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National Pollutant Discharge Elimination System—Cooling Water Intake Structures at Existing Facilities and Phase I Facilities; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122 and 125

[EPA–HQ–OW–2008–0667, FRL–9289–2]

RIN 2040–AE95

National Pollutant Discharge Elimination System—Cooling Water Intake Structures at Existing Facilities and Phase I Facilities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: This proposed rule would establish requirements under section 316(b) of the Clean Water Act (CWA) for all existing power generating facilities and existing manufacturing and industrial facilities that withdraw more than 2 million gallons per day (MGD) of water from waters of the U.S. and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. The proposed national requirements, which would be implemented through National Pollutant Discharge Elimination System (NPDES) permits, would establish national requirements applicable to the location, design, construction, and capacity of cooling water intake structures at these facilities by setting requirements that reflect the best technology available (BTA) for minimizing adverse environmental impact. The proposed rule constitutes EPA's response to the remand of the Phase II existing facility rule and the remand of the existing facilities portion of the Phase III rule. In addition, EPA is also responding to the decision in *Riverkeeper* I and proposing to remove from the Phase I new facility rule the restoration-based compliance alternative and the associated monitoring and demonstration requirements. EPA expects this proposed regulation would minimize adverse environmental impacts, including substantially reducing the harmful effects of impingement and entrainment. As a result, the Agency anticipates this proposed rule would help protect ecosystems affected by cooling water intake structures and preserve aquatic organisms and the ecosystems they inhabit in waters used by cooling water intake structures at existing facilities.

DATES: Comments must be received on or before July 19, 2011.

ADDRESSES: Submit your comments, identified by Docket No. EPA–HQ–OW–2008–0667 by one of the following methods:

- *http:www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *E-mail: OW-Docket@epa.gov,* Attention Docket ID No. EPA–HQ–OW–2008–0667.
- *Mail:* Water Docket, U.S. Environmental Protection Agency, Mail Code: 4203M, 1200 Pennsylvania Ave., NW., Washington, DC 20460. Attention Docket ID No. EPA–HQ–OW–2008–0667. Please include a total of 3 copies. In addition, please mail a copy of your comments on information collection provisions to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), *Attn:* Desk Officer for EPA, 725 17th St., NW., Washington, DC 20503.
- *Hand Delivery:* Water Docket, EPA Docket Center, EPA West Building Room 3334, 1301 Constitution Ave., NW., Washington, DC, Attention Docket ID No. EPA–HQ–OW–2008–0667. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information by calling 202–566–2426.

Instructions: Direct your comments to Docket No. EPA–HQ–OW–2008–0667. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or e-mail. The *http://www.regulations.gov* Web site is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *http://www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the Water Docket in the EPA Docket Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is 202–566–1744, and the telephone number for the Water Docket is 202–566–2426.

FOR FURTHER INFORMATION CONTACT: For additional technical information, contact Paul Shriner at 202–566–1076; e-mail: *shriner.paul@epa.gov.* For additional economic information, contact Erik Helm at 202–566–1049; e-mail: *helm.erik@epa.gov.* For additional biological information, contact Tom Born at 202–566–1001; e-mail: *born.tom@epa.gov.*

SUPPLEMENTARY INFORMATION:

What Entities Are Regulated By This Action? This proposed rule would apply to existing facilities that use cooling water intake structures to withdraw water from waters of the U.S. and have or require a National Pollutant Discharge Elimination System (NPDES) permit issued under Section 402 of the CWA. Existing facilities subject to this regulation would include those with a design intake flow greater than 2 MGD. If a facility meets these conditions, it is subject to today's proposed regulations. If a facility has or requires a NPDES permit but does not meet the 2 MGD intake flow threshold, it would be subject to permit conditions implementing section 316(b), developed by the NPDES permit director, 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 waterways used to withdraw water from waters of the U.S., provided that at least twenty-five percent of the water withdrawn is used for cooling purposes. The cooling water intake structure extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps. Generally, facilities that meet these criteria fall into two major groups: steam electric generating facilities and 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. Other types of entities not listed in the table could also be regulated.

Category	Examples of regulated entities	Standard Industrial Classification Codes	North American Industry Codes (NAIC)
Federal, State and Local Government.	Operators of steam electric generating point source dischargers that employ cooling water intake structures..	4911 and 493	221111, 221112, 221113, 221119, 221121, 221122, 221111, 221112, 221113, 221119, 221121, 221122.
Industry	Operators of industrial point source dischargers that employ cooling water intake structures..	See below	See below.
	Steam electric generating	4911 and 493	221111, 221112, 221113, 221119, 221121, 221122, 221111, 221112, 221113, 221119, 221121, 221122.
	Agricultural production	0133	111991, 11193.
	Metal mining	1011	21221.
	Oil and gas extraction (Excluding offshore and coastal subcategories).	1311, 1321	211111, 211112.
	Mining and quarrying of nonmetallic minerals	1474	212391.
	Food and kindred products	2046, 2061, 2062, 2063, 2075, 2085.	311221, 311311, 311312, 311313, 311222, 311225, 31214.
	Tobacco products	2141	312229, 31221.
	Textile mill products	2211	31321.
	Lumber and wood products, except furniture	2415, 2421, 2436, 2493.	321912, 321113, 321918, 321999, 321212, 321219.
	Paper and allied products	2611, 2621, 2631, 2676.	3221, 322121, 32213, 322121, 322122, 32213, 322291.
	Chemical and allied products	28 (except 2895, 2893, 2851, and 2879).	325 (except 325182, 32591, 32551, 32532).
	Petroleum refining and related industries	2911, 2999	32411, 324199.
	Rubber and miscellaneous plastics products	3011, 3069	326211, 31332, 326192, 326299.
	Stone, clay, glass, and concrete products	3241	32731.
	Primary metal industries	3312, 3313, 3315, 3316, 3317, 3334, 3339, 3353, 3363, 3365, 3366.	324199, 331111, 331112, 331492, 331222, 332618, 331221, 22121, 331312, 331419, 331315, 331521, 331524, 331525.
	Fabricated metal products, except machinery and transportation equipment.	3421, 3499	332211, 337215, 332117, 332439, 33251, 332919, 339914, 332999.
	Industrial and commercial machinery and computer equipment	3523, 3531	333111, 332323, 332212, 333922, 22651, 333923, 33312.
	Transportation equipment	3724, 3743, 3764	336412, 333911, 33651, 336416.
	Measuring, analyzing, and controlling instruments; photographic, medical, and optical goods; watches and clocks.	3861	333315, 325992.
	Electric, gas, and sanitary services	4911, 4931, 4939, 4961.	221111, 221112, 221113, 221119, 221121, 221122, 22121, 22133.
	Educational services	8221	61131.
	Engineering, accounting, research, management and related services.	8731	54171.

To determine whether your facility could be regulated by this action, you should carefully examine the applicability criteria in § 125.91 of the proposed rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Supporting Documentation

1. Docket

EPA has established an official public docket for this action under Docket ID No. EPA–HQ–OW–2008–0667. The official public docket consists of the documents specifically referenced in this action, any public comments received, and other information related to this action. Although a part of the official docket, the public docket does not include information claimed as Confidential Business Information (CBI) or other information the disclosure of which is restricted by statute. For information on how to access materials in the docket, refer to the preceding **ADDRESSES** section. To view docket materials, please call ahead to schedule an appointment. Every user is entitled to copy 266 pages per day before incurring a charge. The Docket may charge 15 cents for each page over the 266-page limit plus an administrative fee of $25.00.

2. Electronic Access

You may access this **Federal Register** document and the docket electronically, as well as submit public comments, through the Web site *http://www.regulations.gov* by searching for Docket ID No. EPA–HQ–OW–2008–0667. For additional information about the public docket, visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

3. Technical Support Documents

The proposed regulation is supported by three major documents:

1. Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EPA–821–R–11–003), hereafter referred to as the Economic and Benefits Analysis (EBA or more simply EA). This document presents the analysis of compliance costs, closures, energy supply effects, and a summary of benefits associated with the proposed rule.

2. Environmental and Economic Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EPA–821–R–11–002), hereafter referred to as the Environmental and Economic Benefits Analysis (EEBA). This document examines cooling water intake structure impacts and regulatory benefits at the regional level.

3. Technical Development Document for the Proposed Section 316(b) Existing Facilities Rule (EPA–821–R–11–001), hereafter referred to as the Technical Development Document (TDD). This document presents detailed information on the methods used to develop unit costs and describes the set of technologies that may be used to meet the proposed rule requirements.

Table of Contents

I. Legal Authority, Purpose, and Background of Today's Proposed Regulation

A. Legal Authority

Today's proposal is issued under the authority of sections 101, 301, 304, 308, 316, 401, 402, 501, and 510 of the Clean Water Act (CWA), 33 U.S.C. 1251, 1311, 1314, 1318, 1326, 1341, 1342, 1361, and 1370.

B. Purpose of Today's Proposed Regulation

The purpose of today's proposed rule is to propose national requirements for cooling water intake structures at existing facilities that implement section 316(b) of the CWA. Section 316(b) of the CWA provides that any standard established pursuant to section 301 or 306 of the CWA and applicable to a point source must require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact.

EPA first promulgated regulations to implement section 316(b) in 1976. The U.S. Court of Appeals for the Fourth Circuit remanded these regulations to EPA which withdrew them, leaving in place a provision not remanded that directed permitting authorities to determine BTA for each facility on a case-by-case basis. In 1995, EPA entered into a consent decree establishing a schedule for taking final action on regulations to implement section 316(b).

Pursuant to a schedule in the amended decree providing for final action on regulations in three phases, in 2001, EPA published a Phase I rule governing new facilities. The U.S. Court of Appeals for the Second Circuit, while generally upholding the rule, rejected the provisions allowing restoration to be used to meet the requirements of the rule. *Riverkeeper, Inc.* v. *U.S. EPA,* 358 F. 3d 174, 181 (2d Cir.2004) ("*Riverkeeper* I"). Today's proposed rule proposes to delete these restoration provisions.

In 2004, EPA published the Phase II rule applicable to existing power plants with a design intake flow greater than or equal to 50 MGD. Following challenge, the Second Circuit remanded numerous aspects of the rule to the Agency, including the Agency's decision to reject closed-cycle cooling as BTA. The Agency made this determination, in part, based on a consideration of costs and benefits. The Second Circuit concluded that a comparison of the costs and benefits of closed-cycle cooling was not a proper factor to consider in determining BTA. *Riverkeeper, Inc.* v. *U.S.EPA,* 475 F. 3d 83 (2d Cir. 2007) ("*Riverkeeper* II"). In 2008, the U.S, Supreme Court agreed to review the *Riverkeeper* II decision limited to a single issue: whether section 316(b) authorizes EPA to balance costs and benefits in 316(b) rulemaking. In April 2009, in *Entergy Corp.* v. *Riverkeeper Inc.,* 129 S. Ct. 1498, 68 ERC 1001 (2009) (40 ER 770, 4/3/09), 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. The court left it to EPA's discretion to decide whether and how to consider costs and benefits in 316(b) actions, including rulemaking and BPJ determinations. The Supreme Court remanded the rule to the Second Circuit. Subsequently, EPA asked the Second Circuit to return the rule to the Agency for further review of the rule.

In 2006, EPA published the Phase III rule. The Phase III rule establishes 316(b) requirements for certain new offshore oil and gas extraction facilities. In addition, EPA determined that, in the case of electric generators with a design intake flow of less than 50 MGD and existing manufacturing facilities, 316(b) requirements should be established by NPDES permit directors on a case-by-case basis using their best professional judgment. In July 2010, the U. S. Court of Appeals for the Fifth Circuit issued a decision upholding EPA's rule for new offshore oil and gas extraction facilities. Further, the court granted the request of EPA and environmental petitioners in the case to remand the existing facility portion of the rule back to the Agency for further rulemaking. See section C.2 below for a more detailed discussion of the history of EPA's actions to address standards for cooling water intake structures.

In response to the remand in Phase II, the remand of the existing facility portion of the Phase III rule, and the associated Supreme Court decision, EPA is today proposing a number of requirements. Most significantly, EPA is proposing requirements reflecting the best technology available for minimizing adverse environmental impact, applicable to the location, design, construction, and capacity of cooling water intake structures for existing facilities. EPA is treating existing power generating facilities and existing manufacturing and industrial facilities in one proceeding. Today's proposal applies to all existing power generating facilities and existing manufacturing and industrial facilities that have a design intake flow of at least two million gallons from waters of the United States and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. In addition, EPA is today also responding to the decision in *Riverkeeper* I and proposing minor changes to the Phase I rule for new facilities. Specifically, EPA proposes to remove from the Phase I rule the restoration-based compliance alternative and the associated monitoring and demonstration requirements.

C. Background

1. The Clean Water Act

The Federal Water Pollution Control Act, also known as the Clean Water Act (CWA), 33 U.S.C. 1251 *et seq.,* seeks to restore and maintain the chemical, physical, and biological integrity of the nation's waters. 33 U.S.C. 1251(a). Among the goals of the Act is that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water. 33 U.S.C. 1251(a)(2).

In furtherance of these objectives, the CWA establishes a comprehensive regulatory program, key elements of which are (1) a prohibition on the discharge of pollutants from point sources to waters of the United States, except in compliance with the statute; (2) authority for EPA or authorized States or Tribes to issue National Pollutant Discharge Elimination System (NPDES) permits that authorize and regulate the discharge of pollutants; and (3) requirements for effluent limitations and other conditions in NPDES permits to implement applicable technology-based effluent limitations guidelines and standards and applicable State water quality standards.

Section 402 of the CWA authorizes EPA (or an authorized State or Tribe) to issue an NPDES permit to any person discharging any pollutant or combination of pollutants from a point source into waters of the United States. Forty-seven States and one U.S. territory are authorized under section 402(b) to administer the NPDES permitting program. NPDES permits restrict the types and amounts of pollutants, including heat, that may be discharged from various industrial, commercial, and other sources of wastewater. These permits control the discharge of pollutants by requiring dischargers to meet technology-based effluent limitations guidelines (ELGs) or new source performance standards (NSPS) established pursuant to section 301 or section 306. Where such nationally applicable ELGs or NSPS exist, permit authorities must incorporate them into permit requirements. Where they do not exist, permit authorities establish effluent limitations and conditions, reflecting the appropriate level of control (depending on the type of pollutant) based on the best professional judgment (BPJ) of the permit writer. Limitations based on these guidelines, standards, or on best professional judgment are known as technology-based effluent limits. Where technology-based effluent limits are inadequate to meet applicable State water quality standards, section 301(b)(1)(C) of the Clean Water Act requires permits to include more stringent limits to meet applicable water quality standards. NPDES permits also routinely include standard conditions applicable to all permits, special conditions, and monitoring and reporting requirements. In addition to these requirements, NPDES permits must contain conditions to implement the requirements of section 316(b).

Section 510 of the Clean Water Act provides that, except as provided in the Clean Water Act, nothing shall preclude or deny the right of any State (or political subdivision thereof) to adopt or enforce any requirement respecting control or abatement of pollution; except that if a limitation, prohibition or standard of performance is in effect under the Clean Water Act, such State may not adopt any other limitation, prohibition, or standard of performance which is less stringent than the limitation, prohibition, or standard of performance under the Act. EPA interprets this to reserve for the States authority to implement requirements that are more stringent than the Federal requirements under state law. *PUD No. 1 of Jefferson County* v. *Washington Dep't of Ecology,* 511 U.S. 700, 705 (1994).

Sections 301, 304, and 306 of the CWA require that EPA develop technology-based effluent limitations guidelines and new source performance standards that are used as the basis for discharge requirements in wastewater discharge permits. EPA develops these effluent limitations guidelines and standards for categories of industrial dischargers based on the pollutants of concern discharged by the industry, the degree of control that can be attained using various levels of pollution control technology, consideration of various economic tests appropriate to each level of control, and other factors identified in sections 304 and 306 of the CWA (such as non-water quality environmental impacts including energy impacts). EPA has promulgated regulations setting effluent limitations guidelines and standards under sections 301, 304, and 306 of the CWA for more than 56 industries. See 40 CFR parts 405 through 471. EPA has established effluent limitations guidelines and standards that apply to most of the industry categories that use cooling water intake structures (*e.g.,* steam electric power generation, paper and allied products, petroleum refining, iron and steel manufacturing, and chemicals and allied products).

Section 316(b) states that any standard established pursuant to section 301 or section 306 of [the Clean Water] Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

Section 316(b) addresses the adverse environmental impact caused specifically by the intake of cooling water, rather than discharges of pollutants, including thermal discharges, into waters of the United States. Despite this special focus, the requirements of section 316(b) remain closely linked to several of the core elements of the NPDES permit program established under section 402 of the CWA to control discharges of pollutants into navigable waters. Thus, while effluent limitations apply to the discharge of pollutants by NPDES-permitted point sources to waters of the United States, section 316(b) applies to facilities subject to NPDES requirements that also withdraw water from a water of the United States for cooling and that use a cooling water intake structure to do so.

The CWA does not describe the factors to be considered in establishing section 316(b) substantive performance requirements that reflect the "best technology available for minimizing adverse environmental impact" nor does it require that EPA develop nationally applicable performance requirements through rule making. The most recent guidance in interpreting 316(b) comes from the U.S. Supreme Court's decision in *Entergy Corp.* v. *Riverkeeper, Inc.* As noted, the decision was limited to the single question of whether Section 316(b) of the Clean Water Act authorizes EPA to compare costs and benefits of various technologies when setting national performance standards for cooling water intake structures under Section 316(b) of the Clean Water Act. In *Riverkeeper* II, the Second Circuit rejected EPA's determination that closed-cycle cooling was not BTA because it could not determine whether EPA had improperly considered costs and benefits in its 316(b) rulemaking. The Supreme Court reversed and remanded the Second Circuit ruling in a 6–3 opinion authored by Justice Scalia. The Court held that it is reasonable for EPA to conduct a cost-benefit analysis in setting national performance standards for cooling water intake structures under Section 316(b). The Court held that EPA has the discretion to consider costs and benefits under Section 316(b) but is not required to consider costs and benefits. The Court's discussion of the language of section 316(b)—section 316(b) is "unencumbered by specified statutory factors"—and its critique of the Second Circuit's decision affirms EPA's broad discretion to consider a number of factors in standard setting under section 316(b). While the Supreme Court's decision is limited to whether or not EPA may consider one factor (cost/benefit analysis) under section 316(b), the language also suggests that EPA has wide discretion in considering other factors that it deems relevant to 316(b) standard setting. ("It is eminently reasonable to conclude that § 1326b's silence is meant to convey nothing more than a refusal to tie the agency's hands as to whether cost-benefit analysis should be used, and if so to what degree." 129 S.Ct. 1498, 1508 (2009).

Regarding the other factors EPA may consider, section 316(b) cross references sections 301 and 306 of the CWA by requiring that any standards established pursuant to those sections also must require that the location, design, construction and capacity of intake structures reflect BTA. EPA has interpreted the cross reference as authorizing consideration of the same factors considered under those provisions Thus, for example, section 306 directs EPA to establish performance standards for *new* sources based on the "best available demonstrated control technology" (BADT). 33 U.S.C. 1316(a)(1). In establishing BADT, EPA "shall take into consideration the cost of achieving such effluent reduction, and any non-water quality environmental impact and energy requirements." 33 U.S.C. 1316(b)(2)(B). The specific cross-reference in CWA section 316(b) to CWA section 306 "is an invitation to look to section 306 for guidance in discerning what factors Congress intended the EPA to consider in determining the 'best technology available' " for new sources. See *Riverkeeper* v. *EPA,* 358 F. 2d 174, 186 (2nd Cir. 2004).

Similarly, Section 301 of the CWA requires EPA to establish standards known as "effluent limitations" for existing point source discharges in two phases. In the first phase, applicable to all pollutants, EPA must establish effluent limitations based on the "best practicable control technology currently available" (BPT). 33 U.S.C. 1311(b)(1)(A). In establishing BPT, the CWA directs EPA to consider the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and to also take into account the age of the equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as [EPA] deems appropriate. 33 U.S.C. 1314(b)(1)(b).

In the second phase, EPA must establish effluent limitations for conventional pollutants based on the "best conventional pollution control technology" (BCT), and for toxic pollutants based on the "best available technology economically achievable" (BAT). 33 U.S.C. 1311(b)(2)(A), (E).

In determining BCT, EPA must consider, among other factors, the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived, and the comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industry source * * * and the age of equipment and facilities involved, the process employed, the engineering aspects * * * of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impacts (including energy requirements), and such other factors as [EPA] deems appropriate. 33 U.S.C. 1314(b)(4)(B).

In determining BAT, the CWA directs EPA to consider "the age of equipment and facilities involved, the process employed, the engineering aspects * * * of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impacts (including energy requirements), and such other factors as [EPA] deems appropriate." 33 U.S.C. 1314(b)(2)(B).

Section 316(b) expressly refers to section 301, and the phrase "best technology available" is very similar to the phrases "best available technology economically achievable" and "best practicable control technology currently available" in that section. Thus, section 316(b), section 301(b)(1)(A)—the BPT provision—and section 301(b)(1)(B)—the BAT provision—all include the terms "best," "technology," and "available," but neither BPT nor BAT goes on to consider minimizing adverse environmental impacts, as BTA does. See 33 U.S.C. 1311(b)(1)(A) and (2)(A). These facts, coupled with the brevity of section 316(b) itself, prompt EPA to look to section 301 and, ultimately, section 304 for further guidance in determining the "best technology available to minimize adverse environmental impact" of cooling water intake structures for existing facilities.

By the same token, however, there are significant differences between section 316(b) and sections 301 and 304. See *Riverkeeper, Inc.* v. *United States Environmental Protection Agency* (2nd Cir. Feb. 3, 2004) ("not every statutory directive contained [in sections 301 and 306] is applicable" to a section 316(b) rulemaking). Moreover, as the Supreme Court recognized, while the provisions governing the discharge of toxic pollutants must require the elimination of discharges if technically and economically achievable, section 316(b) has the less ambitious goal of "minimizing adverse environmental impact." 129 S.Ct. 1498, 1506. In contrast to the effluent limitations provisions, the object of the "best technology available" is explicitly articulated by reference to the receiving water: to minimize adverse environmental impact in the waters from which cooling water is withdrawn. This difference is reflected in EPA's past practices in implementing sections 301, 304, and 316(b). EPA has established BAT effluent limitations guidelines and NSPS based on the efficacy of one or more technologies to reduce pollutants in wastewater in relation to their costs without necessarily considering the impact on the receiving waters. This contrasts to 316(b) requirements, where EPA has previously considered the costs of technologies in relation to the benefits of minimizing adverse environmental impact in establishing 316(b) limits, which historically has been done on a case-by case basis. *In Re Public Service Co. of New Hampshire,* 10 ERC 1257 (June 17, 1977); *In Re Public Service Co. of New Hampshire,* 1 EBAD 455 (Aug. 4, 1978); *Seacoast Anti-Pollution League* v. *Costle,* 597 F. 2d 306 (1st Cir. 1979). EPA concluded that, because both section 301 and 306 are expressly cross-referenced in section 316(b), EPA reasonably interpreted section 316(b) as authorizing consideration of the same factors, including costs, as in those sections. EPA interpreted "best technology available" to mean the best technology available at an "economically practicable" cost. This approach squared with the limited legislative history of section 316(b) which suggested the BTA was to be based on technology whose costs were "economically practicable." In debate on section 316(b), one legislator explained that "[t]he reference here to 'best technology available' is intended to be interpreted to mean the best technology available commercially *at an economically practicable cost.*" 118 Cong. Rec. 33,762 (1972) (statement of Rep. Clausen) (emphasis added).

For EPA's initial Phase II rulemaking, as it had during 30 years of BPJ section 316(b) permitting, EPA therefore interpreted CWA section 316(b) as authorizing EPA to consider not only the costs of technologies but also their effects on the water from which the cooling water is withdrawn.

2. History of Actions To Address Cooling Water Intake Structures Under the NPDES Program

a. 1976 Rulemaking

In April 1976, EPA promulgated regulations under section 316(b) that addressed cooling water intake structures. 41 FR 17387 (April 26, 1976), see also the proposed rule at 38 FR 34410 (December 13, 1973). The rule added a new § 401.14 to 40 CFR Chapter I that reiterated the requirements of Clean Water Act section 316(b). It also added a new part 402, which included three sections: (1) Section 402.10 (Applicability), (2) § 402.11 (Specialized definitions), and (3) § 402.12 (Best technology available for cooling water intake structures). Section 402.10 stated that the provisions of part 402 applied to "cooling water intake structures for point sources for which effluent limitations are established pursuant to section 301 or standards of performance are established pursuant to section 306 of the Act." Section 402.11 defined the terms "cooling water intake structure," "location," "design," "construction," "capacity," and "Development Document." Section 402.12 included the following language: The information contained in the Development Document shall be considered in determining whether the location, design, construction, and capacity of a cooling water intake structure of a point source subject to standards established under section 301 or 306 reflect the best technology available for minimizing adverse environmental impact.

In 1977, fifty-eight electric utility companies challenged those regulations, arguing that EPA had failed to comply with the requirements of the Administrative Procedure Act (APA) in promulgating the rule. Specifically, the utilities argued that EPA had neither published the Development Document in the **Federal Register** nor properly incorporated the document into the rule by reference. The U.S. Court of Appeals for the Fourth Circuit agreed and, without reaching the merits of the regulations themselves, remanded the rule. *Appalachian Power Co.* v. *Train,* 566 F.2d 451 (4th Cir. 1977). EPA later withdrew part 402. 44 FR 32956 (June 7, 1979). The regulation at § 401.14, which reiterates the statutory requirement, remains in effect.

Since the Fourth Circuit remanded EPA's section 316(b) regulations in 1977, NPDES permit authorities have made decisions implementing section 316(b) on a case-by-case, site-specific basis. EPA published draft guidance addressing section 316(b) implementation in 1977. *See Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) Pub. L. 92–500* (U.S. EPA, 1977). This draft guidance described the studies recommended for evaluating the impact of cooling water intake structures on the aquatic environment and recommended a basis for determining the best technology available for minimizing adverse environmental impact. The 1977 section 316(b) draft guidance states, "[t]he environmental-intake interactions in question are highly site-specific and the decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis." (Section 316(b) Draft Guidance, U.S. EPA, 1977, p. 4). This case-by-case approach was also consistent with the approach described in the 1976 Development Document referenced in the remanded regulation. The 1977 section 316(b) draft guidance suggested a general process for developing information needed to support section 316(b) decisions and presenting that information to the permitting authority. The process involved the development of a site specific study of the environmental effects associated with each facility that uses one or more cooling water intake structures, as well as consideration of that study by the permitting authority in determining whether the facility must make any changes for minimizing adverse environmental impact. Under this framework, the Director determined whether appropriate studies have been performed, whether a given facility has minimized adverse environmental impact, and what, if any, technologies may be required.

b. Phase I—New Facility Rule

On November 9, 2001, EPA took final action on regulations governing cooling water intake structures at new facilities. See 66 FR 65255 (December 18, 2001). On December 26, 2002, EPA made minor changes to the Phase I regulations. 67 FR 78947. The final Phase I new facility rule (40 CFR part 125, subpart I) establishes requirements applicable to the location, design, construction, and capacity of cooling water intake structures at new facilities that have a design capacity to withdraw at least two million gallons per day (MGD) and use at least twenty-five percent of the water they withdraw solely for cooling purposes.

In the new facility rule, EPA adopted a two-track approach. Under Track I, for facilities that withdraw equal to or greater than 10 MGD, the intake flow of the cooling water intake structure is restricted, at a minimum, to a level commensurate with that which could be attained by use of a closed-cycle, recirculating cooling system. For facilities that withdraw greater than 2 MGD, the design through-screen intake velocity is restricted to 0.5 feet per second and the total quantity of intake is restricted to a proportion of the mean annual flow of a freshwater river or stream, or to a level necessary to maintain the natural thermal stratification or turnover patterns (where present) of a lake or reservoir except in cases where the disruption is beneficial, or to a percentage of the tidal excursions of a tidal river or estuary. If certain environmental conditions exist, an applicant that withdraws equal to or greater than 10 MGD must select and implement appropriate design and construction technologies for further minimizing impingement mortality and entrainment. Applicants with greater than 2 MGD but less than 10 MGD flows are not required to reduce intake flow to a level commensurate with a closed-cycle, recirculating cooling system, but must still meet specific operational criteria.

Under Track II, the applicant has the opportunity to demonstrate to the Director that the technologies he employs will reduce the level of adverse environmental impact to a comparable level to what would be achieved by meeting the Track I requirements for restricting intake flow and velocity. In making this demonstration, the regulations allow an applicant to rely on a combination of measures in additional to technology controls for reducing impingement and entrainment to achieve results equivalent to the Track I intake flow and velocity requirements. These include measures to restore the affected water body such as restocking fish and improvement of the surrounding habitat to offset the adverse effects that would otherwise be caused by the operation of the intake structures. These restoration measures would result in increases in fish and shellfish which, in combination with any technologies employed, would result in a level of fish and shellfish in the water body comparable to that which would result from the reductions in impingement mortality and entrainment that would be achieved under Track I. Note that restoration provisions are no longer authorized (and EPA is proposing to delete them from the CFR in this rule making), but they are included in this description of the Phase I rule for completeness. See Chapter II of this preamble for more information.

In addition, under the Phase I rule, the Director (*i.e.,* the permitting authority) may establish less stringent alternative requirements for a facility if compliance with the Phase I standards would result in compliance costs wholly out of proportion to those EPA considered in establishing the Phase I requirements or would result in significant adverse impacts on local air quality, water resources, or local energy markets.

EPA specifically excluded new offshore oil and gas extraction facilities from the Phase I new facility rule, but committed to consider establishing requirements for such facilities in the Phase III rulemaking. 66 FR 65338 (December 18, 2001).

c. Phase II—Large Flow Existing Power Plants

On February 16, 2004, EPA took final action on regulations governing cooling water intake structures at certain existing power producing facilities. 69 FR 41576 (July 9, 2004). The final Phase II rule applied to existing facilities that are point sources; that, as their primary activity, both generate and transmit electric power or generate electric power for sale or transmission; that use or propose to use a cooling water intake structure with a total design intake flow of 50 MGD or more to withdraw water from waters of the United States; and that use at least 25 percent of the withdrawn water exclusively for cooling purposes. In addition, power producers fitting the description above were also subject to the final Phase II rule even if they obtain their cooling water from one or more independent suppliers of cooling water. Such facilities were subject to the rule if their supplier withdraws water from waters of the U.S. even if the supplier was not itself a Phase II existing facility. EPA included this provision to prevent circumvention of the Phase II rule requirements by a facility purchasing cooling water from entities not otherwise subject to Section 316(b).

The final Phase II rule and preamble also clarified the definition of an "existing" power producing facility. The Phase II rule defined an "existing facility" as "any facility that commenced construction as described in § 122.29(b)(4) on or before January 17, 2002; and any modification of, or addition of a unit at such a facility that does not meet the definition of a new facility at § 125.83." Given that the definition of the term "existing facility" was based in part on the Phase I definition of the term "new facility," the preamble to the final Phase II rule also clarified and provided some examples of how the definition of "existing facility" might apply to certain changes at power producing facilities.

Under the Phase II rule, EPA established BTA performance standards for the reduction of impingement mortality and, under certain circumstances, entrainment (see 69 FR 41590–41593). The performance standards consisted of ranges of reductions in impingement mortality and/or entrainment (*e.g.*, reduce impingement mortality by 80 to 95 percent and/or entrainment by 60 to 90 percent) relative to a "calculation baseline" that reflected the level of impingement mortality and entrainment that would occur absent specific controls. These performance standards were not based on a single technology but, rather, on consideration of a combination of technologies that EPA determined were commercially available and economically achievable for the industries affected as a whole. (69 FR 41598–41610). EPA based the impingement mortality and entrainment (I&E) performance standards on a combination of technologies because it found no single technology to be most effective at all affected facilities. For impingement standards, these technologies included: (1) Fine and wide-mesh wedgewire screens, (2) barrier nets, (3) modified screens and fish return systems, (4) fish diversion systems, and (5) fine mesh traveling screens and fish return systems. With regard to entrainment reduction, these technologies include: (1) Aquatic filter barrier systems, (2) fine mesh wedgewire screens, and (3) fine mesh traveling screens with fish return systems. Because EPA based the performance standards on a combination of technologies and because of the uncertainty inherent in predicting the efficacy of one or more of these technologies as applied to different Phase II facilities, EPA promulgated these standards as ranges. Furthermore, because the site-specific performance was based on a comparison to a once-through system without any specific controls on the shoreline near the source waterbody (*i.e.*, calculation baseline, see section III.A.2 for more details), the rule also allowed facilities to receive credit towards meeting the performance standards for I&E reduction associated with alternate locations of their intakes (eg, deep water where fish and shellfish were less abundant).

The types of performance standard applicable to a particular facility (*i.e.*, reductions in impingement mortality only or impingement mortality and entrainment) were based on several factors, including the facility's location (*i.e.*, source waterbody), rate of use (capacity utilization rate), and the proportion of the waterbody withdrawn.

The Phase II rule identified five compliance alternatives to meet the performance standards. A facility could demonstrate to the Director one of the following: (1) That it has already reduced its flow commensurate with a closed-cycle recirculating system (to meet both impingement mortality and entrainment), or that it has already reduced its maximum through-screen velocity to 0.5 feet per second or less (to meet the impingement performance standard only); (2) that its current cooling water intake structure configuration meets the applicable performance standards; (3) that it has selected design and construction technologies, operational measures, and/or restoration measures that, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the applicable performance standards; (4) that it meets the applicability criteria and has installed and is properly operating and maintaining a rule-specified and/or approved State-specified design and construction technology (*i.e.,* submerged cylindrical wedgewire screens) in accordance with § 125.99(a) or an alternative technology that meets the appropriate performance standards and is approved by the Director in accordance with § 125.99(b); or (5) that its costs of compliance would be significantly greater either than the costs considered by the Administrator for a like facility to meet the applicable performance standards, or than the benefits of meeting the applicable performance standards at the facility. Under the cost-cost comparison alternative, a Director could determine that the cost of compliance for a particular facility would be significantly greater than the costs considered by EPA in establishing the applicable impingement mortality and entrainment reduction performance standards. Similarly, under the cost-benefit comparison alternative, a Director could determine that the cost of compliance for a particular facility would be significantly greater than the benefits of complying with the applicable performance standards. In the event of either of these determinations, the Director would have to make a site-specific determination of BTA for minimizing adverse environmental impact that came as close as possible to meeting the applicable performance standards at a cost that did not significantly exceed either the costs EPA considered in establishing these standards or the site-specific benefits of meeting these standards.

The final Phase II rule also provided that a facility that chooses specified compliance alternatives might request that compliance with the requirements of the rule be determined based on the implementation of a Technology Installation and Operation Plan (TIOP) that would indicate how the facility would install and ensure the efficacy, to the extent practicable, of design and construction technologies, and/or operational measures, and/or a Restoration Plan. The rule also established requirements for the development and submittal of a TIOP (§ 125.95(b)(4)(ii)) as well as provisions that specified how compliance could be determined based on implementation of a TIOP (§ 125.94(d)). Under these provisions, a TIOP could be requested in the first permit term and continued use of a TIOP could be requested where a facility was in compliance with such plan and/or its Restoration Plan.

d. Phase III Rulemaking—Low Flow Existing Power Plants, Existing Manufacturing Facilities, and New Offshore Oil and Gas Facilities

On June 16, 2006, EPA published a final Phase III rule that established categorical regulations for new offshore oil and gas extraction facilities that have a design intake flow threshold of greater than 2 MGD and that withdraw at least 25 percent of the water exclusively for cooling purposes. For most such facilities, the rule establishes requirements virtually identical to the requirements applicable to new facilities in the Phase I rule. In the Phase III rule, EPA declined to establish national standards for Phase III existing facilities. Instead it concluded that CWA section 316(b) requirements for electric generators with a design intake flow of less than 50 MGD and all existing manufacturing facilities would continue to be established on a case-by-case basis under the NPDES permit program using best professional judgment. (71 FR 35006).

3. Rulings by the U.S. Court of Appeals for the Second Circuit

Both the Phase I and Phase II 316(b) rules were challenged in the U.S. Court of Appeals for the Second Circuit. Key aspects of each of these decisions are discussed below.

a. Phase I Rule

Various environmental and industry groups challenged the Phase I 316(b) rule. In February 2004, the Second Circuit sustained the entire rule except for the restoration provision, ruling that restoration was not a technology as provided for in 316(b). With respect to the other provisions of the rule, the Court concluded the Phase I rule was based on a reasonable interpretation of the applicable statute and sufficiently supported by the record. Restoration provisions of the rule were remanded to EPA for further rulemaking consistent with the Court's decision. *Riverkeeper, Inc.* v. *EPA,* 358 F.3d 174, 191 (2nd Cir., 2004). Today's proposal rule would remove the restoration provisions from the Phase I rule. *See* Chapter II of this preamble for more details.

b. Phase II Rule

Industry, environmental stakeholders, and some States[1] challenged many aspects of the Phase II regulations. On January 25, 2007, the Second Circuit (*Riverkeeper, Inc.* v. *EPA,* 475 F.3d 83, (2d Cir., 2007)) upheld several provisions of the Phase II rule and decision and remanded others to EPA for further rulemaking.

As noted above, for the final rule EPA rejected closed-cycle cooling as BTA. Instead, EPA selected a suite of technologies to reflect BTA, including *e.g.,* screens, aquatic filter barriers, and barrier nets. Based on the chosen technologies, EPA established national performance standards for reducing impingement mortality and entrainment of fish and fish organisms but did not require the use of any specific technology. Among the aspects of the rule the Second Circuit remanded for further clarification was EPA's decision to reject closed-cycle cooling as BTA and EPA's determination of performance ranges as BTA. In addition, the Second Circuit found that, consistent with its Phase I decision, restoration was not a technology for BTA, and that EPA's cost-benefit site-specific compliance alternative was not in accord with the Clean Water Act. There are also several issues for which the court requested additional clarification, and some instances where the court determined that EPA had failed to provide adequate notice and opportunity to comment on certain provisions of the rule.

4. EPA Suspension of the Phase II Rule

As a result of the decision of the Second Circuit Court of Appeals in *Riverkeeper, Inc.* v. *EPA,* 475 F.3d 83, (2d Cir., 2007), EPA, on July 9, 2007 (72 FR 37107) suspended the requirements for cooling water intake structures at Phase II existing facilities, pending further rulemaking. Specifically, EPA suspended the provisions in § 122.21(r)(1)(ii) and (5), and part 125 Subpart J, with the exception of Sec. 125.90(b). EPA explained that suspending the Phase II requirements was an appropriate response to the Second Circuit's decision, and that such action would allow it to consider how to respond to the remand. In addition, suspending the Phase II rule was responsive to the concerns of the regulated community and permitting agencies, both of whom sought guidance regarding how to proceed in light of the approaching deadline of the remanded rule. EPA's suspension clarified that pending further rulemaking, permit requirements for cooling water intake structures at Phase II facilities should be established on a case-by-case, best professional judgment (BPJ) basis (*see* 125.90(b)).

5. Ruling by the U.S. Supreme Court

Following the Phase II decision in the Second Circuit, several industry group litigants petitioned the U.S. Supreme Court to hear an appeal regarding several issues in the case. *Entergy Corp. et al.* v. *EPA, S. Ct. No. 07–588, et al.* On April 14, 2008, the Supreme Court granted the petitions for writs of certiorari submitted by these Phase II litigants, but limited its review to the issue of whether section 316(b) authorizes EPA to compare costs with benefits in determining BTA for cooling water intake structures. The Supreme Court held oral arguments in this case on December 2, 2008, and issued a decision on April 1, 2009. The Supreme Court held that it is permissible for EPA to rely on cost-benefit analysis in decision making for setting the Phase II national performance standards, and in providing for cost-benefit variances from those standards as part of the Phase II regulations. The Court indicated that the phrase "best technology available for minimizing adverse environmental impact" does not unambiguously preclude use of cost-benefit analysis in decision making. The ruling supports EPA's discretion to consider costs and benefits, but imposes no obligation on the agency to do so.

6. Ruling by the U.S. Court of Appeals for the Fifth Circuit

In 2009, EPA petitioned the Fifth Circuit to remand the existing facility portion of the Phase III rule. Specifically, EPA requested remand of those provisions in the Phase III rule that establish 316(b) requirements at electric generators with a design intake flow of less than 50 MGD, and at existing manufacturing facilities, on a case-by-case basis using best professional judgment. This request did not affect the Phase III rule requirements that establish categorical regulations for new offshore oil and gas extraction facilities that have a design intake flow threshold of greater than 2 MGD and that withdraw at least 25 percent of the water exclusively for cooling purposes.

On July 23, 2010, the U. S. Court of Appeals for the Fifth Circuit issued a decision regarding the Phase III rule. The Court granted EPA's motion to remand the rule with respect to existing facilities. In addition, the Fifth Circuit affirmed the portion of the rule that regulated cooling water intake structures for new offshore oil and gas facilities. In sustaining these requirements, the Fifth Circuit upheld EPA's decision not to use cost benefit balancing in determining the requirements for these new facilities. This was in accord with the discretion afforded by 316(b) and affirmed by the Supreme Court, namely that EPA properly interpreted section 316(b) as authorizing, but not requiring, the Agency to consider costs and benefits in its decision making.

7. Settlement of Litigation in U.S. District Courts

On January 19, 1993, a group of individuals and environmental organizations[2] filed, under section 505(a)(2) of the CWA, 33 U.S.C. 1365(a)(2), a complaint in *Cronin, et. al.* v. *Reilly,* 93 Civ. 314 (LTS)(S.D.N.Y.). The plaintiffs alleged that EPA had failed to perform a non-discretionary duty to issue regulations implementing section 316(b) of the CWA, 33 U.S.C. 1326(b). In 1995, EPA and the plaintiffs executed a consent decree in the case that provided for EPA to implement section 316(b) of the CWA by prescribed dates in the three separate rulemaking proceedings described above. In late 2002, the district court entered an amended consent decree that modified the schedule for the Phase II and Phase III rulemakings for existing facilities.

On November 17, 2006, some of the same environmental organizations in the *Cronin* case filed a second complaint, amended on January 19, 2007, in *Riverkeeper, et al.* v. *EPA,* 06 Civ. 12987 (S.D.N.Y.). Here, the plaintiffs alleged that EPA failed to perform a non-discretionary duty under section 316(b) of the CWA in its final regulation covering the Phase III facilities, and also had violated sections 706(2)(A) and 706(2)(C) of the Administrative Procedure Act (APA) in the manner in which it had made that decision.

Earlier, the same plaintiffs had also petitioned for review of the Phase III rule in the U.S. Court of Appeals for the Second Circuit. This and other petitions for review were consolidated for hearing

[1] Rhode Island, Connecticut, Delaware, Massachusetts, New Jersey, and New York.

[2] There are the following plaintiffs currently: Riverkeeper, Inc.; Alex Matthiessen, a/k/a The Hudson Riverkeeper; Maya K. Van Rossum, a/k/a The Delaware Riverkeeper; Terrance E. Backer, a/k/a The Soundkeeper; John Torgan, a/k/a The Narragansett BayKeeper; Joseph E. Payne, a/k/a The Casco BayKeeper; Leo O'Brien, a/k/a the San Francisco BayKeeper; Sue Joerger, a/k/a The Puget Soundkeeper; Steven E. Fleischli, a/k/a The Santa Monica BayKeeper; Andrew Willner, a/k/a The New York/New Jersey Baykeeper; The Long Island Soundkeeper Fund, Inc.; The New York Coastal Fishermen's Association, Inc.; and The American Littoral Society, Inc.

in the U.S. Court of Appeals for the Fifth Circuit. *Conoco Phillips* v. *EPA* (5th Cir. No. 06–60662). Following the Supreme Court decision in *Entergy,* EPA, Riverkeeper and others requested remand of the regulation to allow EPA to reconsider its decisions regarding Phase III facilities in light of more recent technical information and recent court decisions. As noted above, on July 23, 2010, the Fifth Circuit granted the joint motion of EPA and environmental petitioners for a voluntary remand. On September 3, 2010, one of the industry petitioners filed a petition asking the Fifth Circuit panel to rehear its grant of the motion to remand.

On August 14, 2008, EPA filed a motion to terminate the *Cronin* proceeding because it had discharged its obligations ("to take final action") under the decree with respect to the Phase II and III rulemakings. The plaintiffs in *Cronin* asserted that EPA had not discharged its obligations under the second amended decree because the Second Circuit remanded core provisions of the 316(b) rule for existing power plants to EPA, and EPA had suspended the Phase II rule. In the *Riverkeeper* proceeding, on February 7, 2007, EPA moved to dismiss arguing that the district court lacked jurisdiction to hear the challenge to the Phase III rule.

EPA entered into a settlement with the plaintiffs in both lawsuits. Under the settlement agreement, EPA agreed to sign a notice of a proposed rulemaking implementing section 316(b) of the CWA at existing facilities no later than March 14, 2011 and to sign a notice taking final action on the proposed rule no later than July 27, 2012. Plaintiffs agreed to seek dismissal of both their suits, subject to a request to reopen the *Cronin* proceeding in the event EPA failed to meet the agreed deadlines. The district courts have now entered orders of dismissal. On March 11, 2011, the parties agreed to an amendment to the settlement agreement to extend the date for proposal to March 28, 2011.

II. Proposed Amendments Related to the Phase I Rule

EPA is proposing several limited changes to the Phase I rule at 40 CFR subpart I. The changes fall into two categories. The first is deletion of the provision in the rule that would allow a facility to demonstrate compliance with the Phase I BTA requirements in whole or in part through restoration measures. The proposed change responds to the decision of the U.S. Court of Appeals for the Second Circuit which remanded these provisions to EPA because it concluded the statute did not authorize restoration measures to comply with section 316(b) requirements. The second category of changes reflects technical corrections or errors that do not change the substance of the current Phase I rule. EPA is not reopening any other aspects of the Phase I rule other than the provisions specifically noted here.

A. Restoration Provisions Not Authorized

As discussed above in Section I.C.2, the Phase I final rule established two compliance tracks. Track I requires facilities to restrict intake flow and velocity. Track II gives a facility the option of demonstrating to the Director that the control measures it employs will reduce the level of adverse environmental impact to a comparable level to what would be achieved by meeting the Track I requirements. As part of this demonstration, Track II allows a facility to make use of restoration measures. The Comprehensive Demonstration Study allowed a quantitative or qualitative demonstration that restoration measures would meet, in whole or in part, the performance levels of Track I. Similarly, the Verification Monitoring Plan could be tailored to verify that the restoration measures would maintain the fish and shellfish in the waterbody at a substantially similar level to that which would be achieved under Track I. *See* 65 FR 65280–65281.

As discussed in Section I.C.3, the Second Circuit concluded that EPA exceeded its authority by allowing new facilities to comply with section 316(b) through restoration measures, and remanded that aspect of the rule to EPA. The Supreme Court did not grant the petitions for writs of certiorari concerning restoration provisions. Thus in EPA's view the Agency is bound by the Second Circuit decision. Today's proposed rule proposes to amend Phase I to remove those provisions in § 125.84(d) and 125.89(b)(1)(ii) authorizing restoration measures. This proposed rule also specifically proposes deletion of application requirements contained in the Comprehensive Demonstration Study at § 125.86(c)(2)(ii); evaluation of proposed restoration measures at 125.86(c)(2)(iv)(C); and verification monitoring requirements at 125.86(c)(2)(iv)(D)(*2*)) that are specific to restoration. EPA acknowledges these changes may reduce the alternatives available to some Phase I facilities. However, EPA notes that the deletion of restoration measures does not otherwise alter the availability of Track II. In any event, EPA's determination of BTA for Phase I did not presume reliance on the restoration provisions, and the deletion of restoration measures in no way alters the Agency's BTA determination for Phase I facilities.

B. Corrections to Subpart I

Today's proposed rule proposes to change the applicability statement at 125.81(a)(3) to match the applicability of the technical requirements at 125.84 and application requirements at 125.86. The applicability in all three instances should specify design intake flow or withdrawals "greater" than the specified value of 2 MGD. See Basis for the Final Regulation at 66 FR 65270.

Today's proposed rule also proposes a correction to the source waterbody flow information submission requirements. Track I requirements at 125.84(b)(3) apply to new facilities that withdraw equal to or greater than 10 MGD. Track I requirements at 125.84(c)(2) apply to facilities that withdraw less than 10 MGD. The source waterbody flow information under 125.86(b)(3) requires a facility to demonstrate it has met the flow requirements of both 125.84(b)(3) "and" 125.84(c)(2). However, a facility cannot be subject to both 125.84(b)(3) and 125.84(c)(2) at the same time. Accordingly, the word "and" should read as "or" in 125.86(b)(3).

In addition, today's proposed rule proposes corrections to the application requirement for the Source Water Biological Characterization at 122.21(r)(4). Accordingly, references to the Source Water Biological Characterization should read as (r)(4). However, the references to the Source Water Biological Characterization at 125.86(b)(4)(iii), at 125.87(a), and at 125.87(a)(2) incorrectly refer to 122.21(r)(3) and are thus being corrected.

III. What New Information Has EPA Obtained or Developed in Support of This Proposed Rule?

In developing the Phase I, Phase II, and Phase III rules, EPA collected and analyzed a substantial amount of information regarding cooling water intake structures, their biological impacts, available technologies to reduce those impacts, and other relevant subjects. EPA considered a sizable volume of material submitted during previous public comment periods, as well as additional data from stakeholders, industry groups, technology vendors, and environmental organizations since those comment periods. Many of the materials are summarized or discussed in the preambles to these regulations or in the administrative record for these rules (see, *e.g.,* docket numbers W–00–03, OW–2002–0049, and EPA–OW–2004–0002). Today's proposal is based on data and information contained in the records supporting the Phase I, Phase II, and Phase III rulemakings, as well as new information. This section summarizes new data collected since the promulgation of the Phase III rule in June 2006; it will not review or summarize previous data collection efforts except to frame discussions about the new data. For information on EPA's historic data collection efforts, refer to the preambles and records for the three rules (see, *e.g.,* 65 FR 49070, 66 FR 28854, 68 FR 17131, 68 FR 13524, 69 FR 41593, 69 FR 68457, and 70 FR 71059).

A. Additional Data

EPA has supplemented the existing documents with additional information as summarized below.

1. Site Visits

As documented in the suspended 2004 Phase II rule, EPA conducted site visits to 22 power plants in developing the 2004 rule. See 67 FR 17134. Since 2007, EPA has conducted over 50 site visits to power plants and manufacturing sites. The purpose of these additional visits was to: Gather information on the intake technologies and cooling water systems in place at a wide variety of existing facilities; better understand how the site-specific characteristics of each facility affect the selection and performance of these systems; gather performance data for technologies and affected biological resources; and solicit perspectives from industry representatives. EPA used a number of criteria in selecting the sites to visit, including those sites representing a variety of geographical locations and different types of intakes, and sites that already had an impingement or entrainment technology in place for which the facility had collected performance data. EPA also asked trade associations to recommend sites facing unique circumstances that may affect the adoption of certain control technologies. EPA also collected information on 7 additional facilities that staff did not physically visit; usually, these were other facilities owned by the parent company of a site visited by EPA. EPA also held conference calls or met with representatives of other sites at EPA's Washington, DC location.

Copies of the site visit reports (which provide an overall facility description as well as detailed information such as electricity generation, the facility's cooling water intake structure and associated fish protection and/or flow reduction technologies, impingement and/or entrainment sampling and associated data, and a discussion of the possible application of cooling towers) for each site are provided in the docket for the proposed rule. In addition, in response to stakeholder inquiries, EPA made these site reports publicly available well before publication of the proposed rule. A list of the facilities visited by EPA is provided in the TDD.

2. Data Provided to EPA by Industrial, Trade, Consulting, Scientific or Environmental Organizations or by the General Public

EPA has continued to exchange information with various stakeholders in the development of today's proposal. EPA met several times with Electric Power Research Institute (EPRI), Edison Electric Institute, Nuclear Energy Institute, and Utility Water Act Group, along with other representatives from facilities and affected industries on topics including the latest advancements in fish protection technologies, permit experience, and the feasibility and cost of installing technologies at certain types of facilities.

In 2010, the North American Electric Reliability Corporation (NERC) issued a reliability study and found potentially substantial reliability effects under a 316(b) rule scenario that would require closed-cycle cooling of all large power plants. See *Potential Resource Adequacy Impacts of U.S. Environmental Regulations. October 2010.* The scenario assumes all existing steam units with a capacity utilization factor of less than 35% would close,[3] and assumes all in-scope electric generators would be required to install cooling towers within a 5-year window. While the report's focus was on energy reliability and reflects a regulatory scenario that is not directly comparable to any of the options explored for today's proposed rule, the report nevertheless serves as a useful upper bound estimate of (1) the potential for premature generating unit retirements to avoid the costs of retrofitting existing cooling water intake systems and (2) increased power needs as a result of a capacity derating (*i.e.,* the energy penalty[4]).

[3] IPM analyses do not predict all units with capacity utilization rates of less than 35% would close as a result of a closed-cycle cooling retrofit. Thus the total loss in capacity under EPA's Option 2 would be 14,418 MW or 1.3% of existing capacity.

[4] The report assumes the total energy penalty of 4 percent is a constant; EPA believes the energy penalty is reduced over time as units replace, repower, or make other modifications such as condenser replacement that would eliminate the turbine backpressure.

The Edison Electric Institute published a study of the combined impact of EPA's upcoming air, water (316(b)), and solid waste rulemakings on the coal fired fleet of power plants. See *Potential Impacts of Environmental Regulation on the U.S. Generation Fleet Final Report. January 2011.* As with the NERC study, conservative assumptions were made about EPA rules yet to be proposed or promulgated. The report summarizes reductions in capacity, but does not distinguish how much of that capacity was unused in the baseline scenario. Conservative costing assumptions such as 21 percent higher average costs,[5] and application of full retrofit costs to new capacity (instead of incremental costs for installing required technology at new construction) gives results that are not comparable to any of the options explored for today's proposed rule. While this study analyzed multiple scenarios, each scenario combines the effects of multiple rules so that the impact of the section 316(b) rule alone could not be determined. Even so, the report provides useful insight on the potential impact of multiple rulemakings if each EPA rule was promulgated at the level of stringency assumed in the study.

EPA met with Riverkeeper and other environmental groups to discuss the progress of the revisions to the rule, advances in fish protection technologies, state programs, environmental issues associated with cooling water withdrawals, and the feasibility of closed-cycle cooling. Through these interactions, EPA has received additional data and information including, but not limited to: Efficacy data, operating information, cost information, feasibility studies, environmental impacts, and non-water quality related impact information for various candidate BTA technologies.

3. Other Resources

EPA also collected information on cooling water intake structure-related topics from a variety of other sources, such as state and international policies. For example, the California Office of Administrative Law approved the "Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling" on September 27, 2010, which requires that all coastal power plants reduce their intake flow to a level commensurate with closed-cycle cooling. The Delaware state legislature passed a resolution that urges the Delaware Department of Natural

[5] EPRI's site-specific evaluation of 82 facilities provides an average capital cost of $275 per GPM, but the EEI report uses $319 per GPM.

Resources and Environmental Control (DNREC) to consider closed-cycle cooling as BTA and to require closed-cycle cooling at all facilities. The New York Department of Environmental Conservation (DEC) released a draft policy in March 2010 that would require flow reduction equivalent to closed-cycle cooling at all existing facilities that withdraw more than 20 MGD as part of the state's plan to restore the Hudson River. Additional examples of state programs are discussed further in the TDD.

In addition to state-wide cooling water policies, some recent individual NPDES permits have incorporated requirements for significant reductions in cooling water flow. For example, EPA Region I (which develops NPDES permits for several non-delegated New England states) issued a final NPDES permit in October 2003 that required Brayton Point in Somerset, Massachusetts to reduce cooling water intake flow and thermal discharges approximately 95 percent.[6] Brayton is currently constructing two natural draft cooling towers at the facility. New Jersey, as part of its policy for protecting marine life from the adverse impacts created by power plants, issued a draft permit for Oyster Creek that would require closed-cycle cooling, and is studying closed-cycle cooling for two units at Salem Generating Station. Other examples are documented in site visit reports found in the record for today's proposed action.

Electric generators are the subject of several rulemaking efforts that either are or will soon be underway. In addition to this rulemaking proposal, this includes regulation under section 110(a)(2)(D) of the Clean Air Act (CAA) addressing the interstate transport of emissions contributing to ozone and PM air quality problems, coal combustion wastes, hazardous air pollutants under CAA section 112, and criteria pollutant NSPS standards under CAA section 111. They will also soon be the subject of a rulemaking under CAA section 111 concerning emissions of greenhouse gases. EPA recognizes that it is important that each and all of these efforts achieve their intended environmental objectives in a common-sense manner that allows the industry to comply with its obligations under these rules as efficiently as possible and to do so by making coordinated investment decisions and, to the greatest extent possible, by adopting integrated compliance strategies. In addition, EO 13563 states that "[i]n developing regulatory actions and identifying appropriate approaches, each agency shall attempt to promote such coordination, simplification, and harmonization. Each agency shall also seek to identify, as appropriate, means to achieve regulatory goals that are designed to promote innovation." Thus, EPA recognizes that it needs to approach these rulemakings, to the extent that its legal obligations permit, in ways that allow the industry to make practical investment decisions that minimize costs in complying with all of the final rules, while still achieving the fundamentally important environmental and public health benefits that the rulemakings must achieve. The Agency expects to have ample latitude to set requirements and guidelines in ways that can support the states' and industry's efforts in pursuing practical, cost-effective and coordinated compliance strategies encompassing a broad suite of its pollution-control obligations.

[6] See *http://www.epa.gov/ne/braytonpoint/index.html.*

B. Implementation Experience

Following promulgation of the 2004 Phase II rule, states and EPA Regions began to implement the rule. During that time, EPA worked to assist states in understanding the rule requirements, develop guidance materials, and support review of the documentation of the new requirements. As a result, EPA became aware of certain elements of the 2004 rule that were particularly challenging or time-consuming to implement. In developing today's proposed rule, EPA has considered these challenges and crafted a revised regulatory framework that the Agency believes is easier for all stakeholders to understand and implement. Some of the key changes are described below.

1. Calculation Baseline

The 2004 Phase II rule required that facilities reduce impingement mortality and entrainment from the calculation baseline. The calculation baseline was intended to represent a "typical" Phase II facility and outlined a configuration for a typical CWIS. (See 69 FR 41590.) EPA defined the calculation baseline as follows:

> an estimate of impingement mortality and entrainment that would occur at your site assuming that: the cooling water system has been designed as a once-through system; the opening of the cooling water intake structure is located at, and the face of the standard 3/8 inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source waterbody; and the baseline practices, procedures, and structural configuration are those that [a] facility would maintain in the absence of any structural or operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes or reducing impingement mortality and entrainment.

Under this approach, a facility that had undertaken efforts to reduce impingement and entrainment impacts (*e.g.,* by installing a fine mesh screen or reducing intake flow) would be able to "take credit" for its past efforts and only be required to incrementally reduce impingement mortality or entrainment to meet the performance standards.

In practice, both permittees and regulatory agencies encountered difficulty with the calculation baseline, specifically how a facility should determine what the baseline represented and how a particular facility's site-specific configuration or operations compared to the calculation baseline. For facilities whose site configuration conforms to the calculation baseline, it was relatively easy to determine impingement mortality and entrainment at the conditions representing the calculation baseline. However, for facilities that have a different configuration, estimating a hypothetical calculation baseline could be difficult. For example, facilities with intake configuration that differed significantly from the calculation baseline (*e.g.,* a submerged offshore intake) were unsure as to how to translate their biological and technological data to represent the calculation baseline (a shoreline CWIS). Oftentimes facilities encountered difficulty in determining the appropriate location for monitoring to take place. Other facilities were unsure as to how to take credit for retired generating units and other flow reductions practices. In site visits, EPA learned that facilities with little or no historical biological data encountered a particularly difficult and time-intensive task of collecting appropriate data and developing the calculation baseline. For example, EPA found that for some sites impingement was very difficult to convert into a baseline, as facilities needed to predict which fish would be impinged and then further estimate which of those impinged organisms survived. As a result, EPA has developed a new approach to the technology-based requirements proposed today that does not use a calculation baseline.

2. Entrainment Exclusion Versus Entrainment Survival

As EPA worked towards revising the existing facility rules, EPA discovered a nuance to the performance based requirements of the 2004 Phase II rule: Entrainment exclusion versus entrainment survival. As discussed in section III.C below, EPA re-reviewed the data on the performance of intake technologies and conducted statistical analysis of the data. From this analysis, it became apparent that the 2004 Phase II rule did not fully consider the true performance of intake technologies in affecting "entrainable" organisms.

By definition, entrainment is the incorporation of aquatic organisms into the intake flow, which passes through the facility and is then discharged. In order to pass through the technologies located at the CWIS (*e.g.,* intake screens, nets, etc.), the organisms must be smaller than the smallest mesh size.[7] For coarse mesh screens (3/8″ mesh size), most "entrainables" simply pass through the mesh (and through the facility) with only some contact with the screen.[8] In this situation the mortality of organisms passing through the facility was assumed to be 100 percent. However, as mesh sizes are reduced,[9] more and more entrainables will actually become impinged on the screens (*i.e.,* "converted" from entrainable to impingeable) and would then be subjected to spray washes and returned along with larger impinged organisms as well as debris from the screens. Under the 2004 Phase II rule, these "converts" would be classified as a reduction in entrainment, since the entrainment performance standard simply required a reduction in the number (or mass) of entrained organisms entering the cooling system. However, for some facilities the low survival rate of converts resulted in the facility having difficulty complying with the impingement mortality limitations. By comparison, the performance standard for impingement was measured as impingement mortality. Organisms that were impinged (*i.e.,* excluded) from the CWIS were typically washed into a return system and sent back to the source water. In this case, impingement mortality is an appropriate measure of the biological performance of the technology.

Through EPA's review of control technologies, the Agency found that the survival of "converts" on fine mesh screens was very poor, and in some extreme cases comparable to the extremely low survival of entrained organisms that are allowed to pass entirely through the facility.[10] More specifically, EPA found that nearly 100 percent of eggs were entrained unless the mesh slot size was less than 2 mm, and mortality of eggs "converted" to impingement ranged from 20 to 30 percent. Further, the mortality of larvae collected from a fine mesh screen was usually greater than 80 percent. As a result, a facility with entrainment exclusion technologies such as fine mesh screens could approach 90 percent performance, but the subsequent survival of eggs and larvae combined ranged from 0 to 52 percent (mean value of 12 percent survival) depending on life stage and species, and the facility's impingement mortality rates increased. In other words, a facility that simply excluded entrainable organisms (with no attention being paid to whether they survive or not) could be deemed to have met its entrainment requirements under the 2004 Phase II rule, when in fact it may be causing the same level of mortality as a facility with no entrainment controls at all. EPA's current review of entrainment and entrainment mortality shows the same trends identified in the research reviews by EPRI (2003), namely that entrainment decreases with increasing larval length, increased sweeping flow, decreasing slot (intake) velocity, and decreasing slot width. In other words, by using screens with finer mesh, entrainment mortality can be converted to impingement mortality without necessarily protecting any more aquatic organisms.

3. Cost-Cost Test

In the 2004 Phase II rule, EPA developed facility-specific cost estimates, and published those costs in Appendix A (69 FR 41669). The 2004 Phase II rule also included a cost-cost test (see 69 FR 41644) where a facility could demonstrate that its costs to comply with the 2004 rule were significantly greater than those that EPA had considered. Since initial implementation of the July 9, 2004 316(b) Phase II rule, EPA has identified several concerns with the facility-specific costs listed in Appendix A and their use in the cost-cost test. First, EPA has identified numerous inconsistencies between facility permit applications, responses in the facility's 316(b) survey, and overall plant capacity as reported in the most recent EIA database. These inconsistencies resulted in Appendix A costs that were different from the facility's own compliance cost estimates due to inconsistencies in the underlying parameters used to estimate these costs. In addition, as described more fully in Chapter 2 of this proposal's Technical Development Document, EPA does not have available technical data for all existing facilities. EPA obtained the technical data for facilities through industry questionnaires. In order to decrease burden associated with these questionnaires, EPA requested detailed information from a sample, rather than a census, of facilities. EPA has thus concluded that the costs provided in Appendix A are not appropriate for use in a facility-level cost-cost test. Moreover, for most of the national requirements EPA is proposing here, a cost-cost variance is not necessary for the reasons described below. As a result, EPA is not providing a framework similar to Appendix A in today's proposed rule.[11] (See section III.C below and VII for more information about how EPA developed compliance costs.)

First, the impingement mortality requirements of today's proposed rule are economically achievable,[12] and the low variability in the costs of impingement mortality controls at a facility makes such a provision unnecessary. Second, a cost-cost variance is not necessary for entrainment mortality requirements because the costs of various requirements are a factor considered in each site-specific determination. Under the national rule, entrainment requirements would be established on a facility specific basis, except in the case of new units at an existing facility, which are subject to standards based on closed-cycle cooling or its equivalent. In the facility-specific process proposed today for entrainment mortality, a facility would be required to submit facility-specific compliance cost estimates. The determination of whether the cost of specific entrainment mortality technologies is too high is made by the Director on a case-by-case basis and accordingly a cost-cost provision is unnecessary for these facilities. However, consistent with the Phase I rule, EPA has included a

[7] In the case of many soft-bodied organisms such as eggs and larvae, the force of the intake flow can be sufficient to bend organisms that are actually larger than the screen mesh and pull them into the cooling system.

[8] Eggs are generally smaller than 2 millimeters in diameter, while larvae head capsids are much more variable in size, increasing as they mature to the juvenile stage.

[9] Fine mesh screens were considered to be one technology that could be used to meet the entrainment performance standards under the 2004 Phase II rule. EPA also reviewed performance data for screens with mesh sizes as small as 0.5 mm, as described in section III.C.

[10] Through-plant entrainment survival has been studied extensively, with EPRI's Review of Entrainment Survival Studies being amongst the most comprehensive. See DCN 2–017A–R7 from the Phase I docket.

[11] There is a form of "cost-cost variance" for new units at existing facilities, comparable to the provision in Phase I for new facilities. See further discussion below.

[12] The Phase II rule found impingement mortality (plus entrainment exclusion on certain waterbodies) was economically achievable; EPA has not identified any reason for revising this conclusion. See 69 FR 41603.

provision for new units at existing facilities that the Director may establish less stringent alternative requirements for a facility if compliance with the Phase I standards would result in compliance costs wholly out of proportion to those EPA considered in establishing the Phase I requirements or would result in significant adverse impacts on local air quality, water resources other than impingement or entrainment, or local energy markets.

C. New or Revised Analyses

In addition to collecting new information, EPA has re-evaluated some existing data and analyses that underlay its earlier decisions. The standards of the 2004 Phase II regulation required impingement mortality reduction for all life stages of fish and shellfish of 80 to 95 percent from the calculation baseline (for all Phase II facilities) and entrainment reduction requirements of 60 to 90 percent (for certain Phase II facilities). EPA based these performance requirements on a suite of technologies and compliance alternatives. For today's proposal, EPA has reanalyzed various candidate technologies as the basis for EPA's BTA decision. This reanalysis includes, but is not limited to, a reanalysis of candidate BTA technologies, their effectiveness, their costs, and their application. This section highlights some of the results from this reanalysis. See Section VI for a thorough discussion of EPA's updated BTA analysis and determination. Based on this reanalysis, EPA has reached several conclusions. The first is that closed-cycle cooling reduces impingement and entrainment mortality to the greatest extent. The second is that screen technologies are significantly less effective, particularly in comparison with closed-cycle cooling, in reducing entrainment mortality than EPA had concluded in 2004. Finally, EPA determined that while none of the reviewed technologies cause unacceptable energy reliability concerns, particulate emission increases, or adverse economic impacts at the national level, the performance and availability of some technologies varies widely depending on local factors, and these issues could be a significant concern at individual sites.

1. Revised Performance Database

In its Section 316(b) rule development efforts to date, EPA has gathered industry documents and research publications with information from studies which evaluated the performance of a range of technologies for minimizing impingement or entrainment. As explained in 68 FR 13538–13539, EPA previously developed a Technology Efficacy Database in an effort to document and assess the performance of various technologies and operational measures designed to minimize the impacts of cooling water withdrawals (*see* DCN 6–5000 in the docket for the 2004 Phase II rule). In support of today's proposal, EPA has updated that performance database. In updating the database, EPA's objective was to review the methods used to generate data in these studies and to combine relevant data across studies in order to produce statistical estimates of the overall performance of each of the technologies.

In developing the updated database, EPA considered data from over 150 documents. This includes documents previously contained in all three phases of EPA's 316(b) rulemaking records as well as new documents obtained during development of today's proposal. These documents contain information on the operation and/or performance of various forms and applications of these technologies, typically at a specific facility or in a controlled setting such as a research laboratory. The studies presented in these documents were performed by owners of facilities with cooling water intake structures, organizations that represent utilities and the electric power industry, and other research organizations. EPA established two general criteria for using data from the documents: (1) The data must be associated with technologies for minimizing impingement mortality or entrainment[13] that are currently viable (as recognized by EPA) for use by industries with cooling water intake structures that are (or will be) subject to Section 316(b) regulation; and (2) the data must represent a quantitative measure (*e.g.,* counts, densities, or percentages) that is related to the impingement mortality or entrainment of some life form of aquatic organisms within cooling water intake structures under the given technology.

For studies meeting the above criteria, EPA populated a new database. This performance study database consisted of two primary data tables. The first table contains specific information on a particular study, such as the document and study IDs, facility name, water body, data classification (*e.g.,* impingement mortality, entrainment), technology category, and other test conditions when specified (*e.g.,* mesh size, intake velocity, flow rate, water temperature, conditions when the technology is in place, control conditions). The second table contains the reported performance data for a given study. Each row of this table contains one or more performance measures for a particular species along with other factors when they were specified (*e.g.,* age category, dates or seasons of data collection, water temperature, velocity, elapsed time to mortality). For one option considered for today's proposed rule, EPA used this database in an attempt to revise the impingement mortality and entrainment limits developed for the Phase II rule. However, as described in section VI, the performance data for screens and other intake technologies indicates that those technologies were not very effective at minimizing entrainment mortality in comparison to closed-cycle cooling. As a result, EPA has not included this option in today's proposed rule package.

