ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 122, 123, 124, and 125

[FRL–7625–9]

RIN 2040–AD62

National Pollutant Discharge Elimination System—Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today's final rule implements section 316(b) of the Clean Water Act (CWA) for certain existing power producing facilities that employ a cooling water intake structure and are designed to withdraw 50 million gallons per day (MGD) or more of water from rivers, streams, lakes, reservoirs, estuaries, oceans, or other waters of the United States for cooling purposes. This final rule constitutes Phase II of EPA's section 316(b) regulation development and establishes national requirements, and procedures for implementing those requirements, applicable to the location, design, construction, and capacity of cooling water intake structures at these facilities. The rule applies to existing facilities that, as their primary activity, both generate and transmit electric power or generate electric power but sell it to another entity for transmission. The national requirements, which will be implemented through National Pollutant Discharge Elimination System (NPDES) permits, are based on the best technology available to minimize the adverse environmental impact associated with the use of cooling water intake structures.

Today's final rule establishes performance standards that are projected to reduce impingement mortality by 80 to 95 percent and, if applicable, entrainment by 60 to 90 percent. With the implementation of today's final rule, EPA intends to minimize the adverse environmental impact of cooling water intake structures by reducing the number of aquatic organisms lost as a result of water withdrawals associated with these structures.

DATES: This regulation is effective September 7, 2004. For judicial review purposes, this final rule is promulgated as of 1 p.m. Eastern Standard Time (EST) on July 23, 2004, as provided in 40 CFR 23.2.

ADDRESSES: The docket for today's final rule is available for public inspection at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC.

FOR FURTHER INFORMATION CONTACT: For additional technical information contact Martha Segall at (202) 566–1041 or Debra Hart at (202) 566–6379. The e-mail address for the above contacts is *rule.316b@epa.gov*.

SUPPLEMENTARY INFORMATION:

I. General Information

A. What Entities Are Regulated by This Action?

This final rule applies to Phase II existing facilities that are point sources; as their primary activity both generate and transmit electric power or generate electric power for sale to another entity for transmission; use or propose to use one or more cooling water intake structures with a total design intake flow of 50 million gallons per day (MGD) or more to withdraw water from waters of the United States; and use 25 percent of water withdrawn exclusively for cooling water purposes. This rule defines ''existing facility'' as any facility that commenced constructions on or before January 17, 2002, and any modification of, or any addition of a unit at such a facility that does not meet the definition of a new facility at § 125.83.

This rule defines the term ''cooling water intake structure'' to mean 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, the intake pumps.

Category	Examples of regulated entities	Standard Industrial Classification (SIC) codes	North American Industry Classification System (NAICS) codes
Federal, State, and Local Government ...	Steam electric generating point source dischargers that employ cooling water intake structures.	4911 and 493	221112, 221113, 221119, 221121, 221122
Industry	Steam electric generating industrial point source dischargers that employ cooling water intake structures (this includes utilities and nonutilities).	4911 and 493	221112, 221113, 221119, 221121, 221122

This exhibit is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This exhibit lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the exhibit could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in § 125.91 of the 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.

B. How Can I Get Copies of This Document and Other Related Information?

1. Docket

EPA has established an official public docket for this action under Docket ID No. OW 2002–0049. 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. The official public docket is the collection of materials that is available for public viewing at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The EPA Docket Center 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. 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 electronically through the EPA Internet under the ''**Federal Register**'' listings at *http://www.epa.gov/fedrgstr/.*

An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.epa.gov/edocket/* to view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the docket facility identified in section I.B.1. Once in the system, select ''search,'' then key in the appropriate docket identification number.

C. Supporting Documentation

The final regulation is supported by three major documents:

1. Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule (EPA–821–R–04–005), hereafter referred to as the Economic and Benefits Analysis. This document presents the analysis of compliance costs, closures, energy supply effects, and benefits associated with the final rule.

2. Regional Analysis for the Final Section 316(b) Phase II Existing Facilities Rule (EPA–821–R–04–006), hereafter referred to as the Regional Analysis Document or the Regional Study(ies) Document. This document examines cooling water intake structure impacts and regulatory benefits at the regional level.

3. Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule (EPA–821–R–04–007), hereafter referred to as the Technical Development Document. 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 final rule's requirements.

D. Table of Contents

II. Scope and Applicability of the Final Rule

This rule applies to owners and operators of existing facilities, as defined in § 125.93 of today's rule that meet all of the following criteria:

- The facility's primary activity is to generate electric power. The facility either transmits the electric power itself, or sells the electric power to another entity for transmission;
- The facility is a point source that uses or proposes to use one or more cooling water intake structures, including a cooling water intake structure operated by an independent supplier 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 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;
- The facility is a point source; and
- The cooling water intake structures have a total design intake flow of 50

million gallons per day (MGD) or greater.

In the case of a Phase II existing facility that is co-located with a manufacturing facility, only that portion of the cooling water flow that is used by the Phase II facility to generate electricity for sale to another entity will be considered when determining whether the 50 MGD and 25 percent criteria are met. Facilities subject to this final rule are referred to as ''Phase II existing facilities.'' Existing facilities with design flows below the 50 MGD threshold, as well as most existing manufacturing facilities, offshore seafood processors, and offshore and coastal oil and gas extraction facilities are not subject to this rule. Those facilities have different characteristics as compared to the large, power-generating facilities subject to today's rule. If an existing facility is a point source and has or is required to have an NPDES permit, but does not meet the applicability thresholds in today's rule, it is subject to permit conditions implementing section 316(b) of the CWA set by the permit director on a case-by-case basis, using best professional judgment. EPA expects to address at least some of these facilities in a separate rulemaking, referred to as Phase III.

In the preamble to the proposed rule EPA indicated that its intent was to exclude from regulation under the Phase II rule existing facilities whose primary business is manufacturing. See, *e.g.,* 67 FR 17124 (April 9, 2002). At the same time, in § 125.91(a)(3) of the proposed rule, the applicability criteria covered facilities that both generate and transmit electric power, or generate electric power but sell it to another entity for transmission. Numerous commenters indicated concerns that, as proposed, § 125.91(a)(3) would not clearly exclude all existing manufacturing facilities from the Phase II rule since some facilities generate electric power primarily for their own use, but transmit or sell any surplus. Therefore, for the final rule, EPA revised § 125.91 so that it reaches only those existing facilities that generate and transmit or sell electric power as their primary activity. The final rule does not apply to existing manufacturing facilities, including manufacturing facilities that generate power for their own use and transmit any surplus power, or sell it for transmission, provided the primary activity of the facility is not electric power generation.

A. What Is an ''Existing Facility'' for Purposes of the Section 316(b) Phase II Rule?

In today's rule, EPA is defining the term ''existing facility'' to include any facility that commenced construction as described in 40 CFR 122.29(b)(4) [1] on or before January 17, 2002. EPA established January 17, 2002 as the date for distinguishing new facilities from existing ones because that is the effective date of the Phase I new facility rule. In addition, EPA is defining the term ''existing facility'' in this 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 40 CFR 125.83, the definition used to define the scope of the Phase I rule. That definition states:

''*New facility* means any building, structure, facility, or installation that meets the definition of a 'new source' or 'new discharger' in [other NPDES regulations] and is a greenfield or stand-alone facility; commences construction after January 17, 2002; and uses either a newly constructed cooling water intake structure, or an existing cooling water intake structure whose design capacity is increased to accommodate the intake of additional cooling water. New facilities include only 'greenfield' and 'stand-alone' facilities. A greenfield facility is a facility that is constructed at a site at which no other source is located or that totally replaces the process or production equipment at an existing facility (see 40 CFR 122.29(b)(1)(i) and (ii). A stand-alone facility is a new, separate facility that is constructed on property where an existing facility is located and whose processes are substantially independent of the existing facility at the same site (see 40 CFR 122.29(b)(1)(iii). New facility does not include new units that are added to a facility for purposes of the same general industrial operation (for example, a new peaking unit at an electrical generating station).'' [2]

The preamble to the final Phase I rule discusses this definition at 66 FR 65256; 65258–65259; 65285–65287, December 18, 2001.

EPA included in its Phase II proposed rule a freestanding definition of ''existing facility.'' That definition read as follows:

''Existing facility means any facility that commenced construction before January 17, 2002; and

(1) Any modification of such a facility;

(2) Any addition of a unit at such a facility for purposes of the same industrial operation;

(3) Any addition of a unit at such a facility for purposes of a different industrial operation, if the additional unit uses an existing cooling water intake structure and the design capacity of the intake structure is not increased; or

(4) Any facility constructed in place of such a facility, if the newly constructed facility uses an existing cooling water intake structure whose design intake flow is not increased to accommodate the intake of additional cooling water.'' 67 FR 17221.

Upon further consideration, EPA has decided that it would be clearest to define existing facility primarily by stating that any facility that is not a new facility under 40 CFR 125.83 is an existing facility for purposes of this subpart. Accordingly, the language in this final rule is intended to be clear and consistent with EPA's definition of new facility in the Phase I rule at 40 CFR 125.83. In addition, the definition in today's regulation is also intended to ensure that sources excluded from the definition of new facility in the Phase I rule are captured by the definition of existing facility for the purposes of today's rule. At the same time, EPA believes that the approach taken in

[1] 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 (40 CFR 122.29(b)(4)).

[2] 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. These read as follows:

''(1) Examples of 'new facilities' include, but are not limited to: the following scenarios:

(i) A new facility is constructed on a site that has never been used for industrial or commercial activity. It has a new cooling water intake structure for its own use.

(ii) A facility is demolished and another facility is constructed in its place. The newly-constructed facility uses the original facility's cooling water intake structure, but modifies it to increase the design capacity to accommodate the intake of additional cooling water.

(iii) A facility is constructed on the same property as an existing facility, but is a separate and independent industrial operation. The cooling water intake structure used by the original facility is modified by constructing a new intake bay for the use of the newly constructed facility or is otherwise modified to increase the intake capacity for the new facility.

(2) Examples of facilities that would not be considered a 'new facility' include, but are not limited to, the following scenarios:

(i) A facility in commercial or industrial operation is modified and either continues to use its original cooling water intake structure or uses a new or modified cooling water intake structure.

(ii) A facility has an existing intake structure. Another facility (a separate and independent industrial operation), is constructed on the same property and connects to the facility's cooling water intake structure behind the intake pumps, and the design capacity of the cooling water intake structure has not been increased. This facility would not be considered a 'new facility' even if routine maintenance or repairs that do not increase the design capacity were performed on the intake structure.''

today's rule is identical in terms of effect to the approach in the proposed rule. Thus, the approach taken in today's final rule is in no way intended to change the scope of the rule as compared with the proposal as far as the facilities treated as ''existing'' facilities under the rule. The change is in drafting technique, not in meaning.

The facility encompassed by today's regulation is the point source that uses a cooling water intake structure to generate electric power. This is because the requirements of CWA section 316(b) are implemented through NPDES permits, which are issued only to point source dischargers of pollutants to waters of the United States. A point source generating electric power would be subject to Phase I or Phase II even if the cooling water intake structure it uses is located elsewhere. Similarly, 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 rule or to increase capacity). Rather, the determination as to whether a facility is new or existing focuses on the power-generating point source itself, *i.e.*, whether it is a greenfield facility or a stand-alone facility. This focus on the point source discharger is consistent with section 316(b), which by its express terms applies only to point sources.

Under this rule, an existing power generating facility that uses a cooling water intake structure and repowers by either replacing or modifying an existing generating unit would remain subject to regulation as a Phase II existing facility, unless the existing facility were completely demolished and another facility constructed in its place that used either a new intake structure or the existing structure with an increased design capacity. For example, the following facility modifications or additions would result in a facility being characterized as an existing facility under today's rule:

- An existing power generating facility undergoes a modification of its process short of total replacement of the process and concurrently increases the design capacity of its existing cooling water intake structures;
- An existing power generating facility builds a new process at its site for purposes of the same industrial operation and concurrently increases the design capacity of its existing cooling water intake structures;
- An existing power generating facility completely rebuilds its process but uses the existing cooling water intake structure with no increase in design capacity.

Phase II existing facilities subject to today's rule include point sources that do not presently use, but propose to use, cooling water intake structures and do not meet the definition of new facility at § 125.83. This is appropriate because there may be some cases in which an existing facility historically withdrew its cooling water from a municipal or other source, but then decides to withdraw cooling water from a water of the United States. In these cases, the facility may not previously have met all of the criteria applicable to an existing facility under today's rule (*i.e.*, the facility did not previously withdraw cooling waters from a water of the United States) but may make changes that would place the facility within the scope of today's rule. A comparable situation would be when a facility previously relied on units that do not require cooling water, and then adds or modifies a unit for purposes of the same industrial operation (*i.e.,* power generation) such that cooling water is subsequently required. For example, an existing power generating facility that adds a new generating unit at the same site for purposes of repowering and concurrently increases the design capacity of its existing cooling water intake structure(s), or adds a new intake structure where it did not previously need one, for example when converting a gas turbine to a combined cycle unit, would be considered an existing facility.

In the preamble to the Phase I rule, EPA noted that it had defined ''existing facility'' in a manner consistent with existing NPDES regulations with a limited exception. EPA noted that it had generally deferred regulation of new sources constructed on a site at which an existing source is located until the Agency had completed analysis of its survey data on existing facilities. 66 FR 65286. Accordingly, the Phase I rule treated almost all changes to existing facilities for purposes of the same industrial operation as existing facilities. These included the addition of new generating units at the same site, even where they required an increase in cooling water intake structure design capacity or the construction of a new cooling water intake structure, as well as the complete demolition of an existing facility and its replacement with a new facility, so long as it did not increase the design capacity of the cooling water intake structure. The only exception was the demolition of an existing facility and its replacement with a new facility accompanied by an increase in design capacity of the cooling water intake structure. As the preamble explained: ''The definition of a new facility in the final rule applies to a facility that is repowered only if the existing facility has been demolished and another facility is constructed in its place, and modifies the existing cooling water intake structure to increase the design intake capacity.'' *Id.*[2a] By contrast, the Phase I rule treated the addition of a new unit for purposes of a different industrial operation as an existing facility only if it used an existing cooling water intake structure whose design intake flow was not increased.

The Phase II proposed rule continued this approach in its definition of ''existing facility.'' It continued to treat all changes to existing facilities for purposes of the same industrial operation as an existing facility unless the change was a complete demolition and replacement of the facility accompanied by an increase in cooling water intake design capacity. It also continued to treat the addition of new units for purposes of a different industrial operation differently, only allowing them to be ''existing facilities'' if they used an existing cooling water intake structure and did not increase its design intake flow. 67 FR 17221. In putting forth this proposed definition, EPA noted that it had collected data from a variety of sources, including survey data, specifically relating to repowering facilities. *Id.* at 17131–17135. It also made a point of explaining the wide variety of repowering activities that an existing facility could undertake under the proposed rule—anything short of demolition of an existing facility and its replacement with a new facility combined with increasing the design capacity of a cooling water intake structure—while still being regulated as an ''existing facility'' rather than a ''new facility.'' *Id.* at 17128.

On the basis of the analysis of the survey data and other information in the record, the Agency now has concluded that it should adhere to its provisional

[2a] Because they are part of the same ''industrial operation,'' such units are not ''stand-alone'' facilities for purposes of the ''new facility'' definition. As the fifth sentence of the definition of ''new facility'' explains, they are categorically treated as ''existing facilities'' regardless of any other considerations unless they completely replace an existing facility and its cooling water design intake capacity is increased. Accordingly, there is thus no need to make a determination whether they are ''substantially independent'' of the existing facility at the same site under the fourth sentence of the definition in order to determine whether they are ''existing'' or ''new facilities.'' The fifth sentence alone controls that question.

decision generally giving wide latitude to existing facilities to make changes or additions to their facilities at the same site. In particular, new units that are added to a facility for purposes of the same general industrial operation should be treated as existing facilities because limitations associated with an existing site make it inappropriate to subject such units to new facility requirements. These limitations include space, existing location on a waterbody, location in already congested areas which could affect (if Phase 1 requirements were applied) visibility impairment, highway and airport safety issues, noise abatement issues, salt drift and corrosion problems and additional energy requirements. Moreover, power generation facilities should not be discouraged from making any upgrade, modification, or repowering that would increase energy efficiency or supply out of concern that they would be considered a new facility for purposes of section 316(b). Additional benefits will be realized in terms of reducing industrial sprawl if incremental power generation is not discouraged at existing power generation sites. These considerations counsel in favor of treating new units locating at existing sites as existing rather than new facilities. EPA also noted when it promulgated the Phase I rule (*see* 66 FR 65286) that it is not feasible for the permit authority to judge whether the facility could have been located elsewhere for the purpose of determining whether the facility is subject to the new facility rules. Accordingly, EPA has decided to retain the Phase I definition's provision that a new facility does not include new units that are added to a facility for purposes of the same general industrial operation. As noted above, this decision is fully consistent with the approach to this issue laid out in the proposed Phase II rule.

The final rule definition of ''existing facility'' is sufficiently broad that it encompasses facilities that will be addressed under the Phase III rule (*e.g.*, existing power generating facilities with design flows below the 50 MGD threshold, certain existing manufacturing facilities, seafood processors, and offshore and coastal oil and gas extraction facilities). EPA notes, however, that these facilities are not covered under this rule because they do not meet the requirements of § 125.91.

B. What Is ''Cooling Water'' and What Is a ''Cooling Water Intake Structure?''

Today's rule adopts for Phase II existing facilities the same definition of a ''cooling water intake structure'' that applies to new facilities. 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 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 rule adopts the new facility rule's definition of ''cooling water'': 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 for both cooling and non-cooling purposes 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 water, service water, or evaporative cooling tower makeup water; dilution of effluent heat content; equipment cooling; and air conditioning. EPA notes that this clarification does not change the fact that only the intake water used exclusively for cooling purposes is counted when determining whether the 25 percent threshold in § 125.91(a)(4) is met.

This definition of ''cooling water intake structure'' differs from the definition provided in the 1977 Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92–500 (U.S. EPA, 1977). The final rule definition clarifies that the cooling water intake structure includes the physical structure that extends from the point at which water is withdrawn from the surface water up to and including the intake pumps. Inclusion of the term ''associated constructed waterways'' in today's rule is intended to clarify that the definition includes those canals, channels, connecting waterways, and similar structures that may be built or modified to facilitate the withdrawal of cooling water. The explicit inclusion of the intake pumps in the definition reflects the key role pumps play in determining the capacity (*i.e.*, dynamic capacity) of the intake. These pumps, which bring in water, are an essential component of the cooling water intake structure since without them the intake could not work as designed.

C. Is My Facility Covered if It Withdraws From Waters of the United States?

The requirements finalized today apply to cooling water intake structures that have the design capacity to withdraw amounts of water equal to or greater than the specified intake flow threshold 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 cooling ponds, then withdraw water from the ponds for cooling purposes. EPA recognizes that cooling ponds may, in certain circumstances, constitute part of a closed-cycled cooling system. See, *e.g.*, 40 CFR 125.83. However, 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. EPA interprets 40 CFR 122.2 to give permit writers discretion to regulate cooling ponds as ''waters of the United States'' where cooling ponds meet the definition of ''waters of the United States.'' The determination whether a particular cooling pond is or is not a water of the United States is to be made by the permit writer on a case-by-case basis, informed by the principles enunciated in Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001). Therefore, facilities that withdraw cooling water from cooling ponds that are waters of the United States and that meet today's other criteria for coverage (including the requirement that the facility has or will be required to obtain an NPDES permit) are subject to today's rule. 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/ANPRM-FR.pdf*). Section 125.91(d) also 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 rule.

