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ENVIRONMENTAL PROTECTION AGENCY

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RIN 2040-AC23

National Pollutant Discharge Elimination System—Regulations Addressing Cooling Water Intake Structures for New Facilities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: Today's proposed rule would implement section 316(b) of the Clean Water Act (CWA) for new facilities that use water withdrawn from rivers, streams, lakes, reservoirs, estuaries, oceans or other waters of the U.S. for cooling water purposes. The proposed rule would establish national requirements applicable to the location, design, construction, and capacity of cooling water intake structures at new facilities. The proposed national requirements would minimize the adverse environmental impact associated with the use of these structures.

Today's proposed rule would establish location, design, construction, and capacity requirements that reflect the best technology available for minimizing adverse environmental impact from the cooling water intake structure based on the placement of the intake structure and the water body type. The Environmental Protection Agency (EPA) proposes to group surface water into four categories—freshwater rivers and streams, lakes and reservoirs, estuaries and tidal rivers, and oceans—and to establish requirements for cooling water intake structures located in each water body type. In general, the closer the intake structure is to areas that are most sensitive or biologically productive, the more stringent the requirements proposed to minimize adverse environmental impact. Under this proposal, EPA would set performance requirements and would not mandate the use of specific technologies.

EPA expects that this proposed regulation would reduce impingement and entrainment at new facilities over the next 20 years. Today's proposed rule would establish requirements that would help preserve ecosystems in close proximity to cooling water intake structures at new facilities. EPA has considered the potential benefits of the

proposal and the preamble discusses them in qualitative terms. Expected benefits include a decrease in expected mortality or injury to aquatic organisms that would otherwise be subject to entrainment into cooling water systems or impingement against screens or other devices at the entrance of cooling water intake structures. The proposed regulatory requirements also could reduce adverse impact on threatened and endangered species.

DATES: Comments on this proposed rule and Information Collection Request (ICR) must be received or postmarked on or before midnight October 10, 2000.

ADDRESSES: Public comments regarding this proposed rule should be submitted by mail to: Cooling Water Intake Structure (New Facilities) Proposed Rule Comment Clerk—W-00-03, Water Docket, Mail Code 4101, EPA, Ariel Rios Building, 1200 Pennsylvania Avenue, NW., Washington, DC 20460. Comments delivered in person (including overnight mail) should be submitted to the Cooling Water Intake Structure (New Facilities) Proposed Rule Comment Clerk—W-00-03, Water Docket, Room EB 57, 401 M Street, SW., Washington, DC 20460. You also may submit comments electronically to ow-docket@epa.gov. Please submit any references cited in your comments. Please submit an original and three copies of your written comments and enclosures. For additional information on how to submit comments, see "SUPPLEMENTARY INFORMATION, How May I Submit Comments?"

EPA has prepared an ICR for this proposed rule (EPA ICR number 1973.01). For further information or a copy of the ICR contact Sandy Farmer by phone at (202)260-2740, e-mail at farmer.sandy@epamail.epa.gov or download off the internet at <http://www.epa.gov/icr>. Send comments on the Agency's need for this information, the accuracy of the burden estimates, and any suggested methods for minimizing respondent burden (including the use of automated collection techniques) to the following addresses. Please refer to EPA ICR No. 1973.01 in any correspondence.

Ms. Sandy Farmer, U.S. Environmental Protection Agency, OP Regulatory Information Division (2137), 401 M Street, SW., Washington, DC 20460 and

Office of Information and Regulatory Affairs, Office of Management and Budget, Attention: Desk Officer for EPA, 725 17th Street, NW., Washington, DC 20503.

FOR FURTHER INFORMATION CONTACT: For additional technical information contact Deborah G. Nagle at (202) 260-2656 or James T. Morgan at (202) 260-6015. For additional economic information contact Lynne Tudor at (202) 260-5834. The e-mail address for the above contacts is "rule.316b@epa.gov."

SUPPLEMENTARY INFORMATION:

What Entities Are Potentially Regulated by This Action?

This proposed rule would apply to new facilities that use cooling water intake structures to withdraw water from waters of the U.S. and that have or require a National Pollutant Discharge Elimination System (NPDES) permit issued under section 402 of the CWA. New facilities subject to this regulation would include those with a design intake flow of greater than two (2) million gallons per day (MGD). If a new facility meets these conditions, it is subject to today's proposed regulations. If a new facility has or requires an NPDES permit but does not meet the 2 MGD intake flow threshold, it would be subject to permit conditions implementing section 316(b) on a case-by-case basis, using best professional judgment. This proposal defines the term "cooling water intake structure" to mean the total physical structure and any associated constructed waterways used to withdraw water from waters of the U.S., provided that at least twenty-five (25) percent of the water withdrawn is used for cooling purposes. Generally, facilities that meet these criteria fall into two major groups: new steam electric generating facilities and new manufacturing facilities.