2. Impingement Mortality and Entrainment Technology Performance Estimates

To evaluate the effectiveness of different control technologies and the extent to which the various regulatory options considered for today's proposal minimize adverse environmental impacts associated with cooling water intake structures, EPA used the data collected in the revised performance database to develop impingement mortality and entrainment reduction estimates associated with each technology. For some technologies, this proposal reflects updated information or a different methodology for estimating effectiveness. For impingement mortality, EPA focused on 14 studies of 31 species for traveling screens with post-Fletcher modifications and with a 48 hour[14] or less holding time, and found the monthly impingement mortality corresponding to the 95th percentile was 31 percent mortality. EPA's full analysis of impingement mortality limitations may be found in Chapter XI of the TDD. EPA found the best performance of entrainment exclusion for fine mesh screens was 73 to 82 percent for eggs and 46 to 52 percent for larvae at 0.5 mm slot sizes. The best performance of fine mesh screens for entrainment survival (and not just exclusion) was 29 to 34 percent, with zero survival of eggs and larvae under certain conditions. The next section further discusses the distinction

[13] There were insufficient numbers of studies specifically looking at entrainment mortality or entrainment survival, therefore EPA broadened the review to include any measure of entrainment.

[14] Holding times beyond 48 hours often result in mortality due to holding conditions rather than mortality due to impingement.

between entrainment exclusion and entrainment survival.

3. Exclusion Technologies

As discussed in section III.B above, screens and other technologies operate using a principle of excluding organisms from entering the cooling system. For technologies other than cooling towers, EPA generally calculated their efficacy as the mean percent efficacy of the available data. Because EPA has sufficient data to evaluate impingement mortality, its impingement mortality technology efficacy calculation accounts for mortality. However, because EPA has data on entrainment exclusion but lacks sufficient entrainment mortality data to calculate exclusion technology entrainment mortality efficacy, EPA's calculated mean entrainment percent efficacy does not account for mortality. Available data on today's proposed technology basis demonstrate that entrainment reductions associated with fine mesh technologies vary depending on life stage and mesh size. See Section VIII and the TDD for additional information on EPA's estimate of entrainment reductions for today's proposal.

In reality, excluding an organism from the cooling water intake does not minimize entrainment-related adverse environmental impacts unless the excluded organisms survive and ultimately return back to the waterbody. In the 2004 Phase II rule, EPA made the assumption that any entrainable organism which was entrained died (*i.e.,* 100 percent mortality for organisms passing through the facility) and any organism not entrained survived. In other words, if a technology reduced entrainment by 60 percent, then EPA estimated 40 percent of the organisms present in the intake water would die in comparison to 100 percent in the absence of any entrainment reduction. As explained in Section VI, while it has been conjectured that certain species of eggs have been shown to survive entrainment under certain conditions, EPA has not received any new data for either the most common species or the most frequently identified species of concern described in available studies and, as such, has not altered its decision that for purposes of national rulemaking, entrainment should be presumed to lead to 100 percent mortality. Today's proposed rule would allow facilities to demonstrate, on a site-specific basis, that entrainment mortality of one or more species of concern is not 100 percent.

For today's proposal, EPA analyzed the limited data on the survivability of organisms that are "converted" from entrained to impinged on fine mesh screens. These data show that under most operational conditions, many larvae die as a result of the impact and impingement on fine mesh screens. In the case of eggs, the data indicate that some species may die, but some do survive. The data also demonstrate that if the organisms can withstand the initial impingement on the fine mesh screen, the majority of entrainable organisms survive after passing through a fish return and returning to the source water. Finally, the data indicate that survival increases as the body length and age of the larvae increases.[15] EPA seeks additional data on the survivability (or mortality) of organisms that are converted from entrained to impinged on fine mesh screens.

4. Application of Requirements Based on Capacity Utilization Rate (CUR) and Waterbody Type

In the 2004 Phase II rule, the type of performance standard applicable to a particular facility (*i.e.,* reductions in impingement mortality only or impingement mortality and entrainment) depended on several factors, including the facility's location (*i.e.,* source waterbody), capacity utilization rate (CUR) (as an indicator of the rate of use), and the proportion of the source waterbody withdrawn. EPA's reanalysis of impingement and entrainment data does not support the premise that the difference in the density of organisms between marine and fresh waters justifies different standards. More specifically, the average density of organisms in fresh waters may be less than that found in marine waters, but the actual density of aquatic organisms in some specific fresh water systems exceeds that found in some marine waters. In other words, there is considerable overlap in the range of densities found in marine waters and in fresh waters. EPA also believes the different reproduction strategies of freshwater versus marine species makes broad characterizations regarding the density less valid a rationale for establishing different standards for minimizing adverse environmental impact.

In re-considering the applicability of requirements based on CUR, EPA found that even infrequently used facilities may still withdraw significant volumes of water when not generating electricity. EPA also found that load-following and peaking plants operate at or near 100 percent capacity (and therefore 100 percent design intake flow) when they are operating, and these operations occur frequently during peak summer electricity demand, coinciding with some of the most biologically sensitive portions of the year.[16] Accordingly, today's proposed requirements are not based on waterbody type or CUR. See further discussion in Section VI.

IV. Revised Industry Description

Today's proposed rule applies to all existing electric generating and manufacturing facilities, except for certain water going vessels as described in section V. EPA has earlier fully described the electricity industry in the 2002 Phase II proposed rule (*see,* for example, 67 FR 17135) and the manufacturing industries in the 2004 Phase III proposed rule (*see,* for example, 69 FR 68459).[17] While these general descriptions continue to broadly reflect the current state of these industries, EPA has revised some of its estimates of numbers of facilities, intakes, flows, and other pertinent information. In particular, this section describes those facilities with a cooling water intake structure having a DIF of greater than 2 MGD, related cooling water use in power production and manufacturing activities, and an overview of the industry sectors in scope for today's proposed rule. See the TDD and EA for today's proposed rule for more detailed information including industry profiles.

A. Water Use in Power Production and Manufacturing

Water is used for a wide variety of application in the United States. The U.S. Geologic Survey (USGS) publishes a comprehensive review of water use across industry sectors every 5 years. The 2005 report indicated that 410 billion gallons per day (BGD) of water are withdrawn for various uses. (See

[15] EPA found this is a very important distinction when reviewing technology efficacy, as some studies do not include the smaller, more fragile, and often non-motile stages of larvae. Older stages of larvae have started to develop avoidance responses, and generally have already started developing scales and skeletal structures.

[16] Some facilities continue to withdraw cooling water even when not generating for a variety of reasons: to discourage biofouling or mechanical seizures, to promote continued water flow, or to maintain a state of readiness. Peaking facilities (those with a CUR of less than 15percent, as defined in the 2004 Phase II rule) may withdraw relatively small volumes on an annual basis, but if they operate during biologically important periods such as spawning seasons or migrations, then they may have nearly the same adverse impact as a facility that operates year round.

[17] EPA also addressed both electric generators and manufacturers in the 2000 Phase I proposed rule (see, for example, 65 FR 49070). The support documents for all three rule phases also provide information characterizing the affected industry sectors.

DCN 10–6872.) Of that amount, approximately 201 BGD is withdrawn by electric generators, primarily for non-contact cooling,[18] plus water withdrawals by other industrial sites of 18.2 BGD for a total of 219 BGD. This total flow represents the universe of flow potentially subject to regulation under 316(b), therefore today's proposed rule may address over half of the water withdrawals in the entire nation.[19]

Industrial water use (broadly defined as water used by power plants and manufacturers) falls generally into one of four categories: non-contact cooling water, contact cooling water, process water, and other water uses. A more detailed description of each category and how it relates to 316(b) is provided below.

1. Non-Contact Cooling Water

Power plants and manufacturers frequently generate large amounts of heat in their industrial processes. Non-contact cooling systems are one of the most common techniques used to dissipate this heat. In a non-contact cooling system, water is pumped through a heat exchanger or other equipment where it comes into indirect contact with heated materials in the industrial process. The water absorbs heat and is subsequently discharged (in a once-through cooling system) or recirculated (in a closed-cycle system). In these systems, the cooling water does not come into contact with any industrial materials, equipment or processes; the cooling water is contained within the cooling system for heat absorption and generally requires very little treatment (except heat removal) before discharge.

At power generators, non-contact cooling is by far the largest water use. Approximately three quarters of the total annual electricity output in the United States results from steam powered turbines. Power plants heat water inside a boiler. The water is turned to steam, at which point the temperature of the steam can be increased with further heating, allowing additional energy to be stored in the steam. The steam is then used to spin a turbine, producing electricity. The steam must then be condensed and returned to the boiler.[20] Non-contact cooling water is used to extract heat and return the steam to water in a condenser. The water can then be pumped back to the boiler for heating to repeat the cycle. Consistent with engineering theory, there are limits to the maximum efficiency of a thermal plant. Thermal power plants are actually not very efficient at converting fuel to electricity; only 30 to 60 percent of the fuel is captured as electricity, with the higher efficiency units relying on further use of the steam for further heating (usually referred to as cogeneration) or energy purposes (such as combined cycle power generators or other process warming). Depending on the type of generating unit, roughly one-third to two-thirds of the total energy generated is lost in the form of heat that must be subsequently dissipated.

At manufacturers, non-contact cooling is also a significant component of water use. Some manufacturers have electric generating units which generally operate in the same manner as summarized above. In some cases, virtually all of the manufacturing facility's cooling water withdraws are for power production. In contrast to power generators, some manufacturing facilities also need a reliable source of high pressure steam for manufacturing processes. Other manufacturers may need to condense steam generated from other processes, or may need to extract heat from a raw or processed material (*e.g.,* to reduce the temperature of an intermediate petroleum or chemical product before it enters a subsequent processing stream). Some facilities engage in testing or research, and have cooling needs for these activities.

2. Contact Cooling Water

Contact cooling water differs from non-contact cooling in that contact cooling systems use cooling water in direct contact with the hot equipment or heated materials. As a result, contact cooling water may intermingle with industrial products or equipment and often will take up pollutants other than heat, such as oil and grease or metals. Contact cooling water often requires treatment for these pollutants before it may be discharged.

In power plants, cooling water may be used for contact cooling of pumping equipment, such as the cooling water pump bearings. Contact cooling water is more frequently needed by manufacturing processes, such as quench water (*e.g.,* water into which bars of hot metal are dipped for rapid cooling or control of the formed metal temperature), mechanical pulping, forming and molding processes, food and agricultural products, and petrochemical gas quenching.

3. Process Water

Process water is water that is used directly in an industrial process. While steam electric plants do have some process water, process water is more typically associated with manufacturers, as the primary industrial process at power plants (electricity generation) is usually cooled with non-contact cooling water. Examples of process water include water used to break down wood pulp in a paper mill, water that is used in creating consumer products such as beverages or personal care products, water added to facilitate transportation of materials within a manufacturing process, water needed as a raw material, and water used in numerous chemical separations processes. Process water may be used as an ingredient in the intermediate products, consumed by the products, lost to evaporation, extracted later in the process line for treatment and discharge, or further reused.

EPA has found through site visits, extensive experience with manufacturing water use in the development of previous effluent guidelines, and a general review of water uses by manufacturing processes that a significant amount of reduction, reuse, and recycling has already occurred in most manufacturing processes, in part due to pretreatment standards and NPDES permit conditions. Beyond these reductions, today's proposed rule recognizes that many industrial facilities have worked to reduce the volume of process water usage at their sites and to increase the reuse of process water for other purposes within the facility. A leading facility or an entire industry may have evolved to use less process water in its industrial process. For example, EPA has found some facilities have undergone plant wide energy audits to reduce their energy needs by up to 25 percent, providing a roughly 25 percent reduction in cooling water needs. One analysis of paper mills estimates that over 39 billion gallons daily of water is recycled and not used solely for cooling purposes by a typical mill. Further, there has been a 69 percent reduction in

[18] Irrigation was the next highest user of water at 31% of the total withdrawn.

[19] In the Phase I rule, EPA also presented data indicating that the combined 316(b) rules for electric generators and the largest manufacturing sectors would address approximately 99% of all cooling water withdrawals in the U.S. See 65 FR 49071 and the Phase I Economic and Engineering Analyses of the Proposed § 316(b) New Facility Rule.

[20] The thermodynamic laws governing the Rankine cycle in power plants requires a heat source and a heat sink. The difference in temperature and pressure is a major factor in maintaining efficiency of the thermal engine. Additional reasons for condensing the steam include: handling pressure drops in the system, the need to remove non-condensable gases before they damage equipment, to allow make-up water to be added to the system, and to safely allow pumping of the water back to the boiler.

the average volume of treated effluent at pulp and paper mills (see DCN 10–6902). In response to effluent guidelines discharge limitations, some facilities have reduced their compliance costs by reducing the volume of wastewater they must treat. Some effluent limitation guidelines have also established explicit requirements for flow reduction. In the case of iron and steel facilities, effluent limitations require no discharge of process wastewater pollutants (for example, see 40 CFR part 420 subpart D Steelmaking). As another observed example of the recycling of process water, a facility might use non-contact cooling water for condensing steam, but then reuse the heated water for washing raw materials instead of discharging the water.

See section V for more information on how water reuse and conservation efforts are considered in compliance alternatives for today's proposed rule.

4. Other Uses

Given the diversity of industrial processes across the U.S., there are many other industrial uses of water not intended to be addressed by today's proposed rule. Emergency water withdrawals, such as fire control systems and nuclear safety systems, are not considered as part of a facility's design intake flow. Warming water at liquefied natural gas terminals, and hydro-electric plant withdrawals for electricity generation are not cooling water uses and are not addressed by today's proposal. Other water uses might include service water and dilution water. Service water is a generic term that often refers to uses other than non-contact cooling (*i.e.,* it may include contact cooling), but can also include specialty water uses such as makeup water for radiation waste systems at nuclear power plants. Examples of dilution water are using water to reduce the concentration of a pollutant for biological treatment purposes, or to reduce the temperature of an effluent.

B. Overview of Electric Generators

In the Phase I proposal, EPA described its rationale for setting the threshold for section 316(b) national requirements at 2 MGD. As described in that proposed rule, EPA selected 2 MGD to ensure that almost all cooling water withdrawn from waters of the U.S. is covered by a national regulation. The Agency recognized that there was relatively little information currently available regarding the lower bound of withdrawals at which significant levels of impingement and entrainment and, therefore, adverse environmental impact, was likely to occur. At the time, most case studies available to the agency documenting impingement and entrainment from cooling water withdrawals focused on facilities withdrawing very large amounts of water (in most cases greater than 100 MGD). After soliciting comment and data on several different thresholds, the Agency adopted 2 MGD in the final rule. 66 FR 65288.

While the overview of the electric generating facilities in the previous Phase II and III proposed and final rules has not changed substantially, this section combines those multiple industry profiles into one overview. The information below is generally based on data from the U.S. Department of Energy's (DOE) "Annual Electric Generator Report" (Form EIA–860) and "Annual Electric Power Industry Report" (Form EIA–861), and EPA's Section 316(b) Industry Surveys. According to the 2007 EIA database, 38 of the 671 facilities have ceased operation since the Survey and 15 facilities will likely do so by the time today's proposed rule is promulgated (*i.e.,* 2012). EPA also excluded 20 electric generators that are already required by state policy to comply with standards based on closed-cycle cooling, and thus for regulatory analysis purposes are not expected to be affected by the proposed rule. In addition, 39 facilities are projected to be baseline closures according to Integrated Planning Model analyses (see Section VII of this preamble and Chapter 6 of the EA for discussion of IPM analysis).[21] Based on (1) data collected from these Surveys; (2) the compliance requirements in today's proposed rule, and (3) the in-scope threshold of 2 MGD DIF (see section V for further explanation of the 2 MGD threshold), EPA has therefore identified 559 Electric Generators that are in scope of today's 316(b) Existing Facilities Proposed Rule.[22] [23]

EPA estimates that the 559 steam electric generators represent 3 percent of all parent-entities, approximately 11 percent of all facilities, and over 45 percent of the electric power sector capacity. Based on the 2007 EIA database, EPA estimates that 388 of these in-scope facilities are owned by utilities and 171 in-scope facilities are owned by non-utilities.[24] The majority of electric generating facilities expected to be subject to today's proposed Existing Facilities rule, or 285 facilities, are investor-owned utilities, while nonutilities make up the second largest category. For a detailed discussion of parent-entities, see Chapter 5 and 7 of the EA (DCN 10–0002).

As reported in Exhibit IV–1, approximately half of the in-scope electric generators draw water from a freshwater river (306 facilities or 55 percent), followed by lakes or reservoirs (117 facilities or 21 percent) and estuaries or tidal rivers (83 facilities or 15 percent). The exhibit also shows that most of the in-scope facilities (355 facilities or 63 percent) employ a once-through cooling system.

EXHIBIT IV–1—NUMBER OF IN-SCOPE ELECTRIC GENERATORS BY WATERBODY AND COOLING-SYSTEM TYPE [a]

Waterbody type	Recirculating Number	Once-through Number	Combination Number	Other Number	Total [b] Number
Estuary/Tidal River	5	69	8	1	83
Ocean	0	9	0	0	9
Lake/Reservoir	36	73	7	1	117
Freshwater Stream/River	102	166	32	5	306

[21] For the purpose of this analysis, a facility is considered no longer in operation and retired if it no longer has any steam operations.

[22] EPA developed the estimates of the number and characteristics of facilities expected to be within the scope of today's proposed rule, based on the facility sample weights that were developed for the suspended 2004 Phase II Final Regulation analysis. These weights provide comprehensive estimates for the total of expected in-scope facilities based on the full set of facilities sampled in the Section 316(b) Industry Surveys. See Appendix 3.A: Weighting Concepts of the Economic and Benefits Analysis report for further discussion of the sample weights used in this analysis.

[23] EPA estimates of the characteristics of facilities expected to be within the scope of today's proposed rule are also based on the facility sample weights that were developed for the suspended 2004 Phase II Final Regulation analysis.

[24] Electric utilities engage in the generation, transmission, and the distribution of electricity for sale generally in a regulated market. Utilities include investor-owned, publicly-owned, and cooperative entities.

EXHIBIT IV–1—NUMBER OF IN-SCOPE ELECTRIC GENERATORS BY WATERBODY AND COOLING-SYSTEM TYPE [a]—Continued

Waterbody type	Recirculating Number	Once-through Number	Combination Number	Other Number	Total [b] Number
Great Lake	4	37	2	0	43
Total	148	355	49	7	559

[a] The numbers of facilities are calculated on a sample-weighted basis.
[b] Individual values may not sum to totals due to independent rounding.

C. Overview of Manufacturers

EPA obtained information on in-scope Manufacturers presented in the tables below from the EPA's Section 316(b) Industry Surveys (the Industry Screener Questionnaire (SQ) and the Industry Detailed Questionnaire (DQ)). Based on the Survey data and the compliance requirements in today's proposed rule, EPA estimates 592 industry facilities with greater than 2 MGD DIF would be subject to today's proposal; 575 of these facilities are in the 6 primary manufacturing industries.[25]

Exhibit IV–2 below presents in-scope and industry-wide facility and parent entity counts by industry. The largest share of manufacturers, or 225 facilities, is in the Pulp and Paper industry, while facilities in the Chemicals and Allied Products make up the second largest category at 179 facilities.

EXHIBIT IV–2—EXISTING MANUFACTURERS BY INDUSTRY

Sector	Number of facilities	
	Sector total	Number in-scope [b c]
Aluminum	333	26
Chemicals	4,433	179
Food	28,938	37
Paper	597	225
Petroleum	352	39
Steel	1,525	68
Total	36,178	[a] 575

[a] In-scope facility counts include baseline closures and exclude an estimated additional 17 facilities with NAICS codes that do not fall into any of these six primary manufacturing industries.
[b] Number of in-scope facilities are weighted estimates; see Appendix 3.A of the EA for information on weights development. Individual values may not sum to totals due to independent rounding of sample-weighted (non integer) estimates.
[c] These facility count estimates are based on sample weights that are applicable for estimating the number of facilities that would be within the scope of today's proposed rule. However, because of missing financial data on certain facilities, these weights were not used in assessing the economic impact of the rule. Alternative weights, which yield modestly different total in-scope facility estimates (*e.g.,* 569 in-scope facilities in the Primary Manufacturing Industries instead of the 575 reported in this table), were used for developing facility count estimates in the economic impact analysis.

Exhibit IV–3 provides the distribution of manufacturing intakes by source water body and cooling system type. In total, EPA estimates that 593 intakes will be within the scope of today's rule. The vast majority (453 facilities or 77 percent) withdraw cooling water from freshwater streams or rivers, followed by Great Lakes (47 facilities). Two hundred eighty-seven (48 percent) manufacturers employ once-through cooling systems, 119 (20 percent) use closed-cycle cooling systems, and 124 (21 percent) use "combination" systems. An estimated 192 (32 percent) manufacturers have installed one or more cooling towers. In the total of 593 facility/intake combinations, EPA does not have information on the cooling water system type for 4 facilities/intakes. Note that not all manufacturers that have installed a cooling tower are classified as using closed-cycle cooling systems, as facilities with multiple cooling water systems may be "combination" systems that employ both closed-cycle and once-through cooling. Manufacturers may also list "helper" cooling towers in their survey responses, which are generally used to mitigate discharge temperatures and do not necessarily affect intake flows.

EXHIBIT IV–3—NUMBER OF IN-SCOPE MANUFACTURERS BY WATERBODY AND COOLING-SYSTEM TYPE

Waterbody type	Recirculating [b] Number	Once-through Number	Combination Number	Other Number	Type unknown Number	Total [a] Number
Estuary/Tidal River	1	23	16	0	0	40
Ocean	0	11	0	0	0	11
Lake/Reservoir	7	13	12	11	0	42
Freshwater Stream/River	111	215	82	41	4	453
Great Lake	0	25	14	7	0	47
Total	119	287	124	59	4	593

[a] Facility counts include baseline closures and exclude 17 facilities with NAICS codes that do not fall into the six primary manufacturing industries (see Chapter 3 of EA for more detail). Individual facilities may be reported more than once in this table if they have multiple intakes while a single intake that serves both recirculating and once-through systems is counted once as a combination. Individual values may not sum to totals due to independent rounding of sample-weighted (non integer) estimates.
[b] Four facilities have an unknown CWS type.

[25] The remaining 17 facilities have NAICS codes that do not fall into any of these six primary manufacturing industries.

D. Other Existing Facilities

EPA's data collection efforts largely focused on five industrial sectors: Chemicals and allied products (SIC Major Group 28); primary metals industries (SIC Major Group 33); paper and allied products (SIC Major Group 26); petroleum and coal products (SIC Major Group 29); and food and kindred products (SIC Major Group 20).[26] The first four sectors use a significant portion of the cooling water withdrawn among all manufacturing industries and were more heavily targeted in EPA's industry questionnaire effort, but data were also collected from the following industries: Food processing; aircraft engines and engine parts; cutlery; sawmills and planing mills; finishers of broad woven fabrics of cotton; potash, soda and borate minerals; iron ores; and sugarcane and sugar beets. These data from other industries, while not a statistically derived sample, confirm that the primary industry sectors discussed above account for the vast majority of non-power plant cooling water use. The data collected for these other industries suggests that the intake structure design and construction at these industries were substantially similar to the industries for which EPA did collect data, and EPA did not receive any data during the Phase III proposed rule comment period that suggests otherwise. EPA's analysis of costs and impacts includes these additional existing facilities.

V. Scope and Applicability of the Proposed Section 316(b) Existing Facility Rule

The proposed rule includes all existing facilities with a design intake flow of more than 2 MGD. The proposed rule also clarifies the definition and requirements for new units at existing facilities. The applicable requirements are summarized in Exhibits V–1 and V–2.

EXHIBIT V–1—APPLICABILITY BY PHASE OF THE 316(b) RULES

Facility characteristic	Applicable rule
New power generating or manufacturing facility	Phase I rule.
New offshore oil and gas facility	Phase III rule.
New unit at an existing power generating or manufacturing facility	This proposed rule.
Existing power generating or manufacturing facility	This proposed rule.
Existing offshore oil and gas facility and seafood processing facilities	This proposed rule (Case-by-case, best professional judgment).

EXHIBIT V–2—APPLICABLE REQUIREMENTS OF TODAY'S PROPOSED RULE FOR EXISTING FACILITIES

Facility characteristic	Applicable requirements
Existing facility with a AIF >125 MGD	Impingement mortality requirements at 125.94(b) and Entrainment Characterization Study requirements at 125.94(c) (categorical rule).
Existing facility with a DIF >2 MGD but AIF not greater than 125 MGD	Impingement mortality requirements at 125.94(b) (categorical rule).
New unit with a DIF >2 MGD at an existing facility	Impingement and entrainment mortality requirements at 125.94(d) (categorical standard).
Other existing facility with a DIF of 2 MGD or smaller or that has an intake structure that withdraws less than 25 percent of the water for cooling purposes.	Case-by-case, best professional judgment.

Initially, EPA divided the 316(b) rulemaking into three phases in response to litigation and to make the best use of its resources (see Section I). However, as EPA's analysis progressed, it became clear that cooling water intake structures are operated similarly at most industrial facilities (*i.e.,* both power producing and manufacturing facilities). From a biological perspective, the effect of intake structures on impingement and entrainment does not differ depending on whether an intake structure is associated with a power plant or a manufacturer. Instead the impingement and entrainment impacts associated with intakes of the same type are generally comparable, and today's proposed rule addresses these impacts without discriminating which facilities are behind the intake structure. Thus, EPA is consolidating the universe of potentially regulated facilities from the 2004 Phase II rule with the existing facilities in the 2006 Phase III rule for purposes of today's proposed rule. This consolidation also provides a "one-stop shop" for information related to today's proposed rulemaking, as all existing facilities would be addressed in an equitable manner by the same set of technology-based requirements.

A. General Applicability

This rule would apply to owners and operators of existing facilities that meet all of the following criteria:

- The facility is a point source that uses or proposes to use cooling water from one or more cooling water intake structures, including a cooling water intake structure operated by an independent supplier not otherwise subject to 316(b) requirements that withdraws water from waters of the United States and provides cooling water to the facility by any sort of contract or other arrangement;
- The total design intake flow of the cooling water intake structure(s) is greater than 2 MGD; and
- The cooling water intake structure(s) withdraw(s) cooling water from waters of the United States and at least twenty-five (25) percent of the water withdrawn is used exclusively for cooling purposes measured on an average annual basis for each calendar year.

EPA is proposing to continue to adopt provisions to ensure that the rule does not discourage the reuse of cooling water for other uses such as process water. The definition of cooling water at 125.93 provides that cooling water used in a manufacturing process either before or after it is used for cooling is considered process water for the purposes of calculating the percentage of a facility's intake flow that is used for cooling purposes. Therefore, water used for both cooling and non-cooling purposes does not count towards the 25

[26] EPA also identified many other industry sectors that use cooling water; a more comprehensive list of industries that use cooling water and their NAICS and SIC Codes can be found in section A of the Supplementary Information.

percent threshold. EPA notes this definition is the same definition used for new facilities in the Phase I rule at 125.83. Examples of water withdrawn for non-cooling purposes includes water withdrawn for warming by liquefied natural gas facilities and water withdrawn for public water systems by desalinization facilities. Further, the proposed rule at 125.91(c) specifies that obtaining cooling water from a public water system or using treated effluent (such as wastewater treatment plant "gray" water) as cooling water does not constitute use of a cooling water intake structure for purposes of this rule.

Today's proposed rule focuses on those facilities that are significant users of cooling water; only those facilities that use more than 25% of the water withdrawn for cooling purposes are subject to the proposed rule. EPA previously considered a number of approaches for clarifying applicability of the rule (66 FR 28854 and 66 FR 65288). EPA adopted the 25% threshold in each of the Phase I, II, and III rules, and EPA has not received any new data or identified new approaches that would provide further clarity to the applicability of the rule. EPA is proposing to continue to adopt 25% as the threshold for the percent of flow used for cooling purposes to ensure that a large majority of cooling water withdrawn from waters of the U.S. is addressed by requirements for minimizing adverse environmental impact. Because power generating facilities typically use far more than 25 percent of the water they withdraw exclusively for cooling purposes, the 25 percent threshold will ensure that intake structures accounting for nearly all cooling water used by the power sector are addressed by today's proposed requirements. While manufacturing facilities often withdraw water for more than cooling purposes, the majority of the water is withdrawn from a single intake structure.[27] Once water passes through the intake, water can be apportioned to any desired use, including uses that are not related to cooling. However, as long as at least 25% of the water is used exclusively for cooling purposes, the intake will be subject to the requirements of today's rule. EPA estimates that approximately 68% of manufacturers and 93% of power-generating facilities that meet the other proposed thresholds for the rule use more than 25% of intake water for cooling and thus will be addressed by today's rule.

EPA decided to propose requiring the Director, exercising BPJ, to establish BTA impingement and entrainment mortality standards for an existing offshore oil and gas facility, a seafood processing vessel, or an offshore liquefied natural gas import terminal. Such a facility would be subject to permit conditions implementing CWA section 316(b) where the facility is a point source that uses a cooling water intake structure and has, or is required to have, an NPDES permit. At their discretion, permit writers may further determine that an intake structure that withdraws less than 25% of the intake flow for cooling purposes should be subject to section 316(b) requirements, and set appropriate requirements on a case-by-case basis, using best professional judgment. Today's proposed rule is not intended to constrain permit writers at the Federal, State, or Tribal level, from addressing such cooling water intake structures.

B. What is an "existing facility" for purposes of the Section 316(b) Phase II rule?

In today's proposed rule, EPA is defining the term "existing facility" to include any facility that commenced construction before January 18, 2002, as provided for in § 122.29(b)(4).[28] EPA is proposing to establish January 17, 2002 as the date for distinguishing existing facilities from new facilities because that is the effective date of the Phase I new facility rule. Thus, existing facilities include all facilities the construction of which commenced on or before this date. In addition, EPA is defining the term "existing facility" in this proposed rule to include modifications and additions to such facilities, the construction of which commences after January 17, 2002, that do not meet the definition of a new facility at § 125.83, which is the definition used to define the scope of the Phase I rule.[29]

The preamble to the final Phase I rule discusses this definition at 66 FR 65256; 65258–65259; 65285–65287, December 18, 2001. EPA's definition of an "existing facility" in today's proposed regulation is intended to ensure that all sources excluded from the definition of new facility in the Phase I rule are captured by the definition of existing facility in this proposed rule.

A point source would be subject to Phase I or today's proposed rule even if the cooling water intake structure it uses is not located at the facility.[30] In addition, modifications or additions to the cooling water intake structure (or even the total replacement of an existing cooling water intake structure with a new one) does not convert an otherwise unchanged existing facility into a new facility, regardless of the purpose of such changes (*e.g.,* to comply with today's proposed rule or to increase capacity). Rather, the determination as to whether a facility is new or existing focuses on whether it is a green field or stand-alone facility and whether there are changes to the cooling water intake to accommodate it.

C. What is "cooling water" and what is a "cooling water intake structure?"

EPA has not revised the definition of cooling water intake structure for today's proposed rule. A cooling water intake structure is defined as the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the United States. Under the definition in today's proposed rule, the cooling water intake structure extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps. Today's proposed rule proposes for existing facilities the same definition of a "cooling water intake structure" that applies to new facilities under Phase I. Today's proposal also adopts the new facility rule's definition of "cooling water" as water used for contact or noncontact cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content. The definition specifies that the intended use of cooling water is to absorb waste heat rejected from the processes used or auxiliary operations on the facility's premises. The definition also indicates that water used in a manufacturing process either before or after it is used for cooling is process water and would not be considered cooling water for purposes of determining whether 25 percent or more of the flow is cooling water. This clarification is necessary because cooling water intake structures typically bring water into a facility for numerous purposes, including industrial processes; use as circulating

[27] Facilities may also use groundwater wells or municipal water for various uses, but the volume of these withdrawals is usually much smaller than the volume withdrawn from surface waters.

[28] Construction is commenced if the owner or operator has undertaken certain installation and site preparation activities that are part of a continuous on-site construction program, and it includes entering into certain specified binding contractual obligations as one criterion (§ 122.29(b)(4)).

[29] The Phase I rule also listed examples of facilities that would be "new" facilities and facilities that would "not be considered a 'new facility' " in two numbered paragraphs.

[30] For example, a facility might purchase its cooling water from a nearby facility that owns and operates a cooling water intake structure.

water, service water, or evaporative cooling tower makeup water; dilution of effluent heat content; equipment cooling; and air conditioning. Note however, that all intake water (including cooling and process) is included in the determination as to whether the 2 MGD DIF threshold for covered intake structures is met.

D. Would my facility be covered only if it is a Point Source Discharger?

Today's proposed rule would apply only to facilities that are point sources (*i.e.,* have an NPDES permit or are required to obtain one). This is the same requirement EPA included in the Phase I new facility rule at § 125.81(a)(1). Requirements for complying with section 316(b) will continue to be applied through NPDES permits.

Based on the Agency's review of potential existing facilities that employ cooling water intake structures, the Agency anticipates that most existing facilities subject to this proposed rule will control the intake structure that supplies them with cooling water, and discharge some combination of their cooling water, wastewater, or storm water to a water of the United States through a point source regulated by an NPDES permit. Under these circumstances, the facility's NPDES permit will include the requirements for the cooling water intake structure. In the event that an existing facility's only NPDES permit is a general permit for storm water discharges, the Agency anticipates that the Director would write an individual NPDES permit containing requirements for the facility's cooling water intake structure. Alternatively, requirements applicable to cooling water intake structures could be incorporated into general permits. If requirements are placed into a general permit, they must meet the requirements set out at 40 CFR 122.28.

As EPA stated in the preamble to the final Phase I rule (66 FR 65256 (December 18, 2001)), the Agency encourages the Director to closely examine scenarios in which a facility withdraws significant amounts of cooling water from waters of the United States but is not required to obtain an NPDES permit. As appropriate, the Director will necessarily apply other legal requirements, where applicable, such as section 404 or 401 of the Clean Water Act, the Coastal Zone Management Act, the National Environmental Policy Act, the Endangered Species Act, or similar State or Tribal authorities to address adverse environmental impact caused by cooling water intake structures at those facilities.

E. Would my facility be covered if it withdraws water from waters of the U.S.? What if my facility obtains cooling water from an independent supplier?

The requirements in today's proposed rule apply to cooling water intake structures that have the design capacity to withdraw amounts of water equal to or greater than 2 MGD from "waters of the United States." Waters of the United States include the broad range of surface waters that meet the regulatory definition at 40 CFR 122.2, which includes lakes, ponds, reservoirs, nontidal rivers or streams, tidal rivers, estuaries, fjords, oceans, bays, and coves. These potential sources of cooling water may be adversely affected by impingement and entrainment.

Some facilities discharge heated water to manmade cooling ponds, and then withdraw water from the ponds for cooling purposes. EPA recognizes that cooling ponds may, in certain circumstances, constitute a closed-cycle cooling system and therefore may already comply with some or all of the technology-based requirements in today's proposed rule. However, facilities that withdraw cooling water from cooling ponds that are waters of the United States and that meet the other criteria for coverage (including the requirement that the facility has or will be required to obtain an NPDES permit) would be subject to today's proposed rule. In some cases water is withdrawn from a water of the United States to provide make-up water for a cooling pond. In many cases, EPA expects such make-up water withdrawals are commensurate with the flows of a closed-cycle cooling tower, and again the facility may already comply with requirements to reduce its intake flow under the proposed rule. In those cases where the withdrawals of make-up water come from a water of the United States, and the facility otherwise meets today's criteria for coverage (including a design intake flow of 2 million gallons per day), the facility would be subject to today's proposed rule requirements.

EPA does not intend this rule to change the regulatory status of cooling ponds. Cooling ponds are neither categorically included nor categorically excluded from the definition of "waters of the United States" at 40 CFR 122.2. The determination whether a particular cooling pond is, or is not, a water of the United States is to be made by the permitting authority on a case-by-case basis. The EPA and the U.S. Army Corps of Engineers have jointly issued jurisdictional guidance concerning the term "waters of the United States" in light of the Supreme Court's decision in *Solid Waste Agency of Northern Cook County* v. *U.S. Army Corps of Engineers,* 531 U.S. 159 (2001) (SWANCC). A copy of that guidance was published as an Appendix to an Advanced Notice of Proposed Rulemaking on the definition of the phrase "waters of the U.S.," see 68 FR 1991 (January 15, 2003), and may be obtained at (*http://www.epa.gov/owow/wetlands/pdf/ANPRM–FR.pdf*). The agencies additionally published guidance in 2008 regarding the term "waters of the United States" in light of both the *SWANCC* and subsequent *Rapanos* case (*Rapanos* v. *United States,* 547 U.S. 715 (2006)).

The Agency recognizes that some facilities that have or are required to have an NPDES permit might not own and operate the intake structure that supplies their facility with cooling water. In addressing facilities that have or are required to have an NPDES permit that do not directly control the intake structure that supplies their facility with cooling water, revised § 125.91 provides (similar to the new facility rule) that facilities that obtain cooling water from a public water system or use treated effluent are not deemed to be using a cooling water intake structure for purposes of this proposed rule. However, obtaining water from another entity that is withdrawing water from a water of the US would be counted as using a cooling water intake structure for purposes of determining whether an entity meets the threshold requirements of the rule. For example, facilities operated by separate entities might be located on the same, adjacent, or nearby property(ies); one of these facilities might take in cooling water and then transfer it to other facilities prior to discharge of the cooling water to a water of the United States. Section 125.91(b) specifies that use of a cooling water intake structure includes obtaining cooling water by any sort of contract or arrangement with one or more independent suppliers of cooling water if the supplier or suppliers withdraw water from waters of the United States but that is not itself a new or existing facility subject to section 316(b), except if it is a public water system.

As a practical matter, existing facilities are the largest users of cooling water, and typically require enough cooling water to warrant owning the cooling water intake structures. In some cases, such as at nuclear power plants or critical baseload facilities, the need for cooling water includes safety and reliability reasons that would likely preclude any independent supplier arrangements. Therefore, EPA does not expect much application of this provision. EPA is nevertheless retaining the provision in order to prevent facilities from circumventing the requirements of today's proposed rule by creating arrangements to receive cooling water from an entity that is not itself subject to today's proposed rule, and is not explicitly exempt from today's rule (such as drinking water or treatment plant discharges reused as cooling water).

F. What intake flow thresholds result in an existing facility being subject to this proposed rule?

There are two ways in which EPA determines the cooling water flow at a facility. The first way is based on the design intake flow (DIF), which reflects the maximum intake flow the facility is capable of withdrawing. While this normally is limited by the capacity of the cooling water intake pumps, other parts of the cooling water intake system could impose physical limitations on the maximum intake flow the facility is capable of withdrawing. The second way is based on the actual intake flow (AIF), which reflects the actual volume of water withdrawn by the facility. EPA has defined AIF to be the average water withdrawn each year over the preceding 3 years. Both of these definitions are used in today's proposed rule.

In this proposed rule EPA considered requirements based on the intake flow at the existing facility. EPA is proposing the rule to apply to facilities that have a total design intake capacity of at least 2 MGD (see § 125.91).[31] Above 2 MGD, 99.7% of the total water withdrawals by utilities and other industrial sources would potentially be covered (if the other criteria for coverage are met) while 58% of the manufacturers, 70% of the non-utilities, and 100% of the utilities would be covered. EPA also chose the greater than 2 MGD threshold to be consistent with the applicability criteria in the Phase I rule.[32] EPA continues to believe that this threshold ensures that the largest users of cooling water will be subject to the proposed rule.

EPA proposes to continue to use a threshold based on design intake flow as opposed to actual intake flow for several reasons. In contrast to actual intake flow, design intake flow is a fixed value based on the design of the facility's operating system and the capacity of the circulating and other water intake pumps. This provides clarity, as the design intake flow does not change, except in limited circumstances, such as when a facility undergoes major modifications. On the other hand, actual flows can vary significantly over sometimes short periods of time. For example, a peaking power plant may have an actual intake flow close to the design intake flow during times of full energy production, but an AIF of zero during periods of standby. Use of design intake flow provides clarity as to regulatory status, is indicative of the possible magnitude of environmental impact, and would avoid the need for monitoring to confirm a facility's status. Also see 69 FR 41611 for more information about these thresholds.

Under current NPDES permitting regulations at § 122.21, all existing facilities greater than 2 MGD DIF must submit basic information describing the facility, source water physical data, source water biological characterization data, and cooling water intake system data. Under this proposed rule, all facilities greater than 2 MGD DIF must submit additional facility-specific information including the proposed impingement mortality reduction plan, relevant biological survival studies, and operational status of each of the facility's units.[33] Certain facilities withdrawing the largest volumes of water for cooling purposes have additional information and study requirements such as the Entrainment Characterization Study as described below.

EPA is proposing to use actual intake flow (AIF) rather than design intake flow (DIF) for purposes of determining which facilities must conduct an Entrainment Characterization Study. Environmental impacts, particularly entrainment and entrainment mortality, result from actual water withdrawals, and not the maximum designed withdrawals. Further, using actual flow may encourage some facilities to reduce their flows in order to avoid collecting supplemental data and submitting the additional entrainment characterization study. Furthermore, any facility that has DIF greater than 2 MGD is required to submit basic information that will allow the permitting authority to verify its determination of whether or not it meets the 125 MGD AIF threshold.

EPA has selected a threshold of 125 MGD AIF because a threshold of 125 MGD would capture 90 percent of the actual flows but would only establish the Entrainment Characterization Study requirements for 30 percent of existing facilities. This would significantly reduce facility burden by more than two-thirds of the potentially in-scope facilities, and would focus permit authorities on the majority of cooling water withdrawals by addressing approximately 200 billion gallons of daily cooling water withdrawals.

In today's proposal, EPA seeks to clarify that for some facilities, the design intake flow is not necessarily the maximum flow associated with the intake pumps. For example, a power plant may have redundant circulating pumps, or may have pumps with a name plate rating that exceeds the maximum water throughput of the associated piping. EPA intends for the design intake flow to reflect the maximum volume of water that a plant can physically withdraw from a source waterbody over a specific time period. This also means that a plant that has permanently taken a pump out of service or has flow limited by piping or other physical limitations should be able to consider such constraints when reporting its DIF. EPA solicits comment on whether the definition of DIF should be revised to make this clarification more apparent.

G. Offshore Oil and Gas Facilities, Seafood Processing Vessels or LNG Import Terminals BTA Requirements Under This Proposed Rule

Under today's proposal, existing offshore oil and gas facilities, seafood processing facilities and LNG import terminals would be subject to 316(b) requirements on a best professional judgment basis. In the Phase III rule, EPA studied offshore oil and gas facilities and seafood processing facilities[34] and could not identify any technologies (beyond the protective screens already in use) that are technically feasible for reducing impingement or entrainment in such existing facilities.[35] As discussed in the Phase III rule, known technologies that could further reduce impingement or entrainment would result in unacceptable changes in the envelope of existing platforms, drilling rigs, mobile offshore drilling units (MODUs), seafood processing vessels (SPVs), and similar facilities as the technologies would project out from the hull, potentially decrease the seaworthiness, and potentially interfere with structural

[31] The 2004 Phase II rule applied to existing power-generating facilities with a design intake flow of 50 mgd or greater. Facilities potentially in scope of the Phase III rule had a DIF of greater than 2 MGD.

[32] See 65 FR 49067/3 for more information.

[33] The proposed rule contains streamlined information submission requirements for facilities that already employ closed cycle cooling.

[34] EPA studied naval vessels and cruise ships as part of its development of a general NPDES permit for discharges from ocean-going vessels. (See *http://cfpub.epa.gov/npdes/home.cfm?program_id=350* for more information.) EPA studied seafood processing vessels and oil and gas exploration facilities in the 316(b) Phase III rule.

[35] As discussed in today's preamble, requirements for new offshore facilities set forth in the Phase III rule remain in effect.

components of the hull. EPA also believes that for many of these facilities, the cooling water withdrawals are most substantial when the facilities are operating far out at sea—and therefore not withdrawing from a water of the U.S. The EPA is aware that LNG facilities may withdraw hundreds of MGD of seawater for warming (re-gasification). However, some existing LNG facilities may still withdraw water where 25 percent or more of the water is used for cooling purposes. As discussed in section V, EPA has not identified a uniformly applicable and available technology for minimizing impingement and entrainment (I&E) mortality at these facilities. However, technologies may be available for some existing LNG facilities. LNG facilities that withdraw any volume of water for cooling purposes would be subject to case-by-case, best professional judgment BTA determinations.

EPA has not identified any new data or approaches that would result in a different determination. Therefore, today's rule would continue to require that the BTA for existing offshore oil and gas extraction facilities and seafood processing facilities is established by NPDES permit directors on a case-by-case basis using best professional judgment. EPA solicits comment and data on the appropriateness of national categorical standards for these facilities.

H. What is a "new unit" and how are new units addressed under this proposed rule?

The Phase I rule did not distinguish between new stand-alone facilities and new units where the units are built on a site where a source is already located and does not totally replace the existing source. Because EPA is not changing the new facility rule definitions, and is only proposing clarifying revisions to the existing facility rule, this proposed provision is not intended to otherwise reopen the Phase I rule. Today's proposed rule establishes requirements for new units added to an existing facility that are not a "new facility" as defined at § 125.83. Today's proposal seeks to clarify the definitions of "new" versus "existing" by first noting that, for purposes of section 316(b), a facility cannot be defined as a new facility and an existing facility at the same time. In this rule, while EPA will continue to treat replacement and new units for the same industrial purpose as existing facilities, EPA intends to have different requirements for the addition of new units. A replacement unit or repowered unit, as distinct from constructing an additional unit, would not be treated as a new unit. The requirements for new units are modeled after the requirements for a new facility in the Phase I rule.

EPA has adopted this approach for the following reasons. As new units are built at existing facilities to provide additional capacity, facilities have the ideal opportunity to design and construct the new units without many of the additional expenses associated with retrofitting an existing unit to closed-cycle. The incremental downtime that can be associated with retrofitting to closed-cycle cooling is avoided altogether at a new unit. In addition, when new units are added, the condensers can be configured for closed-cycle, reducing energy requirements, and high efficiency cooling towers can be designed as part of the new unit, allowing for installation of smaller cooling towers. Thus, the capital costs for closed cycle cooling at new units are lower than the capital costs for once-through cooling. These advantages may not always be available when retrofitting cooling towers at an existing unit.

In consideration of the fact that additional unit construction decisions rest largely within the control of the individual facility, EPA decided that subjecting new units to the same national BTA requirements as those applicable to new facilities is warranted.

VI. BTA Consideration

In response to the Supreme Court's decision in *Entergy Corp. et al.* v. *EPA* in April 2009, and the Second Circuit decision in *Riverkeeper II,* EPA has reevaluated the requirements for existing facilities under section 316(b). As discussed in Section III, for the BTA determinations proposed below, EPA collected additional data and information and updated the technology efficacy and costs analyses prepared for the earlier rulemaking efforts. These data and analyses serve to update the rulemaking record and allow EPA to apply greater technical rigor to EPA's analysis of BTA. As a result, EPA has decided not to re-propose requirements similar to those of the final Phase II rule, but would adopt, for the reasons explained in this preamble, a new framework. In addition, as previously noted, EPA decided to address all existing facilities subject to 316(b) in one rule (*i.e.,* Phase II and Phase III).

A. EPA's Approach to BTA

Section 316(b) of the CWA requires EPA to establish standards for cooling water intake structures that reflect the "best technology available for minimizing adverse environmental impact." The statute is silent with respect to the factors that EPA should consider in determining BTA but courts have held that, given section 316(b)'s reference to sections 301 and 306 of the Act, EPA may look to the factors considered in those sections in establishing those standards for section 316(b) standard setting. The Supreme Court noted that, given the absence of any factors language in Section 316(b), EPA has more discretion in its standard setting under section 316(b) than under the effluent guidelines provisions. EPA has broad discretion in determining what is the "best" available technology for minimizing adverse environmental impact. EPA is not bound to evaluate the factors it considers in standard setting in precisely the same way it considers them in establishing effluent limitations guidelines under section 304 of the Clean Water Act. Thus, the U.S. Supreme Court has explained that, under section 316(b), "best" technology may reflect a consideration of a number of factors and that "best" does not necessarily mean the technology that achieves the greatest reduction in environmental harm that the regulated universe can afford. Rather, the "best" (or "most advantageous" technology in the court's words) may represent a technology that most efficiently produces the reductions in harm.

EPA has interpreted section 316(b) to require the Agency to establish a standard based on the best technology available that will minimize impingement and entrainment—the two main adverse effects of cooling water intake structures. In EPA's view, there are several important considerations underpinning its decision. First, its BTA determination should be consistent with,and reflective of, the goals of Section 101 of the CWA: "to restore and maintain the physical, chemical, and biological integrity of the Nation's waters," with an interim goal of protecting water quality so as to provide for the protection and propagation of fish, shellfish, and wildlife and provide for recreation in and on the water.

Second, because the Supreme Court has concluded that EPA may permissibly consider costs and benefits in its BTA determination and E.O. 13563 directs EPA only to propose regulations based on a reasoned determination that the benefits justify the costs, EPA has taken costs and benefits into account in this proposal. EPA has concluded that the benefits of the proposed option justify its costs. See section VI. E below.

Both *Riverkeeper* decisions recognize that EPA may consider a number of factors in establishing section 316(b) standards. In the Phase I *Riverkeeper* case, the court explained that the cross reference in section 316(b) to sections 301 and 306 is an "invitation" to look to those statutory provisions for guidance concerning the factors EPA should consider in determining BTA. In the Phase II decision, the court stated that the interpretation of section 316(b) should be "informed" by these other two provisions. EPA may consider the factors involved in establishing effluent discharge limitations when regulating intake structures. The factors specifically delineated in CWA sections 301 and 306 that EPA may consider include: cost of the technology, taking into account the age of the equipment and facilities, process employed, engineering aspects associated with a particular technology, process changes and non-water quality environmental impact (including energy requirements).

In selecting the "best" technology, EPA looked at a number of factors. Thus, EPA first considered the availability and feasibility of various technologies, their costs including potential costs to facilities as well as households, and economic impacts of different technologies. EPA reviewed the efficacy of these technologies in reducing impingement and entrainment mortality, including cost-effectiveness relationships. EPA also considered additional factors set out in 304(b) of the Clean Water Act, including location, age, size, and type of facility. EPA next considered the non-water quality effects of different technologies on energy production and availability, electricity reliability, and potential adverse environmental effects that may arise from the use of the different controls evaluated.

EPA has also considered the costs and the benefits of the different technologies it evaluated for BTA. Consideration of benefits in particular is complicated by the absence of well-developed tools or data to fully express the ecological benefits in monetized terms. EPA has, however, used the best currently available science to monetize the benefits of the various options in four major categories: Recreational fishing, commercial fishing, nonuse benefits, and benefits to threatened and endangered species (see Exhibit VIII–10). EPA believes that the benefits estimated for the first two categories are fairly complete, while the benefits estimated for the latter two categories are incomplete for a number of reasons. For example, the non-use benefits consider only the northeast and middle Atlantic states. EPA will continue to refine its tools in order to develop a more complete analysis concerning benefits during the rulemaking proceeding.

As a result of this thorough evaluation, EPA is proposing the use of modified traveling screens with a fish handling and return system or reduced intake velocity as BTA for impingement mortality. EPA's record shows modified traveling screens are available for all facilities, whereas reduced intake velocity may not be available at all locations. For entrainment, on the other hand, EPA could identify no single technology that represented BTA for all facilities for the reasons explained in detail below. Instead, as the national BTA entrainment requirement for existing facilities, EPA is proposing to adopt regulations that establish a process for the permitting authority to determine entrainment BTA controls on a site-specific basis following the consideration of several factors. In addition to the general considerations discussed above, EPA has identified the following specific factors as the key elements in its decision not to prescribe a single technology as the basis for a national BTA determination. These factors are local energy reliability, air emissions permits, land availability, and remaining useful plant life. The rest of this chapter describes each of these considerations in detail.

B. Technologies Considered to Minimize Impingement and Entrainment

As described in Section IV, power plants and manufacturers withdraw large volumes of cooling water on a daily basis. The majority of environmental impacts associated with intake structures are caused by water withdrawals that ultimately result in the loss of aquatic organisms. These losses may be due to impingement, entrainment, or both. Impingement occurs when organisms are trapped against the outer part of a screening device of an intake structure.[36] The force of the intake water traps the organisms against the screen and they are unable to escape. Not all organisms contained in the incoming water are impinged, however. Some may pass through the screening system and the intake structure and travel through the entire cooling system including the pumps, condenser tubes, and discharge pipes. This is referred to as entrainment. Various factors lead to the susceptibility of an organism to impingement or entrainment. For more detailed discussion of impingement and entrainment and their resulting impact, see 67 FR 17136–17140 and the EEBA.

[36] Typically, cooling water intake structures use various screening devices to prevent large objects (e.g., trash, logs) from being drawn in with the cooling water and ultimately clogging or damaging the cooling water system.

As described in Section III.D, reductions in impingement or entrainment do not necessarily mean reductions in mortality. For purposes of this proposal, EPA has developed the following definitions for impingement and entrainment and mortality:

- Impingement: The entrapment of all life stages of fish and shellfish on the outer part of an intake structure or against a screening device during periods of intake water withdrawal.
- Impingement Mortality: The death of fish or shellfish due to impingement (as defined above). Note impingement mortality need not occur immediately; impingement may cause harm to the organism, which results in mortality several hours after the impingement event. For purposes of this proposed rule, impingement mortality is limited to those organisms collected or retained by 3⁄8 inch sieve.
- Entrainment: The incorporation of all life stages of fish and shellfish with intake water flow entering and passing through a cooling water intake structure and into a cooling system.
- Entrainment Mortality: The death of fish or shellfish due to entrainment. This also includes the death of those fish and shellfish due to fine mesh screens or other technologies used to exclude the organisms from entrainment. For purposes of this proposed rule, entrainment mortality is limited to those organisms passing through a 3⁄8-inch sieve.

Based on available information, as described in section III.D, EPA is assuming for purposes of this rule that all entrained organisms are a loss, *i.e.*, no entrained organisms survive. Therefore, in the absence of entrainment control, entrainment is assumed to lead to entrainment mortality. Also see Chapter A7 of the Phase II Regional Studies Document (DCN 6–0003; EPA–HQ–OW–2002–0049–1490). Entrainable organisms generally consist of eggs and early life stage larvae. Early larvae generally do not have skeletal structures, have not yet developed scales, and in many cases are incapable of swimming for several days post hatching. However, for impingement, mortality occurs less than 100% of the time. Impingeable organisms are generally larger juvenile or adult fish, with fully formed scales and skeletal structures, and well developed survival traits such as avoidance responses. EPA's data demonstrate that, under the proper conditions, many impinged organisms survive.

In addition to these definitions it is helpful to further characterize impingement and entrainment as those terms are used in the literature and in studies conducted by power plants. Historically, traveling screens deployed by power plants utilized a 3⁄8-inch mesh size. For this reason, most studies and reports referring to impingement are in fact referring to those organisms impinged on a 3⁄8-inch mesh screen. Impingement can also refer to any organism incapable of swimming away from the intake structure due to the water velocity at the intake. Similarly, entrainable organisms are those organisms fitting through a mesh of less than or equal to 3⁄8 of an inch. This also means the majority of entrainable organisms are comprised of eggs, larvae, and juveniles. More recent studies, particularly those that evaluate mesh sizes smaller than 3⁄8 of an inch, continue to refer to impingement as any organism caught on the screen. This can cause some confusion, as many organisms that would have been entrained with a 3⁄8-inch mesh instead become impinged by the finer mesh. These are referred to as "impinged entrainables" or "converts." EPA has also found that most studies of entrainment are biased towards the larger (older) larvae with higher survival rates and do not analyze survival of smaller larvae. This corresponds to larvae body lengths sufficient to have begun scale and bone development, and generally reflects the more motile early life stages. EPA found these study findings cannot be applied to non-motile life stages, which are incapable of avoidance responses. As discussed in Section III.C, it is also important to note that the prevention of entrainment by some exclusion technologies may result in very high entrainment reductions, but these organisms do not necessarily survive interactions with the exclusion technology. Therefore, while entrainment refers specifically to passage through the cooling water intake system, entrainment mortality also includes those smaller organisms killed by exclusion from the cooling water intake system. Today's rule proposes to use the 3⁄8-inch mesh size as part of the definition of impingement and entrainment mortality as a means of clearly differentiating those organisms that may be susceptible to impingement or entrainment, and thereby avoiding any confusion over the status of "impinged entrainables" or "converts."

Generally, there are two basic approaches to reduce impingement and entrainment (I&E) mortality. The first approach is flow reduction, where the facility installs technology or operates in a manner to reduce or eliminate the quantity of water being withdrawn. Reduced volumes of cooling water produce a corresponding reduction in I&E, and therefore reduced I&E mortality. The second way to reduce I&E is to install technologies or operate in a manner that either (a) gently excludes organisms or (b) collects and returns organisms. Under the first approach, technologies or practices are used to divert those organisms that would have been subject to I&E. The second approach is to install collection and return technologies; organisms not diverted are collected and returned back to the source water.

Though not available to all facilities, a third approach to reducing impingement and entrainment is relocating the facility's intake to a less biologically rich area in a water body, usually further from shore and/or at greater depths, or varying the timing of withdrawals by time of day, season, etc., to target withdrawals to times when organism densities are lower. This approach can be effective at entrainment reduction, but is not generally available to inland facilities.

The section below further describes flow reduction and exclusion technologies.

1. Flow Reduction

Flow reduction is commonly used to reduce impingement and entrainment. For purposes of rulemaking, EPA assumes that entrainment and impingement (and associated mortality) at a particular site are proportional to source water intake volume.[37] Thus, if a facility reduces its intake flow, it similarly reduces the amount of organisms subject to impingement and entrainment. Some common flow reduction technologies include: Variable frequency drives, variable speed pumps, seasonal operation or seasonal flow reductions, unit retirements, use of alternate cooling water sources, water reuse, and closed-cycle cooling systems. For additional detailed information on these technologies as well as others, see the TDD, "California's Coastal Power Plants: Alternative Cooling System Analysis" (DCN 10–6964), and EPRI's "Fish Protection at Cooling Water Intake Structures: A Technical Reference Manual" (DCN 10–6813).

a. Variable Frequency Drives and Variable Speed Pumps

A facility with variable speed drives or pumps operating at their design maximum can withdraw the same volume of water as a conventional circulating water pump. However, unlike a conventional circulating water pump, variable speed drives and pumps allow a facility to reduce the volume of water being withdrawn for certain time periods. The pump speed can be adjusted to reduce water withdrawals when cooling water needs are lower, such as when ambient water temperatures are colder (and therefore capable of dissipating more heat) or when fewer generating units are operating. In site visits, EPA found that variable speed drives and pumps were typically used at units operating below capacity, such as load following units. For this reason most base load generating units and continuously operated manufacturing processes would obtain minimal reductions in flow as a result of these technologies. EPA estimates that facilities with intermittent water withdrawals could achieve a 5 to 10 percent reduction in flow.[38] EPA is further aware that some facilities need to withdraw water for cooling even while the facility is not in production, such as facilities on standby status, or nuclear facilities where the heat energy generated by fission must still be dissipated while the facility is out of service.

b. Seasonal Flow Reductions

Seasonal flow reduction refers to the reduction or elimination of a quantity of water being withdrawn during certain biologically important time periods. Most facilities that practice seasonal flow reductions do so in order to reduce entrainment because peak entrainment events are often seasonal, typically occurring during local spawning season, while impingement is more sporadic. For example, clupeids species experience impingement episodes sporadically all throughout the winter and spring. Largemouth bass, on the other hand, may spawn in the late-spring, which would thus be a season of

[37] Impingement rates are related to intake flow, intake velocity, and the swimming ability of the fish subject to impingement. Entrainment is generally considered to be proportional to flow and therefore reduced on a 1-to-1 basis via flow reductions, as EPA assumes for purposes of national rulemaking that entrainable organisms are uniformly distributed throughout the source water. EPA has consistently applied this assumption throughout the 316(b) rulemaking process (see, *e.g.,* 66 FR 65276 for a discussion of proportional flow requirements in the Phase I rule or 69 FR 41599) and continues to believe that it is broadly applicable on a national scale and is an appropriate assumption for a national rulemaking. EPA recognizes that this assumption is not necessarily true on a site specific basis and that relocating or varying the time pattern of withdrawals may be effective strategies to reduce I&E in some cases.

[38] Withdrawals of colder water could allow facilities to reduce their intake using variable speed drives and pumps, but EPA does not have data on the efficacy or availability of this approach.

potentially high entrainment for this species. During this specific peak entrainment time period, a facility could operate less (or perhaps not at all) thereby reducing or eliminating the volume of cooling water withdrawn. This may be accomplished through a combination of variable speed pumps or shutting down some portion of the pumping system. Seasonal flow reduction may also consist of operating a once-through cooling system during part of the year and switching to closed-cycle during peak entrainment season. Facilities may also choose to schedule periodic maintenance to occur during these time periods; these maintenance activities often require the facility to reduce or cease operations and can be timed to coincide with the most biologically productive periods. By identifying species of concern at facilities visited by EPA, the Agency has identified some sites where entrainment is significant all year long, and other sites where peak entrainment occurs in as few as three to four months of the year. In addition, not all power generating facilities in a local area could stop operating at the same time without interrupting local electricity reliability. Therefore, not all facilities can utilize seasonal flow reduction technologies.

c. Unit Retirements

Some power plants have retired units completely or have essentially ceased all operations but have yet to be formally retired or decommissioned. Reasons for their inactivity vary,[39] but the end result is the facility eliminates the need for cooling water withdrawals for these units. Similarly, manufacturers may retire processing units as market demand changes, process lines are moved to other sites, or production technologies change. Unit closures provide clear reductions in flow, but the demand for electricity (or other products) may dictate that production be increased at the facility in question or another facility altogether; there is usually no guarantee that the intake flow will be permanently retired. EPA expects flow reductions due to unit closures could be reasonably included as part of a facility's I&E mortality reductions for a period of up to 10 years.

d. Alternate Sources of Cooling Water

While not reducing the overall usage of water at a facility, using an alternate source of cooling water may have the same effect in reducing impingement and entrainment, as new or additional withdrawals from surface waters may be reduced. An example is using "gray" water as a source of cooling water; a facility reaches an agreement with a nearby wastewater treatment plant to accept the WWTP's effluent as a source of cooling water.[40] Such alternative sources are limited by available capacity, consistency of flow, and increasing competition for these sources of water, and may be more challenging to find for existing facilities than for new facilities that are not yet fixed in location.

e. Water Reuse

Typically associated with manufacturing facilities, water reuse (defined as using water for multiple processes) can reduce the volume of water needed for cooling, process, or other uses. For example, a facility might withdraw water for non-contact cooling water and then re-use the heated effluent as part of an industrial process. In effect, the facility has eliminated the need to withdraw additional water for the latter process. EPA has observed significant water reuse at manufacturing facilities, but has not developed national level data for such reuse due to the range of different manufacturing sectors and the significant variability in manufacturing processes (during site visits, it was observed that complex facilities have found it difficult to assess their specific water reuse). See Section IV for further discussion on water usage in specific industrial sectors.

f. Closed-cycle Cooling Towers

Closed-cycle cooling systems allow a facility to transfer its waste heat to the environment using significantly smaller quantities of (or in some cases no) water. There are two main types of closed-cycle cooling systems: Wet cooling and dry cooling. Each of these is described below.

Wet Cooling Tower Systems

In a wet cooling system, cooling water that has absorbed waste heat, transfers that heat through evaporation of some of the heated water into the surrounding air and recirculates the cooling water to continue the cooling process.[41] This process enables a facility to re-use the remaining water, thereby reducing the quantity of water that must be withdrawn from a water body. Because the heat is transferred through evaporation, while the amount of water withdrawn from the water source is greatly reduced, it is not eliminated completely because make-up water is required to replace that lost through evaporation and blowdown. There are two main types of wet cooling systems: Natural draft and mechanical. While wet cooling towers reduce withdrawals relative to once-through systems, they may increase the consumptive use of water since they tend to rely on evaporation (which is not returned to the water body) for heat dissipation. When once-through cooling is used and withdrawals are a significant portion of the waterbody, the return of heated water may contribute to greater evaporation from the water body. However, EPA does not have data on the relative magnitude of these effects. The relative loss of water through evaporation for closed cycle and once-through systems is site specific, depending on the exact design of the systems.

A natural draft cooling tower is tall[42] and has a hyperbolic shape. The height of these towers creates a temperature differential between the top and bottom of the tower, creating a natural chimney effect that facilitates heat transfer as heated water contacts rising air. In contrast, mechanical cooling towers rely on motorized fans to draw air through the tower and into contact with the heated water. These towers are likely to be much shorter units than natural draft cooling towers,[43] and due to their modular construction can be built in multiples, but they may require more land area for the same amount of cooling. Both types of towers require electricity for pumps, while mechanical draft towers also require electricity to operate the fans; both electricity needs serve to reduce a facility's net generating output. Thus the monetary and environmental costs of making up this reduction in energy efficiency need to be considered. These environmental costs include human health and welfare effects from increased air emissions, including the global climate change effects of increased greenhouse gas output at fossil-fueled plants. Both natural draft and mechanical cooling towers can operate in freshwater or saltwater environments. Saltwater applications typically require more make-up water than freshwater

[39] Note that some generating units are retired for market-driven reasons (*i.e.,* the unit is no longer considered sufficiently profitable to operate). They may also be mothballed, placed on cold storage, or maintained in various other states of operational readiness.

[40] See, for example, EPA's site visit report for PSEG's Linden Generating Station (DCN 10–6557), which has a capacity of 1230 MW, 35% CUR, and uses 7–8 mgd of gray water as makeup water for its cooling towers.

[41] In addition, a smaller portion of the heat is also removed through direct contact between the warm water and the cooler surroundings.

[42] Natural draft towers can be as high as 500 feet or more.

[43] Mechanical draft towers typically range from 30 to 75 feet in height.

applications, making them less efficient in reducing water withdrawals.[44] Optimized cooling towers may achieve flow reductions of 97.5 percent or better and 94.9 percent or better for freshwater and saltwater sources, respectively.

Dry Cooling Tower Systems

Dry cooling systems virtually eliminate the need for cooling water withdrawals.[45] Unlike wet cooling systems, in dry cooling systems, waste heat is transferred completely through convection and radiation, rather than evaporation. Direct dry cooling is much like a car radiator; turbine exhaust steam passes through tubes or fins and the condensate is returned for reuse in the turbine. The system is completely closed to the atmosphere and there is no contact between the outside air and the steam or the resulting condensate. Due to the heavy reliance of dry cooling on ambient air temperatures and the lower efficiency of heat transfer through convection and radiation, dry cooling towers are much larger and therefore more expensive [46] than wet cooling towers for a given cooling load. Dry cooling towers have been built in areas where limited water supplies exist for either once-through cooling or wet cooling make-up water, such as the arid southwestern U.S. Dry cooling is not demonstrated and available for nuclear facilities, due to the backup cooling systems and related safety needs required at a nuclear facility.

Hybrid Cooling Tower Systems

In certain applications, a facility may choose a hybrid cooling tower design that incorporates elements of both wet and dry cooling. Typically, the base of the tower functions as a wet cooling tower and the upper portion as a dry tower; the most common reason for this design is to reduce the visible plume emitted from the tower, which is accomplished by recapturing some of the water vapor evaporated in the wet portion of the tower. This design is also usually much shorter than natural draft wet towers, which can also offer plume abatement controls.

2. Exclusion Technologies To Minimize Impingement and/or Entrainment

Over the last several decades, in addition to flow reduction and closed-cycle cooling, numerous technologies have been developed in an effort to minimize impingement and entrainment mortality associated with cooling water intake systems. The following summarizes the most widely used technologies as well as the most effective and best performing technologies. For additional detailed information on these technologies as well as others, see the TDD, CA Report, and EPRI report.

a. Screens

i. Traveling Screens

Traveling screens are a technology in place at virtually all cooling water intake structures. These screens were originally designed to prevent debris from entering the cooling water system, but also prevent some fish and shellfish from entering the cooling water system. Traveling screens have been installed in numerous environmental conditions: Salt water, brackish water, fresh water, and icy water. Based on the technical survey, EPA found 93 percent of electric generators and 73 percent of manufacturers employ traveling screens or other intake screens. There are many types of traveling screens (*e.g.,* through flow, dual flow, center flow). The most common design in the U.S. is the through flow system. The screens are installed behind bar racks (trash racks) but in front of the water circulation pumps. The screens rotate up and out of the water where debris (including impinged organisms) is removed from the screen surface by a high pressure spray wash. Screen wash cycles are triggered manually or by a certain level of head loss across the screen (indicating clogging). By definition, this technology works by collecting or "impinging" fish and shellfish on the screen. Traveling screens are ideally used with a fish handling and return system, discussed further in Section VI.B.3 below.

ii. Cylindrical Wedgewire Screens

Cylindrical wedgewire screens, also called "V" screens or profile screens, unlike traveling screens, are a passive intake system. Wedgewire screens consist of a v-shaped, cross section wire on a framing system. Slot sizes for conventional traveling screens typically refer to a square opening (3⁄8″ × 3⁄8″) that is punched or woven into the screen face. Wedgewire screens are constructed differently, however, with the slot size referring to the maximum distance between longitudinally adjacent wires. These screens are designed to have a low through-slot velocity (less than 0.5 ft/sec or 0.15 m/sec) and typically have smaller slot sizes than a coarse mesh traveling screen. The entire wedgewire structure is submerged in the source waterbody.

When appropriate conditions are met, these screens exploit physical and hydraulic exclusion mechanisms to achieve consistently high impingement reductions (and as a result, impingement mortality reductions). Wedgewire screens require an ambient current crossflow to maximize the sweeping velocity provided by the waterbody. The screen orientation and cross current flow carries organisms away from the screen allowing them to avoid or escape the intake current. Lower intake velocities also allow fish to escape from the screen face. Entrainment reductions can potentially be observed when the screen slot size is small enough and intake velocity is low enough to exclude egg and larval life stages.[47] There is also limited evidence suggesting that extremely low intake velocities can allow some egg and larval life stages to avoid the intake due to hydrodynamic influences of the cross current. Therefore performance is largely dictated by local conditions that are further dependent on the source waterbody's biological composition. Costs of wedgewire screens also increases significantly as slot size and design intake velocity decrease. Wedgewire screens may also employ cleaning and de-icing systems such as air-burst sparging to aid in maintaining open intake structures and low intake velocities.