D. Is My Facility Covered if It Is a Point Source Discharger?

Today's rule applies only to facilities that are point sources (*i.e.*, have an NPDES permit or are required to obtain one) because they discharge or might discharge pollutants, including storm water, from a point source to waters of the Unites States. This is the same requirement EPA included in the Phase I new facility rule at 40 CFR 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 Phase II existing facilities that employ cooling water intake structures, the Agency anticipates that most existing power generating facilities that will be subject to this rule will control the intake structure that supplies them with cooling water, and discharge some combination of their cooling water, wastewater, and storm water to a water of the United States through a point source regulated by an NPDES permit. In this scenario, the requirements for the cooling water intake structure will be specified in the facility's NPDES permit. In the event that a Phase II 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 criteria set out at 40 CFR 122.28.

The Agency also 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. For example, electric power-generating 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(c) of today's rule addresses such a situation. It provides 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 Phase II existing facility. This provision is intended to prevent facilities from circumventing the requirements of today's rule by creating arrangements to receive cooling water from an entity that is not itself a Phase II existing facility.

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, section 125.91(d) also 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 rule.

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 should apply other legal requirements, 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. What Cooling Water Use and Design Intake Flow Thresholds Result in an Existing Facility Being Subject to This Rule?

This final rule applies to existing facilities that are point sources and use cooling water intake structures that (1) withdraw cooling water from waters of the United States and use at least twenty-five (25) percent of the water withdrawn exclusively for cooling purposes, and (2) have a total design intake capacity of 50 MGD or more measured on an average annual basis (see § 125.91). Today's rule further provides that where a Phase II existing facility is co-located with a manufacturing facility, only that portion of the cooling water intake flow that is used by the Phase II facility to generate electricity for sale to another entity will be considered for purposes of determining whether the 50 MGD and 25 percent criteria have been exceeded.

EPA chose the 50 MGD threshold to focus the rule on the largest existing power generating facilities. EPA estimates that the 50 MGD threshold will subject approximately 543 of 902 (60 percent) existing power generating facilities to this final rule and will address approximately 90 percent of the total flow withdrawn by these facilities. EPA established the 50 MGD threshold because the regulation of existing facilities with flows of 50 MGD or greater in Phase II will address those existing power generating facilities with the greatest potential to cause or contribute to adverse environmental impact. In addition, EPA has limited data on impacts at facilities withdrawing less than 50 MGD. Deferring regulation of such facilities to Phase III provides an additional opportunity for the Agency to collect impingement and entrainment data for these smaller facilities.

Similarly, because Phase II existing facilities typically use far more than 25 percent of the water they withdraw for cooling purposes, EPA established the 25 percent threshold to ensure that nearly all cooling water and the largest existing facilities using cooling water intake structures are addressed by today's requirements. As in the Phase I rule, water used for both cooling and non-cooling purposes does not count towards the 25 percent threshold. Thus, the rule does not discourage the reuse of cooling water as process water or vice versa. Water that serves as cooling water but is either previously or subsequently used as process water is not considered cooling water for purposes of determining the percentage of the water withdrawn that is used for cooling and whether that percentage equals or exceeds 25 percent. Water withdrawn for non-cooling purposes includes water withdrawn for warming by liquified natural gas facilities and water withdrawn for public water systems by desalinization facilities.

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

A. Legal Authority

Today's final rule 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. This rule partially fulfills the obligations of the U.S. Environmental Protection Agency (EPA) under a consent decree in *Riverkeeper, Inc.* v. *Leavitt,* No. 93 Civ. 0314, (S.D.N.Y).

B. Purpose of Today's Regulation

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. Today's rule establishes requirements reflecting the best technology available for minimizing adverse environmental impact, applicable to the location, design, construction, and capacity of cooling water intake structures at Phase II existing power generating facilities that have the design capacity to withdraw at least fifty (50) MGD of cooling water from waters of the United States and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes.

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). 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 as authorized by the statute; (2) authority for EPA or authorized States or Tribes to issue National Pollutant Discharge Elimination System (NPDES) permits that regulate the discharge of pollutants; (3) requirements for limitations in NPDES permits based on effluent limitations guidelines and standards and water quality standards.

Today's rule implements section 316(b) of the CWA as it applies to ''Phase II existing facilities'' as defined in this rule. Section 316(b) addresses the adverse environmental impact caused by the intake of cooling water, not discharges into water. Despite this special focus, the requirements of section 316(b) are 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. For example, 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 withdraw water from waters of the United States for cooling and that use a cooling water intake structure to do so.

Section 402 of the CWA provides authority for 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-five 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 primarily by requiring dischargers to meet effluent limitations established pursuant to section 301 or section 306. Effluent limitations may be based on promulgated Federal effluent limitations guidelines, new source performance standards, or the best professional judgment of the permit writer. Limitations based on these guidelines, standards, or best professional judgment are known as technology-based effluent limits. Where technology-based effluent limits are inadequate to ensure attainment of water quality standards applicable to the receiving water, section 301(b)(1)(C) of the Clean Water Act requires permits to include more stringent limits based on applicable water quality standards. NPDES permits also routinely include monitoring and reporting requirements, standard conditions, and special conditions. In addition, NPDES permits contain conditions to implement the requirements of section 316(b). Section 301 of the CWA prohibits the discharge of any pollutant by any person, except in compliance with specified statutory requirements, including section 402.

Section 510 of the Clean Water Act provides, that except as provided in the Clean Water Act, nothing in the Act shall (1) 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 or political subdivision may not adopt or enforce 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. 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 technology-based minimum discharge requirements in wastewater discharge permits. EPA issues 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 50 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, iron and steel manufacturing, pulp and paper manufacturing, petroleum refining, and chemical manufacturing).

Section 316(b) states, in full:

> 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.

The phrase ''best technology available'' in CWA section 316(b) is not defined in the statute, but its meaning can be understood in light of similar phrases used elsewhere in the CWA. See *Riverkeeper* v. *EPA,* slip op. at 11 (2nd Cir. Feb. 3, 2004) (noting that the 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).

In sections 301 and 306, Congress directed EPA to set effluent discharge standards for new sources based on the ''best available demonstrated control technology'' and for existing sources based on the ''best available technology economically achievable.'' For new sources, section 306(b)(1)(B) directs EPA to establish ''standards of performance.'' The phrase ''standards of performance'' under section 306(a)(1) is defined as being the effluent reduction that is

''achievable through application of the best available demonstrated control technology, processes, operating methods or other alternatives * * *.'' This is commonly referred to as ''best available demonstrated technology'' or ''BADT.'' For existing dischargers, section 301(b)(1)(A) requires the establishment of effluent limitations based on ''the application of best practicable control technology currently available.'' This is commonly referred to as ''best practicable technology'' or ''BPT.'' Further, section 301(b)(2)(A) directs EPA to establish effluent limitations for certain classes of pollutants ''which shall require the application of the best available technology economically achievable.'' This is commonly referred to as ''best available technology'' or ''BAT.'' Section 301 specifies that both BPT and BAT limitations must reflect determinations made by EPA under Clean Water Act section 304. Under these provisions, the discharge of pollutants from point sources is based not on the impact of the discharge on the receiving waters, but instead upon the capabilities of the equipment or ''control technologies'' available to control those discharges.

The phrases ''best available demonstrated technology''; and ''best available technology''—like ''best technology available'' in CWA section 316(b)—are not defined in the statute. However, section 304 of the CWA specifies factors to be considered in establishing the best practicable control technology currently available, and best available technology.

For best practicable control technology currently available, 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 shall 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).

For ''best available technology,'' 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 ''best technology available'' in that section. These facts, coupled with the brevity of section 316(b) itself, prompted EPA to look to section 301 and, ultimately, section 304 for guidance in determining the ''best technology available to minimize adverse environmental impact'' of cooling water intake structures for existing Phase II 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,* slip op. at 13, (2nd Cir. Feb. 3, 2004) (''not every statutory directive contained [in sections 301 and 306] is applicable'' to a section 316(b) rulemaking). Section 316(b) requires that cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. 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). While EPA has established effluent limitations guidelines based on the efficacy of one or more technologies to reduce pollutants in wastewater in relation to cost without necessarily considering the impact on the receiving waters, 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 have 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 EAD 455 (Aug. 4, 1978); *Seacoast Anti-Pollution League* v. *Costle,* 597 F. 2d 306 (1st Cir. 1979).

For this Phase II rulemaking, EPA therefore interprets CWA section 316(b) as authorizing EPA to consider not only technologies but also their effects on and benefits to the water from which the cooling water is withdrawn. Based on these two considerations, EPA has established in today's rule national requirements for facilities to install technology that is technically available, economically practicable, and cost-effective while at the same time authorizing a range of technologies that achieve comparable reductions in adverse environmental impact.

2. Consent Decree

Today's final rule partially fulfills EPA's obligation to comply with a consent decree, as amended. The Second Amended Consent Decree, which is relevant to today's rule, was filed on November 25, 2002, in the United States District Court, Southern District of New York, in *Riverkeeper, Inc.* v. *Leavitt,* No. 93 Civ 0314, a case brought against EPA by a coalition of individuals and environmental groups. The original Consent Decree, filed on October 10, 1995, provided that EPA was to propose regulations implementing section 316(b) by July 2, 1999, and take final action with respect to those regulations by August 13, 2001. Under subsequent interim orders, the Amended Consent Decree filed on November 22, 2000, and the Second Amended Consent Decree, EPA has divided the rulemaking into three phases and is working under new deadlines. As required by the Second Amended Consent Decree, on November 9, 2001, EPA took final action on a rule governing cooling water intake structures used by new facilities (Phase I). 66 FR 65255 (December 18, 2001). The Second Amended Consent Decree requires that EPA take final action by February 16, 2004, with respect to Phase II regulations that are ''applicable to, at a minimum: (1) Existing utilities (*i.e.*, facilities that both generate and transmit electric power) that employ a cooling water intake structure, and whose intake flow levels exceed a minimum threshold to be determined by EPA during the Phase II rulemaking process; and (2) existing nonutility power producers (*i.e.*, facilities that generate electric power but sell it to another entity for transmission) that employ a cooling water intake structure, and whose intake flow levels exceed a minimum threshold to be determined by EPA during the Phase II rulemaking process.'' The consent decree further requires that EPA propose regulations governing cooling water intake structures used, at a minimum, by smaller-flow power plants and facilities in four industrial sectors (pulp and paper making, petroleum and coal products manufacturing, chemical and allied manufacturing, and primary metal manufacturing) by November 1, 2004, and take final action by June 1, 2006 (Phase III).

3. What Other EPA Rulemakings and Guidance Have Addressed Cooling Water Intake Structures?

In April 1976, EPA published a final rule 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 CWA section 316(b). It also added a new part 402, which included three sections: (1) § 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 United States 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 40 CFR 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) P.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, ''The 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. Where adverse environmental impact is present, the 1977 draft guidance suggested a stepwise approach that considers screening systems, size, location, capacity, and other factors.

Although the draft guidance described the information that should be developed, key factors that should be considered, and a process for supporting section 316(b) determinations, it did not establish uniform technology-based national standards for best technology available for minimizing adverse environmental impact. Rather, the guidance left the decisions on the appropriate location, design, capacity, and construction of cooling water intake structures to the permitting authority. 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.

4. Phase I New Facility Rule

On November 9, 2001, EPA took final action on regulations governing cooling water intake structures at new facilities. 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 withdraw at least two (2) million gallons per day (MGD) and use at least twenty-five (25) 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 with a design intake flow more 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 with a design intake flow more than 2 MGD, the design through-screen intake velocity is restricted to 0.5 ft/s and the total quantity of intake is restricted to a proportion of the mean annual flow of a freshwater river or stream, or 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 with intake capacity greater than 10 MGD must select and implement appropriate design and construction technologies for minimizing impingement mortality and entrainment. (Applicants with 2 to 10 MGD flows are not required to reduce intake flow to a level commensurate with a closed-cycle, recirculating cooling system, but must install technologies for reducing impingement mortality at all locations.) Under Track II, the applicant has the opportunity to demonstrate that impacts to fish and shellfish, including important forage and predator species, within the watershed will be comparable to the reduction in impingement mortality and entrainment it would achieve were it to implement the Track I intake flow and velocity requirements.

With the new facility rule, EPA promulgated national minimum requirements for the design, capacity, and construction of cooling water intake structures at new facilities. EPA believes that the final new facility rule establishes a reasonable framework that creates certainty for permitting of new facilities, while providing significant flexibility to take site-specific factors into account.

5. Proposed Rule for Phase II Existing Facilities

On April 9, 2002, EPA published proposed requirements for cooling water intake structures at Phase II existing facilities to implement section 316(b) of the Clean Water Act. EPA proposed to establish requirements that gave facilities three different compliance options for meeting performance standards that vary based on waterbody

type, the percentage of the source waterbody withdrawn, and the facility capacity utilization rate. 67 FR 17122. EPA received numerous comments and data submissions concerning the proposal.

6. Notice of Data Availability

On Wednesday, March 19, 2003, EPA published a Proposed Rule Notice of Data Availability (NODA). 68 FR 13522. This notice presented a summary of the data EPA had received or collected since proposal, an assessment of the relevance of the data to EPA's analysis, revisions to EPA's estimate of the costs and benefits of the proposed rule, new proposed compliance alternatives, and potential modifications to EPA's proposed regulatory approach. As part of the NODA, EPA also reopened the comment period on the complete contents of the proposed rule.

7. Public Participation

EPA has worked extensively with stakeholders from the industry, public interest groups, State agencies, and other Federal agencies in the development of this final rule. These public participation activities have focused on various section 316(b) issues, including issues relevant to development of the Phase I rule and Phase II rule.

EPA conducted outreach to industry groups, environmental groups, and other government entities in the development, testing, refinement, and completion of the section 316(b) survey, which has been used as a source of data for the Phase II rule. The survey is entitled ''Information Collection Request, Detailed Industry Questionnaires: Phase II Cooling Water Intake Structures & Watershed Case Study Short Questionnaire,'' September 3, 1999. In addition, EPA conducted two public meetings on section 316(b) issues. In June of 1998, in Arlington, Virginia, EPA conducted a public meeting focused on a draft regulatory framework for assessing potential adverse environmental impact from impingement and entrainment. 63 FR 27958 (May 21, 1998). In September of 1998, in Alexandria, Virginia, EPA conducted a public meeting focused on technology, cost, and mitigation issues. 63 FR 40683 (July 30, 1998). In addition, in September of 1998, and April of 1999, EPA staff participated in technical workshops sponsored by the Electric Power Research Institute on issues relating to the definition and assessment of adverse environmental impact. EPA staff have participated in other industry conferences, met upon request on numerous occasions with representatives of industry and environmental groups.

In the months leading up to publication of the proposed Phase I rule, EPA conducted a series of stakeholder meetings to review the draft regulatory framework for the proposed rule and invited stakeholders to provide their recommendations for the Agency's consideration. EPA managers have met with the Utility Water Act Group, Edison Electric Institute, representatives from an individual utility, and with representatives from the petroleum refining, pulp and paper, and iron and steel industries. EPA conducted several meetings with environmental groups attended by representatives from 15 organizations. EPA also met with the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and, with the assistance of ASIWPCA, conducted a conference call in which representatives from 17 States or interstate organizations participated. After publication of the proposed Phase I rule, EPA continued to meet with stakeholders at their request. Summaries of these meetings are in the docket.

EPA received many comments from industry stakeholders, government agencies, and private citizens on the Phase I proposed rule 65 FR 49059 (August 10, 2000). EPA received additional comments on the Phase I Notice of Data Availability (NODA) 66 FR 28853 (May 25, 2001). These comments informed the development of the Phase II proposal.

In January, 2001, EPA also attended technical workshops organized by the Electric Power Research Institute and the Utilities Water Act Group. These workshops focused on the presentation of key issues associated with different regulatory approaches considered under the Phase I proposed rule and alternatives for addressing section 316(b) requirements.

On May 23, 2001, EPA held a day-long forum to discuss specific issues associated with the development of regulations under section 316(b) of the Clean Water Act. 66 FR 20658 (April 24, 2001). At the meeting, 17 experts from industry, public interest groups, States, and academia reviewed and discussed the Agency's preliminary data on cooling water intake structure technologies that are in place at existing facilities and the costs associated with the use of available technologies for reducing impingement and entrainment. Over 120 people attended the meeting.

In August 21, 2001, EPA staff participated in a technical symposium sponsored by the Electric Power Research Institute in association with the American Fisheries Society on issues relating to the definition and assessment of adverse environmental impact under section 316(b) of the CWA.

During development of the Phase I final rule and Phase II proposed rule, EPA coordinated with the staff from the Nuclear Regulatory Commission (NRC) to ensure that there would not be a conflict with NRC safety requirements. NRC staff reviewed the proposed Phase II rule and did not identify any apparent conflict with nuclear plant safety. NRC licensees would continue to be obligated to meet NRC requirements for design and reliable operation of cooling systems. NRC staff recommended that EPA consider adding language which states that in cases of conflict between an EPA requirement under this rule and an NRC safety requirement, the NRC safety requirement take precedence. EPA added language to address this concern in this final rule.

In a concerted effort to respond to a multitude of questions concerning the data and analyses that EPA developed as part of the Phase II proposal, EPA held a number of conference calls with multiple stakeholders to clarify issues and generally provide additional information. To supplement these verbal discussions, EPA drafted three supporting documents: one that explained the methodology EPA used to calculate entrainment rates; and two others that provided specific examples of how EPA applied this methodology to calculate benefits for the proposed rule. In addition, EPA prepared written responses to all questions submitted by the stakeholders involved in the initial conference calls.

Finally, EPA sponsored a *Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms,* held on May 6–7, 2003, at the Hilton Crystal City at National Airport in Arlington, Virginia. This symposium brought together professionals from Federal, State, and Tribal regulatory agencies; industry; environmental organizations; engineering consulting firms; science and research organizations; academia; and others concerned with mitigating harm to the aquatic environment by cooling water intake structures. Efficacy and costs of various technologies to mitigate impacts to aquatic organisms from cooling water intake structures, as well as research and other future needs, were discussed.

These coordination efforts and all of the meetings described in this section are documented or summarized in the docket established for this rule.

IV. Environmental Impacts Associated With Cooling Water Intake Structures

With the implementation of today's final rule, EPA intends to minimize the adverse environmental impacts of cooling water intake structures by minimizing the number of aquatic organisms lost as a result of water withdrawals associated with these structures or through restoration measures that compensate for these losses. In the Phase I new facility rule and proposed Phase II existing facility rule, EPA provided an overview of the magnitude and type of environmental impacts associated with cooling water intake structures, including several illustrative examples of documented environmental impacts at existing facilities (see 65 FR 49071–4; 66 FR 65262–5; and 67 FR 17136–40).