The following table lists the types of entities that are potentially subject to this proposed rule. This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware that could potentially be regulated by this action; other types of entities not listed in the table could also be regulated. To determine whether your facility would be regulated by this action, you should carefully examine the applicability criteria proposed at § 125.81 of the rule. If you have questions regarding the applicability of this action to a particular entity, consult one of the persons listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

structures located inside the littoral zone.

EPA decided to propose at least 50 meters outside the littoral zone as the location in which the least stringent set of requirements would apply. The Agency has concluded this is appropriate because the greatest numbers of aquatic organisms and their habitat are not typically present 50 meters outside the littoral zone and therefore will not be vulnerable to impingement and entrainment. EPA recognizes that some important species have critical life stage areas at various distances outside of a littoral zone, and solicits public comment on how best to deal with this species and site-specific variability. EPA also is considering distance criteria of 200 meters, 100 meters, and just outside the littoral zone. EPA solicits comment on these alternative distance criteria.

To address concerns about potential implementation issues associated with basing the regulatory requirements on site-specific determinations of the littoral zone, the Agency also is considering establishing a fixed distance from the shoreline instead of a fixed distance from the littoral zone to define the area in which the most stringent minimum requirements would be applicable. EPA solicits comment on the following criteria for distance from the shoreline: (1) 30 percent of the distance from shoreline to the opposing shore (*i.e.*, 30 percent of the water body width) for streams, rivers, lakes, and reservoirs and (2) 500 meters offshore for tidal rivers, estuaries, and oceans. Regulatory language such as the following could be used to implement this approach:

Littoral zone in a freshwater river or stream, lake, or reservoir means the nearshore area that extends 30 percent of the distance from one shoreline to the opposite shoreline (*i.e.*, 30 percent of the width of the waterbody at the point of measurement) and in a tidal river, estuary, or ocean means the nearshore area extending 500 meters from the shoreline.

3. Flow and Volume

As stated previously, flow is one component of capacity and capacity includes the maximum volume of water that can be withdrawn through a cooling water intake structure. Flow and volume are parameters that can be regulated to minimize adverse environmental impact. In particular, the magnitude of entrainment impacts is directly related to the capacity or intake flow (or volume) of cooling water intake structures. The adverse impact that results from entrainment of organisms occurs after the organism has entered the cooling water system, where it may

be exposed to elevated temperatures, shearing forces, impact from mechanical equipment, swift changes in pressures, lack of dissolved oxygen, and chemicals. Once organisms are entrained, mortality and injury rates can be high.

One way to minimize the adverse environmental impact from entrainment is to minimize the flow or volume a facility withdraws. Therefore, today's proposed rule includes requirements that would limit cooling water intake design flow or volume at new facilities.

a. Flow Requirements for New Facilities With Cooling Water Intake Structures Located in Freshwater Rivers and Streams

Total design intake flow from all cooling water intake structures at a facility located in a freshwater river or stream must be no more than the lower of five (5) percent of the source water body mean annual flow or 25 percent of the source water 7Q10.

New facilities that have cooling water intake structures located in freshwater rivers or streams would have to meet a flow requirement that would limit the proportion of the design intake flow withdrawn by the facility compared to the flow of the water body in which the intake is located. Proposed § 125.84(b). Two proportional requirements are being proposed, and facilities would be required to meet the more stringent of the two.

The first of these requirements would limit the total design intake flow from all cooling water intake structures at the facility to five (5) percent of the annual mean flow of the water body. As previously noted, entrainment impacts of cooling water intake structures are closely linked to the amount of water passing through the intake structure because the eggs and larvae of many aquatic species are free-floating and may be drawn with the flow of cooling water into an intake structure. The five percent requirement would establish a maximum level for entrainment effects that, in all areas within 50 meters of the littoral zone, would be further reduced by additional requirements (such as requirements to reduce cooling water withdrawals, and additional design and construction technologies to further reduce impingement and entrainment). EPA estimates that the combination of these requirements (and the design intake velocity limitation for reducing impingement in almost all waterbody types) should result in protection of greater than 99 percent of the aquatic community from impingement and entrainment. This combination of requirements to establish a minimum level of protection for aquatic

communities is analogous to the process employed by EPA's water quality-based regulatory programs for developing the necessary levels of protection to protect aquatic communities within the water body as a whole where impacts may occur. These requirements provide the minimum level of protection for designated uses that reflect the goals in section 101(a) of the CWA, *i.e.*, "protection and propagation of fish and shellfish and wildlife and recreation in and on the water." As described elsewhere, the Director would have authority under this proposal to impose additional requirements on a site-specific basis in certain circumstances should the requirements proposed today not protect aquatic life from adverse environmental impact.