According to data from the industry questionnaire, EPA's site visits, and industry documents, dozens of facilities across the U.S. employ cylindrical wedgewire screens. However, wedgewire screens are not feasible for facilities with limited access to source water, such as shallow water or limited shoreline frontage. Wedgewire screens may also not be feasible where the size and number of wedgewire screens would interfere with navigational traffic. As described above, locations also need to have an adequate source water sweeping velocity. Most of the performance data for wedgewire screens is based on coarse mesh slot sizes with an intake velocity of 0.5 feet per second. As it is extremely difficult to measure

[44] Modular cooling tower units provide an additional cooling tower alternative. Modular cooling towers resemble mechanical cooling towers, but are portable, typically rented for short-term periods and quickly assembled.

[45] Dry cooling systems do blow down some of the circulating water within the cooling system to prevent the buildup of materials within the condenser. However, the volume of makeup water is extremely low—a dry cooling system typically reduces intake flows by 98–99 percent over a comparable once-through cooling system.

[46] The construction and capital costs for dry cooling towers have been reported as five to 10 times as expensive as wet cooling towers, and the parasitic load for dry cooling is higher than for wet cooling. See DCN 10–6679.

[47] Note that this is entrainment exclusion and not necessarily related to the survival of entrainable organisms. See Section III.B.2 for more detail.

impingement and entrainment reductions in the field, most performance data is based on barge studies and lab studies. EPA does not have data on the performance of fine mesh wedgewire screens on entrainment survival; therefore EPA has only considered wedgewire screens for impingement mortality. For additional discussion of the specific design and operation of cylindrical wedgewire screens, see the TDD. The following section discusses the importance of mesh size to impingement and entrainment mortality reductions.

iii. Screen Mesh Size Considerations

Coarse Mesh

Coarse mesh traveling screens are the typical traveling screen fitted on the majority of cooling water intakes. A large number of facilities have intake screens with ⅜-inch (9.5 mm) mesh panels. This size mesh is common because, as a general rule of thumb, the maximum screen slot size is never larger than one half of the condenser tube diameter (the condenser tubing is the narrowest point in the cooling water system and, as such, is most susceptible to clogging from debris), and this tubing is typically ¾ or ⅞ inches in diameter. Mesh of ⅜-inch (roughly 9.5 mm) does not prevent entrainment and in the absence of any other precautions can lead to high mortality of impinged fish. Coarse mesh traveling screens have been in use by both power plants and manufacturers for more than 75 years and represent the baseline technology. Similarly, the majority of successful wedgewire installations are coarse mesh.

Fine Mesh

Fine mesh traveling and wedgewire screens are similar to coarse mesh screens, with the only difference being the size of the screen mesh. The mesh size of fine mesh screens varies, depending on the organisms to be protected, but typically range from 0.5 to 5 mm. Typically, facilities have incorporated fine mesh in an effort to reduce entrainment. Data in the record demonstrate that entrainment typically decreases as mesh size decreases. However, slot sizes larger than 2 mm do not prevent eggs from passing through the screen. Fine mesh traveling screens have been in use in this industry since the 1980s. EPA estimates as many as 17 percent of existing intakes could not be expanded in size to accommodate a 2 mm mesh, and as many as 55 percent of existing intakes could not accommodate a 0.5 mm slot size under conditions of low intake velocities. For these reasons, fine mesh screens are demonstrated for some locations, but are not the best performing technologies, and are not available technologies for the industry as a whole. See Chapter 6 of the TDD for more details.

b. Barrier Nets

Barrier nets are nets that fully encircle the intake area of water withdrawal, from the bottom of the water column to the surface and that prevent fish and shellfish from coming in contact with the intake structure and screens. According to data from the industry questionnaire (as of the year 2000), at least a half dozen facilities employ a barrier net. Typically, barrier nets have large mesh sizes (*e.g.,* ½-inch or 12.7 mm)[48] and are designed to prevent impingement. Due to the large mesh size, they offer no reduction in entrainment. They are often deployed seasonally, wherever seasonal migrations create high impingement events or to avoid harsh winter conditions which jeopardize integrity of the net. Barrier nets also prevent impingement of shellfish on the intake traveling screen. Shellfish such as crustaceans may pose a unique issue for traveling screens because the shellfish are not impinged, but rather they may grab hold of the traveling screen surface and are not removed from the traveling screen by pressure wash sprays. Barrier nets have been shown to be particularly helpful in this regard. For this reason, the costs of options considered today include the costs of barrier nets to minimize impingement mortality of shellfish.

c. Aquatic Filter Barriers

Aquatic Filter Barriers (AFBs), such as the Gunderboom Marine Life Exclusion System (MLES) or simply "Gunderboom," are similar to barrier nets in that they extend throughout the area of water withdrawal from the bottom of the water column to the surface. However, AFBs consist of water permeable fabric panels with small pores (< 20 microns). AFBs reduce both impingement mortality and entrainment because they present a physical barrier to all life stages. The surface area of an AFB is quite large compared to a traveling screen, allowing for extremely low water velocities. The low velocity allows non-motile organisms to drift away. EPA is aware of one power plant that used an AFB, but notes that this facility recently ceased operations.[49] EPA has updated performance data for AFB for small flow intakes, but does not have enough data to evaluate the technology at large intakes and in all waterbodies.

3. Collection and Return

Conventional traveling screens were not designed with the intention of protecting fish and aquatic organisms that become entrapped against them. Marine life may become impinged against the screens from high intake velocities that prevent their escape. Prolonged contact with the screens may suffocate insufficiently strong species or certain susceptible life stages of fish. Exposure to high pressure sprays and other screening debris may cause significant injuries that result in latent mortality, or increase the susceptibility to predation or re-impingement. Organisms that do survive initial impingement and removal are not typically provided with a specifically-designed mechanism to return them to the water body and are handled in the same fashion as other screening debris. Other objects collected on the screen are typically removed with a high-pressure spray and deposited in a dumpster or debris return trough for disposal. Screens are rotated periodically based on a set time interval or when the pressure differential between the upstream and downstream faces exceeds a set value. Conventional traveling screen systems have been modified to reduce impingement-related mortalities with collection and return systems. In simplest form, this is comprised of a return flume or trough with sufficient water volume and flow to enable impinged organisms to return to the source water. Return systems should be designed to avoid predation and latent mortality while organisms are in the flume, positioned at an appropriate water depth for high survival of the organisms, located at an appropriate elevation to avoid large drops of the organisms back to the surface water, and sited to avoid repeated impingement of the organisms by the intake structure.

Following the 1972 Clean Water Act's requirement to require technology-based solutions to minimize adverse environmental impacts, some conventional coarse mesh traveling screen systems were modified to reduce impingement mortality by removing fish trapped against the screen and returning them to the receiving water with as few injuries as possible. The first modified

[48] Barrier net mesh sizes vary, depending on the configuration, level of debris loading, species to be protected, and other factors.

[49] This facility ceased operations for reasons other than impingement and entrainment related to cooling water intake.

screens, also known as "Ristroph" screens, feature capture and release modifications. In the simplest sense, these screens are fitted with troughs (also referred to as buckets) containing water that catch the organisms as they rise out of the water and are sprayed off of the screen. The return component consists of a gentle mechanism to remove impinged fish from the collection buckets, such as a low-pressure spray. The buckets empty into a collection trough that returns fish to a suitable area in the source water body. These modified screens have shown significant improvements in reducing impingement mortality compared with unmodified screen systems.

Data from early applications of the "Ristroph" screen design showed that while initial survival rates might be high at some installations, latent mortality rates were higher than anticipated, indicating significant injuries could be sustained during the impingement and return process that were not immediately fatal. Based on a study conducted by Ian Fletcher in the 1990s (see DCN 5–4387), industry identified several additional critical screen modifications to address latent mortality. These include redesign of the collection buckets to minimize turbulence, addition of a fish guard rail/barrier to prevent fish from escaping the collection bucket, replacement of screen panel materials with "fish friendly" smooth woven mesh, and a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side. The Fletcher analysis also identified that longer impingement duration, insufficient water retention in the buckets, and exposure to the air and temperature extremes could negatively impact fish survival. Finally, these findings indicate that modified Ristroph screens must be continually rotated instead of the periodic rotation schedule common with conventional screen systems. Performance data for modified traveling screens with fish return systems show low levels of impingement mortality across a wide variety of water body types and fish species. Therefore, EPA has concluded modified traveling screens with a fish return system is a candidate best performing technology for impingement mortality.

For additional and more detailed discussion of the specific design and operation of these screen modifications, see the TDD.

4. Intake Location and Velocity Caps

Currently, the most common intake location for a cooling water intake structure is along a shoreline. In some types of waterbodies, shoreline locations are thought to have the potential for greater environmental impact because the water is withdrawn from the most biologically productive areas especially with regards to earlier life stages. Some facilities employ an offshore intake to withdraw water from less biologically productive areas to reduce entrainment relative to intakes located in more productive shoreline areas, though impingement (and therefore impingement mortality) reductions have also been observed. Obviously, reduction in impingement mortality and entrainment depend on intake location at a particular site, but the greatest potential for reductions is found with far offshore locations at distances of several hundred feet, something not possible on many rivers and streams. Both depth and the offshore location must be evaluated to determine if fish densities and species distribution at the offshore location are substantially different than those near the shoreline. Two areas where far offshore locations are commonly used today include the oceans and Great Lakes.

EPA found most offshore intakes are fitted with a velocity cap. Velocity caps are a physical structure rising vertically from the sea bottom and placed over top of the intake pipe. Intake water is withdrawn through openings in the velocity cap in a manner which converts the direction of flow from vertical to horizontal. The horizontal flow provides a physiological trigger in fish to induce an avoidance response thereby reducing impingement mortality. The velocity cap further serves to limit the zone of influence of the intake to the depth level at which the velocity cap is situated, thus affecting only the life stages that live at that depth. Furthermore, the velocity at an offshore intake is lower than the velocity of an equivalent sized intake at the shoreline due to differences in pressure, resulting in a lower intake velocity at the velocity cap than at a shoreline intake. Velocity caps are also usually equipped with supports and bar spacing selected to prevent larger aquatic organisms (*e.g.,* turtles or marine mammals) from entering the intake pipe. Because velocity caps operate under the principle that the organisms can escape the current, velocity caps do not offer entrainment reductions over and above those achieved by being located offshore. Reductions in entrainment observed with velocity caps occur due to the difference in organism densities in far offshore deep water compared to a surface intake at the shoreline.

For additional and more detailed discussion of the specific design and operation of offshore intake locations and velocity caps, see the TDD.

5. Reduced Intake Velocity

Impingement mortality can be greatly reduced by reducing the through-screen velocity in any screen. Reducing the rate of flow of cooling water through the screen (through-screen velocity) to 0.5 ft/sec or less reduces impingement of most fish because it allows them to escape the intake current. (See 66 FR 65274 and DCN 2–028A, EPRI's "Technical Evaluation of the Utility of Intake Approach Velocity as an Indicator of Potential Adverse Environmental Impact Under Clean Water Act 316(b).") Limited lab studies indicate that entrainment also may decrease as through-screen velocity decreases and that through-screen velocity may have an effect on entrainment survival rates, although such data is extremely variable by species (see DCN 10–6802 and DCN10–6803). As a result, some Phase II facilities have designed and operate their modified traveling screens or wedgewire screens so as not to exceed a through-screen velocity of 0.5 ft/sec. In addition, for the reasons described in Section VI.B.2, aquatic filter barriers and velocity caps [50] are likely to have velocities of 0.5 ft/sec or less. Swim speed studies demonstrate that for most facilities, an intake velocity of 0.5 feet per second or less results in 90 percent or better reductions in impingement mortality for most species. (EPA notes that preliminary results from recent studies of fine mesh screens suggest that at even lower intake velocities such as 0.25 feet per second, there may be some hydrodynamic influences that reduce entrainment mortality even more, because flow dynamics are nonlinear. It is unclear whether such observations hold true when cooling water withdrawals (water volumes) are large.) Therefore, EPA has concluded reduced intake velocity is a candidate best performing technology for impingement mortality.

C. Technology Basis for Today's Proposed Regulation

As described in the previous section, EPA examined the full range of technologies that reduce impingement and/or entrainment, and evaluated these technologies based on their efficacy in reducing impingement and entrainment, availability, and cost. Based on an assessment of these factors, EPA has

[50] Velocity as measured at the velocity cap opening.

identified three best performing technologies for further analysis as the basis for today's proposed rule: Modified traveling screens with a fish return (for fish impingement), barrier nets (for shellfish impingement on tidal waters), and mechanical draft wet cooling towers (for impingement and entrainment at new units). Although EPA has identified velocity reduction to 0.5 feet per second or less as a candidate best performing technology for impingement mortality, EPA is not proposing reduced intake velocity as BTA because it is not available at all facilities, but is allowing facilities to comply with intake velocity of 0.5 feet per second or less where available.

EPA has concluded that modified traveling screens, such as Ristroph screens and equivalent modified traveling screens are a best performing technology for impingement mortality. These screens use coarse size mesh with collection buckets designed to minimize turbulence, a fish guard rail/barrier to prevent fish from escaping the collection bucket, "fish friendly" smooth woven mesh, and a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side. The fish removal spray must be of lower pressure and the fish return must be fish friendly and provide sufficient water and minimize turbulence. Modified traveling screens must generally be continually rotated to obtain the highest reductions in impingement mortality. As discussed in Section III, traveling screens with post-Fletcher modifications achieve a monthly impingement mortality of 31 percent mortality (performance corresponding to the 95th percentile of the beta distribution) under conditions of 48 hour or less holding times. The use of the 95th percentile is consistent with the convention EPA has used for monthly average limitations in the effluent guidelines program (*i.e.,* for pollutant discharges). In developing the monthly average standard proposed for this rule, EPA has taken into account the reasonable anticipated variability in impingement mortality that may occur at a well-operated facility. Variability occurs due to changes in seasons, differing intake locations, higher mortality of certain species, and speciation found in different water bodies.

In contrast to the monthly average, which is adjusted to reflect month-to-month variability in performance of the technology, EPA has not included an upward adjustment of the annual average [51] standard to account for year-to-year variability. The annual average standard requires that impingement mortality not exceed 12 percent, calculated as the average of monthly impingement mortality for 12 consecutive months as determined by the Director. The 12 percent value corresponds to the long-term average performance of the technology that EPA has identified as BTA, based on available data from eight episodes of sampling collected on three different waterbody types over all seasons (see Chapter 11 of the TDD for more information). EPA expects facilities to track their compliance with the annual average standard on an ongoing basis, and to proactively modify their technology or operations when any individual monthly average suggests that they may be in danger of exceeding the annual average standard in the future. EPA recognizes that some variability in the annual average is inevitable, and thus the only way to consistently achieve the 12 percent annual standard is to target a better level of performance as the long-term average performance. While EPA's data show a long-term average performance of 12 percent impingement mortality for the BTA technology, EPA believes that by continuously monitoring and adaptively adjusting the operation of the technology, facilities can achieve a better long-term performance than is documented in the data, and thus consistently meet the annual average.

EPA also considered applying a confidence or tolerance limit to the long-term average in deriving the annual average standard. EPA rejected this approach because EPA believes that facilities can achieve better long-term performance than documented in the data by maintaining tight control on their technology and operations and adaptively managing the technology to achieve the best possible performance. While EPA has not included any additional costs for this adaptive management, EPA believes that such adaptive management should be part of the routine maintenance and operation of the technology and additional costs should not be necessary.

EPA has occasionally used annual limits in the effluent guidelines program (most recently for the pulp and paper industry category (40 CFR 430, promulgated in 1998) and has previously not included a variability factor for annual limits. Thus, EPA's proposed approach to calculating the annual standard for mortality impingement is consistent with past practice. EPA requests comment on its proposed approach for calculating and implementing the annual standard.

This technology does not minimize adverse environmental impacts associated with entrainment, and does not specifically address impingement mortality of shellfish.

EPA selected the seasonal deployment of barrier nets on estuaries and oceans as the best performing technology for minimizing the impingement mortality of shellfish (crustaceans) because no other technology has been identified that is available, demonstrated, and feasible. EPA did not select wedgewire screens as a candidate technology for impingement mortality because wedgewire screens are not available and feasible for all existing facilities. Wedgewire screen performance requires an adequate crossflow of the source water that is not present in all waterbodies. Wedgewire screens also require a minimum water depth in order to fully submerge the screens; the requisite depth and space to submerge the screens is not available at all locations, and further may pose an obstacle to navigation. However, where passive screens such as cylindrical wedgewire screens are feasible, data in the record shows they would perform equally as well or better than seasonal deployment of barrier nets. EPA has included a provision in the proposed regulation that specifies that passive screens meet the IM requirement for shellfish.

One technology for reducing impingement mortality as well as reducing entrainment mortality is wet cooling towers. Mechanical cooling towers achieve flow reductions of 97.5 percent for freshwater and 94.9 percent for saltwater sources by operating the towers at a minimum of 3.0 and 1.5 cycles of concentration, respectively. Based on the high levels (greater than 95 percent on average) of flow reduction obtained by optimized cooling tower operation, EPA has identified wet cooling towers as a candidate best performing technology for both impingement mortality and entrainment mortality for new units at existing facilities. As discussed further below, EPA is not proposing cooling towers as BTA for existing facilities (other than new units) because it is not available on a national basis. As described in Section VI.B, other technologies are demonstrated, but are not the best performing technologies and/or are not

[51] The annual average should not be confused with a rolling average of the preceding 12 months; EPA has specified in the rule language at § 125.96 that the annual average means 12 consecutive months as specified by the Director. EPA expects that compliance with the annual average standard would be determined once each calendar year.

available technologies for the industry as a whole.

Although, EPA's record shows numerous instances of existing facility retrofits to closed-cycle, EPA has not identified it as BTA for the reasons discussed below. EPA has also not identified any other available and demonstrated candidate technology for entrainment mortality that is available on a national basis; see Section VI.B and the TDD for other entrainment technologies that may be available on a site-specific basis. EPA did not select the other flow reduction technologies such as variable speed drives and seasonal flow reductions as the technology basis for entrainment mortality because these technologies are not feasible for all facilities. Further, EPA has not identified a basis for subcategorizing existing facilities for where these flow reduction technologies are feasible, because their seasonal operation depends on the site-specific biology of the facility. EPA did not select relocation of a shoreline intake to far offshore as a technology basis because this technology is not feasible for all facilities. Even if EPA subcategorized by water body type (*i.e.,* intake location), the performance of wet cooling towers for entrainment mortality is at least three times that of a far offshore intake. Therefore relocation of the intake is not the best performing technology for minimizing entrainment mortality.

D. Options Considered for Today's Proposed Regulation

After careful consideration of the technologies available as described in Section VI.C, EPA developed four primary options based on these technologies for today's proposed rule. Three of the options would require the same impingement mortality standards, but would vary the approach to entrainment mortality controls. The fourth option would allow both impingement and entrainment mortality controls to be established on a site-specific BPJ basis for facilities with a DIF less than 50 MGD. The options are described briefly below, followed by a discussion of EPA's evaluation of each option as BTA.

1. Option 1—Uniform Impingement Mortality Controls at All Existing Facilities; Site-Specific Entrainment Controls for Existing Facilities (Other Than New Units) That Withdraw Over 2 MGD DIF; Uniform Entrainment Controls for All New Units at Existing Facilities

Under this option, all existing facilities withdrawing more than 2 MGD would be required to meet either the design or the performance standard for impingement mortality. Entrainment controls would be established by the permitting authority on a case-by-case basis taking into account those factors at a particular facility that are specified in today's proposal and the information required by the existing permit regulations at § 122.21(r)(1)–(8) for all facilities with at least 2 MGD DIF. In addition, under EPA's CWA sections 301, 308, 316(b), and 402 authority, in the case of facilities withdrawing greater than 125 MDG AIF (actual intake flow), the site-specific determination of BTA would be based on a submission of certain other required information. The proposal would amend the permit application requirements at § 122.21(r)(9)–(11) to require the facility to prepare an Entrainment Characterization Study that would fully characterize the amount of entrainment at the facility. (See below for more details about the study). In addition, under the proposal, the facility would provide detailed information on the other factors relevant to the Director's site-specific BTA determination. These would include information concerning the technologies available for control of such entrainment, the costs of controls, the non-water quality impacts of such controls, and both the monetized and non-monetized benefits of such controls. The CWA requires, and EPA encourages, the public to have a role in the permitting process; therefore EPA has also included meaningful public opportunity for participation in the site-specific decision making to help ensure the soundness of both the information and subsequent determinations.

a. Impingement Mortality Controls

As described earlier in this section, traveling screens have undergone a number of technological improvements over the years and modern screens have proven to be highly effective in promoting the survival of impinged organisms. The proposed rule requires the use of state-of-the-art screens with fish buckets, a low pressure spray wash, a dedicated fish return line, etc., but is not specifying any particular screen configuration, mesh size or screen operations, so long as facilities can consistently meet the numeric impingement mortality limits (impingement mortality also includes a design standard for shellfish). EPA is also not specifying additional design or operational criteria to promote development of improved technologies, and to allow facilities to use variations such as dual flow traveling screens and drum screens.

EPA did not select intake velocity as the sole technology basis for impingement mortality controls because, although the performance of 0.5 feet per second intake velocity is slightly better than the selected technology, the intake velocity is not available or feasible for all existing facilities (see Chapter 6 of the TDD). However, EPA has long recognized the relationship between impingement and intake velocity. EPA conducted an analysis of fish swim speeds in the Phase I rule (see 66 FR 65274) and concluded that a design through-screen velocity of 0.5 feet per second would be protective of 96% of motile organisms. As a result, a facility may chose to comply with the impingement mortality standards in today's proposed rule by instead demonstrating that the through-screen design velocity does not exceed 0.5 feet per second, or by demonstrating that the actual average intake velocity does not exceed 0.5 feet per second.

While the data shows the majority of healthy motile organisms would be protected by a maximum intake velocity of 0.5 feet per second, some species would not be adequately protected. Some facilities employ traveling screens, but do not have fish friendly modifications such as a fish handling and return system. EPA is concerned that some facilities would comply with the impingement mortality requirements by the intake velocity compliance alternative, and would continue to operate unmodified traveling screens. This is particularly a concern where the traveling screens are located in a forebay, potentially resulting in entrapment of any impinged organisms. Therefore, EPA is considering a provision that would require facilities to either demonstrate that the species of concern are adequately protected by the maximum intake velocity requirements, or to employ specific fish friendly protective measures including, at a minimum, a fish handling and return system. EPA solicits comment and data on such a provision.

EPA did not select wedgewire screens as the technology basis for impingement mortality controls because wedgewire screens are not available and feasible for all existing facilities. EPA also did not need to include wedgewire screens as a compliance alternative because wedgewire screens designed with an intake velocity of 0.5 feet per second can demonstrate compliance with the impingement mortality limits based on the intake velocity as just described. EPA did not select flow reduction by retrofit to closed-cycle cooling as the technology basis for impingement mortality because closed-cycle cooling costs more than 10 times that of modified traveling screens with a fish return system. In other words, modified traveling screens with a fish return system and closed-cycle cooling are comparable in impingement mortality performance, but modified traveling screens with a fish return system is more cost-effective than flow reduction at preventing impingement mortality. EPA is not including wet cooling towers as a compliance alternative (*e.g.,* a pre-approved technology) because EPA's data shows existing facilities that retrofit to a closed-cycle cooling system have an intake velocity of less than 0.5 feet per second. As a practical matter, make-up water withdrawals are made at such low velocities that facilities with closed-cycle can demonstrate compliance with the alternative reduced intake velocity to meet the impingement mortality limits. For estuaries and oceans, EPA is proposing seasonal deployment of barrier nets on estuaries as the technology basis for minimizing the impingement mortality of shellfish (crustaceans) because no other technology has been identified that is available, demonstrated, and feasible. As noted previously, use of wedgewire screens (along with the limitations on intake velocity) obviates the need for barrier nets.

b. Entrainment Controls

The proposal would require consideration of site-specific entrainment controls for each facility above 2 MGD DIF. EPA considered proposing no further controls to address entrainment mortality, and to rely instead only on the BTA impingement mortality controls, which would achieve up to a 31 percent reduction in total AEI. EPA has not selected this option as the basis for national BTA because EPA believes that some facilities may be able to do more to control entrainment and that requiring a structured site-specific analysis of candidate BTA technologies for entrainment control will allow the Director to determine where it is appropriate to require such controls. However, one outcome of the site specific analysis may be that the Director would determine that no other technologies beyond impingement control meet the criteria for selection as BTA, because no other technologies are feasible and/or their benefits do not justify their costs. EPA requests comment on the option of basing national BTA on impingement controls only and dropping the specific requirement for a structured site-specific analysis of entrainment BTA options, as discussed below.

In the case of site-specific entrainment controls for facilities withdrawing greater than 125 MGD AIF, EPA's proposal would, in addition, require these facilities to develop and submit an entrainment characterization study for use by the Director in establishing site-specific BTA. See Section V.F for more on development of the 125 MGD threshold. (Facilities under the 125 MGD AIF threshold must still provide certain water body and water population information under the current permit applications requirements at § 122.21(r)). An early step in conducting the entrainment characterization study is the preparation of an entrainment mortality data collection plan, which must be submitted to the Director for review and comment before implementation. The entrainment mortality data collection plan would include, at a minimum, the specific entrainment monitoring methods, taxonomic identification, latent mortality identification, documentation of all methods, and quality assurance/quality control procedures for sampling and data analysis appropriate for a quantitative survey. EPA would also require peer review of the entrainment mortality data collection plan. Peer reviewers would be selected in consultation with the Director who may consult with EPA and federal, State, and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s).

The Entrainment Characterization Study would include information already collected to meet current § 122.21(r)(4) requirements. In addition, under the new permit application requirements proposed for § 122.21(r)(5)–(12), the facility would submit certain additional site-specific information. This would include an engineering study of the technical feasibility and incremental costs of candidate entrainment mortality control technologies. The facility would also study, evaluate, and document: the technical feasibility of technologies at a minimum including closed-cycle cooling and fine mesh screens with a mesh size of 2 mm or smaller; engineering cost estimates of all technologies considered; any outages, downtime, or other impacts to revenue along with a discussion of all reasonable attempts to mitigate these cost factors; and a discussion of the magnitude of water quality and other benefits, both monetized and non-monetized, of the candidate entrainment mortality reduction technologies evaluated. Finally, the information must include a discussion of the changes in non-water quality factors attributed to technologies and/or operational measures considered, including but not limited to increases and decreases in the following: energy consumption; thermal discharges; air pollutant emissions including particulates and associated human health and global climate change impacts; water consumption; noise; safety (*e.g.,* visibility of cooling tower plumes, icing); grid reliability, and facility reliability. See Section IX for a thorough discussion of these study requirements.

Under this option, it is EPA's expectation that the Director would review the candidate technologies for entrainment mortality control that at a minimum includes closed-cycle cooling and fine mesh screens. In the decision about what additional entrainment controls (if any) to require, the Director would consider all of the facility-specific factors described above. At a minimum, the Director must provide a discussion explaining how issues concerning local energy reliability, air emissions or land availability insofar as they relate to the feasibility of adoption of a particular entrainment technology, remaining useful plant life, and the relationship of social benefits to social costs were addressed in the site-specific determination. Under the proposal, the Director must issue a written explanation for the basis of the BTA determination for each facility. EPA also expects the written explanation would provide a review of the social costs (and not just the facility costs (see chapter 11 of the EA) of the various technologies; a review of the potential reductions in entrainment and entrainment mortality; and a review and analysis of monetized and non-monetized benefits).

Under Option 1, new units at an existing facility that withdraws more than 2 MGD would have requirements similar to the requirements of a new facility in Phase I. Under this option, new units would be required to reduce flow commensurate with closed-cycle cooling for the new unit. Under the proposal, as with Track II of the Phase I rule, a facility could demonstrate compliance with entrainment control requirements by establishing reductions in entrainment mortality for the new unit that are 90 percent of the reductions that would be achieved by closed-cycle cooling.

2. Option 2—Impingement Mortality Controls at All Existing Facilities That Withdraw Over 2 MGD DIF; Require Flow Reduction Commensurate With Closed-Cycle Cooling by Facilities Greater Than 125 MGD DIF and at New Units at Existing Facilities

Under Option 2, all in-scope existing facilities would be required to achieve the numeric impingement mortality limits described in Option 1 above. In addition, this option would require flow reduction commensurate with closed-cycle cooling by facilities greater than 125 MGD DIF and at new units. Option 2 explores using the facility size, in terms of design intake flow (DIF), as a factor for establishing different BTA for different subcategories. EPA's analysis shows that a DIF of 125 MGD would be an appropriate threshold for this purpose; see Section V. For all facilities that withdraw over 2 MGD but less than or equal to 125 MGD DIF, entrainment controls would be determined by the permitting authority on a case-by-case basis taking into account the factors at a particular facility. Facilities greater than 125 MGD DIF would not submit Entrainment Characterization Studies (because under this option this rule would have already determined that closed cycle is BTA for that facility), but all facilities would still submit § 122(r)(2)–(r)(7) to the Director to inform the BTA determination as described in Option 1. Requirements for new units at an existing facility would be the same as described in Option 1.

EPA also considered a variation of this option that uses 125 MGD Actual Intake Flow (AIF) rather than 125 MGD Design Intake Flow (DIF) as the threshold. Setting the threshold at 125 MGD AIF would allow a Permit Director to treat differently those facilities that are above 125 MGD on a DIF basis but below 125 MGD on an AIF basis relative to today's Option 2. EPA traded off introducing more flexibility at those facilities for simplicity of implementation (DIF is static), but solicits comment on both the threshold and the flow basis for this option.

The technology basis for entrainment mortality controls for facilities greater than 125 MGD DIF under this option would be wet cooling towers as described in Section VI.B. The record shows optimized wet cooling towers achieve flow reductions of 97.5 percent and 94.9 percent for freshwater and saltwater sources, respectively. Optimized operation of wet cooling towers would be demonstrated through flow monitoring and conductivity measurements. Alternatively, this option would allow facilities to demonstrate flow reductions commensurate with closed-cycle cooling based on optimized wet cooling towers.

As part of this option, EPA would provide flexibility to the Director to establish compliance timelines for each existing facility to mitigate grid reliability and local electricity reliability. Under this option, most existing facilities would have no more than 10 years to complete the retrofit to closed-cycle cooling. Under this option the Director would determine when and if any such schedule for compliance is necessary, and if the facility is implementing closed-cycle as soon as possible. This provision would give the Director the discretion to provide nuclear facilities with no more than 15 years to complete the retrofit, because all nuclear facilities are baseload generating units and the additional flexibility in timelines would further mitigate energy reliability, and because the retrofits at these types of facilities in particular involve additional complexities and safety issues. The Director would have the discretion to provide manufacturing facilities with no more than 15 years to complete the retrofit due to the complexity of manufacturing facilities, multiple process units and product lines, and to allow consideration of production schedules in setting such a timeline.

3. Option 3—Establish Impingement Mortality Controls at All Existing Facilities That Withdraw Over 2 MGD DIF; Require Flow Reduction Commensurate With Closed-Cycle Cooling at All Existing Facilities Over 2 MGD DIF

Under this option, all in-scope existing facilities would be required to achieve numeric impingement mortality limits as described in Option 1 above. In addition, this option would require flow reduction commensurate with closed-cycle cooling by all facilities (including new units at existing facilities) as described in Option 2. This option would similarly authorize the Director to establish compliance timelines for each existing facility to mitigate grid reliability and local electricity reliability as described in Option 2 above. Requirements for new units at an existing facility would be the same as described in Option 1.

4. Option 4—Uniform Impingement Mortality Controls at Existing Facilities With Design Intake Flow of 50 MGD or More; BPJ Permits for Existing Facilities With Design Intake Flow Between 2 MGD and 50 MGD DIF; Uniform Entrainment Controls for All New Units at Existing Facilities

Under Option 4, only in-scope existing facilities with a design intake flow of 50 MGD or more would be required to comply with uniform national impingement regulatory requirements as described in Option 1 above. In-scope facilities with a design intake flow less than 50 MGD would not be subject to the national impingement requirements in today's proposed rule but would continue to have their 316(b) permit requirements established on a case-by-case, best professional judgment basis. In the case of an existing facility below 50 MGD that adds a new unit, the flow associated with the new unit would be subject to the uniform entrainment requirements based on closed cycle cooling. Finally, all existing facilities withdrawing in excess of 2 MGD of design intake flow would be subject to entrainment controls established on a site-specific basis.

EPA considered additional thresholds, subcategories, and other factors to explore other options; see Chapter 7 of the TDD for more information. In particular, EPA considered an approach that required impingement mortality controls only, but is not proposing such an approach because it would only address one-third of the mortality due to impingement and entrainment on a nationwide basis and EPA believes there is value in the structured site-specific entrainment BTA determination required in Option 1. As discussed in Section VI.E, EPA is aware of technologies that can further reduce entrainment mortality for some facilities. EPA also considered an approach that would establish both impingement and entrainment mortality requirements on a case-by-case basis taking into account the factors at a particular facility, but is not proposing such an approach because there are low-cost technologies for impingement mortality that are available, feasible, and demonstrated for facilities on a national basis. EPA requests comment on these and the other approaches discussed in Chapter 7.

E. Option Selection

EPA is proposing Option 1 as best technology available for minimizing adverse environmental impact under section 316(b) of the CWA. As previously explained, in evaluating technologies that reduce impingement or entrainment mortality as the possible basis for section 316(b) requirements, EPA assessed a number of different technologies. Based on this technology assessment, EPA concluded that closed-cycle cooling reduces impingement and entrainment mortality to the greatest extent.

But EPA has determined that closed cycle cooling is not the "best technology available" for this proposal. After considering all of the relevant factors, EPA proposes that it should not establish a uniform BTA entrainment standard based on closed-cycle cooling for existing facilities other than for new units. Instead, for existing facilities other than new units, EPA is proposing that the permitting authority should establish BTA entrainment mortality controls on a site-specific basis. Site-specific proceedings are the appropriate forum for weighing all relevant considerations in establishing BTA entrainment mortality controls as discussed in section F below.

EPA proposes to reject closed-cycle cooling as the basis for national entrainment controls and choose an option under which the permitting authority would establish entrainment controls on a site-specific basis after considering specified factors. EPA concluded that closed-cycle is not the best technology available for minimizing adverse environmental impact on a national basis. The record shows that closed-cycle cooling is not practically feasible in a number of circumstances. While EPA cannot identify with precision the extent of these limitations on installation on closed-cycle on a nation-wide basis, EPA knows that the circumstances are not isolated or insignificant. In light of this, EPA decided that it should not establish closed-cycle cooling as the presumptive BTA entrainment control. Instead, entrainment controls should be determined in a site-specific setting where the opportunity for local community input in decision-making process will be maximized.

Four factors, in particular, led EPA, for this proposal, to reject a uniform standard based on closed-cycle cooling and illustrate why site-specific standard setting is the proper approach here. These factors are energy reliability, air emissions permits, land availability, and remaining useful plant life. Further explanation is provided below as to why these factors support establishing BTA entrainment mortality control on a site-specific basis as discussed in section F below.

As noted, the Supreme Court in its *Entergy* decision determined that EPA may permissibly consider the benefits, both quantitative and qualitative, derived from reductions in the adverse environmental impacts associated with cooling water intake structures and the costs of achieving them and determine the extent of reductions warranted under the circumstances. Further, E.O. 13563 directs agencies, to the extent permitted by law, to propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify). E.O. 13563, Sec. 1(b)(1).

Pursuant to the principles spelled out in the Executive Order, EPA has assessed costs and benefits for its proposed regulatory option and has reasonably determined that the benefits of its proposed rule justify the costs. EPA has analyzed the social cost of this rule to be $384 million annually. New unit requirements would cost $15 million per year. As will be described in more detail below, there are significant benefits associated with the proposed rule. These benefits include the annual reduction in impingement of 615 million age-one equivalents. In addition, there are important other benefits that EPA was not able to fully quantify such as reductions in impingement and entrainment at new units, impacts to many shellfish species, and non-use values associated with the vast majority of fish and shellfish. The rule would also require establishing site-specific entrainment control through a process in which specific environmental conditions and the localized benefits of entrainment reductions will be assessed along with the costs of controls. The information generated in the required studies would enhance the transparency of decision-making, and the opportunity for meaningful public participation and ensure decision-making based on the best available data. Overall, these requirements will foster protection and restoration of healthy aquatic ecosystems that have important commercial, recreational, aesthetic and cultural values to their surrounding communities. Many of the benefits that would result from the rule are not quantified, and as a result the Agency's quantitative benefits analysis underestimates the totality of the rule's benefits. Based on the record, EPA has determined that the proposed impingement and entrainment mortality controls will result in benefits that justify the costs of the rule.

EPA would also note that its valuation of the benefits is not yet complete. For example, EPA's analysis does not fully quantify or monetize certain potentially important categories of benefits, such as existence values for threatened and endangered species, secondary and tertiary ecosystem impacts, benthic community impacts, shellfish impacts and the impacts arising from reductions in thermal discharges that would be associated with closed cycle. Changes in fish assemblages due to impingement, entrainment and thermal effects are also not fully valued. These categories of benefits that are not fully valued are often referred to as non-use benefits: those benefits people derive absent a use or activity, such as fishing; the value one places on knowing that an aquatic ecosystem is healthy is a non-use value. Non-use benefits could be more completely evaluated than they have been to date. EPA intends to characterize these benefits more fully through the use of a stated preference survey of the general population and will consider the results of this survey analysis in development of the final rule. Although not discussed in this preamble, EPA also conducted an alternative benefits analysis that is suggestive of the potential for a more complete analysis to result in monetary benefits that are much more in line with social costs (see chapter 9 of the EEBA). These factors all lend further support to EPA's conclusion that benefits associated with the proposal justify its costs.

EPA is proposing that the permitting authority would consider social costs and benefits on a site specific basis in establishing entrainment mortality controls. This approach is consistent with the direction of E.O. 13563 and supported by several considerations.

On the basis of currently available information, a national evaluation of benefits no matter how accurate would necessarily fail to account for the variations in benefits from location to location. A national assessment would tend to mask variations in benefits and costs from different geographical locations for different water bodies. Thus for example, some fish species at coastal facilities have biological spawning attributes that differ from those at other locations. The proportion of the receiving water withdrawn for cooling may also vary among sites. The values that communities place on their resources may vary from site to site. As a consequence, for example, one ecological environment may experience large masses of hardier eggs subject to potential entrainment while another will have fewer but less hardy eggs susceptible to entrainment. The resulting differences in the value of reduced entrainment—which may be dramatic for some sites—necessarily disappear in a national aggregation of results. The Agency has decided this masking of variation in benefits supports a requirement to consider the localized benefits of entrainment control technologies in the site-specific process to establish entrainment mortality controls.

Today's proposed rule establishes requirements based on closed-cycle cooling for new units added to an existing facility that are not a "new facility" as defined at § 125.83. The requirements for new units are essentially the same as the requirements for a new facility in the Phase I rule.

EPA also considered a variation of Option 1 that would exclude existing facilities (except existing facilities that add a new unit) with a design intake flow under 50 MGD from the national impingement mortality requirements of today's proposal (Option 4). These smaller facilities would continue to be permitted on a case-by-case, best professional judgment basis for both impingement and entrainment controls. Under this option, 98.9 percent of the monetized benefits of Option 1 are realized. In addition, almost all small businesses would be excluded from the impingement requirement of the national rule, thereby reducing impacts of the national rule to small businesses. The cost of Option 4 would result in savings of $57 million over Option 1.

EPA rejected Option 4 for the proposal as BTA because EPA found that Option 1 is available, feasible, and demonstrated for all in-scope facilities on a national basis. Moreover, EPA analysis showed that economically Option 1 does not have a significant impact on a substantial number of small entities, including those that would be exempted from the national impingement mortality controls under Option 4. Of the 13 full-facility closures discussed below in Section VII, none are predicted to be small businesses. Additionally, the analysis performed under the Regulatory Flexibility Analysis showed that under Option 1, five to six small entities would incur costs exceeding 1 percent of revenue and 3 small entities would incur costs exceeding 3 percent of revenue. As percentages of the estimated total of small in-scope entities (56–96 small in-scope entities, see above), these small entities represent 5–13 percent of small in-scope entities at the 1 percent of revenue threshold, and 3–5 percent of small in-scope entities at the 3 percent of revenue threshold.

Option 4 is similar to the final determination with respect to the Phase III rule, which relied on BPJ to determine impingement and entrainment BTA for all facilities with DIF less than 50 MGD. Unlike the Phase III determination, Option 4 would not rely on BPJ for new units at existing facilities or manufacturing facilities with DIF greater than 50 MGD. This is consistent with the recommendations of the Small Business Advocacy Review Panel for the Phase III rule, which noted that an applicability threshold in the range of 20 to 50 MGD would remove a significant number of Phase III facilities, but only a small percent of flow, from coverage under national requirements, and recommended that EPA analyze a range of potential thresholds, particularly those between 20 and 50 MGD. EPA is also aware of concerns that even though Option 1 by itself does not have a significant adverse impact on a substantial number of small entities, many of the small entities affected by the rule, particularly those in the electric power sector, are subject to cumulative impacts from a number of other major regulations that will likely have to be implemented in the same time frame as this rule. For the final rule, EPA will also evaluate the relative costs and benefits of Option 4, once it has more complete benefits information, including results from its WTP Survey on impacts to fish populations. EPA solicits comment on Option 4 and the impacts, including the cumulative impacts of today's proposal on small entities generally. EPA also requests comment on whether, if Option 4 were adopted for the final rule, it should include uniform national requirements for new units at existing facilities with DIF less than 50 MGD based on closed-cycle cooling.

F. Four Factors Support EPA's Decision To Establish Site-Specific BTA Entrainment Controls for Existing Facilities

The four key factors that support determining entrainment mortality controls on a site-specific basis (except with respect to new units) and rejecting Options 2 and 3 are energy reliability, increased air emissions, land availability, and remaining useful life. First, EPA recognized that there may be potential adverse consequences to the reliability of energy delivery on the local level from the installation of cooling towers. Second, EPA also is aware that increased air emissions may be associated with increased combustion of fossil fuel as the result of installation of closed cycle cooling, and additional PM formulation associated with plume drift (even with plume abatement technology). These increased air emissions have human health, welfare, and global climate change impacts which must be considered. Furthermore, it may be difficult or impossible to obtain air permits for cooling towers at existing facilities located in nonattainment areas or attainment areas with maintenance plans. Third, EPA has identified land availability concerns that might limit the feasibility of the installation of cooling towers on a site-specific basis. Finally, EPA concluded that there are circumstances in which construction and installation of cooling towers might not be warranted given the remaining useful life of a particular facility. How all of these factors support the Agency's conclusion that site-specific, not national, entrainment controls for most existing facilities except those installing new units is discussed in detail below.

1. Energy Reliability Should Be Considered on a Localized Basis

During EPA's site visits, several urban areas were identified where the existing transmission system would not be able to transfer sufficient electricity during periods of extended downtime. This limitation to reliability occurs even when a surplus of electricity can be generated within the same NERC region. For example, EPA identified localized circumstances in Los Angeles and Chicago where an extended outage of one or more generating units could not be readily replaced by excess capacity in nearby areas. Currently available models are not able to predict localized impacts, and instead are limited to measures of reserve capacity in broader geographic regions. This uncertainty about the extent and likelihood of local reliability impacts is an important consideration in the decision to propose requiring site-specific development of section 316(b) entrainment requirements.

One approach EPA could have adopted in today's proposed rule would have been to establish a uniform entrainment requirement and then to address these local reliability concerns by providing permitting authorities the flexibility to establish extended compliance timelines (*i.e.,* 10 to 15 years) (see Option 2). This would have allowed facilities to develop more workable construction schedules with their permit writers and coordinate with NERC to schedule installation down times accounting for generating supply reliability needs. This approach would have been consistent with EPA's assessment that, at the national level (rather than local level), closed-cycle cooling would not pose material energy reliability consequences; see EA for more information. EPA was concerned that such a flexible approach, however, would not resolve all local reliability concerns, because currently available information is not adequate to establish either the extent or significance of possible electric reliability concerns.

These same concerns would not apply in the case of the installation of new units because of the smaller nature of such projects and the availability of options like seasonal operation and portable cooling towers to address the flow reduction requirements. Since the unit is not yet online, the potential for local energy reliability to be compromised is minimal; also, local energy reliability is likely improved with the addition of the new unit, even if older units are later retired.

2. Increased Air Emissions Could Be a Factor on a Local Basis

As previously discussed, closed-cycle cooling would result in increased air emissions of various pollutants, including particulates, sulfur dioxide, nitrogen oxides, mercury, and greenhouse gases, among others.[52] As a result of the installation of closed-cycle cooling structures, fossil-fueled facilities would need to burn additional fuel (thereby emitting additional PM, CO_2, SO_2, NO_X, and Hg). There are two reasons for this: (1) To compensate for energy required to operate cooling towers, and (2) slightly lower generating efficiency attributed to higher turbine backpressure. In contrast to retrofits, new units can have their cooling water intake systems optimized for cooling towers, reducing the size of the cooling towers, increasing their efficiency, and reducing energy requirements (see Section VI.E).

The impact of the increased emissions varies based on the local circumstances. The increased emissions may consist of cooling tower emissions, stack emissions from increased fuel usage, and plumes of water vapor. EPA's analysis suggests that the most significant impacts will be specifically for $PM_{2.5}$, which, in addition to increased mortality and morbidity, may result in a facility having difficulty in obtaining air permits in those localities in non-attainment for $PM_{2.5}$ because of the need to identify offsets to its emissions. EPA notes that while there is the potential for increases in PM (*e.g.,* salt drift) in the vicinity of any wet cooling tower, there are plume abatement and drift eliminator technologies that may address this concern (and EPA has included costs for such technologies in its analysis of Options 2 and 3). However, emissions may not be eliminated entirely. EPA expects most effects of PM from cooling tower emissions would be so localized as to be wholly on the facility's property. (See DCN 10–6954.) EPA recognizes this is separate from PM emissions from the stack as a result of increased fuel usage. In addition, plumes of water vapor from the cooling tower may cause safety issues due to icing of nearby roadways, and visibility constraints for facilities located near an airport. EPA's review of emissions data from E–GRID (year 2005) suggests that impacts from other pollutants will be less significant, but on a localized basis these could still be significant. They include human health, welfare, and global climate change impacts associated with a variety of pollutant that are emitted from fossil fuel combustion generally. EPA is not able to quantify the frequency with which facilities may experience these local impacts, and therefore EPA believes a site-specific assessment must be conducted to fully address such local impacts.

EPA believes that emissions are less of a concern at new units. The condensers can be optimized for closed-cycle, reducing energy requirements, and high efficiency cooling towers can be incorporated into the design of the new unit, potentially allowing for installation of smaller cooling towers. Turbine backpressure and the associated energy penalty can be eliminated in a new unit. However, new units will still have a parasitic energy penalty. Therefore energy penalties and air emissions for tower operations can be minimized but not eliminated. The effects of requiring closed cycle cooling at new units of existing facilities is similar to the effects of this requirement at new facilities and would not pose an unacceptable impact. See the TDD for more information.

3. Land Availability Could Be A Factor on a Localized Basis

While EPA's record indicated that the majority of facilities have adequate available land for placement of cooling towers,[53] some facilities do have feasibility constraints. Based on site visits, EPA has found that several facilities have been able to engineer solutions when faced with limited available land. EPA attempted to determine a threshold of land (for example, one option explored a threshold of approximately 160 acres per GW) below which a facility could not feasibly install cooling towers. While EPA originally estimated as many as 23 percent of facilities would not have enough space,[54] EPA found some facilities with a small parcel of land were still able to install closed-cycle cooling by engineering creative solutions. On the other hand, EPA found that some facilities with large acreage still could not feasibly install cooling towers due to local zoning or other local concerns. In conjunction with setback distances to mitigate noise and plume abatement (based on GPS mapping of residential areas), EPA estimates as many as 25 percent of facilities may have one or more constraints on available space that would limit retrofit of cooling towers for the entire facility or would result in increased compliance costs. At this time, EPA lacks adequate data to better analyze how land constraints can be accommodated at existing facilities.

In contrast, for new units, because the amount of space dedicated to closed-cycle would be limited to the new unit rather than the entire facility, space constraints would be much less of an issue. New units also pose the opportunity to properly design an optimized closed-cycle cooling system for the new unit. Retrofitting an existing facility would require a facility to identify (or possibly obtain) enough acres to accommodate the cooling towers and their tie-in. By not uniformly requiring facilities to retrofit to closed-cycle, EPA has determined that more land is available for new unit construction, especially in light of compact design and more efficient use of limited resources. Furthermore, new units and their corresponding cooling system can be built in stages rather than as a facility-wide retrofit.

While EPA has concluded that space constraints would not foreclose the installation of closed cycle cooling for new units at existing facilities, EPA has concerns about whether, on a national basis, physical geography would constrain the full retrofit of closed-cycle cooling to existing facilities. Under the

[52] EPA recognizes that retrofitting closed cycle cooling could be combined with other energy efficiency or pollution control technologies with the net effect of reducing air emissions; however, facilities could (and may well have to under other rules) install such technologies anyway, without converting to closed cycle cooling as well. Comparing closed-cycle cooling to once-through cooling with all other technologies held constant, there is an energy penalty that would lead to greater air emissions.

[53] In the case of fossil fuel plants, scrubber controls may also be newly required to comply with air rules and standards.

[54] EPRI reported at least 6 percent of sites evaluated were deemed "infeasible" on the basis that no space was available on which to locate a cooling tower. (DCN 10–6951) While EPA does not have access to the facility level data, and is therefore unable to confirm the infeasibility analysis, EPRI's report supports EPA's assertion that there is significant uncertainty around space constraints for facilities to install closed-cycle cooling.

circumstances, EPA decided not to propose uniform entrainment standards for all existing facilities based on closed-cycle cooling. Instead, EPA has determined that it should establish a process for site-specific determination of entrainment controls. Site-specific proceedings would provide the opportunity to address these issues, along with the other factors discussed in this preamble in determining which additional entrainment mortality controls, if any, are appropriate.

4. Remaining Useful Plant Life Could Be a Factor on a Facility Basis

Many facilities are nearing the end of their useful life. Considering the long lead time to plan, design, and construct closed-cycle cooling systems such as wet cooling towers, EPA proposes that the permit authority should be given the latitude to consider the remaining useful plant life in establishing entrainment mortality standards for that facility. The remaining useful plant life along with other site-specific information, would affect the evaluation of the benefits (non-monetized and monetized) of closed-cycle at a particular facility. For example, closed-cycle at a facility that is going to shut down in 3 years would not result in the benefits that a facility that would continue to operate for 20 years. Because of this factor, EPA proposes that requiring closed-cycle cooling should be evaluated on a facility-specific basis, arguing against a uniform national entrainment mortality standard.

This is obviously not an issue for new units. A new unit has its full useful life before it and thus would experience the maximum possible entrainment mortality reductions throughout that useful life. Considering this factor, EPA is proposing that new units be treated the same as new facilities. EPA believes this factor, along with the other factors discussed above, indicates that it is reasonable to require new units to meet entrainment mortality requirements based on closed-cycle cooling.

G. The Process for Establishing Site-Specific BTA Entrainment Controls

EPA believes that the factors discussed above support establishment of BTA entrainment requirements on a site-specific basis and counsels against establishing a national rule based on a single BTA technology for entrainment controls. In addition, there are other factors that also support site-specific decision-making. Thus, as noted, for example, a national weighing of cost and benefits tends to mask important local differences and argues for site-specific evaluations.

As a result, EPA proposes that closed-cycle cooling for all existing units is not BTA on a national basis, except for new units at existing facilities.

EPA has decided to propose Option 1 as the basis for national performance standards that represent the "best technology available" for cooling water intake structures at existing facilities. EPA proposes that a uniform national impingement standard coupled with entrainment controls determined on a site-specific basis represents the best technology available for minimizing the adverse environmental impacts associated with intake structures. EPA's proposed decision to reject a single uniform national entrainment standard is based on closed-cycle cooling not being the "best technology available" on a national basis and not warranted under the circumstances. This proposed decision flowed from EPA's consideration of the factors described above and its conclusion that determination of BTA for entrainment through a process that allowed full and site-specific assessment of these factors with respect to candidate entrainment controls including closed-cycle cooling represented the most appropriate course here.

H. Implementation

EPA's proposal would require a site-specific determination of BTA. In that process, the permit writer would have access to all the information necessary for an informed decision about which additional technology to reduce entrainment mortality, if any, is BTA, including a full consideration of whether the benefits justify the costs.

The adoption of the proposed Option 1 approach of site-specific BTA entrainment decisions will result in one of two outcomes at any facility: BTA is an entrainment mortality technology beyond what the facility has already installed (this may include closed cycle cooling or other technologies, see Section VI.B and C), or BTA requires no additional controls for entrainment mortality. Thus, EPA expects that, under the proposed approach, there will be additional entrainment controls for some facilities and none for others.

EPA notes that in a number of areas of the country (California, Delaware, New York and New England; see, *e.g.,* DCNs 10–6963 and 10–6841, as well as EPA Region I's Brayton Point), permitting authorities have already required or are considering requiring existing facilities to install closed-cycle cooling operations. EPA supports those state efforts and determinations and thinks that similar decisions would be able to be made under this proposed rule.

The proposal would require that the facility's permit application must include the following information: The facility would submit an engineering study of the technical feasibility and incremental costs of candidate entrainment mortality control technologies. The facility would also study, evaluate, and document: the technical feasibility of technologies at a minimum including closed-cycle cooling and fine mesh screens with a mesh size of 2 mm or smaller; engineering cost estimates of all technologies considered; any outages, downtime, or other impacts to revenue along with a discussion of all reasonable attempts to mitigate these cost factors; and a detailed discussion of the magnitude of water quality benefits, both monetized and non-monetized, of the candidate entrainment mortality reduction technologies evaluated. Finally, the study must include a detailed discussion of the changes in non-water quality factors attributed to technologies and/or operational measures considered, including but not limited to increases and decreases in the following: energy consumption; thermal discharges; air pollutant emissions including particulates and their health and environmental impacts; noise; safety (*e.g.,* visibility of cooling tower plumes, icing); grid reliability, and facility reliability. See Section IX for a thorough discussion of these study requirements.

Certain facilities would submit an Entrainment Characterization Study including an entrainment mortality data collection plan that would indicate, at a minimum, the specific entrainment monitoring methods, taxonomic identification, latent mortality identification, documentation of all methods, and quality assurance/quality control procedures for sampling and data analysis appropriate for a quantitative survey. EPA would also require peer review of the entrainment mortality data collection plan. Peer reviewers would be selected in consultation with the Director who may consult with EPA and Federal, State, and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s). Further, facilities with greater than 125 MGD AIF must complete an Entrainment Characterization Study (ECS). The ECS could include information already collected to meet current § 122.21(r)(2)–(r)(4) requirements. With the information in this study, the permit writer will know more about potential entrainment mortality reductions. Data from the ECS would also corroborate any through-plant entrainment survival study results from Performance Studies conducted in 122.21(r)(7). Data collected as part of the ECS would support the Benefits Valuation Study in 122.21(r)(11) by parsing entrainment mortality, for example, by recreational/commercial species and those species that are strictly forage species,[55] by species most susceptible to thermal effects (including thermal barriers), and by species of particular local or regional concern and threatened and endangered species. EPA's benefits estimate were based on an extrapolation of available I&E mortality studies; the specific entrainment characterization study conducted by a facility may lead to a different estimate of I&E mortality for that facility than its portion of EPA's regional estimate in the analysis in Section VIII.

The purpose of the ECS is to better understand, and thus help minimize, the impact of entrainment on species of concern. More specifically, the ECS should identify species of concern that may be entrained, and estimate their baseline mortality rates given current entrainment controls. Moreover, the ECS should include as much information as practical about the aquatic ecosystem effects of entrainment mortality of species of concern. An understanding of the potential ecosystem consequences of entrainment mortality for species of concern will help inform decisions about permit requirements for additional technologies and management practices. EPA will endeavor to identify high quality examples of ECSs as they are completed, and post them to the web site for this rule as a resource for ECS preparation.

Following the permit writer's review of this information, the permit writer must determine what BTA entrainment standard to propose and explain in writing the basis for the proposal. The written explanation and the draft permit would then be available for comment from the interested public under the Permitting Authority's normal permitting process. Therefore, EPA's proposed BTA standard would establish uniform requirements for impingement mortality and a process in which BTA entrainment controls would be determined on a site-specific basis.

[55] Distinctions between predator and prey cannot be made on the basis of species alone; the young of some recreational and commercial species function as forage fish.

I. EPA's Costing of the Preferred Option

For the purposes of this proposal, EPA has prepared an economic analysis according to Executive Order 12866. For the preferred option, this analysis incorporates the full costs and partially monetized benefits of impingement controls, including the costs of conducting the entrainment characterization studies. There may be additional costs and benefits associated with reductions in entrainment mortality that result from the Director's BTA entrainment determinations. Because this process will play out over the next 10 to 15 years as Directors consider waterbody-specific data, local impacts, and public comment, and weigh costs and benefits of further entrainment reductions, air quality impacts, grid reliability, and land availability, estimates of the costs of these site-specific determinations would be highly speculative.

For illustrative purposes, EPA analyzed two hypothetical outcomes for site-specific BTA determinations under Option 1. EPA analyzed the cost of closed-cycle at the 76 largest fossil fuel plants withdrawing from tidal waters and arrived at an annual compliance cost for these facilities of $762 million. EPA also analyzed a variant on the above scenario. EPA estimates this second scenario would involve 46 facilities at an annual compliance cost of $480 million, assuming only baseload and load following facilities would retrofit to closed-cycle cooling.

These hypothetical scenarios illustrate the site-specific costs if a significant number of facilities install and operate a closed-cycle cooling system. These scenarios assume facilities would install only closed-cycle cooling and operate it year-round. This may represent an upper-bound cost for those facilities. EPA also assumed that cooling towers will be installed at fossil fuel plants within 10 years. EPA is aware that there are other possible scenarios for projecting which facilities might be required to install closed-cycle cooling or other entrainment mortality technologies as a result of individual BTA determinations. Some of these would show lower or higher costs than those presented here. EPA requests comment on other scenarios that might better capture the range of costs that result from the structured analysis of entrainment mortality BTA required by today's proposed rule.

J. Consideration of Cost/Benefit on a Site-Specific Basis

In establishing performance standards for entrainment controls, as the Supreme Court in *Entergy* made clear, one factor that EPA may consider is the costs and benefits associated with various control options. That is, in setting standards, EPA may consider the benefits derived from reductions in the adverse environmental impacts associated with cooling water intake structures and the costs of achieving the reductions. As previously explained, EPA has determined that the benefits of the proposed rule justify its costs. In addition, EPA has explained why consideration of costs and benefits is also appropriate in the site-specific permit setting when establishing entrainment controls.

In the site-specific proceeding, the permit writer would be required to consider, among other factors, quantified and qualitative social benefits and social costs of available entrainment controls, including ecological benefits and benefits to any threatened or endangered species. The permit writer would be able to reject otherwise available entrainment controls if the costs of the controls are not justified by their associated benefits (taking into account both quantified and non-quantified benefits) as well as the other factors discussed in the proposed rule.

In making the site-specific entrainment BTA determination, the proposal would require that the Director consider the information required under § 122.21(r) to be submitted with the section 316(b) permit application. Further, in the case of the larger cooling water intake structures (125 MGD AIF or greater), the proposed rule would require submission of additional information including, among other things, studies on entrainment at the facility, the costs and feasibility of control options, and information on the monetized and non-monetized benefits of entrainment controls. In evaluating benefits, the Director should not ignore benefits that cannot be monetized and consider only the I&E reductions that can be counted. The assessment of benefits must take into account all benefits, including categories such as recreational, commercial and other use benefits, benefits associated with reduced thermal discharges, reduced losses to threatened and endangered species, altered food webs, nutrient cycling effects, and other nonuse benefits. Merely because there is no price tag on those benefits does not mean that they are not valuable.

Under the proposal, the Director must explain the basis for rejecting an available technology not selected for entrainment control in light of the submissions, with a consideration of the same four factors that argued against a uniform requirement for closed-cycle cooling. EPA expects that the Director's decision about BTA controls will also reflect consideration of the costs and benefits (monetized and non-monetized) of the various control technologies considered for the facilities.

As noted, the permit writer may reject an otherwise available entrainment technology as BTA (or not require any BTA controls) if the costs of the controls are not justified by the benefits. EPA decided to adopt this approach in determining site-specific entrainment controls because it is permissible under *Entergy* and consistent with the more than 30-year history of section 316(b) permitting decisions as well as E.O. 13563.

This history illustrates the role that cost/benefit considerations have played. As early as 1977, EPA issued a permitting decision and a General Counsel opinion that explained that, while Section 316(b) does not require a formal cost-benefit analysis, the relationship of costs and benefits may be considered in 316(b) decision-making. *In re Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2),* No. 76–7, 1977 WL 22370 (June 10, 1977), remanded on other grounds, 572 F.2d 872 (1st Cir. 1978); accord *In re Central Hudson Gas & Elec. Corp., Op. EPA Gen. Counsel,* NPDES No. 63, 1977 WL 28250, at *8 (July 29, 1977). In the more than 30 years since then, EPA and state permitting authorities have considered the relationship between costs and benefits to some extent in making individual permitting decisions. *See, e.g., In re Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2),* No. 76–7, 1978 WL 21140 (E.P.A. Aug. 4, 1978), aff'd, *Seacoast Anti-Pollution League* v. *Costle,* 597 F.3d 306, 311 (1st Cir. 1979).

Because E.O. 13563 directs agencies to propose and adopt rules only upon a reasoned determination that the benefits justify the costs, EPA is proposing to apply this same standard in BTA entrainment determinations. This approach is consistent with the framework EPA has traditionally followed and would allow for a full assessment in permit decisions of both qualitative and quantitative benefits and costs. As designed, EPA's proposed requirement for the establishment of site-specific BTA entrainment requirements strikes an appropriate balance between environmental improvements and costs, allowing the permitting authority to consider all of the relevant factors on a site-specific basis and determine BTA on the basis of those factors.

After considering all of the factors relevant to a particular site, the Director must establish appropriate entrainment controls at those facilities. The Director must review available control technology and may reject otherwise available entrainment controls as BTA if the social costs of the controls are not justified by their social benefits (taking into account both quantified and non-quantified benefits) or if there are other adverse factors that cannot be mitigated that the Director deems unacceptable. As designed, EPA's proposed requirement for the establishment of site-specific BTA entrainment requirements strikes an appropriate balance between environmental improvements and costs by electively requiring closed-cycle cooling or other entrainment technologies at some facilities, without requiring the same technologies at all facilities.

VII. Economic Impact of the Proposed Rule

This section summarizes EPA's analysis of the social cost and economic impact for the following regulatory options: Option 1: Impingement mortality (IM) limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD), closed cycle cooling or its equivalent for new units, and a site-specific determination of entrainment BTA for all other facilities: Option 2: Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 125 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3: Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens, for all facilities with flow greater than 2 MGD; and Option 4: Impingement mortality (IM) limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD), closed cycle cooling or its equivalent for new units, and a site-specific determination of entrainment BTA for all other facilities and of impingements mortality controls for facilities with flow less than or equal to 50 MGD. These options are described more fully in Section VI.C.

The first part of this section provides an overall summary of the costs of the regulatory options to complying facilities and federal and state governments. This discussion is followed by a review of the method for developing compliance cost estimates. The third part provides an estimate of the total social costs of the regulatory options. The final part reviews the economic impact of the regulatory options.

A. Overview of Costs to Complying Facilities and Federal and State Governments

For estimating the total cost and economic impact of the regulatory options presented in this preamble, EPA estimated costs associated with the following cost components: Initial fixed and capital costs, annual operating and maintenance costs, downtime costs, recordkeeping, monitoring, studies, and reporting costs. The cost estimates reflect the incremental costs attributed only to today's proposal. For example, facilities with closed-cycle recirculating systems would likely already meet all of the proposed performance standards, and therefore most facilities with closed-cycle cooling would not incur costs to retrofit new technologies (though such facilities would still incur some components of permitting costs). EPA assumes, based on its technical survey data that most closed-cycle cooling systems operate with an intake velocity of less than 0.5 fps, and so would comply with the impingement BTA requirements. However, EPA recognizes a facility with closed-cycle cooling may incur additional costs to meet the proposed performance standards; some facilities with closed-cycle cooling were assumed to incur costs of modified screens with a fish handling and return system. Because EPA assumes the fish handling and return system would meet the requirements to eliminate entrapment, EPA has not included further costs for entrapment.

For the economic analyses, EPA distinguished between the two industry groups covered by the standards for existing facilities as follows:

> Manufacturing and Other Industries ("Manufacturers")—facilities in the paper, aluminum, steel, chemicals, petroleum, food and kindred products, and other industries. In addition to engaging in production activities, some of these facilities also generate electricity for their own use and occasionally for sale. Electric power producers ("Electric Generators")—facilities owned by investor-owned utilities, municipalities, States, Federal authorities, cooperatives, and nonutilities, whose primary business is electric power generation or related electric power services.

Costs to complying Electric Generators and Manufacturers include technology costs, cost of installation downtime, and costs of administrative activities; in addition, electric generating facilities are expected to incur certain energy penalty costs (*see*

Chapter 3 of the EBA report for a discussion of costs to complying facilities and of implementation costs to federal, State, and local governments). Manufacturing facilities may also need additional electricity to run certain technologies, but if they do not produce this electricity themselves, these additional energy requirements are included in operating costs, rather than accounted for separately as an energy penalty. Electric Generators incurring these costs include facilities owned by private firms, governments, and electric co-operatives. Manufacturers incurring these costs include facilities owned by private firms only. The administrative costs to federal, State, and local governments include the costs of rule implementation—*e.g.,* permits, monitoring, and working with in-scope facilities to achieve compliance. Costs are initially developed on a pre-tax, as incurred, basis. These costs underlie the analysis of the social costs of the regulatory options and are also used in assessing the impact of compliance requirements on in-scope facilities and the affected industrial categories. In the analysis of facility impacts, costs are accounted for on an after-tax basis.

B. Development of Compliance Costs

This section describes the data and methods used to estimate compliance costs of the options considered and the costs of today's proposed rule. Costs were developed for technology controls to address impingement mortality separately from controls for entrainment mortality, as the requirements of the various rule options considered would lead to different technologies being used by each facility to comply. Some of the options considered would impose different compliance timelines for impingement mortality and entrainment mortality technologies. As a result, different methodologies were used and each is briefly described below. More detailed information on these methodologies, as well as costs of other technologies and regulatory approaches, are available in the TDD.

1. Combined Facility-Specific and Model-Facility Approach

EPA develops national level costs estimates for facilities within scope of the various regulatory options. In general, facility-specific data can be used to determine what requirements apply to a given facility or whether that facility would already meet the requirements set forth in the proposed rule. This approach requires facility-specific technical data for all of the approximately 1,200 existing facilities in scope. An alternative approach is to develop a series of model facilities that exhibit the typical characteristics of the affected facilities and calculate costs for each model facility; EPA would then determine how many of each model facility would be needed to accurately represent the full universe of affected facilities.

EPA has estimated costs for potentially regulated facilities using a combination of the facility-specific and model facility approaches. The facility-specific approach used in this effort involved calculating compliance costs for 891 individual facilities for which EPA had detailed technical data from its various industry questionnaires regarding the intake design and technology. Specifically, these are the in-scope facilities that completed the detailed technical questionnaire. Where facilities reported data for separate cooling water intake structures (CWISs), compliance costs may have been derived for each intake and these intake costs were summed together to obtain total costs for each facility. These facilities became model facilities and each facility's costs were then multiplied by a weighting factor (derived from a statistical analysis of the industry questionnaire) specific to each facility to obtain industry-wide costs for the national economic impacts analyses. The weighting factors are similar to ones derived during the development of the 2004 Phase II Rule for extrapolating the impacts of DQ facilities to all in-scope facilities.

2. Updates to the Survey Data

In the 2004 Phase II rule, EPA developed facility-specific cost estimates for all facilities and published those costs in Appendix A (69 FR 41669). Since the initial implementation of the 2004 Phase II rule, EPA identified several concerns with using only the facility-specific costing approach, as well as the use of those costs in Appendix A. Since 2004, EPA has collected data from industry and other groups as described in section III. These data generally reflect changes to actual intake flow, design intake flow, intake velocity, technology in place, and operational status. EPA developed a new master database including this new data to supplement the data from the detailed technical questionnaire. Although it has been approximately 10 years since the detailed technical questionnaire was initially collected, EPA has conducted over 50 site visits, reviewed current permits, and conducted literature reviews including comparisons to data collected by EPRI, EIA, and EEI. Based on that review EPA has concluded the master database is representative and appropriate for most facilities.[56] The following section describes how EPA used this new database to estimate compliance costs.

3. Tools for Developing Compliance Costs

During the 2004 Phase II rule, EPA began developing a spreadsheet based tool that would provide facilities and permit authorities with a simple and transparent method for calculating facility-specific compliance costs. EPA refined the tool in developing the Phase III regulations. EPA has since made further refinements to the cost tool, which was used to calculate the compliance costs for impingement mortality for today's proposed rule. The cost tool employs a decision tree (*see* the TDD for a graphical presentation of the decision tree) to determine a compliance response for each model facility and assigns a technology "module" that represents a retrofit to a given technology. Cost estimates are derived through a series of computations that apply facility-specific data (such as DIF, width of intake screens, etc.) to the selected technology module. Cost tool outputs include capital costs, incremental operation and maintenance (O&M) costs, and installation downtime (in weeks).

To calculate the compliance costs of retrofitting to closed-cycle cooling for controlling entrainment mortality, EPA utilized a second tool based on a cost-estimating spreadsheet developed by the Electric Power Research Institute (EPRI). EPRI's first draft methodology presented three different levels of capital cost (Easy, Average, Difficult) based on the relative difficulty of the retrofit project. For electric generators, EPA used costs for the Average level of difficulty, as it was developed across a broad spectrum of facilities and is the most appropriate for estimating national level costs.[57] For manufacturers, EPA used the Difficult level of retrofit costs. This reflects the more complex water systems and generally more frequent technical challenges to retrofitting closed-cycle cooling at a manufacturing facility. While some manufacturers only withdraw cooling water for power or steam generation, many manufacturers have multiple units or processes that utilize cooling water. In site visits, EPA found the largest manufacturing facilities would require multiple retrofits, and accordingly believes the

[56] EPA notes that, while it has not collected updated technical information for every facility, it has updated financial data, as discussed later in this section.