For the same reasons set forth in the preamble to the Phase I rule (66 FR 65256, 65291–65297), EPA has determined that there are multiple types of undesirable and unacceptable environmental impacts that may be associated with Phase II existing facilities, depending on conditions at the individual site. These types of impacts include entrainment and impingement; reductions of threatened and endangered species; damage to critical aquatic organisms, including important elements of the food chain; diminishment of a population's compensatory reserve; losses to populations including reductions of indigenous species populations, commercial fisheries stocks, and recreational fisheries; and stresses to overall communities and ecosystems as evidenced by reductions in diversity or other changes in system structure and function. Similarly, based on the analyses and for the same reasons set forth in the preamble to the new facility rule (66 FR 65256, 65291–65297), EPA has selected reductions in impingement and entrainment as a quick, certain, and consistent metric for determining performance at Phase II existing facilities. Further, EPA considered the non-impingement and entrainment environmental impacts for this rule and found them to be acceptable at a national level. This section describes the environmental impacts associated with cooling water withdrawals and why they are of concern to the Agency.

EPA estimates that facilities under the scope of today's final rule withdraw on average more than 214 billion gallons of cooling water a day from waters of the United States.[2] A report by the U.S. Geological Survey estimates that the use of water by the thermoelectric power industry accounted for 47 percent of all combined fresh and saline withdrawals from waters of the United States in 1995.[3] The withdrawal of such large quantities of cooling water in turn has the potential to affect large quantities of aquatic organisms including phytoplankton (tiny, free-floating photosynthetic organisms suspended in the water column), zooplankton (small aquatic animals, including fish eggs and larvae, that consume phytoplankton and other zooplankton), fish, and shellfish. Aquatic organisms drawn into cooling water intake structures are either impinged on components of the cooling water intake structure or entrained in the cooling water system itself.

Impingement takes place when organisms are trapped against intake screens by the force of the water being drawn through the cooling water intake structure. The velocity of the water withdrawal by the cooling water intake structure may prevent proper gill movement, remove fish scales, and cause other physical harm or death of affected organisms through exhaustion, starvation, asphyxiation, and descaling. Death from impingement (''impingement mortality'') can occur immediately or subsequently as an individual succumbs to physical damage upon its return to the waterbody.

Entrainment occurs when organisms are drawn through the cooling water intake structure into the cooling system. Organisms that become entrained are typically relatively small, aquatic organisms, including early life stages of fish and shellfish. Many of these small, fragile organisms serve as prey for larger organisms higher on the food chain which are commercially and recreationally desirable species. As entrained organisms pass through a facility's cooling system they may be subject to mechanical, thermal, and at times, chemical stress. Sources of such stress include physical impacts in the pumps and condenser tubing, pressure changes caused by diversion of the cooling water into the plant or by the hydraulic effects of the condensers, sheer stress, thermal shock in the condenser and discharge tunnel, and chemical toxic effects from antifouling agents such as chlorine. Similar to impingement mortality, death from entrainment can occur immediately or subsequently as the individual succumbs to the damage from the stresses encountered as it passed through the cooling water system once it is discharged back into the waterbody.

The environmental impacts attributable to impingement mortality and entrainment at individual facilities include losses of early life stages of fish and shellfish, reductions in forage species, and decreased recreational and commercial landings. EPA estimates that the current number of fish and shellfish, expressed as age 1 equivalents, that are killed from impingement and entrainment from cooling water intake structures at the facilities covered by this Phase II rule is over 3.4 billion annually. Expressing impingement mortality and entrainment losses as age 1 equivalents is an accepted method for converting losses of all life stages into individuals of an equivalent age and provides a standard metric for comparing losses among species, years, and facilities. The largest losses are in the mid-Atlantic, where EPA estimates 1.7 billion age 1 equivalents are lost annually due to impingement and entrainment.[4] Although the number of age 1 equivalent fish killed by impingement and entrainment is very large, precise quantification of the nature and extent of impacts to populations and ecosystems is difficult. Population dynamics and the physical, chemical, and biological processes of ecosystems are extremely complex. While generally accepted as a simple and transparent method for modeling losses, the proportional methodology that EPA uses to estimate impingement and entrainment nationwide has uncertainties that may result in under or over estimating actual impingement and entrainment rates.

Decreased numbers of aquatic organisms can disrupt aquatic food webs and alter species composition and overall levels of biodiversity. For example, a model that examined the effect of large entrainment losses of forage fish, such as bay anchovy, predicted subsequent reductions in predator populations (including commercially and recreationally important species such as striped bass, weakfish, and blue fish) as high as 25%.[5] This is because forage species, which comprise a majority of

[2] EPA 1999. Detailed Industry Questionnaires: Phase II Cooling Water Intake Structures & Watershed Case Study Short Questionnaire. U.S. Environmental Protection Agency, Office of Wastewater Management, Washington, D.C. OMB Control No. 2040–0213.

[3] Solley, W.B., R.R. Pierce and H.A. Perlman. 1998. Estimated Use of Water in the United States in 1995. U.S. Geological Survey Circular 1200.

[4] For more information, please see Chapter D2: Evaluation of Impingement and Entrainment in the Mid-Atlantic Region in the Section 316(b) Existing Facilities Regional Studies, Part D: Mid-Atlantic.

[5] Summers, J.K. 1989. Simulating the indirect effects of power plant entrainment losses on an estuarine ecosystem. Ecological Modelling, 49: 31–47.

entrainment losses at many facilities, are often a primary food source for predator species.

EPA is also concerned about the potential impacts of cooling water intake structures located in or near habitat areas that support threatened, endangered, or other species of concern (those species that might be in need of conservation actions, but are not currently listed as threatened or endangered under State or Federal law).[6] In the San Francisco Bay-Delta Estuary, California, in the vicinity of the Pittsburg and Contra Costa Power Plants several fish species (*e.g.*, Delta smelt, Sacramento splittail, chinook salmon, and steelhead) are now considered threatened or endangered by State and/or Federal authorities. EPA evaluated facility data on impingement and entrainment rates for these species and estimated that potential losses of special status fish species at the two facilities may average 8,386 age 1 equivalents per year resulting from impingement and 169 age 1 equivalents per year due to entrainment.[7] In another example, EPA is aware that from 1976 to 1994, approximately 3,200 threatened or endangered sea turtles entered enclosed cooling water intake canals at the St. Lucie Nuclear Generating Plant in Florida.[8] The facility developed a capture-and-release program in response to these events. Most of the entrapped turtles were captured and released alive; however, approximately 160 turtles did not survive. An incidental take limit established by NMFS in a 2001 biological opinion for this facility has been set at no more than 1,000 sea turtles captured in the intake, with less than one percent killed or injured as a result of plant operations (only two of those killed or injured may be Kemp's Ridley sea turtles and none may be hawksbill or leatherback sea turtles).[9] Although the extent to which threatened, endangered, and other special status species are taken by cooling water intake structures more generally is yet to be determined, EPA is concerned about potential impacts to such species.

Examples of Environmental Impacts Caused by Cooling Water Intakes

1. Hudson River

The power generation facilities on the Hudson River in New York are some of the most extensively studied in the nation. The fish populations in the Hudson River have also been studied extensively to measure the impacts of these power plants. Studies of entrainment at five Hudson River power plants during the 1980s predicted year-class reductions ranging from six percent to 79 percent, depending on the fish species.[10] A Draft Environmental Impact Statement (DEIS) prepared by industry of entrainment at three Hudson River facilities (Roseton, Bowline, and Indian Point) predicted year-class reductions of up to 20 percent for striped bass, 25 percent for bay anchovy, and 43 percent for Atlantic tomcod.[11] The New York State Department of Environmental Conservation (NYSDEC) concluded that any ''compensatory responses to this level of power plant mortality could seriously deplete any resilience or compensatory capacity of the species needed to survive unfavorable environmental conditions.'' [12] In the DEIS, the facilities argue that their operation has not harmed the local aquatic communities, because all observed population changes are attributable to causes other than the operation of the power plants, such as water chestnut growth, zebra mussel invasion, changes in commercial fishing, increases in salinity and improved water quality in the New York Harbor.

In contrast, the Final Environmental Impact Statement (FEIS) prepared by NYSDEC for these three facilities concludes that impacts are associated with the power plants and notes that these impacts are more like habitat degradation than the ''selective cropping'' of fish that occurs during regulated fishing because the entire community is impacted rather than specific species higher on the food chain.[13] The multiple facilities on the Hudson River act cumulatively on the entire aquatic community. New York State's 2002 section 316(b) report lists the Hudson River downstream from the Federal dam at Troy, New York, as impacted by cooling water use by power plants due to the loss each year of a substantial percentage of annual fish production. The FEIS estimates, from samples collected between 1981 and 1987, that the average annual entrainment losses from these three facilities includes 16.9 million American shad, 303.4 million striped bass, 409.6 million bay anchovy, 468 million white perch, and 826.2 million river herring.[14] In addition, related studies have found a small long-term decline in both species richness and diversity within the resident fish community. A commenter on the DEIS cited further evidence that Atlantic tomcod, Atlantic sturgeon, bluefish, weakfish, rainbow smelt, white perch and white catfish are showing long-term trends of declining abundance of 5 to 8% per annum.[15] Declines in abundances of several species and changes in species composition have raised concerns about the overall health of the community. The FEIS concluded that additional technology was necessary to minimize the adverse environmental impact from these three once-through systems.[16]

The FEIS further concluded that entrainment at these facilities has diminished the forage base for each species so there is less food available for the survivors. This disruption of the food chain compromises the health of the entire aquatic community. The FEIS used, as a simplified hypothetical example, the loss of an individual bay anchovy that would ordinarily serve as prey for a juvenile striped bass. If this individual bay anchovy is killed via entrainment and disintegrated upon

[6] For more information, please see Chapter A12: Threatened & Endangered Species Analysis Methods in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

[7] Impingement and entrainment data were obtained from the 2000 Draft Habitat Conservation Plan for the Pittsburg and Contra Costa facilities. Please see EPA's Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule for detailed information on EPA's evaluation of impingement and entrainment at these facilities.

[8] Florida Power and Light Company. 1995. Assessment of the impacts at the St. Lucie Nuclear Generating Plant on sea turtle species found in the inshore waters of Florida.

[9] Florida Power and Light Company, 2002. Florida Power & Light Company St. Lucie Plant Annual Environmental Operating Report 2002.

[10] Boreman J. and P. Goodyear. 1988. Estimates of entrainment mortality for striped bass and other fish species inhabiting the Hudson River Estuary. *American Fisheries Society Monograph* 4:152–160.

[11] Consolidated Edison Company of New York. 2000. Draft environmental impact statement for the state pollutant discharge elimination system permits for Bowline Point, Indian Point 2 & 3, and Roseton steam electric generating stations.

[12] New York State Department of Environmental Conservation (NYSDEC). 2000. Internal memorandum provided to the USEPA on NYDEC's position on SPDES permit renewals for Roseton, Bowline Point 1 & 2, and Indian Point 2 & 3 generating stations.

[13] New York State Department of Environmental Conservation (NYSDEC). 2003. Final Environmental Impact Statement: Concerning the Applications to Renew NYSPDES Permits for the Roseton 1 & 2, Bowling 1 & 2 and Indian Point 2 & 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties.

[14] Ibid.

[15] Henderson, P.A. and R.M. Seaby. 2000. Technical comments on the Draft Environmental Impact Statement for the State Pollution Discharge Elimination System Permit Renewal for Bowline Point 1 & 2, Indian Point 2 & 3, and Roseton 1 & 2 Steam Generating Stations. Pisces Conservation Ltd.

[16] New York State Department of Environmental Conservation (NYSDEC). 2003. Final Environmental Impact Statement: Concerning the Applications to Renew NYSPDES Permits for the Roseton 1 & 2, Bowline 1 & 2 and Indian Point 2 & 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties.

passage through a CWIS, it is no longer available as food to a striped bass, but rather it is only useful as food to lower trophic level organisms, such as detritivores (organisms that feed on dead organic material). Further, the bay anchovy would no longer be available to consume phytoplankton, which upsets the distribution of nutrients in the ecosystem.[17]

The Hudson River, like many waterbodies in the nation, has undergone many changes in the past few decades. These changes, which have affected fish populations either positively or negatively, include improvements to water quality as a result of upgrades to sewage treatment plants, invasions by exotic species such as zebra mussels, chemical contamination by toxins such as PCBs and heavy metals, global climate shifts such as increases in annual mean temperatures and higher frequencies of extreme weather events (*e.g.*, the El Niño-Southern Oscillation), and strict management of individual species stocks such as striped bass.[18] In addition, there are dramatic natural changes in fish populations on an annual basis and in the long term due to natural phenomena because the Hudson River, like many waterbodies, is a dynamic system with many fundamental, fluctuating environmental parameters—such as flow, temperature, salinity, dissolved oxygen, nutrients, and disease—that cause natural variation in fish populations each year.[19] The existence of these interacting variables makes it difficult to determine the exact contribution of impingement and entrainment losses on a population's relative health. Nonetheless, as described later in this section, EPA is concerned about the potential for cumulative impacts resulting from multiple facility intakes that collectively impinge and/or entrain aquatic organisms within a specific waterbody.

2. Mount Hope Bay

Environmental impacts were also studied in another recent permit reissuance for the Brayton Point Station in Somerset, Massachusetts, where EPA is the permitting authority. EPA determined that, among other things, the facility's cooling water system had contributed to the collapse of the fishery and inhibited its recovery despite stricter commercial and recreational fishing limits and improved water quality due to sewage treatment upgrades. The facility currently withdraws nearly one billion gallons of water each day and the average annual losses of aquatic organisms due to impingement and entrainment are estimated in the trillions, including 251 million winter flounder, 375 million windowpane flounder, 3.5 billion tautog and 11.8 billion bay anchovy. A dramatic change in the fish populations in Mount Hope Bay is apparent after 1984 with a decline by more than 87 percent, which coincides with a 45 percent increase in cooling water withdrawal from the bay due to the modification of Unit 4 from a closed-cycle recirculating system to a once-through cooling water system and a similar increase in the facility's thermal discharge.[20] [21] The downward trend of finfish abundance in Mount Hope Bay is significantly greater than declines in adjacent Narragansett Bay that is not influenced by the operation of Brayton Point Station.[22] Despite fishing restrictions, fish stocks have not recovered.

3. Southern California Bight

At the San Onofre Nuclear Generating Station (SONGS), in a normal (non-El Niño) year, an estimated 57 tons of fish were killed per year when all units were in operation.[23] The amount lost per year included approximately 350,000 juveniles of white croaker, a popular sport fish; this number represents 33,000 adult equivalents or 3.5 tons of adult fish. In shallow water, densities of queenfish and white croaker decreased 60 percent within one kilometer of SONGS and 35 percent within three kilometers from SONGS as compared to densities prior to facility operations. Densities of local midwater fish decreased 50 to 70 percent within three kilometers of the facility. In contrast, relative abundances of some bottom-dwelling species in the same areas were higher because of the enriched nature of the SONGS discharge, which in turn supported elevated numbers of prey items for bottom-dwelling fish.

4. Missouri River

In contrast to these examples, facilities sited on waterbodies previously impaired by anthropogenic activities such as channelization demonstrate limited entrainment and impingement losses. The Neal Generating Complex facility, located near Sioux City, Iowa, on the Missouri River is coal-fired and utilizes once-through cooling systems. According to a ten-year study conducted from 1972–82, the Missouri River aquatic environment near the Neal complex was previously heavily impacted by channelization and very high flow rates meant to enhance barge traffic and navigation.[24] These anthropogenic changes to the natural river system resulted in significant losses of fish habitat. At this facility, there was found to be little impingement and entrainment by cooling water intakes.

Studies like those described in this section provide only a partial picture of the range of environmental impacts associated with cooling water intake structures. Although numerous studies were conducted to determine the environmental impacts caused by impingement and entrainment at existing facilities, many of them are based on limited data that were collected as long as 25 years ago. EPA's review of available facility impingement and entrainment studies identified a substantial number of serious study design limitations, including data collections for only one to two years or limited to one season and for a subset of the species affected by cooling water intakes; limited taxonomic detail (*i.e.*, many losses not identified to the species level); a general lack of statistical information such as inclusion of variance measures in impingement and entrainment estimates; and the lack of standard methods and metrics for quantifying impingement and entrainment, which limits the potential for evaluating cumulative impacts across multiple facilities. Further, in many cases it is likely that facility operating conditions and/or the state of the waterbody itself has changed since these studies were conducted. Finally, the methods for monitoring impingement and entrainment used in the 1970s and 1980s, when most section 316(b) evaluations were performed, were often inconsistent and incomplete, making quantification of impacts difficult in some cases. Recent advances in environmental assessment techniques

[17] Ibid.

[18] Ibid.

[19] Ibid.

[20] Ibid.

[21] T Gibson, M. 1995 (revised 1996). Comparison of trends in the finfish assemblages of Mt. Hope Bay and Narragansett Bay in relation to operations for the New England Power Brayton Point station. Rhode Island Division of Fish and Wildlife, Marine Fisheries Office.

[22] EPA–New England. 2002. Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA (NPDES Permit No. MA 0003654), July 22, 2002.

[23] Murdoch, W.W., R.C. Fay, and B.J. Mechalas. 1989. Final Report of the Marine Review Committee to the California Coastal Commission. August 1989, MRC Document No. 89–02.

[24] Tondreau, R., J. Hey and E. Shane, Morningside College. 1982. Missouri River Aquatic Ecology Studies: Ten Year Summary (1972–1982). Prepared for Iowa Public Service Company, Sioux City, Iowa.

provide new and in some cases better tools for monitoring impingement and entrainment and quantifying the current magnitude of the impacts.[25] [26]

EPA is also concerned about the potential for cumulative impacts related to cooling water withdrawal. Cumulative impacts may result from (1) multiple facility intakes impinging and/or entraining aquatic organisms within a specific waterbody, watershed, or along the migratory pathway of specific species; (2) the existence of multiple stressors within a waterbody/watershed, including cooling water intake withdrawals; and (3) long-term occurrences of impingement and/or entrainment losses that may result in the diminishment of the compensatory reserve of a particular fishery stock.

Historically, environmental impacts related to cooling water intake structures have been evaluated on a facility-by-facility basis. These historical evaluations do not consider the potential for a fish or shellfish species to be concomitantly impacted by cooling water intake structures belonging to other facilities that are located within the same waterbody or watershed in which the species resides or along the coastal migratory route of a particular species. The potential cumulative effects of multiple intakes located within a specific waterbody or along a coastal segment are difficult to quantify and are not typically assessed. (One relevant example is provided for the Hudson River; see discussion earlier in this section.) Nonetheless, EPA analyses suggest that almost a quarter of all Phase II existing facilities are located on a waterbody with another Phase II existing facility (DCN 4–4009). Thus, EPA is concerned that although the potential for aquatic species to be affected by cooling water withdrawals from multiple facility intakes is high, this type of cumulative impact is largely unknown and has not adequately been accounted for in evaluating impacts. However, recently the Atlantic States Marine Fisheries Commission (ASMFC) was requested by its member States to investigate the cumulative impacts on commercial fishery stocks, particularly overutilized stocks, attributable to cooling water intakes located in coastal regions of the Atlantic.[27] Specifically, the ASMFC study will evaluate the potential cumulative impacts of multiple intakes on Atlantic menhaden stock [28] which range along most of the U.S. Atlantic coast with a focus on revising existing fishery management models so that they accurately consider and account for fish losses from multiple intake structures. Results from these types of studies, although currently unavailable, will provide significant insight into the degree of impact attributable to intake withdrawals from multiple facilities.