The Agency has considered other design intake flow levels in developing this proposal, including 1 percent, 10 percent, and 15 percent of the mean annual flow of the waterbody. With the exception of the 1 percent level, EPA concludes these levels would result in decreased protection. EPA solicits comment on these alternatives to five percent of the annual mean flow.

The second part of the flow requirement would limit the proportion of the total design intake flow to 25 percent of the source water body's 7Q10 flow. The 7Q10 is the lowest average seven-consecutive-day low flow with an average recurrence frequency of once in 10 years determined hydrologically. EPA estimates that limiting the proportion of a river or stream to 25 percent of the 7Q10, in conjunction with the other requirements proposed today, also should protect more than 99 percent of aquatic communities from adverse environmental impact. As explained above, this flow requirement, in combination with other requirements, would establish a minimum level of protection for aquatic communities analogous to that employed by EPA's water quality-based regulatory programs. The Agency invites comment on the use of other low-flow protection requirements, including a requirement that would limit cooling water intake structure capacity to 10 percent, 15 percent, 25 percent, or 35 percent of the 7Q10 low flow.

EPA has analyzed the potential siting implications of the proposed flow requirements and has determined that within the United States approximately 104,000 river miles have sufficient flow to support the water usage needs of large manufacturing facilities withdrawing up to 18 million gallons of water per day (MGD). Approximately 47,000 river miles could support a large nonutility power-producing facility

withdrawing 85 MGD, and approximately 18,000 river miles could support a large utility plant requiring 700 MGD. Under today's proposed rule, large new facilities needing additional cooling water in other areas would need to supplement withdrawals from waters of the U.S. with other sources of cooling water, or redesign their cooling systems to use less water.

As another gauge of the siting impacts of the proposed flow requirement for new facilities, the Agency determined that 89 percent of existing non-nuclear utility facilities (from a 1997 database of the Energy Information Agency and a 1994 Edison Electric Institute database) would be able to be sited at their current location under today's proposed requirements if they also operated in compliance with the flow reduction requirements proposed today. (Please note that the Agency does not intend to prejudge or signal in any way whether its proposed rule for existing facilities will or will not include capacity limitations commensurate with a level that could be attained by a recirculating cooling water system. The purpose of the analysis was to determine whether today's proposed flow requirements would unreasonably limit siting alternatives for new facilities only.)

Finally, to further examine the potential siting implications of today's proposal for new facilities, the Agency reviewed data on water use by existing facilities in arid regions of the country. The Agency found that 80 percent of the existing facilities in Arizona, California, Nevada, New Mexico, Oklahoma, and Texas do not use waters of the U.S. in their operations, suggesting that new facilities in these areas would similarly use waters other than waters of the U.S. in their operations. Therefore, they would not be affected by today's proposal if they were being constructed as new facilities subject to the rule.

Based on these analyses, the Agency is proposing flow requirements as an economically practicable component of requirements for BTA to minimize adverse environmental impact.

b. Flow Requirements for New Facilities With Cooling Water Intake Structures Located in Lakes and Reservoirs

Total design intake flow from all cooling water intake structures at a facility located in a lake or reservoir must not alter the natural thermal stratification of the water body.

EPA is proposing that cooling water intake structures located in lakes or reservoirs not alter the natural thermal stratification of the water body. Proposed § 125.84(c). Under natural conditions the water in lakes and reservoirs is seasonally stratified: The

coldest water is on the bottom, and the warmest water is at the surface. EPA proposes to limit the facility's design intake flow to a threshold below which it will not cause the alteration of the thermal (and hence the dissolved oxygen) structure of the lake or reservoir.

EPA is not proposing a proportional flow requirement for these facilities because the volume of the lakes and reservoirs on which they are located typically must be sufficient to accept their heated discharge and still maintain the efficiency of their cooling system. Because lakes and reservoirs typically do not have a strong current or flow, the volume of the water body must be great enough to dissipate the heat so that it is not recirculated back to the facility in its cooling water intake. However, EPA is proposing a requirement to protect the water body from alteration of the natural stratification, which can be caused by withdrawing large amounts of lower-temperature cooling water generally with low dissolved oxygen during the summer months. This would limit the intake flow of facilities that are located on a lake or reservoir to a capacity appropriate for the size of the water body, thus limiting the number of aquatic organisms impinged or entrained from the same water body.

