-cycle system into the design of the new unit, or by making other design changes equivalent to the reductions associated with closed-cycle cooling.

16. How many facilities will have to perform the entrainment studies?

As many as 380 facilities each withdraw more than 125 million gallons of water per day and, therefore, would be required to conduct studies. EPA notes that some of these facilities already employ various technologies for reducing entrainment or have conducted some or all of the biological studies needed for the site-specific determinations.

17. How many megawatts of new capacity annually will have to meet the closed-cycle requirement?

The new capacity per year expected to install closed-cycle as a result of the new units provision is 516 megawatts (MW). This is about the size of 2/3 of a single combined-cycle unit.

18. Does the technology required under the rule exist already?

The technologies required under the rule have been in use for several decades and have been implemented at a large number of existing facilities.

19. When will plants have to comply?

All compliance dates are geared to the time EPA issues a final rule. The proposed rule EPA just released is open for public comment. The compliance dates won't be relevant until EPA issues a final rule, which is scheduled for July 2012. When the final rule is effective, technologies to meet the impingement requirements of the rule would have to be implemented as soon as possible but within 8 years at the latest. Larger facilities have to perform some additional studies but that will be determined by their permitting authority. New units would have to comply by the time they begin operations.

20. Why didn't EPA require closed-cycle cooling, in whole, or in part, as part of this proposed rule?

EPA rejected a closed-cycle cooling requirement that would have applied to all facilities because it identified four circumstances that may limit the availability of closed-cycle cooling. These circumstances include local energy reliability concerns, air quality issues, geographical constraints on the installation of closed-cycle cooling and facilities with a limited remaining useful plant life. For example, EPA lacks sufficient data to fully understand all the site-specific impacts of closed-cycle cooling on energy reliability and air quality. Further, some facilities might not have sufficient land available for the closed-cycle technologies. Finally, it might not make sense for some older facilities to retrofit to closed cycle-cycle cooling at the end of the useful life of individual units.

21. Isn't this proposed rule less stringent than earlier rulemakings that were remanded by the courts?

Prior to this proposal there were two rulemakings that addressed existing facilities and resulted in the following:

a. Phase II rulemaking -- impingement and entrainment requirements for all large power plants. Based on site visits and conversations with industry, it appears that restoration projects, rather than reduced cooling water intake flows, would have been used to meet the entrainment requirement. The restoration compliance option was struck down by the Second Circuit in 2007.
b. Phase III rulemaking – no national impingement and entrainment requirements for any small existing power plants or any manufacturing facility.

The proposed rule issued today contains national impingement requirements for all existing facilities, and therefore is more environmentally protective than the previous rulemakings for existing facilities.

22. How would you respond to members of Congress who point to this proposal as an example of EPA overreach and negative impact on American business?

EPA has carefully considered impacts on industry and crafted a proposed rule that achieves a balance between environmental protection and costs to industry. EPA has proposed an approach that establishes common sense national requirements, while allowing for more stringent site-specific determinations to be made based on local concerns.

23. What are the built-in flexibilities in the rule?

In meeting the impingement requirement that a limited number of fish be killed by a facility, the facility would determine which technology to employ to meet the impingement limit, or the facility could reduce their intake velocity to 0.5 feet per second.

In meeting the requirement to reduce the intake flow to a level similar to a closed cycle, recirculating system, existing facilities looking to add a new unit to increase the electrical generating capacity of the facility may either incorporate a closed-cycle system into the design of the new unit, or make other design changes equivalent to the reductions associated with closed-cycle cooling.

24. What do new facilities need to do to comply with the rule as opposed to existing facilities?

A new facility for purposes of CWA section 316(b) consists of 1 or more brand new electric generation units and is not affected by this rule. New facilities must comply with the 316(b) Phase I rule affecting new facilities, which was issued in 2001. See http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/phase1/index.cfm

This proposed rule affects existing power plants and manufacturing facilities that generate electricity or manufacture other goods, and that also withdraw at least 2 million gallons per day of cooling water.

25. How will nuclear plants be affected by this rule?

Nuclear facilities would have to meet the same requirements as all other facilities affected by this proposed rule. However, conscious of the special nature of nuclear facilities, the proposed rule provides that if the Permitting Director, in consultation with the Nuclear Regulatory Commission, determines that compliance with this proposed rule would result in a conflict with a safety requirement established by the Commission, the Permit Director “must make a site-specific determination of best technology available for minimizing adverse environmental impact that would not result in a conflict with the Commission's safety requirement."

Additionally, any water withdrawn for emergency purposes by any facility (including nuclear facilities) is not subject to the requirements of this proposed rule.

Technology Questions

26. What is once-through cooling?

Once-through cooling is when a facility withdraws water from a waterbody, sends it through the cooling system one time, and then discharges the heated water back to a waterbody.

27. What is closed-cycle cooling?

Closed-cycle cooling is when a facility recycles or recirculates cooling water within its facility, and thus withdraws only 2% to 5% of the water it would withdraw if it were once-through cooling. Closed cycle cooling is often referred to as cooling towers, or wet cooling, which may be tall, as in hyperbolic, natural draft cooling towers, or may be short and modular, employing fans to produce draft, as in mechanical evaporative cooling towers.

28. What is the energy penalty associated with closed-cycle cooling?

The energy penalty is associated with closed-cycle cooling. The energy penalty variously refers to one or more of the following effects. All closed-cycle systems require electricity to operate pumps, and that electricity cannot be sold to the electric grid. Mechanical evaporative cooling towers also require electricity to operate fans. In addition, when once-through facilities that were designed to use lower temperature water from a waterbody are retrofit to closed-cycle cooling, the recirculated water may not be as cool, thus reducing the efficiency of the heat dissipation of the cooling water system, which may temporarily reduce the electricity generation capacity of an electric power plant.

29. Don't cooling towers consume more water than once-through cooling?

This comparison stems from a technical concern that because of evaporation, closed-cycle cooling consumes more water than once-through cooling. While there are evaporative losses associated with closed-cycle cooling, it is not clear that evaporation associated with returning heated once-though cooling water to a waterbody doesn't result in similar evaporative losses. EPA is not aware of any studies that analyze this comparison and has asked for public comment on the issue.

30. Were other entrainment technologies considered besides cooling towers?

Yes. Some facilities can employ practices or technologies to reduce cooling water withdrawals, such as variable speed pumps or reduced operation of the facility during the peak fish spawning season. Additionally, while coarse mesh screens (3/8") are used to control impingement, fine mesh screens (less than 3/8") may be used in some applications to control entrainment. There are two issues with these screens that make their widespread use unlikely to be feasible for minimizing adverse environmental impacts. First, smaller screen mesh sizes exclude more organisms from being drawn into and through the cooling water system, but this does not ensure organism survival (larvae are soft-bodied and even gentle impact on a screen can result in fatal injuries; the smaller the screen mesh, the more likely larvae are to impact the screen. Second, a finer mesh requires more screens to produce the same open area through which water can flow; at many facilities, there is insufficient space available to employ finer mesh screens without reducing the flow.