EPA also considered information suggesting that impingement and entrainment, in conjunction with other factors, may be a nontrivial stress on a waterbody. EPA recognizes that cooling water intake structures are not the only source of human-induced stress on aquatic systems. Additional stresses to aquatic systems include, but are not limited to, nutrient, toxics, and sediment loadings; low dissolved oxygen; habitat loss; and stormwater runoff. Although EPA recognizes that a nexus between a particular stressor and adverse environmental impact may be difficult to establish with certainty, EPA believes stressors that cause or contribute to the loss of aquatic organisms and habitat such as those described above, may incrementally impact the viability of aquatic resources. EPA analyses suggest that over 99 percent of all existing facilities with cooling water withdrawal that EPA surveyed in its section 316(b) survey of existing facilities are located within two miles of waters that are identified as impaired by a State or Tribe (see 66 FR 65256, 65297). Thus, the Agency is concerned that to the extent that many of the aquatic organisms subject to the effects of cooling water withdrawals reside in impaired waterbodies, they are potentially more vulnerable to cumulative impacts from an array of physical and chemical anthropogenic stressors.

Finally, EPA believes that an aquatic population's potential compensatory ability—the capacity for a species to increase its survival, growth, or reproduction in response to reductions sustained to its overall population size—may be compromised by impingement and entrainment losses in conjunction with all the other stressors encountered within a population's natural range, as well as impingement and entrainment losses occurring consistently over extended periods of time. As discussed in the Phase I new facility rule (see 66 FR 65294), EPA is concerned that even if there is little evidence that cooling water intakes alone reduce a population's compensatory reserve, the multitude of stressors experienced by a species can potentially adversely affect its ability to recover.[29] Moreover, EPA notes that the opposite effect or ''depensation'' (decreases in recruitment as stock size declines[30]) may occur if a population's size is reduced beyond a critical threshold. Depensation can lead to further decreases in population abundances that are already seriously depleted and, in some cases, recovery of the population may not be possible even if the stressors are removed. In fact, there is some evidence that depensation may be a factor in some recent fisheries collapses.[31] [32] [33]

Another problem associated with assessing the environmental impact of cooling water intakes is that existing fishery resource baselines may be inaccurate.[34] There is much evidence that the world's fisheries are in general decline,[35] [36] however, many fishery stocks have not been adequately assessed. According to a 2002 study, only 23 percent of U.S. managed fish stocks have been fully assessed and of these, over 40 percent are considered depleted or are being fished beyond sustainable levels.[37] Another study estimated that more than 70 percent of commercial fish stocks are fully

[25] Schmitt, R.J. and C.W. Osenberg. 1996. Detecting Ecological Impacts. Academic Press, San Diego, CA.

[26] EPRI 1999. Catalog of Assessment Methods for Evaluating the Effects of Power Plant Operations on Aquatic Communities. TR–112013, EPRI, Palo Alto, CA.

[27] Personal communication, D. Hart (EPA) and L. Kline (ASMFC), 2001.

[28] Personal communication, D. Hart (EPA) and L. Kline (ASMFC), 2003.

[29] Hutchings, J.A. and R.A. Myers. 1994. What can be learned from the collapse of a renewable resource? Atlantic cod, *Gadus morhus,* of Newfoundland and Labrador. Canadian Journal of Fisheries and Aquatic Sciences 51:2126–2146.

[30] Goodyear, C.P. 1977. Assessing the impact of power plant mortality on the compensatory reserve of fish populations. Pages 186–195 in W. Van Winkle, ed., Proceedings of the Conference on Assessing the Effects of Power Plant Induced Mortality on Fish Populations. Pergamon Press, New York, NY.

[31] Myers, R.A., N.J. Barrowman, J.A. Hutchings, and A.A. Rosenburg. 1995. Population dynamics of exploited fish stocks at low population levels. Science 26:1106–1108.

[32] Hutchings, J.A. and R.A. Myers. 1994. What can be learned from the collapse of a renewable resource? Atlantic cod, *Gadus morhus,* of Newfoundland and Labrador. Canadian Journal of Fisheries and Aquatic Sciences 51:2126–2146.

[33] Liermann, M. and R. Hilborn. 1997. Depensation in fish stocks: A hierarchic Bayesian meta-analysis. Can. J. Fish. Aquatic. Sci. 54:1976–1985.

[34] Watson, R. and D. Pauly. 2001. Systematic distortions in world fisheries catch trends. Nature 414:534–536.

[35] Ibid.

[36] Pew Oceans Commission. 2003. America's Living Oceans: Charting a course for sea change. Summary Report. May 2003. Pew Oceans Commission, Arlington, VA.

[37] U.S. Commission on Ocean Policy. 2002. Developing a National Ocean Policy: Mid-Term Report of the U.S. Commission on Ocean Policy. Washington, DC.

exploited, overfished or collapsed.[38] Another estimated that large predatory fish stocks are only a tenth of what they were 50 years ago.[39] Most studies of fish populations last only a few years, do not encompass the entire life span of the species examined, and do not account for cyclical environmental changes such as ENSO events, and other long term cycles of oceanographic productivity.[40]

Although a clear and detailed picture of the status of all our fishery resources does not exist,[41] it is undisputed that fishermen are struggling to sustain their livelihood despite strict fishery management restrictions which aim to rebuild fish populations. EPA shares the concerns expressed by expert fishery scientists that historical overfishing has increased the sensitivity of aquatic ecosystems to subsequent disturbance, making them more vulnerable to other stressors, including cooling water intake structures.

In conclusion, EPA's mission includes ensuring the sustainability of communities and ecosystems. Thus, EPA must comprehensively evaluate all potential threats to resources and work towards eliminating or reducing identified threats. As discussed in this section, EPA believes that impingement and entrainment losses attributable to cooling water intakes do pose a threat to aquatic organisms and through today's rule is seeking to minimize that threat.

V. Description of the Final Rule

Clean Water Act section 316(b) requires that any standard established pursuant to section 301 or section 306 of the CWA 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. Today's final rule establishes national performance requirements for Phase II existing facilities that ensure such facilities fulfill the mandate of section 316(b).

This rule applies to Phase II existing facilities that use or propose to use a cooling water intake structure to withdraw water for cooling purposes from waters of the United States and that have or are required to have a National Pollutant Discharge Elimination System (NPDES) permit issued under section 402 of the CWA. Phase II existing facilities include only those facilities whose primary activity is to generate and transmit electric power and who have a design intake flow of 50 MGD or greater, and that use at least 25 percent of the water withdrawn exclusively for cooling purposes (see § 125.91). Applicability criteria for this rule are discussed in detail in section II of this preamble.

Under this final rule, EPA has established performance standards for the reduction of impingement mortality and, when appropriate, entrainment (see § 125.94). The performance standards consist 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). These performance standards reflect the best technology available for minimizing adverse environmental impacts determined on a national categorical basis. The type of performance standard applicable to a particular facility (*i.e.*, reductions in impingement only or impingement and entrainment) is 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. Exhibit V–1 summarizes the performance standards based on waterbody type.

In most cases, EPA believes that these performance standards can be met using design and construction technologies or operational measures. However, under the rule, the performance standards also can be met, in whole or in part, by using restoration measures, following consideration of design and construction technologies or operational measures and provided such measures meet restoration requirements (see § 125.94(c)).

As noted earlier in this section, today's rule generally requires that impingement mortality of all life stages of fish and shellfish must be reduced by 80 to 95 percent from the calculation baseline; and for some facilities, entrainment of all life stages of fish and shellfish must be reduced by 60 to 90 percent from the calculation baseline (see § 125.94(b)).

EXHIBIT V–1.—PERFORMANCE STANDARD REQUIREMENTS

Waterbody type	Capacity utilization rate	Design intake flow	Type of performance standard
Freshwater River or Stream	Less than 15%	N/A [1]	Impingement mortality only.
	Equal to or greater than 15%.	5% or less mean annual flow.	Impingement mortality only.
		Greater than 5% of mean annual flow.	Impingement mortality and entrainment.
Tidal river, Estuary or Ocean	Less than 15%	N/A [1]	Impingement mortality only.
	Equal to or greater than 15%.	N/A	Impingement mortality and entrainment.
Great Lakes	Less than 15%	N/A	Impingement mortality only.
	Equal to or greater than 15%.	N/A	Impingement mortality and entrainment.

[38] Broad, W.J. and A.C. Revkin. 2003. Has the Sea Given Up its Bounty? The New York Times. July 29, 2003.

[39] Myers, R.A. and B. Worm. 2003. Rapid worldwide depletion of predatory fish communities. Nature 423: 280–283.

[40] Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, L.W. Botsford, B.J. Bourque, R.H. Bradbury, R. Cooke, J. Erlandson, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, and R.R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. Science 293(5530):629–638.

[41] National Marine Fisheries Service (NMFS). 2002. Annual Report to Congress on the Status of U.S. Fisheries—2001. U.S. Dep. Commerce, NOAA, Natl. Mar. Fish. Serv., Silver Spring, MD, 142 pp.

EXHIBIT V–1.—PERFORMANCE STANDARD REQUIREMENTS—Continued

Waterbody type	Capacity utilization rate	Design intake flow	Type of performance standard
Lakes or Reservoirs	N/A	Increase in design intake flow must not disrupt thermal stratification except where it does not adversely affect the management of fisheries.	Impingement mortality only.

[1] Determination of appropriate compliance reductions is not applicable.

This final rule identifies five alternatives a Phase II existing facility may use to achieve compliance with the requirements for best technology available for minimizing adverse environmental impacts associated with cooling water intake structures. Four of these are based on meeting the applicable performance standards and the fifth allows the facility to request a site-specific determination of best technology available for minimizing adverse environmental impacts under certain circumstances. EPA has established these compliance alternatives for meeting the performance standards to provide a significant degree of flexibility to Phase II existing facilities, to ensure that the rule requirements are economically practicable, and to provide the ability for Phase II existing facilities to address unique site-specific factors. Application requirements vary based on the compliance alternative selected and, for some facilities, include development of a Comprehensive Demonstration Study. Application requirements are discussed later in this section. The five compliance alternatives are described in the following paragraphs.

Under § 125.94(a)(1)(i) and (ii), a Phase II existing facility may demonstrate to the Director that it has already reduced its flow commensurate with a closed-cycle recirculating system, or that it has already reduced its design intake velocity to 0.5 ft/s or less. If a facility can demonstrate to the Director that it has reduced, or will reduce, flow commensurate with a closed-cycle recirculating system, the facility is deemed to have met the performance standards to reduce impingement mortality and entrainment (see § 125.94 (a)(1)(i)). Those facilities would not be required to submit a Comprehensive Demonstration Study with their NPDES application. If the facility can demonstrate to the Director that is has reduced, or will reduce maximum through-screen design intake velocity to 0.5 ft/s or less, the facility is deemed to have met the performance standards to reduce impingement mortality only. Facilities that meet the velocity requirements would only need to submit application studies related to determining entrainment reduction, if subject to the performance standards for entrainment.

Under § 125.94(a)(2) and (3), a Phase II existing facility may demonstrate to the Director, either that its current cooling water intake structure configuration meets the applicable performance standards, or 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 specified performance standards in § 125.94(b) and/or the requirements in § 125.94(c).

Under § 125.94(a)(4), a Phase II existing facility may demonstrate to the Director that it has installed and is properly operating and maintaining a rule-specified and approved design and construction technology in accordance with § 125.99(a). Submerged cylindrical wedgewire screen technology is a rule-specified design and construction technology that may be used in instances in which a facility's cooling water intake structure is located in a freshwater river or stream and meets other criteria specified at § 125.99(a).

In addition, under this compliance alternative, a facility or other interested person may submit a request to the Director for approval of a different technology. If the Director approves the technology, it may be used by all facilities with similar site conditions under his or her jurisdiction if allowed under the State's administrative procedures. Requests for approval of a technology must be submitted to the Director and include a detailed description of the technology; a list of design criteria for the technology and site characteristics and conditions that each facility must possess in order to ensure that the technology can consistently meet the appropriate impingement mortality and entrainment performance standards in § 125.94(b); and information and data sufficient to demonstrate that all facilities under the jurisdiction of the Director can meet the relevant impingement mortality and entrainment performance standards in § 125.94(b) if the applicable design criteria and site characteristics and conditions are present at the facility. A Director may only approve an alternative technology following public notice and opportunity for comment on the approval of the technology (§ 125.99(b)).

Under § 125.94(a)(5) (i) or (ii), if the Director determines that a facility's costs of compliance would be significantly greater than the costs considered by the Administrator for a like facility to meet the applicable performance standards, or that the costs of compliance would be significantly greater than the benefits of meeting the applicable performance standards at the facility, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact. Under this alternative, a facility would either compare its projected costs of compliance using a particular technology or technologies to the costs the Agency considered for a like facility in establishing the applicable performance standards, or compare its projected costs of compliance with the projected benefits at its site of meeting the applicable performance standards of today's rule (see section IX.H). If in either case costs are significantly greater, the technology selected by the Director must achieve an efficacy level that comes as close as practicable to the applicable performance standards without resulting in significantly greater costs.

During the first permit term, a facility that chooses compliance alternatives in § 125.94(a)(2), (3), (4), or (5) may request that compliance with the requirements of this rule be determined based on the implementation of a Technology Installation and Operation Plan indicating how the facility will install and ensure the efficacy, to the extent practicable, of design and construction

technologies and/or operational measures, and/or a Restoration Plan (§ 125.95(b)(5)). The Technology Installation and Operation Plan must be developed and submitted to the Director in accordance with § 125.95(b)(4)(ii). The Restoration Plan must be developed in accordance with § 125.95(b)(5). During subsequent permit terms, if the facility has been in compliance with the construction, operational, maintenance, monitoring, and adaptive management requirements in its TIOP and/or Restoration Plan during the preceding permit term, the facility may request that compliance during subsequent permit terms be based on its remaining in compliance with its TIOP and/or Restoration Plan, revised in accordance with applicable adaptive management requirements if the applicable performance standards are not being met.

Three sets of data are required to be submitted 180 days prior to expiration of a facility's existing permit by all facilities regardless of compliance alternative selected (see § 122.21(r)(2)(3) and (5)). These are:

- Source Water Physical Data: A narrative description and scaled drawings showing the physical configuration of all source waterbodies used by the facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the waterbody 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 and the results of such studies; and locational maps.
- Cooling Water Intake Structure Data: A narrative description of the configuration of each of its facility's cooling water intake structures and where it is located in the waterbody and in the water column; latitude and longitude in degrees, minutes, and seconds for each of its cooling water intake structures; a narrative description of the operation of each of its 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; 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.
- Cooling Water System Data: A narrative description of the operation of each cooling water system, its relationship to the cooling water intake structures, proportion of the design intake flow that is used in the system, the number of days of the year the system is in operation, and seasonal changes in the operation of the system, if applicable; and engineering calculations and supporting data to support the narrative description.

In addition to the specified data facilities are require to submit, some facilities are also required to conduct a Comprehensive Demonstration Study. Specific requirements for the Comprehensive Demonstration Study vary based on the compliance alternative selected. Exhibit II summarizes the Comprehensive Demonstration Study requirements for each compliance alternative. Specific details of each Comprehensive Demonstration Study component are provided in section IX of this preamble.

EXHIBIT V–2.—SUMMARY OF COMPREHENSIVE DEMONSTRATION STUDY REQUIREMENTS FOR COMPLIANCE ALTERNATIVES

Compliance alternative (§ 125.94(b))	Comprehensive demonstration study requirements (§ 125.95(b))
1—Demonstrate facility has reduced flow commensurate with closed-cycle recirculating system.	None.
1—Demonstrate facility has reduced design intake velocity to ≤ 0.5 ft/s	No requirements relative to impingement mortality reduction. If subject to entrainment performance standard, the facility must only address entrainment in the applicable components of its Comprehensive Demonstration Study, based on the compliance option selected for entrainment reduction.
2—Demonstrate that existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards.	Proposal for Information Collection. Source Waterbody Flow Information. Impingement Mortality and/or Entrainment Characterization Study (as appropriate). Technology and Compliance Assessment Information —Design and Construction Technology Plan —Technology Installation and Operation Plan Restoration Plan (if appropriate). Verification Monitoring Plan.
3—Demonstrate that facility has selected design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the performance standards.	Proposal for Information Collection. Source Waterbody Flow Information. Impingement Mortality and/or Entrainment Characterization Study (as appropriate). Technology and Compliance Assessment Information —Design and Construction Technology Plan —Technology Installation and Operation Plan Restoration Plan (if appropriate). Verification Monitoring Plan.
4—Demonstrate that facility has installed and properly operates and maintains an approved technology.	Technology Installation and Operation Plan. Verification Monitoring Plan.

EXHIBIT V–2.—SUMMARY OF COMPREHENSIVE DEMONSTRATION STUDY REQUIREMENTS FOR COMPLIANCE ALTERNATIVES—Continued

Compliance alternative (§ 125.94(b))	Comprehensive demonstration study requirements (§ 125.95(b))
5—Demonstrate that a site-specific determination of BTA is appropriate	Proposal for Information Collection. Source Waterbody Flow Information. Impingement Mortality and/or Entrainment Characterization Study (as appropriate). Technology Installation and Operation Plan. Restoration Plan (if appropriate). Information to Support Site Specific Determination of BTA including: —Comprehensive Cost Evaluation Study (cost-cost test and cost-benefit test); —Valuation of Monetized Benefits of Reducing IM&E (cost-benefit test only); —Site-Specific Technology Plan (cost-cost test and cost-benefit test); Verification Monitoring Plan.

The requirements in today's final rule are implemented through NPDES permits issued under section 402 of the CWA. Permit applications submitted after the effective date of the rule must fulfill rule requirements. However, facilities whose existing permit expires before [insert four years after date of publication in the FR], may request a schedule for submission of application materials that is as expeditious as practicable but does not exceed [insert three years and 180 days after date of publication in the FR], to provide sufficient time to perform the required information collection requirements. Phase II existing facilities must comply with this final rule when they become subject to an NPDES permit containing these requirements.

Finally, today's rule preserves each State's right to adopt or enforce more stringent requirements (see § 125.90(d)). It also provides that if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements in its NPDES program that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94, the Administrator must approve such alternative regulatory requirements (§ 125.90(c)).

VI. Summary of Most Significant Revisions to the Proposed Rule

A. Data Updates

Based on comments received, additional information made available, and the results of subsequent analyses, EPA revised a number of assumptions that were used in developing the engineering costs, the information collection costs, the economic analyses, and the benefits analyses. These new assumptions are presented below and were used in the analyses in support of this final rule.

1. Number of Phase II Facilities

Since publishing the NODA, EPA continued to verify design flow information for facilities that had been classified as either Phase II (large, existing power production) or Phase III (smaller, power producing or manufacturing) facilities. This verification resulted in the following changes: One facility that was classified as a Phase II facility at proposal was reclassified as being out of scope of the section 316(b) regulation, as it ceased operating. Four facilities that were classified as Phase III facilities at proposal based on projected design intake flow were reclassified as Phase II facilities. As a result, the overall number of Phase II facilities increased from 540 to 543 facilities.[42] For the final rule, all costs, benefits, and economic analyses are based on the updated set of Phase II facilities.