[57] For purposes of energy reliability estimates, EPA used the Difficult level for electric generators.

Difficult level of retrofit costs is more representative for purposes of estimating national level costs. Additionally, EPA's tool includes additional modifications to EPRI's methodology, such as increased compliance costs for approximately 25 percent of facilities to reflect the additional expense of noise control or plume [58] abatement, and using only the cooling water flow rate for non-contact cooling water flow [59] for purposes of estimating costs for closed-cycle cooling. EPA has included the spreadsheet tools in the docket for the proposed rule to assist both facilities and permit authorities in estimating compliance costs. (*See* DCNs 10–6655 and DCN 10–6930).

4. Which technologies form the basis for compliance cost estimates?

EPA identified two broad classes of control technologies that may be used singularly or in combination to comply with the proposed rule. These classes of control technologies are: (1) Technologies that address impingement mortality (IM) and (2) technologies that address entrainment mortality (EM). *See* Section VI for further details. Under the various options considered, a facility may be subject to one or both requirements, depending on their configuration, technologies in use, or other site-specific factors.

For the impingement mortality requirements, EPA analyzed data from a wide variety of technologies and facilities and concluded that modified Ristroph (or equivalent) coarse mesh traveling screens are the most appropriate basis for determining the compliance costs.[60] As discussed in Section VI of the preamble, a facility may also comply with impingement mortality requirements by meeting a maximum intake velocity limit. Based on facility-specific data, EPA made a preliminary assessment of which model facilities would not currently meet impingement mortality requirements through either approach, and assigned technology costs based on the installation of modified traveling screens with a fish handling and return system. This assigned technology is assumed to meet the BTA standard (*see* § 125.94(b)). However, some facilities might still incur costs for restructuring their intakes to avoid entrapment.[61] EPA solicits comment and data on the costs of this requirement.

For facilities subject to entrainment mortality requirements, EPA selected wet cooling towers as the technology basis for determining the compliance costs. In some cases, costs reflect installation of multiple technologies, as impingement mortality and entrainment mortality requirements were applied separately to each facility. EPA also evaluated other technologies for reducing entrainment mortality, such as seasonal operation of cooling towers, partial towers, variable speed pumps, and fine mesh screens. The performance of these technologies is further described in section VI; a detailed discussion of how the costs were developed may be found in the TDD.

5. How is facility downtime assessed?

Downtime is the amount of time that a facility may need to shut down due to the installation of a compliance technology. Downtime estimates primarily assume that the facility would need to completely shut down operations to retrofit an intake, such as relocating an intake, connecting wet cooling towers into the facility, or reinforcing condenser housings. Downtime estimates are provided as incremental outages, taking into account the periodic outages all facilities already incur as part of preventative maintenance or routinely scheduled outages. For example, nuclear facilities have refueling outages approximately every 18 months lasting approximately 40 days.[62] The entrainment control implementation periods, 10 years for fossil fuel plants and 15 years for nuclear plants, in Options 2 and 3 would provide facilities with an opportunity to schedule the retrofit when other major upgrades are being done, reducing downtime.

For most facilities subject to impingement mortality, no downtime was assigned. Facilities that are replacing or rehabilitating existing traveling screens typically do so one intake bay at a time without affecting the overall operations. EPA has also found that facilities that need to scrub screens do so during other routinely scheduled outages. For some compliance technologies such as relocating an intake, or expanding an existing intake to lower the intake velocity, several weeks of downtime are incurred, as these are more invasive tasks.

For facilities subject to entrainment mortality controls, EPA reviewed historical retrofit data and site visits conducted since 2004, and has largely retained its assumptions for downtime from the Phase II and Phase III rules. On average, EPA assumes the net construction downtime for a cooling tower retrofit for non-nuclear electric generators is 4 weeks. This total downtime allows for the tie-in of the cooling tower to the existing cooling water system. The refueling outage downtime, the safety-sensitive nature of nuclear facility retrofits, and other data in EPA's record supports 28 weeks as the net construction downtime for nuclear facilities. Downtime for manufacturing facilities that use cooling water for power and steam generation was converted into the incremental cost for purchase of those utilities during the outage. For individual process units other than power or steam generation units at a manufacturing facility (*i.e.* cooling water use for purposes other than power production), on average the downtime was assumed to be zero. In EPA's extensive experience with manufacturers while developing effluent guidelines, EPA found manufacturers are generally able to shut down individual intakes for specific process lines, use inventory approaches such as temporary increases of intermediate products, and develop other workarounds without interrupting the production of the entire facility. EPA requests comment from those manufacturing facilities that have made modifications to their cooling water systems on their experiences with facility downtime. See below for further discussion of how installation downtime in weeks is included in the estimated national costs.

6. How is the energy penalty assessed?

The term "energy penalty" in relation to a conversion to closed-cycle cooling has two components: One is the extra

[58] The EPRI tool includes drift abatement technologies in its cost assumptions, so no additional costs were included for drift eliminators.

[59] As described in the TDD, EPA only used non-contact cooling water flows in determining the proper size for wet cooling towers, the technology that forms the technical basis for entrainment mortality. Cooling towers are not widely used for contact cooling or process water, so these flows were excluded. For electric generators, the vast majority of flow is non-contact cooling, but manufacturers are more varied in their water usage.

[60] Note that this does not preclude the use of other technologies; EPA simply used the available performance data in deriving the performance requirements and excluded technologies that were either inconsistent performers or did not offer sufficient data for analysis in a national categorical regulation. EPA's research has shown that other technologies may also be capable of meeting the proposed requirements, but EPA did not opt to identify these technologies as the technology basis for today's proposal.

[61] Facilities incurring costs for impingement mortality are assumed to meet the requirement for entrapment. Because EPA does not know how many facilities that already comply with impingement mortality requirements would incur additional costs to avoid entrapment, EPA conducted a sensitivity analysis of the additional costs; see Chapter 12 of the TDD.

[62] Nuclear Energy Institute (NEI) reported average length of outage from 2003 to 2009.

power required to operate fans at a mechanical draft cooling tower, as well as additional pumping requirements (often referred to as the parasitic energy penalty), and the other is the lost power output due to the reduction in steam turbine efficiency because of an increase in cooling water temperature (often referred to as the turbine efficiency penalty or turbine backpressure penalty). Energy penalty costs only apply to facilities retrofitting a cooling tower; facilities installing a new impingement mortality technology will generally see little or no measureable change in energy usage. EPA's national level costs include the costs for both components. The parasitic energy penalty was included as a separate component in the O&M costs and was assessed for all facilities. The turbine efficiency penalty was typically expressed as a percentage of power output; EPA estimates the turbine efficiency energy penalty for nuclear and non-nuclear power generation would be 2.5% and 1.5%, respectively (see the TDD). For most manufacturers, the energy penalty for turbine efficiency loss for non-nuclear power plants (*i.e.,* 1.5%) was assumed. This may overstate costs where cooling water is used by a manufacturing facility for purposes other than power production.

7. How did EPA assess facility-level costs for the national economic impacts and energy reliability analyses?

To assess the national economic impacts, EPA conducted a modeling analysis using IPM (Integrated Planning Model). This model is widely used by EPA for analysis of rules and policies affecting electric generating facilities. This analysis is used to assess economic impacts, increases in household electricity bills, and changes in electricity reliability. In contrast to the model facility costing approach, the IPM model requires a facility-level cost for each facility. Model facility costs were converted to a per MGD DIF basis, and then averaged to derive cost equations using DIF as the independent variable. This cost equation thus provides average costs that can be applied to any facility by simply scaling to that facility's DIF. EPA also used a conservative compliance scenario in order to develop a bounding "worst case" impact analysis by assuming all facilities would be subject to Entrainment Mortality reductions based on closed-cycle cooling towers. In the worst case scenario EPA conducted the IPM analysis using the Difficult level cost for all facilities, thereby generating an upper bound of total costs and conservative predictions of the economic impacts. See the EBA for more information. In conducting its analysis, EPA found the equations used to derive the cost module estimates produced substantially higher costs per MGD rates at lower flow levels. To reflect the higher per unit costs of retrofits at lower DIF (*i.e.* smaller) facilities, EPA derived separate model facility cost equations for facilities with DIF <10 MGD and those with DIF ≥ 10 MGD. (See the TDD).

8. How did EPA assess costs for new units?

This section describes the data and methods used to estimate compliance costs for new units at existing electric generators and manufacturers. Compliance costs for new units at existing electric generators are calculated using a similar methodology to the compliance cost estimates for existing facilities. EPA is not able to predict which facilities will construct new units, however the national projections of increased capacity (*i.e.* additional megawatts capacity to be constructed each year) can be converted to a number of new units of a specified size; EPA then applied the cost equations to these projected new units. Based on site visits, EPA has found that industry trends towards water conservation and reuse in addition to the operational flexibility at existing manufacturers would result in no additional compliance costs for achieving flow commensurate with closed-cycle cooling at new units. EPA solicits comment on this assumption.

a. New Units at Existing Electric Generators

Power generation units that meet the definition of a "new unit" will be required to meet entrainment reduction based on closed-cycle cooling or an equivalent reduction in entrainment mortality for the cooling water component of the intake flow based on the average intake flow (AIF). Estimates for compliance costs for new units are based on the net difference in costs between what cooling system technologies would have been built under the current regulatory structure and what will be built given the change in requirements imposed by the proposed regulation. Compliance costs are derived using estimates of the new generating capacity that will be subject to these requirements.

Generally speaking, EPA has identified a number of differences in costs between a closed-cycle cooling retrofit at an existing facility compared to installing closed-cycle cooling at a new unit:

- New units can incorporate closed-cycle cooling in a more cost effective manner.
- The duration of new unit construction is sufficiently long enough that there would be, in nearly all circumstances, no net increase in "construction downtime."
- For power generation systems, the design of boilers, steam turbines and condensers "from scratch" allows for the optimization of the system design and cooling water flow volume to minimize the heat rate penalty. Flow is reduced over a comparable once-through cooling system, which reduces closed-cycle cooling system costs.
- Because major components of the once-through intake and cooling system must be constructed from scratch, the capital costs of closed-cycle cooling for new units are lower than the capital costs of once-through cooling.[63]
- There will be an increase in the parasitic energy requirements associated with fan operation in the closed-cycle cooling towers.
- While parasitic energy requirements for pumping head will increase as well, it may be offset, at least in part, by reductions in pumping flow associated with optimization. Any capacity losses due to parasitic energy penalty can be accounted for in the new unit design.
- New construction allows the use of an optimized cooling system design that can minimize any system efficiency losses associated with conversion to closed-cycle.

Estimation of New Capacity Subject to the Rule

New generating units will be constructed at either "greenfield" facilities subject to the Phase I regulation or at existing facilities where they may be subject to the new unit requirements for entrainment reduction.[64] New generating capacity at existing facilities can occur in three ways: (1) From new units added to an existing facility; (2) repowering, replacement and major upgrades of existing units; and (3) minor increases in system efficiency and output. Repowered, replaced, and upgraded units are not considered new units under today's proposed rule and would not be subject to requirements for entrainment reduction. While a small portion of this new capacity may result from minor increases in plant efficiency and output, this analysis assumes all

[63] See DCN 10–6650 and DCN 10–6651.

[64] This discussion will focus only on new units at existing facilities; for a discussion of the Phase I rule, see 66 FR 65256.

new capacity will occur be associated with new units.

New power generation capacity estimates by fuel/plant type were derived from IPM modeling. For the new unit costs analysis EPA focused on coal and combined cycle, since these comprised the majority of increased capacity that utilize a steam cycle and are most likely to be constructed at existing generation facilities. In the Phase I rule analysis, EPA determined that 76% of new coal and 88% of new combined cycle capacity would be constructed at new "greenfield" facilities and would be subject to Phase I requirements while the remainder (24% of coal and 12% of combined cycle) would occur at existing facilities and be subject to existing facility regulations. EPA has selected a conservative value of 30% reflecting both coal and combined cycle to serve as an estimate for the portion of new capacity that would be constructed at existing facilities.

At existing nuclear facilities, only new capacity associated the construction of new generating units would be subject to the new unit requirements. Considering their size and heat discharge as well as recent trends in industry, it is assumed that any new nuclear units will utilize closed-cycle cooling [65] and so the capacity for these nuclear facilities is not included in the costs of requirements for new units. Exhibit VII–1 presents a summary of new capacity estimates for all fuel types.

EXHIBIT VII–1—ESTIMATED NEW CAPACITY

Fuel type	New capacity (MW) [a]		New capacity incurring costs under this rule	
	Annual average	24 Year total	Annual average	24 Year total
Coal	3,573	85,744	1,072	25,723
Combined Cycle	1,491	35,795	447	10,739

[a] Includes capacity subject to both Phase I and existing facility requirements.

Baseline Compliance

Baseline compliance reflects the scenario whereby new units will use once-through cooling or closed-cycle cooling. About 32% of existing facility steam generating capacity already employs closed-cycle and another 11% employ combination cooling systems. EPA assumes that at existing plants where closed-cycle cooling is already employed for at least part of the generating capacity that closed-cycle would be used for any new capacity, regardless of the requirements of today's proposed rule. Therefore at least 43% of new capacity is projected to be compliant in the baseline (*i.e.,* they will already meet the entrainment mortality requirements of the proposed rule for new units). For example, a number of regulatory authorities have adopted or pursued closed-cycle cooling requirements for some or all existing facilities (*e.g.,* New York, California, Delaware). EPA expects this to be particularly true where the new unit would result in a substantial increase in the volume of once-through cooling water withdrawn above what is currently permitted. Thus, approximately 50% of new fossil units at existing facilities in the baseline scenario would already be compliant with the proposed rule. EPA requests comment on this assumption.

Repowering Versus New Units

The increased capacity at existing fossil fuel facilities is divided into two types of projects. The first is new unit(s) added adjacent to the existing generating units which would require a new intake or the existing intake to be substantially modified in order to supply the needed additional volume of cooling water. The second is a repowered unit which replaces an existing generating unit(s) and is assumed to be sized such that the existing once-through cooling water intake volume will provide sufficient flow to meet heat discharge requirements. Based on 2007 IPM projections (since more recent projections do not include this distinction) approximately 85% of projected total new combined cycle capacity was estimated to be repowered oil and gas units. The estimate for repowered coal capacity was very small (less than 1%). However, since there are significant economic advantages to repowering, EPA believes this to be an underestimate and selected a more conservative value of 10%. Exhibit VII–2 presents the capacity values assumed to be compliant in the baseline or that require costs associated with closed-cycle cooling for new added units versus repowering.

EXHIBIT VII–2—NEW CAPACITY SUBJECT TO NEW UNIT REQUIREMENT BY COST CATEGORY

Fuel type		Capacity subject to new unit compliance costs (MW)	
		Annual average	24 Year total
Coal	Baseline is Compliant	536	12,862
	New Added Unit	482	11,575
Combined Cycle	Baseline is Compliant	224	5,369
	New Added Unit	34	805

[65] Less than half of the current U.S. nuclear plants still use once through cooling.

Compliance Cost Estimation

Compliance costs reflect compliance with the proposed requirements for closed-cycle for the new unit; these costs do not represent costs to retrofit the entire facility to closed-cycle. Compliance costs for new units are derived from EPA's estimates for retrofitting a closed-cycle cooling system at existing facilities where the costs are expressed on a per MGD basis. For new units, the cost equations are converted to a cost per MW capacity. The cooling water flow estimates are based on plant fuel efficiency values of 42% for coal (the average of values for super-critical and ultra-critical steam), 57% for combined cycle, and 33.5% for nuclear. [DCN 10–2827]. Cost components were broken out as follows.

Capital Costs

EPA has found that for new units, the total estimated capital costs for a closed-cycle cooling system is slightly less than the capital costs of a once-through cooling system (when including costs for a new intake structure). Therefore, a conservative estimate of the incremental compliance capital costs are $0 for new units.

O&M Costs

Fixed and variable O&M costs are adjusted by deducting the O&M costs for traveling screens assumed in the baseline once-through system. Energy costs are also adjusted downward to account for reduced pumping volume passing through the intake structure and adjusted up to account for the increase in pumping head through the cooling tower.

Downtime

Each of the new units will involve extensive construction activities that would result in a prolonged construction downtime regardless of the cooling system requirements. Thus, no downtime costs are assessed for new unit compliance.

Energy Penalty

The energy penalty consists of parasitic load and heat rate penalties. Both types of installation—new and retrofit—face parasitic load associated with fans and pumps, but only retrofits would face a heat rate penalty, which is the largest portion of a retrofit energy penalty. Energy penalty costs associated with net changes in parasitic energy requirements between once-through and closed-cycle cooling are included in the O&M cost estimates.

b. New Units at Existing Manufacturers

Similar to new units at existing electric generators, manufacturing "units" that meet the definition of a "new unit" will be required to meet entrainment reduction requirements. These requirements will require closed-cycle cooling or an equivalent reduction in entrainment for the cooling water component of the intake flow based on the average intake flow (AIF). Estimates for compliance costs for new units are based on the net difference in costs between what would have been built under the current regulatory structure (baseline) and what will be built given the change in requirements imposed by the proposed regulation. Thus, baseline manufacturing unit process design and cooling water technology would be based on the response to the permitting authorities application of existing requirements including 316(b), applicable industrial water use and discharge standards (*e.g.,* categorical standards), and BPJ.

As discussed in section IV of the preamble, it has become standard practice for industries to adopt water use reduction and reuse practices wherever practical. A new unit provides the opportunity to employ such measures to the fullest extent. Thus, the baseline cooling AIF for "new units" at manufacturers should, in most cases, be much smaller than the AIF for a comparable existing unit. This is especially true for new units that perform a similar function or produce a similar product to existing units since economic factors such as the need to increase process efficiencies are often driving factors in the decision to construct a new unit. EPA recognizes that while this appears to be a general trend, it may not always be true on a site-specific basis.

For manufacturing process units that are newly constructed, many of the same cost-related factors listed above for power generators apply but additional factors may include:

- A much greater proportion of intake flow is used for process water and other non-cooling purposes which greatly increases the opportunity to design and incorporate cooling water reuse strategies within the unit.
- Where the new unit comprises only a portion of the plant, cooling water reduction may be accomplished through reuse elsewhere within the plant. The proposed rule provides credit for such flow reductions.
- The modular nature of closed-cycle cooling allows for the limited application of closed-cycle cooling only to the portion of cooling flow necessary to meet any additional reductions not accounted for by any other reuse or reduction strategies employed. Additionally, new units can utilize cooling system designs specifically tailored to process requirements. The modular nature of closed-cycle cooling and the flexibility inherent in the process system allows for more optimal placement of cooling tower units, thus minimizing piping costs.
- Flow reductions associated with the use of variable speed pumps can result in benefits associated with both reduced flow and pumping energy costs.

For power generation facilities and generating units that use once-through cooling, the majority of the intake flow is used for non-contact cooling purposes. Process water typically constitutes a few percent or less of the total. A review of the responses to the detailed technical survey showed that the median and average values for the percent of design intake flow used for cooling purposes reported for each separate cooling water intake at power generation facilities were 100% and 85% respectively. In contrast, most industrial manufacturing operations utilize a substantial portion of intake water for non-cooling purpose and the same median and average values for manufacturing facilities were 50% and 52%, respectively. In addition, this cooling flow component data includes contact cooling water, as discussed in section IV.A (*i.e.,* flow reduction is only required for non-contact cooling water flows), thus decreasing the proportion. Therefore, a "typical" manufacturing unit may use less than 50% of AIF for cooling purposes of the type that may be subject to the "new unit" requirements. In many cases, this "typical" facility may be able to reuse 100% of the cooling water in place of the process component. Thus, the "typical" manufacturing facility may be capable of designing a "new" process that could meet the "new unit" requirements through water reuse alone. EPA has observed significant innovation and water reuse during site visits to manufacturing facilities, and notes extensive industry trends towards internal water and energy audits.

Since this 50% value is the median of all reported manufacturing cooling water intake systems, at least half of manufacturing cooling water systems may have the potential to meet the "new unit" requirements simply by reusing non-contact water as process water. For the remainder, modifications to the process that reduce cooling water use such as use of variable speed pumps may provide additional reduction. For some, there may be a need to install cooling towers for the cooling flow component that cannot be reused. EPA assumes, however, that this, however, will in most instances be a small portion of the total intake flow. Also, if the new unit comprises only a portion of the entire manufacturing facility, there may be other process units and plant operations nearby that could reuse the cooling water (or supply reusable water) in order to meet the flow reduction requirements. The proposed rule encourages facilities to incorporate flexible water use arrangements, including a provision where cooling water that is reused elsewhere in the facility is not considered cooling water; as a result, facilities will have an incentive to reuse water and avoid being subject to 316(b) requirements.

For new units that would require an increase in intake flow, EPA has found that the capital costs of the new intake and screen technology which requires deeper pump and intake wells to accommodate source water depth variations will be comparable to the capital costs for closed-cycle technology. In these cases, closed-cycle may have slightly higher O&M costs for pump and fan energy but these costs may be offset by other cost savings such as reductions in water treatment costs.

The definition of new manufacturing units limits the applicability of closed-cycle requirements to new units. As such, it is assumed that the construction activities would involve substantial downtime periods that would be of similar or more likely greater duration than required for construction and tie-in activities associated with the closed-cycle cooling technology. EPA concludes that only a small portion of new units will need to meet new unit flow reduction requirements through the use of closed-cycle cooling and the associated net costs will be minimal. EPA requests comment on these costing assumptions.

C. Social Cost of the Regulatory Options

EPA calculated the social cost of the four regulatory options for existing Manufacturers and Electric Generators using two social discount rate values: 3 percent and 7 percent. For the analysis of social costs, EPA discounted all costs to the beginning of 2012, the date at which this proposal would become effective under the regulation development schedule. EPA assumed that all facilities subject to the regulation would achieve compliance between 2013 and 2027, inclusive, depending on the compliance schedules associated with the four regulatory options considered in the proposed rule for specific categories of facilities. EPA performed the social cost analysis over a 50-year period to reflect: The last year in which individual facilities are expected to achieve compliance (2027) under any of the regulatory options considered for this analysis, the technology life of the longest-lived compliance technology installed at any facility (30 years), and a period of 5 years after the last year of compliance technology operation during which benefits continue to accrue. Under this framework, the last year for which costs were tallied in the analysis is 2056, with benefits continuing on a diminishing basis through 2061. Because the analysis period extends beyond the useful life of compliance equipment assumed to be installed at facilities that achieve compliance before 2017, the social cost analysis accounts for re-installation of IM compliance technologies after the end of their initial useful life periods; however, EPA does not expect in-scope facilities to completely re-build cooling towers (components such as piping and the concrete basin can be reused) and EPA expects other technology replacement costs (such as pumps and fill material) are accounted for as part of the ongoing O&M expenses for cooling towers. Costs incurred by governments for administering the regulation were analyzed over the same time frame. This analysis accounts for technology costs associated with new units starting in the first year after promulgation, *i.e.,* 2013 (for more information on new units see Chapter 3: Development of Costs for Regulatory Options of the EBA report).

At a 3 percent discount rate, EPA estimates annualized costs of compliance of $384 million under Option 1, $4,463 million under Option 2, $4,631 million under Option 3, and $327 million under Option 4. At a 7 percent discount rate, these costs are $459 million, $4,699 million, $4,862 million, and $383 million, respectively. The largest component of social cost is the pre-tax cost of regulatory compliance incurred by complying facilities. These costs include one-time technology costs of complying with the rule, one-time costs of installation downtime, annual fixed and variable operating and maintenance (O&M) costs, the value of electricity requirements for operating compliance technology, and permitting costs (initial permit costs, annual monitoring costs, and permit reissuance costs). In addition, all Electric Generators are expected to become subject to I&E mortality requirements at the 125 MGD threshold under Option 2. Social cost also includes implementation costs incurred by Federal and State governments. EPA's social cost estimates exclude the cost to facilities estimated to be baseline closures. As further described in the EBA document, in the case of Electric Generators, the baseline closure generating units were identified in Energy Information Administration reports or in the baseline IPM analyses, as having closed or projected to close independent of the requirements of the existing facilities rule. For Manufacturers, EPA's analyses indicated that these facilities are in sufficiently weak financial condition before outlays for this regulation, that the facilities are likely to close, again, independent of the requirements of the existing facilities rule. Because these facilities are not expected to comply with the existing facilities rule, EPA did not include the costs that would otherwise be assigned to these facilities in the analysis of social cost. Consistent with this treatment of costs, EPA also did not include benefits from these facilities in the tally of benefits to society for the analysis of social costs and benefits of the existing facilities rule.

Exhibit VII–3 presents the social cost of the proposed options, by type of cost, using 3 percent and 7 percent discount rates.

EXHIBIT VII–3—ANNUALIZED SOCIAL COST

[In millions, 2009 $] [a]

	Option 1	Option 2	Option 3	Option 4
3% Discount Rate:				
Direct Compliance Cost:				
Manufacturers	$61.31	$141.69	$172.92	$33.99
Electric Generators	318.77	4,319.59	4,457.79	289.77
Total Direct Compliance Cost	380.08	4,461.28	4,630.71	323.77

EXHIBIT VII–3—ANNUALIZED SOCIAL COST—Continued

[In millions, 2009 $] [a]

	Option 1	Option 2	Option 3	Option 4
State and Federal Administrative Cost	3.71	1.62	0.92	2.79
Total Social Cost	383.80	4,462.90	4,631.62	326.55
7% Discount Rate:				
Direct Compliance Cost:				
Manufacturers	68.90	133.60	157.49	39.04
Electric Generators	385.68	4,564.02	4,703.65	340.80
Total Direct Compliance Cost	454.58	4,697.62	4,861.14	379.84
State and Federal Administrative Cost	4.23	1.72	0.91	3.26
Total Social Cost	458.81	4,699.35	4,862.05	383.10

[a] These social cost estimates do not include costs associated with installation of cooling tower technology at new generating units subject to today's rule. They also do not include costs associated with complying with site-specific BTA determinations under Options 1, 2, and 4. Section VI.I discusses costs for complying with site-specific BTA determinations.

As shown in Exhibit VII–3, compliance cost in the Electric Generators segment accounts for the majority of total social cost and direct compliance cost under all four options. On a per regulated facility basis and at a 3 percent discount rate, annualized pre-tax costs in the Electric Generators segment amount to $0.57 million under Option 1, $7.73 million under Option 2, $7.97 million under Option 3, and $0.52 million under Option 4.[66] For Manufacturers, the average cost per regulated facility at a 3 percent discount rate is $0.12 million under Option 1, $0.27 million under Option 2, $0.33 million under Option 3, and $0.07 million under Option 4.[67] EPA's analysis found a similar profile of per facility costs by industry segment for the 7 percent discount rate case (see EBA Chapter 11 for additional detail). While all four options require some form of control technology at all facilities with design intake flows of two MGD or greater, Option 2 and Option 3 require more costly technologies, which raises the per-facility cost of compliance in these options.

EPA's estimate of federal and State government costs for administering this proposal is comparatively minor in relation to the estimated direct cost of regulatory compliance. EPA estimates government annual administrative costs under 3 and 7 percent discount rates, respectively, of approximately $3.71 million and $4.23 million (Option 1), $1.62 million and $1.72 million (Option 2), $0.92 million and $0.91 million (Option 3), and $2.79 million and $3.26 million (Option 4).

[66] Calculated using the total of 559 in-scope Electric Generators based on technical facility weights.

[67] Calculated using the total of 518 in-scope Manufacturers based on technical facility weights.

EPA also estimated the costs for installation of closed cycle cooling system technology at New Generating Units, as required by today's rule. These costs are based on the estimates of occurrence of new unit construction that would be subject to the New Units requirement, and the incurrence of costs as described above in the section titled "How Did EPA Assess Costs for New Units?"

The social costs of adding closed cycle cooling system capability at newly constructed units at existing facilities are not included in the total social cost tallies presented above. EPA did not include these costs in the tallies presented above because EPA did not estimate benefits from installation of closed cycle cooling systems at these units (their location is unknown). As a result, comparisons of social cost, which would include these costs, with benefits, which would not include the I&E mortality reductions from installing those closed cycle cooling systems, would be inconsistent. The costs for adding closed cycle cooling system capability at newly constructed units are the same across all four of the regulatory options presented in today's proposed rule, because the technology performance requirements for existing units at existing facilities, which vary by regulatory option, do not apply to these newly constructed generating units. On an annualized cost base, these amount to $14.7 million at a 3 percent discount rate, and $10.9 million at a 7 percent discount rate.

D. Economic Impact

EPA assessed the economic impact of the regulatory options in different ways depending on the affected segment, Manufacturers or Electric Generators:

For Manufacturers, EPA assessed the impact of compliance costs on business viability at the level of the affected facility (*facility-level analysis*), including assessment of the potential for facility closures and of the potential for affected facilities to incur financial stress short of closure. For manufacturers, EPA also assessed the impact of compliance requirements on the entities that own in-scope facilities (*firm-level analysis*), based on the level of compliance costs incurred by the total of in-scope facilities owned by a firm in relation to the revenue of the firm.

For Electric Generators, EPA assessed economic impact in three ways: (1) An assessment of the impact of compliance costs on first, complying facilities and second, the entities that own those facilities, based on comparison of compliance costs to facility and firm revenue, (2) an assessment of potential electricity price effects on residential and other electricity consumers, and (3) an assessment of the impact of the proposed regulatory options within the context of the electricity markets in which affected facilities operate.

These analyses are based on the facilities included in EPA's previous 316(b) surveys of electric generators and those manufacturing industries whose operations are most reliant on cooling water and that are expected to be most affected by this proposal. For each regulatory option, only those facilities that would be subject to national standards, based on their DIF, are included in the analyses.

The following sections summarize the methods and findings for manufacturers and electric power generators for these analyses.

a. Manufacturers

This section presents EPA's estimated economic impacts on Manufacturers for the three regulatory options. The economic impact analyses for Manufacturers assess how facilities, and the firms that own them, are expected to be affected financially by the regulatory options. The facility impact analysis starts with compliance cost estimates from the EPA engineering analysis (see section VII.B) and then calculates how these compliance costs would affect the financial performance and condition of the sample facilities and owning firms.

Measures of economic impact include facility closures and associated losses in revenue and employment, financial stress short of closure ("moderate impacts"), and firm-level impacts.[68]

In conducting the facility impact analysis, EPA first eliminated from the analysis those facilities that the Agency estimated to be at substantial risk of financial failure regardless of any additional financial burden that might result from the regulatory options under consideration (baseline closure facilities). Second, for the remaining facilities, EPA evaluated how compliance costs would likely affect facility financial performance and condition. EPA identified a facility as a regulatory closure if it would have operated under baseline conditions but would fall below an acceptable financial performance level under the new regulatory requirements.

EPA's analysis of regulatory closures is based on the estimated change in facility After-Tax Cash Flow (cash flow) as a result of the regulation and specifically examines whether the change in cash flow would be sufficient to cause the facility's going concern business value to become negative. EPA calculated business value using a discounted cash flow framework in which cash flow is discounted at an estimated cost of capital to calculate the going concern value of the facility. The specific definition of cash flow used in these analyses is after-tax free cash flow available to all capital—equity and debt—including an allowance for ongoing capital expenditures required by the business. Correspondingly, the cost of capital reflects the combined cost, after-tax, of equity and debt capital. For its analysis of economic/financial impacts on the Manufacturers industry segment, EPA used 7 percent as a real, after-tax cost of capital. Use of the 7 percent discount rate is consistent with guidance from the Office of Management and Budget on the opportunity cost of capital to society.

In these analyses, EPA first calculated the baseline going concern value of the facility using its baseline cash flow—*i.e.,* facility cash flow before compliance-related outlays—and used this value to determine whether a given facility is a baseline closure (for details see Chapter 4 of the EBA report). If EPA found the facility's estimated going concern value to be negative, then the facility was judged a baseline closure—*i.e.,* likely to fail financially, independent of incurrence of compliance costs—and removed the facility from further consideration in the impact and other economic analyses.

As the second step in the facility impact analysis, EPA adjusted the baseline cash flow to reflect the expected financial effects of compliance technology installation and operation. Based on an assessment of cost pass-through potential in the affected industries (see Chapter 5 and Appendix 4.A of the EBA), EPA assumed that *none* of the facility's compliance costs could be passed on to its customers as price and revenue increases—*i.e.,* all compliance costs must be absorbed within the facility's cash flow. EPA then recalculated the facility's business value using the adjusted post-compliance cash flow. If this analysis found that the facility's business value would become negative as a result of meeting compliance requirements, then EPA judged the facility to be a regulatory closure.

EPA also identified facilities that would likely incur moderate financial impacts, but that are not expected to close, as a result of the rule. EPA established thresholds for two measures of financial performance and condition—interest coverage ratio and pre-tax return on assets—and compared the facilities' performance before and after compliance under each regulatory option with these thresholds. EPA attributed incremental moderate impacts to the rule if both financial ratios exceeded threshold values in the baseline (*i.e.,* there were no moderate impacts in the baseline), but at least one financial ratio fell below the threshold value in the post-compliance case.

i. Baseline Closure Analysis

Exhibit VII–4 presents projected baseline closures for the estimated facilities in the Primary Manufacturing Industries and additional known facilities in Other Industries.[69] From the analysis as outlined above, EPA determined that 73 facilities (or 13 percent) of the estimated 569 regulated facilities in the six Primary Manufacturing Industries are baseline closures. The highest percentages of baseline closures occur in the Steel industry sector (32 percent). An additional three facilities (or 30 percent) of the 10 known facilities in Other Industries are projected to be baseline closures. These facilities were excluded from the post-compliance analysis of regulatory impacts, leaving 504 facilities for the assessment of compliance impacts.

EXHIBIT VII–4—SUMMARY OF BASELINE CLOSURES FOR MANUFACTURERS

Sector	Total number of facilities[a]	Number of baseline closures	Percentage of baseline closures	Operating in baseline
Paper	230	32	14	198
Chemicals	171	4	3	167
Petroleum	36	5	15	30
Steel	68	22	32	46
Aluminum	27	3	12	24
Food and Kindred Products	37	6	17	31
Total Facilities in Primary Manufacturing Industries	*569*	*73*	*13*	*497*

[68] For the analysis of three regulatory options presented in this document, neither employment loss nor output loss were in fact relevant because none of these options resulted in regulatory closures.

[69] The estimated number of Manufacturers facilities considered in the impact analysis (579) differs from the number reported in the broader analyses (592). EPA determined that the survey responses of 14 sample facilities lacked certain financial data needed for the facility impact analysis while containing sufficient data to support estimates of facility counts and compliance costs. EPA therefore retained these sample facilities (37 sample weighted facilities) in the broader analyses but excluded them from the impact analysis. When these sample facilities were excluded from the impact analysis, the sample weights for the remaining facilities within the affected sample frames were adjusted upwards to account for their removal (the revised weights are referred to as the economic analysis weights). The difference in the reported facility totals in the impact and social cost analyses reflects the removal of these 14 facilities and the use of adjusted sample weights, which due to rounding error results in a difference of 13 between the facilities in the impact analysis and those in the other analyses.

EXHIBIT VII–4—SUMMARY OF BASELINE CLOSURES FOR MANUFACTURERS—Continued

Sector	Total number of facilities [a]	Number of baseline closures	Percentage of baseline closures	Operating in baseline
Additional known facilities in Other Industries	10	3	30	7
Total Manufacturers Facilities	579	76	13	504

[a] Economic Analysis Weights were used to determine facility counts. See preceding footnote.

ii. Number of Facilities Subject to National Standards

EPA estimates that all of these 504 Manufacturers facilities—497 facilities in the Primary Manufacturing Industries and 7 facilities in the Other Industries—are subject to the requirements under the four regulatory options, although the technology response anticipated at individual facilities differs under each option. Under Option 1, all 504 facilities passing the baseline closure test would be required to meet IM standards and EPA estimates that 370 will need to install new technology in order to do so. Under Option 2, 57 facilities with DIF exceeding 125 MGD would be required to meet I&E mortality standards, and EPA estimates that all of these facilities would need to retrofit closed-cycle cooling. The remaining 448 facilities would be subject only to IM standards, and EPA estimates that 366 would need to install new technology to meet these requirements. Under Option 3, all 504 facilities would be required to meet I&E mortality standards, and in this case EPA estimates that 426 facilities would need to install a cooling tower to meet these requirements. In addition, EPA estimates that 181 facilities would need to install additional IM technology to meet Option 3's regulatory requirements. Under Option 4, 156 facilities would be required to meet IM standards; in this case, EPA estimates that 139 facilities would need to install new technology to meet this requirement.

iii. Post-Compliance Facility Impact Analysis; Summary of Impacts

Of the 504 Manufacturers facilities potentially subject to regulation after excluding baseline closures, EPA estimated that no facilities would close or incur employment losses as a result of the Options. EPA also found that no facilities would incur moderate impacts under Options 1, 2, and 4, but 17 facilities would incur moderate impacts under Option 3.

Exhibit VII–5 summarizes the estimated impacts of the proposed rule on Manufacturers by option, including facility impacts and total annualized compliance costs on an after-tax basis. The reported costs exclude compliance costs for baseline closures. The total annualized, after-tax compliance cost reported in Exhibit VII–5 represents the cost actually incurred by complying firms, taking into account the reductions in tax liability resulting from compliance outlays and assuming no recovery of costs from customers through increased prices. The after-tax analysis uses a combined federal/State tax rate, and accounts for facilities' baseline tax circumstances. Specifically, tax offsets to compliance costs are limited not to exceed facility-level tax payments as reported in facility questionnaire responses. The total annualized, after-tax compliance cost reported here is the sum of annualized, after-tax costs by facility at the year of compliance, using a 7 percent after-tax cost of capital. This cost calculation differs from the calculation of compliance costs as included in the calculation of the total social costs of the regulation (see Section VII.C) where costs are accounted for on a pre-tax basis.

EXHIBIT VII–5—FACILITY IMPACTS AND COMPLIANCE COSTS FOR MANUFACTURERS

	Option 1	Option 2	Option 3	Option 4
Primary Manufacturing Industries				
Number of Facilities Operating in Baseline	497	497	497	497
Number of Closures (Severe Impacts)	0	0	0	0
Percentage of Facilities Closing	0%	0%	0%	0%
Number of Facilities with Moderate Impacts	0	0	17	0
Percentage of Facilities with Moderate Impacts	0%	0%	3.40%	0.00%
Annualized Compliance Costs (after tax, million 2009 $)	$40.78	$108.71	$147.87	$23.38
Additional Known Facilities in Other Industries				
Number of Facilities Operating in Baseline	7	7	7	7
Number of Closures (Severe Impacts)	0	0	0	0
Percentage of Facilities Closing	0%	0%	0%	0%
Number of Facilities with Moderate Impacts	0	0	0	0
Percentage of Facilities with Moderate Impacts	0%	0%	0%	0%
Annualized Compliance Costs (after tax, million 2009 $)	$1.13	$1.52	$1.99	$0.60

iv. Firm-Level Impact

In addition to analyzing the impact of the regulation at the facility level, EPA also examined the impact of the proposed rule on firms that own manufacturing facilities with cooling water intake structures. A firm that owns multiple facilities could be adversely affected due to the cumulative burden of regulatory requirements over these facilities. For the assessment of firm-level effects, EPA calculated annualized after-tax compliance costs as a percentage of firm revenue and reports here the estimated number and percentage of affected firms incurring compliance costs in three cost-to-revenue ranges: Less than 1 percent; at least 1 percent but less than 3 percent; and 3 percent or higher.

EPA's sample-based analysis of facilities in the Primary Manufacturing Industries supports specific estimates of the number of facilities expected to be affected by the regulation and the total compliance costs expected to be incurred in these facilities. However, the sample-based analysis does not support specific estimates of the number of firms that own facilities in the Primary Manufacturing Industries. In addition, and as a corollary, the sample-based analysis does not support specific estimates of the number of regulated facilities that may be owned by a single firm, or of the total of compliance costs across regulated facilities that may be owned by a single firm. For the firm-level analysis, EPA therefore considered two approximate bounding cases based on the sample weights developed from the facility survey. These cases provide a range of estimates for the number of firms incurring compliance costs and the costs incurred by any firm owning a regulated facility. The cases are as follows:

1. *Lower bound estimate of number of firms owning facilities that face requirements under the regulation; upper bound estimate of total compliance costs that a firm may incur.* For this case, EPA assumed that any firm owning a regulated sample facility(ies), owns the known sample facility(ies) and all of the sample weights associated with the sample facility(ies). This case yields an approximate lower bound estimate of the count of affected firms, and an approximate upper bound estimate of the potential cost burden to any single firm (see EBA Chapter 4 for information on the analysis of firm-level impacts).

2. *Upper bound estimate of number of firms owning facilities that face requirements under the regulation; lower bound estimate of total compliance costs that a firm may incur.* For this case, EPA inverted the prior assumption and assumed (1) that a firm owns only the regulated sample facility(ies) that it is known to own from the sample analysis and (2) that this pattern of ownership, observed for sampled facilities and their owning firms, extends over the facility population represented by the sample facilities. This case minimizes the possibility of multi-facility ownership by a single firm and thus maximizes the count of affected firms, but also minimizes the potential cost burden to any single firm.

Exhibit VII–6 summarizes the results of the firm-level analysis for these two analytic cases.

EXHIBIT VII–6—FIRM-LEVEL AFTER-TAX ANNUAL COMPLIANCE COSTS AS A PERCENTAGE OF REVENUE

Number of firms in the analysis	Pot. reg.	Not analyzed due to lack of revenue information[b]		Number and percentage with after tax annual compliance costs/annual revenue of:					
				Less than 1%		1–3%		At least 3%	
		Number	%	Number	%	Number	%	Number	%
Primary Manufacturing Industries									
Case 1: Lower bound estimate of number of firms owning facilities that face requirements under the regulation; upper bound estimate of total compliance costs that a firm may incur[a]									
Option 1	117	3	3	113	96	0	0	1	1
Option 2	117	3	3	113	96	0	0	1	1
Option 3	117	3	3	113	96	0	0	1	1
Option 4	117	0	0	117	100	0	0	0	0
Case 2: Upper bound estimate of number of firms owning facilities that face requirements under the regulation; lower bound estimate of total compliance costs that a firm may incur.									
Option 1	359	9	3	349	97	0	0	1	0
Option 2	359	9	3	349	97	0	0	1	0
Option 3	359	9	3	349	97	0	0	1	0
Option 4	359	0	0	359	100	0	0	0	0
Other Industries									
Option 1	9	0	0	9	100	0	0	0	0
Option 2	9	0	0	9	100	0	0	0	0
Option 3	9	0	0	9	100	0	0	0	0
Option 4	9	0	0	9	100	0	0	0	0

[a] The alternative analysis case concepts are not applicable to the Other Industries firms and facilities, because these facilities do not receive sample weights.

[b] For Options 1, 2, and 3, all facilities and parent firms are assigned costs; however three firms are not analyzed because no revenue data is available. In Option 4, these three firms are assigned no costs, and so by definition have cost to revenue ratios less than 1% and are categorized as such.

As presented in Exhibit VII–6, EPA estimated that the number of firms owning regulated facilities in the Primary Manufacturing Industries range from 117 (Case 1 estimate) to 359 (Case 2 estimate), depending on the assumed ownership cases outlined above. An additional 9 firms are known to own facilities in Other Industries.[70]

EPA's analyses indicate that the number of firms falling in the reported cost-to-revenue impact ranges is the

[70] The alternative analysis case approaches are not applicable to the Other Industries firms and facilities, because these facilities do not receive sample weights.

same across Options 1, 2, and 3, by analysis case. No firms fall in the reported impact ranges under Option 4 for either analysis case. Under Case 1, Lower Bound Estimate of Number of Firms Owning Facilities/Upper Bound Estimate of Costs Incurred by these Firms, zero of the estimated 117 firms owning Manufacturers facilities incur costs between 1 and 3 percent of revenue for all Options, and one firm incurs costs exceeding 3 percent of revenue under Options 1, 2, and 3. No firms incur costs exceeding 3 percent of revenue under Option 4. The remaining 113 (Options 1, 2, and 3), and 117 (Option 4) firms incur costs below 1 percent of revenue or no costs.

Under Case 2, Upper Bound Estimate of Number of Firms Owning Facilities/ Lower Bound Estimate of Costs Incurred by these Firms, zero firms in the Primary manufacturing industries are estimated to incur costs between 1 and 3 percent of revenue under all Options. Like Case 1, one firm incurs costs exceeding 3 percent of revenue under Options 1, 2, and 3, and no firms incur costs exceeding 3 percent of revenue under Option 4. The remaining 349, and 359 firms, respectively, incur costs below 1 percent of revenue or no costs.

For the firms owning Other Industries facilities, EPA's analysis indicates that across all Options, no firms incur costs exceeding 1 percent of revenue.

Regardless of the analysis case or regulatory option, the number and percentage of firms incurring costs between one and three percent of revenue, or exceeding three percent of revenue, are small.

b. Electric Generators

For Electric Generators, EPA assessed the economic impact of the regulatory options in three major ways: (1) Entity level impacts (at both the facility and parent company levels), (2) potential electricity price effects on residential and other electricity consumers, and (3) broader electricity market impacts (taking into account the interconnectedness of regional and national electricity markets, using five metrics, for the full industry, for in-scope facilities only, and as the distribution of impacts at the facility level).

1. Assessment of the Impact on Complying Facilities and Parent Entities

EPA assessed the cost to complying facilities and parent entities based on cost-to-revenue analyses. For these two analyses, the Agency assumed that none of the compliance costs will be passed on to consumers through electricity rate increases and will instead be absorbed by complying facilities and their parent entities. In performing these and other impact analyses, EPA developed and used sample weights to extrapolate impacts assessed initially at the level of a sample of facilities to the full population of in-scope facilities. Specifically, EPA developed and used different sets of weights, with each weight set being used to derive a specific estimate and/or used with a different set of sample facilities to which the weights were applied to derive a given estimate. (See Appendix 3.A of the EBA report for a discussion on weights development and application.)

a. Cost-to-Revenue Analysis for Complying Facilities

To provide insight on the potential significance of the compliance costs to complying facilities, EPA calculated the annualized after-tax compliance costs of the regulatory options as a percentage of baseline annual revenues, for 559 in-scope facilities.[71] [72] Most of the revenue estimates used in this analysis were developed using the average of facility-specific baseline (*i.e.,* pre-promulgation) projections from the Integrated Planning Model (IPM) for 2015, 2020, 2025, and 2028.[73] In a few instances where IPM-based revenue values were not available, EPA used estimates based on Energy Information Administration (EIA) data. EPA performed this analysis for each of the 257 facilities for which compliance cost estimates were explicitly developed. As stated above, EPA used facility sample weights to estimate the total numbers of in-scope facilities that fall within various cost-to-revenue ranges as reported in Exhibit VII–7 (see Chapter 5 of the EBA report for a discussion of the facility-level cost-to-revenue analysis).

Exhibit VII–7, below, summarizes the facility-level cost-to-revenue analysis results for each option, by North American Electricity Reliability Corporation (NERC) region.[74] EPA estimates for Options 1 and 4, that the majority of facilities subject to today's proposal will incur annualized costs of less than 1 percent of revenue (481 facilities or 86 percent). Under Options 2 and 3, the majority of in-scope facilities, 333 (or approximately 60 percent) and 386 (or approximately 69 percent), respectively, will incur annualized costs exceeding 3 percent of revenue.

EXHIBIT VII–7—FACILITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS BY REGULATORY OPTION AND NERC REGION [A]

Number of in-scope facilities [a, b]	No revenue [c]	Number of facilities with cost-to-revenue ratio of			Minimum ratio %	Maximum ratio %
		< 1%	1–3%	> 3%		
Option 1: IM Everywhere						
ASCC	0	0	0	0	0.00	0.00
ERCOT	5	28	7	2	0.00	3.28
FRCC	0	18	4	4	0.00	3.49

[71] For private, tax-paying entities, after-tax costs are a more relevant measure of potential cost burden than pre-tax costs. For non tax-paying entities (e.g., State government and municipality owners of in-scope facilities), the estimated costs used in this calculation include no adjustment for taxes.

[72] For the facility cost-to-revenue analysis, EPA estimated compliance costs for all facilities as of an assumed single proxy compliance year, 2015, for comparison with 2015 revenues. EPA's choice of the year for which cost and revenue values are used in a particular part of the cost analysis was driven by the concept of a given analysis (e.g., should cost and revenue values be as of the Rule promulgation year, as of a facility's expected compliance year, or as of a post-compliance, steady state operations year?) and the availability of data for the analysis. For more information on the methodology for the facility-level cost-to-revenue analysis, *see* Chapter 5 of the EBA report.

[73] To develop the average of year-by-year revenue values over the data years, EPA set aside from the averaging calculation, revenue values for years that are substantially lower than the otherwise "steady state average"—e.g., because of a generating unit being out of service for an extended period. EPA believes the resulting cost-to-revenue comparison provides a more realistic assessment of potential impact on a "steady state" operations basis.

[74] The NERC regions used for summarizing these findings are as of 2008. Some NERC regions have been re-defined over the past few years. The NERC region definitions used in today's Proposed Existing Facilities Regulation analyses vary by analysis depending on which region definition aligns better with the data elements underlying the analysis.

EXHIBIT VII–7—FACILITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS BY REGULATORY OPTION AND NERC REGION [A]—Continued

Number of in-scope facilities [a, b]	No revenue [c]	Number of facilities with cost-to-revenue ratio of			Minimum ratio %	Maximum ratio %
		< 1%	1–3%	> 3%		
HICC	0	2	2	0	0.34	1.04
MRO	0	43	4	0	0.00	1.80
NPCC	0	49	14	0	0.00	2.64
RFC	0	148	13	3	0.00	3.58
SERC	0	146	6	5	0.00	3.61
SPP	0	28	6	0	0.00	2.38
WECC	0	19	0	4	0.00	3.38
Total	5	481	55	18	0.00	3.61
Option 2: IM Everywhere and EM for Facilities With DIF > 125 MGD						
ASCC	0	0	0	0	0.00	0.00
ERCOT	5	5	1	31	0.00	43.39
FRCC	0	5	4	16	0.00	35.37
HICC	0	0	0	3	3.87	8.48
MRO	0	20	6	20	0.00	10.96
NPCC	0	15	10	38	0.00	37.53
RFC	0	47	15	102	0.00	12.50
SERC	0	44	14	100	0.00	24.23
SPP	0	11	6	17	0.00	49.66
WECC	0	19	0	4	0.00	40.10
Total	5	166	55	333	0.00	49.66
Option 3: I&E Mortality Everywhere						
ASCC	0	0	0	0	0.00	0.00
ERCOT	5	5	1	31	0.00	43.39
FRCC	0	5	4	16	0.00	35.37
HICC	0	0	0	3	3.87	8.48
MRO	0	6	7	33	0.00	18.38
NPCC	0	0	9	55	1.22	37.53
RFC	0	38	8	119	0.00	51.38
SERC	0	29	22	106	0.00	28.47
SPP	0	11	6	17	0.00	49.66
WECC	0	17	0	6	0.00	40.10
Total	5	112	57	386	0.00	51.38
Option 4: IM for Facilities With DIF > 50 MGD						
ASCC	0	0	0	0	0.00	0.00
ERCOT	5	28	7	2	0.00	3.28
FRCC	0	18	4	4	0.00	3.49
HICC	0	2	2	0	0.34	1.04
MRO	0	43	4	0	0.00	1.80
NPCC	0	52	11	0	0.00	2.64
RFC	0	151	12	2	0.00	3.54
SERC	0	148	5	5	0.00	3.61
SPP	0	28	6	0	0.00	2.38
WECC	0	19	0	4	0.00	3.38
Total	5	488	49	17	0.00	3.61

[a] No explicitly analyzed facilities are located in the ASCC region. For more information on explicitly and implicitly analyzed in-scope facilities see Appendix 3.A of the EBA report.

[b] Facility counts exclude baseline closures.

[c] IPM and EIA report no revenue for 2 facilities (5 on the weighted basis); consequently, facility-level cost-to-revenue analysis is performed for 257 facilities (559 on the weighted basis).

b. Parent Entity-Level Cost-to-Revenue Analysis

EPA also assessed the economic impact of the options considered for today's proposed rule at the parent entity-level. The cost-to-revenue analysis at the entity level provides insight on the impact of compliance requirements on those entities that own more than one in-scope facility. For this analysis, EPA identified the domestic parent entity of each in-scope facility and obtained the entity's revenue from publicly available data sources. For 5 identified ultimate parent entities that own at least one explicitly analyzed Electric Generator (*i.e.,* Detailed Questionnaire (DQ) facilities and a subset of the Short Technical Questionnaire (STQ) facilities with re-circulating systems in their baseline) and that are non-U.S. firms EPA could not obtain revenue for a domestic entity but did obtain revenue at the level of the international parent entity; for these 5 entities, EPA used this international entity revenue in the cost-to-revenue analysis. EPA compared the total annualized after-tax compliance costs, as of 2015 to the identified parent entity's total sales revenue (see Chapter 5 of the EBA report).

Because compliance costs for the regulatory options were directly attributable to only a subset of the in-scope facilities (*i.e.,* the explicitly analyzed, Detailed Questionnaire (DQ) facilities and a subset of the Short Technical Questionnaire (STQ) facilities with re-circulating systems in their baseline) and were therefore able to be linked with only a subset of the parent entities that own in-scope facilities, EPA developed and used entity-level sample weights for this analysis, as outlined in the Appendix 3.A of the EBA report. EPA defined two cases combining entity-level sample weights with facility-level weights to yield approximate estimates of the numbers of parent entities incurring costs in specific cost-to-revenue ranges. Each case addresses a specific element of the understanding of entity-level effects (see Chapter 5 of the EBA report for a discussion of the entity-level cost-to-revenue analysis):

- Estimation of facility costs at the level of the parent entity, accounting for the potential ownership of implicitly analyzed, sample-represented facilities by an identified parent entity and
- Estimation of the number of parent entities, accounting for the potential presence of parent entities that own only (an) implicitly analyzed facility(ies) and thus cannot be associated with the explicitly analyzed facilities.

The two analysis cases and the findings from their analysis are as follows:

- *Using facility-level weights:* For this case, facility-level weights were applied to the estimated compliance costs for facilities identified as being owned by a given parent entity.[75] This calculation may overstate the number of facilities and compliance costs at the level of any given parent entity, but also likely underestimates the number of parent entities. This analysis indicates that 97 unique parent entities own 559 facilities subject to today's proposal. From this analysis, EPA estimates that the majority of parent entities will incur annualized costs of less than one percent of revenues under Option 1 (85 out of 97 parent entities or 89 percent), Option 2 (54 out of 97 parent entities or 56 percent), and Option 4 (86 out of 97 parent entities or 91 percent). Under the more costly Option 3, a nearly equal number of entities are expected to incur costs above and below 1 percent of revenue, *i.e.,* 46 and 45 out of 91 parent entities, respectively, not taking into account 6 parent entities with unknown revenue (see Exhibit VII–8).

EXHIBIT VII–8—ENTITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS, USING FACILITY-LEVEL WEIGHTS

Parent entity type	Total number of facilities [b]	Total number of entities	Number of entities with cost-to-revenue ratio of [a]			
			< 1%	1–3%	> 3%	Unknown
Option 1: IM Everywhere						
Cooperative	25	11	10	0	1	0
Federal	16	1	1	0	0	0
Investor-owned	306	38	38	0	0	0
Municipality	25	13	9	4	0	0
Nonutility	170	30	23	0	1	6
Other political subdivision	0	0	0	0	0	0
State	17	4	4	0	0	0
Total	559	97	85	4	2	6
Option 2: IM Everywhere and EM for Facilities With DIF > 125 MGD						
Cooperative	25	11	7	1	3	0
Federal	16	1	0	0	1	0
Investor-owned	306	38	20	14	4	0
Municipality	25	13	6	5	2	0
Nonutility	170	30	18	2	4	6
Other political subdivision	0	0	0	0	0	0
State	17	4	3	0	1	0
Total	559	97	54	22	15	6
Option 3: I&E Mortality Everywhere						
Cooperative	25	11	4	3	4	0
Federal	16	1	0	0	1	0
Investor-owned	306	38	20	14	4	0
Municipality	25	13	2	5	6	0
Nonutility	170	30	18	2	4	6
Other political subdivision	0	0	0	0	0	0
State	17	4	2	1	1	0
Total	559	97	46	25	20	6

[75] Parent entity weights were not used in this calculation because the combination of facility weights and entity weights would overstate, perhaps substantially, the estimate of in-scope facilities and compliance costs assigned to parent entities.

EXHIBIT VII–8—ENTITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS, USING FACILITY-LEVEL WEIGHTS—Continued

Parent entity type	Total number of facilities [b]	Total number of entities	Number of entities with cost-to-revenue ratio of [a]			
			< 1%	1–3%	> 3%	Unknown
Option 4: IM for Facilities With DIF > 50 MGD						
Cooperative	25	11	10	0	1	0
Federal	16	1	1	0	0	0
Investor-owned	306	38	38	0	0	0
Municipality	25	13	10	3	0	0
Nonutility	170	30	23	0	1	6
Other political subdivision	0	0	0	0	0	0
State	17	4	4	0	0	0
Total	559	97	86	3	2	6

[a] EPA was unable to determine entity-level revenues for 6 (8 weighted) parent entities; consequently, for the purpose of this analysis, EPA used the sum of facility-level revenues for facilities owned by these parent entities.
[b] Facility counts exclude baseline closures.

• *Using entity-level weights:* For this case, entity-level weights were applied to the calculated number of parent entities estimated to incur costs in each cost-to-revenue range.[76] This calculation may understate the number of facilities and compliance costs at the level of any given parent entity, but accounts more comprehensively for the number of parent entities owning in-scope facilities. This analysis found that 140 unique domestic parent entities own 257 facilities subject to today's proposal (see Exhibit VII–9).[77] From this analysis, EPA estimates that the majority of parent entities will incur annualized costs of less than one percent of revenues regardless of the option.

EXHIBIT VII–9—ENTITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS, USING ENTITY-LEVEL WEIGHTS

Parent entity type	Total number of facilities [b]	Total number of entities [c]	Number of entities with cost-to-revenue ratio of [a]			
			< 1%	1–3%	> 3%	Unknown
Option 1: IM Everywhere						
Cooperative	13	20	18	2	0	0
Federal	7	1	1	0	0	0
Investor-owned	138	42	42	0	0	0
Municipality	13	35	35	0	0	0
Nonutility	78	38	29	0	1	8
Other political subdivision	0	0	0	0	0	0
State	8	4	4	0	0	0
Total	257	140	129	2	1	8
Option 2: IM Everywhere and EM for Facilities With DIF > 125 MGD						
Cooperative	13	20	13	5	2	0
Federal	7	1	0	0	1	0
Investor-owned	138	42	35	6	1	0
Municipality	13	35	24	8	3	0
Nonutility	78	38	25	4	1	8
Other political subdivision	0	0	0	0	0	0
State	8	4	3	0	1	0
Total	257	140	101	23	9	8
Option 3: I&E Mortality Everywhere						
Cooperative	13	20	9	9	2	0
Federal	7	1	0	0	1	0
Investor-owned	138	42	35	6	1	0
Municipality	13	35	13	11	11	0
Nonutility	78	38	25	4	1	8
Other political subdivision	0	0	0	0	0	0
State	8	4	3	0	1	0

[76] In the same way as stated above, facility weights were not used in conjunction with entity weights because the combination of facility weights and entity weights would overstate, perhaps, the estimate of in-scope facilities and compliance costs assigned to parent entities.

[77] The NERC regions used to summarize these findings are as of 2004, which is the NERC region basis used in the utility-level EIA 2007 database. Some NERC regions have been re-defined over the past few years. The NERC region definitions used in these analyses vary by analysis depending on which region definition aligns better with the data elements underlying the analysis.

EXHIBIT VII–9—ENTITY-LEVEL COST-TO-REVENUE ANALYSIS RESULTS, USING ENTITY-LEVEL WEIGHTS—Continued

Parent entity type	Total number of facilities [b]	Total number of entities [c]	Number of entities with cost-to-revenue ratio of [a]			
			< 1%	1–3%	> 3%	Unknown
Total	257	140	86	29	17	8
Option 4: IM for Facilities With DIF > 50MGD						
Cooperative	13	20	18	2	0	0
Federal	7	1	1	0	0	0
Investor-owned	138	42	42	0	0	0
Municipality	13	35	36	0	0	0
Nonutility	78	38	29	0	1	8
Other political subdivision	0	0	0	0	0	0
State	8	4	4	0	0	0
Total	257	140	130	2	1	8

[a] EPA was unable to determine entity-level revenues for 6 (8 weighted) parent entities; consequently, for the purpose of this analysis, EPA used the sum of facility-level revenues for facilities owned by these parent entities.
[b] Facility counts exclude baseline closures.
[c] There are a total of 143 parent entities on an unweighted basis, 3 of which are other political subdivision entities. These entities own only implicitly analyzed facilities; consequently, there is no explicitly analyzed other political subdivision parent entity to represent these implicitly analyzed parent entities and total weighted entity counts do not include 3 other political subdivision entities.

As discussed above, because compliance costs for the regulatory options were directly attributable to only a subset of the in-scope facilities and were therefore able to be linked with only a subset of the parent entities that own in-scope facilities, EPA conducted entity cost-to-revenue analysis using two weighting approaches. Using facility-level weights is likely to underestimate the number of parent entities and overstate the number of facilities and compliance costs at the level of any given parent entity. At the same time, using entity-level weights is likely to account more comprehensively for the number of parent entities owning in-scope facilities but understate the number of facilities and compliance costs at the level of any given parent entity.

Under these alternative approaches, at the 1–3 percent of revenue impact level, EPA estimates that 4 and 2 firms (4.1 percent and 1.4 percent of firms owning in-scope facilities, respectively) would fall in this impact range under Option 1, 22 and 23 firms (22.7 percent and 16.4 percent, respectively) under Option 2, and 25 and 29 firms (25.8 percent and 20.7 percent, respectively) under Option 3. At the 3 percent of revenue impact level, the Agency estimates that 2 and 1 firms (2.1 percent and 0.7 percent, respectively) would fall in this impact range under Option 1, 15 and 9 firms (15.5 percent and 6.4 percent, respectively) under Option 2, and 20 and 17 firms (20.6 percent and 12.1 percent, respectively) under Option 3. The results for Option 4 are virtually identical to those of Option 1, with one fewer entity incurring costs between 1 and 3 percent of revenue.

2. Assessment of Potential Electricity Price Effects

As an additional measure of economic impact, EPA assessed the potential electricity price effects from today's Proposed Existing Facilities Regulation in two ways: (1) An assessment of the potential annual increase in household electricity costs and (2) an assessment of the potential annual increase in electricity costs per MWh of total electricity sales. These analyses assume that all compliance costs will be passed through on a pre-tax basis as increased electricity prices as opposed to the treatment in the facility- and firm-level analyses discussed in Section VII.D.b.1, which assume that *none* of the compliance costs will be passed to consumers through electricity rate increases. For discussion of the reasonableness of this assumption see EBA Chapter 5.

a. Cost to Residential Households

Using the assumptions outlined above, EPA estimated the potential annual increase in electricity costs per household by NERC region. The analysis uses the total annualized pre-tax compliance cost per megawatt hour (MWh) for the year 2015, in conjunction with the reported total electricity sales quantity for each NERC region as reported by the EIA for 2007 for all NERC regions except ASCC and HICC, for which total 2015 electricity sales projections came from the Department of Energy's *Annual Energy Outlook 2009* (AEO 2009).[78] This analysis also uses the quantity of residential electricity sales per household as reported by the 2007 EIA for all NERC regions 2007.

To calculate the average cost per household, by region, EPA divided total compliance costs for each NERC region by the reported total MWh of sales within the region. The potential annual cost impact per household was then calculated by multiplying the estimated average cost per MWh by the average MWh per household, by NERC region.[79]

Exhibit VII–10 below, summarizes the annual household impact results for each option, by NERC region. These results show that for Option 1, the average annual cost per residential household is expected to range from $0.05 in WECC to $3.93 in SPP, for Option 2 from $0.09 in WECC to $27.11 in SERC, and for Option 3 from $0.11 in WECC to $27.88 in SERC. Overall, for a typical U.S. household, Option 4 is expected to result in the lowest annual cost of $1.37 per household, while Option 3 is expected to result in the highest annual cost of $17.60 per household. Option 1 and Option 2 are estimated to result in annual costs of $1.41 per household and $17.09 per household, respectively.

[78] AEO does not provide information for ASCC and HICC.

[79] The NERC regions used for summarizing these findings are as of 2004, which is the NERC region basis used in the utility-level EIA 2006 database. Some NERC regions have been re-defined over the past few years. The NERC region definitions used in today's Proposed Existing Facilities Regulation analyses vary by analysis depending on which region definition aligns better with the data elements underlying the analysis.

EXHIBIT VII–10—AVERAGE ANNUAL COST PER RESIDENTIAL HOUSEHOLD IN 2015 BY REGULATORY OPTION AND NERC REGION [a] [b]

NERC Region [c]	Option 1	Option 2	Option 3	Option 4
ASCC	$0.00	$0.00	$0.00	$0.00
ECAR	1.23	20.00	20.47	1.22
ERCOT	1.76	26.52	26.52	1.74
FRCC	2.37	17.89	18.21	2.37
HICC	3.16	23.82	23.82	3.16
MAAC	2.11	18.97	19.31	1.95
MAIN	1.46	19.18	20.18	1.41
MAPP	1.79	16.00	17.04	1.74
NPCC	1.38	19.89	21.13	1.37
SERC	1.64	27.11	27.88	1.61
SPP	3.93	21.56	21.56	3.86
WECC	0.05	0.09	0.11	0.01
U.S.	1.41	17.09	17.60	1.37

[a] The rate impact analysis assumes full pass-through of all compliance costs to electricity consumers.
[b] Cost estimates exclude baseline closures.
[c] No explicitly analyzed facilities are located in the ASCC region. For more information on explicitly and implicitly analyzed in-scope facilities see Appendix 3.A of the EBA report.

As stated above, this analysis assumes that all of the compliance costs will be passed onto consumers through increased electricity rates. However, at least some facilities and firms are likely to absorb some of these costs, thereby reducing the impact of today's proposed rule on electricity consumers. At the same time, EPA recognizes that Electric Generators that operate as regulated public utilities are generally permitted to pass on environmental compliance costs as rate increases to consumers.

b. Compliance Cost per Unit of Electricity Sales

EPA also calculated the per unit of electricity sales cost of the regulatory options. EPA used two data inputs in this analysis (1) total pre-tax compliance cost by NERC region, and (2) estimated total electricity sales, from the AEO 2009 for 2015, by NERC region, for all NERC regions except ASCC and HICC; for ASCC and HICC EPA used 2007 EIA. The Agency summed sample-weighted pre-tax annualized compliance costs as of 2015 over complying facilities by NERC region to calculate an approximate total estimated annual cost in each region. EPA then calculated the approximate average price impact per unit of electricity consumption by dividing total compliance costs by the reported total MWh of sales in each NERC region.

As reported in Exhibit VII–11, annualized compliance costs (in dollars per KWh sales) range from 0.001¢ in the WECC region to 0.040¢ in the HICC region for Option 1, from 0.001¢ in the WECC region to 0.303¢ in the HICC region for Options 2 and 3, and from less than 0.001¢ in the WECC region to 0.040¢ in the HICC region for Option 4. On average, across the United States, Option 4 results in the lowest cost of 0.012¢ per KWh, while Option 3 results in the highest cost of 0.157¢ per KWh. Option 1 and Option 2 result in national costs of 0.013¢ per KWh and 0.153¢ per KWh, respectively.

EXHIBIT VII–11—COMPLIANCE COST PER UNIT OF ELECTRICITY SALES IN 2015 BY REGULATORY OPTION AND NERC REGION (2009 ¢/KWH SALES) [a] [b]

NERC Region [c]	Annualized pre-tax compliance costs (2009 $)	Total electricity sales (KWh)	Compliance cost per unit of electricity sales (2009 ¢/KWh sales)
Option 1: IM Everywhere			
ASCC	$0	6,326,610,000	0.000
ECAR	62,390,503	569,849,487,305	0.011
ERCOT	40,029,111	313,395,965,576	0.013
FRCC	41,259,203	242,320,907,593	0.017
HICC	4,259,468	10,585,038,000	0.040
MAAC	61,468,467	294,365,234,375	0.021
MAIN	41,292,594	275,415,008,545	0.015
MAPP	27,565,966	165,189,056,396	0.017
NPCC	51,647,619	284,990,412,176	0.018
SERC	99,360,633	887,073,303,223	0.011
SPP	63,811,175	204,172,271,729	0.031
WECC	4,015,273	701,826,043,025	0.001
U.S.	497,100,012	3,960,424,804,688	0.013
Option 2: IM Everywhere and EM for Facilities with DIF > 125 MGD			
ASCC	0	6,326,610,000	0.000
ECAR	1,010,953,670	569,849,487,305	0.177
ERCOT	602,721,709	313,395,965,576	0.192
FRCC	311,699,736	242,320,907,593	0.129
HICC	32,074,166	10,585,038,000	0.303

EXHIBIT VII–11—COMPLIANCE COST PER UNIT OF ELECTRICITY SALES IN 2015 BY REGULATORY OPTION AND NERC REGION (2009 ¢/KWH SALES) [A B]—Continued

NERC Region [c]	Annualized pre-tax compliance costs (2009 $)	Total electricity sales (KWh)	Compliance cost per unit of electricity sales (2009 ¢/KWh sales)
MAAC	551,710,436	294,365,234,375	0.187
MAIN	542,786,160	275,415,008,545	0.197
MAPP	246,541,770	165,189,056,396	0.149
NPCC	744,738,535	284,990,412,176	0.261
SERC	1,643,059,866	887,073,303,223	0.185
SPP	350,239,021	204,172,271,729	0.172
WECC	6,930,361	701,826,043,025	0.001
U.S.	6,043,455,430	3,960,424,804,688	0.153
Option 3: I&E Mortality Everywhere			
ASCC	0	6,326,610,000	0.000
ECAR	1,035,075,751	569,849,487,305	0.182
ERCOT	602,721,709	313,395,965,576	0.192
FRCC	317,419,881	242,320,907,593	0.131
HICC	32,074,166	10,585,038,000	0.303
MAAC	561,627,430	294,365,234,375	0.191
MAIN	571,233,958	275,415,008,545	0.207
MAPP	262,582,596	165,189,056,396	0.159
NPCC	791,203,354	284,990,412,176	0.278
SERC	1,689,520,164	887,073,303,223	0.190
SPP	350,239,021	204,172,271,729	0.172
WECC	8,641,891	701,826,043,025	0.001
U.S.	6,222,339,919	3,960,424,804,688	0.157
Option 4: IM for Facilities with DIF > 50MGD			
ASCC	0	6,326,610,000	0.000
ECAR	61,651,375	569,849,487,305	0.011
ERCOT	39,560,948	313,395,965,576	0.013
FRCC	41,259,203	242,320,907,593	0.017
HICC	4,259,468	10,585,038,000	0.040
MAAC	56,749,132	294,365,234,375	0.019
MAIN	40,018,375	275,415,008,545	0.015
MAPP	26,744,938	165,189,056,396	0.016
NPCC	51,290,663	284,990,412,176	0.018
SERC	97,785,654	887,073,303,223	0.011
SPP	62,721,433	204,172,271,729	0.031
WECC	913,556	701,826,043,025	0.000
U.S.	482,954,744	3,960,424,804,688	0.012

[a] This analysis assumes full pass-through of all compliance costs to electricity consumers.
[b] Cost values exclude baseline closures.
[c] There are no explicitly analyzed facilities located in the ASCC region. For more information on explicitly and implicitly analyzed in-scope facilities see Appendix 3.A of the EBA report.