The flow requirements specified in today's proposal are adequate to protect most lakes and reservoirs. However, EPA recognizes that there are unique situations, such as the Great Lakes, in which there are site-specific factors that may warrant more stringent requirements (as determined by the Director) to minimize adverse environmental impact. One of the primary concerns with lakes and reservoirs is that the withdrawal of cooling water should not alter the natural thermal stratification of the water body. Since the volume of water in the Great Lakes is quite large compared to the amount of water withdrawn for cooling purposes, it is highly unlikely that the thermal structure of these lakes would be influenced by cooling water withdrawals. However, the Great Lakes, like estuaries, have areas of high productivity and sensitive critical habitats that could be adversely affected by cooling water intake structures. The Agency recognizes that new facilities with cooling water intake structures in such water bodies might need more stringent requirements than those generally proposed here for lakes and reservoirs. Section 125.84(f) would provide the Director the authority under this proposal to address important site-

specific factors that lead to the need for additional control measures.

c. Flow Requirements for New Facilities With Cooling Water Intake Structures Located in Estuaries and Tidal Rivers

The total design intake flow from all cooling water intake structures at a facility must be no greater than one (1) percent of the volume of the water column in the area centered about the opening of the intake with a diameter defined by the distance of one tidal excursion at the mean low water level.

EPA is proposing a proportional flow requirement for cooling water intake structures located in estuaries and tidal rivers that limits the total design intake flow to no greater than one (1) percent of the volume of the water column in an area centered about the opening of the intake with a diameter defined by the distance of one tidal excursion at the mean low water level. Proposed § 125.84(d).

The basis for this proposal is similar to that underlying the proposed requirements for new facilities with cooling water intake structures located in freshwater rivers and streams. EPA selected a one (1) percent threshold for estuaries and tidal rivers because they are extremely productive and sensitive biological areas. A more conservative approach is necessary to protect these types of water bodies. However, because estuary volumes are very large, allowing a withdrawal of one (1) percent of an entire estuary would potentially allow for the impingement and entrainment of a very large number of aquatic organisms. Limiting the withdrawal to one (1) percent of a volume defined using the tidal excursion is a more appropriate and conservative approach to minimize adverse environmental impact and would protect 99 percent of the organisms in the area influenced by the cooling water intake structure. As noted above, this requirement in combination with the other requirements would establish a minimum level of protection analogous to water quality protection levels in other EPA programs.

In addition, in natural systems species and populations that are impinged and entrained might not inhabit the entire estuary, or different species might inhabit different parts of the estuary. Therefore, EPA is proposing to use a smaller volume that relates more specifically to the cooling water intake structure and the area it influences. The volume being proposed for comparison to the intake volume is determined using the tidal excursion in the area of the cooling water intake structure. Tidal excursion is a measurement of the distance that a particle travels during

one tidal cycle (see proposed definition at § 125.83). It would include the total of the distance upstream of the cooling water intake structure the particle would travel during the flood tide and the distance downstream it would travel during the ebb tide. By defining distances using the tidal excursion, the requirement would allow for a volume to be delineated by using the tidal excursion distance and drawing a radius (using the midpoint of the excursion distance) from one end of the excursion distance to the other. (See Appendix 2 to Preamble.) EPA invites comment on this approach.

d. Flow Requirements for New Facilities With Cooling Water Intake Structures Located in Estuaries and Tidal Rivers or the Littoral Zone in Other Water Body Types

You must reduce your intake flow to a level commensurate with that which could be attained by a closed-cycle recirculating cooling water system.

The reduction of the cooling water intake structure's capacity is one of the most effective means to reduce adverse environmental impact, especially in or near sensitive biological areas. EPA is proposing that facilities with intakes located in tidal rivers and estuaries; in the littoral zone of lakes, freshwater rivers, or oceans; or less than 50 meters outside the littoral zone of lakes, freshwater rivers, or oceans limit their flow to a level commensurate with that which could be attained by a closed-cycle recirculating cooling water system. Proposed §§ 125.84(b) through (c).