The reason for the change is that the Agency revised the estimated design intake flows for facilities that responded to the short-technical questionnaire EPA used to collect information for this rule. The Agency has now adopted a more robust set of annual flow data (using all the years of data collected for the final rule, rather than only flows for 1998 as reported at proposal). This change altered the calculated design intake flows for the facilities that provided responses to the short-technical questionnaire that EPA used to collect data. Facilities that provided responses to the detailed questionnaire were unaffected, as the Agency collected maximum design intake flows directly through the detailed questionnaire.

2. Technology Costs

Since publishing the NODA, EPA used new information to revise the capital and operation and maintenance (O&M) costs for several compliance technologies, including those used as the primary basis for the final rule. Overall, the cost updates resulted in the following changes: total capital costs decreased by 5 percent and total operation and maintenance costs decrease by 3 percent. These comparisons are based on the raw costs, adjusted to year-2002 dollars, which have not been discounted or annualized.[43] The revised costing assumptions are discussed in detail in section VI.3.

3. Permitting and Monitoring Costs

Since proposal, EPA made several corrections and revisions to its burden and cost estimates for implementing the information collection requirements of today's rule, based on comments received and additional analysis. The following corrections and revisions were made since proposal:

- EPA corrected the hourly rates for the statistician and biological technician labor categories, which were inadvertently transposed at proposal.
- EPA increased the burdens associated with impingement and entrainment monitoring for the Impingement Mortality and Entrainment Characterization Study.

[42] Note that these numbers are unweighted. [As with many surveys, EPA was able to obtain data from most, but not all of the facilities potentially subject to this rule. To estimate the characteristics for those facilities that were not surveyed, EPA assigned a statistically derived sample weight to those facilities for which data were collected.] On a sample-weighted basis, the number of Phase II facilities increased from 551 to 554. The number of Phase II facilities modeled by the Integrated Planning Model (IPM) increased from 531 to 535.

[43] Based on additional research conducted after NODA publication and prior to issuance of the final rule, EPA changed the projected compliance response for some facilities. These changes, together with the increase in the number of in-scope Phase II facilities, contributed to the change in total compliance costs.

• EPA revised the pilot study costs to assume that only a subset of facilities which are projected to install new technologies will perform pilot studies, and to be proportional to the projected capital costs for installing these new technologies in order to comply with the rule. EPA also developed an alternative national cost estimate using slightly different assumptions with regard to pilot study costs (see section XI).

• EPA adjusted the facility-level costs to account for facilities that were projected to demonstrate compliance through the installation of a wedge-wire screen in a freshwater river under the compliance alternative in 125.94(a)(4).

4. Net Installation Downtime for Non-recirculating Cooling Tower Compliance Technologies

In developing the proposal for this rule, the Agency estimated that technologies other than recirculating cooling towers would not require installation downtime for construction. However, the Agency amended this outlook for the NODA and published revised estimates of net construction downtimes for complying facilities installing a subset of technologies analyzed and developed as candidates for best technology available (BTA). Based on comments received on the NODA, the Agency has conducted further research into the construction downtimes that it used in the NODA for certain technologies. For the final regulation analysis, the Agency has adopted minor revisions to the construction downtimes for certain technologies, with the general effect being an increase in the net construction downtimes for a few technologies that the Agency views as candidates for reducing entrainment. (Net downtime was estimated by subtracting 4 weeks from total downtime, based on an assumption that facilities will schedule construction downtime during a 4 week period of normal downtime unrelated to the rule, for example, for routine maintenance.) As such, the Agency projects that a significant number of facilities expected to comply with the entrainment reduction requirements of the rule will have increased downtime costs compared to the NODA and the proposal analyses. The final costs of this rule reflect these changes, which are further discussed in Section X and the Technical Development Document.

B. Regulatory Approach, Calculation Baseline, and Measuring Compliance

1. Regulatory Approach

EPA has largely adopted the proposed rule with some restructuring and one significant change: an additional compliance alternative, the approved technology option (§ 125.94(a)(4)) which was discussed in detail in the NODA (68 FR 13539). The restructuring of the rule language now makes the reduction of flow commensurate with a closed-cycle recirculating system a separate compliance alternative, such that the rule now includes five compliance alternatives. In addition, EPA has clarified that facilities may comply with the rule requirement in section 125.94 by successfully implementing the construction, operational, maintenance, monitoring, and adaptive management requirements in a Technology Installation and Operation Plan developed in accordance with § 125.95(b)(4)(ii) and/or a Restoration Plan developed in accordance with § 125.95(b)(5). These plans must be designed and adaptively managed to meet the applicable performance standards in § 125.94(b) and (c). The following discussion describes the regulatory approach of the final rule, as developed through the proposed rule and the NODA.

EPA proposed requirements for the location, design, construction, and capacity of cooling water intakes based on the waterbody type and the volume of water withdrawn by a facility (67 FR 17122). EPA grouped waterbodies into five categories, as in the Phase I regulation—freshwater rivers and streams, lakes and reservoirs, Great Lakes, estuaries and tidal rivers, and oceans. In general, the more sensitive or biologically productive the waterbody, the more stringent were the requirements proposed. The proposed requirements also varied based on the percentage of the source waterbody withdrawn and the capacity utilization rate.

Under the proposed rule, a facility could choose one of three compliance options: (1) Demonstrate that the facility currently meets the specified performance standards, (2) select and implement design and construction technologies, operational measures, or restoration measures that will, in combination with any existing design and construction technologies, operational measures, or restoration measures, meet the specified performance standards, and/or (3) demonstrate that the facility qualifies for a site-specific determination of best technology available, because its costs of compliance are significantly greater than those considered by EPA during the development of the proposed rule or the facility's costs of compliance would be significantly greater than the benefits of compliance with the proposed performance standards at the facility. A facility could also use restoration measures in addition to or in lieu of design and construction technologies and/or operational measures to achieve compliance under any of the compliance options.

In the NODA, EPA sought comment on a proposed fourth compliance option (68 FR 13522, 1359–41). In response to comments expressing concern that the proposed Comprehensive Demonstration Study requirements (at § 125.95(b)) would impose a significant burden on permit applicants, EPA examined an additional, more streamlined compliance option under which a facility could implement certain specified technologies that have been predetermined by EPA or the permitting authority to be highly likely to meet applicable performance standards, in exchange for not having to perform most of the elements of the proposed Comprehensive Demonstration Study.

Two variations were offered in the NODA: (1) EPA would evaluate the effectiveness of specific technologies in achieving an 80 to 95 percent reduction in impingement mortality and a 60 to 90 percent reduction in entrainment and then specify applicability criteria to ensure that the technology would meet the performance standards at facilities satisfying the criteria, or (2) EPA would establish the criteria and a process for States to pre-approve intake structure control technologies as likely to meet the performance standards. For facilities located on freshwater rivers and streams and meeting specified criteria, wedgewire screens would be expected to meet the proposed performance standards. EPA also recognized that these two variations are not mutually exclusive and either or both could be adopted in the final rule.

To a large extent, EPA is adopting the regulatory framework put forth in the proposed rule and supplemented by the NODA. To the three compliance alternatives originally proposed, EPA has added an approved technology alternative discussed in the NODA and included reduction of flow commensurate with closed-cycle cooling as a distinct alternative.

2. Calculation Baseline

Also, in response to comments that the proposed definition for the calculation baseline was overly vague,

EPA published in the NODA a series of additional considerations regarding the calculation baseline and a new definition of it taking these considerations into account (68 FR 13522, 13580–81). The specifications are as follows and the new definition is in today's final rule at § 125.93.

- Baseline cooling water intake structure is located at, and the screen face is parallel to, the shoreline or another depth if this would result in higher baseline impingement mortality and entrainment than the surface. EPA believes it is appropriate to allow credit in reducing impingement mortality from screen configurations that employ angling of the screen face and currents to guide organisms away from the structure before they are impinged.
- Baseline cooling water intake structure opening is located at or near the surface of the source waterbody. EPA believes it is appropriate to allow credit in reducing impingement mortality or entrainment due to placement of the opening in the water column.
- Baseline cooling water intake structure has a traveling screen with the standard 3/8 inch mesh size commonly used to keep condensers free from debris. This allows a more consistent estimation of the organisms that are considered ''entrainable'' vs. ''impingeable'' by specifying a standard mesh size that can be related to the size of the organism that may potentially come in contact with the cooling water intake structure.
- Baseline practices, procedures, and structural configurations are those that the facility would maintain in the absence of any structural or operational controls implemented in whole or in part for the purpose of reducing impingement mortality and entrainment. This recognizes and provides credit for any structural or operational controls, including flow or velocity reductions, a facility had adopted that reduce impingement mortality or entrainment.

EPA also requested comment on allowing an ''as built'' approach under which facilities could choose to use the existing level of impingement mortality and entrainment as the calculation baseline if they did not wish to take credit for the previously adopted measures. This could significantly simplify the monitoring and calculations necessary to determine the baseline.

In the NODA, EPA also discussed an approach to compliance under which facilities would have an ''optimization period'' during which they would not be required to meet performance standards but, rather, would install, operate and maintain the selected control technologies to minimize impingement mortality and entrainment. EPA suggested several possible durations for this optimization period, and also requested comment on not specifying the duration, but instead leaving it up to the Director. 68 FR 13586 (March 19, 2003).

For the final rule, EPA adopted the NODA definition of calculation baseline with some modifications. More specifically, EPA clarified the calculation baseline to include consideration of intake depth other than at or near the surface in determining the baseline. EPA also adopted the ''as built'' approach for the calculation baseline, which allows facilities to use current levels of impingement mortality and entrainment as the calculation baseline if the facility is configured similarly to the criteria set up for the calculation baseline.

Finally, EPA clarified how compliance with the requirements in § 125.94 should be determined. In particular, the final rule provides that compliance during the first permit term (and subsequent permit terms if specified conditions are met) may be determined based on compliance with the construction, operational, maintenance, monitoring, and adaptive management requirements in an approved Technology Installation and Operation Plan and/ or an approved Restoration Plan, that has been developed in accordance with specified requirements to meet the applicable performance standards.

3. Measuring Compliance

EPA has clarified how compliance will be measured. At proposal, EPA received comment from the industry that there were uncertainties associated with how compliance with the proposed requirements, particularly the numeric impingement mortality and entrainment performance standards, would be determined. Under the proposed rule and NODA, determining compliance, while obviously dependent on the compliance alternative selected, would, in general, require the development of waterbody characterization data, including key criteria (species, parameters, etc.) to be measured and monitored; a determination of baseline environmental impacts; implementation of cooling water intake technologies (assuming the facility does not already meet applicable performance standards and pursues this alternative); monitoring the selected criteria; and an evaluation of compliance with the applicable numeric impingement mortality and/or entrainment permit standard. The industry stakeholders were concerned that using the performance standard to set enforceable performance requirements would require facilities to collect and analyze greater amounts of data than EPA projected to be able to account for the variability inherent in biological and efficacy data needed to support compliance determinations in spite of overall good technology performance. These stakeholders stated that setting enforceable performance standards would lead to greater administrative burdens and delays when determining numeric standards and monitoring requirements to determine compliance. They were also concerned that establishing numeric standards would stifle innovation because of fears that a technology would not perform as anticipated. These stakeholders suggested that the performance standards in the rule serve as a consistent basis for setting permit conditions and for identifying technologies; installing, operating, and maintaining the chosen technology; performing compliance monitoring; and refining or adjusting operation, maintenance, or other factors in light of initial monitoring.

Today's rule allows facilities to develop and implement a Technology Installation and Operation Plan that would, when used, serve as the primary mechanism upon which compliance with the performance standard requirements of this rule is determined. EPA has established this compliance mechanism because it will ensure that Phase II existing facilities will continually be required to achieve a level of performance that constitutes, for them, best technology available for minimizing adverse environmental impact. For facilities that choose to comply with applicable requirements in whole or in part through the use of restoration measures, the Restoration Plan would serve a similar function. The Restoration Plan is discussed in detail in section IX.

An existing facility that chooses to use a Technology Installation and Operation Plan must (1) select design and construction technologies, operational measures, and/or restoration measures that will meet the performance standards, and (2) prepare a Technology Installation and Operation Plan documenting what, how and when it will install, operate, maintain, monitor, assess, and adaptively manage the design and construction technologies and operational measures to meet the performance standards, including operational parameters and

inspection schedules, etc. Each facility using a Technology Installation Operation Plan must specify key parameters regarding monitoring (*e.g.*, parameters to be monitored, location, and frequency), optimization activities and schedules for undertaking them, ways of assessing efficacy (including adaptive management plan for revising design and construction technologies or operational measures) that ensure that such technologies and measures are effectively implemented, and revised as needed to meet performance standards. This plan must be reviewed and approved by the Director and evaluated for sufficiency and/or revised at each permit term to ensure that the facility is moving expeditiously toward attainment of the applicable performance standards. Once approved, each Phase II existing facility must implement the plan according to its terms. Compliance with the final rule's performance standards during the permit term will be assessed based on the terms of the plan. If a facility does not comply with the plan, the Director has discretion to implement the performance standards or requirements through specifying numeric impingement mortality and entrainment requirements or technology prescription (for the site-specific alternative) in the permit. In addition, a facility that is unable to meet the applicable performance standards using the Technology Installation and Operation Plan approach may request in a subsequent permit that the Director make a site-specific determination of best technology available in accordance with § 125.94(a)(5).

Under these provisions, compliance is determined in terms of whether the facility is implementing, in accordance with the Technology Installation and Operation Plan schedule, the technologies, measures and practices determined by the Director to be the best technologies available for minimizing adverse environmental impact for that facility. The Section 316(b) requirements for the facility are expressed non-numerically, which is analogous to the use of best management practices under other provisions of the CWA. See, *e.g.*, sections 402(a) and 402(p). While EPA has been able to calculate ranges for national performance standards based on model technologies, EPA has insufficient data to determine—as it routinely can do in the context of effluent limitations guidelines and standards—that use of those model technologies will consistently result in achievement of those standards.

The record persuades EPA that there is uncertainty associated with the application and long-term efficacy of these technologies at all facilities under the multitude of different site-specific factors and conditions under which these technologies might have to perform. In addition, even at a single site, there is substantial year-to-year variability in species abundance and composition, as well as other natural and anthropogenic factors, that may affect the performance of a particular technology installed at the facility and it is unclear how this would affect the efficacy of the technology. The Technology Installation and Operation Plan provisions are intended to account for this. For example, meeting numerical reduction standards may not be possible at some sites either because hydrological conditions are not conducive to technological effectiveness, or due to species sensitivity. A Technology Installation and Operation Plan allows a facility, working with the Director, to identify, install, and adaptively manage technologies suited to its particular site conditions. In addition, measuring impingement mortality and entrainment reduction is difficult and would require a substantial amount of multi-year biological data and analysis is burdensome for the facility to develop, is often well beyond the type of information EPA can expect State Directors to be able to develop when monitoring compliance. A Technology Installation and Operation Plan simplifies enforcement: if a facility fails to meet the schedules and other terms of its plan, it is violating its section 316(b) requirements; there is no need to engage in extensive debate about the meaning of complex biological data. This does not mean that biological monitoring and assessment of success in meeting applicable performance standards is not important. If fact, it is critical to the compliance approach adopted in the rule in that it informs facilities and permit authorities when adaptive management, including revisions to the Technology Installation and Operation Plan, are needed to meet the performance standards.

The Technology Installation and Operation Plan provisions also reflect that there is uncertainty about how long it would take a facility to adaptively manage the technology and determine the appropriate operating conditions for the technology to meet the applicable performance requirements. Data and comments available to EPA suggest that it is common for existing facilities to adjust technologies over time in order to achieve optimum performance and, therefore, an adaptive management approach as specified under a plan is appropriate. See documentation at DCN# 1–3019–BE, 4–1830, and 6–5001. EPA understands that adaptive management is going to be necessary for a number of facilities because there are relatively few rigorous evaluations of efficacy under different site and operating conditions. The available studies may also be limited in the numbers and types of species that they have evaluated and they may not show the long term demonstrated effectiveness (and/or consistency of effectiveness) of the technology with the added uncertainties associated with the variability of natural biological systems. By requiring facilities to employ adaptive management principles, EPA assures that the facility will be implementing, on an ongoing basis, the best array of technologies available to them.

As noted above, the Technology Installation and Operation Plan provisions also simplify implementation because they identify the specific compliance requirements needed to meet the performance standard ranges and reduce some of the burden associated with measuring and enforcing compliance with these ranges for both existing facilities and Directors. Directors and facilities may find use of a Technology Installation and Operation Plan preferable because it is less feasible to develop and accurately evaluate biological monitoring data over a relatively short period, as would be required by measuring compliance against a numeric performance standard. Rather, the plan provisions allow implementation to be adaptive, and allow for data development and assessment to proceed in a manner that is appropriate for the facility, technology, and waterbody characteristics.

EPA has the legal authority to express section 316(b) requirements in terms of design criteria, in addition to or in place of enforceable numeric performance standards. EPA employed a design criterion approach in the Phase I rule, when EPA was able to identify a single nationally available and economically practicable technology for the category of new facilities as a whole, in that case closed-cycle recirculating cooling technology. In this rule, EPA was not able to identify a uniform set of technologies that would be available and economically practicable for all existing facilities, but EPA was able to articulate a uniform nationally applicable principle in the form of the performance standards in § 125.94(b), by

which such technologies could be identified by the Director and implemented through the use of a Technology Installation and Operation Plan designed to achieve them. While the technology solution was different in Phase I and Phase II, the legal principle is the same. In addition, EPA has the legal authority to identify section 316(b) requirements as an evolving set of technologies, rather than a single technology array fixed in time. Section 316(b) requires that any technology selected under that section must be the best available to the facility. This term encompasses consideration of effectiveness, costs, non-water quality environmental impacts, feasibility issues and a host of other considerations relevant to existing facilities. See section 304(b)(2)(B). The record indicates that for some facilities, the question of what are *available* technologies and, among those, what is the *best* technology, may change over time. A Technology Installation and Operation Plan is intended to assure that at all times a facility is implementing a technology—or a technology plan—that reflects the best of all technologies consistent with uniform guiding principles in the form of performance standards available to them in light of their site-specific circumstances.

Finally, EPA notes that the way in which performance standards guide technology selection and implementation varies slightly among the five compliance options. For facilities complying with § 125.94(a)(1), the technologies identified are so effective that EPA is confident that any facility employing them will meet the performance standards, so a Technology Installation and Operation Plan and performance monitoring are not required. Because these technologies are not available to all Phase II existing facilities, however, EPA has provided alternative compliance options. For facilities complying in accordance with § 125.94(a)(2), (3), or (4), compliance is generally achieved by implementation of a Technology Installation and Operation Plan designed to meet applicable performance standards. Finally, for facilities that comply in accordance with § 125.94(a)(5) for whom even compliance in accordance with § 125.94(a)(2), (3), or (4) is not available because of significantly higher costs, compliance is achieved by implementation of a Technology Installation and Operation Plan that achieves an efficacy as close as practicable to the applicable performance standards.