3. Assessment of the Impacts in the Context of Electricity Markets

In the analyses for the previous 316(b) regulations, EPA used the Integrated Planning Model (IPM), a comprehensive electricity market optimization model, to assess the economic impact of regulatory options within the context of regional and national electricity markets. For its economic impact assessment of today's proposed regulatory options, EPA used an updated version of this same analytic system, Integrated Planning Model Version 3.02 EISA (IPM V3.02), to assess facility and market-level effects of the options.

Use of a comprehensive, market analysis system is important in assessing the potential impact of the options because of the interdependence of electricity generating units in supplying power to the electric transmission grid. Increases in electricity production costs and potential reductions in electricity output at directly affected facilities—whether due to the temporary shutdown of electric generating units during technology installation and/or the energy production penalties that can result from compliance system operation—can have a range of broader market impacts that extend beyond the effect on complying facilities and their direct customers. In addition, the impact of compliance requirements on directly affected facilities may be seen differently when the analysis considers the impact on those facilities in the context of the broader electricity market instead of looking at the impact on a standalone, single-facility basis.

IPM V3.02 provides outputs for the North American Electric Reliability Corporation (NERC) regions that lie within the continental United States. IPM V3.02 does not analyze electric power operations in Alaska and Hawaii because these states' electric power operations are not connected to the continental U.S. power grid.

IPM V3.02 is based on an inventory of U.S. utility- and non-utility-owned boilers and generators that provide power to the integrated electric transmission grid, as recorded in the Department of Energy's Energy Information Administration databases as of 2005.[80] The IPM baseline universe of facilities includes 533, or nearly all, of the 559 electric generating facilities that EPA estimates will be within the scope of today's proposed rule.[81] IPM Version 3.02 embeds a baseline energy demand forecast that is derived from the Department of Energy's *Annual Energy Outlook 2008* (AEO2008). IPM V3.02 incorporates in its analytic baseline the expected compliance response for the following air regulations affecting the power sector: Title IV of the Clean Air Act (the Acid Raid Program); the NO_X SIP Call; various New Source Review (NSR) settlements;[82] and several state rules[83] affecting emissions of SO_2 and NO_X that were finalized through February 3, 2009. IPM also includes state rules that have been finalized and/or approved by a state's legislature or environmental agency, and in certain instances, facility-level compliance technology installations that have already been undertaken because of CAIR requirements.[84 85]

EPA recognizes that due to downtime or connection outages estimated to occur in conjunction with installation of several of the technologies, and the number of facilities that will need to come into compliance over the years after today's rule is promulgated, short-term electric reliability issues could occur unless care is taken within each region to coordinate outages with NERC and, where possible, with normal scheduled maintenance operations. Based on this concern, EPA's options were developed with flexibility provided to the permit authority to tailor compliance timelines. EPA anticipates in those instances where local electric reliability could be affected, facilities would notify the Director via provisions in the permit application. Once approved, facilities would receive workable construction schedules from permit writers to schedule installation down times without negatively impacting electric supply reliability.

In performing analyses based on IPM V3.02, EPA first developed a baseline—*i.e.,* without regulation—projection of electricity markets and facility operations over the period from the expected promulgation date, 2012, through 2028 (pre-regulation baseline case). EPA then overlaid this analysis with the estimated compliance costs and other operating effects—downtime for installation of compliance technology and energy penalty—for in-scope facilities under selected regulatory options (post-compliance cases).

For the IPM analysis, EPA analyzed three options that closely correspond to those discussed elsewhere in this document: (1) Non-Cooling Tower-Based Impingement and Entrainment requirements at all in-scope facilities (Option 1: IM Everywhere), (2) Impingement Mortality Controls at all in-scope facilities, and Cooling Towers at all in-scope facilities with DIF exceeding 125 MGD (Option 2: IM Everywhere and EM for Facilities with DIF>125MGD), and (3) Cooling Towers at all in-scope facilities (Option 3: I&E Mortality Everywhere).[86] The fourth option discussed elsewhere in this document—Option 4: Non-Cooling Tower-Based Impingement and Entrainment requirements at all in-scope facilities with DIF of 50 MGD or more—was not analyzed in IPM due to time constraints. Since this option mimics the requirements of Option 1, but only applies them to a subset of in-scope facilities, the findings for this option in the IPM analysis would be lower than those estimated for Option 1.

The IPM V3.02 runs provide analysis results for selected run-years. EPA specified these analysis years taking into account the expected promulgation date for today's Proposed Existing Facilities Regulation (2012), the years in which facilities would be expected to install compliance technology and achieve compliance (2013–2027),[87] and the years in which all complying facilities would be expected to achieve compliance (2028 and subsequent years). In the following sections, EPA reports results for the analysis year 2028, which is the first year after promulgation in which all in-scope facilities would be expected to have achieved compliance and thus represents a steady state of post-compliance operations, *i.e.*, the steady-state year.[88] In addition, EPA also analyzed potential electricity market-level effects for years during which facilities would be expected to shut down operations temporarily to complete technology installation. For the IPM-based analyses of IM-only installations, the specified compliance window is from 2013 to 2017, for cooling tower installations by fossil fuel electric power generating facilities from 2018 to 2022, and for cooling tower installations by nuclear electric power generating facilities from 2023 to 2027. Consequently, the analysis of compliance technology installation downtime used output from model run-years 2015 for IM technology installations and 2020 and 2025 for CT installations by fossil fuel and nuclear electric power generating facilities, respectively. The impacts of the analysis options are measured as the difference between key economic and operational impact metrics between the pre-regulation baseline case and the post-compliance case.

[80] In some instances, facility information has been updated to reflect known material changes in a plant's generating capacity since 2005.

[81] The exclusions of facilities from the IPM analysis include 4 facilities that are located in Alaska or Hawaii (and thus not included in IPM), 4 "lower-48" facilities that are not connected to the integrated electric transmission grid, 7 facilities excluded from the IPM baseline as the result of custom adjustments made by ICF, and 11 facilities that are not explicitly present in the 316(b) facility dataset for this analysis. See Chapter 6 of the EBA report for more details.

[82] Include agreements between EPA and Southern Indiana Gas and Electric Company (Vectren), Public Service Enterprise Group, Tampa Electric Company, We Energies (WEPCO), Virginia Electric & Power Company (Dominion), Santee Cooper, Minnkota Power Coop, American Electric Power (AEP), East Kentucky Power Cooperative (EKPC), Nevada Power Company, Illinois Power, Mirant, Ohio Edison, and Kentucky.

[83] Include current and future state programs in Connecticut, Delaware, Georgia, Illinois, Maine, Maryland, Massachusetts, Minnesota, Missouri, New Hampshire, North Carolina, New Jersey, New York, Oregon, Texas, and Wisconsin.

[84] For a detailed description of IPM Version 3.02, see Chapter 6 of the EBA report.

[85] At the time that EPA began analyzing the Proposed Existing Facilities Rule options, the Agency was still developing the regulatory standards to replace CAIR requirements. The Transport Rule, which replaces CAIR, was proposed on July 6, 2010, i.e., after EPA began to develop the baseline for the current 316(b) existing facilities rule analyses. Consequently, the IPM baseline used for the analysis of the Proposed existing facilities rule options does not reflect requirements under the newly proposed Transport Rule. However, because EPA used IPM v3.02 EISA, i.e., the same IPM version used for the market model analysis of 316(b) regulatory options, to assess the impact of the proposed Transport Rule on the U.S. electric power sector, the 316(b) baseline includes other important existing regulations currently affecting this industry sector. Consequently, on balance, EPA judges that the performance of the market model analyses against the v3.02 EISA constitutes a reasonable cost and economic impact analysis for the Proposed Existing Facilities Rule—in particular, given the uncertainties regarding the final standards promulgated, and the specific requirements that States will adopt in implementing the Transport Rule.

[86] The costs as analyzed in IPM differ slightly from those used in the non-IPM analyses. For more details on these differences see Chapter 6 of the EBA report.

[87] For the IPM-based analyses of IM-only installations, the specified compliance window is from 2013 to 2017, for cooling tower installations by fossil fuel electric power generating facilities from 2018 to 2022, and for cooling tower installations by nuclear electric power generating facilities from 2023 to 2027.

[88] The first year of full compliance is 2028 for Options 2 and 3, and 2018 for Option 1. To facilitate comparison of market-level impacts across options, this presentation focuses on 2028 as the steady state comparison year.

a. Analysis Results for the Year 2028—To Reflect Steady State, Post-Compliance Operations

For the steady-state analysis (year 2028), EPA considered impact metrics of interest at three levels of aggregation: (1) Impact on national and regional electricity markets, (2) impact on the group of in-scope power generating facilities (*i.e.,* facilities that are expected to be within the scope of today's proposed regulation but do not necessarily incur technology cost), and (3) impact on individual in-scope facilities.

(1) Impact on National and Regional Electricity Markets

For the assessment of market level impacts, EPA considered five output metrics from IPM V3.02: (1) Incremental capacity closures, calculated as the difference between capacity under the regulatory options and capacity under the base case, which includes both full facility closures and partial facility closures (*i.e.,* unit closures) in aggregate capacity terms; (2) incremental capacity closures as a percentage of baseline capacity; (3) post-compliance changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by net generation; (4) post-compliance changes in energy price, where energy prices are defined as the wholesale prices received by facilities for the sale of electric generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenue minus the sum of fixed and variable O&M costs, fuel costs, and annualized capital costs.

Exhibit VII–12 reports results for the three market model analysis Options for each of the five metrics above, with national totals and detail at level of regional electricity markets defined on the basis of the current NERC regions. These market model analysis options correspond to regulatory Options 1, 2, and 3 (EPA did not run Option 4 separately because EPA assumes baseline MW capacity basis Options 1 and 4 are similar, and Option 4 is less stringent than Option 1. Results for Option 1 can be viewed as an upper bound estimate of the market impacts of Option 4 in Exhibits VII–12, VII–13, VII–14, and VII–15). The NERC regions are as follows: ERCOT (Electric Reliability Council of Texas), FRCC (Florida Reliability Coordinating Council), MRO (Midwest Reliability Organization), NPCC (Northeast Power Coordination Council), RFC (ReliabilityFirst Corporation), SERC (Southeastern Electricity Reliability Council), SPP (Southwest Power Pool), and WECC (Western Electricity Coordinating Council).

Additional results are presented in Chapter 6 of the EBA report. Chapter 6 also presents a more detailed interpretation of the results of the market-level analysis.

EXHIBIT VII–12—IMPACT OF MARKET MODEL ANALYSIS OPTIONS ON NATIONAL AND REGIONAL MARKETS AT THE YEAR 2028

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (%)	Change in energy price per MWh (%)	Change in pre-tax income (2009 $) (%)
		Capacity (MW)	Percent of baseline capacity			
Option 1: IM Everywhere						
ERCOT	98,757	151	0.2	−0.1	0.0	−0.4
FRCC	79,298	75	0.1	0.3	0.0	−0.4
MRO	71,200	29	0.0	−0.4	0.0	−1.0
NPCC	79,688	682	0.9	−0.4	0.1	0.3
RFC	244,700	−279	−0.1	0.2	0.1	−0.1
SERC	286,461	−79	0.0	−0.1	0.0	−0.4
SPP	67,703	13	0.0	0.0	0.0	−0.5
WECC	219,764	9	0.0	0.0	0.0	−0.1
Total	1,147,571	601	0.1	0.0	NA	−0.3
Option 2: IM Everywhere and EM for Facilities with DIF > 125 MGD						
ERCOT	98,757	4,462	4.5	−1.1	0.2	−9.5
FRCC	79,298	36	0.0	1.2	0.1	−4.7
MRO	71,200	806	1.1	1.5	0.1	−8.4
NPCC	79,688	3,862	4.8	−2.6	−1.6	−10.4
RFC	244,700	3,197	1.3	2.7	0.3	−10.3
SERC	286,461	903	0.3	2.0	−0.1	−8.9
SPP	67,703	969	1.4	0.9	−0.1	−8.6
WECC	219,764	184	0.1	0.1	−0.3	−0.8
Total	1,147,571	14,418	1.3	1.0	NA	−7.6
Option 3—I&E Mortality Everywhere						
ERCOT	98,757	4,498	4.6	−1.2	0.2	−9.5
FRCC	79,298	36	0.0	1.3	0.1	−4.8
MRO	71,200	801	1.1	1.5	0.1	−9.1
NPCC	79,688	3,861	4.8	−2.7	−1.7	−11.0
RFC	244,700	3,195	1.3	2.7	0.5	−10.2
SERC	286,461	997	0.3	2.0	0.0	−8.9
SPP	67,703	1,004	1.5	0.9	0.0	−8.7
WECC	219,764	183	0.1	0.1	−0.3	−0.9
Total	1,147,571	14,576	1.3	1.0	NA	−7.7

As reported in Exhibit VII–12, the market model analysis indicates that Option 1 would have very small effects on overall electricity markets, on both a national and regional sub-market basis, in the year 2028, the first analysis year of full compliance with the regulation. At the national level, the analysis indicates a total reduction in capacity from closures of 601 MW, or less than 0.1 percent of the total capacity baseline in 2028. At the regional level, the greatest capacity reduction, 682 MW, occurs in the NPCC region; this reduction would be approximately 0.9 percent of baseline capacity. Two NERC regions—RFC and SERC—are estimated to experience avoided capacity closures—*i.e.,* one or more generating units that are otherwise projected to cease operations in the baseline become more economically attractive sources of electricity in the post-compliance case, because of relative changes in the economics of electricity production across the full market, and thus avoid closure. This counterintuitive result is due to the integrated nature of electricity markets.

At the national level, the variable production cost of electricity stays essentially the same, but with small variations by region. The greatest increase occurs in FRCC (0.3 percent) and the largest decline occurring in MRO and NPCC (0.4 percent). Energy prices also change little across NERC regions, with NPCC and RFC recording small increases of 0.1 percent—these very small estimated changes in energy prices are essentially within the analytic "noise" of the market model analysis system. Given the additional costs from compliance with almost no change in electricity prices, national sector-level pre-tax income is projected to decline slightly, by 0.3 percent. All regions except NPCC experience a decrease in pre-tax income; the greatest decrease, approximately 1.0 percent, occurs in MRO.[89]

Option 2 requires that facilities with cooling water design intake of 125 MGD or less meet non-cooling tower-based impingement mortality requirements and site-specific entrainment mortality BTA (*i.e.,* Option 1 specifications), while facilities with cooling water design intake exceeding 125 MGD install cooling towers. As expected, the market model analysis projects that the more expensive Option 2 with some facilities installing cooling towers would have a greater impact than Option 1 on national and regional electricity markets. Under Option 2, capacity closures total 14,418 MW, or 1.3 percent of the baseline capacity value, with all regions projected to incur closures. The largest percentage impact occurs in NPCC, with a loss of approximately 4.8 percent of the baseline capacity value. Similarly, variable production costs for electricity generation increase nationally by approximately 1.0 percent, with the largest increase occurring in RFC, at 2.7 percent; only two of the 8 NERC regions—ERCOT and NPCC—experience a decline of 1.1 percent and 2.6 percent, respectively. The effect on energy prices varies across regions, with RFC recording the largest increase, at 0.3 percent, and NPCC recording the largest decline, 1.6 percent. Finally, as would be expected with the higher compliance outlays, longer installation downtimes, and energy penalties with some facilities installing cooling towers under Option 2, total sector pre-tax income is more materially affected compared to Option 1: At the national level, pre-tax income declines by 7.6 percent. All regions experience a loss in pre-tax income, with the largest loss occurring in NPCC, at 10.4 percent.

The market model analysis projects that the most expensive option, Option 3 (I&E Mortality Everywhere), would have a slightly greater impact on national and regional electricity markets than Option 2, as more in-scope facilities are required to install cooling towers (nearly all) to meet compliance requirements. Under Option 3, capacity loss is nearly the same as under Option 2—14,576 MW or 1.3 percent of the baseline capacity value—with all regions projected to incur closures. As under Option 2, the largest percentage impact under Option 3 occurs in NPCC, with a loss of approximately 4.8 percent of the baseline capacity value. Similarly, the impact on variable production costs for electricity generation under Option 3 is approximately the same as under Option 2 at the national and regional level. At the national level, variable production costs increase by 1.0 percent, with the largest increase also occurring in RFC, at 2.7 percent; again, only two of the 8 NERC regions—ERCOT and NPCC—record a decline of 1.2 percent and 2.7 percent, respectively. The effect on energy prices also varies across regions, with RFC recording the largest increase of 0.5 percent and NPCC recording the largest decline of 1.7 percent. The impact on total sector pre-tax income under Option 3 is also similar to the impact under Option 2; at the national level, pre-tax income declines by 7.7 percent with all regions experiencing a loss in pre-tax income.

(2) Impact on In-Scope Facilities

EPA used IPM V3.02 results for 2028 to assess the potential impact of the regulatory Options on the subset of electric generating facilities that are estimated to be within the scope of today's proposed regulation compliance requirements. Only results for in-scope facilities are reported in this analysis.

Exhibit VII–13 reports results for the first three of the regulatory Options for in-scope facilities, as a group. Chapter 6 of the EBA presents a more detailed interpretation of the results of the analysis of today's Proposed Existing Facilities Regulation.

EXHIBIT VII–13—IMPACT OF MARKET MODEL ANALYSIS OPTIONS ON IN-SCOPE FACILITIES, AT THE YEAR 2028

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (percent)
		Capacity (MW)	Percent of baseline capacity	
Option 1—IM Everywhere				
ERCOT	35,985	−99	−0.3	−0.2
FRCC	27,210	−11	0.0	0.0

[89] IPM does not model traditional utility rate regulation but attempts to capture price effects as though they occur in competitive, deregulated markets. As a result, the price effects estimated in IPM may be less than those that would actually occur, given that most States continue to operate under traditional utility regulation. Likewise, the proposed rule's impact on electric generators' net income may be overstated. In contrast, the electricity rate impact analyses presented earlier in this section (Section VII. 2), assume full pass-through of compliance costs as increased electricity prices, which may more closely approximate the price effect in regulated markets, but could overstate the price effect in deregulated markets.

EXHIBIT VII–13—IMPACT OF MARKET MODEL ANALYSIS OPTIONS ON IN-SCOPE FACILITIES, AT THE YEAR 2028—Continued

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (percent)
		Capacity (MW)	Percent of baseline capacity	
MRO	29,131	298	1.0	−0.3
NPCC	33,618	859	2.6	−1.2
RFC	138,519	−95	−0.1	0.1
SERC	151,806	198	0.1	0.0
SPP	23,879	−102	−0.4	−0.2
WECC	38,906	9	0.0	−0.1
Total	479,054	1,056	0.2	−0.1
Option 2—IM Everywhere and EM for Facilities With DIF 125 MGD				
ERCOT	35,985	5,486	15.2	−4.3
FRCC	27,210	−336	−1.2	0.1
MRO	29,131	969	3.3	2.6
NPCC	33,618	4,415	13.1	−8.8
RFC	138,519	3,329	2.4	1.9
SERC	151,806	433	0.3	2.1
SPP	23,879	2,285	9.6	−1.2
WECC	38,906	234	0.6	0.7
Total	479,054	16,815	3.5	0.5
Option 3—I&E Mortality Everywhere				
ERCOT	35,985	5,528	15.4	−4.9
FRCC	27,210	−336	−1.2	0.0
MRO	29,131	1,016	3.5	2.7
NPCC	33,618	4,415	13.1	−9.0
RFC	138,519	3,329	2.4	2.0
SERC	151,806	699	0.5	2.1
SPP	23,879	2,259	9.5	−2.3
WECC	38,906	234	0.6	0.8
Total	479,054	17,144	3.6	0.4

The market model analysis results for in-scope facilities show a greater degree of adverse impact than that observed over all generating units. These more substantial adverse impacts among the directly affected in-scope units are offset by generally positive changes in capacity and energy production at the facilities that are not directly by the proposed rule's requirements, and which are not included in this section's analysis.

Under Option 1, today's preferred option, looking over all in-scope facilities, the total capacity loss from early retirements is 1,056 MW at the national level, or 0.2 percent of baseline capacity in the in-scope units. The impact on capacity retirements varies across NERC regions with 4 out of 8 regions recording capacity closures and the remaining 4 experiencing *avoided* capacity closures. Some closures (or avoided closures) are full facility closures (*i.e.,* all generating units at the facility close or avoid closure), while others are partial closures (*i.e.,* at least one generating unit at the facility is assessed as closing, or avoiding closure, in the post-compliance case). Overall, 39 generating units close (approximately 9,874 MW) and 30 generating units avoid closure (approximately 8,819 MW) in the post-compliance case, resulting in net closure of 9 generating units (approximately 1,055 MW). The 39 generating unit closures reflect full closure of 20 units in 13 facilities (5,647 MW) and partial closure of 19 units in 16 facilities (4,227 MW). The largest capacity loss occurs in NPCC (859 MW or 2.6 percent of baseline capacity).

As described in the preceding section, these net losses of capacity due to early retirements among in-scope facilities are offset at the total market level by capacity increases among other facilities. These capacity increases typically occur through "earlier" construction of new generating units or repowering of existing units. These new units also typically operate with higher energy efficiency and lower electricity production cost. As a result, the early retirements among in-scope facilities under the proposed regulatory option have little impact at the level of national and regional electricity markets.

Finally, at the national level, variable production costs decline by approximately 0.1 percent as older, less-efficient plants close and are replaced by newer plants in the IPM model. These effects vary by region, with some regions experiencing slight increases, while other regions experience slight decreases. These findings of very small national and regional effects in these impact metrics confirm EPA's assessment, stated in the preceding paragraph, that the assessed capacity closures among in-scope facilities are of little economic consequence in national and regional electricity markets.

Again, the findings for the more expensive Option 2 (IM Everywhere and EM for Facilities with DIF > 125MGD) are of greater consequence, as some facilities would be required to incur the cost of cooling tower installation. The total loss in capacity in 2028 is assessed at 16,815 MW, with the largest capacity loss of 15.2 percent occurring in NPCC.

In the same way as reported for Option 1, the capacity loss of 16,815 MW under Option 2 also reflects a combination of early retirements and avoided retirements of generating units. Under Option 2, 149 generating units close (36,163 MW) and 86 generating units avoid closure (19,186 MW), leading to an estimated net closure of 63 generating units (16,977 MW). Out of the 149 closed units, 72 units (22,976 MW) are in 35 fully closed facilities and 77 units (13,186 MW) are in 46 partially closed facilities.

Under Option 2, the findings for the change in variable production cost are also considerably larger compared to Option 1. At the national level, Option 2 results in a 0.5 percent increase in variable production cost. This effect varies considerably by region, with NPCC recording the largest decrease in variable production costs (8.8 percent) and MRO incurring the largest increase (2.6 percent).

The analysis results for Option 3 are similar to those for Option 2, and again show a greater degree of impact on capacity and electricity generation among in-scope facilities compared to the degree of impact observed at the market level. At the national level, Option 3 results in 17,144 MW of retired capacity (compared to 16,815 MW under Option 2), which is approximately 3.6 percent of total baseline in-scope capacity (compared to 3.5 percent under Option 2). As is the case for Options 1 and 2, the net capacity reduction of 17,144 MW reported for Option 3 includes early retirement and avoided retirement of generating units. Under Option 2, 162 generating units close (37,255 MW) and 88 generating units avoid closure (20,258 MW), leading to an estimated net closure of 74 generating units (16,997 MW). Out of the 162 closed units, 79 units (23,262 MW) are in 39 fully closed facilities and 83 units (13,992 MW) are in 50 partially closed facilities.

The impact on variable production costs observed for Option 3 is similar in magnitude to that observed for Option 2. At the national level, variable production costs decline by approximately 0.4 percent. Under Option 3, this effect also varies considerably by region, with NPCC, again, recording the largest decrease in variable production costs (9.0 percent) and MRO incurring the largest increase (2.7 percent).

(3) Impact on Individual In-Scope Facilities

Results for the group of in-scope facilities as a whole may mask shifts in economic performance among individual facilities subject to today's proposed rule. To assess potential facility-level effects, EPA analyzed facility-specific changes between the base case and the post-compliance cases for the following metrics: (1) Capacity utilization (defined as annual generation (MWh) divided by [capacity (MW) times 8,760 hours]), (2) electricity generation, (3) revenue, (4) variable production costs per MWh, defined as variable O&M cost plus fuel cost divided by net generation, and (5) pre-tax income, defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs.

Exhibit VII–14 presents the estimated number of in-scope facilities with specific degrees of change in operations and financial performance as a result of today's regulatory options. This exhibit excludes in-scope facilities with estimated significant status changes in 2028 that render these metrics of change not meaningful—*i.e.,* under the analyzed Option, a facility that is assessed as either a full or partial closure between the base case and the post-compliance case. This is done because the measures presented in Exhibit VII–11 such as change in revenue would not be meaningful for these facilities. For example, for a facility that is projected to close in the post-compliance case, the reduction in revenue would be 100 percent. On this basis, 118 facilities are excluded from assessment under Option 1, 159 facilities under Option 2, and 165 facilities under Option 3.

In addition, the change in variable production cost per MWh of generation could not be developed for facilities that have zero generation in either the baseline or post-compliance cases. For these facilities—28, 21, and 18 facilities under Options 1, 2, or 3, respectively—variable production cost per MWh cannot be calculated for one or other of the two cases (because the divisor, MWh, is zero), and therefore the change in variable production cost per MWh cannot be meaningfully determined. Facilities excluded from this assessment are recorded in the "N/A" column.

EXHIBIT VII–14—IMPACT OF MARKET MODEL ANALYSIS OPTIONS ON INDIVIDUAL IN-SCOPE FACILITIES AT THE YEAR 2028—NUMBER OF FACILITIES BY IMPACT MAGNITUDE

Economic measures	Reduction			No change	Increase			N/A [b]
	> 3%	1–3%	< 1%		< 1%	1–3%	> 3%	
Option 1—IM Everywhere								
Change in Capacity Utilization [a]	0	1	23	398	41	5	3	118
Change in Generation	6	7	39	391	26	0	2	118
Change in Revenue	5	3	164	4	282	13	0	118
Change in Variable Production Costs/MWh	0	2	91	22	319	6	3	146
Change in Pre-Tax Income	40	126	243	0	55	4	3	118
Option 2—IM Everywhere and EM for Facilities With DIF > 125 MGD								
Change in Capacity Utilization [a]	13	18	102	147	104	24	22	159
Change in Generation	154	89	6	146	8	12	15	159
Change in Revenue	139	103	51	0	73	54	10	159
Change in Variable Production Costs/MWh	3	5	24	14	107	55	201	180
Change in Pre-Tax Income	267	33	55	0	28	23	24	159
Option 3—I&E Mortality Everywhere								
Change in Capacity Utilization [a]	10	16	132	96	118	25	27	165
Change in Generation	184	110	6	95	9	10	10	165
Change in Revenue	158	127	44	0	49	38	8	165
Change in Variable Production Costs/MWh	4	8	15	9	74	63	233	183

EXHIBIT VII–14—IMPACT OF MARKET MODEL ANALYSIS OPTIONS ON INDIVIDUAL IN-SCOPE FACILITIES AT THE YEAR 2028—NUMBER OF FACILITIES BY IMPACT MAGNITUDE—Continued

Economic measures	Reduction			No change	Increase			N/A [b]
	> 3%	1–3%	< 1%		< 1%	1–3%	> 3%	
Change in Pre-Tax Income	315	12	41	0	24	11	21	165

[a] The change in capacity utilization is the difference between the capacity utilization percentages in the base case and post-compliance cases. For all other measures, the change is expressed as the percentage change between the base case and post-compliance values.

[b] Facilities with status changes in either base case or post-compliance scenario have been excluded from these calculations. In addition, the change in variable production cost per MWh could not be developed for 28, 21, and 18 facilities with zero generation in either base case or Options 1, 2, or 3 post-compliance scenarios, respectively.

For Option 1, which corresponds to EPA's proposed option, the analysis of changes in individual facilities indicates that most facilities experience very slight effects—no change, or less than a 1 percent reduction or 1 percent increase—in all of the impact metrics except Change in Pre-Tax Income. Only 1 facility is estimated to incur a reduction in capacity utilization exceeding 1 percent; 13 facilities incur a reduction in generation exceeding 1 percent; and 8 facilities incur a reduction in revenue exceeding 1 percent. Only 9 facilities incur an increase in variable production costs exceeding one percent. The estimated change in pre-tax income is more consequential as 126 facilities are projected to incur reductions in pre-tax income of 1–3 percent and 40 facilities are projected to incur reductions in pre-tax income exceeding 3 percent of the baseline value.

The findings for Option 2 are substantially more consequential compared to those estimated for Option 1. For 243 facilities, the reduction in generation is estimated to exceed 1 percent; for 242 facilities, the reduction in revenue is estimated to exceed 1 percent; for 256 facilities, the increase in variable production costs is estimated to exceed 1 percent. Again, the change in pre-tax income is more substantial, with 33 facilities expected to incur reductions in pre-tax income of 1–3 percent and 267 facilities, greater than 3 percent.

As in the preceding discussions, the findings for Option 3 are slightly more consequential than those estimated for Option 2. For 294 facilities, the reduction in generation is estimated to exceed 1 percent; for 285 facilities, the reduction in revenue is estimated to exceed 1 percent; for 296 facilities, the increase in variable production costs is estimated to exceed 1 percent. The change in pre-tax income is more substantial, with 12 facilities expected to incur reductions in pre-tax income of 1–3 percent and 315 facilities, greater than 3 percent.

b. Analysis Results for the Years 2015, 2020, and 2025—To Capture the Effect of Installation Downtime

This section presents market-level results for today's proposed rule options for model run years 2015, 2020, and 2025. As discussed above, run year 2015 captures the period when in-scope facilities install IM technologies, while run years 2020 and 2025 capture the period when fossil fuel and nuclear facilities install cooling towers, respectively, and may incur installation downtime. Of particular importance as a potential impact, the additional unit downtime from installation of compliance technology would manifest as increased electricity production costs resulting from the dispatch of higher production cost generating units during the periods when units are taken offline to install compliance technologies. Because these effects are of most concern in terms of potential impact on national and regional electricity markets, this section presents results only for the total set of facilities analyzed in IPM (Exhibit VII–15) and does not present results for the subset of only in-scope facilities.

For the assessment of compliance technology installation downtime impacts at the national level, EPA considered five output metrics from IPM V3.02: (1) Changes in electricity generation, (2) changes in revenue, (3) cost changes, including changes in fuel costs, variable O&M costs, fixed O&M costs, and capital costs, (4) changes in pre-tax income, and (5) changes in variable production costs per MWh. For each measure of concern, Exhibit VII–15 presents the results for the base case and the existing facilities rule options for each downtime year, *i.e.,* 2015, 2020, and 2025 and the percentage difference between the two. This section of the preamble discusses downtime impact at the national level only; for regional-level results see Appendix 6.A of EBA report.

EXHIBIT VII–15—IMPACT OF MARKET MODEL ANALYSIS OPTIONS DURING THE PERIOD OF INSTALLATION DOWNTIME

Economic measures (all dollar values in $2009)	Baseline value	Option 1		Option 2		Option 3	
		Value	% Change	Value	% Change	Value	% Change
2015 (2013–2017)							
Generation (TWh)	4,320	4,320	0.0	4,320	0.0	4,320	0.0
Revenue ($Millions)	$212,857	$212,883	0.0	$214,124	0.6	$214,201	0.6
Costs ($Millions)	$144,212	$144,764	0.4	$144,251	0.0	$144,244	0.0
Fuel Cost	$81,076	$81,080	0.0	$80,896	−0.2	$80,895	−0.2
Variable O&M	$12,034	$12,080	0.4	$12,056	0.2	$12,054	0.2
Fixed O&M	$43,697	$44,140	1.0	$43,683	0.0	$43,680	0.0
Capital Cost	$7,405	$7,463	0.8	$7,616	2.8	$7,614	2.8
Pre-Tax Income ($Millions)	$68,646	$68,119	−0.8	$69,873	1.8	$69,957	1.9
Variable Production Cost ($/MWh)	$21.55	$21.57	0.1	$21.52	−0.2	$21.52	−0.2

EXHIBIT VII–15—IMPACT OF MARKET MODEL ANALYSIS OPTIONS DURING THE PERIOD OF INSTALLATION DOWNTIME—Continued

Economic measures (all dollar values in $2009)	Baseline value	Option 1		Option 2		Option 3	
		Value	% Change	Value	% Change	Value	% Change
2020 (2018–2022)							
Generation (TWh)	4,530	....	....	4,530	0.0	4,530	0.0
Revenue ($Millions)	$261,531	....	....	$270,507	3.4	$270,709	3.5
Costs ($Millions)	$160,340	....	....	$167,450	4.4	$167,719	4.6
Fuel Cost	$83,418	....	....	$82,295	−1.3	$82,295	−1.3
Variable O&M	$13,349	....	....	$13,661	2.3	$13,673	2.4
Fixed O&M	$46,160	....	....	$50,888	10.2	$51,016	10.5
Capital Cost	$17,413	....	....	$20,605	18.3	$20,736	19.1
Pre-Tax Income ($Millions)	$101,191	....	....	$103,057	1.8	$102,990	1.8
Variable Production Cost ($/MWh)	$21.36	....	....	$21.18	−0.8	$21.18	−0.8
2025 (2023–2027)							
Generation (TWh)	4,746	....	....	4,746	0.0	4,746	0.0
Revenue ($Millions)	$280,613	....	....	$282,363	0.6	$282,381	0.6
Costs ($Millions)	$174,856	....	....	$184,900	5.7	$185,148	5.9
Fuel Cost	$86,633	....	....	$86,812	0.2	$86,834	0.2
Variable O&M	$13,907	....	....	$14,295	2.8	$14,299	2.8
Fixed O&M	$47,561	....	....	$53,500	12.5	$53,625	12.7
Capital Cost	$26,755	....	....	$30,294	13.2	$30,390	13.6
Pre-Tax Income ($Millions)	$105,757	....	....	$97,463	−7.8	$97,233	−8.1
Variable Production Cost ($/MWh)	$21.18	....	....	$21.30	0.6	$21.31	0.6

Because in-scope facilities would be required to meet compliance requirements not later than 5 years following rule promulgation, Option 1 has downtime effects during only the five-year period of 2013–2017. Results for the year 2015 are indicative of annual effects during each of these years. With few facilities having an increase in net downtime under Option 1, the estimated effects of downtime are relatively minor. Variable production costs increase by less than 0.1 percent. Another potential market level impact due to the incurrence of downtime is the possible increase in electricity prices and, consequently, revenue. At the market level, the change in total revenue is nearly zero, indicating very small overall effects on consumer prices. While these effects vary at the regional level, these effects are overall very small (see *Appendix 6.A* of the EBA).

Unlike Option 1, Option 2 would be expected to have downtime effects during each of the three five-year periods, as IM-only facilities comply during the first five years (2012–2017) following rule promulgation, fossil fuel facilities installing cooling tower technology comply during the second five years (2018–2022), and nuclear facilities installing cooling tower technology comply during the third five years (2023–2027).

During the first five-year period (2012–2017), downtime effects under Option 2, although larger than those under Option 1, remain small. Variable production costs decline by a very minor amount, 0.2 percent, as the market begins to adjust overall in anticipation of the larger effects on capacity availability as the result of cooling tower installation in later years. Total market-level revenue increases by $1.2 billion, or 0.6 percent, indicating small effects on consumer prices.

During the second five-year period (2018–2022), downtime effects are more pronounced under Option 2. At the market level, variable production costs decline again, by 0.8 percent, but revenue increases by nearly $9.0 billion, or 3.4 percent. Thus, the impact on consumer prices is greater during this period than during the preceding five years. Again, the reduction in variable production costs and revenue reflect replacement of generation from older, less efficient and higher fuel cost capacity, with generation from more energy efficient, lower production cost capacity.

The greatest impact on variable production cost under Option 2 occurs during the third five-year period (2023–2027), when nuclear facilities incur downtime during technology installation. Net downtime for cooling tower installation at nuclear facilities is estimated at 24 weeks compared to 0.3–4 weeks for installations at fossil fuel facilities. During this period, variable production costs increase by $0.12 per MWh or approximately 0.6 percent. Although variable production cost increases during this period (while declining during the preceding two five-year periods), annual revenue increases by a smaller amount, $1.8 billion, or a 0.6 percent increase above baseline. The smaller increase in revenue, and by inference in consumer prices, results from the ongoing market adjustment with replacement of less efficient, higher fuel cost generation with more efficient, lower fuel cost capacity. The effects at the national level vary at the regional level (see *Appendix 6.A* of the EBA).

Like Option 2, Option 3 would be expected to have downtime effects during each of the three five-year periods. During the first five-year period (2012–2017), impacts are nearly identical to those of Option 2 at the national and regional level. At the national level, variable production costs decline by 0.2 percent, and total revenue increases by $1.2 billion, or 0.6 percent, indicating small effects on consumer prices. While under Option 2, revenue declines by 0.2 percent, under Option 3 it increases by 0.5 percent. Further, under Option 3, the decline in variable production costs as well as the drop in electricity prices are slightly more significant.

During the second five-year period (2018–2022), downtime effects of Option 3 are again similar to, but slightly higher than, those of Option 2.

At the national level, variable production costs decline by 0.8 percent, while revenue increases by $9.2 billion, or 3.4 percent. Again, the impact on consumer prices under Option 3 is greater during this period than during the preceding five years.

As with Option 2, under Option 3 the greatest impact on variable production cost occurs during the third five-year period (2023–2027). During this period, market-level variable production costs increase by $0.13 per MWh or approximately 0.6 percent. Although variable production cost increases during this period (while declining during the preceding two five-year periods), annual revenue increases by a smaller amount, $1.8 billion, or a 0.6 percent increase above baseline.

At the regional level, as is the case for Option 2, under Option 3, these effects vary across regions. For all three analyzed five-year periods, the direction of the change in variable production costs, revenue, and electricity prices under Option 3 is the same as that under Option 2 for all NERC regions; the difference in the magnitude of change is not very pronounced either (see *Appendix 6.A* of the EBA).

5. Summary of Economic Impacts

EPA performed cost and economic impact assessment in two parts. The first set of cost and economic impact analyses—entity level impacts (at both the facility and parent company levels), an assessment of the potential electricity rate impact of compliance costs to the residential sector, and across sectors—reflects baseline operating characteristics of in-scope facilities and assumes no changes in those baseline operating characteristics—*e.g.,* level of electricity generation and revenue—as a result of the requirements of the proposed regulatory options. The second set of analyses look at broader electricity market impacts—taking into account the interconnection of regional and national electricity markets, for the full industry, for in-scope facilities only, and as the distribution of impacts at the facility level. No single metric or impact level definitively measures economic impacts. Rather, EPA has considered the totality of these measures of economic impacts in concluding that there are no significant economic impacts associated with Option 1 (the preferred option) or Option 4, while there are considerably greater economic impacts associated with Options 2 and 3.

VIII. Benefits Analysis

A. Introduction

This section presents EPA's estimates of the national environmental benefits of the options analyzed for 316(b) facilities. In this section, EPA describes how it calculated values for those benefits it could monetize. It also presents descriptive information for those benefits for which it could not develop a monetary value. The benefits assessed occur because of reductions in impingement, where fish and other aquatic life are trapped on equipment at the entrance to the CWIS, and entrainment, where aquatic organisms, eggs, and larvae are taken into the cooling system, passed through the heat exchanger, and then discharged back into the source water body, (I&E mortality) at cooling water intake structures (CWIS) affected by the proposed rulemaking. I&E mortality kills or injures large numbers of aquatic organisms at all life stages. Based on impingement mortality and entrainment data presented in I&E mortality facility studies, EPA assumes a mortality rate of 100% for both impinged and entrained individuals. Mortality rates are then adjusted based on the efficiency of technology in place.[90] By reducing I&E mortality rates, the proposed options are likely to increase the number of fish, shellfish, and other aquatic organisms in affected water bodies. In turn, this increased number of aquatic organisms directly improves welfare for individuals using the affected aquatic resources, generating so-called "use benefits" such as increases to the value of recreational and commercial fisheries. Reductions to I&E mortality also improve welfare for individuals absent any use of the affected resources, so-called "nonuse benefits," such as improved ecosystem function and resource bequest values. Section VIII.D provides an overview of the types and sources of benefits anticipated, how these benefits are estimated, the level of benefits that the proposed options would achieve, and how monetized benefits compare to costs.

EPA derived national benefit estimates for the proposed options from a series of regional studies representing a range of water body types and aquatic resources. Section VIII.B provides detail on the regional study design. Sections VIII.C through VIII.E briefly describe the methods EPA used to evaluate I&E mortality impacts at Section 316(b) facilities, and to derive an economic value associated with these losses.

[90] See discussion in Section III on entrainment mortality data and assumptions.

Further, because IPM does not predict where new capacity occurs, and EPA has not identified any other information projecting where new units would be located, EPA did not estimate benefits associated with new capacity (*i.e.* new units at an existing facility). As noted above, EPA also did not include costs for these new units in its social cost analysis. This is consistent with EPA's treatment of new facilities, such as new offshore oil and gas facilities in the Phase III rule.

The methodologies used to estimate benefits of proposed options are largely built upon those used to estimate benefits for the suspended Phase II regulation and the remanded rule for 316(b) Phase III existing facilities. In addition to updating these analyses, EPA more fully investigated the effects of I&E mortality on threatened and endangered (T&E) species, and improved its estimation of nonuse benefits. The 2011 Environmental and Economic Benefits Analysis document for the proposed 316(b) Existing Facility rule (hereafter EEBA) provides detailed descriptions of the these new methodologies used to analyze the benefits of proposed regulatory options, and provides references to (i) Part A of the 2004 Regional Benefits Analysis for the suspended Final Section 316(b) Phase II Rule, and (ii) Part A of the 2006 Regional Benefits Analysis Document for the Final Section 316(b) Phase III Existing Facilities Rule for analyses using similar methodologies.

The EEBA document provides EPA's benefit estimates for the proposed options. EPA relied on information on cooling water systems and intake structures already in place collected in the Section 316(b) Industry Surveys (the Industry Screener Questionnaire (SQ) and the Detailed Industry Questionnaire (DQ)) to estimate the number of manufacturing facilities that would potentially be in-scope of the regulatory options considered for the Proposed Existing Facilities Rule. Because the DQs were sent to a sample of the manufacturing industries that use cooling water, the respondents were assigned sample weights designed to represent other facilities that were not covered in the survey. For the analysis of in-scope Electric Generators, EPA used information on cooling water systems and intake structures already in place, from 656 in-scope facilities that responded to the 2000 Section 316(b) Surveys (the Industry Short Technical Questionnaire (STQ) and the Detailed Industry Questionnaire (DQ)). All in-scope facilities have design intake flow of at least 2 million gallons per day (MGD). Regional benefits are estimated from the sample of facilities for which there is sufficient DQ information to estimate the environmental impacts of regulatory options. The environmental impacts from the set of explicitly analyzed facilities are then extrapolated to the universe of facilities within a region using statistical weights developed for this analysis. National benefits are estimated as the sum of all regional benefits.

B. Regional Study Design

EPA evaluated the benefits of today's rule in seven study regions (California,[91] North Atlantic, Mid Atlantic, South Atlantic, Gulf of Mexico, Great Lakes, and Inland). Regions were defined based on ecological similarities within regions (*e.g.* similar communities of aquatic species), and on characteristics of commercial and recreational fishing activities. The five coastal regions identified (California, North Atlantic, Mid-Atlantic, South Atlantic, and Gulf of Mexico) correspond to those of the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). The Great Lakes region includes Lake Ontario, Lake Erie, Lake Huron (including Lake St. Clair), Lake Michigan, Lake Superior, and the connecting channels (Saint Mary's River, Saint Clair River, Detroit River, Niagara River, and Saint Lawrence River to the Canadian border) as defined in 33 U.S.C. 1268, Sec. 118(a)(3)(b). The Inland region includes all remaining facilities that withdraw water from freshwater lakes, rivers, and reservoirs. Notably, of the 521 facilities that are located on freshwater streams or rivers, 31 percent (164) of these facilities have average intake greater than 5 percent of the mean annual flow of the source waters. During periods of low river flow, or during periods of higher than average withdrawals of cooling water, the proportionate withdrawal of source waters may be much higher. Thus, the potential for adverse environmental impacts may increase. The number and total operational intake flow of all 316(b) facilities by study region is presented in Exhibit VIII–1.

EXHIBIT VIII–1—NUMBER OF FACILITIES AND TOTAL MEAN OPERATIONAL FLOW (BGD), BY REGION

Region	Number of potentially regulated facilities [a]	Once-through flow	Closed-cycle flow	Total flow
California [b]	8	1.2	0.0	1.2
Great Lakes	67	18.8	0.2	19.0
Inland [c]	669	134.9	3.9	138.8
Mid-Atlantic	54	28.1	0.1	28.2
Gulf of Mexico	30	12.9	0.0	12.9
North Atlantic	26	7.0	0.0	7.0
South Atlantic	17	7.4	< 0.1	7.5
All Regions	871	210.3	4.2	214.5

[a] This table presents the unweighted number of facilities because weighted facilities counts are not estimated separately by benefits region. The estimated total weighted number of potentially regulated facilities is 1152 (including baseline closures).

[b] The California region includes manufacturing facilities in the state of California and four facilities in Hawaii. It excludes coastal electric generating facilities in the state of California due to state regulation of cooling water intakes for these facilities. There are no coastal facilities in Oregon and a single facility in Washington classified as a baseline closure.

[c] A facility in Texas has intakes located in both the Inland and Gulf of Mexico regions. It is included within the Inland region in the current table to prevent double-counting.

To estimate regional I&E mortality, EPA extrapolated loss data from 97 facilities that conducted I&E mortality studies (model facilities) to all in-scope facilities within the same region. EPA judged these 97 studies include the most representative studies with the best available data. EPA used regions to account for differences in ecosystems, aquatic species, and characteristics of commercial and recreational fishing activities. Extrapolation was conducted on the basis of actual intake flow reported for the period 1996–1998 by facilities in response to EPA's Section 316(b) Detailed Questionnaire and Short Technical Questionnaire. Chapter 3 of the EEBA document provides details of the extrapolation procedure. Because the goal of the analysis was to provide estimates of I&E mortality losses at regional and national scales, EPA recognizes that there may be substantial variability in the number of actual losses (and benefits) of individual facilities. However, EPA concludes that extrapolation is a reasonable basis for developing estimates of regional- and national-level benefits for the purposes of this proposed rulemaking.

C. Physical Impacts of I&E Mortality

EPA's benefits analysis is based on facility-provided I&E mortality monitoring data. Facility data consist of records of impinged and entrained organisms sampled at intake structures and cover organisms of all ages and life stages. Sampling protocols were not standardized across facilities. Differences among facility protocols included sampling methods and equipment used, the number of samples taken, sampling duration, and the unit of time and volume of intake flow used to express I&E mortality losses. To standardize estimates across facilities, EPA converted sampling counts into annual I&E mortality losses. Using standard fishery modeling techniques,[92] EPA constructed models that combined facility-derived I&E mortality counts with life history data from the scientific literature to derive annual estimates of:

- Age-one equivalent losses (A1Es)—the number of individuals of different ages impinged and entrained by facility

[91] The California region includes manufacturing facilities in the state of California and four facilities in Hawaii. It excludes coastal electric generating facilities in the state of California due to state regulation of cooling water intakes for these facilities. There are no coastal facilities in Oregon and a single facility in Washington classified as a baseline closure.

[92] Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191; Hilborn, R. and C.J. Walters. 1992. Quantitative Fisheries Stock Assessment, Choice, Dynamics and Uncertainty. Chapman and Hall, London and New York.; Quinn, T.J., II. and R.B. Deriso. 1999. Quantitative Fish Dynamics. Oxford University Press, Oxford and New York; Dixon, D.A. 1999. Catalog of Assessment Methods for Evaluating the Effects of Power Plant Operations on Aquatic Communities. Final Report. Report number TR_112013.

intakes, standardized to equivalent numbers of 1-year old fish. A conversion rate between all life history stages and age 1 is calculated using species-specific survival tables. The loss of an individual younger than age 1 results in a conversion rate less than 1 while the loss of an individual older than age 1 results in a conversion rate greater than 1.

• Foregone fishery yield—pounds of commercial harvest and numbers of recreational fish and shellfish that are not harvested due to I&E mortality. EPA used the Thompson-Bell equilibrium yield model (Ricker, 1975) to convert I&E mortality losses to forgone fishery yield assuming that (1) I&E mortality losses reduce the future yield of harvested adults, and (2) reductions in I&E mortality rates will lead to an increase in harvested biomass. The general procedure involves multiplying age-specific harvest rates by age-specific weights to calculate an age-specific expected yield.

• Biomass Production Foregone—biomass that would have been produced had individuals not been impinged or entrained (Rago, 1984), calculated for all forage species from species- and age-specific growth rates and survival probabilities. It refers to the weight of impinged and entrained forage species that are not commercial or recreational fishery targets but serve as valuable components of aquatic food webs, particularly as an important food supply to other aquatic species, including commercial and recreational species.

Estimates of foregone fishery yield include direct and indirect losses of impinged and entrained species that are harvested. Indirect losses represent the yield of harvested species lost due to reductions in prey availability based on a simple trophic transfer model (*i.e.* forage species).[93] A detailed methodology for these analyses is provided in Chapter 3 of the EEBA document.

Studies from individual facilities may under or overestimate I&E mortality rates. For example, facility studies typically focus on a subset of fish species impacted by I&E mortality, resulting in some species being ignored, and thereby number of individuals lost to I&E mortality being underestimated. Due to the low number of replicate studies, estimating the magnitude of this underestimate is not possible. Moreover, studies often do not count early life stages of organisms that are difficult to identify. In addition, many of the I&E mortality studies used by the Agency were conducted over 30 years ago, prior to the improvement to aquatic conditions that have resulted from implementation of the Clean Water Act. In locations where water quality was degraded at the time of I&E mortality sampling relative to current conditions, the abundance and diversity of fish populations may have been depressed, resulting in low I&E mortality estimates. Therefore, use of these data may underestimate the magnitude of current I&E mortality losses. Alternatively, studies may have occurred in locations where local fish populations are currently lower than they were when the study occurred. Such a shift in fish populations may have occurred due to natural variability in populations, because of other anthropogenic effects (*i.e.,* pollution, over-harvesting, etc.), or because of competition from invasive species. In such cases, the use of these data may overestimate the magnitude of current I&E mortality losses.

The use of linear methods for projecting losses to fish and shellfish in the waterbody may also overstate or understate impacts. Nevertheless, EPA believes that the data from facility studies were sufficient to estimate the relative magnitude of I&E mortality losses nationwide. Exhibit VIII–2 presents EPA's estimates of baseline annual I&E mortality losses, and reductions to annual I&E mortality losses estimated to occur under various regulatory options. Option 3 results in the greatest reduction in I&E mortality, followed by Option 2, Option 1, and Option 4, respectively. EPA did not model the entrainment reductions for Option 1 and Option 4 because these are based on site-specific determinations of BTA, which are impossible to predict. While EPA does estimate potential ranges of costs for these site-specific determinations in section VII (though not as part of the primary cost estimates), EPA cannot estimate comparable ranges of monetized benefits because benefits are location specific and EPA has no way of predicting what entrainment technology would be adopted at any specific facility. However, EPA believes the entrainment reductions resulting from site-specific BTA determinations could be significant, depending on the technologies adopted.

VIII–2—BASELINE I&E MORTALITY LOSSES AND REDUCTIONS FOR ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Loss mode	Baseline I&E losses	Reduction in losses by regulatory option			
		Option 1	Option 2	Option 3	Option 4
Individuals (millions)					
IM	517.46	421.62	500.44	504.14	413.70
EM	527,968.21	0.00	400,351.83	407,417.58	0.00
E Mortality	528,485.67	421.62	400,852.27	407,921.72	413.70
Age-One Equivalents (millions)					
IM	747.40	614.97	722.53	728.35	602.42
EM	1,441.52	0.00	1,259.02	1,285.20	0.00
I&E Mortality	2,188.92	614.97	1,981.55	2,013.55	602.42
Forgone Fishery Yield (million lbs)					
IM	15.21	11.99	14.86	14.93	11.86
EM	56.30	0.00	43.66	44.31	0.00
I&E Mortality	71.50	11.99	58.52	59.24	11.86

[93] Indirect losses account for about 9 percent of commercial and recreational harvest reductions at baseline.

VIII–2—BASELINE I&E MORTALITY LOSSES AND REDUCTIONS FOR ALL IN-SCOPE FACILITIES BY REGULATORY OPTION—Continued

Loss mode	Baseline I&E losses	Reduction in losses by regulatory option			
		Option 1	Option 2	Option 3	Option 4
Production Forgone (million lbs)					
IM	152.71	126.44	148.09	149.32	123.81
EM	485.07	0.00	393.39	406.88	0.00
I&E Mortality	637.78	126.44	541.48	556.20	123.81

Scenarios: Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

Exhibit VIII–3 presents EPA's estimates of annual I&E mortality losses by option and by fish category. Estimates of annual forgone fishery yield include both direct losses to harvested species as well as indirect losses due to reductions in prey fish species. Because the vast majority of the biomass moving through food webs is lost due to low trophic transfer efficiency (*i.e.,* does not reach the higher trophic levels with direct use value to humans), the portion of I&E mortality losses with direct human use values (*i.e.,* those that contribute to forgone harvest) represent only a small percentage of all organisms suffering I&E mortality losses at CWIS. Neither forage species nor the unlanded portion of recreational and commercial species were assigned direct use values in this analysis, though losses in forage species did contribute to the overall losses in recreational and commercial species as noted above. Because the majority of annual I&E mortality losses include unharvested recreational and commercial fish and forage fish, considering nonuse values in the final Section 316(b) rule benefits analysis is particularly important.

EXHIBIT VIII–3—DISTRIBUTION OF ANNUAL BASELINE I&E MORTALITY LOSSES AND REDUCTIONS BY SPECIES CATEGORY AND REGULATORY OPTION, FOR ABSOLUTE LOSSES AND AGE-1 EQUIVALENTS

I&E loss metric	Baseline I&E losses	Reduction in losses by regulatory option			
		Option 1	Option 2	Option 3	Option 4
Individuals (millions)					
All Species	528,485.67	421.62	400,852.27	407,921.72	413.70
Forage Species	360,431.51	307.89	278,690.45	283,584.80	301.21
Commercial & Recreational Species	168,054.16	113.73	122,161.82	124,336.91	111.49
Commercial & Recreational Harvest	59.41	15.66	53.28	54.05	15.51
Lost Individuals with Direct Use Value (%)	0.01	3.71	0.01	0.01	3.75
Age-One Equivalents (millions)					
All Species	2,188.92	614.97	1,981.55	2,013.55	602.42
Forage Species	1,654.78	525.66	1,512.64	1,535.44	514.11
Commercial & Recreational Species	534.15	89.31	468.91	478.11	88.31
Commercial & Recreational Harvest (million fish)	59.41	15.66	53.28	54.05	15.51
A1E Losses with Direct Use Value (%)	2.71	2.55	2.69	2.68	2.57

Scenarios: Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

D. National Benefits of Today's Considered Options

1. Overview

Economic benefits of the proposed options for in-scope facilities can be broadly defined into use and nonuse benefit categories of goods and services.

Use values include benefits that pertain to the use (direct or indirect) of affected fishery resources. Use value reflects the value of all current direct and indirect uses of a good or service. Direct use benefits can be further categorized according to whether or not affected goods and services are traded in the market (*e.g.* commercially-captured fish are traded, recreational catch is not). Likewise, indirect use benefits can be linked to either market or nonmarket goods and services. For example, reductions to I&E mortality losses of forage fish will enhance the biomass of species targeted for commercial (market) and recreational (nonmarket) uses.

Nonuse benefits are those benefits that are independent of any current or anticipated use of a resource. Nonuse benefits reflect human values associated with existence and bequest motives.

EPA estimated the economic benefits from national regulatory options using a range of valuation methods. Commercial fishery benefits were valued using market data. Recreational angling benefits were valued using a benefits transfer approach. To estimate indirect use benefits from reduced I&E mortality losses to forage species, EPA used a simple trophic transfer model. This model translated changes in I&E mortality losses of forage fish into changes in the harvest of commercial and recreational species. All benefits for fish saved under today's proposed rule are estimates based on projected numbers of age-one equivalent fish, converted to harvestable age equivalents on a species-by-species basis for those commercial species analyzed.

EPA calculated the monetary value of use benefits of the national categorical regulatory options for existing facilities using two discount rate values: 3% and 7%. All dollar values presented are in 2009$. Because avoided fish deaths occur mainly in fish that are younger than harvestable age (eggs, larvae, and juveniles), the benefits from avoided I&E mortality would be realized typically 3–4 years after their avoided death. A detailed description of the approaches used to address this can be found in Appendix C of the EEBA.

Neither forage species nor the unlanded portion of recreational and commercial were assigned direct use values in this analysis. Their potential value to the public is derived from several alternative sources: Their indirect use as both food and breeding population for those fish that are harvested, the willingness of individuals to pay for the protection of fish based on a sense of altruism, stewardship, bequest, or vicarious consumption, and their support of ecosystem stability and function (nonuse benefits). To estimate a subset of nonuse benefits from reducing losses to forage species, and landed and unlanded commercial and recreational species, EPA explored benefits transfer from nonmarket valuation studies of nonuse values of aquatic ecosystem improvements. These efforts generated partial estimates of nonuse values for resource changes expected to result in the North Atlantic and Mid-Atlantic benefits regions from the proposed options, but EPA was unable to estimate reliable nonuse valuations for changes expected to result in other study regions. EPA is in the process of developing a stated preference survey to estimate total willingness to pay (WTP) for improvements to fishery resources affected by I&E mortality from in-scope 316(b) facilities (75 FR 42,438). However EPA did not have sufficient time to fully develop and implement this survey for the proposed regulation. EPA will issue a Notice of Data Availability pending completing survey implementation and data analysis. As a consequence of the challenges associated with estimating nonuse benefits, some non-monetized benefits are described only qualitatively or quantitatively.

2. Timing of Benefits

Discounting refers to the economic conversion of future benefits and costs to their present values, thereby accounting for the fact that individuals value future outcomes less than comparable near-term outcomes. Discounting enables a valid comparison of benefits and costs that occur across different time periods. For the analysis of the proposed options, monetized benefits are calculated in a manner that makes the timing comparable to the annualized cost estimates. The benefits of the proposed options are estimated as the typical benefits expected once the rule takes effect. The need to discount arises from two different delays in the realization of benefits.

First, facilities will not always achieve compliance in the same year that costs are incurred. Facilities will face regulatory requirements once the rule takes effect, but it will take time to make the required changes. It is assumed that facilities installing impingement technology will achieve compliance sooner than facilities installing cooling towers. Facilities installing only impingement technology are assumed to have an average compliance year of 2015, non-nuclear electric generating facilities installing towers have an average compliance year of 2020, and nuclear electric generating facilities and manufacturing facilities installing towers have an average compliance year of 2025. To account for the lag between the incurrence of costs and the realization of benefits, benefits are discounted to a greater extent compared to the costs.

Second, an additional time lag will result between technology implementation and increased fishery yields. This lag occurs because several years may pass between the time an organism is spared from I&E mortality and the time of its potential harvest. For example, a larval fish spared from entrainment (in effect, at age 0) may be caught by a recreational angler at age 3, meaning that a 3-year time lag arises between the incurred technology cost and the realization of the estimated recreational benefit. Likewise, if a 1-year-old fish is spared from impingement and is then harvested by a commercial waterman at age 2, there is a 1-year lag between the incurred cost and the subsequent commercial fishery benefit. To account for this growth period, EPA applied discounting by species groups in each regional study.

3. Recreational Fishing Valuation

a. Recreational Fishery Methods

To estimate recreational benefits of the proposed options, EPA developed a benefits transfer approach based on a meta-analysis of recreational fishing valuation studies designed to measure the various factors that determine willingness to pay for catching an additional fish per trip. Regional benefits are summarized as follows (see Chapter 7 of the EEBA document for details):

1. Estimate annual foregone catch of recreational fish (number of fish) attributable to I&E mortality under current conditions.
2. Estimate the marginal value per fish.
3. Multiply forgone catch by the marginal value per fish to estimate the total annual value of forgone catch.
4. Estimate the annual value of reductions in forgone catch attributable to the regulatory analysis options.
5. Discount benefits at 3% and 7% to reflect the time lag between I&E mortality reductions and increased harvests.

b. Estimated Benefits to Recreational Anglers

Decreasing I&E mortality increases the number of fish available to be caught by recreational anglers, thereby increasing angler welfare. Exhibit VIII–4 shows the estimated benefits resulting from reduced I&E mortality under today's options. The total annualized recreational fishing benefit for all regions, discounted at 3% (I&E mortality combined), ranges from $15.3 to $44.9 million; and the total for all regions, discounted at 7%, ranges from $13.9 to $33.3 million.

EXHIBIT VIII–4—ANNUAL RECREATIONAL FISHING BENEFITS FROM ELIMINATING OR REDUCING I&E MORTALITY LOSSES AT ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Regulatory Option	Increased harvest *(million fish)*	3% Discount rate *(million 2009$)*	7% Discount rate *(million 2009$)*
Baseline	26.79	$76.89	$75.64
Option 1	5.77	15.62	14.21
Option 2	23.55	43.52	32.40
Option 3	24.06	44.94	33.30
Option 4	5.65	15.34	13.94

Scenarios: Baseline = Eliminating Baseline I&E Mortality Losses; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

4. Commercial Fishing Valuation

Reductions in I&E mortality at cooling water intake structures are expected to benefit the commercial fishing industry. By reducing the number of fish killed, the number of fish available for harvest is expected to increase. The next section summarizes the methods EPA used to estimate benefits to the commercial fishing sector. The following section presents the estimated commercial fishing benefits.

a. Commercial Fishing Valuation Methods

The total loss to the economy from I&E mortality impacts on commercially harvested fish species is determined by the sum of changes in both producer and consumer surplus. EPA assumed a linear relationship between stock and harvest, such that if 10% of the current commercially targeted stock were harvested, then 10% of the commercially targeted fish lost to I&E mortality would have been harvested, absent I&E mortality. The percentage of fish harvested is based on data of historical fishing mortality rates.

Producer surplus provides an estimate of the economic damages to commercial fishers, but welfare changes can also be expected to accrue to final consumers of fish and to commercial consumers (including processors, wholesalers, retailers, and middlemen) if the projected increase in harvest is accompanied by a change in price. The analysis of market impacts involves the following steps (see Chapter 6 of the EEBA for details):

1. Assessing the net welfare changes for fish consumers due to changes in fish harvest and the corresponding change in fish price.
2. Assessing net welfare changes for fish harvesters due to the change in total revenue, which could be positive or negative.
3. Calculating the increase in net social benefits when the fish harvest changes by combining the welfare changes for consumers and harvesters.

For a more detailed description of the methodology for commercial fishing, see Chapter 6 of the EEBA.

b. Commercial Fishing Valuation Results

Exhibit VIII–5 presents the estimated annual commercial fishing benefits attributable to the proposed options. The results reported include the total reduction in losses in pounds of fish, and the value of this reduction discounted at 3%, and 7%. With a 3% discount rate, total estimated annualized commercial fishing benefits for the U.S., range from $1.0 to $4.5 million. Applying a 7% rate, these benefits range from $0.9 to $3.3 million. EPA estimated the expected price changes from eliminating baseline levels of I&E mortality losses and found them to be small, ranging from 0.13 percent to 2.1 percent.

EXHIBIT VIII–5 ANNUAL COMMERCIAL FISHING BENEFITS FROM ELIMINATING OR REDUCING I&E MORTALITY LOSSES AT ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Regulatory Option	Increased harvest *(million fish)*	3% Discount rate *(million 2009$)*	7% Discount rate *(million 2009$)*
Baseline	32.62	$8.05	$7.89
Option 1	9.89	0.99	0.89
Option 2	29.72	4.47	3.31
Option 3	29.99	4.52	3.34
Option 4	9.86	0.99	0.89

Scenarios: Baseline = Eliminating Baseline I&E Mortality Losses; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

5. Nonuse Benefits

Aquatic organisms without any direct uses account for the majority of cooling water intake structure losses (Exhibit VIII–6.). Although individuals do not use these resources directly, they may value changes in their status or quality. To assess the public policy significance of the ecological gains from the national categorical regulatory options for existing facilities, EPA developed a benefit transfer approach to partially monetize nonuse benefits associated with reductions in I&E mortality of fish, shellfish, and other aquatic organisms under the categorical regulatory options for the North Atlantic and Mid-Atlantic benefits regions. EPA applied estimated values from a study occurring in Rhode Island; these estimates are likely to be representative of nonuse values held by individuals residing in the Northeast US, and less accurate in other regions. EPA was unable to identify comparable studies occurring in other regions which could be used to estimate nonuse values. Chapter 8 of the EEBA provides further detail on this analysis.

a. Nonuse Valuation Methods

The preferred techniques for estimating total resource values (use plus nonuse) are to use values from the existing studies or conduct original stated preference surveys. There are many studies in the environmental economics literature that quantify benefits or willingness to pay (WTP) associated with various types of water quality and aquatic habitat changes. However, none of these studies allows the isolation of non-market WTP associated with quantified reductions in fish losses for forage fish. Most available studies estimate WTP for broader, and sometimes ambiguously defined, policies that simultaneously influence many different aspects of aquatic environmental quality and ecosystem services, but for which WTP associated with fish or aquatic life alone cannot be identified. Stated preference methods rely on surveys which ask people to state their willingness to pay (WTP) for particular ecological improvements, such as increased protection of aquatic species or habitats with particular attributes. EPA is in the process of developing a stated preferences survey to estimate total willingness to pay (WTP) for improvements to fishery resources affected by I&E mortality from in-scope 316(b) facilities. The survey will provide estimates of total values, will allow estimates of value associated with specific choice attributes (following standard methods for choice experiments), and will also allow the flexibility to provide insight into the relative importance of use versus nonuse values in the 316(b) context. However EPA did not have sufficient time to fully develop and deploy this survey and derive reliable estimates of the monetary value of reducing those impacts at the national level. Benefit transfer of values from existing stated preference studies was used by EPA in the absence of an original study.

EPA identified a recent study conducted by Johnston *et al.,* (2009) that is closely related to the 316(b) policy context. Both Johnston *et al.,* (2009) and the present context address policy changes that increase the number of forage fish in aquatic habitat with unknown effects on overall fish populations. Originally developed for a case study addressing Rhode Island residents' preferences for the restoration of migratory fish passage over dams in the Pawtuxet and Wood-Pawcatuck watersheds of Rhode Island, Johnston *et al.,* (2009) estimates nonuse values by asking respondents to consider changes in ecological indicators reflecting quantity of habitat, abundance of wildlife, ecological condition, and abundance of migratory fish species. Within this study, estimated values were based on the relative change in abundance of fish species impacted to the greatest extent by restoration.

Estimated benefit functions from the Johnston *et al.,* (2009) choice experiment survey allows one to distinguish benefits associated with resource uses from those associated primarily with nonuse motives. Within the benefit transfer application, WTP is quantified for increases in non-harvested fish alone, based on the implicit price for migratory fish changes. This transfer holds all effects related to identifiable human uses constant (*e.g.,* effects on catchable fish, public access, observable wildlife, etc.). The remaining welfare effect—derived purely from effects on forage fish with little or no direct human use—may therefore be most accurately characterized as a nonuse benefit realized by households.

The estimation of nonuse values involved the following steps:

1. Use a variant of the Johnston *et al.,* (2009) model (the survey variant which characterizes effects on the number of migratory fish passing upstream) to estimate household WTP per percent increase in the number of fish in a given watershed.

2. Calculate the relative change in abundance for the fish species impacted to the greatest extent by the regulation. By comparing increases in age-1 equivalent fish to estimates of biomass at species' carrying capacity, EPA found that of all species with habitats inside the boundaries of the North Atlantic and Mid-Atlantic benefits regions, winter flounder is likely to experience the largest percent change in population. This species is harvested; however fish and commercial species may be forage during early life-stages and have nonuse values.

3. Estimate total household WTP by applying model results for WTP per percentage to estimated winter flounder losses. Total regional WTP is the product of household WTP and the number of households within the affected region (see Chapter 8 of the EEBA for details.)

b. Estimated Nonuse Benefits for the North Atlantic and Mid Atlantic Regions

EPA expects that decreasing I&E mortality will lead to increased fish abundance in affected waterbodies, thus increasing nonuse benefits. Exhibit VIII–6 shows the benefits that would result from reducing I&E mortality losses through today's proposed options. Estimates of WTP were calculated based on the increase in age-1 equivalent winter flounder relative to estimated current biomass. Discounted at 3%, the total annualized nonuse benefit for the North Atlantic and Mid-Atlantic regions, ranges from $0.5 to $75.5 million. When discounted at 7%, annualized nonuse benefits range from $0.5 to $58.5 million.