EPA concludes these facilities would require this additional level of control because of their proximity to potentially sensitive and highly productive biological areas. Closed-cycle recirculating cooling water systems are known to reduce the amount of cooling water needed and in turn to directly reduce the number of aquatic organisms taken into the cooling water intake structure. For the traditional steam electric utility industry, facilities located in fresh water areas that have closed-cycle recirculating cooling water systems can, depending on the quality of the makeup water, reduce water use by 96 to 98 percent from the amount they would use if they had once-through cooling water systems. Steam electric generating facilities that have closed-cycle recirculating cooling water systems using salt water can reduce water usage by about 70 to 96 percent

when makeup and blowdown flows are minimized.⁴³

Today's proposal would require that the intake flow withdrawn by a cooling water intake structure be reduced to a level commensurate with that which can be attained by a closed-cycle recirculating cooling water system by all cooling water intake structures at the facility. That level, in conjunction with the other requirements proposed today, would minimize adverse environmental impact and be economically practicable. Such flow reductions are a necessary component of the technology for minimizing adverse environmental impact in highly productive areas. In addition, EPA cost estimates show that this requirement is available to new facilities on a national level. EPA realizes that makeup water would be required because of losses within the system, including blowdown, evaporation, windage, and drift. The Agency invites comment on the use of a flow reduction requirement that requires the reduction of intake flow to level commensurate with that which can be attained by a closed-cycle recirculating cooling water system that has minimized makeup and blowdown flows.

To examine the extent to which new facilities are likely to reuse and recycle cooling water, the Agency reviewed the engineering databases that support the effluent limitations guidelines for several categories of industrial point sources. In general, this review identified extensive use of recycle or reuse of cooling water in documents summarizing industrial practices in the late 1970s and early 1980s, as well as increased recycling and reuse of cooling water in the 1990s. For example, the reuse of cooling water in the manufacturing processes was identified in the pulp and paper and chemicals industries, in some cases as part of the basis for an overall zero discharge requirement (inorganic chemicals). Other facilities reported reuse of a portion of the cooling water that was eventually discharged as process wastewater, with some noncontact cooling water discharged through a separate outfall or after mixing with treated process water.

This review has documented that recycle and reuse of noncontact cooling water is a common industrial practice to reduce both cooling water usage and overall water usage by manufacturing

⁴³ The lower range would be appropriate where State water quality standards limit chloride to a maximum increase of 10 percent over background and therefore require a 1.1 cycle of concentration. The higher range may be attained where cycles of concentration up to 2.0 are used for the design.

facilities. Facilities that reuse 100 percent of the water withdrawn from waters of the U.S. for cooling purposes would be considered to have achieved the flow reduction requirements (*i.e.*, reduce intake flow to a level commensurate with that which can be attained by a closed-cycle recirculation cooling water system that has minimized makeup and blowdown flows). In implementing today's proposed rule, EPA would consider reuse to be equivalent to a closed-cycle recirculating system. The Agency invites comment on the proposed approach for considering reuse of cooling water at manufacturing plants in lieu of recirculation as an alternative to meet the flow reduction requirement in today's proposal.

4. Velocity

The velocity of water entering a cooling water intake structure exerts a direct physical force against which fish and other organisms must act to avoid impingement or entrainment. EPA considers velocity to be one of the more important factors that can be controlled to minimize adverse environmental impact at cooling water intake structures.

To develop an appropriate, nationally protective minimum velocity requirement at cooling water intake structures, EPA reviewed available literature, State and Federal guidance, and regulatory requirements and found that a velocity of 0.5 ft/s has been used as guidance in at least three Federal documents.^{44 45 46} The 0.5 ft/s threshold recommended in the Federal documents is based on a study of fish swimming speeds and endurance performed by Sonnichsen et al. (1973).⁴⁷ This study concluded that appropriate velocity thresholds should be based on the fishes' swimming speeds (which are

⁴⁴ John Boreman, *Impacts of Power Plant Intake Velocities on Fish*, Power Plant Team, U.S. Fish and Wildlife Service, 1977.

⁴⁵ A.G. Christianson, F.H. Rainwater, M.A. Shirazi, and B.A. Tichenor, *Reviewing Environmental Impact Statements: Power Plant Cooling Systems, Engineering Aspects*, U.S. Environmental Protection Agency (EPA), Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon, Technical Series Report EPA-660/2-73-016, October 1973.

⁴⁶ Willis King, "Instructional Memorandum RB-44: Review of NPDES (National Pollutant Discharge Elimination System) Permit Applications processed by the EPA (Environmental Protection Agency) or by the State with EPA oversight," *Navigable Waters Handbook*, U.S. Fish and Wildlife Service, February 1973.

⁴⁷ John C. Sonnichsen, Jr., B.W. Bentley, G.F. Bailey, and R.E. Nakatani, *A Review of Thermal Power Plant Intake Structure Designs and Related Environmental Considerations*, Hanford Engineering Development Laboratory, Richland, Washington, HEDL-TME 73-24, UC-12, 1973.