4. Site-Specific Requirements

a. Costs Significantly Greater Than Costs Considered by the Administrator

In today's final rule, a facility that demonstrates to the Director that the costs of compliance with the performance standards and/or restoration requirements would be significantly greater than the costs considered by the Administrator for a similar facility, will be given a site-specific determination of best technology available for minimizing adverse environmental impact. The standards of the rule have not changed since proposal, with the exception of one clarification: in the final rule, the alternative site-specific requirements established by the Director must achieve an efficacy that is as close as practicable to the performance standards and/or restoration requirements specified in § 125.94(b) and (c). This was not specified in the proposed rule language. In addition, today's final rule also explains how a facility should calculate costs considered by the Administrator for a similar facility, for comparison with the costs of compliance for the facility. EPA details these steps in § 125.94(a)(5)(i)(A)–(F).

In the proposed rule, submittal requirements for facilities requesting a variance based upon a cost-cost test were identical to those for facilities requesting a variance based on a cost-benefit test. Thus, a facility requesting a site-specific determination based on a cost-cost comparison had to submit three studies: the Cost Evaluation Study, the Valuation of Monetized Benefits of Reducing Impingement and Entrainment, and the Site-Specific Technology Plan. In the final rule, by contrast, a facility must submit only the Cost Evaluation Study and the Site-Specific Technology Plan.

Under the Comprehensive Cost Evaluation Study detailed at proposal, a facility must submit detailed engineering cost estimates to document the costs of implementing the technologies and/or operational measures in the facility's Design and Construction Plan. In the final rule, the facility must provide, in addition to the engineering cost estimates, a demonstration that the costs significantly exceed the benefits of complying with the applicable performance standards. EPA did not make significant changes to the requirements under the Site-Specific Technology Plan.

In summary, the major changes in the cost-cost analysis are as follows:

- In the final rule, EPA has specified how a facility must ''calculate costs considered by the Administrator'' for comparison with the facility's estimate of the costs of compliance with the final rule,
- Elimination of the requirement to submit a Valuation of Monetized Benefits of Reducing Impingement and Entrainment, and
- Addition of the requirement to demonstrate that the costs significantly exceed the costs considered by the Administrator for a similar facility, under the Cost Evaluation Study.

b. Costs Significantly Greater Than Benefits

In today's final rule, a facility that demonstrates to the Director that the costs of compliance with the performance standards and/or restoration requirements would be significantly greater than the benefits will be given a site-specific determination of best technology available for minimizing adverse environmental impact. The standards of the rule have not changed since proposal, with the exception of one clarification: in the final rule, the alternative site-specific requirements established by the Director must achieve an efficacy that is as close as practicable to the performance standards and/or restoration requirements specified in § 125.94(b) and (c). This was not specified in the proposed rule language.

In the final rule, as in the proposal, a facility requesting a site-specific determination based on a cost-benefit comparison must submit three studies: the Cost Evaluation Study, the Benefits Valuation Study (referred to in proposal as Valuation of Monetized Benefits of Reducing Impingement and Entrainment), and the Site-Specific Technology Plan. The final rule has both added and clarified requirements for the first two components relative to the proposal, but has provided no substantive changes in the requirements for the Site-Specific Technology Plan.

Under the Comprehensive Cost Evaluation Study detailed at proposal, a facility must submit detailed engineering cost estimates to document the costs of implementing the technologies and/or operational measures in the facility's Design and Construction Plan. In the final rule, the facility must provide, in addition to the engineering cost estimates, a demonstration that the costs significantly exceed the benefits of complying with the applicable performance standards.

Additional clarifications are found in the Benefits Valuation Study. In the proposed rule, a facility was required to submit (1) a description of the

methodology used to estimate the benefits' value, (2) the basis for assumptions and quantitative estimates, and (3) an uncertainty analysis. In the final rule, EPA has retained the three submittal requirements. Under the first component, EPA has specified the categories of potential valuation estimates in the final rule, namely commercial, recreational and ecological benefits. EPA has added that a facility should include non-use benefits if applicable. To the second component, EPA has added that the basis may include a determination of entrainment survival if the Director approved such a study. Requirements for the uncertainty analysis remain unchanged from proposal. In the final rule, EPA has added that a facility will be required to submit peer review of the items submitted (upon the Director's request) and a narrative description of non-monetized benefits that would result at the site if the facility was to meet applicable performance standards.

In summary, the major changes in the cost-benefit analysis are as follows:

- Facilities will be required to achieve an efficacy that is ''as close as practicable'' to performance standards and/ or restoration requirements,
- Facilities will need to specifically demonstrate that costs are significantly greater than the benefits of compliance, and
- Facilities will have additional requirements under the Benefits Valuation Study.

VII. Basis for the Final Regulation

A. Why Is EPA Establishing a Multiple Compliance Alternative Approach for Determining Best Technology Available for Minimizing Adverse Environmental Impact?

Today's final rule authorizes a Phase II existing facility to choose one of five alternatives for establishing the best technology available for minimizing adverse environmental impacts at the facility. A facility may (1) demonstrate that it has reduced or will reduce its cooling water intake flow commensurate with a closed-cycle, recirculating system, and or that it has reduced, or will reduce, the maximum through-screen design intake velocity to 0.5 ft/s or less; (2) demonstrate that its existing design and construction technologies, operational measures, and/or restoration measures meet the applicable performance standards and restoration requirements; (3) demonstrate that it has selected design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the applicable performance standards and restoration requirements; (4) demonstrate that it will install or has installed and properly operates and maintains an approved design and construction technology; or (5) demonstrate that it has selected, installed, and is properly operating and maintaining, or will install and properly operate and maintain, design and construction technologies, operational measures, and/or restoration measures that the Director has determined to be the best technology available for the facility based on application of a specified cost-to-cost test or a cost-to-benefit test. The basis for each of the five compliance alternatives is explained in section VII.C. of this preamble.

The rule establishes performance standards for the reduction of impingement mortality and entrainment. EPA established these performance standards in part based on a variety of technologies, but the rule does not mandate the use of any specific technology. These performance standards vary by waterbody type (*i.e.*, freshwater river/stream, estuary/tidal river, ocean, Great Lake, or lake/reservoir) and the capacity utilization rate of the facility. They may be met in whole or in part using restoration measures after demonstrating, among other things, that the facility has evaluated the use of design and construction technologies and operational measures at the site. The basis for the performance standards is explained in section VII.B. of this preamble and the basis for the restoration requirements is explained at section VII.F. of this preamble. For a more detailed description of the rule, see sections V and IX of this preamble. These requirements reflect the best technology available for minimizing adverse environmental impact from cooling water intake structures.

EPA adopted this regulatory scheme because it provides a high degree of flexibility for existing facilities to select the most effective and efficient approach and technologies for minimizing adverse environmental impact associated with their cooling water intake structures. This approach also reflects EPA's judgment that, given the wide range of various factors that affect the environmental impact posed by Phase II existing facilities, different technologies or different combinations of technologies can be used and optimized to achieve the performance standards.

B. Why and How Did EPA Establish the Performance Standards at These Levels?

1. Overview of Performance Standards

The final rule establishes two types of performance standards, one that addresses impingement mortality and one that addresses entrainment. EPA used impingement mortality and entrainment as a metric for performance because these are primary and distinct types of harmful impacts associated with the use of cooling water intake structures (*see also* section IV). Both the impingement mortality and the entrainment performance standards apply to facilities demonstrating compliance under alternatives two, three, and four, described above (§ 125.94(a)(2), (3), and (4)). In addition, the Director's site-specific alternative requirements must be as close as practicable to the applicable performance standards under § 125.94. Performance standards for entrainment do not apply to facilities with low utilization capacity, those with a design intake flow of five percent or less of the mean annual flow of a freshwater river or stream, and those that withdraw cooling water from a lake (other than one of the Great Lakes) or reservoir because such facilities have a low propensity for causing significant entrainment impacts due to limited facility operation, low intake flow, or general waterbody characteristics. The impingement mortality performance standard requires a Phase II existing facility that complies under § 125.94(a)(2), (3), and (4) to reduce impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline.

Both an entrainment performance standard and an impingement mortality standard apply to facilities with a capacity utilization rate of 15 percent or greater and that withdraw cooling water from a tidal river, estuary, ocean, one of the Great Lakes, as well as facilities that use cooling water from a freshwater river or stream and the design intake flow of the cooling water intake structure is greater than five percent of the mean annual flow because EPA believes that these facilities cause more significant entrainment impacts. The entrainment standard, where applicable, requires a Phase II facility to reduce entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline.

2. Basis for Performance Standards

Overall, the performance standards that reflect best technology available under today's final rule are not based on a single technology but, rather, are

based on consideration of a range of technologies that EPA has determined to be commercially available for the industries affected as a whole and have acceptable non-water quality environmental impacts, except for some potential regional energy (reliability) impacts that will be minimized to the extent possible through flexible compliance options. Because the requirements implementing section 316(b) are applied in a variety of settings and to Phase II existing facilities of different types and sizes, no single technology is most effective at all existing facilities, and a range of available technologies has been used to derive the performance standards.

EPA developed the performance standards for impingement mortality reduction based on an analysis of the efficacy of the following technologies: (1) Design and construction technologies such as fine and wide-mesh wedgewire screens, as well as aquatic filter barrier systems, that can reduce mortality from impingement by up to 99 percent or greater compared with conventional once-through systems; (2) barrier nets that may achieve reductions of 80 to 90 percent; and (3) modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems that have achieved reductions in impingement mortality ranging from 60 to 90 percent as compared to conventional once-through systems.

Available performance data for entrainment reduction are not as comprehensive as impingement data. However, aquatic filter barrier systems, fine mesh wedgewire screens, and fine mesh traveling screens with fish return systems have been shown to achieve 80 to 90 percent or greater reduction in entrainment compared with conventional once-through systems. EPA notes that screening to prevent organism entrainment may cause impingement of those organisms instead.

3. Discussion of Key Aspects of Performance Standards

The performance standards at § 125.94(b)(1),(2), and (3) are based on the type of waterbody in which the intake structure is located, the volume of water withdrawn by a facility, and the facility capacity utilization rate. Under the final rule, EPA has grouped waterbodies into five categories: (1) Freshwater rivers or streams, (2) lakes or reservoirs, (3) Great Lakes, (4) tidal rivers and estuaries, and (5) oceans. The Agency considers location, one aspect of which is waterbody type, to be an important factor in addressing adverse environmental impact caused by cooling water intake structures. Because different waterbody types have the potential for different adverse environmental impacts, the requirements to minimize adverse environmental impact vary by waterbody type.

The reproductive strategies of tidal river and estuarine species, together with other physical and biological characteristics of those waters, make them more susceptible than other waterbodies to impacts from cooling water intake structures (66 FR 288857–288859; 68 FR 17140). In contrast, many aquatic organisms found in non-tidal freshwater rivers and streams are less susceptible to entrainment due to their demersal (bottom-dwelling) nature and the fact that they do not typically have planktonic (free-floating) egg and larval stages (66 FR 28857; 68 FR 17140). Comments on the proposed Phase II existing facility rule also acknowledge that waterbody type is an important factor in assessing the impacts of cooling water intake structures, although some commenters preferred a site-specific approach, and others maintained that all waters deserve the most rigorous technology. A number of States supported EPA's proposed approach.

Absent entrainment control technologies, entrainment at a particular site is generally proportional to intake flow at that site. As discussed above, EPA believes it is reasonable to vary performance standards by the potential for adverse environmental impact in a waterbody type. EPA is limiting the requirement for entrainment controls in fresh waters to those facilities that withdraw the largest proportion of water from freshwater rivers or streams because they have the potential to impinge and entrain larger numbers of fish and shellfish and therefore have a greater potential to cause adverse environmental impact. EPA is not requiring entrainment reductions in freshwater rivers or streams where facilities withdraw 5 percent or less of the source water annual mean flow because such facilities generally have a low propensity for causing significant entrainment impacts due to the low proportion of intake flow in combination with the characteristics of the waterbody.

There are additional performance standards for facilities withdrawing from a lake (other than one of the Great Lakes) or a reservoir. If such a facility proposes to increase the design intake flow of the cooling water intake structure, the increase in total design intake flow must not disrupt the natural thermal stratification or turnover pattern of the source water except in cases where the disruption does not adversely affect the management of fisheries § 125.94(b)(3)(iii)). The natural thermal stratification or turnover pattern of a lake is a key characteristic that is potentially affected by the intake flow (which can alter temperature and/or mixing of cold and warm water layers) and location of cooling water intake structures within such waterbodies. Cooling water intake structures withdrawing from the Great Lakes are required to reduce fish and shellfish impingement mortality by 80 to 95 percent and to reduce entrainment by 60 to 90 percent. As described in the Phase I proposed rule (65 FR 49086) and NODA (66 FR 28858), EPA believes that the Great Lakes are a unique system that should be protected to a greater extent than other lakes and reservoirs. Similar to oceans, large lakes such as the Great Lakes can possess estuarine-like environments in the lower reaches of tributary streams. For example, within the U.S., a total of 1,370 distinct coastal wetlands fringe the Great Lakes and the channels that connect the lakes. (2–016A Herdendorf, C.E. Great Lakes estuaries. Estuaries, 13(4): 493–503. 1990, pg. 493). The Agency is therefore specifying entrainment controls as well as impingement mortality controls for the Great Lakes. EPA has not applied the entrainment performance standard to lakes other than the Great Lakes because, in general, these waterbodies contain aquatic organisms that tend to be less impacted by entrainment than organisms in estuaries or fresh water rivers or streams.

The performance standards for facilities with cooling water intake structures located in a tidal river or estuary and with a capacity utilization rate of 15 percent or greater are to reduce impingement mortality by 80 to 95 percent and entrainment by 60 to 90 percent for fish and shellfish. As discussed previously, EPA believes estuaries and tidal rivers are more susceptible than other waterbodies to adverse impacts from impingement and entrainment.

The performance standards for facilities with cooling water intake structures located in an ocean are to reduce impingement mortality by 80 to 95 percent and entrainment by 60 to 90 percent for fish and shellfish. EPA is establishing requirements for facilities withdrawing from oceans that are similar to those for tidal rivers and estuaries because the coastal zone of oceans (from which coastal cooling water intake structures withdraw water)

are highly productive areas for fish and shellfish. (*See* the Phase I proposed rule (65 FR 45060) and documents in the record for the Phase I new facility rule (Docket # W–00–03) such as 2–013A through O, 2–019A–R11, 2–019A–R12, 2–019A–R33, 2–019A–R44, 2–020A, 3–0059). EPA is also concerned about the extent to which fishery stocks that rely upon tidal rivers, estuaries and oceans for habitat are overutilized and seeks to minimize the impact that cooling water intake structures may have on these species or forage species on which these fishery stocks may depend. Recent data demonstrate that approximately 78% of the fish stocks managed by the National Oceanic and Atmospheric Administration's National Marine Fishery Service (NMFS) are fully exploited, overfished, or collapsed (America's Living Oceans: Charting a Course for Sea Change, Pew Oceans Commission, June 4, 2003). (*See also* documents 2–019A–R11, 2–019A–R12, 2–019A–R33, 2–019A–R44, 2–020A, 2–024A through O, and 3–0059 through 3–0063 in the record of the Final New Facility Rule (66 FR 65256), Docket # W–00–03).

In accordance with the Phase II rule, facilities that operate with a capacity utilization rate of less than 15 percent are subject to the performance standard for impingement mortality only. EPA is not requiring, in today's rule, that these facilities control entrainment. EPA has several reasons for this. First, EPA has determined that entrainment control technology is not economically practicable in view of the reduced operating levels of these facilities. These facilities also tend to operate most often in mid-winter or late summer, which are times of peak energy demand but periods of generally low abundance of entrainable life stages of fish and shellfish. Finally, the total volume of water withdrawn by these facilities is significantly lower than for facilities operating at or near peak capacity, and as noted above, entrainment at a site is generally proportional to flow, absent entrainment controls. Consequently, EPA determined that it was neither necessary nor cost-effective for these facilities to reduce entrainment where the total volume of water withdrawn and the number of organisms that would be protected from entrainment is likely to be small. EPA is also allowing facilities with multiple, distinct cooling water intakes that are exclusively dedicated to different generating units to determine capacity utilization and applicable performance standards separately for each intake for the same reasons.

As in the Phase I rule, EPA is setting performance standards for minimizing adverse environmental impact based on a relatively easy to measure and certain metric—reduction of impingement mortality and entrainment. Although adverse environmental impact associated with cooling water intake structures can extend beyond impingement and entrainment, EPA has chosen this approach because impingement and entrainment are primary, harmful environmental effects that can be reduced through the use of specific technologies. In addition, where other impacts at the population, community, and ecosystem levels exist, these will also be reduced by reducing impingement and mortality. Using impingement mortality and entrainment as a metric provides certainty about performance standards and streamlines, and thus speeds, the issuance of permits.

EPA is expressing the performance standard in the form of ranges rather than a single performance benchmark because of the uncertainty inherent in predicting the efficacy of any one of these technologies, or a combination of these technologies, across the spectrum of facilities subject to today's rule. The lower end of the range is being established as the percent reduction that EPA, based on the available efficacy data, expects all facilities could eventually achieve if they were to implement and optimize available design and construction technologies and operational measures on which the performance standards are based. (*See* Chapter 4, ''Efficacy of Cooling Water Intake Structure Technologies,'' of the Phase II Existing Facility Technical Development Document, EPA–821–R–04–007, February 2004. Also, *see* EPA's 316(b) technology efficacy database, DCN 6–5000.) The lower end of the range also reflects, in part, higher mortality rates at sites where there may be more fragile species that may not have a high survival rate after coming in contact with fish protection technologies at the cooling water intake structure (*e.g.*, fine mesh screens). The higher end of the range is a percent reduction that available data show many facilities can and have achieved with the available technologies upon which the performance standards are based.

In specifying a range, EPA anticipates that facilities will select the most cost-effective technologies or operational measures to achieve the performance level (within the stated range) based on conditions found at their site, and that Directors will review the facility's application to ensure that appropriate alternatives were considered. Proper selection, operation, and maintenance of these technologies would serve to increase potential efficiencies of the technologies. EPA also expects that some facilities may be able to meet these performance requirements by selecting and implementing a suite (*i.e.*, more than one) of technologies and operational measures and/or, as discussed in this section, by undertaking restoration measures.

Several additional factors support EPA's expectation that the impingement mortality and entrainment reduction reflected in the performance standards can eventually be achieved by all facilities using the design and construction technologies and measures on which the standards were based. First, a significant portion of the available performance data reviewed is from the 1970s and 1980s (when section 316(b) was initially implemented) and does not reflect recent developments, innovations (*e.g.*, aquatic filter barrier systems, sound barriers), or experience using these technologies. These data, developed during early implementation of the CWA, do not fully reflect today's improved understanding of both how the various control technologies work and the various factors that reflect what constitutes and how to measure healthy aquatic conditions. Second, these conventional barrier and return system technologies have not been optimized on a widespread level to date, as would be encouraged by this rule. Available information indicates that facilities that use these cooling water intake structure technologies often achieve better results from the technologies through adjusting which technologies are applied and how they are used. Such optimization, which also benefits from the advances in understanding noted above, would be promoted under this rule as facilities work to achieve the performance standards. Third, EPA believes that some facilities could achieve further reductions (estimated at 15–30 percent) in impingement mortality and entrainment by providing for seasonal flow restrictions, variable speed pumps, systems conversions to closed-cycle, recirculating systems, and other operational measures and innovative flow reduction alternatives. Such operational measures could be used to supplement design and construction technologies where necessary to meet the performance standards. Facilities also could benefit from combining inexpensive technologies as a ''suite.'' For additional discussion, see chapter 4 in the Phase II Existing Facility Technical Development Document.