EXHIBIT VIII–6—ANNUAL NONUSE BENEFITS FROM ELIMINATING OR REDUCING I&E MORTALITY LOSSES AT ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Regulatory option	Winter flounder I&E losses (million A1E)	Increased winter flounder age-1 equivalent abundance relative to virgin biomass (%)	3% Discount rate (millions 2009$)	7% Discount rate (millions 2009$)
Baseline	6.50	6.56	$128.64	$130.78
Option 1	0.03	0.03	0.52	0.48
Option 2	5.32	5.37	72.09	55.93
Option 3	5.57	5.63	75.48	58.52

EXHIBIT VIII–6—ANNUAL NONUSE BENEFITS FROM ELIMINATING OR REDUCING I&E MORTALITY LOSSES AT ALL IN-SCOPE FACILITIES BY REGULATORY OPTION—Continued

Regulatory option	Winter flounder I&E losses (million A1E)	Increased winter flounder age-1 equivalent abundance relative to virgin biomass (%)	3% Discount rate (millions 2009$)	7% Discount rate (millions 2009$)
Option 4	0.03	0.03	0.52	0.48

Scenarios: Baseline = Eliminating Baseline I&E Mortality Losses; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

6. Threatened and Endangered Species

This section summarizes methods and results of EPA's analysis of benefits from improved protection of threatened and endangered (T&E) species from the national categorical regulatory options considered in today's Proposal. Chapter 5 of the EEBA provides further detail on this analysis.

For T&E species, mortality due to I&E mortality from CWISs may represent a substantial portion of annual reproduction because of the reduced population levels that cause a species to be protected. Consequently, I&E mortality may either lengthen recovery time, or hasten the demise of these species. Adverse effects of CWIS on T&E species may occur in several ways:

• Populations of T&E species may suffer direct harm as a consequence of I&E mortality

• T&E species may suffer indirect harm if CWIS alters food webs

• CWIS may alter habitat critical to the long-term survival of T&E species (*e.g.,* thermal discharges associated with once through cooling)

Consequently, EPA believes that 316(b) regulation may help preserve a number of threatened and endangered species.

a. Qualitative Assessment of I&E Mortality Impacts to T&E Species

By definition, T&E species are characterized by low population levels. As such, it is unlikely that these species are recorded in I&E mortality monitoring studies which sample only a portion of all I&E mortality losses. Thus, losses are difficult to identify and quantify within a framework developed for common species. Consequently, EPA developed a qualitative methodology to estimate the number of T&E species affected by I&E mortality.

To qualitatively assess the potential for CWIS impacts on aquatic T&E species, EPA constructed a database that assessed the geographical overlap of CWIS and habitat used by aquatic T&E species. This database identified the number of T&E species potentially impacted by each in-scope 316(b) facility, and the number of facilities potentially impacting each T&E species. Additional details can be found in Chapter 5 of the EEBA document.

Using this database, EPA found 89 federally-listed T&E species that overlap with at least one in-scope 316(b) CWIS (Exhibit VIII–7) Species included freshwater, marine, and anadromous fish, freshwater mussels, and sea turtles. On average, the habitat of each T&E species overlapped with 20 in-scope facilities (Exhibit VIII–7), suggesting that the regulation of 316(b) facilities may have substantial positive benefits on ensuring the long-term sustainability and recovery of T&E species.

EXHIBIT VIII–7—NUMBER OF IN-SCOPE 316(B) CWIS WITHIN T&E SPECIES HABITAT ON A PER-SPECIES BASIS

Subset of affected species [1] [2]	Species	Interactions [3]	Facilities per T&E species [4]	
			Avg	Max
All T&E Species	88	1,734	19.70	135
Sea Turtles	6	652	108.67	135
T&E Freshwater Mussels	43	836	19.44	85
T&E Anadromous Fish	13	115	8.85	64
T&E Freshwater Fish	21	64	3.05	7
T&E Marine Fish	3	17	5.67	11

[1] T&E species included species of concern and species under review for listing by the US Fish and Wildlife Service (freshwater) or NOAA National Marine Fisheries Service (marine). Only species overlapping with a minimum of one CWIS are included.
[2] Two species of coral are included in the 'All Species' category, and not in any subcategory.
[3] Each interaction represents an overlap between the range of a T&E species and CWIS.
[4] Avg = average, Max = maximum.

b. Quantitative Assessment of I&E Mortality Impacts to T&E Species

Although difficult to observe and quantify, EPA identified 15 T&E species with confirmed I&E mortality losses. In addition to documented species-level instances of T&E mortality, EPA identified I&E mortality losses at the level of genera [94] when these genera contain a T&E species whose habitat range overlapped the reporting facility's CWIS. Although these are not confirmed I&E mortality losses of T&E species, they provide evidence that additional T&E species are likely to be directly affected by I&E mortality. A total of 19 genus-level matches were reported, suggesting that the 15 T&E species suffering I&E mortality losses may be an underestimate.

[94] Genera is the plural of genus. Genus is the rank superior to species in taxonomic biological classification. For example, the genus of Atlantic salmon (*Salmo falar*) is *Salmo.*

Of the 15 federally-listed T&E species for which losses were documented within I&E mortality studies, EPA was able to quantify losses for 2 species. Data were either qualitative or of insufficient quality to quantify regional losses for the remaining 13 federally-listed T&E species. EPA also quantified losses for the American Paddlefish (*Polyodon spathula*), listed as threatened or endangered on several state lists, using facility I&E mortality loss studies. Exhibit VIII–8 presents EPA's estimates of baseline annual I&E mortality losses, and reductions to I&E mortality losses estimated to occur under various regulatory options.

EXHIBIT VIII–8—BASELINE ANNUAL I&E MORTALITY LOSSES FOR T&E SPECIES AND REDUCTIONS FOR ALL IN-SCOPE FACILITIES BY REGULATORY OPTION (A1ES)

Species	Value	Baseline	Option 1	Option 2	Option 3	Option 4
Pallid Sturgeon	Use, Nonuse	88	73	85	86	72
American Paddlefish	Use, Nonuse	17,628	8,631	15,946	16,317	8,420
Topeka Shiner	Nonuse	3,669	3,069	3,546	3,581	2,994
Total		21,384	11,773	19,577	19,984	11,486

Scenarios: Baseline = Baseline I&E Mortality Losses; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

I&E mortality is only one of many factors that adversely affect T&E species. Estimating total population impacts from changes in I&E losses requires estimates of current populations of these fish and estimates of other anthropogenic effects which were not readily available for all T&E species with quantified I&E mortality losses at the time of this analysis. Therefore, EPA was unable to quantify effects on T&E population from the 316(b) regulation.

c. Valuation Methods of T&E Fish Species

EPA believes that for T&E species, the primary value is non-use value. Harvest of these species is prohibited (or at least restricted), reflecting a societal judgment that protection and preservation of these species is of greater value than harvest. As noted above, EPA had sufficient data from I&E mortality studies to quantify I&E mortality loss estimates for three T&E species (Exhibit VIII–8). EPA applied estimates from a Random Utility Model (RUM) analysis conducted for the suspended 316(b) Phase II regulation to evaluate recreational fishing benefits for I&E loss reductions for two of these species. EPA applied transfer values from this analysis to monetize I&E mortality losses for these species (see Chapter 5 for details). EPA emphasizes that nonuse values for T&E fish species are likely to be significantly greater than any use values, and these EPA was not able to quantify. With this caveat, the results of the analysis of recreational fishing benefits for two T&E species are shown below.

d. Estimated Monetary Benefits From Reduced Mortality of T&E Fish Species

Using a 3% discount rate, total annualized use benefits for the two T&E species with monetized I&E mortality losses are estimated to range from $0.5 to $0.7 million. Applying a 7% discount rate, annualized benefits range from $0.4 to $0.6 million.

EXHIBIT VIII–9—ANNUAL USE BENEFITS FROM ELIMINATING OR REDUCING I&E MORTALITY LOSSES OF T&E SPECIES AT ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Regulatory option	Increased harvest *(number of fish)*	3% Discount rate *(million 2009$)*	7% Discount rate *(million 2009$)*
Baseline	17,715.55	$1.14	$1.14
Option 1	8,704.08	0.50	0.45
Option 2	16,030.56	0.72	0.56
Option 3	16,403.11	0.72	0.55
Option 4	8,491.59	0.49	0.44

Note: Values are included for pallid sturgeon and paddlefish in the Inland region.
Scenarios: Baseline = Eliminating Baseline I&E Mortality Losses; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD.; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

EPA notes that the benefit values presented in Exhibit VIII–9 represent only a fraction of values for T&E species potentially affected by the proposed regulation: the Agency was able to obtain use values for only a small subset of all affected T&E species. Moreover, because of the nature of T&E species, even a small increase in population may yield economic and ecological benefits (*e.g.,* Richardson and Loomis 2008, Huppert *et al.,* 2004; Berrens *et al.,* 1996)

e. Valuation Methods for T&E Sea Turtles

In addition to estimating values of T&E fish with quantitative estimates of I&E mortality losses, EPA estimated the WTP for sea turtle conservation. In this analysis, EPA applied estimates from a study using a stated preference valuation approach to estimate total economic value of a management program that reduces the risk of extinction of loggerhead sea turtles (Whitehead 1993).

Although I&E mortality is relatively low compared to mortality from shrimp trawling and other fisheries (Plotkin 1995), it is known that low levels of turtle mortality during juvenile and subadult life stages can have a substantial effect on population growth (Crouse *et al.,* 1987). EPA believes that the marginal decrease in extinction probability of sea turtles due to 316(b) regulatory options is likely to be at least 0.01, or a 1% decrease in the probability of extinction over 25 years. This assessment is based upon reports that I&E mortality may result in the loss of more than 100 turtles per year, and because turtle population growth rates are known to be sensitive to changes in juvenile and subadult life stages (Crouse *et al.,* 1987).

f. Estimated Monetary Benefits From Reduced Mortality of T&E Sea Turtles

The U.S. range of loggerhead sea turtles includes the Gulf of Mexico, South Atlantic, Mid-Atlantic, and North Atlantic 316(b) regions (USFWS 2010). To calculate national WTP for an increased 25-year survival probability of loggerhead sea turtles, EPA assumed the affected population to include households in states with in-scope 316(b) facilities that occur within loggerhead sea turtle habitat. Using this assumption, EPA determined 53.4 million households would be willing to pay for improved protection of loggerhead sea turtles. Although incidences of mortality have been reported at facilities in California, Texas, Florida, South Carolina, North Carolina, and New Jersey EPA does not have sufficient information to quantify total sea turtle losses due to intakes, or the reductions in such losses that might occur from the various options. But as an illustrative example, assuming that the survival probability of loggerhead sea turtles over 25 years was increased by 1%, and applying a mean household value of $0.35 (2009$, see the EEBA Chapter 5), the monetized value would be $16.6 million and $16.0 million using discount rates of 3% and 7%, respectively. Because EPA does not currently have accurate national estimates of I&E mortality for turtle species, nor are population models available that estimate the effect of 316(b) regulation on population size and extinction risk, these estimates are presented only as an illustrative example, and are not included in national totals.

g. Other Indications of Society's WTP for Protection of T&E Species

Many sources provide information that indicates that society places significant value on protecting T&E species. These include, but are not limited to:

- The Endangered Species Act of 1973 which provides for the conservation of T&E species of fish and wildlife. To comply with this law the federal government and state governments spent a total of $467.6 million during fiscal year 2008 on protection of federally listed T&E species with habitat overlapping CWIS.
- Restrictions placed on the habitat occupied by T&E species. For example, water diversions on the San Joaquin-Sacramento River delta, in place to protect the Delta Smelt (*Hypomesus transpacificus*), limit the extraction of water for drinking and agriculture.
- The willingness of individuals to volunteer their time to conserve T&E species. For example, dozens of organizations recruit thousands of volunteers every year to participate in sea turtle conservation and research projects; volunteers are often required to undergo substantial training and commit to long hours.

While costs to replace, protect or enhance stocks, and costs to users affected by efforts to conserve stocks are not direct measures of economic benefits, they indicate that society is willing to pay significant sums to protect and restore populations of T&E species. Although I&E mortality is only one of many stressors on these species, reducing the magnitude of these losses may contribute to the recovery of populations over time, thereby eliminating some costs associated with conserving threatened and endangered species.

7. Assessment of Thermal Discharge Impacts

Since thermal discharges are a product of once-through cooling water systems, the impacts of thermal discharges are a relevant consideration when assessing appropriate technologies to reduce the effects of cooling water intakes. Thermal pollution has long been recognized to cause harm to the structure and function of aquatic ecosystems. Concerns about the impacts of thermal discharges are addressed by provisions of CWA Section 316(a) regulations. NPDES permits are required to limit thermal discharges in order to ensure that that there is no appreciable harm to a balanced, indigenous population of shellfish, fish and wildlife. Permit requirements, however, may not totally eliminate all adverse impacts in all cases. In addition to reducing total I&E mortality, closed cycle cooling reduces thermal pollution. Most retrofit installations of cooling towers at electric generating facilities have been required by NPDES permits for the sole purpose of reducing thermal discharges.

EPA did not quantify nationally the impacts of thermal discharges. However, numerous studies have shown that thermal discharges may substantially alter the structure of aquatic communities by modifying photosynthetic, metabolic, and growth rates. Thermal discharges also harm aquatic life by reducing levels of dissolved oxygen, altering the location and timing of fish behavior such as spawning, aggregation, and migration, and may cause thermal shock-induced mortality for some species. Adverse temperature effects may also be more pronounced in aquatic ecosystems that are already subject to other environmental stressors such as high levels of biochemical oxygen demand, sediment contamination, or pathogens. Within mixing zones, which often extend several miles downstream from outfalls, thermal discharges may impair efforts to restore and protect the waterbody. For example, permit requirements to limit nitrogen discharges in a watershed, and thereby reduce harmful algal blooms, may be counteracted by thermal discharges which promote growth of harmful algae. Thermal discharges may have indirect effects on fish and other vertebrate populations through increasing pathogen growth and infection rates.

Thermal discharges may thus alter the ecological services, and reduce the benefits, of aquatic ecosystems that receive heated effluent. The magnitude of thermal effects on ecosystem services is related to facility-specific factors, including the volume of the waterbody from which cooling water is withdrawn and returned, other heat loads, the rate of water exchange, the presence of nearby refugia, and the assemblage of nearby fish species. Again, EPA emphasizes that thermal impacts are supposed to be minimized through implementation of Section 316(a), but to the extent that any impacts remain after the requirements in 316(a) have been satisfied, replacing once-through cooling with closed-cycle cooling may provide additional benefits.

8. National Monetized Benefits

Quantifying and monetizing reductions in I&E mortality losses due to the regulatory options is extremely challenging. National benefit estimates are subject to uncertainties inherent in valuation approaches used to assess the benefits categories (See Chapters 5, 6, 7, and 8 of the EEBA document.). The combined effect of these uncertainties is of unknown magnitude or direction—that is, the estimates may over- or understate the anticipated national-level benefits. While EPA has no data to indicate that the results for each benefit category are atypical or unreasonable, EPA believes that some potentially significant benefit categories have not been fully monetized, and thus the national monetized benefits presented below likely underestimate total benefits, challenging the Agency's ability to base BTA decision making on the relationship of quantified costs and benefits alone.

Exhibit VIII–10 presents EPA's estimates of the partial monetized benefits from I&E mortality reduction of the considered regulatory options. These monetized values represent use values from increased commercial and recreational catch, recreational fishing benefits from increased catch of threatened and endangered species, and nonuse values associated with an increase in fish abundance (those fish that are not caught) in the North and Mid-Atlantic benefit regions. Partial estimated benefits from reducing I&E mortality under the proposed rule and alternative options range from $17.3 to $125.6 million (2009$) per year, discounted at 3%, and from $15.8 to $95.7 million (2009$) per year when discounted at 7%. EPA was not able to fully monetize the benefits for this proposal. Thus, the estimates presented represent a conservative (*i.e.* low) estimate of total regulatory benefits.

EXHIBIT VIII–10—SUMMARY OF NATIONAL BENEFITS FOR ALL IN-SCOPE FACILITIES BY REGULATORY OPTION

Regulatory option	Monetized benefit categories				
	Recreational fishing	Commercial fishing	Nonuse	T&E Species[a]	Total
3% Discount Rate (Millions 2009$)					
Baseline	76.89	8.05	12.64	1.14	214.72
Option 1	15.62	0.99	0.52	0.50	17.63
Option 2	43.52	4.47	72.09	0.72	120.79
Option 3	44.94	4.52	75.48	0.72	125.65
Option 4	15.34	0.99	0.52	0.49	17.33
7% Discount Rate (Millions 2009$)					
Baseline	75.64	7.89	130.78	1.14	215.45
Option 1	14.21	0.89	0.48	0.45	16.04
Option 2	32.40	3.31	55.93	0.56	92.20
Option 3	33.30	3.34	58.52	0.55	95.71
Option 4	13.94	0.89	0.48	0.44	15.76

[a] Benefits estimates for T&E species are restricted to recreational fishing benefits from increased catch of T&E species. They do not include benefits for reduced mortality of T&E sea turtles and other nonuse values associated with T&E species.

Scenarios: Baseline = Eliminating Baseline I&E Mortality Losses; Option 1 = IM Everywhere; Option 1 = IM limitations based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (MGD); Option 2 = Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 2 MGD and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 3 = Intake flow commensurate with closed-cycle cooling for all facilities and IM limitations based on modified traveling screens for all facilities with flow greater than 2 MGD; Option 4 = IM limitations based on modified traveling screens for all facilities with flow greater than 50 million gallons per day (MGD).

E. Uncertainty and Limitations

EPA recognizes that its estimates of ecological and economic benefits projected to occur under regulation are impacted by uncertainty at many levels (uncertainty and limitations are discussed in detail in Chapters 2, 3, 4, 5, 6, 7, and 8). Moreover, due to incomplete data availability, and limited resources, the Agency recognizes that there are limitations to the analyses presented above and in the EEBA. Examples of uncertainty and limitations include, but are not limited to:

- Not all ecological goods and services impacted by CWIS at in-scope 316(b) facilities are modeled or monetized, suggesting that the total benefits of regulation may be underestimated. For example, potential increases to ecosystem stability that may occur as a result of regulation is not explicitly estimated nor monetized, though it is difficult to parse out what exactly is or is not included in WTP estimates for non-use values, which were included for the North Atlantic and Mid-Atlantic regions.
- When particular ecological goods and services are monetized, data is not always available at a national scale. For example, EPA was able to estimate nonuse benefits of I&E mortality reductions only within the North and Mid-Atlantic regions, suggesting that nonuse values are significantly underestimated.
- EPA makes simplifying assumptions that allow for I&E mortality losses and benefits to be estimated on a national scale. For example, EPA assumes that I&E mortality losses from model facilities are representative of all facilities within a region. The effect of these assumptions are unknown, and may lead to over- or under-estimates of modeled losses and benefits. However, EPA notes that the age of the studies and likely improvements to waters make them less representative of current conditions.
- EPA relies on biological and economic data of various scope, duration, and date to estimate regional and national baseline and benefits. The effect of these various differences on total regional and national benefits is uncertain.
- EPA developed methodologies to estimate regional and national baselines and benefits of 316(b) regulation. As such, location- and species-specific quantitative estimates may not be precise. Overall, however, EPA believes its approach is valid for regional and national-scale analyses that incorporate a large number of facilities and species.

Overall, EPA recognizes many sources of uncertainty in its models, and is aware of the limitations of analysis. However, EPA has used the best available scientific and economic methodologies to partially monetize benefits using available resources. As noted above, EPA expects to improve its benefits estimates by incorporating the results of a national survey of WTP to protect fish and aquatic resources into the analysis for the final rule. Because EPA was only able to partially monetize non-use benefits, EPA expects that true benefits are greater than the estimates presented here.

IX. Implementation

The following sections describe how the Agency expects the proposed rule requirements to be implemented.

A. How would the proposed requirements be applied?

The requirements of today's proposal would be applied to individual facilities through NPDES permits issued by the EPA or authorized States under Section 402 of the Clean Water Act. Today's proposed requirements would apply to each cooling water intake structure located at a facility subject to the requirements. In cases where a facility has more than one cooling water intake structure, and each cooling water intake structure provides cooling water to one or more generating or manufacturing units, the proposed requirements would apply to each cooling water intake structure individually and compliance would be required at each cooling water intake structure.

B. When would affected facilities be required to comply?

These promulgated regulations would become effective sixty (60) days after the date of publication in the **Federal Register**. After the effective date of a regulation, permitting authorities often allow facilities some time period to come into compliance. As proposed, facilities would have to comply with the impingement mortality requirements as soon as possible. Facilities may request additional time (not to exceed eight years as described below) to comply with the requirements for impingement mortality. With respect to entrainment requirements, under the proposal, existing facilities must comply as soon as possible under a schedule of compliance established by the permitting authority.

EPA found during site visits that the vast majority of facilities indicated they could comply with the impingement requirements of the Phase II rule within a single permit term (5 years), with most sites needing less time and some sites needing slightly more. For example, facilities that already have traveling screens should be able to modify the existing traveling screens, add fish return systems, conduct necessary testing, and achieve the IM limits within a few years. On the other hand, EPA identified certain technical and logistical issues at some facilities that may warrant additional time, such as replacing intake structures to utilize wedgewire screens, adding additional intake bays to reduce intake velocity, or pilot testing of other technologies. As discussed in section 6, the need for outages by multiple facilities in one geographic area would need to be coordinated so as to minimize any impacts on the consistency and reliability of power generation; this could also result in the need for slightly more time. In these circumstances EPA expects a facility could reasonably require as long as 8 years to attain compliance.

For those existing facilities that will be subject to both impingement mortality and entrainment mortality requirements, the Director should take this into account when establishing a deadline for compliance, which may also result in the facility needing more time to comply with the IM requirements. For example, if a facility plans to retrofit to wet cooling towers to both reduce entrainment mortality and to use the resulting lower intake velocity to comply with requirements for impingement mortality, the Director may be able to allow for compliance with the IM requirements to extend to the same schedule as the entrainment mortality requirements. However, where the Director determines a facility would need longer than 8 years to comply with the EM requirements established by the Director, the proposed rule would not allow the compliance schedule for IM to extend beyond 8 years. EPA recognizes that this limitation may penalize facilities that might install cooling towers to meet both IM and EM requirements but are unable to complete installation within 8 years. EPA requests comment on this limitation.

The Director would have the discretion to implement a shorter (*i.e.,* more stringent) timeline for compliance, but in no event should the Director allow a compliance schedule to extend beyond the dates specified at § 125.93. Furthermore, EPA expects today's proposal gives advance notice to affected facilities what the Agency's expectations are regarding compliance schedules.

The record demonstrates that biological organisms subject to impingement and entrainment from cooling water intake structures may vary considerably from site to site with respect to types of species, quantity of organisms, distribution of life stages, feeding habits, and other factors. As a result, EPA envisions that each facility subject to today's proposal would study available technologies and operational measures, and subsequently install, incorporate and optimize the technology most appropriate for each site. EPA believes the proposed § 125.93 affords flexibility for a reasonable amount of time to conduct biological studies, assess and select appropriate technologies, apply for necessary permits, complete construction, and optimize the technologies' performance. The permitting authority would establish any additional interim milestones within these timelines in accordance with the existing NPDES provisions at § 122.47.

C. What are my requirements?

As proposed, all existing facilities subject to the proposed rule that withdraw a DIF of greater than two MGD would be required to comply with the impingement mortality requirements at § 125.94(b). EPA estimates that 1262 facilities would be subject to impingement mortality requirements. As many as 93 percent of electric generators and 73 percent of manufacturers already employ traveling or other intake screens which could be modified to meet today's proposed requirements. In addition, 374 facilities already have full or partial cooling towers, and most of these facilities already have a maximum intake velocity of less than 0.5 feet per second. As a result, half of all manufacturers and more than three-fourths of all electric generators may already meet some or all of today's proposed requirements for impingement mortality.

To provide flexibility in meeting proposed rule IM requirements, EPA is offering facilities two options for compliance with IM requirements. Facilities may install technologies and demonstrate that they are meeting the impingement mortality restrictions at § 125.94(b)(1), or demonstrate compliance with the monthly and annual intake velocity standards as described at § 125.94(b)(2). As discussed in Section VI, intake velocity is an important parameter for minimizing impingement and therefore reducing impingement mortality. Data in the record demonstrate that facilities with a maximum intake velocity of 0.5 feet per second significantly reduce the potential for impingement and impingement mortality to a level equal to or better than the impingement mortality restrictions. EPA is therefore proposing an alternative standard that would allow facilities to demonstrate to the Director that either the maximum design intake velocity, or the maximum actual intake velocity as it passes through the structural components of a screen measured perpendicular to the mesh (under § 125.94(b)(2)(i)) or through the opening of the intake (under § 125.94(b)(2)(ii)), will not exceed 0.5 feet per second.

Under either option for compliance with the Impingement Mortality standard, facilities that withdraw water from an ocean or estuary would also be required to reduce IM of shellfish to a level commensurate with properly deployed barrier nets. EPA expects passive screens would meet or exceed this level of performance, and has identified passive screens in the proposed regulations as being pre-approved for purposes of meeting this requirement. Also, under either option, facilities would be required to ensure that their intakes are structured so as to avoid entrapment (*i.e.,* organisms being trapped in an intake bay or canal and unable to escape). Facilities with traveling screens located in a forebay would be expected to install fish handling and return systems to meet this requirement. EPA expects passive screens such as cylindrical wedgewire would also meet this requirement.

In addition, facilities would be required to meet entrainment mortality standards as determined by the Director on a case-by-case basis. Under today's proposal, facilities with an actual intake flow of 125 MGD or greater would be required to submit with their application studies as described in this section to assist the Director in establishing appropriate entrainment mortality controls for that facility. The Director would evaluate each facility's application materials to make a site-specific determination of BTA for entrainment mortality for the facility. In some cases, the Director may determine that additional requirements are not necessary to satisfy BTA for entrainment.

Cooling water intakes with flows totaling less than two MGD are not subject to the proposed requirements. In addition, intakes where less than 25% of flow is used for cooling are also not subject to these requirements. Emergency back-up water flows would not be considered cooling water for purposes of this calculation. Furthermore, EPA seeks to promote water reuse in the proposed rule by specifically exempting wastewater, process water, and other gray water (even when used for cooling) from the definition of cooling water used in this calculation. However, once an intake satisfies these threshold requirements, all flow from the intake is subject to the impingement requirements. To the extent that any entrainment requirements are based on flow commensurate with closed cycle cooling, these would be applied to the non-contact cooling portion of the intake only, and could be met, in full or in part, by reusing water for non-cooling purposes. Intakes not subject to the rule may still be subject to requirements under other Federal, state, or local authorities.

New units at existing facilities would be required to meet the impingement mortality requirements at § 125.94(b) and entrainment mortality requirements at § 125.94(d). The impingement mortality requirements would be the same as those identified for existing facilities, *i.e.* either numerical restrictions on impingement mortality or a maximum intake velocity. The entrainment mortality requirements are based on the level of EM reductions achieved by closed-cycle cooling. The proposed rule would allow facilities to demonstrate performance commensurate with the closed-cycle cooling identical to the Phase I rule provision for new facilities.

D. What information must I submit in my permit application?

All existing facilities would be required to complete and submit application studies to describe the source water body, cooling water intake structures, cooling water system; characterize the biological community in the vicinity of the cooling water intake structure; develop a plan for controlling impingement mortality; describe biological survival studies that address technology efficacy and other studies on impingement and entrainment at the facility; and, discuss the operational status of the facility. The application studies would be used by the Director to assess the impingement and entrainment impacts of the cooling water intake structure and determine appropriate technological and/or operational controls, as necessary. Facilities withdrawing more than 125 MGD and existing facilities with new units would also complete and submit studies to characterize entrainment mortality and assess the costs and benefits of installing various potential technological and operational controls. A list of the proposed application materials is presented below. EPA request comment on the practicability and burden for facilities to prepare and submit this information. EPA is particularly interested in the burden to facilities with DIF < 50 MGD. EPA also requests comment on the practical utility of this information.

List of Proposed Application Materials

Facilities that already employ closed-cycle cooling and new units at existing facilities that plan to employ closed cycle would submit:

122.21(r)(2) Source water physical data
122.21(r)(3) Cooling water intake structure data
122.21(r)(4) Source water baseline biological characterization data
122.21(r)(6) Proposed Impingement Mortality Reduction Plan

All other existing facilities *would submit:*

122.21(r)(2) Source water physical data
122.21(r)(3) Cooling water intake structure data
122.21(r)(4) Source water baseline biological characterization data
122.21(r)(5) Cooling water system data
122.21(r)(6) Proposed Impingement Mortality Reduction Plan
122.21(r)(7) Performance studies
122.21(r)(8) Operational status

Facilities withdrawing more than 125 MGD (except those with closed cycle), and existing facilities with new units that plan to demonstrate performance equivalent to closed cycle would also submit:

122.21(r)(9) Entrainment characterization study
122.21(r)(10) Comprehensive technical feasibility and cost evaluation study
122.21(r) (11) Benefits valuation study
122.21(r) (12) Non-water quality impacts assessment

A summary of each application requirement follows. The proposed timeline for submittal of the application materials is outlined in the next section.

Section 122.21(r)(2) Source Water Physical Data

This requirement is unchanged from the Phase I rule and the suspended Phase II rule. The facility would be required to submit data to characterize the facility and evaluate the type of waterbody and species potentially affected by the cooling water intake structure. The applicant would be required to submit: A narrative description and scaled drawings showing the physical configuration of all source water bodies used by the facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports the determination of the water body type where each cooling water intake structure is located; identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods used to conduct any physical studies to determine the intake's area of influence within the waterbody and the results of such studies; and locational maps. The Director would use this information to evaluate the appropriateness of any design or technologies proposed by the applicant.

Section 122.21(r)(3) Cooling Water Intake Structure Data

This requirement is unchanged from the Phase I rule and the suspended Phase II rule. This data would be used to characterize the cooling water intake structure and evaluate the potential for impingement and entrainment of aquatic organisms. Information on the design of the intake structure and its location in the water column would allow evaluation of which species and life stages would potentially be subject to impingement and entrainment. A diagram of the facility's water balance would be used to identify the proportion of intake water used for cooling, make-up, and process water. The water balance diagram also provides a picture of the total flow in and out of the facility, and would be used to evaluate gray water, waste water, and other reuses within the facility. The applicant would be required to submit: A narrative description of the configuration of each of cooling water intake structure and where it is located in the water body and in the water column; latitude and longitude in degrees, minutes, and seconds for each cooling water intake structure; a narrative description of the operation of each of cooling water intake structure, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable; a flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and engineering drawings of the cooling water intake structure.

Section 122.21(r)(4) Source Water Baseline Biological Characterization Data

This information would be required to characterize the biological community in the vicinity of the cooling water intake structure and to characterize the operation of the cooling water intake structures. This supporting information must include existing data if they are available. However, the facility may supplement the data using newly conducted field studies if it chooses to do so. The information the applicant would submit includes: Identification of data that are not available and efforts made to identify sources of the data; a list of species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the cooling water intake structure; identification of the species and life stages that would be most susceptible to impingement and entrainment. Species evaluated should include the forage base as well as those most important in terms of significance to commercial and recreational fisheries. In addition, the applicant must provide identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa; data representative of the seasonal and daily activities (*e.g.,* feeding and water column migration) of biological organisms in the vicinity of the cooling water intake structure; identification of all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at your cooling water intake structures; and documentation of any public participation or consultation with Federal or State agencies undertaken in development of the plan. If the applicant supplements the information with data collected using field studies, supporting documentation for the Source Water Baseline Biological Characterization would include a description of all methods and quality assurance procedures for sampling, and data analysis including a description of the study area; taxonomic identification of sampled and evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods. The sampling and/or data analysis methods used must be appropriate for a quantitative survey and based on consideration of methods used in other biological studies performed within the same source water body. The study area should include, at a minimum, the area of influence of the cooling water intake structure. The applicant may also identify protective measures and stabilization activities that have been implemented, and describe how these measures and activities affected the baseline water condition in the vicinity of the intake. Existing facilities with closed-cycle cooling would not be required to submit this information under the proposed rule.

Section 122.21(r)(5) Cooling Water System Data

This data would be used by the Director in determining the appropriate standards that would be applied to the facility. Facilities would be able to use this information, along with the water balance diagram required by 122.21(r)(5), to demonstrate the extent to which flow reductions have already been achieved. The applicant would provide the following information for each cooling water intake structure they use: A narrative description of the operation of the cooling water system and its relationship to cooling water intake structures; the proportion of the design intake flow that is used in the system including a distribution of water used for contact cooling, non-contact cooling, and process uses; a distribution of water reuse (to include cooling water reused as process water, process water reused for cooling, and the use of gray water for cooling); description of reductions in total water withdrawals including cooling water intake flow reductions already achieved through minimized process water withdrawals; description of any cooling water that is used in a manufacturing process either before or after it is used for cooling, including other recycled process water flows; the proportion of the source waterbody withdrawn (on a monthly basis); the number of days of the year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable. The applicant would also submit a description of existing impingement and entrainment technologies or operational measures and a summary of their performance, including but not limited to reductions in entrainment mortality due to intake location and reductions in total water withdrawals and usage, and efficiencies in energy production for each producing unit that result in the use of less cooling water, including but not limited to combined cycle and cogeneration. For example, the applicant may provide comparative density data for the intake to demonstrate the extent to which location of the intake has reduced adverse environmental impact.

Section 122.21(r)(6) Proposed Impingement Mortality Reduction Plan

The facility's proposed Impingement Mortality Reduction Plan would identify the approach the facility would use to meet proposed rule IM requirements, *i.e.,* direct measure of impingement mortality through sampling, or demonstration that the maximum intake velocity is equal to or less than 0.5 fps. For the former, the Plan would include the duration and frequency of monitoring (which EPA assumes would generally be conducted on a biweekly basis, although the exact frequency would be determined case-by-case), the monitoring location, the organisms to be monitored, and the method in which naturally moribund organisms would be identified and taken into account. The Plan would also address the impingement mortality of shellfish, as appropriate, for intakes that withdraw from oceans and tidal waters, *e.g.,* seasonal deployment of barrier nets, passive screens, or an appropriate handling and return system. The Plan would document all methods and quality assurance/quality control procedures for sampling and data analysis. The proposed sampling and data analysis methods would be appropriate for a quantitative survey and include consideration of the methods used in other studies performed in the source waterbody. The Plan would include a description of the study area (including the area of influence of the cooling water intake structure(s)), and provide a taxonomic identification of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish).

For facilities that plan to meet IM requirements by demonstrating that the maximum intake velocity is equal to or less than 0.5 fps, the Plan would provide for each intake either, (1) documentation that the design intake velocity is equal to or less than 0.5 feet per second, as described at § 125.94(b)(2)(i–ii), or, (2) documentation of the facility's proposed method for demonstrating the required maximum intake velocity (equal to or less than 0.5 feet per second) in accordance with § 125.94(b)(2)(i–ii). This velocity must be maintained while as much as 15 percent of the intake surface area is blocked due to debris, ice, plant growth, or any other clogging materials. EPA notes that its proposed definition of intake velocity at § 125.92 provides that this requirement would be applicable for screen/mesh type intakes as well as offshore intakes. For facilities with traveling screens, EPA believes the low cost and ease of installing an effective fish handling and return system warrants the retrofit of such controls, even if the maximum intake velocity is less than 0.5 feet per second, however, this is not required by the proposed rule. If intake velocity is not maintained at less than 0.5 feet per second, the regulation requires modified traveling screens to include collection buckets designed to minimize turbulence to aquatic life, the addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side of the screens, and a fish handling and return system with sufficient water flow to return the fish to the source water in a manner that does not promote predation or re-impingement of the fish.

Under the proposed impingement requirements, the owner or operator of the facility must ensure that there is a means for impingeable fish or shellfish to escape the cooling water intake system or be returned to the waterbody through a fish return system. Thus, a facility would need to demonstrate that their cooling water intake structure does not lead to entrapment. This provision is intended to avoid the collection of impingeable organisms into a cooling water intake system where there is neither a fish handling and return system nor an opportunity for the organisms to escape the cooling water intake system. For example, a facility may have an offshore intake with a velocity cap that meets the maximum velocity requirements for IM. The intake then leads to a pipe, canal, or forebay for which there is no means to return the organisms to the source water. In this example, this provision would require that the facility implement a fish handling and return system. Note since the facility would meet the maximum velocity requirements for IM, the facility would not have to conduct biological monitoring to demonstrate compliance with the IM limits. EPA anticipates facilities that already employ closed-cycle cooling would document the maximum intake velocity is equal to or less than 0.5 feet per second. EPA requests comment on the additional controls to address entrapment at facilities that employ closed-cycle cooling or other technologies with velocity equal to or less than 0.5 feet per second.

Section 122.21(r)(7) Performance Studies

Under the proposal, the applicant would submit a description of any biological survival studies conducted at the facility and a summary of any conclusions or results, including: Site-specific studies addressing technology efficacy, through-plant entrainment survival, and other impingement and entrainment mortality studies; studies conducted at other locations including a justification as to why the data is relevant and representative of conditions at the facility. Due to changes in the water body over time, studies older than 10 years should include an explanation of why (or why not) the data is still relevant and representative of conditions at the facility. The Director would use such studies when assessing the facility's approach to IM and when establishing technology based requirements for EM. Permit applicants are not required to conduct new studies to fulfill this requirement. This requirement is rather aimed at obtaining results for studies that have already been conducted as part of past permit proceedings or for other purposes.

Section 122.21(r)(8) Operational Status

Under the proposal, the applicant would submit a description of the operational status of each unit including: Descriptions of each individual unit's operating status including age of the unit, capacity utilization for the previous 5 years, and any major upgrades completed within the last 15 years (*e.g.,* boiler or condenser replacement, changes to fuel type); a description of completed, approved, or scheduled uprates and NRC relicensing status for nuclear facilities; a description of plans or schedules for decommissioning or replacement of units; and a description of current and future production schedules for manufacturing facilities. The Director would use such information in determining compliance schedules. Further, such information would be used to determine flow reductions due to unit closures, which may affect a facility's DIF or AIF, and therefore may result in changes to a facility's regulatory status and requirements. Where the remaining useful plant life is considerably shorter than the useful life of an EM technology, this information would also be used to support a discussion of benefits for that EM technology.

Section 122.21(r)(9) Entrainment Characterization Study

Under the proposal, this study would include a plan for collecting entrainment mortality data, requires a peer review process, and then requires the owner or operator of the facility to carry out the data collection. This study would provide data necessary to evaluate EM for that facility. EPA envisions the information already collected to meet 122.21(r)(4) requirements would be used in developing the Entrainment Characterization Study. For all species and life stages identified under the requirements of 122.21(r)(4), the owner or operator of the facility would develop and submit an entrainment mortality data collection plan for review by the Director. The entrainment mortality data collection plan would include: The duration and frequency of monitoring; the monitoring location, including a description of the study area and the area of influence of the cooling water intake structure(s); a taxonomic identification of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish); the organisms to be monitored, including species of concern and threatened or endangered species; any other organisms identified by the Director; the method in which latent mortality would be identified; and documentation of all methods and quality assurance/quality control procedures for sampling and data analysis. The proposed sampling and data analysis methods must be appropriate for a quantitative survey.

The owner or operator of the facility must also provide for peer review of the entrainment mortality data collection plan. The Director may consult with Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s). Further, the Director may require the owner or operator of the facility to include additional peer reviewers of the plan. EPA expects peer reviewers would have appropriate qualifications (*e.g.,* in the fields of biology, engineering, etc.) for the subject matter. An explanation for any significant reviewer comments not accepted must be included in the final plan submission. Additional guidance on conducting peer review may be found in EPA's Peer Review handbook, available online at *http://www.epa.gov/peerreview/pdfs/Peer%20Review%20HandbookMay06.pdf.*

The Entrainment Characterization Study would include the following components:

1. Taxonomic identifications of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) that are in the vicinity of the cooling water intake structure(s) and are susceptible to entrainment;

2. Characterization of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species), including a description of the abundance and temporal and spatial characteristics in the vicinity of the cooling water intake structure(s), based on sufficient data to characterize annual, seasonal, and diel variations in entrainment (*e.g.,* related to climate and weather differences, spawning, feeding and water column migration). These may include historical data that are representative of the current operation of your facility and of biological conditions at the site; and,

3. Documentation of the current entrainment of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species). The documentation may include historical data that are representative of the current operation of your facility and of biological conditions at the site. Entrainment samples to support the facility's calculations would be collected during periods of representative operational flows for the cooling water intake structure and the flows associated with the samples would be documented.

EPA expects this information would be used to help determine the site-specific BTA for EM. For facilities with no EM technologies, this information would characterize the potential for EM. The information would also be used to demonstrate that technologies and other measures already in place, or site-specific factors such as intake location or design, already reduce EM. For example, abundance data may demonstrate lower comparative densities which can significantly lower entrainment rates. The information could also be used by new units to demonstrate that alternative technologies or a combination of technologies reduce EM at that site to a level commensurate with closed-cycle cooling.

Section 122.21(r)(10) Comprehensive Technical Feasibility and Cost Evaluation Study

Under the proposal, the owner or operator of the facility would submit an engineering study of the technical feasibility and incremental costs of candidate entrainment mortality control technologies. The study would include an evaluation of technical feasibility of closed-cycle cooling and fine mesh screens with a mesh size of 2mm or smaller, as well as any other entrainment reduction technologies identified by the applicant or requested by the Director. This study would include: a description of all technologies and operational measures considered (which could include alternative designs of closed-cycle recirculating systems such as natural draft cooling towers, hybrid designs, and compact or multi-cell arrangements); documentation of factors that make a candidate technology impractical or infeasible for further evaluation. For example, a discussion of land availability might include an evaluation of adjacent land and acres potentially available due to generating unit retirements, production unit retirements, other buildings and equipment retirements, ponds, coal piles, rail yards, transmission yards, and parking lots; decommissioning of existing units; repurposing of existing land uses; documentation that insufficient acres are available on-site; and evidence that the purchase or other acquisition of property adjacent to the facility is not feasible. EPA is exploring providing guidance on assessing land availability that might suggest a threshold ratio of acres/capcity that could serve as a guideline for when sufficient land may not be available. EPA has not identified any electric generating facilities with more than the 160 acres per GW capacity that EPA believes would be unable to construct retrofit cooling towers. EPA specifically solicits comment on this ratio, and solicits data for determining whether alternative thresholds are more appropriate.

The proposed rule would require that costs be presented as the net present value (NPV) of the social costs and the corresponding annual value. In addition to the required social costs, the owner or operator may choose to provide facility level compliance costs, however such costs must be provided and discussed separately from social costs. The cost evaluation component of this study would include engineering cost estimates of all technologies considered above and also discuss and provide documentation of any outages, downtime, energy penalties or other impacts to revenue. The cost evaluation should be based on least-cost approaches to implementing each candidate technology while meeting all regulatory and operational requirements of the plant. Depreciation schedules, interest rates, further consideration of remaining useful life of the facility as discussed in 122.21(r)(8), and any related assumptions would be identified.

The owner or operator of the facility must obtain peer review of the Comprehensive Technical Feasibility and Cost Evaluation Study, as described above for the Entrainment Characterization Study. EPA expects peer reviewers would have appropriate qualifications (*e.g.,* engineering, hydrology, planning and design, etc.) for the subject matter.

Section 122.21(r)(11) Benefits Valuation Study

Under the proposal, the owner or operator of the facility would submit a detailed discussion of the magnitude of water quality benefits, both monetized and non-monetized, of the candidate entrainment mortality reduction technologies evaluated in 122.21(r)(8), including incremental changes in the impingement mortality and entrainment mortality of fish and shellfish; and monetization of these changes to the extent appropriate and feasible using the best available scientific, engineering, and economic information. This may include monetization using market values, market proxies (e.g., models based on travel costs or other methodologies), and stated preference methods. Benefits that cannot be monetized should be quantified where feasible and discussed qualitatively. The study would also include discussion of recent mitigation efforts already completed and how these have affected fish abundance and ecosystem viability in the intake structure's area of influence. Finally, the study would identify other benefits to the environment and the community, including improvements for mammals, birds, and other organisms and aquatic habitats. The owner or operator of the facility must obtain peer review of the benefits evaluation study, as described above for the Entrainment Characterization Study. EPA expects peer reviewers would have appropriate qualifications (*e.g.,* biologist, hydrologist) for the subject matter.

Section 122.21(r)(12) Non-Water Quality Impacts Assessment

The owner or operator of the facility would submit a detailed discussion of the changes in non-water quality factors attributed to technologies and/or operational measures considered. These changes may include, but are not limited to, increases or decreases in the following: Energy consumption; thermal discharges including an estimate of increased facility capacity, operations, and reliability due to relaxed permitting constraints related to thermal discharges; air pollutant emissions and their health and environmental impacts; noise; safety such as the potential for plumes, icing, and availability of emergency cooling water; grid reliability including an estimate of changes to facility capacity, operations, and reliability due to cooling water availability; consumptive water use, and facility reliability such as production of steam and impacts to production based on process unit heating or cooling. The owner or operator of the facility would provide for peer review of the Non-water Quality Impacts Assessment as described above for the Entrainment Characterization Study. EPA expects peer reviewers would have appropriate qualifications (*e.g.,* biologist, safety engineer, power engineer, hydrologist) for the subject matter. EPA recognizes that in some cases it may be efficient for permit applicants to combine several of the required studies into a single document and have them reviewed holistically by a single set of peer reviewers. Such an approach is not precluded by the proposed rule as long as the peer review panel has the background appropriate to conduct the combined review and the permitting authority approves. EPA requests comment on the peer review requirements and the level of specificity regarding peer review in the draft rule text.

EPA is aware that specialized experience may be useful or appropriate in assessing some of the factors indentified in 122.21(r). EPA solicits comment on further guidance or rule language that could assist in the consistent development of these studies and more uniform review of these factors by the Director. For example, EPA could establish modeling of plume drift as part of the assessment of icing and safety. This requirement could also be included as part of the technical feasibility and costs analysis required at 122.21 (r)(10). Similarly, required emissions estimates could include more specific criteria under 122.21(r)(11).

Facilities Demonstrating Flow Reduction Commensurate With Closed-Cycle Recirculating System

Under § 125.94(d), new units at existing facilities would be subject to entrainment mortality requirements. These facilities may choose to demonstrate that they have already reduced actual intake flow (AIF) to a level commensurate with a closed-cycle recirculating system in their permit application to meet rule requirements. In general, flow reduction may be achieved through the use of a closed-cycle cooling system such as a wet cooling tower (mechanical or natural draft), a dry cooling system, variable speed pumps, or operational measures such as seasonal reductions in flow. Under today's proposal, each facility would have the flexibility to select the flow reduction technique or combinations thereof that best meets their operational needs, so long as the total reduction in flow is commensurate with that of a closed-cycle cooling system.[95]

For today's proposal, EPA is clarifying the term "commensurate" in the context of flow reductions. EPA examined its record to clarify how a facility could demonstrate a reduced flow "commensurate" with a closed-cycle recirculating system. EPA's record demonstrates that for the traditional steam electric utility industry, facilities located in freshwater areas (with a salinity of less than 0.5 parts per thousand) that have closed-cycle recirculating cooling water systems typically reduce water use by 97.5% percent from the amount they would use if they had once-through cooling water systems.[96] Similarly, facilities that have closed-cycle recirculating cooling systems using salt (or brackish) water[97] typically reduce water usage by 94.9 percent.[98] Therefore, if a facility selects to demonstrate flow reduction commensurate with closed-cycle cooling using flow reduction technologies and controls other than through closed-cycle cooling (*e.g.,* through seasonal flow reductions, unit retirements, and other flow reductions), EPA is proposing that it would have to demonstrate total flow reductions approximating 97.5% for freshwater withdrawals and 94.9% for saltwater withdrawals. Today's proposal includes these criteria in the definition of closed-cycle recirculating systems at § 125.92. EPA solicits comment on whether to establish these metrics as a binding requirement, or whether the determination of what flow measure is commensurate with closed-cycle cooling should be left to the Director for each facility.

EPA expects the Director to carefully consider the approach proposed by the facility to ensure that it is reasonable. For example, many facilities have two pumps installed per unit, but typically only operate one pump at a time. The second pump may provide additional pumping capacity (such as may be required in summer) or it may only serve as a back-up or for use during maintenance of the main pump. In the former case, the facility's intake flow

[95] The term "commensurate" is intended to be viewed in terms of a reduction in the facility's actual intake flow. The facility's DIF reflects the maximum volume of water that the facility can withdraw (and would be the basis for applicability) but the AIF (based on the facility's average flows over the previous 3 year period) represents the impacts to aquatic communities. Reducing the AIF is the most appropriate approach, as it represents actual impacts and is most representative of a facility's actual operational schedule. EPA fully expects, however, that many facilities would construct a closed-cycle cooling system based on its DIF to comply with the proposed rule, as this enables the facility to utilize its full DIF at any given time, thereby maintaining full operational flexibility. EPA's costs reflect the costs for the entire DIF. See below for more information on how a facility can demonstrate that it has achieved a reduction in flow that is commensurate with closed-cycle cooling.

[96] Assuming a cycle of concentration of 3.0 and a condenser delta T of 20°F. See Section V for more information.

[97] Saltwater also includes brackish water, tidal rivers, and estuaries where the water has a salinity of equal to or greater than 0.5 parts per thousand (by mass) at a time of annual low flow.

[98] Assuming a cycle of concentration of 1.5 and a condenser delta T of 20°F. See Section V for more information.

(both DIF and AIF) should properly account for the pumping capacity of both pumps. In the latter, the true flow for the intake structure may be equivalent to the pumping capacity of only a single pump.[99] Also, EPA is aware that some facilities may elect to retire units to demonstrate a reduced flow and wants to ensure that such facilities would qualify for this alternative provided they meet the applicable requirements.[100] EPA is proposing that these credits for unit closures be valid for 10 years from the date of the closure.[101] EPA believes this approach reasonably allows facilities to get credit for flow reductions attributable to unit closures, but also requires such facilities to make future progress to ensure its operations reflect best available technology to control entrainment. EPA is seeking comment on this approach.

Under 125.94(d)(2), EPA would allow facilities to implement technologies other than closed-cycle cooling systems that reduce entrainment mortality by at least 90 percent of what would have been obtained via flow reduction commensurate with closed-cycle cooling under 125.94(d)(1). This compliance provision mirrors the Track II provision of the Phase I rule, and is intended to provide opportunities for facilities to consider technologies such intake relocation or fine mesh screens, or operational measures such as the recyle and reuse of cooling water for other purposes. Further, facilities could adopt a combination of such technologies and practices, provided the facility can demonstrate reductions in entrainment mortality of 90 percent or better as compared to closed-cycle cooling. EPA seeks comment on this provision.

E. When are application studies due?

EPA recognizes that facilities previously subject to the withdrawn Phase II rule (existing electric generating facilities with a DIF greater than 50 MGD) should have already compiled much of the proposed application information and expects that these data would be used to meet many of the requirements under today's proposal. In some cases the information may have been collected, but reports may not have been generated or finalized. EPA also understands that many other facilities may not have collected this information, *e.g.,* smaller power plants and manufacturers, and in those cases facilities would have to initiate new data collection efforts. For this reason, EPA is proposing two different timelines for application submittal, as illustrated in Exhibits IX–1 and IX–2. EPA is proposing that facilities previously subject to the Phase II rule would be required to submit some application studies six months after rule promulgation. Other studies would follow in sequence over a period of time not to exceed five years. Other existing facilities not previously subject to the withdrawn Phase II rule (*e.g.,* small power plants and all existing manufacturers) would begin submitting application studies three years after rule promulgation. Additional required studies would be submitted over a period not to exceed seven years and six months. EPA believes that these proposed schedules will afford facilities ample time to plan, complete, and submit application materials as well as provide Directors time to evaluate the submissions and develop appropriate permit conditions. These schedules are linked to the effective date of the rule in order to establish a level playing field and to avoid delays implementing the rule regardless of a facility's current permit status. EPA solicits comment on the proposed schedule, and specifically seeks comment and data on the appropriate amount of time to collect data, write reports, conduct peer reviews, obtain comment, provide for public participation, and issue final permit conditions.

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[99] In this scenario, EPA does not envision that a facility would be able to remove the second pump to demonstrate a reduction in flow, as the pump is simply redundant equipment and would not reduce the overall water withdrawals.

[100] As a point of clarification, EPA notes that flow reduction credit would be available to a facility regardless of the rationale for maintaining the reduced flow. In other words, a facility may have ceased operation of a unit for reasons other than today's proposed regulation, and as such, withdraws much less water than before. Nevertheless, the net effect is that entrainment would be reduced.

[101] Some facilities have intake systems for units that have not operated for an extended time period. These units have essentially ceased operations; such facilities may include the pumping capacity associated with these units in their DIF even though it may not accurately represent their actual operations (i.e., it may be inappropriate to consider these units under 125.94(c)(5)(ii)).

Exhibit IX-1: Application Requirements and Due Dates for Initial Permit Term* - Power Plants with DIF of 50 MGD or more

Application Requirement and Submittal Date	Submittal Date (all dates from rule promulgation)	Existing Facility Category
		Power Plants with DIF of 50 MGD or more
	6 months	§ 122.21(r)(2) *Source water physical data* § 122.21(r) (3) *Cooling water intake structure data* § 122.21(r) (4) *Source water baseline biological characterization data* § 122.21(r) (5) *Cooling water system data* § 122.21(r) (6) *Proposed IM reduction plan* § 122.21(r) (7) *Performance studies* § 122.21(r) (8) *Operational status* AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study:(i) EM plan with peer reviewers identified*
	1 year	AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study:(ii) peer reviewed EM plan and (iii) implement EM plan*
	3.5 years	§ 122.21(r) (6) *Proposed IM reduction plan results*
	4 years	AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study: (iii) completed study*
	5 years	AIF>125 MGD and facilities with new units: § 122.21(r) (10) *Comprehensive technical feasibility and cost evaluation study* § 122.21(r) (11) *Benefits valuation study* § 122.21(r) (12) *Non-water quality and other environmental impacts study*

*Subsequent Permit Terms

After the initial submission of the §122.21(r) application studies, the owner or operator of a facility may submit a request to reduce the information required, if conditions at the facility and in the waterbody remain substantially unchanged since the previous application such that relevant previously submitted information remains representative of current source water, intake structure, cooling water system, and operating conditions. The request for reduced information requirements must be submitted to the Director at least one year prior to the expiration of its NPDES permit. The Director may accept or reject any part of the request. (See § 125.95(c)).

For subsequent permit terms, information collection activities required under §122.21(r) must begin no later than eighteen months prior to permit expiration (see § 125.95(d)).

For subsequent permit terms, all permit application materials are expected to be submitted to the Director with the application for permit renewal at least 6 months prior to permit expiration.

Exhibit IX-2: Application Requirements and Due Dates for Initial Permit Term* - Other Existing Facilities with DIF > 2 MGD

Application Requirement and Submittal Date	Submittal Date (all dates from rule promulgation)	Existing Facility Category Other Existing Facilities with DIF > 2 MGD
	3 years	§ 122.21(r)(2) *Source water physical data* § 122.21(r) (3) *Cooling water intake structure data* § 122.21(r) (4) *Source water baseline biological characterization data* § 122.21(r) (5) *Cooling water system data* § 122.21(r) (6) *Proposed IM reduction plan* § 122.21(r) (7) *Performance studies* § 122.21(r) (8) *Operational status* AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study:(i) EM plan with peer reviewers identified*
	3.5 years	AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study:(ii) peer reviewed EM plan and (iii) implement EM plan*
	6 years	§ 122.21(r) (6) *Proposed IM reduction plan results*
	6.5 year	AIF>125 MGD and facilities with new units: § 122.21(r) (9) *Entrainment characterization study: (iii) completed study*
	7.5 years	AIF>125 MGD and facilities with new units: § 122.21(r) (10) *Comprehensive technical feasibility and cost evaluation study* § 122.21(r) (11) *Benefits valuation study* § 122.21(r) (12) *Non-water quality and other environmental impacts study*
	*Subsequent Permit Terms After the initial submission of the §122.21(r) application studies, the owner or operator of a facility may submit a request to reduce the information required, if conditions at the facility and in the waterbody remain substantially unchanged since the previous application such that relevant previously submitted information remains representative of current source water, intake structure, cooling water system, and operating conditions. The request for reduced information requirements must be submitted to the Director at least one year prior to the expiration of its NPDES permit. The Director may accept or reject any part of the request. (See § 125.95(c)). For subsequent permit terms, information collection activities required under §122.21(r) must begin no later than eighteen months prior to permit expiration (see § 125.95(d)). For subsequent permit terms, all permit application materials are expected to be submitted to the Director with the application for permit renewal at least 6 months prior to permit expiration.	

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F. What are the monitoring requirements in today's proposal for existing facilities?

1. Monitoring Requirements for Impingement Mortality

Today's proposed rule proposes impingement mortality requirements for all existing facilities. As such, facilities would be required to monitor to demonstrate compliance with the impingement mortality restrictions at § 125.94(b)(1), demonstrating a monthly average of fish impingement mortality of 31% or less, and an annual average of 12% or less. (Different monitoring requirements apply for compliance with the alternative requirements at § 125.94(b)(2) for design intake velocity; these are discussed in a later section.) To demonstrate compliance with the impingement mortality standards at § 125.94(b)(1), the facility would be required to monitor at a frequency specified by the Director. EPA assumes the facility would monitor no less than once per week during primary periods of impingement as determined by the Director, and no less than biweekly during all other times. For each monitoring event, the facility would determine the number of organisms that are collected or retained on a 3⁄8 inch sieve (*i.e.,* that are impinged [I]), and the number that die within 24–48 hours of impingement (*i.e.,* impingement mortality [IM]). Fish that are included in any carryover from a traveling screen or removed from a screen as part of debris removal would be counted as fish impingement mortality. Under the proposed definition at 125.92, naturally moribund fish and invasive species would be excluded from the totals for both impingement and impingement mortality. The percentage of impingement mortality is defined by the following equation:

$$\% IM = \left(\frac{IM}{I}\right) x\ 100$$

For each calendar month, the facility would calculate the arithmetic average of the percentage impingement mortalities observed during each of the sampling events. For example, if a facility conducted four sampling events in December, it would calculate the monthly average from the weekly values. If a facility's calculated monthly average is less than the monthly average limitation (31%), then it would be in compliance that month. To demonstrate compliance with the annual average limit, the facility would calculate the arithmetic average of all of its sampling events during the year. If the facility's calculated annual average percentage impingement mortality is less than the annual average limitation, then it would be in compliance.

EPA envisions that the permitting authority would review and approve the Impingement Mortality Reduction Plan including the frequency and duration of monitoring, the monitoring location, the organisms to be monitored, and the method in which naturally moribund organisms would be identified and taken into account. In establishing the monitoring requirements, EPA expects facilities and permitting authorities would consider whether data collection should cover the entire daily and (where appropriate) tidal cycles. Typically, facilities have collected impingement samples continuously for 6 or 8 hours, and repeated this cycle to cover an entire 24-hour period. Stratifying collection in this manner allows an analysis of the diel variation exhibited by many aquatic organisms. EPA expects that facilities would continue to conduct sampling in such a manner to account for diel variations, where appropriate. EPA also expects the plan would ensure that sampling occurs during periods of representative flow and not during periods of non-peak flow or scheduled outages. The sampling plan would cover all five years of the permit term.

EPA is not proposing a list of the species to be monitored due to the site-specific nature of the biological organisms impacted by an intake structure. Rather, EPA is proposing that a facility provide data on the composition of all species in its waterbody as part of its NPDES permit application (information from the source water baseline characterization data required at § 122.21(r)(4) and impingement plan at § 125.95(b)) to help inform the Director's determination of the species that would be monitored for compliance with the proposed impingement mortality limitations. In addition, the permitting authority may impose additional monitoring requirements such as consideration of threatened or endangered species, as appropriate. EPA is also not including provisions for reducing the monitoring frequency in the future; given that the source waterbody may change over time (including hosting different or increased numbers of individuals or species), EPA believes that weekly monitoring at a minimum is appropriate.

The ideal point to measure impingement mortality is the location where organisms are returned to the waterbody. However, for ease of sampling and access, EPA envisions most facilities would collect samples from the fish return system(s) at some point prior to the fish return discharge point.[102] Based on the studies in EPA's database, EPA envisions facilities would either (1) divert some or all of the flow from the fish return into a fish collection and holding area or (2) place a net or debris basket fitted with 3/8" mesh spacing in the fish return and collect and transfer the retained organisms to a holding tank. Facilities would handle the organisms in the collection device as little as possible and transfer them to a holding area with conditions as close as practicable to the source water. Facilities would count the number of living organisms in the holding area and subsequently hold the sample using proper technique[103] to maintain the health of the collected organisms.[104] At a time period of 48 hours after the initial collection, the facility would count the number of dead organisms. The facility would then determine the percentage of organisms that died after 48 hours in comparison to the total number of living organisms measured initially. Any organisms not collected by the fish handling and return system, such as organisms in the carryover of a traveling screen or organisms collected by a high pressure wash and sent to debris bins, would be counted as 100% mortality. Naturally moribund organisms would be excluded from the calculation. The facility would keep records of this information and subsequently compare its result to today's proposed impingement mortality limitations.

EPA requests comment on all aspects of these monitoring requirements. In particular, EPA requests comment on whether EPA should specific minimum sampling frequencies or leave this determination to the Director. EPA also requests comment on methods for evaluating latent mortality effects resulting from impingement. EPA's record demonstrates that a holding time of no more than 48 hours is optimal for evaluating the latent mortality associated with impingement while at the same time minimizing mortality associated with holding the organisms. In the majority of recent studies, 48 hours appears to be the standard holding time. EPA specifically requests comment and supporting data on whether it should: Specifically establish 48 hours after initial impingement as the time at which to monitor impingement mortality; allow a range such as 24 to 48 hours; establish 24 hours as the standard holding time; or adopt some other technique for standardizing results. EPA also requests comment on whether survival under monitored holding conditions as discussed above is reflective of survival in the wild and thus an appropriate measure of the impingement mortality achieved by the facility.

As explained in Section VI, the impingement mortality restrictions proposed today are based on the

[102] Based on EPA's site visits and other data, even facilities with multiple intakes (and multiple screens, etc.) typically only have one fish handling and return system. This is consistent with EPA's proposed approach to determine compliance at the facility level. For facilities with more than one return system (including those that are bi-directional in tidal waters), compliance is still determined at the facility level.

[103] EPA recognizes that there are no standard methods for conducting impingement and entrainment studies and that there can be variability in designing a sampling plan between sites. However, there are elements that should be incorporated into any sampling plan, as outlined in DCN 10–6708.

[104] Facilities that divert the flow directly would similarly pass the flow through a net or debris basket fitted with 3/8" mesh spacing or would only count organisms that would have been collected with such a basket or net.

operation of a modified coarse mesh traveling screen with a fish return. Because EPA wants to ensure that a facility's monitoring plan is consistent with the technical basis for today's restrictions, EPA is proposing to require facilities to monitor impingement mortality using a sample that has been passed through a sieve or net with a 3⁄8" mesh size, so that only organisms that do not pass through this mesh size are counted.[105] In doing so, facilities would only retain (and therefore count) organisms that would have been impinged on a coarse mesh screen, which was the technological basis used for developing the proposed impingement mortality limits.[106] Facilities could similarly apply a "hypothetical net" in that they could elect to only count organisms that would not have passed through a net with 3⁄8" mesh. For example, a facility that uses a fine-mesh screen or diverts the flow directly to a sampling bay would only need to count organisms that would remain if the flow passed through a net, screen, or debris basket fitted with 3/8" mesh spacing. EPA further believes the IM restrictions could be applied to other screen-based fish protection technologies, and allows for future better performing technologies. EPA solicits comment on this approach to measuring impingement mortality. EPA specifically solicits comment on ways to ensure that the procedures used to collect and analyze samples do not inadvertently lead to greater mortality than would occur among organisms that were returned to the water body without being sampled.

If the Director has approved a plan for compliance with the velocity requirements specified in § 125.94(b)(2) and the facility has documented a maximum design intake flow for the intake equal to or less than 0.5 feet per second, there are no compliance monitoring requirements. If the facility cannot document a design intake flow for the intake equal to or less than 0.5 feet per second under all conditions, including during minimum ambient source water surface elevations (based on the Director's judgment using hydrological data) and maximum head loss across the screens, the permit must require compliance monitoring for intake velocity to demonstrate the intake velocity is consistent with the requirements of § 125.94(b)(2). The frequency of monitoring would be no less than twice per week. In this circumstance facilities would not be subject to the impingement mortality monitoring requirements otherwise specified in § 125.96(a)(1) and (2). EPA requests comment on whether it should specify a minimum frequency for intake velocity monitoring or leave this determination to the Director.

EPA notes the proposed rule does not specify the owner or operator of a facility with a cooling water intake structure that supplies cooling water exclusively for operation of a wet or dry cooling tower(s) and that meets the definition of closed-cycle recirculating system at § 125.92 is deemed to meet this impingement mortality standard. This is because the largest facilities with closed cycle cooling still have the potential to withdraw 100 MGD or more in makeup water. EPA's record shows virtually all facilities with wet cooling towers have a maximum intake velocity of 0.5 feet per second. EPA expects a facility that operates a cooling tower would be able to demonstrate the maximum design intake velocity does exceed 0.5 feet per second, and the proposed rule already provides that such facilities do not have any additional monitoring requirements for impingement mortality.

2. Monitoring Requirements for Entrainment Mortality

Existing Facilities

Whenever the Director is establishing entrainment control, monitoring requirements must also be developed. As proposed, the permit application studies at § 122.21(r) would be required for each permit renewal. EPA expects the Director would use these studies, including the Entrainment Characterization Study at § 122.21 (r)(9), as a basis for any additional monitoring requirements for entrainment mortality.

New Units at Existing Facilities

Under § 125.96(c), existing facilities with new units would be required to conduct compliance monitoring to demonstrate flow reductions consistent with the requirements of § 125.94(d)(1) and (2), or equivalent I&E reductions. For facilities required to demonstrate flow reductions consistent with the requirements of § 125.94(d)(1), the frequency of monitoring would be no less than once per week and would be representative of normal operating conditions. Flow monitoring would include measuring cooling water withdrawals, make-up water, and blowdown volume. The Director may require additional monitoring necessary to demonstrate compliance with both § 125.94(d) as well as any more stringent standards under § 125.94(f).

To meet requirements under § 125.94(d)(1), EPA expects facilities would first measure AIF in order to establish a site-specific baseline prior to installing any new technologies or employing new operational measures. EPA has defined AIF as the average volume of water withdrawals on an annual basis over the past three calendar years (see § 125.92). Facilities would then conduct flow monitoring which would include measuring cooling water withdrawals, make-up water, and blowdown volume. The Director may require additional monitoring necessary to demonstrate compliance with § 125.94(d). These flows would be used to document the facility has minimized make-up and blowdown flows.

To meet requirements under § 125.94(d)(2), facilities would again measure AIF in order to establish a site-specific baseline prior to installing any new technologies or employing new operational measures. The facility would also measure the density of entrainable organisms (E_D) at a proximity to the intake that is representative of the entrainable organisms present in the absence of the cooling water intake structure and is representative of annual average abundance. For the purpose of today's rule, entrainable is defined as any organism that passes through a 3⁄8 inch sieve. As discussed in Section VI, this would avoid any confusion as to which organisms would be subject to which standards. Facilities would also monitor the latent entrainment mortality in front of the intake structure. Entrainable organisms passing the cooling water intake structure would be counted as 100 percent entrainment mortality unless the facility demonstrates to the approval of the Director that the mortality for each species of concern is less than 100 percent. Samples would be collected at a minimum to monitor each species of concern or other species as required by the Director over a 24-hour period. Samples would be collected no less than biweekly during the primary period of reproduction, larval recruitment, and peak abundance identified during the source water

[105] See section 3 for a discussion of how EPA has changed its view of screen mesh size. EPA recognizes that fine mesh screens may simply "convert" smaller organisms that previously would have passed through the screen to impinged organisms.

[106] EPA's analysis of impingement survival rates is based on data from facilities with coarse mesh screens; these limits may be applied differently at facilities with smaller mesh size. Therefore, these limits do not provide a disincentive to facilities from using finer-meshed screens (i.e., screens with a mesh opening smaller than 3/8") on their traveling screens. As long as the organisms that are large enough to have been impinged upon a coarse mesh screen achieve the required survival rates, the facility would be considered to meet the impingement mortality requirements.

baseline characterization required under § 122.21(r)(4). Samples would be representative of the cooling water intake when the structure is in operation. In addition, sufficient samples would be collected to allow for calculation of annual average entrainment levels. The sampling would measure the total count of entrainable organisms or density of organisms, unless the Director approves of a different metric for such measurements. In addition, facilities would monitor the AIF for each intake. The AIF would be measured at the same time as the samples of entrainable organisms are collected.

The following equation illustrates how to calculate a baseline level of entrainment (E_B):

$$E_B = E_D \times AIF$$

Performance commensurate with a closed-cycle cooling system (E_{BTA}) can therefore be determined by reducing E_B by the percentage of flow reduced through the use of a closed-cycle cooling system. For example, a facility withdrawing makeup water from a freshwater source (as described above, would achieve a reduction of 97.5 percent) would calculate its performance as:

$$E_{BTA} = (E_B) \times (100 - 97.5) \div 100$$

The resulting value, E_{BTA}, is the required level of entrainment performance (as measured by entrainment mortality). The facility could implement any combination of flow reduction, technologies, and operational measures to meet the required level of entrainment performance. For example, a facility withdraws 200 MGD AIF from a freshwater river. The annual average entrainment density in the proximity of the intake structure is 6,400 organisms per 100 cubic meters withdrawn.

$$E_B = E_D \times AIF$$

$$6{,}400 \text{ organisms}/100\text{m}^3 \times (100\text{m}^3/26{,}417 \text{ gallons}) \times 200{,}000{,}000 \text{ gallons per day} = 48 \text{ million organisms per day}$$

The maximum entrainment mortality for a closed-cycle cooling system is thus

$$E_{BTA} = (E_B) \times (100 - 97.5) \div 100 = (48 \times 10^6 \text{ organisms per day}) \times (100 - 97.5) \div 100 = 1.2 \times 10^6 \text{ organisms.}$$

The minimum required level of performance for demonstrating entrainment mortality at a comparable level (E_C) to a closed-cycle cooling system is the level corresponding to 90 percent[107] of the reduction that a facility with a closed-cycle cooling system could achieve:

$$E_C = (E_B) \times (100 - (97.5 \times .9)) \div 100 = (48 \times 10^6 \text{ organisms per day}) \times (100 - (97.5 \times .9)) \div 100 = 5.9 \times 10^6 \text{ organisms.}$$

The Director may require additional monitoring necessary to demonstrate compliance with both § 125.94(d) as well as any more stringent standards under § 125.94(f).