The calculation baseline used to determine compliance with

performance standards is defined in § 125.93 as an estimate of impingement mortality and entrainment that would occur at a site assuming (1) the cooling water system had been designed as a once-through system; (2) 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 (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment. In addition, the facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline. EPA's definition also clarifies the range of available information sources for the baseline. The calculation baseline may be estimated using: historical impingement mortality and entrainment data from the facility or from another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of the facility's cooling water intake structure; or current impingement mortality and entrainment data collected at the facility. Further, a facility may request that the calculation baseline be modified to be based on a location of the opening of the cooling water intake structure at a depth other than at or near the surface if it can demonstrate to the Director that the other depth would correspond to a higher baseline level of impingement mortality and/or entrainment. EPA decided to use this definition because it represents the most common default conditions the Agency could identify to give facilities credit for design and construction technologies, operational measures, and/or restoration measures that they have already implemented to minimize adverse environmental impact, while providing a clear and relatively simple definition. Based on comments received on the Phase II NODA, this calculation baseline definition includes additional criteria that EPA has added to provide clarity to the analysis. (Proposed changes to the calculation baseline were discussed in the Phase II NODA, see 68 FR 13580). In many cases, existing technologies at the site show some reduction in impingement and entrainment when compared to this baseline. In such cases, impingement mortality and entrainment reductions (relative to the calculated baseline) achieved by these existing technologies should be counted toward compliance with the performance standards. In addition, operational measures such as operation of traveling screens, employment of more efficient return systems, and even locational choices should be credited for any corresponding reduction in impingement mortality and entrainment. See section IX of this preamble for a discussion of how the calculation baseline is used to compare facility performance with the rule's performance standards.

C. What Is the Basis for the Five Compliance Alternatives That EPA Selected for Establishing Best Technology Available?

1. Meeting Performance Standards Through Reducing Intake Flow Commensurate With a Closed Cycle Recirculating System or Reduced Design Intake Velocity

Under § 125.94(a)(1)(i), any facility that reduces its flow to a level commensurate with a closed-cycle, recirculating cooling system meets the performance standards in today's rule because such a reduction in flow is deemed to satisfy any applicable impingement mortality and entrainment performance standards for all waterbodies. Facilities that select this compliance alternative either through the use of closed-cycle recirculating system technology at the plant, or by retrofitting their facility, will not be required to further demonstrate that they meet the applicable performance standards. Similarly, under 125.94(a)(1)(ii), any facility that reduces its design intake velocity to 0.5 ft/s or less is deemed to have met the performance standards for impingement mortality and is not required to demonstrate further that it meets the performance standards for impingement mortality.

Available data described in Chapter 3 of the Phase II Existing Facility Technical Development Document suggest that closed-cycle, recirculating cooling systems (*e.g.*, cooling towers or ponds) can reduce mortality from impingement by up to 98 percent and entrainment by up to 98 percent when compared with conventional once-through systems.[44] Although closed-cycle, recirculating cooling is not one of the technologies on which the performance standards are based, use of a closed-cycle, recirculating cooling system would always achieve the performance standards and therefore, facilities that reduce their flow commensurate with closed-cycle, recirculating cooling systems are deemed to have met performance standards. The rule, at § 124.94(a)(1)(i), thus establishes a compliance alternative based on the use of a closed-cycle, recirculating cooling system. While EPA based the requirements of the new facility rule on the performance standards of closed-cycle recirculating systems, EPA has determined that this technology is not economically practicable for many existing Phase II facilities. EPA is nonetheless aware that some existing facilities have installed this highly effective technology and has thus provided a streamlined alternative for such facilities.

Additionally, EPA established a compliance alternative that allows facilities to reduce intake velocity to meet the impingement mortality performance standards. As EPA discussed in the proposed rule at 67 FR 17151 and Phase I final rule at 66 FR 65274, intake velocity is one of the key factors that can affect the impingement of fish and other aquatic biota, since in the immediate area of the intake it exerts a direct physical force against which fish and other organisms must act to avoid impingement and entrainment. As discussed in that notice, EPA compiled data from three swim speed studies (University of Washington study, Turnpenny, and EPRI) and these data indicated that a 0.5 ft/s velocity would protect at least 96 percent of the tested fish. As further discussed, EPA also identified federal documents (Boreman, DCN 1–5003–PR; Bell (1990); and National Marine Fisheries Service (NMFS), (1997)), an early swim speed and endurance study performed by Sonnichsen *et al.* (1973), and fish screen velocity criteria that are consistent with this approach.

[44] Reducing the cooling water intake structure's capacity is one of the most effective means of reducing entrainment (and impingement). For the traditional steam electric utility industry, facilities located in freshwater areas that have closed-cycle recirculating cooling water systems can, depending on the quality of the make-up water, reduce water use by 96 to 98 percent from the amount they would use if they had once-through cooling water systems. Steam electric generating facilities that have closed-cycle, recirculating cooling systems using salt water can reduce water usage by 70 to 96 percent when make-up and blowdown flows are minimized. The lower range of water usage would be expected where State water quality standards limit chloride to a maximum increase of 10 percent over background and therefore require a 1.1 cycle of concentration. The higher range should be attainable where cycles of concentration up to 2.0 are used for the design.

2. Meeting Performance Standards Through the Use of Design and Construction Technologies, Operational Measures, and/or Restoration Measures

Under the second and third compliance alternatives (§ 125.94(a)(2) and (3)), a facility may either demonstrate to the Director that the facility's existing design and construction technologies, operational measures, and/or restoration measures already meet the minimum performance standards specified under § 125.94(b) and (c), or that it has selected design and construction technologies, operational measures, and/or restoration measures or some combination thereof that will meet these performance standards.

Available data indicate that, when considered as a suite of technologies, barrier and fish handling technologies are available on a national basis for use by Phase II existing facilities. These technologies exist and are in use at various Phase II facilities and, thus, EPA considers them collectively technologically achievable. In addition, 50 percent of the potentially regulated facilities that do not already have closed-cycle cooling systems have some other technology in place that reduces impingement or entrainment. In turn, a large subset of these facilities (33 percent) also have fish handling or return systems that reduce the mortality of impinged organisms. The fact that these technologies are collectively available means that one or more technologies within the suite is available to each Phase II facility.

EPA finds that the design and construction technologies necessary to meet the requirements are commercially available and economically practicable for existing facilities, because facilities can and have installed many of these technologies years after a facility began operation. Typically, additional design and construction technologies such as fine mesh screens, wedgewire screens, fish handling and return systems, and aquatic filter fabric barrier systems can be installed during a scheduled outage (operational shutdown). Referenced below are examples of facilities that installed these technologies after they initially started operating.

Lovett Generating Station. A 495 MW facility (gas-fired steam), Lovett is located in Tomkins Cove, New York, along the Hudson River. The facility first began operations in 1949 and has three generating units with once-through cooling systems. In 1994, Lovett began the testing of an aquatic filter barrier system to reduce entrainment, with a permanent system being installed the following year. Improvements and additions were made to the system in 1997, 1998, and 1999, with some adjustments being accepted as improvements of this vendor's technology for all subsequent installations at other locations.

Big Bend Power Station. Situated on Tampa Bay, Big Bend is a 1998 MW (coal-fired steam) facility with four generating units. The facility first began operations in 1970 and added generating units in 1973, 1976, and 1985. Big Bend supplies cooling water to its once-through cooling water systems via two intake structures. When the facility added Unit 4 in 1985, regulators required the facility to install additional intake technologies. A fish handling and return system, as well as a fine-mesh traveling screen (used only during months with potentially high entrainment rates), were installed on the intake structure serving both the new Unit 4 and the existing Unit 3.

Salem Generating Station. A 2381 MW facility (nuclear), Salem is located on the Delaware River in Lower Alloways Creek Township, New Jersey. The facility has two generating units, both of which use once-through cooling and began operations in 1977. In 1995, the facility installed modified Ristroph screens and a low-pressure spray wash with a fish return system. The facility also redesigned the fish return troughs to reduce fish trauma.

Chalk Point Generating Station. Located on the Patuxent River in Prince George's County, Maryland, Chalk Point has a capacity of 2647 MW (oil-fired steam). The facility has four generating units and uses a combination of once-through and closed-cycle, recirculating cooling systems (two once-through systems serving two generating units and one recirculating system with a tower serving the other two generating units). In 1983, the facility installed a barrier net, followed by a second net in 1985, giving the facility a coarse mesh (1.25″) outer net and a fine mesh (.75″) inner net. The barrier nets are anchored to a series of pilings at the mouth of the intake canal that supplies the cooling water to the facility and serve to reduce both entrainment and the volume of trash taken in at the facility.

3. Meeting Performance Standards Through Use of an Approved Design and Construction Technology

Under the fourth compliance alternative, a facility can demonstrate that it meets specified conditions and that it has installed and properly operates and maintains a pre-approved technology. EPA is approving one technology at this time: submerged cylindrical wedgewire screen technology to treat the total cooling water intake flow. There are five conditions that must be met in order to use this technology to comply with the rule: (1) The cooling water intake structure is located in a freshwater river or stream; (2) the cooling water intake structure is situated such that sufficient ambient counter currents exist to promote cleaning of the screen face; (3) the through screen design intake velocity is 0.5 ft/s or less; (4) the slot size is appropriate for the size of eggs, larvae, and juveniles of any fish and shellfish to be protected at the site; and (5) the entire main condenser cooling water flow is directed through the technology (small flows totaling less than two MGD for auxiliary plant cooling uses are excluded). Directors are explicitly authorized in § 125.99 to pre-approve other technologies for use at facilities with other specified characteristics within their respective jurisdiction after providing the public with a notice and an opportunity to comment on the request for approval of the technology. The Director's authority to pre-approve other technologies is not limited to technologies for use by facilities located on freshwater rivers and streams.

EPA has adopted this compliance alternative in response to comments that suggested that EPA provide an additional, more streamlined compliance option under which a facility could implement certain specified technologies that are deemed highly protective in exchange for reducing the scope of the Comprehensive Demonstration Study. (*See* 68 FR 13522, 13539; March 19, 2003). EPA evaluated the effectiveness of specific technologies using the impingement mortality and entrainment reduction performance standards as assessment criteria. The technology selected for the approved technology option has a demonstrated ability to reduce impingement mortality by 80 to 95 percent for fish and shellfish and, if required, reduce entrainment by 60 to 90 percent for any stages of fish and shellfish at facilities that meet the conditions specified in section 125.99(a). Thus, the technology has a demonstrated ability to meet the most stringent performance standards that would apply to any facility situated on a freshwater river or stream. (*See* DCN 1–3075, 1–5069, 1–5070, 3–0002, and 4–4002B. *Also see,* DCN 6–5000 and Chapter 3 of the Technical Development Document.) Because cylindrical wedgewire screens are believed to be effective when deployed under the

specified conditions and properly maintained, facilities that select this compliance option are provided substantially streamlined requirements for completing the Comprehensive Demonstration Study. However, facilities selecting this option are still required to prepare a Technology Installation and Operation Plan to monitor the effectiveness of the technology at their site in meeting the performance standards.

4. Site-Specific Determination of Best Technology Available To Minimize Adverse Environmental Impact

A facility may comply with the rule by seeking a site-specific demonstration of the best technology available to minimize adverse environmental impact by demonstrating, to the Director's satisfaction, that its cost of complying with the applicable performance standards would be significantly greater than the costs considered by EPA for a like facility when establishing such performance standards, or that its costs would be significantly greater than the benefits of complying with such performance standards at the facility. (*See* sections 125.94(a)(5)(i) and (ii)). If a facility satisfies one of the two cost tests in § 125.94(a)(5), then the Director must establish site-specific alternative requirements based on design and construction technologies, operational measures, and/or restoration measures that achieve an efficacy that is, in the judgment of the Director, as close as practicable to the applicable performance standards without resulting in costs that are significantly greater than either the costs considered by the Administrator in establishing the applicable performance standards, or the benefits at the facility.

In establishing the performance standards in 125.94(b) and the compliance alternatives in sections 125.94(a)(1)–(4), EPA considered several factors, including efficacy, availability, ease of implementation, indirect effects, the costs that EPA expects all existing facilities to incur (national costs) and the benefits if all existing facilities meet the performance standards (national benefits). This provision for alternative requirements is included in the rule to give facilities flexibility to demonstrate that the best technology available to minimize adverse environmental impact at their particular sites may be less stringent than would otherwise be achieved if the facility selected one of the compliance alternatives in sections 125.94(a)(1)–(4). (For a discussion of EPA's legal authority to authorize compliance with alternative requirements based on this cost-cost comparison, *see* Section VIII. I.).

a. Basis of the Cost-Cost Test

For a number of related reasons, EPA chose to use a comparison of a facility's actual costs to the costs EPA estimated that facility would incur to meet the national performance standards (a ''cost-cost test'') as a basis for obtaining a site-specific determination of best technology available. EPA's record for this rule shows that, for the category of existing facilities as a whole, today's rule is technically achievable and economically practicable. Although EPA collected more information for this rulemaking than is typical for an effluent limitation guideline rulemaking, detailed information on some factors important to the effectiveness and costs of the technologies, such as debris loading and the presence of navigational channels within the waterbody at which cooling water intakes are sited, was not requested. Moreover, the information EPA used to develop its costs was in some cases limited by the fact that, while EPA sent surveys to all facilities covered under today's rule, only 42% were sent detailed questionnaires. The remaining 58% only received a short technical questionnaire which requested minimal characterization information. Also, EPA may not have elicited information regarding characteristics of a particular facility that, if known would have either significantly changed EPA's national cost estimates or demonstrated that none of the technologies on which the categorical requirements are based are economically achievable by the facility. Similarly, existing facilities have less flexibility than new facilities in selecting the location of their intakes and technologies for minimizing adverse environmental impact, and therefore it may be difficult for some facilities to avoid costs much higher than those EPA considered when establishing the performance standards. The cost-cost site-specific alternative ensures that the overall rule remains economically practicable for facilities subject to today's rule. In short, for certain facilities EPA may not have anticipated some site-specific costs or the costs for retrofit may exceed those EPA considered. Despite EPA's best effort, such costs are difficult to estimate in a national rule. Because of the wide range of available technologies considered and a number of site-specific factors that may significantly affect the cost and practicability of installing particular technologies at particular sites, the site-specific uncertainty in the cost estimates is higher than for an effluent limitations guidelines rulemaking. Thus, EPA may not have anticipated all site-specific costs that a facility could incur. In addition, existing facilities have less flexibility than new facilities in selecting the location of their intakes and technologies for minimizing adverse environmental impact and, therefore, it may be difficult for some facilities to avoid costs much higher than those EPA considered when establishing the performance standards in the rule. For all of these reasons, EPA believes that the cost-cost site-specific compliance alternative is necessary to ensure that the rule is economically practicable for existing Phase II facilities. In order to ensure that this alternative provides only the minimum relaxation of performance standards that is needed to make the rule economically practicable, § 125.94(a)(5)(i) requires that the site-specific requirements achieve an efficacy that is as close as practicable to the applicable performance standards without resulting in costs that are significantly greater than those considered by the Administrator for a like facility when establishing the performance standards.

b. Basis of the Cost-Benefit Test

EPA decided to use a comparison of a facility's costs to the benefits of meeting the performance standards at the facility (a ''cost-benefit test'') as another basis for obtaining a site-specific determination of BTA to minimize adverse environmental impact. Section 316(b) authorizes consideration of the environmental benefit to be gained by requiring that the location, design, construction, and capacity of cooling water intake structures reflect the best economically practicable technology available for the purpose of minimizing adverse environmental impact. Accordingly, in determining that the technologies on which EPA based the compliance alternatives and performance standards are the best technologies available for existing facilities to minimize adverse environmental impact, EPA considered the national cost of those technologies in comparison to the national benefits—*i.e.*, the reduction in impingement and entrainment that EPA estimated would occur nationally if all existing facilities selected one of the compliance options in sections 125.94(a)(1)–(4). While EPA believes that there is considerable value in promulgating national performance standards under section 316(b) based on what EPA determines, on a national basis, to be the best technology available to minimize adverse environmental impacts, EPA also recognizes that, at

times, determining what is necessary to minimize adverse environmental impacts can necessitate a site-specific inquiry. EPA's comparison of national costs to national benefits may not be applicable to a specific site due to variations in (1) the performance of intake technologies and (2) characteristics of the waterbody in which the intake(s) are sited, including the resident aquatic biota. For example, there may be some facilities where the absolute numbers of fish and shellfish impinged and entrained is so minimal that the cost to achieve the required percentage reductions would be significantly greater than the benefits of achieving the required reductions at that particular site. More specifically, because of the location of the intake, the characteristics of a particular waterbody, or the behavioral patterns of the fish or shellfish in that particular waterbody, there may be little or no impingement mortality or entrainment occurring at the site (see Neal Generating Complex facility example provided in section IV of this preamble). For such a facility, the cost of reducing an already small amount of impingement mortality and entrainment by 80 to 95 percent and 60 to 90 percent, respectively, may be significantly greater than the benefits. In short, it may not be cost-effective and, therefore may be economically impracticable for a facility to achieve percentage reductions when attempting to save a small number of fish or shellfish. Thus, in a waterbody that is already degraded, very few aquatic organisms may be subject to impingement or entrainment, and the costs of retrofitting an existing cooling water intake structure may be significantly greater than the benefits of doing so. By requiring best technology available to minimize adverse environmental impact, section 316(b) invites a consideration of both technology and of environmental conditions, including the potential for adverse impacts, in the receiving waterbody. EPA believes it is a reasonable interpretation of the statute to allow the Director to consider the results of meeting the performance standards in terms of reducing environmental impacts (*i.e.*, the benefits) in cases where the costs of installing the technology are significantly greater than the reduction in environmental impacts would warrant. As with the cost-cost site-specific provision, EPA also wants to ensure that any relaxation of the performance standards be the minimum necessary to ensure that the costs are not significantly greater than the benefits. Section 125.94(a)(5)(i) thus provides that alternative site-specific requirements must achieve an efficacy that is as close as practicable to the applicable performance standards without resulting in costs that are significantly greater than the benefits of meeting the performance standards at the facility.

D. How Has EPA Assessed Economic Practicability?

The legislative history of section 316(b) indicates that the term ''best technology available'' should be interpreted as ''best technology available commercially at an economically practicable cost.'' [45] This position reflects congressional concern that the application of best technology available should not impose an impracticable and unbearable economic burden. Thus, EPA has conducted extensive analyses of the economic impacts of this final rule, using an integrated energy market model (the IPM [45]). For a complete discussion of this analysis, please refer to section XI.B.1 of this preamble or Chapter B3 of the Economic and Benefits Analysis (EBA) in support of this final rule (DCN 6–0002).