EPA requests comment on all aspects of these monitoring requirements. EPA specifically requests comment on whether it should specify minimum monitoring frequencies or leave this to the determination of the Director.

Visual or Remote Inspections—All Existing facilities

All facilities would either conduct visual inspections or employ remote monitoring devices during the period the cooling water intake structure is in operation. The facility would conduct such inspections at least weekly to ensure that any technologies installed to comply with § 125.94 are maintained and operated to ensure that they will continue to function as designed. EPA is aware that for some facilities, this requirement could pose a feasibility challenge (*i.e.,* ice cover during the winter season, inability of divers to *see* through more than a few inches of water, or certain intakes located in deep water during rough weather). The proposed rule therefore authorizes the Director to establish alternative procedures during periods of inclement weather. EPA solicits comment and data on this provision. EPA specifically requests comment on whether it should establish minimum frequencies for inspections, or leave this to the determination of the Director.

G. What reports would I be required to submit?

1. Status Reports

Facilities that establish a compliance schedule (under § 125.93) would submit (at a minimum) quarterly status reports as to the progress of the facility towards meeting the terms of the compliance schedule and the applicable limits. These reports may include updates on biological monitoring, technology testing results, construction schedules, or other appropriate topics.

2. Monitoring Reports

As described above, facilities would have ongoing impingement mortality monitoring requirements; some facilities would also have entrainment mortality monitoring requirements. The proposed monitoring activities are similar to monitoring required for other effluent discharges already included in NPDES permits. Facilities would be required to include impingement mortality monitoring reports with their Discharge Monitoring Reports (DMRs) (or equivalent) and their permit annual report to the Director. As described at § 125.97, those reports would be required to include:

• The compliance measurement location;
• Identification of species of concern;
• Counts and percentage mortality of organisms sampled, as well as the average for all measurements taken during the preceding 12-month period (*i.e.,* a 12-month "rolling" average);
• Time period for evaluating latent mortality effects;
• Intake velocity measurements, as appropriate, to determine compliance with the design intake velocity requirement of 0.5 fps or less; and
• Any other monitoring requirements specified in the permit.

The Director would evaluate these reports for compliance with monthly and annual impingement mortality limits, velocity limits, and other permit requirements where appropriate.

For facilities that require entrainment mortality controls, the Director would require ongoing entrainment mortality flow monitoring. Facilities would be required to include entrainment mortality flow monitoring reports with their DMRs (or equivalent) and their annual report to the Director. Those reports would be required to include:

• The compliance measurement location;
• A description of the flow monitoring procedure;
• Documentation of flow reductions; and
• Any other monitoring requirements specified in the permit.

The Director would evaluate these reports for compliance with monthly entrainment mortality limits, flow reductions and flow monitoring, and permit requirements as required.

3. Annual Certifications

Today's proposal would require a facility to submit an annual certification statement signed by the responsible corporate officer. This statement would indicate each technology is being maintained and operated as set forth in its permit, or a justification to allow modification of the practices listed in the facility's most recent annual certification. If the Director has approved impingement mortality or

[107] § 125.86 specifies "reduced both impingement mortality and entrainment of all life stages of fish and shellfish to 90 percent or greater of the reduction that would be achieved through § 125.84(b)(1) and (2)."

entrainment mortality compliance alternatives, the statement would specify the information submitted in the most recent annual certification is still valid and appropriate, or provide a justification to allow modification of the practices listed in the most recent annual certification. For example, the statement would include data and information documenting compliance with the requirement in § 124.94(d)(1) that flow commensurate with a closed-cycle recirculating system is met. If the Director has approved the IM maximum intake velocity compliance alternative and the facility cannot document a design intake velocity for the intake equal to or less than 0.5 feet per second, the statement would include data and information documenting compliance with the maximum allowable intake velocity.

If the information contained in the previous year's annual certification is still applicable, the statement would simply state as such and, along with any applicable data submission requirements specified in this section, would constitute the annual certification. However, if the facility has substantially modified its operation of any unit that impacts cooling water withdrawals or operation of cooling water intake structures, it would submit revisions to the information required in the permit application.

H. What records would I be required to keep?

As described at § 125.97(d), facilities would be required to keep all application, status, monitoring, and annual reports and related supporting information and materials for a minimum of 5 years, but facilities may wish to keep records for a longer period to maintain a complete regulatory history of the facility. For example, existing source water biological studies submitted with a facility's permit application may contain data that has been collected within the past 10 years. The proposed rule requires that records be kept from the preceding permit term when the Director has approved a request for reduced information collection in the permit application. The Director may establish additional record keeping requirements in the permit, such as additional records documenting the EM determination and related compliance monitoring or data collection.

I. Are there other Federal statutes that could be incorporated into a facility's permit?

EPA's NPDES permitting regulations at § 122.49 contain a list of Federal laws that might apply to Federally-issued NPDES permits. These include the Wild and Scenic Rivers Act, 16 U.S.C. 1273 *et seq.;* the National Historic Preservation Act of 1966, 16 U.S.C. 470 *et seq.;* the Endangered Species Act, 16 U.S.C. 1531 *et seq.;* the Coastal Zone Management Act, 16 U.S.C. 1451 *et seq.;* and the National Environmental Policy Act, 42 U.S.C. 4321 *et seq.* See § 122.49 for a brief description of each of these laws. In addition, the provisions of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq.,* relating to essential fish habitat might be relevant. Nothing in this proposal would authorize activities that are not in compliance with these or other applicable Federal laws (*e.g.,* Marine Mammal Protection Act, 16 U.S.C. 1361 *et seq.,* and Migratory Bird Treaty Act, 16 U.S.C. 703 *et seq.*).

J. What is the Director's role under today's proposal?

Under today's proposed rule, the Director would need to review all materials submitted by an existing facility with its permit application each permit term to determine appropriate NPDES permit requirements for impingement mortality, entrainment mortality for new units at existing facilities, and site-specific entrainment mortality, as necessary. The Director is encouraged to provide any comments expeditiously on submitted materials so the facility can make responsive modifications to its information gathering activities. More specific responsibilities are described below:

(1) The Director would review materials to determine compliance with the applicable requirements. The proposed rule also provides some discretion to the Director to waive the submittal requirements under certain conditions. First, if the circumstances at the facility have not changed after a five year permit cycle, the Director can reduce the submission requirements. Second, if the Director has made a BTA determination prior to the effective date of the rule, and substantially the same information was already submitted and considered by the Director in making that determination, the Director can reduce the submission requirements. To clarify further, EPA has included a "transition" provision in the submission requirements of today's proposed rule that makes it clear that for any facility that has submitted a permit application before the effective date of the regulation, the Director can select the best approach to permit development and implementation. These provisions are further intended to avoid any unnecessary delay in recently issued permits. EPA expects facilities would continue with any monitoring requirements, study requirements, and compliance schedules in recently issued permits.

(2) If the Director establishes an alternate schedule under § 125.93, the Director would establish a schedule that is as expeditious as possible, but does not extend beyond the dates specified in § 125.93. In establishing the schedule, the Director is encouraged to consider the extent to which those technologies proposed to be implemented to meet the requirements of § 125.95(c) and/or (d) will be used, or may otherwise affect a facility's choice of technology(ies), to meet the requirements of § 125.95(b). Impacts of thermal discharges, along with other stressors, may be a relevant consideration when assessing benefits of technologies to reduce impacts of cooling water intakes or discharges. See EEA for more information. The Director is also encouraged to consider energy reliability and grid requirements when establishing a schedule for electric power generating facilities. The Director may consult with local and regional electric power agencies when establishing a schedule for electric power generating facilities. The Director may determine that extenuating circumstances (*e.g.,* lengthy scheduled outages, future production schedules) warrant establishing a different compliance date for any manufacturing facility.

(3) The Director would review and approve the species of fish and shellfish identified as species of concern.

(4) The Director would review and approve the site-specific impingement mortality plan including the duration and frequency of any monitoring beyond the minimum specified by the rule, the monitoring location, the organisms to be monitored, and the method in which naturally moribund organisms would be identified and taken into account. EPA solicits comment on whether the Director should review, but not approve, the identified plans.

(5) The Director would review the permit application materials and studies submitted under § 122.21(r) on a case-by-case basis and determine which entrainment requirements are necessary.

(6) The Director would review and approve the site-specific entrainment mortality sampling plan for new units at existing facilities (other than those employing closed cycle cooling) including the duration and frequency of monitoring, the monitoring location, the organisms to be monitored, and the method in which latent mortality would

be identified. EPA solicits comment on whether the Director should review, but not formally approve, the identified plans.

(7) The Director would issue a written explanation for the BTA determination and make this determination, and any other information submitted by third parties, available along with the draft permit for public review. This determination is discussed in more detail in Section VI above. In addition, the following discussion guides the Director when considering cost-benefit analysis for permit determinations.

Social Cost-Benefit Analysis for Permit Determinations

In deciding whether and which technology to require a permittee to install to address entrainment mortality, the Director may undertake an evaluation of social costs and benefits of implementing such requirements. This analysis would be based on the information submitted by the applicant, supplemented by information submitted by third parties, and additional information as determined appropriate by the Director. EPA recognizes the resource limitations faced by permitting authorities and does not generally expect that the Director would develop additional information on which to base the evaluation of social benefits and costs, though the Director may opt to do so. This analysis should evaluate benefits and costs from the perspective of society as a whole.

A number of cost elements should be accounted for in assessing the social cost of entrainment technology implementation. These are summarized below.

• *Technology installation cost.* These peer reviewed engineering cost estimates of the physical construction of candidate entrainment technologies at the facility are required in section 122.21(r)(10). These costs would be provided by the applicant under 122.21(r)(10).

• *Installation downtime cost.* Installation of closed cycle cooling systems will often require generating facilities to take additional downtime beyond ordinary annual maintenance downtime. An estimate of downtime cost to the facility is required under 122.21(r)(10). Downtime costs include the value of lost production minus any variable cost savings, as well as any other costs to the facility associated with downtime (shutdown and startup routines, special maintenance protocols, etc) minus any savings associated with downtime.

• *Energy penalty cost.* Operation of closed cycle cooling systems generally imposes an energy penalty, which means additional energy input is required to generate the same quantity of electricity otherwise available for sale to end-use consumers. Again, an assessment of these costs to the facility would be determined under the section 122.21(r)(10) demonstration. The appropriate cost measure is the cost of additional production costs to the facility, if the permittee's facility has sufficient capacity to make up the lost electricity production, or the net revenue loss to the permittee, if the permittee's facility cannot make up the lost electricity production.

• *Operation and maintenance costs* for the entrainment technology equipment. The cost of energy to operate the entrainment technology for electric generators would be accounted for in the assessment of energy penalty costs and should not reappear in the O&M costs. These cost which would be estimated as part of the 122.21(r)(10) assessment would enter the social cost framework unchanged.

• *Other administrative expenses— e.g.,* additional permitting and/or reporting expenses. Being a social cost concept the estimate must include not only the costs to the facility but those expected to be incurred by the permitting authority as well. Permitting costs would generally be lower if a facility opts to install a closed cycle cooling system without going through the BTA site-specific determination, as this allows the facility to minimize the amount of permit application information submitted.

For the assessment of social cost, the cost elements outlined above would typically be accounted for on a real cost basis—that is, pre-tax and excluding the effects of inflation. Costs are tallied over an appropriate timeframe, which will typically be the expected useful life of the technology installation or the remaining life of the facility, if less. Costs should be calculated as both net present value and annualized values, using an appropriate discount rate. The applicant should document the basis for the discount rate chosen.

In assessing the benefits of entrainment technology installation, the Director would assess the value to society from the reductions in I&E mortality that would result from installation of a closed cycle cooling system or alternative entrainment technology. All benefits, including quantified and non-quantified benefits, should be considered in this assessment. The benefits assessment would typically look at a range of potential benefit mechanisms, including increased harvest for commercial fisheries, increased use values for recreational fisheries, and non-use values (existence and bequest values). The latter may be difficult to quantify and/or monetize. If appropriate data are available from stated preference studies or other sources that can be applied to the site being evaluated, these should be used to monetize non-use values. Otherwise, non-use values should be evaluated qualitatively. Quantitative analysis, even in the absence of monetization, can be quite useful in evaluating non-use benefits. For example, quantifying impacts to forage and T&E species, and other indirect impacts on the aquatic environment, may allow the permitting authority to derive a more complete understanding of benefits.

Quantifying and valuing the benefit categories listed above involves significant challenges, as described in the Environmental and Economic Benefits Analysis report. For example, assessing the productivity and value of commercial fisheries involves estimating the expected increases in commercial yield of economically valued species over time as a result of reduced I&E mortality, and valuing these at market prices minus any incremental production costs associated with the incremental catch. Similarly, the assessment of recreational use benefits involves estimating the improvements in recreational fishing opportunities resulting from reduced I&E mortality, and assigning a value to these improvements. The assignment of value is based on the estimated population profile—in particular, number and proximity to affected water resources—of recreational users, the availability of alternative competing water resources for recreational usage, and the resulting estimated change in demand for use and value of the affected water resources based on reduced I&E mortality and increased recreational fishing performance. EPA acknowledges this may be hard to do on a site-specific basis, and solicits comment on tools EPA could consider producing to aid this process.

Non-use benefits, which encompass existence and bequest values, include impacts in such areas as population resilience and support, nutrient cycling, natural species assemblages, and ecosystem health and integrity. These may be assessed on the basis of benefits transfer analysis (using findings from prior analyses involving a similar study context) or by performance of a peer reviewed stated preference survey to assess the value assigned for the environmental improvements resulting from the technology installation. Nonuse values include improving the survival probability of a threatened or endangered species if present in the vicinity of the facility. Benefits may also need to be assessed beyond the vicinity of the facility's intake if migratory species are affected by the intake. Residual impacts of thermal discharges may also be appropriate to consider in the social benefits calculation.

In much the same way as described for the social cost assessment, social benefits are tallied on a year-by-year basis over the expected performance life of the compliance technology. If possible, this tallying should account for the "phase-in" of benefits (*e.g.,* benefits may build up over time as the I&E mortality reductions affect commercial fisheries productivity) and "phase-down" of benefits at the end of the technology equipment's performance life (*e.g.,* the I&E mortality reduction benefits may continue beyond the performance life of the compliance technology). Benefits are computed on a present value basis and annualized using an appropriate discount rate as described above. The same discount rate should be used for benefits and costs. Often, it is appropriate to calculate benefits and costs using more than one discount rate. For example, for regulatory impact analysis, the Office of Management and Budget recommends that costs and benefits be annualized using both a 7% and a 3% rate. However, comparisons between specific benefit and cost numbers should always involve values computed using the same rate.

The resulting estimates of social cost and benefits must be taken into account in reaching determinations on whether to require a permittee to install entrainment technology and the specific level of entrainment technology to be installed. The Director may reject an otherwise available technology as BTA standards for entrainment mortality if the social costs of compliance are not justified by the social benefits, or if there are adverse impacts that cannot be mitigated that the Director deems to be unacceptable. If all technologies considered have social costs not justified by the social benefits, or have unacceptable adverse impacts that cannot be mitigated, the Director may determine that no additional control requirements are necessary beyond what the facility is already doing. The director should document the basis for this determination and include it in the public notice for the draft permit. (8) The Director would review I&E mortality monitoring reports. EPA is shifting towards an electronic DMR system, and many of the IM and EM standards could be incorporated into the DMR itself, rather than requiring a separate report. EPA solicits comment on whether such reports should accompany monthly Discharge Monitoring Reports (DMRs). EPA expects the more detailed monitoring information would be submitted in annual reports and as part of the facility's subsequent permit application submission.

X. Related Acts of Congress, Executive Orders, and Agency Initiatives

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

Under section 3(f)(1) of Executive Order (EO) 12866 (58 FR 51735, October 4, 1993), this action is an "economically significant regulatory action" because it is likely to have an annual effect on the economy of $100 million or more. Accordingly, EPA submitted this action to the Office of Management and Budget (OMB) for review under EO 12866 and 13563 (76 FR 3821, January 21, 2011) and any changes made in response to OMB recommendations have been documented in the docket for this action.

In addition, EPA prepared an analysis of the potential costs and benefits associated with this action. This analysis is contained in Chapter 12 of the EA report. A copy of the analysis is available in the docket for this action and the analysis is briefly summarized here.

Exhibit X–1 (drawn from Table 12–2 of the EA) provides the results of the benefit-cost analysis. Placeholders for nonmonetized benefits are represented by B_1, B_2, B_3, and B_4 which are expected to be option specific in value. EPA's analysis using a habitat equivalence approach (see EEBA, Chapter 9) suggests that B_1, B_2, B_3, and B_4 have the potential to be significant, though EPA does not have the same confidence in those estimates as in the monetized estimates, and is therefore using placeholders.

EXHIBIT X–1—TOTAL ANNUALIZED BENEFITS AND COSTS OF THE REGULATORY OPTIONS

[Millions; 2009 $] [a]

Option	Social costs [b]	Benefits
1. IM Everywhere	$384	$18 + B_1
2. IM Everywhere, EM for Facilities with DIF > 125 MGD	4,463	121 + B_2
3. I&E Mortality Everywhere	4,632	126 + B_3
4. IM for Facilities with DIF > 50 MGD	327	17 + B_4

[a] All costs and benefits were annualized over 50 years and discounted using 3 percent rate.

[b] Total Social Costs include compliance costs to facilities and government administrative costs. Costs and benefits for Options 1, 2, and 4 do not include costs or benefits associated site-specific BTA determinations. In section VI.I, EPA presents several scenarios to illustrate potential costs associated with these determinations for Options 1 and 4. EPA believes the costs and benefits of these determinations could be substantial, and could be significantly larger than the costs and benefits shown for Options 1 and 4. For Option 2, only facilities with AIF < 125 MGD would be subject to site-specific BTA and additional costs and benefits for these facilities are likely to be small relative to the costs and benefits already estimated for this option.

B. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the *Paperwork Reduction Act,* 44 U.S.C. 3501 *et seq.* The Information Collection Request (ICR) document prepared by EPA has been assigned EPA ICR number 2060.05.

Compliance with the applicable information collection requirements imposed under a final rule based on this proposal would be mandatory. Today's proposed rule would require several distinct types of information collection as part of the NPDES permit application. In general, the information will be used to identify how a 316(b) existing facility would meet the impingement mortality and entrainment requirements. Today's rule would also require other reporting and recordkeeping requirements to demonstrate and document compliance with the proposed requirements.

The OMB previously approved information collection requirements contained in the 2004 Phase II final rule and assigned OMB control number 2040–0257. The 2004 Phase II final rule required applicable facilities to perform several data-gathering activities as part of the permit renewal application process. It also required certain monitoring and reporting after permit issuance. The previously-approved information collection requirements included one-time burden associated with the initial permit application and those activities associated with monitoring and reporting once the permit was issued. The total average annual burden associated with the 2004 Phase II rule information collection requirements for the entire Phase II industry was estimated at 1,700,392 hours. The annual average reporting and record keeping burden associated with the 2004 Final Phase II rule for a 316(b) existing facility was estimated to be 5,428 hours per respondent (*i.e.,* total annual average burden of 1,595,786 hours divided by an anticipated 294 respondents). The Director's reporting and record keeping burden for the review, oversight, and administration of the 2004 final Phase II rule was estimated to average 2,615 hours per respondent (*i.e.,* a total annual average burden of 104,606 hours divided by an anticipated 40 States).

Today's proposal streamlines some aspects of the permit application and implementation process and would impose reduced information collection requirements in comparison to the 2004 Phase II rule (for existing power plants with DIF > 50 MGD). For example, under the 2004 Phase II rule, facilities would have been required to submit a Technology Implementation and Operations Plan, which is not required as part of today's proposed rule. Like the 2004 Phase II rule, today's proposal would require facilities to collect and report impingement mortality compliance monitoring data. Under certain alternatives provided in today's proposed rule, design documentation and flow data would be provided instead of biologically monitoring data. The information reporting requirements under today's proposed compliance alternatives, described at § 125.95, include some additional requirements such as submission of an initial certification statement and annual certification statements thereafter, submission of monitoring reports along with DMRs, and submission of annual reports, as well as maintenance of various records.

Facilities that were not part of Phase II would have additional reporting and recordkeeping requirements relative to the current BPJ permitting approach. EPA is currently preparing a revised ICR that will estimate the total burden of the proposed rule using the Phase II burden estimates as a starting point. These will be adjusted to account for differences in what is required under the proposed rule, as well as the extension of new requirements to Phase III facilities. EPA will announce in the **Federal Register** when this information has been placed in the docket for today's rule and will allow a separate 60-day comment period on the proposed paperwork requirements, including the revised burden estimates.

Burden is defined at 5 CFR 1320.3(b).

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, EPA has established a public docket for this rule, which includes this ICR, under Docket ID number EPA–HQ–OW–2008–0667. Submit any comments related to the ICR to EPA and OMB. See **ADDRESSES** section at the beginning of this proposed rule for where to submit comments to EPA. Send comments to OMB at the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW., Washington, DC 20503, Attention: Desk Office for EPA. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after April 20, 2011, a comment to OMB is best assured of having its full effect if OMB receives it by May 20, 2011. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

C. Regulatory Flexibility Act (RFA)

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

1. Definition of Small Entities and Estimation of the Number of Small Entities Subject to Today's Proposed Regulation

For EPA's assessment of the impact of today's proposed rule on small entities, small entity is defined as either a: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; or (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. Federal or State entities owning in-scope facilities are not small entities.

a. Electric Generators

For assessing the impacts of today's rule on small Electric Generator entities, small entity is defined in accordance with SBA criteria for identifying small, non-government entities in the electric power industry, as follows:

• For non-government entities with electric power generation as a primary business, small entities are those with total annual electric output less than 4 million MWh; small governments are those serving a population of less than 50,000.

• For entities with a primary business other than electric power generation, the relevant size criteria are based on revenue or number of employees by NAICS sector (*see* Exhibit X–2).

EXHIBIT X–2—NAICS CODES AND SBA ENTITY SIZE STANDARDS FOR IN-SCOPE ELECTRIC GENERATORS WITH A PRIMARY BUSINESS OTHER THAN ELECTRIC POWER GENERATION [108]

NAICS code	NAICS description	SBA size standard
221112	Fossil Fuel Electric Power Generation	4,000,000 MWh.
221113	Nuclear Electric Power Generation	4,000,000 MWh.
221119	Other Electric Power Generation	4,000,000 MWh.
221122	Electric Power Distribution	4,000,000 MWh.

EXHIBIT X–2—NAICS CODES AND SBA ENTITY SIZE STANDARDS FOR IN-SCOPE ELECTRIC GENERATORS WITH A PRIMARY BUSINESS OTHER THAN ELECTRIC POWER GENERATION [108]—Continued

NAICS code	NAICS description	SBA size standard
221210	Natural Gas Distribution	500 Employees.
238210	Electrical Contractors	$14,000,000 Revenue.
331111	Iron and Steel Mills	1,000 Employees.
331315	Aluminum Sheet, Plate, and Foil Manufacturing	750 Employees.
523910	Miscellaneous Intermediation	$7,000,000 Revenue.
486210	Pipeline Transportation of Natural Gas	$7,000,000 Revenue.
523920	Portfolio Management	$7,000,000 Revenue.
523930	Investment Advice	$7,000,000 Revenue.
524126	Direct Property and Casualty Insurance Carriers	1,500 Employees.
525990	Other Financial Vehicles	$7,000,000 Revenue.
525910	Open-End Investment Funds	$7,000,000 Revenue.
541990	All Other Professional, Scientific, and Technical Services	$7,000,000 Revenue.
551112	Offices of Other Holding Companies	$7,000,000 Revenue.
561499	All Other Business Support Services	$7,000,000 Revenue.
562212	Solid Waste Landfill	$12,500,000 Revenue.
562219	Other Nonhazardous Waste Treatment and Disposal	$12,500,000 Revenue.
562920	Materials Recovery Facilities	$12,500,000 Revenue.
611310	Colleges, Universities, and Professional Schools	$7,000,000 Revenue.

For this analysis, EPA identified the domestic parent entity of each electric generating facility subject to today's proposed rule (for a discussion on determination of parent entities of in-scope Electric Generators see Chapter 5 of the EA report). To determine whether these entities are small entities based on the size criteria outlined above, EPA compared the relevant measure for the identified parent entities to the appropriate SBA size criterion.

From this analysis, EPA estimates that 33 small entities (out of a total of 143 entities that own in-scope Electric Generators) own Electric Generators that would be subject to today's proposed rule, representing 1.6 percent of total estimated small entities in the electric power industry (see Exhibit X–3). Municipalities make up the largest number of small entities owning in-scope facilities (17 out of 33); these small entities represent 1.8 percent of all small entities in that category. Small entities owning in-scope facilities as a percentage of total small entities range, by ownership category, from 0.9 percent for rural electric cooperatives and other political subdivisions, to 10.9 percent for the investor-owned utilities.[109]

EXHIBIT X–3—NUMBER OF SMALL ENTITIES OWNING IN-SCOPE ELECTRIC GENERATING FACILITIES AS A PERCENTAGE OF THE TOTAL NUMBER OF SMALL ENTITIES IN THE INDUSTRY, BY OWNERSHIP TYPE

Ownership type	Total number of small entities in the industry [a]	Small entities owning in-scope facilities	
		Number of in-scope entities [b]	Small in-scope entities as percentage of all in-scope entities in the industry
Investor-Owned Utilities	18	2	10.9
Nonutilities	130	5	3.8
Rural Electric Cooperatives	848	8	0.9
Municipality	968	17	1.8
Other Political Subdivision	113	1	0.9
Federal	0	0	0
State	0	0	0
All Entity Types	2,078	33	1.6

[a] State and Federal entities are considered large.
[b] The entity counts include entities owning known 316(b) Electric Generators and are not weighted estimates.

b. Manufacturers

For purposes of assessing the impacts of today's rule on small Manufacturers, small entity is defined in accordance with SBA criteria. Exhibit X–4 lists the SBA size threshold guidelines for entities owning Manufacturers facilities.

[108] Certain in-scope facilities are owned by entities whose primary business is not electric power generation.

[109] The entity counts include entities owning known 316(b) Electric Generators and are not weighted estimates.

EXHIBIT X–4—NAICS CODES AND SBA ENTITY SIZE STANDARDS FOR IN-SCOPE ENTITIES IN MANUFACTURERS SECTORS

NAICS Code	NAICS Description	SBA Size standard
111930	Sugarcane Farming	$750,000 in Revenue
113110	Timber Tract Operations	$7,000,000 in Revenue
211111	Crude Petroleum and Natural Gas Extraction	500 Employees
212210	Iron Ore Mining	500 Employees
212391	Potash, Soda, and Borate Mineral Mining	500 Employees
221119	Other Electric Power Generation	4,000,000 MWh of Electric Generation
311221	Wet Corn Milling	750 Employees
311311	Sugarcane Mills	500 Employees
311312	Cane Sugar Refining	750 Employees
311313	Beet Sugar Manufacturing	750 Employees
311942	Spice and Extract Manufacturing	500 Employees
313210	Broadwoven Fabric Mills	1,000 Employees
321113	Sawmills	500 Employees
322121	Paper (except Newsprint) Mills	750 Employees
322122	Newsprint Mills	750 Employees
322130	Paperboard Mills	750 Employees
322211	Corrugated and Solid Fiber Box Manufacturing	500 Employees
322222	Coated and Laminated Paper Manufacturing	500 Employees
322291	Sanitary Paper Product Manufacturing	500 Employees
324110	Petroleum Refineries	1,500 Employees
324191	Petroleum Lubricating Oil and Grease Manufacturing	500 Employees
325120	Industrial Gas Manufacturing	1,000 Employees
325181	Alkalis and Chlorine Manufacturing	1,000 Employees
325188	All Other Basic Inorganic Chemical Manufacturing	1,000 Employees
325199	All Other Basic Organic Chemical Manufacturing	1,000 Employees
325211	Plastics Material and Resin Manufacturing	750 Employees
325311	Nitrogenous Fertilizer Manufacturing	1,000 Employees
325320	Pesticide and Other Agricultural Chemical Manufacturing	500 Employees
325412	Pharmaceutical Preparation Manufacturing	750 Employees
325510	Paint and Coating Manufacturing	500 Employees
325992	Photographic Film, Paper, Plate and Chemical Manufacturing	500 Employees
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	500 Employees
331111	Iron and Steel Mills	1,000 Employees
331112	Electrometallurgical Ferroalloy Product Manufacturing	750 Employees
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	1,000 Employees
331221	Rolled Steel Shape Manufacturing	1,000 Employees
331222	Steel Wire Drawing	1,000 Employees
331312	Primary Aluminum Production	1,000 Employees
331315	Aluminum Sheet, Plate and Foil Manufacturing	750 Employees
332312	Fabricated Structural Metal Manufacturing	500 Employees
337910	Mattress Manufacturing	500 Employees
339999	All Other Miscellaneous Manufacturing	500 Employees
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	100 Employees
423930	Recyclable Material Merchant Wholesalers	100 Employees
424510	Grain and Field Bean Merchant Wholesalers	100 Employees
424690	Other Chemical and Allied Products Merchant Wholesalers	100 Employees
424710	Petroleum Bulk Stations and Terminals	100 Employees
447190	Other Gasoline Stations	$9,000,000 in Revenue
522220	Sales Financing	$7,000,000 in Revenue
523910	Miscellaneous Intermediation	$7,000,000 in Revenue
523930	Investment Advice	$7,000,000 in Revenue
524126	Direct Property and Casualty Insurance Carriers	1,500 Employees
525990	Other Financial Vehicles	$7,000,000 in Revenue
531110	Lessors of Residential Buildings and Dwellings	$7,000,000 in Revenue
551112	Offices of Other Holding Companies	$7,000,000 in Revenue
561110	Office Administrative Services	$7,000,000 in Revenue

To determine entity size, EPA started with information reported in the Detailed Industry Questionnaire and Industry Screener Questionnaire, and updated information on each owner's primary NAICS, current revenue, and employment size data from SEC filings, Dun & Bradstreet (D&B, 2009), and corporate Web sites. For details of this process, see Chapter 4 of the EA report. EPA compared the relevant measure for the identified parent entities to the appropriate SBA size criterion.

Because EPA undertook this assessment for the sample of Manufacturers facilities and related owning entities responding to the previous 316(b) questionnaires, it was necessary to estimate the number of owning entities and to assess whether these entities are small, based on application of sample weights. Because the sample weights are based on facilities instead of entities, the facility-based weights do not provide statistically precise estimates of the numbers of owning entities. As a result, EPA applied alternative sample-weighting assumptions that yield lower and upper bound estimates of the numbers of small entities in the Primary Manufacturing Industries owning in-scope Manufacturers facilities, as reported in Exhibit X–5. Because the analysis of facilities in Other Industries is not based on a statistically valid sample, EPA could not estimate the number of entities in Other Industries that would be subject to the requirements of the regulatory analysis options, or the percentage that are small entities. However, based on a review of nationwide water withdrawals and cooling water use, the *Census of Manufacturers,* and comments received on the Phase III proposed rule, EPA does not expect a significant number of additional small entities would be subject to today's proposed regulatory requirements.

EXHIBIT X–5—NUMBER AND PERCENTAGE OF SMALL ENTITIES IN PRIMARY MANUFACTURING INDUSTRIES SUBJECT TO THE PROPOSED REGULATION, BY INDUSTRY

Sector	Total sector small entities [a]	Lower bound estimate of number of entities		Upper bound estimate of number of entities	
		Estimated 316(b) small entities	Percentage of small entities subject to regulation	Estimated 316(b) small entities	Percentage of small entities subject to regulation
Paper	218	9	4.1	29	13.2
Chemicals	2,506	4	0.2	18	0.7
Petroleum	188	4	2.1	4	2.2
Steel	1,149	3	0.3	8	0.7
Aluminum	227	2	0.9	5	2.0
Food	23,546	1	0.0	1	0.0
Total for primary manufacturing industries [b]	27,834	23	0.1	64	0.2

[a] Includes all firms with less than 500 employees from 2006 Statistics of U.S. Businesses (SUSB) of the U.S. Department of Commerce (U.S. DOC). The Small Business Administration defines firms in nearly all profiled NAICS codes according to the firm's number of employees; however, for some in-scope manufacturing NAICS codes this threshold is 500 employees while for others this threshold is 750, 1,100, or 1,500 employees. Because the SUSB employment size categories do not correspond to the SBA entity size classifications, EPA used the 500 employee threshold for all in-scope NAICS.
[b] Due to rounding columns may not sum.

From this analysis, EPA estimates that 23 to 64 small entities own Manufacturers facilities that are subject to today's proposed rule, representing 0.1 to 0.2 percent of total estimated small entities in the Primary Manufacturing Industries (see Exhibit X–5). Of the six Primary Manufacturing Industries, Paper has the largest number of small entities (9 to 29), and these small entities also account for the largest percentage of total small entities in any of the six industries—4.1 to 13.2 percent of estimated total small entities in the Paper industry. The percentage of estimated total small entities subject to regulation reaches 2 percent for two of the remaining Primary Manufacturing Industries (Petroleum and Aluminum).

From the 316(b) survey data, EPA identified an additional 4 entities in the Other Industries that are also small entities; however, as noted, EPA is unable to estimate the total number of small in-scope entities in the Other Industries.

c. Total Estimate of Small In-Scope Entities

On a combined basis, EPA estimates that 56–96 small entities would be within the scope of the existing facilities rule options. These counts do not include the additional known 4 small entities in the Other Industries.

2. Statement of Basis

As described above, EPA began its assessment of the impact of today's proposed regulatory options on small entities by first estimating the number of small entities within the two industry segments subject to the proposed rule—Electric Generators and Manufacturers—that would be expected to be within the scope of today's proposed rule. EPA then assessed whether these small entities would be expected to incur costs that constitute a significant impact; and assessed whether the number of those small entities estimated to incur a significant impact represent a substantial number of small entities.

To assess whether small entities' compliance costs might constitute a significant impact, EPA summed annualized compliance costs [110] for the Electric Generators and Manufacturers facilities estimated to be owned by a given small entity and calculated these costs as a percentage of entity revenue (Cost-to-Revenue Test). EPA compared the resulting percentages to impact criteria of 1 percent and 3 percent of revenue. Small entities estimated to incur compliance costs exceeding one or more of these impact thresholds were identified as potentially incurring a significant impact.

For both Electric Generators and Manufacturers, EPA used alternative sample-weighting approaches, which provide a range of estimates of the numbers of small entities and in-scope facilities owned by these small entities.

The results of this analysis using both weighting approaches are summarized below. In the following summary table (Exhibit X–6), the estimated numbers of small entities incurring costs exceeding 1 percent and 3 percent of revenue are presented as ranges, based on the alternative sample weighting approaches. In addition, EPA compared the estimated numbers of small entities with costs exceeding a given impact threshold with the estimated number of small in-scope entities. The resulting estimated numbers and percentages of small in-scope entities that may incur a significant impact, as reported in Exhibit X–6, provide a measure of the potential impact of the existing facilities rule options on small in-scope entities.

From these analyses, EPA estimates under Option 1, the proposed option, that 5 to 7 small entities will incur costs exceeding 1 percent of revenue, and 3 small entities will incur costs exceeding 3 percent of revenue. As percentages of the estimated total of 56 to 96 small in-scope entities,[111] these small entities

[110] Option 1 does not include an assessment of site-specific entrainment costs. However, Option 3 includes EM based on closed-cycle cooling at all existing facilities.

[111] The estimated total of small in-scope entities does not include the known 4 small Manufacturers

represent 5 to 13 percent of small in-scope entities at the 1 percent of revenue threshold, and 3 to 5 percent of small in-scope entities at the 3 percent of revenue threshold. Both the number of small in-scope entities incurring a potential impact and the total of small in-scope entities are estimated as ranges. EPA calculated the range of percentage of total small in-scope entities incurring a potential impact by comparing (1) the lower of the estimated number of small in-scope entities incurring a potential impact with the higher of the estimated total of small in-scope entities (yields the lower value of the percentage range) and (2) the higher of the estimated number of small in-scope entities incurring a potential impact with the lower of the estimated total of small in-scope entities (yields the higher value of the percentage range).

For Option 2, EPA estimates that 5 to 7 small entities will incur costs exceeding 1 percent of revenue (5–13 percent of small in-scope entities), and 3 to 7 small entities will incur costs exceeding 3 percent of revenue (3–13 percent of small in-scope entities). For Option 3, EPA estimates that 10 to 22 small entities will incur costs exceeding 1 percent of revenue (10–39 percent of small in-scope entities), and 7 to 15 small entities will incur costs exceeding 3 percent of revenue (7–27 percent of small in-scope entities). For Option 4, EPA estimates that 4 to 6 small entities will incur costs exceeding 1 percent of revenue (4–11 percent of small in-scope entities), and 2 small entities will incur costs exceeding 3 percent of revenue (2–4 percent of small in-scope entities) (see Exhibit X–6).

For more details on this analysis see EA Chapter 7: Regulatory Flexibility Act (RFA) Analysis.

EXHIBIT X–6—ESTIMATED COST-TO-REVENUE IMPACT FOR SMALL IN-SCOPE ENTITIES

Regulatory option	Cost impact category			
	Cost > 1% of revenue		Cost >3% of revenue	
	Number of small entities	% of small in-scope entities [c]	Number of small entities [a,c]	% of small in-scope entities [b]
Option 1: IM Everywhere	5–7	5%–13%	[b] 3	3%–5%
Option 2: IM Everywhere and EM for Facilities with DIF>125 MGD	5–7	5%–13%	3–7	3%–13%
Option 3: I&E Mortality Everywhere	10–22	10%–39%	7–15	7%–27%
Option 4: IM for Facilities with DIF > 50 MGD	4–6	4%–11%	[b] 2	2%–4%

[a] The number of entities with cost-to-revenue ratios exceeding 3 percent is a subset of the number of entities with such ratios exceeding 1 percent.

[b] The estimated number of small entities exceeding the impact threshold is the same under both estimation approaches; however, the total number of entities differs.

[c] For both Electric Generators and Manufacturers, EPA used alternative sample-weighting approaches, which provide a range of estimates of the numbers of small entities and in-scope facilities owned by these small entities (*see* Section VII(D)(a)(iv) for manufacturers and see Section VII(D)(b)(1)(b) for electric generator weighting approaches).

As described in the preamble above, EPA eliminated 115 facilities from the analysis that are projected to close as a result of baseline financial conditions. Of the 115 baseline closures, 18 are small entities.

To summarize, for the Proposed Option [112]—Option 1, EPA estimates that 5 to 7 small entities would incur costs exceeding 1 percent of revenue and 3 small entities would incur costs exceeding 3 percent of revenue. These numbers of adversely affected small entities represent 5–13 percent of the estimated total of small in-scope entities for the 1 percent of revenue threshold, and 3–5 percent of the estimated total of small in-scope entities for the 3 percent of revenue threshold. Given the small number and percentage of small in-scope entities estimated to incur a potentially significant economic impact, EPA judges that the Proposed Option, Option 1, will not cause a significant economic impact on a substantial number of small entities (SISNOSE).

3. Certification Statement

After considering the economic impacts of this proposed rule on small entities, EPA certifies that this action will not have a significant economic impact on a substantial number of small entities.

D. Unfunded Mandates Reform Act (UMRA)

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), 2 U.S.C. 1531–1538, requires Federal agencies, unless otherwise prohibited by law, to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. This rule contains a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Accordingly, EPA has prepared under section 202 of the UMRA a written statement which is summarized below (see Chapter 8 of the EA report).

1. Summary of Written Statement

a. Authorizing Legislation

Today's proposed rule is issued under the authority of sections 101, 301, 304, 306, 308, 316, 401, 402, 501, and 510 of the Clean Water Act (CWA), 33 U.S.C. 1251, 1311, 1314, 1316, 1318, 1326, 1341, 1342, 1361, and 1370. See section III of this preamble for detailed information on the legal authority of this rule.

b. Cost-Benefit Analysis

Today's proposed options are expected to have total annualized pre-tax (social) costs of $383.80 million (2009 $) under Option 1, of $4,462.90 million under Option 2, $4,631.62 million under Option 3, and of $326.55 under Option 4, including direct costs incurred by facilities and implementation costs incurred by federal, State, and local governments (annualized over 50 years and discounted at 3 percent).[113] The total monetized use and non-use benefits of

entities in the Other Industries. EPA assessed the potential impact of the regulatory options on these 4 small entities; none were found to incur a significant impact under any of the four regulatory options.

[112] Option 1 does not include an assessment of site-specific entrainment costs.

[113] These social cost estimates use a different estimate of downtime than the private cost estimates cited above, and are thus lower. For more details see Chapter 11 in the EA report.

today's proposed options are estimated to be $17.63 million under Option 1, $120.79 million under Option 2, $125.65 million under Option 3, and $17.33 million under Option 4 (annualized over 50 years and discounted at 3 percent).[114] Thus, the total social costs exceed the total monetized benefits of the proposed options by $366.17 million for Option 1, by $4,342.11 million for Option 2, by $4,505.97 million for Option 3, and by $309.22 under Option 4. EPA notes that these differences are based on a comparison of a partial measure of benefits with a more complete measure of costs; [115] therefore, the results must be interpreted with caution. After considering the monetized and non-monetized benefits of the proposed option, EPA has determined that the benefits of this option justify the costs. For a more detailed comparison of the costs and benefits of today's proposed rule, see Chapter 12 of the EA report.

EPA notes that States may be able to use existing sources of financial assistance to revise and implement this proposed rule. Section 106 of the Clean Water Act authorizes EPA to award grants to States, Tribes, intertribal consortia, and interstate agencies for administering programs for the prevention, reduction, and elimination of water pollution. These grants may be used for various activities to develop and carry out a water pollution control program, including permitting, monitoring, and enforcement. Thus, State and Tribal NPDES permit programs represent one type of State program that can be funded by section 106 grants.

c. Summary of State, Local, and Tribal Government Input

EPA consulted with State governments and representatives of local governments in developing the rule. The outreach activities are discussed in section III.A.3 of this preamble.

d. Least Burdensome Option

EPA considered and analyzed several alternative regulatory options to determine the best technology available for minimizing adverse environmental impact. These regulatory options are discussed in today's proposed rule at 67 FR 17154–17168, as well as in section VIII of this preamble. These options included a range of technology-based approaches including impingement mortality technology at all facilities with a DIF greater than 50 MGD to additionally requiring impingement mortality controls and intake flow commensurate with closed-cycle cooling for all facilities.[116] As discussed in detail in section VI, EPA did not select options exclusively because they were the most cost-effective among the options that fulfill the requirements of section 316(b). EPA selected the preferred option because it meets the requirement of section 316(b) of the CWA that the location, design, construction, and capacity of CWIS reflect the best technology available for minimizing adverse environmental impact. In addition, EPA has determined that the benefits of this option justify the costs, taking quantified and non-quantified costs and benefits into account. The preferred option reflects a flexible approach among the options considered that allows consideration of costs and benefits on a site-specific basis in determining BTA.

2. Impact of Compliance Requirements on Small Governments

This rule is not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments (*i.e.,* governments with a population of less than 50,000). For its assessment of the impact of compliance requirements on small governments, EPA compared total costs and costs per facility as estimated to be incurred by small governments with those values as estimated to be incurred by large governments. EPA also compared costs for small government-owned facilities with those of non-government-owned facilities. The Agency evaluated costs per facility on the basis of both average and maximum annualized cost per facility. In these comparisons, both for the cost totals and, in particular, for the average and maximum cost per facility, the costs for small government-owned facilities were less than those for large government-owned facilities or for small non-government-owned facilities. On this basis, EPA concluded that the compliance cost requirements of the proposed 316(b) Existing Facilities Rule would not significantly or uniquely affect small governments.

Because no Manufacturers facility is government-owned, EPA conducted this analysis for Electric Generators only.

a. Government-Owned Electric Generator Facilities by Ownership and Entity Size Category

Exhibit X–8 provides an estimate of the number of non-Federal Government entities that operate Electric Generators subject to today's proposed rule, by ownership type and size of government entity. As reported in Exhibit X–8, 24 large government entities operate 41 Electric Generators subject to this proposed rule, and 18 small government entities operate 18 Electric Generators subject to the rule. Of the 59 facilities that are owned by government entities, 43 are owned by Municipalities, 9 are owned by State Governments, and 7 are owned by an Other Political Subdivision.

EXHIBIT X–8—NUMBER OF GOVERNMENT ENTITIES AND GOVERNMENT-OWNED ELECTRIC GENERATOR FACILITIES

Ownership Type	Number of government entities (by Size) [a]			Number of facilities (by government entity size) [b]		
	Large	Small	*Total*	Large	Small	*Total*
Municipality	18	17	*35*	26	17	*43*
State Government	4	0	*4*	9	0	*9*
Other Political Subdivision	2	1	*3*	6	1	*7*
Total	24	18	*42*	41	18	*59*

[a] Counts of entities owning explicitly and implicitly analyzed Electric Generators; these are not weighted entity counts.
[b] Counts of explicitly and implicitly analyzed Electric Generators; these are not weighted estimates.

[114] EPA was able to estimate nonuse benefits for the North Atlantic and Mid-Atlantic benefit regions.

[115] The costs reflect the costs for facilities do comply with the primary BTA requirements, and do not reflect any facilities with reduced costs due to the available compliance alternatives and flexibilities. Since EPA anticipates a facility would generally participate in a compliance alternative if it was less burdensome or less costly to do so, today's costs may be overstated.

[116] All options also require site-specific determinations of BTA where uniform national controls are not included.

b. Compliance Costs for Small Government-Owned Electric Generators Facilities

EPA estimates that 10 of the 41 (24%) non-federal government-owned Electric Generators facilities subject to today's proposed rule are owned by small governments (Table X–9).[117,118] Exhibit X–9 summarizes total, average annualized compliance costs, and maximum annualized compliance costs for government (State, local, and Tribal governments) and non-government-owned facilities for the three regulatory options and by size category of owning entity.

EPA first looked at the relationship between costs incurred by small governments and small government-owned Electric Generators in comparison to those incurred by large governments and large government-owned facilities. As reported in Exhibit X–9, the estimated total annualized compliance costs for all non-federal government-owned Electric Generators are $10.8 million for Option 1, $102.3 million for Option 2, $120.1 million for Option 3, and $9.5 million for Option 4. The 31 facilities owned by large governments would incur costs of $9.2 million under Option 1, $100.7 million under Option 2, $107.6 million under Option 3, and $8.1 million under Option 4. In comparison, the 10 facilities owned by small governments would incur costs of $1.5 million under Options 1 and 2, $12.5 million under Option 3, and $1.4 million under Option 4. On an average cost per facility basis, these costs are $0.1 million under Options 1, 2, and 4, and $1.2 million under Option 3, for facilities owned by small governments, with large government-owned facility costs of $0.3 million under Options 1 and 4, $3.2 million under Option 2, and $3.4 million under Option 3. In addition, the maximum per facility costs owned by small governments are $0.2 million under Options 1, 2, and 4, and $2.1 million under Option 3. The comparable values for large government-owned facilities are $1.0 million under Options 1 and 4, and $17.8 million under Options 2 and 3. Accordingly, the costs for small government-owned facilities are considerably lower than those for large governments on the basis of total costs, average cost per-facility, and maximum cost per-facility. EPA therefore concludes that the compliance requirements of today's proposed rule do not significantly or uniquely affect small governments in comparison to large governments.

EXHIBIT X–9—ELECTRIC GENERATORS FACILITIES AND COMPLIANCE COSTS BY OWNERSHIP TYPE AND SIZE FOR 316(B) EXISTING FACILITIES RULE OPTIONS

[Millions; 2009$]

Ownership type	Entity size	Number of facilities (weighted)	Total compliance costs	Average cost per facility	Maximum facility cost [c]
Option 1: IM Everywhere					
Government (excluding Federal)	Small	10	$1.5	$0.1	$0.2
	Large	31	9.2	0.3	1.0
Private	Small	16	7.7	0.5	2.5
	Large	485	354.4	0.7	7.2
All Facilities [b]		559	394.2	0.7	7.2
Option 2: IM Everywhere and EM for Facilities with DIF > 125 MGD					
Government (excluding Federal)	Small	10	$1.5	$0.1	$0.2
	Large	31	100.7	3.2	17.8
Private	Small	16	32.3	2.0	10.9
	Large	485	4,171.7	8.6	59.9
All Facilities [b]		559	4,811.3	8.6	59.9
Option 3: I&E Mortality Everywhere					
Government (excluding Federal)	Small	10	$12.5	$1.2	$2.1
	Large	31	107.6	3.4	17.8
Private	Small	16	34.0	2.2	10.9
	Large	485	4,300.3	8.9	59.9
All Facilities [b]		559	4,959.4	8.9	59.9
Option 4: IM for Facilities with DIF > 50MGD					
Government (excluding Federal)	Small	10	$1.4	$0.1	$0.2
	Large	31	8.1	0.3	1.0
Private	Small	16	6.0	0.4	2.5
	Large	485	346.1	0.7	7.2

[117] A small governmental jurisdiction is defined " as the government of a city, county, town, township, village, school district, or special district with a population of less than 50,000 (5 U.S.C. 601(5)).

[118] The entity counts described in this section were developed on a weighted basis and differ from the values reported in the preceding section, where were developed on an un-weighted basis. The values in this section were developed on a weighted basis because compliance costs were estimated only for explicitly analyzed facilities and facility weights are used to extend these results to the full set of in-scope facilities.

EXHIBIT X–9—ELECTRIC GENERATORS FACILITIES AND COMPLIANCE COSTS BY OWNERSHIP TYPE AND SIZE FOR 316(B) EXISTING FACILITIES RULE OPTIONS—Continued

[Millions; 2009$]

Ownership type	Entity size	Number of facilities (weighted)	Total compliance costs	Average cost per facility	Maximum facility cost [c]
	Small	559	383.0	0.7	7.2

a. Facility counts are weighted estimates and differ from the values reported in Exhibit X–8, above, which are un-weighted counts. Sample weighted values are needed in this table because costs were developed only for the explicitly analyzed Electric Generators facilities. See EA Appendix A.3: Used of Sample Weights in the Proposed Existing Facilities Rule Analysis for more detail.

b. The *All Facilities* counts and cost values include 15 federal government-owned facilities and 10 private facilities owned by entities of unknown size. The individual facility count and cost estimates for the small and large entity categories exclude the values for these 25 facilities.

c. Reflects maximum of un-weighted costs to explicitly analyzed facilities only.

EPA's analysis also considered whether this proposed rule may significantly or uniquely affect small governments in relation to non-government-owned Electric Generators. As reported in Exhibit X–9 the total compliance cost for 10 small government-owned Electric Generators incurring costs under today's proposed rule are $1.5 million under Options 1 and 2, $12.5 million under Option 3, and $1.4 million under Option 4, or on a per facility basis, approximately $0.1 million for Options 1, 2, and 4, and $1.2 million for Option 3. In addition, the highest annualized compliance cost for a small government-owned facility is $0.2 million under Options 1, 2, and 4, and $2.1 million under Option 3. In comparison, all small non-government-owned Electric Generators subject to today's proposed rule are expected to incur annualized compliance costs of $7.7 million under Option 1, $32.3 million under Option 2, $34.0 million under Option 3, and $6.0 million under Option 4, or $0.5, $2.0, $2.2, and $0.4 million per facility, respectively by regulatory option. The highest annualized cost for a small non-government-owned facility is $2.5 million under Options 1 and 4, and $10.9 million under Options 2 and 3. On the basis of this comparison, as well, EPA further concludes that the compliance requirements of the proposed rule do not significantly or uniquely affect small governments. The EA report provides more detail on EPA's analysis of impacts on governments.

3. Administrative Costs

The requirements of Section 316(b) are implemented through the NPDES (National Pollutant Discharge Elimination System) permit program. Forty-six States and territories with NPDES permitting authority under section 402(b) of the CWA are expected to incur costs to administer the Existing Facilities Rule in their jurisdictions. EPA estimates that States and territories will incur costs associated with five types of activities for implementing the requirements of today's proposed rule: (1) Start-Up activities to learn and understand the requirements of today's regulation and to implement administrative structures and procedures for administering the regulation; (2) first permit issuance activities; (3) permit reissuance activities; (4) entrainment study costs, and (5) annual activities. EPA estimates that the total annualized cost for these activities will be $5.31 million for Option 1, $2.19 for Option 2, $1.28 million for Option 3, and $4.06 for Option 4. Monitoring costs comprise the largest share of administrative costs under all three regulatory options. Exhibit X–10 presents the annualized costs of the major administrative activities.

EXHIBIT X–10—ANNUALIZED GOVERNMENT ADMINISTRATIVE COSTS

[Millions; 2009$]

Activity	Cost		
	Electric Generators	Manufacturers	Total In-Scope
Option 1: IM Everywhere			
Start-up Activities	$0.02	$0.02	$0.04
First Permit Issuance Activities	$0.23	$0.24	$0.45
Annual Monitoring Activities	$1.17	$1.12	$2.29
Entrainment Study	$1.19	$0.97	$2.16
Permit Reissuance Activities	$0.18	$0.18	$0.36
Total	$2.79	$2.52	$5.31
Option 2: IM Everywhere and EM for Facilities with DIF > 125 MGD			
Start-up Activities	$0.02	$0.02	$0.04
First Permit Issuance Activities	$0.17	$0.23	$0.35
Annual Monitoring Activities	$0.36	$1.07	$1.37
Entrainment Study	$0.00	$0.00	$0.00
Permit Reissuance Activities	$0.14	$0.17	$0.31
Total	$0.69	$1.48	$2.19

EXHIBIT X–10—ANNUALIZED GOVERNMENT ADMINISTRATIVE COSTS—Continued

[Millions; 2009$]

Activity	Cost		
	Electric Generators	Manufacturers	Total In-Scope
Option 3: I&E Mortality Everywhere			
Start-up Activities	$0.02	$0.02	$0.04
First Permit Issuance Activities	$0.16	$0.13	$0.29
Annual Monitoring Activities	$0.20	$0.52	$0.72
Entrainment Study	$0.00	$0.00	$0.00
Permit Reissuance Activities	$0.13	$0.10	$0.23
Total	$0.51	$0.77	$1.28
Option 4: IM for Facilities with DIF > 50MGD			
Start-up Activities	$0.02	$0.02	$0.04
First Permit Issuance Activities	$0.23	$0.06	$0.29
Annual Monitoring Activities	$1.04	$0.31	$1.35
Entrainment Study	$1.19	$0.97	$2.16
Permit Reissuance Activities	$0.18	$0.05	$0.23
Total	$2.65	$1.41	$4.06

E. Executive Order 13132: Federalism

Under Executive Order 13132, EPA may not issue an action that has federalism implications, that imposes substantial direct compliance costs on the State and local governments, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed action.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This proposed rule would not alter the basic State-federal scheme established in the Clean Water Act under which EPA authorizes States to carry out the NPDES permitting program. EPA expects today's proposed rule would have little effect on the relationship between, or the distribution of power and responsibilities among, the federal and State governments. EPA expects an average annual burden of 21,785 hours with total average annual cost of $1.1 million under Option 1, 6,538 hours and $346,000 under Option 2, and 20,395 hours and $1.0 million under Option 3, for States to collectively administer this rule during the compliance period.[119] After the initial compliance period, EPA expects an average annual burden of 23,550 hours with an average annual cost of $1.2 million for Option 1, 2,528 hours and $154,000 for Option 2, and 16,988 hours and $841,000 for Option 3. EPA has identified 47 Phase II facilities that are owned by State or local government entities. The estimated average annual compliance cost incurred by these facilities is approximately $452,000 per facility under Option 1, $4.5 million under Option 2, and $1.1 million under Option 3. EPA does not expect Option 4 to impose substantial direct compliance costs on the State and local governments higher than Option 1, and therefore is not expected to pose Federalism implications. Thus, Executive Order 13132 does not apply to this rule.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

[119] Because of late revisions to the Existing Facilities Rule's administrative requirements, EPA was unable to update these values from those developed earlier in the regulatory analysis. In addition, EPA did not estimate administrative costs for Option 4, but expects that these costs would be very similar to those estimated for Option 1.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). It would not have substantial direct effects on tribal governments, on the relationship between the Federal government and the Indian tribes, or the distribution of power and responsibilities between the Federal government and Indian tribes as specified in Executive Order 13175. The national cooling water intake structure requirements would be implemented through permits issued under the NPDES program. No tribal governments are currently authorized pursuant to section 402(b) of the CWA to implement the NPDES program. In addition, EPA's analyses show that no facility subject to today's proposed rule is owned by tribal governments and thus this rule does not affect Tribes in any way in the foreseeable future. Thus, Executive Order 13175 does not apply to this action.

EPA specifically solicits additional comment on this proposed action from tribal officials.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

This action is not subject to EO 13045 because it does not establish an environmental standard intended to mitigate health or safety risks. This rule establishes requirements for cooling water intake structures to protect aquatic organisms.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

Executive Order 13211 (66 FR 28355 (May 22, 2001)) requires EPA to prepare and submit a Statement of Energy Effects to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, for actions identified as "significant energy actions." Based on the Office of Management and Budget's guidance for assessing the potential energy impact of regulations (*http://www.whitehouse.gov/omb/memoranda/m01_27.html*), the Agency does not anticipate that today's rule will have a significant adverse effect on the supply, distribution, or use of energy and thus will not constitute a significant regulatory action under Executive Order 13211.

The Agency analyzed the potential energy effects of today's rule and other regulatory options considered for proposal. The potentially significant effects of today's rule on energy supply, distribution or use concern the electric power sector. This analysis found that the rule's compliance requirements would not cause effects in the electric power sector that would constitute a significant adverse effect under Executive Order 13211. Namely, the Agency's analysis found that today's rule would not reduce electricity production in excess of 1 billion kilowatt hours per year or in excess of 500 megawatts of installed capacity, and therefore would not constitute a significant regulatory action under Executive Order 13211.

For more detail on the potential energy effects of this proposal, see Section VII of this preamble or Chapter 9 in the EA report.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This proposed rulemaking may involve technical standards, for example in the measurement of impingement and entrainment. Nothing in this proposed rule would prevent the use of voluntary consensus standards for such measurement where available, and EPA encourages permitting authorities and regulated entities to do so.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order (EO) 12898 (59 FR 7629 (Feb. 16, 1994)) establishes federal executive policy on environmental justice. Its main provision directs federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this proposed rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it increases the level of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population. Because EPA expects that this proposed rule will help to preserve the health of aquatic ecosystems located in reasonable proximity to 316(b) Existing Facilities, EPA believes that all populations, including minority and low-income populations, will benefit from improved environmental conditions as a result of this rule.[120]

To meet the objectives of Executive Order 12898, EPA assessed whether today's proposed rule could distribute benefits among population sub-groups in a way that is significantly unfavorable to low-income and minority populations. EPA compared key demographic characteristics of affected sub-state populations to those demographic characteristics at the level of the state. If the demographic profile of the sub-state "benefit population" were found to differ in a statistically significant and unfavorable[121] way from the demographic profile of the state, generally, then the proposed rule might be assessed as yielding an unfavorable distribution of benefits, from the perspective of the public policy principles of Executive Order 12898. The two demographic variables of interest for this EJ analysis are those within the Fish Consumption Pathway (FCP) Module that best capture the minority and low-income aspects of the populations affected, which are annual household income and race.[122] [123] Variable averages at the sub-state and state levels were compared to determine whether or not the demographic profile of the affected population was consistent with the state profile (for details see Chapter 9 of the EA report).

The comparison of minority populations affected by the 316(b) Existing Facilities to the affected states' overall populations found no statistically significant difference between these groups. While low-income populations were less present in the benefit population than in the State's overall population in many states, the differences were generally very small and the two groups were not found to be significantly different. EPA thus believes that the proposed regulation does not systematically discriminate against, or exclude or deny participation of, the lower income population group or the minority population group in the benefits of the proposed regulation in a way that would be contrary to the intent of E.O. 12898. Because today's proposed regulation requires all 316(b) Existing Facilities to achieve compliance regardless of

[120] Affected populations include all individuals who live within a 50-mile radius of the facility who will be receiving a non-use benefit from the improved health of the aquatic ecosystem in the area, and any additional anglers who live outside of the 50-mile facility buffer and within a 50-mile radius of the reaches nearest to 316(b) Existing Facilities, who will be receiving the use benefit of improved catches as a result of the proposed rule.

[121] That is, the estimated benefit population is comprised of a significantly lower share of low-income and/or minority populations than the general population of the state.

[122] Annual household income data in the FCP Module is available for the following categories: Less than $10,000; $10,000 to $19,999; $20,000 to $24,999; $25,000 to $29,999; $30,000 to $34,999; $35,000 to $39,999; $40,000 to $49,999; $50,000 to $74,999; $75,000 to $99,999; and more than $100,000. For this analysis as well as previous 316(b) rule analyses, these categories were combined into low- and not low-income groups based on the U.S. Department of Health and Human Services' poverty guidelines for a family of four living in the contiguous United States or D.C. The current (2009) poverty guideline is $22,050, which falls within the $20,000 to $24,999 income range (U.S. HHS, 2009). For the current analysis, EPA used $20,000 as the threshold for separating populations into low- and not low-income groups.

[123] Race categories used in the analysis include white, black or African American, Asian or Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and some other race.

location, there can be no systematic discrimination or exclusion of low income or minority populations from participation in the rule's benefits, based, for example, on selection of only specific facilities to which the regulation would apply.[124] EPA thus concludes, overall, that the proposed regulation is consistent with the policy intent of E.O. 12898. Anecdotally, minority (*e.g.,* Native American) and low-income populations may be more likely to include a larger proportion of subsistence fishermen. Since this rule will increase abundance of all fish species in the areas affected by cooling water intakes, it may provide a particular benefit to subsistence fishermen. To the extent that minority and low-income populations are over-represented in this group, they may especially benefit from this rule.

K. Executive Order 13158: Marine Protected Areas

Executive Order 13158 (65 FR 34909, May 31, 2000) requires EPA to "expeditiously propose new science-based regulations, as necessary, to ensure appropriate levels of protection for the marine environment." EPA may take action to enhance or expand protection of existing marine protected areas and to establish or recommend, as appropriate, new marine protected areas. The purpose of the Executive Order is to protect the significant natural and cultural resources within the marine environment, which means "those areas of coastal and ocean waters, the Great Lakes and their connecting waters, and submerged lands thereunder, over which the United States exercises jurisdiction, consistent with international law."

Today's proposed rule recognizes the biological sensitivity of tidal rivers, estuaries, oceans, and the Great Lakes and their susceptibility to adverse environmental impact from cooling water intake structures. This rule provides requirements to minimize adverse environmental impact for cooling water intake structures located on these types of waterbodies.

EPA used GIS data of the locations of Marine Protected Areas (MPAs) from the national MPA program (*http://www.mpa.gov/helpful_resources/inventory.html*) to locate 316(b) existing facilities with intakes within MPAs. Under Option 1, 87 percent of in-scope facilities within MPAs obtain reductions in impingement mortality, while reductions in entrainment mortality cannot be estimated because they will be based on site-specific determinations of BTA. Under Options 2 and 3, impingement mortality is reduced at 92 and 97 percent of 316(b) facilities in MPAs, while the addition of closed-cycle cooling towers results in reduced entrainment mortality at 72 and 92 percent of in-scope facilities found in MPAs, respectively. Therefore, EPA expects today's proposed regulation would advance the objective of the Executive Order to protect marine areas. For more details of the methodology used in this analysis and the specific water bodies expected to be improved, *see* Section 5 in Chapter 9 in the EA report.

[124] Additionally, in states in which low-income populations are less present in the benefits group than in the state population overall, these populations are not subject to the environmental damages today's rule *see*ks to ameliorate to the same extent as other income groups.

XI. Solicitation of Data and Comments

A. General Solicitation of Comment

EPA encourages public participation in this rulemaking. EPA asks that commenters address any perceived deficiencies in the record supporting this proposal and that suggested revisions or corrections to the rule, preamble or record be supported by data. EPA invites all parties to coordinate their data collection activities with the Agency to facilitate cost-effective data submissions. Please refer to the **FOR FURTHER INFORMATION CONTACT** section at the beginning of this preamble for technical contacts at EPA.

Requests for comment on specific issues are scattered throughout this preamble in the sections where such issues are discussed. In addition, EPA specifically requests comment on the issues discussed below.

B. Specific Solicitation of Comments and Data

Definition of "Design Intake Flow"

EPA requests comment on whether the definition of DIF should be further revised to clarify that EPA intends for the design intake flow to reflect the maximum volume of water that a plant can physically withdraw from a source waterbody over a specific time period. This would mean that a facility that has permanently taken a pump out of service or has flow limited by piping or other physical limitations should be able to consider such constraints when reporting its DIF. See Section V.G.

2. National BTA Categorical Standards for Offshore Oil and Gas Extraction and Seafood Processing Facilities

EPA requests comment and data on the appropriateness of a single BTA categorical standards for offshore oil and gas extraction facilities and seafood processing facilities. Today's rule would continue to require that the BTA for existing offshore oil and gas extraction facilities and seafood processing facilities be established by NPDES permit directors on a case-by-case basis using best professional judgment. See Section V.H.

3. Cost-cost Alternative From Phase II Rule

EPA does not have technical data for all existing facilities. EPA concluded that the Phase II rule costs provided in Appendix A are not appropriate for use in a facility-level cost-cost test. See Section III. Moreover, under the national requirements EPA is proposing today, EPA concluded that a specific cost-cost variance is not necessary because the Director already has the discretion to consider such factors. EPA requests comment on these conclusions.

4. Entrainment Survival

There are circumstances where certain species of eggs have been shown to survive entrainment under certain conditions, however EPA has not received any new data for either the most common species or the species of concern most frequently identified in available studies. For purposes of today's national rulemaking, entrainment is still presumed to lead to 100 percent mortality. See Section VI. Today's proposed rule would allow facilities to demonstrate, on a site-specific basis, that entrainment mortality of one or more species of concern is not 100 percent. EPA requests comment on this approach.

5. Alternative Impingement Mortality Compliance Requirements

EPA requests comment and data on a provision that would require facilities seeking to comply with the impingement mortality standard by meeting an intake velocity requirement either to demonstrate that the species of concern is adequately protected by the maximum intake velocity requirements, or else to employ fish friendly protective measures including a fish handling and return system. EPA is considering this provision because the Agency is concerned that some facilities that comply with the impingement mortality requirements by reducing intake velocity to 0.5 fps or less, may still impact species of concern. See Section VI.D.1.a.

6. Monthly and Annual Limits on Impingement Mortality

EPA requests comment on the need to tailor the impingement mortality requirements of today's proposal to account for site-specific circumstances and/or technologies, including location of cooling water intakes that impinge relatively few fish or other approaches that achieve impingement mortality reductions equivalent to the proposed performance standards. For example, if EPA were to consider number of fish killed as an alternative, it might statistically model the data or select the minimum observed value. Studies and information supporting these alternatives would be most helpful. EPA also requests comment on the monthly and annual limits in the proposed rule and way in which they were calculated.

7. Flow Basis for Option

EPA requests comment on both the threshold and the flow basis for a variation of option 2 that would use 125 MGD Actual Intake Flow (AIF) rather than a 125 MGD Design Intake Flow (DIF) as the threshold. See Section VI.D.2.

8. Waterbody Type as a Basis for Different Standards

EPA's reanalysis of impingement and entrainment data does not support the premise that the difference in the density of organisms between marine and fresh waters justifies different standards. More specifically, the average density of organisms in fresh waters may be less than that found on average in marine waters, but the actual density of aquatic organisms in some specific fresh water systems exceeds that found in some marine waters. EPA also believes the different reproduction strategies of freshwater versus marine species make broad characterizations regarding the density less valid a rationale for establishing different standards for minimizing adverse environmental impact. EPA requests comment on its proposal not to differentiate requirements by water body type.

9. Capacity Utilization Rating as a Basis for Different Standards

Electric generating facilities may still continue to withdraw significant volumes of water when not generating electricity. Further, EPA found that load-following and peaking plants operate at or near 100 percent capacity (and therefore 100 percent design intake flow) when they are operating. Peaking facilities (those with a CUR of less than 15 percent, as defined in the 2004 Phase II rule) may withdraw relatively small volumes on an annual basis, but if they operate during biologically important periods such as spawning seasons or migrations, then they may have nearly the same adverse impact as a facility that operates year round. EPA requests comment on its decision not to exclude facilities with a low capacity utilization rate. Comments who believe that EPA should include a CUR threshold in the final rule should provide a suggested threshold and explain the basis for it.

10. Flow Commensurate With Closed-Cycle Cooling

EPA requests comment on whether the demonstration that a facility's flow reduction will be commensurate with closed-cycle cooling should be based on a defined metric, or determined by the permitting authority on a site-specific basis for each facility. EPA is proposing that a facility seeking to demonstrate flow reduction commensurate with closed-cycle cooling using flow reduction technologies and controls other than through closed-cycle cooling (*e.g.,* through seasonal flow reductions, unit retirements, and other flow reductions) would have to demonstrate total flow reductions approximating 97.5% for freshwater withdrawals and 94.9% for saltwater withdrawals. *See* Section IX.D.

11. Credits for Unit Closures

EPA requests comments on the proposed approach to allow credits for unit closures to be valid for 10 years from the date of the closure. In EPA's current thinking this approach reasonably allows facilities to get credit for flow reductions attributable to unit closures, but also requires such facilities to make future progress to ensure its operations reflect best available entrainment controls. See Section IX.D.

12. Land Constraints

EPA requests comment on the use of a ratio for determining the land constraint threshold for retrofit construction of cooling tower, as well as data for determining alternative thresholds. EPA has not identified any facilities with more than 160 acres/1000MWs that EPA believes would be unable to construct retrofit cooling towers. EPA is exploring the use of such a ratio to support determinations regarding adequate land area to construct retrofit cooling towers. See Section IX.D (footnote 1).

13. Proposed Implementation Schedule

EPA requests comment on its proposed schedule for implementing the proposed rule. The proposed schedule uses a phased approach for information submittal, requiring some facilities to submit application materials as soon as six months after rule promulgation. The longest timeframe for information submittal would not exceed seven years and six months. EPA solicits comment on the proposed schedule, and specifically seeks comment and data on the appropriate amount of time to collect data, conduct reviews, obtain comment, provide for public participation, and issue final permit conditions. See Section IX.E.

14. Methods for Evaluating Latent Mortality Effects Resulting From Impingement

EPA requests comment on methods for evaluating latent mortality effects resulting from impingement. EPA requests comment on whether it should specifically establish 24 or 48 hours after initial impingement as the time at which to monitor impingement mortality. EPA's record demonstrates that a holding time of no more than 48 hours is optimal for evaluating the latent mortality associated with impingement while at the same time minimizing mortality associated with holding the organisms. See Section IX.F.1.

15. Counting Impinged Organisms With the "Hypothetical Net"

EPA requests comment on the "hypothetical net" approach to measuring impingement mortality. Facilities could apply a "hypothetical net" in that they could elect to only count organisms that would not have passed through a net with 3/8" mesh. For example, a facility that uses a fine-mesh screen or diverts the flow directly to a sampling bay would only need to count organisms that could be collected if the flow passed through a net, screen, or debris basket fitted with 3/8" mesh spacing. See Section IX.F.1. EPA further solicits comment on alternative approaches that would not penalize facilities for employing fine mesh screens.

16. Incentives for Reducing I&E by Reducing Water Withdrawals

EPA requests comment on incentives or alternative requirements for exceptionally energy efficient or water efficient facilities. See Section III. EPA also solicits comment on the regulatory provisions that encourage the use of recycled water as cooling water, including reclaimed water from wastewater treatment plants and process water from manufacturing facilities, EPA solicits comment on other incentives to encourage use of recycled water to supplement or replace marine, estuarine, or freshwater intakes.

17. Options Which Provide Closed-Cycle Cooling as BTA

EPA solicits comment on regulatory options that establish closed-cycle cooling as BTA. EPA specifically requests comment on the regulatory options 2 and 3 included in today's proposal, which would establish closed-cycle cooling as BTA for EM at a DIF of 2 MGD and 125 MGD, respectively. See Section VI and VII. EPA further solicits comment and supporting data on alternative thresholds, including whether such alternative thresholds should be based on DIF or AIF. EPA also solicits comment and supporting data for alternative criteria that would establish closed-cycle cooling as BTA for some facilities.

18. Costs of Controls To Eliminate Entrapment

EPA assumes facilities with modified traveling screens including a fish handling and return system would meet the proposed requirements to eliminate entrapment of fish and shellfish. EPA believes those facilities with an offshore velocity cap leading to a forebay but without a fish return system would incur costs to meet the proposed requirements for entrapment. For facilities with closed-cycle cooling systems, EPA does not have data on the number of facilities that also have a fish handling and return system. Further, EPA does not have data on the number of facilities that have less than 0.5 feet per second intake velocity but have a cooling water intake system that may cause entrapment. EPA solicits comment and data on the types and numbers of facilities with a cooling water intake system that may cause entrapment, and the costs to eliminate entrapment.

19. Analysis of New Capacity

EPA requests comment on the number of new units and the amount of new capacity construction projected. See Section VII.

20. Monitoring Reports

EPA solicits comment on how frequently I&E mortality monitoring reports should be submitted. EPA further solicits comment on incorporating the monitoring reports into monthly DMRs, or whether less frequent reporting is appropriate. EPA also requests comment on whether minimum monitoring frequencies should be established in this rule or left to the discretion of the Director. See Section IX.

21. Seasonal Operation of Cooling Towers

EPA solicits comment on an option that would require cooling towers on some or all facilities but recognize the site-specific nature of EM by allowing seasonal operation of cooling towers during peak entrainment season. EPA also requests comment on including a similar provision for new units at existing facilities, which are required to achieve I&E reductions commensurate with closed cycle cooling in the proposed rule.

22. New Unit Provision

EPA solicits comment on the new unit provision. Specifically, EPA solicits comment on the clarity of the definition of new unit, and whether it should be expanded to include other units such as those that are repowered or rebuilt. EPA also solicits comment on whether the new unit provision should be deleted, therefore subjecting these units to the same site-specific entrainment BTA determination required of existing units.

23. Review Criteria To Guide Evaluation of Entrainment Feasibility Factors

EPA solicits comment on the criteria specified in the regulation for guiding the evaluation of closed-cycle cooling as BTA for EM. EPA further solicits comment on additional criteria that EPA should address, and whether such criteria should be developed in the regulation or provided in guidance.

24. Alternative Procedures for Visual or Remote Inspections

EPA requests comment on its proposal to permit the Director to establish alternative procedures for conducting visual or remote inspections during periods of inclement weather. EPA also requests comment on whether the rule should specific minimum frequencies for visual or remote inspections, or leave this to the determination of the permitting authority. See Section IX.F.

25. Threshold for In-Scope Facilities

EPA requests comment on the threshold of DIF greater than 2 MGD for identifying facilities in-scope of this rule.

26. Application Requirements

EPA requests comment on the burden and practical utility of all of the proposed application requirements. EPA is particularly interested in the burden of application requirements to facilities with DIF < 50 MGD. EPA also requests comment on its proposal to limit application requirements for facilities that have already installed closed-cycle cooling, or opt to do so without a site-specific assessment of BTA, and whether there are additional requirements that could be relaxed for this group.

27. Comment From State and Local Officials

EPA specifically requests comment on this proposed rule from State and local officials. See Section X.E.

28. Comment From Tribal Officials

EPA specifically requests additional comment on this proposed action from Tribal officials. See Section X.F.

List of Subjects

40 CFR Part 122

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous substances, Reporting and recordkeeping requirements, Water pollution control.

40 CFR Part 125

Environmental protection, Cooling water intake structure, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: March 28, 2011.

Lisa P. Jackson,

Administrator.

For reasons set out in the preamble, Chapter I of Title 40 of the Code of Federal Regulations is proposed to be amended as follows:

PART 122—EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

1. The authority citation for part 122 continues to read as follows:

Authority: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. The suspension of 40 CFR 122.21(r)(1)(ii) and (r)(5), published on July 9, 2007 (72 FR 37109) is lifted.

3. Section 122.21 is amended as follows:

a. Revising paragraph (r)(1)(ii).

b. Revising paragraphs (r)(2) introductory text, (r)(2)(i) though (iii), and (r)(3) through (5).

c. Adding paragraphs (r)(6) through (12).

§ 122.21 Application for a permit (applicable to State programs, see § 123.25)

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(r) * * *

(1) * * *

(ii) *Existing facilities.* (A) The owner or operator of an existing facility as defined in 40 CFR part 125, subpart J, with a cooling water intake structure that supplies cooling water exclusively for operation of a wet or dry cooling system and that meets the definition of closed cycle recirculating system at 40 CFR 125.92 must submit to the Director for review the information required under paragraphs (r)(2), (3), and (6) of this section. The owner or operator of all other existing facilities as defined in part 125, subpart J, of this chapter must also submit to the Director for review the information required under paragraphs (r) (5), (7), and (8) of this section as part of its permit application.

(B) The owner or operator of an existing facility as defined in 40 CFR part 125, subpart J, of this chapter that withdraws greater than 125 MGD actual intake flows (AIF) of water for cooling purposes must submit to the Director for review the information required under paragraphs (r)(9), (10), (11), and (12) of this section.

(C) *New units at existing facilities.* New units at existing facilities with cooling water intake structures as defined in part 125, subpart J, of this chapter must provide an update to the information required under paragraphs (r)(2), (3), and (6) of this section and § 125.95 of this chapter. Requests for alternative requirements under § 125.94(d)(4) of this chapter must be submitted with your permit application.

* * * * *

(2) *Source water physical data.* The owner or operator of the facility must submit:

(i) A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located;

(ii) Identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods you used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies;

(iii) Locational maps; and

* * * * *

(3) *Cooling water intake structure data.* The owner or operator of the facility must submit:

(i) A narrative description of the configuration of each of your cooling water intake structures and where it is located in the water body and in the water column;

(ii) Latitude and longitude in degrees, minutes, and seconds for each of your cooling water intake structures;

(iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable;

(iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and

(v) Engineering drawings of the cooling water intake structure.

(4) *Source water baseline biological characterization data.* The owner or operator of each facility must submit the following information in order to characterize the biological community in the vicinity of the cooling water intake structure and to characterize the operation of the cooling water intake structures. This supporting information must include any available existing data. However, you may also supplement the data using newly conducted field studies. In the case of a new facility, the Director may also use this information in subsequent permit renewal proceedings to determine if your Design and Construction Technology Plan as required in § 125.86(b)(4) of this chapter should be revised. The information you submit must include:

(i) A list of the data in paragraphs (r)(4)(ii) through (vi) of this section that are not available and efforts made to identify sources of the data;

(ii) A list of species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the cooling water intake structure;

(iii) Identification of the species and life stages that would be most susceptible to impingement and entrainment. Species evaluated must include the forage base as well as those most important in terms of significance to commercial and recreational fisheries;

(iv) Identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa;

(v) Data representative of the seasonal and daily activities (*e.g.,* feeding and water column migration) of biological organisms in the vicinity of the cooling water intake structure;

(vi) Identification of all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at your cooling water intake structures;

(vii) Documentation of any public participation or consultation with Federal or State agencies undertaken in development of the plan; and

(viii) If you supplement the information requested in paragraph (r)(4)(i) of this section with data collected using field studies, supporting documentation for the Source Water Baseline Biological Characterization must include a description of all methods and quality assurance procedures for sampling, and data analysis including a description of the study area; taxonomic identification of sampled and evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods. The sampling and/or data analysis methods you use must be appropriate for a quantitative survey and based on consideration of methods used in other biological studies performed within the same source water body. The study area should include, at a minimum, the area of influence of the cooling water intake structure.

(ix) Identification of protective measures and stabilization activities that have been implemented, and a description of how these measures and activities affected the baseline water condition in the vicinity of the intake.

(5) *Cooling water system data.* The owner or operator of the facility must provide the following information for each cooling water intake structure used:

(i) A narrative description of the operation of the cooling water system and its relationship to cooling water intake structures; the proportion of the design intake flow that is used in the system including a distribution of water used for contact cooling, non-contact cooling, and process uses; a distribution of water reuse (to include cooling water reused as process water, process water reused for cooling, and the use of gray water for cooling); description of reductions in total water withdrawals including cooling water intake flow reductions already achieved through minimized process water withdrawals; description of any cooling water that is used in a manufacturing process either before or after it is used for cooling, including other recycled process water flows; the proportion of the source waterbody withdrawn (on a monthly basis); the number of days of the year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable;

(ii) Design and engineering calculations prepared by a qualified professional and supporting data to support the description required by paragraph (r)(5)(i) of this section;

(iii) Description of existing impingement and entrainment technologies or operational measures and a summary of their performance, including but not limited to reductions in entrainment mortality due to intake location and reductions in total water withdrawals and usage.

(6) *Impingement Mortality Reduction Plan.* The Impingement Mortality Reduction Plan must identify the approach the owner or operator of the facility will use to meet the BTA standards for impingement mortality at 40 CFR 125.94(b), including:

(i) Identification of the method of intended compliance with the BTA standards for impingement mortality for each intake by either conducting a direct measure of impingement mortality through sampling, by demonstrating that the maximum design intake velocity is equal to or less than 0.5 feet per second, or by measuring the intake velocity and demonstrating that the actual intake velocity is equal to or less than 0.5 feet per second.

(ii) If you plan to comply with the BTA standards for impingement mortality requirements by conducting a direct measure of impingement mortality through sampling, you must provide a description of the study area including the area of influence of each cooling water intake structure and a taxonomic identification of the sampled or evaluated biological assemblages including all life stages of fish and shellfish that may be susceptible to impingement.

(iii) If you plan to comply with the BTA standards for impingement mortality requirements by conducting a direct measure of impingement mortality through sampling, you must also provide a description of any sampling or monitoring approach to be used in measuring impingement mortality, including:

(A) The duration and frequency of monitoring, subject to the minimum monitoring requirements established by the Director under 40 CFR 125.96 but in no case less frequently than a biweekly basis;

(B) The monitoring locations;

(C) The organisms to be monitored, and

(D) The method in which naturally moribund organisms are identified and taken into account.

(iv) If you plan to comply with the BTA standards for impingement mortality requirements by demonstrating that the design intake velocity is equal to or less than 0.5 feet per second, documentation including:

(A) A demonstration that the maximum design intake velocity is equal to or less than 0.5 feet per second;

(B) A description of technologies or operational measures to keep any debris from blocking the intake at no more than 15 percent of the opening of the intake; and

(C) A description of technologies or operational measures to prevent entrapment of fish or shellfish by the cooling water intake system.

(v) If you plan to comply with the BTA standards for impingement mortality by measuring the intake velocity to demonstrate the intake velocity is equal to or less than 0.5 feet per second, documentation including:

(A) Velocity monitoring to demonstrate that the actual intake velocity is equal to or less than 0.5 feet per second;

(B) Documentation of the technologies and operational measures taken to ensure the actual intake velocity will not exceed 0.5 feet per second; and,

(C) A description of technologies or operational measures to prevent entrapment of impingeable fish or shellfish by the cooling water intake system.

(vi) For intakes that withdraw from oceans and tidal waters, a description of the measures and technologies to reduce impingement mortality of shellfish to a level comparable to that achieved by properly deployed and maintained barrier nets, including but not limited to cylindrical wedgewire screens, seasonal deployment of barrier nets, intake location, and/or an appropriate handling and return system.

(vii) You must demonstrate that the cooling water intake structure does not lead to entrapment. This demonstration must include documentation that organisms are excluded from entering any portion of the intake where there is not an opportunity for them to escape. If your cooling water intake structure results in entrapment and the only way for fish to escape is by being impinged upon the screens or to pass through the facility (in the case of open intakes), you must document that additional protective measures will be deployed such as, for example, modification of traveling screens with collection buckets designed to minimize turbulence to aquatic life, addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side, and a fish return with adequate flow to ensure fish return to the source water body. If you cannot document these additional protective measures, you must count all entrapment of organisms as mortality.

(viii) Documentation of all methods and quality assurance/quality control procedures for sampling and data analysis. The proposed sampling and data analysis methods must be appropriate for a quantitative survey.

(7) *Performance studies.* If the owner or operator has conducted studies, or chooses to use previously conducted studies obtained from other facilities, you must submit a description of those biological survival studies conducted, together with underlying data, and a summary of any conclusions or results, including but not limited to:

(i) Site-specific studies addressing technology efficacy, through-plant entrainment survival, and other impingement and entrainment mortality studies;

(ii) Studies conducted at other locations including an explanation as to why the data from other locations is relevant and representative of conditions at your facility;

(iii) Studies older than 10 years must include an explanation of why the data is still relevant and representative of conditions at your facility.

(8) *Operational status.* The owner or operator of the facility must submit a description of its operational status for each generating, production, or process unit, including but not limited to:

(i) Descriptions of individual unit operating status including age of each unit, capacity utilization (or equivalent) for the previous 5 years, and any major upgrades completed within the last 15 years, including but not limited to boiler replacement, condenser replacement, turbine replacement, or changes to fuel type;

(ii) Descriptions of completed, approved, or scheduled uprates and NRC relicensing status of each unit at nuclear facilities;

(iii) Descriptions of plans or schedules for decommissioning or replacement of units;

(iv) Descriptions of current and future production schedules at manufacturing facilities; and

(v) Descriptions of plans or schedules for any new units planned within the next 5 years.

(9) *Entrainment characterization study.* For all species and life stages identified under the requirements of paragraph (r)(4) of this section, the owner or operator of the facility must:

(i) Develop and submit an entrainment mortality data collection plan for review and comment by the Director. The entrainment mortality data collection plan must include, at a minimum:

(A) The duration and frequency of monitoring;

(B) The monitoring locations, including a description of the study area and the area of influence of the cooling water intake structure(s);

(C) A taxonomic identification of the sampled or evaluated biological assemblages;

(D) Identification of all life stages of fish and shellfish, including identification of any surrogate life stages used, and identification of data representing both motile and non-motile life-stages of organisms;

(E) The organisms to be monitored, including species of concern and threatened or endangered species;

(F) Any other organisms identified by the Director;

(G) The method by which latent mortality would be identified;

(H) Documentation of all methods and quality assurance/quality control procedures for sampling and data analysis. The proposed sampling and data analysis methods must be appropriate for a quantitative survey.

(ii) Obtain peer review of the entrainment mortality data collection plan. You must select peer reviewers in consultation with the Director, including that the Director may require additional peer reviewers. The Director may consult with EPA and Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s) to determine which peer review comments must be addressed by the final plan. You must provide an explanation for any significant reviewer comments not accepted. Peer reviewers must have appropriate qualifications in biology, engineering, hydrology, or other fields and their names and credentials must be included in the peer review report.

(iii) Implement the entrainment mortality data collection plan no later than 6 months after submission of the entrainment mortality data collection plan to the Director.

(iv) The Entrainment Characterization Study must include all of the following components:

(A) Taxonomic identifications of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) that are in the vicinity of the cooling water intake structure(s) and are susceptible to entrainment;

(B) Characterization of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species), including a description of the abundance and temporal and spatial characteristics in the vicinity of the cooling water intake structure(s), based on sufficient data to characterize annual, seasonal, and diel variations in entrainment, and including but not limited to variations related to climate and weather differences, spawning, feeding and water column migration. These may include historical data that are representative of the current operation of your facility and of biological conditions at the site; and,

(C) Documentation of the current entrainment of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species). The documentation may include historical data that are representative of the current operation of your facility and of biological conditions at the site. Entrainment samples to support the facility's calculations must be collected during periods of representative operational flows for the cooling water intake structure and the flows associated with the samples must be documented. Data for specific organism mortality or survival that is applied to other life-stages or species must be identified. The owner or operator of the facility must identify and document all assumptions and calculations used to determine the total entrainment and entrainment mortality for that facility.

(D) Information collected to meet paragraphs (r)(4) and (r)(7) of this section may be used in developing the Entrainment Characterization Study.

(10) *Comprehensive technical feasibility and cost evaluation study.* The owner or operator of the facility must submit an engineering study of the technical feasibility and incremental costs of candidate entrainment mortality control technologies. The study must include the following:

(i) *Technical feasibility.* At a minimum, the owner or operator of the facility must conduct a study to evaluate the technical feasibility of closed-cycle recirculating systems (cooling towers) and fine mesh screens with a mesh size of 2mm or smaller. This study must include:

(A) A description of all technologies and operational measures considered (including alternative designs of closed-cycle recirculating systems—such as natural draft cooling towers, mechanical draft cooling towers, hybrid designs, and compact or multi-cell arrangements);

(B) A discussion of land availability, including an evaluation of adjacent land and acres potentially available due to generating unit retirements, production unit retirements, other buildings and equipment retirements, and ponds, coal piles, rail yards, transmission yards, and parking lots, and

(C) Documentation of factors other than cost that may make a candidate technology impractical or infeasible for further evaluation.

(ii) *Other entrainment mortality control technologies.* Following submission of the engineering study, the Director may require evaluation of additional technologies for reducing entrainment mortality.

(iii) *Cost evaluations.* The study must include engineering cost estimates of all technologies considered in paragraphs (r)(10)(i) and (ii) of this section. All costs must be presented as the net present value (NPV) of the social costs and the corresponding annual value. In addition to the required social costs, you may choose to provide facility level compliance costs, however you must separately discuss facility level compliance costs and social costs. You must discuss and provide documentation for:

(A) Any outages, downtime, or other impacts to facility revenue. Depreciation schedules, interest rates and related assumptions must be identified.

(B) Costs and explanation of any additional facility modifications necessary to support construction and operation of technologies considered in paragraphs (r)(10)(i) and (ii) of this section, including but not limited to relocation of existing buildings or equipment, reinforcement or upgrading of existing equipment, and additional construction and operating permits. Depreciation schedules, interest rates, useful life of the technology considered, and any related assumptions must be identified.

(C) Costs and explanation for addressing any non-water quality impacts identified in paragraph (r)(12) of this section. The cost evaluation must include a discussion of all reasonable attempts to mitigate each of these impacts.

(iv) *Peer review.* Obtain peer review of the comprehensive technical feasibility and cost evaluation study. You must select peer reviewers in consultation with the Director, including that the Director may require additional peer reviewers. The Director may consult with EPA and Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s) to determine which peer review comments must be addressed by the final study. You must provide an explanation for any significant reviewer comments not accepted. Peer reviewers must have appropriate qualifications in biology, engineering, hydrology, or other fields and their names and credentials must be included in the peer review report.

(11) *Benefits valuation study.* The owner or operator of the facility must submit an evaluation of the magnitude of water quality benefits, both monetized and non-monetized, of the candidate entrainment mortality reduction technologies and operational measures evaluated in paragraph (r)(10) of this section, including but not limited to:

(i) Incremental changes in the numbers of fish and shellfish, for all life stages, lost due to impingement mortality and entrainment mortality as defined in 40 CFR 125.92;

(ii) Identification of basis for any monetized values you assigned to changes in commercial and recreational species, forage fish, and shellfish, and to any other ecosystem or non-use benefits;

(iii) Discussion of recent mitigation efforts already completed;

(iv) Identification of other benefits to the environment and local communities, including but not limited to improvements for mammals, birds, and other organisms and aquatic habitats.

(v) Peer review. Obtain peer review of the benefits valuation study. You must select peer reviewers in consultation with the Director, including that the Director may require additional peer reviewers. The Director may consult with EPA and Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s) to determine which peer review comments must be addressed by the final study. You must provide an explanation for any significant reviewer comments not accepted. Peer reviewers must have appropriate qualifications in biology, engineering, hydrology, or other fields and their names and credentials must be included in the peer review report.

(12) *Non-water Quality and Other Environmental Impacts Study.* The owner or operator of the facility must submit a detailed site-specific discussion of the changes in non-water quality factors and other environmental impacts attributed to each technology and operational measure considered in paragraph (r)(10) of this section, including but not limited to both increases and decreases of each factor. The study must include the following:

(i) Estimates of changes to energy consumption, including but not limited to parasitic load and turbine backpressure energy penalties;

(ii) Estimates of changes to thermal discharges, including an estimate of any increased facility capacity, operations, and reliability that may be possible due to relaxed permitting constraints related to thermal discharges;

(iii) Estimates of air pollutant emissions and of the human health and environmental impacts associated with such emissions;

(iv) Estimates of changes in noise;

(v) Discussion of impacts to safety, including documentation of the potential for plumes, icing, and availability of emergency cooling water;

(vi) Impacts to grid reliability for the facility and for each power generating unit, including an estimate of changes to facility capacity, operations, and reliability due to cooling water availability;

(vii) Facility reliability, including but not limited to facility availability, production of steam, and impacts to production based on process unit heating or cooling;

(viii) Significant changes in consumption of water, including a site-specific comparison of the evaporative losses of both once-through cooling and closed cycle recirculating systems, and documentation of impacts attributable to changes in water consumption;

(ix) A discussion of all reasonable attempts to mitigate each of these factors.

(x) Peer review. Obtain peer review of the non-water quality and other environmental impacts study. You must select peer reviewers in consultation with the Director, including that the Director may require additional peer reviewers. The Director may consult with EPA and Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the cooling water intake structure(s) to determine which peer review comments must be addressed by the final study. You must provide an explanation for any significant reviewer comments not accepted. Peer reviewers must have appropriate qualifications in biology, engineering, hydrology, or other fields and their names and credentials must be included in the peer review report.

PART 125—CRITERIA AND STANDARDS FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

4. The authority citation for part 125 continues to read as follows:

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.;* unless otherwise noted.

Subpart I—[Amended]

5. Section 125.84 is amended as follows:

a. In the heading of paragraph (c) by removing the words “equal to or greater than 2 MGD” and adding in their place the words “greater than 2 MGD.”

b. By revising paragraph (d)(1).

§ 125.84 As an owner or operator of a new facility, what must I do to comply with this subpart?

* * * * *

(d) * * *

(1) You must demonstrate to the Director that the technologies employed will reduce the level of adverse environmental impact from your cooling water intake structures to a comparable level to that which you would achieve were you to implement the requirements of paragraphs (b)(1) and (2) of this section. This demonstration must include a showing that the impacts to fish and shellfish, including important forage and predator species, within the watershed will be comparable to those which would result if you were to implement the requirements of paragraphs (b)(1) and (2) of this section. The Director may consider information provided by any fishery management agency(ies) along with data and information from other sources.

* * * * *

6. Section 125.86 is amended as follows:

a. Revise paragraph (b)(3) introductory text.

b. Revise paragraph (b)(4)(iii).

b. Remove and reserve paragraph (c)(2)(iv)(C).

c. Remove and reserve paragraph (c)(2)(iv)(D)(*2*).

§ 125.86 As an owner or operator of a new facility, what must I collect and submit when I apply for my new or reissued NPDES permit?

* * * * *

(b) * * *

(3) *Source waterbody flow information.* You must submit to the Director the following information to demonstrate that your cooling water intake structure meets the flow requirements in § 125.84(b)(3) or (c)(2).

* * * * *

(4) * * *

(iii) The owner or operator of a new facility required to install design and construction technologies and/or operational measures must develop a plan explaining the technologies and measures selected that is based on information collected for the Source Water Biological Baseline Characterization required by 40 CFR 122.21(r)(4). (Examples of appropriate technologies include, but are not limited to, wedgewire screens, fine mesh screens, fish handling and return systems, barrier nets, aquatic filter barrier systems, etc. Examples of appropriate operational measures include, but are not limited to, seasonal shutdowns or reductions in flow, continuous operations of screens, etc.) The plan must contain the following information:

* * * * *

7. Section 125.87 is amended by revising paragraph (a) introductory text and paragraph (a)(2) to read as follows:

§ 125.87 As an owner or operator of a new facility, must I perform monitoring?

* * * * *

(a) *Biological monitoring.* You must monitor both impingement and entrainment of the commercial, recreational, and forage base fish and shellfish species identified in either the Source Water Baseline Biological Characterization data required by 40 CFR 122.21(r)(4) or the Comprehensive Demonstration Study required by § 125.86(c)(2), depending on whether you chose to comply with Track I or Track II. The monitoring methods used must be consistent with those used for the Source Water Baseline Biological Characterization data required in 40 CFR 122.21(r)(4) or the Comprehensive Demonstration Study required by § 125.86(c)(2). You must follow the monitoring frequencies identified below for at least two (2) years after the initial permit issuance. After that time, the Director may approve a request for less frequent sampling in the remaining years of the permit term and when the permit is reissued, if the Director determines the supporting data show that less frequent monitoring would still allow for the detection of any seasonal and daily variations in the species and numbers of individuals that are impinged or entrained.

* * * * *

(2) *Entrainment sampling.* You must collect samples at least biweekly to monitor entrainment rates (simple enumeration) for each species over a 24-hour period during the primary period of reproduction, larval recruitment, and peak abundance identified during the Source Water Baseline Biological Characterization required by 40 CFR 122.21(r)(4) or the Comprehensive Demonstration Study required in § 125.86(c)(2). You must collect samples only when the cooling water intake structure is in operation.

* * * * *

8. Section 125.89 is amended by revising paragraph (b)(1)(ii) to read as follows:

§ 125.89 As the Director, what must I do to comply with the requirements of this subpart?

* * * * *

(b) * * *

(1) * * *

(ii) For a facility that chooses Track II, you must review the information submitted with the Comprehensive Demonstration Study required in § 125.86(c)(2), evaluate the suitability of the proposed design and construction technologies and operational measures to determine whether they will reduce both impingement mortality and entrainment of all life stages of fish and shellfish to 90 percent or greater of the reduction that could be achieved through Track I. In addition, you must review the Verification Monitoring Plan in § 125.86(c)(2)(iv)(D) and require that the proposed monitoring begin at the start of operations of the cooling water intake structure and continue for a sufficient period of time to demonstrate that the technologies and operational measures meet the requirements in § 125.84(d)(1). Under subsequent permits, the Director must review the performance of the additional and/or different technologies or measures used and determine that they reduce the level of adverse environmental impact from the cooling water intake structures to a comparable level that the facility would achieve were it to implement the requirements of § 125.84(b)(1) and (2).

* * * * *

9. The suspension of 40 CFR 125.90(a), (c), and (d), published on July 9, 2007 (72 FR 37109) is lifted.

10. The suspension of 40 CFR 125.91 through 125.99, published on July 9, 2007 (72 FR 37109) is lifted.

11. Subpart J to part 125 is revised to read as follows:

Subpart J—Requirements Applicable to Cooling Water Intake Structures for Existing Facilities Under Section 316(b) of the Clean Water Act

Sec.

Subpart J—Requirements Applicable to Cooling Water Intake Structures for Existing Facilities Under Section 316(b) of the Clean Water Act

§ 125.90 Purpose of this subpart.

(a) This subpart establishes the section 316(b) requirements that apply to cooling water intake structures at existing facilities that are subject to this subpart. These requirements include a number of components. These include standards for minimizing adverse environmental impact associated with the use of cooling water intake structures and required procedures (*e.g.,* permit application requirements, information submission requirements) for establishing the appropriate technology requirements at certain specified facilities as well as required monitoring, reporting, and recordkeeping requirements to demonstrate compliance. In combination, these components represent the best technology available for minimizing adverse environmental impact associated with the use of cooling water intake structures. These requirements are to be established and implemented in National Pollutant Discharge Elimination System (NPDES) permits issued under authority of sections 301, 308, and 402 of the Clean Water Act (CWA).

(b) Cooling water intake structures not subject to requirements under this or another subpart of this part must meet requirements under section 316(b) of the CWA established by the Director on a case-by-case, best professional judgment (BPJ) basis.

(c) Nothing in this subpart shall be construed to preclude or deny the right of any State or political subdivision of a State or any interstate agency under section 510 of the CWA to adopt or enforce any requirement with respect to control or abatement of pollution that is more stringent than those required by Federal law.

§ 125.91 Applicability.

(a) An existing facility, as defined in § 125.92, is subject to this subpart if it meets each of the following criteria:

(1) It is a point source;

(2) It uses or proposes to use cooling water intake structures with a total design intake flow (DIF) of greater than 2 million gallons per day (MGD) to withdraw water from waters of the United States; and

(3) Twenty-five percent or more of the water it withdraws is used exclusively for cooling purposes, measured on an average annual basis for each calendar year.

(b) Use of a cooling water intake structure includes obtaining cooling water by any sort of contract or arrangement with one or more independent suppliers of cooling water if the independent supplier withdraws water from waters of the United States but is not itself a new or existing facility as defined in subparts I or J of this part, except as provided in paragraph (d) of this section. An owner or operator of an existing facility may not circumvent these requirements by creating arrangements to receive cooling water from an entity that is not itself a facility subject to subparts I or J of this part.

(c) Notwithstanding paragraph (b) of this section, obtaining cooling water from a public water system, using reclaimed water from wastewater treatment facilities or desalination plants, or recycling treated effluent as cooling water does not constitute use of a cooling water intake structure for purposes of this subpart.

(d) This subpart does not apply to seafood processing facilities, offshore liquefied natural gas terminals, and offshore oil and gas extraction facilities that are existing facilities as defined in § 125.92. The owners and operators of such facilities must meet requirements established by the Director on a case-by-case, best professional judgment (BPJ) basis.

§ 125.92 Special definitions.

In addition to the definitions provided in § 122.2 of this chapter, the following special definitions apply to this subpart:

Actual Intake Flow (AIF) means the average volume of water withdrawn on an annual basis by the cooling water intake structures over the past three calendar years.

All life stages means eggs, larvae, juveniles, and adults. All life stages of fish and shellfish does not include members of the infraclass Cirripedia in the subphylum Crustacea (barnacles), green mussels (*Perna viridis*), or zebra mussels (*Dreissena polymorpha).* The Director may determine that all life stages of fish and shellfish does not include specified invasive species and naturally moribund species.

Closed-cycle recirculating system means a system designed, using minimized make-up and blowdown flows, to withdraw water from a natural or other water source to support contact or noncontact cooling uses within a facility, or a system designed to include cooling ponds that are not themselves a waters of the U.S. and that does not rely upon continuous intake flows of water. New source water (make-up water) is added to the system to replenish losses that have occurred due to blowdown, drift, and evaporation. *Closed-cycle recirculating system* includes, but is not limited to, wet or dry cooling towers. For cooling towers where the source for make-up water is freshwater or has a salinity equal to or less than 0.5 parts per thousand, minimized make-up and blow down means operating at a minimum cycles of concentration of 3.0. For cooling towers where the source for make-up water is saltwater, brackish water, or has a salinity of greater than 0.5 parts per thousand, minimized make-up and blow down means operating at a minimum cycles of concentration of 1.5. For facilities with a closed-cycle recirculating system other than a cooling tower, minimized make-up and blowdown flows means a reduction in actual intake flow of 97.5 percent for freshwater, and 94.9 percent for salt water or brackish water.

Contact cooling water means water used for cooling which comes into direct contact with any raw material, product, or byproduct. Examples of contact cooling water may include but are not limited to quench water at iron and steel plants, cooling water in a cracking unit, and cooling water directly added to food and agricultural products processing.

Cooling pond means a man-made canal, channel, lake, pond or other impoundment designed and constructed to provide cooling for a nearby electric generating or manufacturing unit. A cooling pond may comprise a closed-cycle recirculating system when waters of the U.S. are withdrawn only for the purpose of replenishing losses of cooling water due to blowdown, drift, and evaporation.

Cooling water means water used for contact or noncontact cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content. The intended use of the cooling water is to absorb waste heat rejected from the process or processes used, or from auxiliary operations on the facility's premises. Cooling water obtained from a public water system, reclaimed water from wastewater treatment facilities or desalination plants, treated effluent from a manufacturing facility, or cooling water that is used in a manufacturing process either before or after it is used for cooling as process water, is not considered cooling water for the purposes of calculating the percentage of a facility's intake flow that is used for cooling purposes in § 125.91(a)(3).

Cooling water intake structure means the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the United States. The cooling water intake structure extends from the point at which water is withdrawn from the surface water source up to, and including, but not limited to, the intake pumps.

Design intake flow (DIF) means the value assigned during the cooling water intake structure design to the maximum volume of water the cooling water intake system is capable of withdrawing from a source waterbody over a specific time period. The facility's DIF may be adjusted to reflect permanent changes to the maximum capabilities of the cooling water intake system to withdraw cooling water, including but not limited to pumps permanently removed from service, flow limit devices, and physical limitations of the piping. DIF does not include values associated with emergency and fire suppression capacity or redundant pumps (*i.e.,* back-up pumps).

Entrainment means the incorporation of any life stages of fish and shellfish with the intake water flow entering and passing through a cooling water intake structure and into a cooling water system. Entrainable organisms includes any organisms potentially subject to *entrainment.* For purposes of this subpart, *entrainment* includes those organisms that pass through a 3⁄8 inch sieve, and excludes those organisms collected or retained on a 3⁄8 inch sieve.

Entrainment mortality means death as a result of entrainment through the cooling water intake structure, or death as a result of exclusion from the cooling water intake structure by fine mesh screens or other protective devices intended to prevent the passage of entrainable organisms through the cooling water intake structure.

Entrapment means the condition where impingeable fish and shellfish lack the means to escape the cooling water intake system. Entrapment includes but is not limited to: organisms caught in the bucket of a traveling screen and unable to reach a fish return; organisms caught in the forebay of a cooling water intake system without any means of being returned to the source waterbody without experiencing mortality; or cooling water intake systems where the velocities in the intake pipes or in any channels leading to the forebay prevent organisms from being able to return to the source waterbody through the intake pipe or channel.

Existing facility means any facility that commenced construction as described in 40 CFR 122.29(b)(4) on or before January 17, 2002; and any modification of, or any addition of a unit at such a facility that is not a new facility at § 125.83.

Flow reduction means any modification that serves to reduce the volume of cooling water withdrawn. Examples include, but are not limited to, variable speed pumps, seasonal flow reductions, wet cooling towers, dry cooling towers, hybrid cooling towers, and unit closures.

Impingement means the entrapment of any life stages of fish and shellfish on the outer part of an intake structure or against a screening device during periods of intake water withdrawal. *Impingement* includes those organisms collected or retained on a ⅜ inch sieve, and excludes those organisms that pass through a ⅜ inch sieve.

Impingement mortality means death as a result of impingement.

Independent supplier means an entity, other than the regulated facility, that owns and operates its own cooling water intake structure and directly withdraws water from waters of the United States. The supplier provides the cooling water to other facilities for their use, but may also use a portion of the water itself. An entity that provides potable water to residential populations (*e.g.,* public water system) is not a supplier for purposes of this subpart.

Moribund means dying; close to death.

New unit means any addition of an operating unit at an existing facility where the construction begins after [effective date of the final rule], including but not limited to a new unit added to a new or existing facility for the same general industrial operation, but that does not otherwise meet the definition of a new facility at § 125.83. *New unit* includes any additional unit where that unit is not subject to the requirements of Subpart I. For purposes of this subpart, new unit refers to newly built units added to increase capacity at the facility and does not include any rebuilt, repowered or replacement unit, including any units where the generation capacity of the new unit is equal to or greater than the unit it replaces.

Operational measure means a modification to any operation that serves to minimize impact to all life stages of fish and shellfish from the cooling water intake structure. Examples of operational measures include, but are not limited to, more frequent rotation of traveling screens, use of a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side of a traveling screen, maintaining adequate volume of water in a fish return, and debris minimization measures such as air sparging of intake screens and/or other measures taken to maintain the design intake velocity.

§ 125.93 Compliance.

(a) The owner or operator of a facility subject to this subpart must comply with the applicable BTA standards for impingement mortality in § 125.94(b) as soon as possible based on the schedule of requirements set by the Director, but in no event later than [date 8 years after the effective date of the final rule].

(b) The owner or operator of a facility subject to this subpart must comply with the applicable BTA standards for entrainment mortality in § 125.94(c) as soon as possible, based on the schedule of requirements set by the Director.

(c) The owner or operator of an existing facility subject to this subpart that commences construction of a new unit after [effective date of the final rule] must comply with the BTA standards with respect to the new unit in § 125.94(b) and § 125.94(d) upon commencement of the new unit's operation. With respect to the existing units at the existing facility, the owner or operator must comply with paragraphs (a) and (b) of this section.

§ 125.94 As an owner or operator of an existing facility, what must I do to comply with this subpart?

(a) *Applicable BTA standards.* (1) The owner or operator of an existing facility with a design intake flow (DIF) greater than 2 MGD is subject to the impingement mortality standard under paragraph (b) of this section.

(2) The owner or operator of an existing facility with a design intake flow (DIF) greater than 2 MGD is subject to the BTA standards for entrainment mortality under paragraph (c) of this section. The owner or operator may choose instead to comply with the entrainment mortality standard at paragraph (d) of this section.

(3) New units at an existing facility that are not a new facility under § 125.83 and that have a design intake flow (DIF) greater than 2 MGD are subject to the BTA standards for impingement mortality at paragraph (b) of this section and the entrainment mortality standards at paragraph (d) of this section.

(b) BTA Standards for Impingement Mortality. By the dates specified in § 125.93, the owner or operator of an existing facility subject to this subpart must achieve the impingement mortality standards provided in paragraphs (b)(1), or (2), of this section:

(1) The owner or operator of an existing facility must:

(i) Achieve the following impingement mortality limitations for all life stages of fish that are collected or retained in a ⅜ inch sieve and held for a period of 24 to 48 hours to assess latent mortality. The annual average comprises the average for all measurements taken during the preceding 12-month period. The compliance period for the annual average will be established by the Director.

IMPINGEMENT MORTALITY NOT TO EXCEED

Regulated parameter	Annual average (percent)	Monthly average (percent)
Fish Impingement Mortality	12	31

(ii) The owner or operator of a facility that withdraws water from an ocean or tidal waters must also reduce impingement mortality of shellfish at a minimum to a level comparable to that achieved by properly deployed and maintained barrier nets. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement.

(iii) The owner or operator of a facility that employs traveling screens or equivalent active screens must:

(A) Count any fish that are included in carryover from a screen or removed from a screen as part of debris removal as fish impingement mortality.

(B) Incorporate protective measures including but not limited to: modified traveling screens with collection buckets designed to minimize turbulence to aquatic life, addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side of the screens, and a fish handling and return system with sufficient water flow to return the fish to the source water in a manner that does not promote predation or re-impingement of the fish.

(iv) The owner or operator of the facility must ensure that there is a means for impingeable fish or shellfish to escape the cooling water intake system or be returned to the waterbody through a fish return system. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement;

(2) The owner or operator of an existing facility must demonstrate to the Director that its cooling water intake system has a maximum intake velocity of 0.5 feet per second. In addition, you must meet the following criteria:

(i) The maximum velocity must be demonstrated as either the maximum actual intake velocity or the maximum design intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh;

(ii) The maximum velocity limit must be achieved under all conditions, including during minimum ambient source water surface elevations (based on BPJ using hydrological data) and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure. If the intake does not have a screen, the maximum intake velocity perpendicular to the opening of the intake must not exceed 0.5 feet per second during minimum ambient source water surface elevations.

(iii) Each intake must be operated and maintained to keep any debris blocking the intake at no more than 15 percent of the opening of the intake. A demonstration that the actual intake velocity is less than 0.5 feet per second through velocity measurements will meet this requirement;

(iv) The owner or operator of a facility that withdraws water from the ocean or tidal waters must also reduce impingement mortality of shellfish at a minimum to a level comparable to that achieved by properly deployed and maintained barrier nets. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement.

(v) The owner or operator of a facility that employs traveling screens or equivalent active screens must:

(A) Count any fish that are included in carryover from a screen or removed from a screen as part of debris removal as fish impingement mortality.

(B) Incorporate protective measures including but not limited to: modified traveling screens with collection buckets designed to minimize turbulence to aquatic life, addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side of the screens, and a fish handling and return system with sufficient water flow to return the fish to the source water in a manner that does not promote predation or re-impingement of the fish.

(vi) The owner or operator of the facility must ensure that there is a means for impingeable fish or shellfish to escape the cooling water intake system or be returned to the waterbody through a fish return system. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement;

(c) *BTA standards for entrainment mortality for existing facilities.* The Director must establish BTA standards for entrainment mortality on a case-by-case basis. These standards must reflect the Director's determination of the maximum reduction in entrainment mortality warranted after consideration of all factors relevant for determining the best technology available at each facility, including the factors specified in § 125.98.

(d) *BTA standards for entrainment mortality for new units at existing facilities.* The owner or operator of a new unit at an existing facility must achieve the entrainment standards provided in either paragraph (d)(1) or (d)(2) of this section.

(1) The owner or operator of a facility must reduce actual intake flow (AIF) at a new unit, at a minimum, to a level commensurate with that which can be attained by the use of a closed-cycle recirculating system for the same level of cooling. The owner or operator of a facility with a cooling water intake structure that supplies cooling water exclusively for operation of a wet or dry cooling tower(s) and that meets the definition of closed cycle recirculating system at § 125.92 meets this entrainment mortality standard.

(2) The owner or operator of a facility must demonstrate to the Director that it has installed, and will operate and maintain, technologies for each intake at the new unit that reduce entrainment mortality of all stages of fish and shellfish that pass through a 3⁄8 inch sieve. The owner or operator of a facility must demonstrate entrainment mortality reductions equivalent to 90 percent or greater of the reduction that could be achieved through compliance with paragraph (d)(1) of this section.

(3) This standard does not apply to:

(i) Process water, gray water, waste water, reclaimed water, or other waters reused as cooling water in lieu of water obtained by marine, estuarine, or freshwater intakes;

(ii) Cooling water used by manufacturing facilities for contact cooling purposes;

(iii) Portions of those water withdrawals for auxiliary plant cooling uses totaling less than two MGD;

(iv) Any volume of cooling water withdrawals used exclusively for make-up water at existing closed-cycle recirculating systems. For facilities with a combination of closed-cycle recirculating systems and other cooling water systems the entrainment mortality standard does not apply to that portion of cooling water withdrawn as make-up water for the closed-cycle recirculating system;

(v) Any quantity of emergency back-up water flows.

(4) The Director may establish alternative requirements if:

(i) The data specific to the facility indicate that compliance with the requirements of paragraphs (d)(1) or (2) of this section for the new unit would result in compliance costs wholly out of proportion to the costs EPA considered in establishing the requirements at issue or would result in significant adverse impacts on local air quality, significant adverse impacts on local water resources other than impingement or entrainment, or significant adverse impacts on local energy markets;

(ii) The alternative requirements must achieve a level of performance as close as practicable to the requirements of paragraphs (d)(1) or (2) of this section;

(iii) The alternative requirements will ensure compliance with other applicable provisions of the Clean Water Act and any applicable requirement of state law;

(iv) The burden is on the owner or operator of the facility requesting the alternative requirement to demonstrate that alternative requirements should be authorized for the new unit.

(5) For cooling water flows specified in paragraph (d) of this section that are

not subject to this standard, the Director may establish additional BTA standards for entrainment mortality on a case by case basis.

(e) *Nuclear facilities.* If the owner or operator of a nuclear facility demonstrates to the Director, upon the Director's consultation with the Nuclear Regulatory Commission, that compliance with this subpart would result in a conflict with a safety requirement established by the Commission, the 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.

(f) *More stringent standards.* The Director may establish more stringent requirements as best technology available for minimizing adverse environmental impact if the Director determines that your compliance with the applicable requirements of this section would not meet the requirements of applicable State and Tribal law, or other Federal law.

(g) The owner or operator of a facility subject to this subpart must:

(1) Submit and retain permit application and supporting information as specified in § 125.95;

(2) Conduct compliance monitoring as specified in § 125.96; and

(3) Report information and data and keep records as specified in § 125.97.

§ 125.95 Permit application and supporting information requirements.

(a) The Director may waive some or all of the information requirements of 40 CFR 122.21(r)(8), (9), (10), (11), and (12) in the first permit application submitted after [effective date of the final rule] if:

(1) The Director has already made a BTA determination requiring operation commensurate with a closed-cycle recirculating system;

(2) The owner or operator of the facility uses cooling water exclusively for operation of a wet or dry cooling system that meets the definition of closed cycle recirculating system at 40 CFR 125.92; or

(3) The Director determines substantially all of the information requirements specified at 40 CFR 122.21(r)(8), (9), (10), (11), and (12) have already been submitted by the owner or operator.

(b) *Permit application submittal timeframe for existing facilities.* The owner or operator of a facility subject to this subpart must submit to the Director the following according the following schedule:

(1) For existing power producers with a DIF of 50 MGD or above:

(i) Information required in 40 CFR 122.21(r)(2), (r)(3), (r)(4), (r)(5), (r)(6), (r)(7), and (r)(8) must be submitted to the Director no later than six months after [effective date of the final rule].

(ii) Results of the Impingement Mortality Reduction Plan as required in 40 CFR 122.21(r)(6) must be submitted to the Director no later than 3 years and six months after [effective date of the final rule].

(2) For existing power producers with an AIF of greater than 125 MGD:

(i) Information required in 40 CFR 122.21(r)(9)(i), including the Entrainment Mortality Data Collection Plan with peer reviewers identified must be submitted to the Director no later than six months after [effective date of the final rule].

(ii) Information required in 40 CFR 122.21(r)(9)(ii), including the peer reviewed Entrainment Mortality Data Collection Plan, must be submitted to the Director no later than 12 months after [effective date of the final rule].

(iii) Information required in 40 CFR 122.21(r)(9)(iii), including the completed Entrainment Characterization Study, must be submitted to the Director no later than 4 years after [effective date of the final rule].

(iv) Information required in 40 CFR 122.21(r)(10), including the Comprehensive Technical Feasibility and Cost Evaluation Study, 40 CFR 122.21(r)(11), including the Benefits Valuation Study, and 40 CFR 122.21(r)(12), including the Non-water Quality and Other Environmental Impacts Study, must be submitted to the Director no later than 5 years after [effective date of the final rule].

(3) For the owner or operator of all other existing facilities subject to this subpart, with the exception of those facilities identified in § 125.95(b):

(i) Information required in 40 CFR 122.21(r)(2), (r)(3), (r)(4), (r)(5), (r)(6), (r)(7), and (r)(8) must be submitted to the Director no later than three years after [effective date of the final rule].

(ii) Results of the Impingement Mortality Reduction Plan as required in 40 CFR 122.21(r)(6) must be submitted to the Director no later than 6 years after [effective date of the final rule].

(4) For the owner or operator of all other existing facilities subject to this subpart with an actual intake flow (AIF) of greater than 125 MGD, with the exception of those facilities identified in § 125.95(b)(2):

(i) Information required in 40 CFR 122.21(r)(9)(i), including the Entrainment Mortality Data Collection Plan, with peer reviewers identified, must be submitted to the Director no later than three years after [effective date of the final rule].

(ii) Information required in 40 CFR 122.21(r)(9)(ii), including the peer reviewed Entrainment Mortality Data Collection Plan, must be submitted to the Director no later than three years and six months after [effective date of the final rule].

(iii) Information required in 40 CFR 122.21(r)(9)(iii), including the completed Entrainment Characterization Study, must be submitted to the Director no later than 6 years and six months after [effective date of the final rule].

(iv) Information required in 40 CFR 122.21(r)(10), including the Comprehensive Technical Feasibility and Cost Evaluation Study, 40 CFR 122.21(r)(11), including the Benefits Valuation Study, and 40 CFR 122.21(r)(12), including the Non-water Quality and Other Environmental Impacts Study, must be submitted to the Director no later than 7 years and six months after [effective date of the final rule].

(c) *Permit application submittal timeframe for new units.* For the owner or operator of any new units at existing facilities subject to this subpart:

(1) Information required in 40 CFR 122.21(r)(2), (r)(3), r(4)and (r)(6) specific to the new unit must be submitted to the Director 6 months prior to the commencement of operation of the new unit.

(2) *Application requirements.* To demonstrate compliance of the new unit with requirements in § 125.94(b) and (d), you must collect and submit to the Director the information in paragraphs (c)(2)(i), (ii), (iii) and (iv) of this section 6 months prior to the start of facility operations.

(i) *Impingement information.* If you choose to comply with the impingement mortality requirements in § 125.94(b)(1), you must submit a plan to implement a monitoring program as specified in § 125.96(a) upon the start of the new unit operation.

(ii) *Velocity information.* If you choose to comply with the impingement mortality requirements in § 125.94(b)(2), you must submit the following information 6 months prior to the start of facility operations:

(A) A narrative description of the design, structure, equipment, and operation used to meet the velocity requirement; and

(B) Design calculations showing that the velocity requirement will be met at minimum ambient source water surface elevations (based on best professional judgment using available hydrological data) and maximum head loss across the screens or other device.

(iii) *Flow reduction information.* If you choose to comply with the flow reduction requirements in § 125.94(d)(1), you must submit the following information to the Director to demonstrate that you have reduced your flow to a level commensurate with that which can be attained by a closed-cycle recirculating cooling water system:

(A) A narrative description of your system that has been designed to reduce your intake flow to a level commensurate with that which can be attained by a closed-cycle recirculating cooling water system and any engineering calculations, including documentation demonstrating that your make-up and blowdown flows have been minimized consistent with the definition of closed-cycle recirculating system at § 125.92; and

(B) If the flow reduction requirement is met entirely, or in part, by reusing or recycling water withdrawn for cooling purposes in subsequent industrial processes, you must provide documentation that the reused or recycled water, along with other technologies you employ, including additional flow reductions, meets the flow reduction requirement of § 125.94(d)(1) or the entrainment mortality reduction requirement of § 125.94(d)(2).

(iv) *Comprehensive Demonstration Study.* If you choose to comply with the entrainment mortality requirements in § 125.94(d)(2), you must perform and submit the results of a Comprehensive Demonstration Study (Study). This information is required to characterize the source water baseline in the vicinity of the cooling water intake structure(s), characterize operation of the cooling water intake(s), and to confirm that the technology(ies) proposed and/or implemented at your cooling water intake structure reduce the impacts to fish and shellfish to levels comparable to those you would achieve were you to implement the requirements in § 125.94(d)(1). To meet the "comparable level" requirement, you must demonstrate that:

(A) You have reduced entrainment mortality of all life stages of fish and shellfish to 90 percent or greater of the reduction that would be achieved through § 125.94(d)(1); and

(B) You must develop and submit a plan to the Director containing a proposal for how information will be collected to support the study. The plan must include:

(*1*) A description of the proposed and/or implemented technology(ies) to be evaluated in the Study;

(*2*) A list and description of any historical studies characterizing the physical and biological conditions in the vicinity of the proposed or actual intakes and their relevancy to the proposed Study. If you propose to rely on existing source water body data, it must be no more than 5 years old, you must demonstrate that the existing data are sufficient to develop a scientifically valid estimate of potential entrainment impacts, and provide documentation showing that the data were collected using appropriate quality assurance/quality control procedures;

(*3*) Any public participation or consultation with Federal or State agencies undertaken in developing the plan; and

(*4*) A sampling plan for data that will be collected using actual field studies in the source water body. The sampling plan must document all methods and quality assurance procedures for sampling, and data analysis. The sampling and data analysis methods you propose must be appropriate for a quantitative survey and based on consideration of methods used in other studies performed in the source water body. The sampling plan must include a description of the study area (including the area of influence of the cooling water intake structure and at least 100 meters beyond); taxonomic identification of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods.

(C) You must submit documentation of the results of the Study to the Director. Documentation of the results of the Study must include:

(*1*) *Source Water Biological Study.* If your new unit will use a new cooling water intake structure, you must update your Source Water Biological Study to include:

(*i*) A taxonomic identification and characterization of aquatic biological resources including: a summary of historical and contemporary aquatic biological resources; determination and description of the target populations of concern (those species of fish and shellfish and all life stages that are most susceptible to impingement and entrainment); and a description of the abundance and temporal/spatial characterization of the target populations based on the collection of multiple years of data to capture the seasonal and daily activities (*e.g.,* spawning, feeding and water column migration) of all life stages of fish and shellfish found in the vicinity of the cooling water intake structure;

(*ii*) An identification of all threatened or endangered species that might be susceptible to entrainment by the proposed cooling water intake structure(s); and

(*iii*) A description of additional chemical, water quality, and other anthropogenic stresses on the source waterbody.

(*2*) *Evaluation of potential cooling water intake structure effects.* This evaluation will include:

(*i*) Calculations of the reduction in entrainment mortality of all life stages of fish and shellfish that would need to be achieved by the technologies you have selected to implement to meet requirements under § 125.94(d)(1). To do this, you must determine the reduction in entrainment mortality that would be achieved by implementing the requirements of § 125.94(d)(1) at your site.

(*ii*) An engineering estimate of efficacy for the proposed and/or implemented technologies used to minimize entrainment mortality of all life stages of fish and shellfish. You must demonstrate that the technologies reduce entrainment mortality of all life stages of fish and shellfish to a comparable level to that which you would achieve were you to implement the requirements in § 125.94(d)(1). The efficacy projection must include a site-specific evaluation of technology(ies) suitability for reducing impingement mortality and entrainment based on the results of the Source Water Biological Study of this section. Efficacy estimates may be determined based on case studies that have been conducted in the vicinity of the cooling water intake structure and/or site-specific technology prototype studies.

(3) Verification monitoring plan. You must include in the Study the following: A plan to conduct, at a minimum, two years of monitoring to verify the full-scale performance of the proposed or implemented technologies, operational measures. The verification study must begin at the start of operations of the cooling water intake structure and continue for a sufficient period of time to demonstrate that the facility is reducing the level of entrainment to the level documented in paragraph (c)(2) of this section. The plan must describe the frequency of monitoring and the parameters to be monitored. The Director will use the verification monitoring to confirm that you are meeting the level of entrainment mortality reduction required in § 125.94(d), and that the operation of the technology has been optimized.

(d) After the initial submission of the 40 CFR 122.21(r) application studies, the owner or operator of a facility may, in subsequent permit applications, request to reduce the information required, if conditions at the facility and in the waterbody remain substantially unchanged since the previous application so long as the relevant previously submitted information remains representative of current source water, intake structure, cooling water system, and operating conditions. The owner or operator of a facility must submit its request for reduced cooling water intake structure and waterbody application information to the Director at least one year prior to the expiration of its NPDES permit. The owner or operator's request must identify each element in this subsection that it determines has not substantially changed since the previous permit application and the basis for the determination. The Director has the discretion to accept or reject any part of the request.

(e) After issuance of the first permit pursuant to this subpart, the owner or operator of a facility must:

(1) Commence information collection activities pursuant to this subsection no later than eighteen months prior to permit expiration;

(2) Submit all required 40 CFR 122.21(r) application studies, or the reduced permit application studies if approved by the Director under § 125.95, to the Director no later than six months prior to permit expiration.

(f) The Director has the discretion to request or determine additional information to supplement the permit application process, including inspection of the facility.

(g) *Permit application records.* The owner or operator of a facility must keep records of all submissions that are part of its permit application for a minimum of 5 years to document compliance with the requirements of this section. If the Director approves a request for reduced permit application studies under § 125.95(d), the owner or operator of a facility must keep records of all submissions that are part of the previous permit application for an additional 5 years.

§ 125.96 Monitoring requirements.

(a) *Monitoring requirements for impingement mortality.* The owner or operator of an existing facility subject to § 125.94(b) must monitor as follows:

(1) Permit compliance monitoring is required at each intake, or where appropriate other points of compliance as approved by the Director including but not limited to forebays, barrier nets, or fish handling and return systems, to demonstrate compliance with the impingement mortality limitations listed in § 125.94(b).

(2) You must collect samples to monitor impingement rates (simple enumeration) for each species over a 24-hour period and no less than once per month when the cooling water intake structure is in operation.

(3) If the Director has approved a compliance alternative provided under § 125.94(b)(2), the monitoring requirement in paragraphs (a)(1) and (a)(2) of this section is waived.

(4) *Compliance monitoring for intake velocity.* If your facility is subject to § 125.94(b)(2) and you cannot document a design intake flow for the intake equal to or less than 0.5 feet per second under all conditions, including during minimum ambient source water surface elevations (based on BPJ using hydrological data) and maximum head loss across the screens, compliance monitoring is required to demonstrate the intake velocity is consistent with the requirements of § 125.94(b)(2). The frequency of monitoring must be no less than twice per week.

(b) *Monitoring requirements for entrainment mortality for new units.* Monitoring is required to demonstrate compliance with the requirements of § 125.94(d).

(1) If you are required to demonstrate flow reductions consistent with the requirements of § 125.94(d)(1), the frequency of monitoring must be no less than once per week and must be representative of normal operating conditions. Flow monitoring must include measuring cooling water withdrawals, make-up water, and blowdown volume. The Director may require additional monitoring necessary to demonstrate compliance with § 125.94(d).

(2) If you are required to demonstrate reductions consistent with the requirements of § 125.94(d)(2), you must monitor entrainable organisms that pass through a 3/8-inch sieve at a proximity to the intake that is representative of the entrainable organisms in the absence of the intake structure. You must also monitor the latent entrainment mortality in front of the intake structure. Mortality after passing the cooling water intake structure must be counted as 100 percent mortality unless you have demonstrated to the approval of the Director that the mortality for each species of concern is less than 100 percent. Samples must be representative of the cooling water intake when the structure is in operation. In addition, sufficient samples must be collected to allow for calculation of annual average entrainment levels of all life stages of fish and shellfish. Specific sampling protocols and frequency of sampling will be determined by the Director. The sampling must measure the total count of entrainable organisms or density of organisms, unless the Director approves of a different metric for such measurements. In addition, you must monitor the AIF for each intake. The AIF must be measured at the same time as the samples of entrainable organisms are collected. The Director may require additional monitoring necessary to demonstrate compliance with § 125.94(d).

(c) *Visual or remote inspections.* You must either conduct visual inspections or employ remote monitoring devices during the period the cooling water intake structure is in operation. You must conduct such inspections at least weekly to ensure that any technologies installed to comply with § 125.94 are maintained and operated to ensure that they will continue to function as designed. The Director may establish alternative procedures for use during periods of inclement weather.

§ 125.97 Other permit reporting and recordkeeping requirements.

The owner or operator of an existing facility subject to this subpart is required to submit to the Director the following information:

(a) *Monitoring reports.* You must include the applicable impingement mortality and entrainment mortality monitoring reports with both your Discharge Monitoring Reports (DMRs) (or equivalent State reports) and your permit annual report to the Director.

(1) *Impingement mortality.* If you intend to comply with the Impingement Mortality requirements by biological measurements, your report must describe the compliance measurement location for each intake, the species of concern, the counts and percentage mortality of organisms sampled, the time period for evaluating latent mortality effects, and other information specified in the permit. If you intend to comply with the Impingement Mortality requirements by demonstrating an intake velocity of less than 0.5 feet per second, your report must describe the compliance measurement location for each intake, the method for velocity measurements, the intake velocity measurements and calculations, and other information specified in the permit.

(2) *Impingement mortality compliance monitoring.* Your report must contain impingement mortality compliance monitoring data to document compliance with the requirements of § 125.94(b) for each intake. If you intend to comply with the Impingement Mortality requirements by biological measurements, you must also

update and submit your calculated annual average for each month covered by the report. The annual average comprises the average for all measurements taken during the preceding 12-month period.

(3) *Entrainment mortality at existing facilities.* The Director will determine what (if any) other reporting requirements are necessary.

(4) *Entrainment mortality for new units at existing facilities.* The owner or operator of a facility complying with § 125.94(d) must describe the compliance measurement location for the facility, the species of concern, the counts and percentage mortality of organisms sampled, and other information specified in the permit.

(5) *Entrainment mortality compliance monitoring for new units at existing facilities.* The owner or operator of a facility must submit monthly reports containing compliance monitoring data to document compliance with the requirements of § 125.94(d)(1) or (d)(2).

(i) For compliance with § 125.94(d)(1), flow measurements of water withdrawn for make-up and blowdown.

(ii) For compliance with § 125.94(d)(2), measurements of entrainment mortality, and your monthly actual intake flow. You must also update and submit your calculated annual average of entrainment mortality. The annual average comprises the average for all measurements taken during the preceding 12-month period.

(b) *Status reports.* If you have a schedule established under § 125.93 you must submit a quarterly status report as to the progress of meeting the applicable standards. These reports may include updates on pilot study results, construction schedules, maintenance outages, or other appropriate topics.

(c) *Annual certification statement and report.* You must submit an annual certification statement signed by the responsible corporate officer as defined in 40 CFR 403.12(l) or 40 CFR 122.22. This statement must include, at a minimum the following information:

(1) An annual certification statement which indicates that each technology as approved by the Director is being maintained and operated as set forth in its permit, or a justification to allow modification of the practices listed in the facility's most recent annual certification.

(2) If your facility is subject to BTA standards for impingement mortality or entrainment mortality specified in § 124.94(b)(2) or (d)(2), you must include a statement in your annual certification that specifies the information submitted in your most recent annual certification is still valid and appropriate or a justification to allow modification of the practices listed in the most recent annual certification.

(i) If you cannot document that you are operating a closed-cycle recirculating system, you must also submit data and information in the annual certification statement documenting compliance with the requirement in § 124.94(d)(1) that flow commensurate with a closed-cycle recirculating system is met.

(ii) If your facility is subject to the Impingement Mortality Standard specified in § 125.94(b)(2) and you cannot document a design intake velocity for the intake equal to or less than 0.5 feet per second, you must also submit data and information in the annual certification documenting compliance with the intake velocity requirements.

(3) If the information contained in the previous year's annual certification is still applicable, you may simply state as such in a letter to the Director, and the letter, along with any applicable data submission requirements specified in this section shall constitute the annual certification. However, if you have substantially modified operation of any unit at your facility that impacts cooling water withdrawals or operation of your cooling water intake structures, you must submit revisions to the information required in the permit application.

(d) *Permit reporting records retention.* You must keep records of all submissions that are part of the permit reporting requirements of this section for a period of at least five (5) years from the date of permit issuance.

(e) The Director has the discretion to require additional supplemental permit reporting when necessary to establish permit compliance and may provide for periodic inspection of the facility.

§ 125.98 Director requirements.

(a) *Permit application.* The Director must review the materials submitted on a timely basis by the applicant under § 122.21(r) before each permit renewal or reissuance to determine compliance with all applicable requirements. The Director is encouraged to provide comments expeditiously so that the permit applicant may modify its information gathering activities and provide any necessary supplemental materials.

(b) *Alternate schedule.* When the Director establishes an alternate schedule under § 125.93, the schedule must provide for compliance as expeditiously as possible. In no event may the schedule provide for compliance beyond the dates specified in § 125.93. In establishing the schedule, the Director is encouraged to consider the extent to which those technologies proposed to be implemented to meet the requirements of § 125.94(c) and/or (d) will be used, or may otherwise affect choice of technology(ies), to meet the requirements of § 125.94(b). When establishing a schedule for electric power generating facilities, the Director should consider measures to maintain adequate energy reliability and necessary grid reserve capacity during any facility outage. These may include establishing a staggered schedule for multiple facilities serving the same localities. The Director may consult with local and regional electric power agencies when establishing a schedule for electric power generating facilities. The Director may determine that extenuating circumstances (*e.g.,* lengthy scheduled outages, future production schedules) warrant establishing a different compliance date for any manufacturing facility. In no event may the schedule provide for compliance beyond the dates specified in § 125.93.

(c) *Species of concern.* The Director must review and approve the species of fish and shellfish identified as species of concern, including but not limited to:

(1) Any species of concern identified using the source water baseline biological characterization data submitted under 40 CFR 122.21(r)(4);

(2) Any fish and shellfish identified for evaluation under § 125.94;

(3) Data submitted as part of the impingement mortality reduction plan under 40 CFR 122.21(r)(6);

(4) Data submitted as part of the site-specific entrainment mortality data collection plan under 40 CFR 122.21(r)(9);

(5) The Director may request additional information in determining the site-specific species of concern and any additional fish and shellfish to be included in the impingement mortality reduction plan and, where applicable, the entrainment mortality data collection plan;

(6) The Director may determine invasive species, naturally moribund species, and other specific species may be excluded from any monitoring, sampling, or study requirements of 40 CFR 122.21 and § 125.94.

(7) The Director may consider data submitted by other interested parties.

(d) *Site-specific impingement mortality reduction plan.* The Director must review and approve the site-specific Impingement Mortality Reduction Plan required under 40 CFR 122.21(r)(6). The plan must include, at a minimum, the duration and frequency of required monitoring, the monitoring location, the organisms to be monitored and, where appropriate, the method in which naturally moribund organisms would be identified and taken into account.

(e) *Site-specific entrainment mortality controls.* The Director must establish case-by-case BTA standards for entrainment mortality for any facility subject to such requirements after reviewing the information submitted under 40 CFR 122.21(r) and § 125.95. These entrainment mortality controls must reflect the Director's determination of the maximum reduction in entrainment mortality warranted after consideration of factors relevant for determining the best technology available at each facility. Prior to any permit renewal, the Director must review the performance of the entrainment mortality technologies used and determine that they continue to meet the BTA requirements of § 125.94(c). The Director must provide a written explanation of the proposed BTA determination in the fact sheet pursuant to 40 CFR 124.8 (or statement of basis pursuant to 40 CFR 124.7) for the proposed permit. The written explanation must describe why the Director has rejected any entrainment mortality control technologies or measures that are better performing than the selected technologies or measures, and must reflect consideration of all reasonable attempts to mitigate any adverse impacts of otherwise available better performing entrainment technologies. The Director may reject an otherwise available technology as BTA standards for entrainment mortality if the social costs of compliance are not justified by the social benefits, or if there are adverse impacts that cannot be mitigated that the Director deems to be unacceptable. If all technologies considered have social costs not justified by the social benefit, or have unacceptable adverse impacts that cannot be mitigated, the Director may determine that no additional control requirements are necessary beyond what the facility is already doing. At a minimum, the proposed determination in the fact sheet or statement of basis must be based on consideration of the following factors:

(1) Numbers and types of organisms entrained;

(2) Entrainment impacts on the waterbody;

(3) Quantified and qualitative social benefits and social costs of available entrainment technologies, including ecological benefits and benefits to any threatened or endangered species;

(4) Thermal discharge impacts;

(5) Impacts on the reliability of energy delivery within the immediate area;

(6) Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;

(7) Land availability inasmuch as it relates to the feasibility of entrainment technology; and

(8) Remaining useful plant life; and

(9) Impacts on water consumption.

(f) *Ongoing permitting proceedings.* Where ongoing permit proceedings have begun prior to [effective date of the final rule] and the Director has determined that the information already submitted by the owner or operator of the facility is substantially the same as required under 40 CFR 122.21(r)(9), (10), (11) and (12), the Director may proceed with any site-specific determination of BTA standards for entrainment mortality without requiring the owner or operator of the facility to resubmit the information required in 40 CFR 122.21(r)(9), (10), (11) and (12), and the Director may choose to address the factors specified in § 125.98(e). If the Director has received permit application information from the owner or operator of the facility, and the Director has determined that the information is substantially the same as required under 40 CFR 122.21(r)(9), (10), (11) and (12) but the Director has not yet made a BTA standards for entrainment mortality determination, the Director must address the factors specified in § 125.98 (e). In all subsequently issued permits for that facility the Director must address the factors specified in § 125.98 (e).

(g) *Site-specific entrainment mortality data collection plan and studies.* The Director must review and approve the site-specific entrainment mortality data collection plan for new units at existing facilities. The plan must include, at a minimum, the duration and frequency of monitoring, the monitoring location, the organisms to be monitored, and the method in which latent mortality would be identified. The Director may require the owner or operator of a facility to include additional peer reviewers for the entrainment mortality data collection plan, the comprehensive technical feasibility and cost evaluation study, the benefits valuation study, and the non-water quality and other environmental impacts assessment.

(h) *Annual certification statement.* The Director must review and verify the Annual Certification Statement required under § 125.97(c).

(i) *Additional information.* In implementing the Director's responsibilities under this provision, the Director is authorized to request additional necessary information and to inspect the facility.

§ 125.99 [Reserved]

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