EPA believes that the requirements of this rule reflect the best technology available at an economically practicable cost. EPA examined the effects of the rule's compliance costs on capacity, generation, variable production costs, prices, net income, and other measures, both at the market and facility levels. In addition, the other economic analyses conducted by EPA showed that the costs for this rule are economically practicable.

However, EPA believes that a consideration of the relationship of costs to environmental benefits is an important component of economic practicability. As discussed in section VIII.C of the proposed Phase I rule (65 FR 49094) EPA has long recognized that there should be some reasonable relationship between the cost of cooling water intake structure control technology and the environmental benefits associated with its use. As the preamble to the 1976 final rule implementing section 316(b) stated, neither the statute nor the legislative history requires a formal or informal cost-benefit assessment (41 FR 17387; April 26, 1976).

[45] *See* 118 CONG. REC 33,762 (1972), reprinted in 1 Legislative History of the Water Pollution Control Act Amendments of 1972, at 264 (1973) (Statement of Representative Don H. Clausen).

E. What Were the Major Options Considered for the Final Rule and Why Did EPA Reject Them?

EPA considered a number of options for determining the best technology available to minimize adverse environmental impact at Phase II existing facilities and assessed these options based on overall efficacy, availability, economic practicability, including economic impact and the relationship of costs with benefits, and non-water quality environmental impacts, including energy impacts. Under the options EPA considered, facilities would be allowed to implement restoration measures to meet the performance standards. Similarly, any options considered also would allow facilities to request alternative, less stringent, requirements if the Director had determined that data specific to the facility indicated that compliance with the relevant requirement would result in compliance costs significantly greater than those EPA considered in establishing the applicable requirement, or compliance costs significantly greater than the benefits of complying with the applicable performance standards. The alternative requirements would be no less stringent than justified by the significantly greater cost or the significant adverse impacts on local air quality or local energy markets. EPA also considered several site-specific approaches to establishing best technology available. These include the site-specific sample rule discussed at 67 FR 17159, an alternative based on EPA's 1977 Draft Guidance, and alternatives suggested by the Utility Water Act Group (UWAG) and Public Service Electric and Gas Company (PSEG), respectively (*see* 67 FR 17162). EPA's reasons for not adopting these site specific alternatives are discussed in section VII.E.5 of this preamble. The five major technology options EPA considered but did not select for the final rule are discussed in greater detail in the next section. Finally, the costs and benefits presented below are those developed at proposal because these estimates are most useful for purposes of comparison. Subsequent analyses, such as those presented in the NODA, have resulted in higher cost estimates in general, but did not alter the relative ranking of these options as EPA made determinations regarding the final rule. Rather, these analyses indicated that the costs for options that would have required more extensive retrofitting efforts than the final rule are even higher relative to the costs of the final

rule than they were estimated to be at proposal.

1. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling System for All Facilities

EPA considered a regulatory option that would have required Phase II existing facilities with a design intake flow 50 MGD or more to reduce the total design intake flow to a level, at a minimum, commensurate with that which can be attained by a closed-cycle recirculating cooling system using minimized make-up and blowdown flows. In addition, facilities in specified circumstances (*e.g.*, located where additional protection is needed due to concerns regarding threatened, endangered, or protected species or habitat; or regarding migratory, sport or commercial species of concern) would have had to select and implement additional design and construction technologies to minimize impingement mortality and entrainment. This option would not have distinguished between facilities on the basis of the waterbody type from which they withdraw cooling water. Rather, it would have required that the same stringent controls be the nationally applicable minimum for all waterbody types. This is the basic regulatory approach EPA adopted for new facilities at 40 CFR 125.80.

EPA did not select a regulatory scheme based on the use of closed-cycle, recirculating cooling systems at existing facilities based on its generally high costs (due to conversions), the fact that other technologies approach the performance of this option, concerns for energy impacts due to retrofitting existing facilities, and other considerations. Although closed-cycle, recirculating cooling water systems serve as the basis for requirements applied to Phase I new facilities, for Phase II existing facilities, a national requirement to retrofit existing systems is not the most cost-effective approach and at many existing facilities, retrofits may be impossible or not economically practicable. EPA estimates that the total capital costs for individual high-flow plants (*i.e.*, greater than 2 billion gallons per day) to convert to wet towers generally ranged from $130 to $200 million, with annual operating costs in the range of $4 to $20 million (*see* TDD; DCN 6–0004). For purposes of general comparison, EPA estimated that capital and installation costs for cooling towers under the Phase I rule would range from approximately $170,000 to $12.6 million per plant (annualized), depending on flow. At proposal, EPA estimated that the total social cost of compliance for this option for Phase II existing facilities would be approximately $3.5 billion per year.

It is significant to note, however, that EPA's estimates did not fully incorporate costs associated with acquiring land needed for cooling towers and, therefore, these estimates may not fully reflect the costs of the option. For example, based on a survey conducted by one industry commenter, EPA learned that 31 out of 56 plants surveyed said that they would need to acquire additional property to accommodate cooling towers, if required by today's rule. EPA recognizes that this could be a significant cost. EPA also recognizes that there may be impediments, irrespective of costs, to acquiring land for cooling towers. Land upon which to construct cooling towers may be difficult or impossible to obtain, especially in urban areas; some facilities might even turn to displacement of wetlands as a solution. The Agency did not include these potential costs in its analysis for the NODA or proposal. In contrast to new facilities, which can take into account the Phase I requirements when choosing where to situate their structures (including cooling towers), existing facilities have far less flexibility and incur far greater costs. EPA believes that this is a special problem for existing facilities that is relevant to determining whether, as a national categorical matter, closed-cycle cooling is the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. EPA received retrofit cost estimates from a number of commenters that indicate that such costs could be at least twice those projected by EPA.

Another issue concerns the energy impacts of cooling towers. EPA examined the information it received after publication of the proposed rule and NODA, and agrees that the energy penalty associated with cooling towers, together with other factors, indicates that this technology is not the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. In reaching this conclusion, EPA relied on energy penalty information provided by the U.S. Department of Energy. EPA worked closely with the U.S. Department of Energy in preparing today's rule because of their expertise in power plant operations and engineering. The U.S. Department of Energy pointed out to EPA that existing fossil-fuel facilities converting from once-through cooling water systems to wet-cooling towers would produce 2.4 percent to 4.0 percent less electricity even while burning the same amount of coal. For at least one nuclear power plant, which provides 78% of the electricity consumed by the State of Vermont, the energy penalty associated with converting to cooling towers was estimated to be 5.3 percent. Expressed differently, DOE estimated that nationally, on average 20 additional 400-MW plants might have to be built to replace the generating capacity lost by replacing once-through cooling systems with wet cooling towers if such towers were required by all Phase II facilities.

This energy penalty leads to other negative consequences. Because this deficit is predicted to occur during the summer months (when energy demand is highest), the net effect would be more consumption of fossil fuel, which in turn increases the emission of sulfur dioxide, NO_X, particulate matter, mercury and carbon dioxide. Increasing fuel consumption at existing coal power plants yields the largest increase in air emissions because existing systems are less efficient at producing power (and therefore burn more coal) and because they generally have less air pollution control equipment in place. EPA believes that it is reasonable to consider these non-water quality environmental impacts and the additional costs associated with controlling these increased emissions in making today's decision. EPA further believes that it is authorized to do so because of the links between § 316(b) and sections 301 and 306, which require EPA to consider both the energy impacts and the air pollution impacts of technologies when identifying technologies in the effluent guidelines context. *See* CWA section 304(b)(2)(B) (cross-referenced in § 301); CWA section 306(b)(1)(B) (new source performance standards).

Some commenters also assert that EPA underestimated the down time that the facility would experience as it converts to cooling towers. This, again, is not an impact that would be experienced by new facilities. EPA agrees that such down time can be significant. Indeed, one of the four retrofit case studies EPA developed indicated a down time of 10 months, and EPA believes it is reasonable to infer that many other facilities would experience the same loss.

EPA also agrees with the commenters who assert that the empirical data base of four retrofit cases to which EPA compared cooling tower retrofit costs and engineering characteristics is not representative of the broader population of facilities and could be too narrow a set from which to develop national costs that would be applicable to a wide range

of facilities. Of the four retrofits EPA studied, two were in a single state (South Carolina), none were located along a coast, and only one generated more than 500 MW of electricity. EPA also recognizes that all of these conversions were performed before 1992. While it is true that the vast majority of the new, greenfield utility and non-utility combined cycle plants built in the past 20 years have wet cooling towers, EPA believes that it is significant that so few existing facilities retrofitted to the technology during the same period. The rarity of this technology as a retrofit further indicates that it is not economically practicable for the vast majority of existing facilities.

EPA also considered several additional points made by commenters in rejecting this option. Some commenters asserted that certain facilities with closed-cycle, recirculating cooling systems often need to address the impacts of cooling tower plumes, and subsequent fog and icing in metropolitan areas, and noise abatement. Commenters also asserted that the costs of retrofitting and operating such systems at facilities which do not now have them is disproportionate to the potential benefits derived, particularly given the similarity in the level of protection provided under this option (all facilities required to reduce flow commensurate with a closed-cycle, recirculating system) and the final rule. Finally, they stated that the need for flexibility in a rule pertaining to existing facilities is critical to allow facility owners a range of options to meet the fish protection requirements. EPA does not agree that in all cases the costs of retrofitting a closed-cycle cooling water system is disproportionate to the benefits derived. Nevertheless, EPA recognizes that these concerns have merit for many facilities and that the validity and extent of such concerns often must be assessed on a case-by-case basis.

Each of these factors has a cost and an economic impact that EPA believes is appropriate to consider when evaluating whether cooling towers are the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. The capital costs estimated by EPA at proposal are already very high; when costs reflecting reasonable changes to EPA's assumptions are added to them, the total capital cost investment and associated economic impact is simply too high at this time for EPA to be able to justify selecting cooling towers as a required technology for all existing Phase II facilities.

EPA further compared the efficacy of closed-cycle, recirculating cooling systems with that estimated for design and construction technologies. Although not identical, the ranges of impingement and entrainment reduction are similar under both options, such that the reductions estimated for the design and construction technologies, particularly when optimized, approach those estimated for closed-cycle, recirculating cooling systems. Therefore, the use of design and construction technologies as the basis for this rule is supported since they can approach closed-cycle, recirculating systems at less cost with fewer implementation problems. EPA considered this similarity in efficacy, along with the economic practicability and availability of each type of technology, in determining that a closed-cycle, recirculating cooling system is not the required technology for all Phase II existing facilities.

2. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type

EPA also considered an alternate technology-based option in which closed-cycle, recirculating cooling systems would have been required for all facilities on certain waterbody types. Under this option, EPA would have grouped waterbodies into the same five categories as in today's rule: (1) Freshwater rivers or streams, (2) lakes or reservoirs, (3) Great Lakes, (4) tidal rivers or estuaries; and (5) oceans. Because oceans, estuaries and tidal rivers contain essential habitat and nursery areas for the vast majority of commercial and recreational important species of shell and finfish, including many species that are subject to intensive fishing pressures, these waterbody types would have required more stringent controls based on the performance of closed-cycle, recirculating cooling systems. EPA discussed the susceptibility of these waters in a Notice of Data Availability (NODA) for the Phase I rule (66 FR 28853, May 25, 2001) and invited comment on documents that may support its judgment that these waters are particularly susceptible to adverse impacts from cooling water intake structures. In addition, the NODA presented information regarding the low susceptibility of non-tidal freshwater rivers and streams to impacts from entrainment from cooling water intake structures.

Under this alternative option, facilities that operate at less than 15 percent capacity utilization would, as in today's final rule, only be required to have impingement control technology. Facilities that have a closed-cycle, recirculating cooling system would have required additional design and construction technologies to increase the survival rate of impinged biota or to further reduce the amount of entrained biota if the intake structure was located within an ocean, tidal river, or estuary where there are fishery resources of concern to permitting authorities or fishery managers.

Facilities with cooling water intake structures located in a freshwater (including rivers and streams, the Great Lakes and other lakes) would have had the same requirements as under today's final rule. If a facility for which closed-cycle recirculating technology was required chose to comply with alternative requirements, then the facility would have had to demonstrate that alternative technologies would reduce impingement and entrainment to levels comparable to those that would be achieved with a closed-loop recirculating system (90% reduction). If such a facility chose to supplement its alternative technologies with restoration measures, it would have had to demonstrate the same or substantially similar level of protection. (For additional discussion see the Phase I final rule 66 FR 65256, at 65315 columns 1 and 2.)

At proposal, EPA estimated that there would be 109[46] facilities located on oceans, estuaries, or tidal rivers that do not have a closed-cycle, recirculating cooling system and would need to reduce intake flow to a level commensurate with that which can be attained by a closed-cycle, recirculating cooling system or upgrade design and construction technology (*e.g.,* screens) in order to meet performance standards for reducing impingement mortality and entrainment.

Although EPA estimated the costs of this option to be less expensive at the national level than an option based on closed-cycle, recirculating cooling systems everywhere, EPA did not select this option based on total social costs estimates of greater than $1 billion per year and its lack of cost-effectiveness, as well as on concerns regarding potential energy impacts. Facilities located on oceans, estuaries, and tidal rivers would incur high capital and operating and maintenance costs for conversions of their cooling water systems. Furthermore, since impacted facilities would be concentrated in coastal regions, EPA is concerned that there is

[46] Sample-weighted.

the potential for short term energy impacts and supply disruptions in these areas if multiple facilities retrofit concurrently or over a relatively short time-frame, as would be required by these regulations.

3. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow

EPA also considered a variation on the above approach that would have required only facilities withdrawing very large amounts of water from an estuary, tidal river, or ocean to reduce their intake capacity to a level commensurate with that which can be attained by a closed-cycle, recirculating cooling system. For example, for facilities with cooling water intake structures located in a tidal river or estuary, if the intake flow is greater than 1 percent of the source water tidal excursion, then the facility would have had to meet standards for reducing impingement mortality and entrainment based on the performance of wet cooling towers. These facilities would instead have had the choice of reducing cooling water intake flow to a level commensurate with wet cooling towers or of using alternative technologies to meet reduction standards based on the performance of wet cooling towers. If a facility on a tidal river or estuary had intake flow equal to or less than 1 percent of the source water tidal excursion, the facility would have only had to meet the same impingement and entrainment performance standards as in the final Phase II rule. These standards were developed based on the performance of technologies such as fine mesh screens and traveling screens with well-designed and operating fish return systems. The more stringent, closed-cycle, recirculating cooling system-based requirements would have also applied to a facility that has a cooling water intake structure located in an ocean with an intake flow greater than 500 MGD.

This option also would impose much higher costs on a subset of facilities than the final rule. Based on an analysis of data collected through the detailed industry questionnaire and the short technical questionnaire, at proposal, EPA estimated there were potentially 109 Phase II existing facilities located on estuaries, tidal rivers, or oceans which would incur capital costs under this option. Of these 109 facilities, EPA estimated that 51 would exceed the applicable flow threshold and be required to meet performance standards for reducing impingement mortality and entrainment based on a reduction in intake flow to a level commensurate with that which can be attained by a closed-cycle recirculating system. Of the 58 [47] facilities estimated to fall below the applicable flow threshold, 10 facilities already meet these performance standards and would not require any additional controls, whereas 48 [48] facilities would require entrainment or impingement controls, or both. Because this option would only require cooling tower-based performance standards for facilities located on tidal rivers, estuaries or oceans where they withdraw saline or brackish waters, EPA does not believe that this option would raise any significant water quantity issues.

At proposal, EPA estimated the total social cost of compliance for the waterbody/capacity-based option to be approximately $0.97 billion per year. EPA did not select this option because it was not determined to be the most cost-effective approach on a national basis. While the national costs of this option are slightly lower than those of requiring wet cooling towers-based performance standard for all facilities located on oceans, estuaries and tidal rivers, the cost for facilities to meet these standards are still substantial. Although EPA would provide an opportunity to seek alternative requirements to address locally significant air quality or energy impacts, EPA does not believe a framework such as this provides sufficient flexibility to ensure effective implementation and to minimize non-water quality (including energy) impacts. In addition, as noted above for the other cooling tower based options that EPA rejected, facilities can achieve almost the same level of impingement mortality and entrainment reductions using the technologies on which this final rule is based as they can using cooling towers, but at substantially lower cost.

4. Impingement Mortality and Entrainment Controls Everywhere

At proposal, EPA evaluated an option that required impingement mortality and entrainment controls for all facilities. This option did not allow for the development of best technology available on a site-specific basis. This alternative based requirements on the percent of source water withdrawn and, like today's final rule, also restricted disruption of the natural thermal stratification of lakes or reservoirs. It also imposed entrainment performance requirements on Phase II existing facilities located on freshwater rivers or streams, and lakes or reservoirs where EPA has determined in today's final rule that such controls are not necessary. Finally, under this alternative, restoration could be used, but only as a supplement to the use of design and construction technologies or operational measures.

This option established clear performance-based requirements that were based on the use of available technologies to reduce adverse environmental impact. Such an alternative would be consistent with the focus on use of best technology required under section 316(b). However, as indicated above, this option lacks the flexibility of the final rule in applying the necessary and appropriate available technology and therefore would be less effective in addressing the specific cooling water intake structure impacts posed by Phase II facilities in their various environmental settings.

At proposal, total social cost of compliance for this option was estimated at approximately $300 million per year. EPA did not select this option because other options were more cost-effective, in part because this option requires entrainment controls in freshwater rivers, streams, and lakes. The benefits of the final rule are almost the same as those for this option but a lower cost (since lakes and reservoirs, and for design intake flows below 5% in freshwater rivers and streams are the least likely to provide significant benefits).

5. Site-Specific Options as Best Technology Available To Minimize Adverse Environmental Impact

In the proposed rule EPA also considered several site-specific approaches to establishing best technology available. These include the site-specific sample rule discussed at 67 FR 17159, an alternative based on EPA's 1977 Draft Guidance (67 FR 17161), and alternatives suggested by UWAG and PSEG, respectively (*see* 67 FR 17162).

EPA did not adopt any of these site-specific regulatory options for several reasons. None of these site-specific approaches would have established national performance standards for best technology available to minimize adverse environmental impact. EPA believes that such national performance standards promote the consistent application of the best technology available to minimize adverse environmental impact. In addition, based on contact with States (*see* Phase I NODA, 66 FR 28865, Phase II proposal 67 FR 17152–3) and anecdotal

[47] Not sample-weighted.

[48] Not sample-weighted.

information [49] EPA believes that each of these site-specific options would have resulted in higher administrative burdens being imposed on applicants and permit writers relative to the final rule. As EPA has discussed in the preamble to the proposal (*see* 67 FR 17167), these administrative burdens can be associated with the need to determine in each case whether adverse impacts are occurring, the nature and level of any such impacts, and which design and construction technologies constitute the best technology available to minimize adverse environmental impacts, including a consideration of costs and benefits. Further, all of the proposed site-specific options increase the likelihood that each significant cooling water intake permitting issue would become a point of contention between the applicant and permit writer, which EPA's experience indicates slows the permitting process, makes it more resource intensive, and makes it more costly. Finally, because the final rule provides facilities with the option of selecting from five compliance alternatives, including a site-specific compliance alternative, the final rule provides facilities with flexibility comparable to that of a site-specific rule. The site-specific alternative in the final rule provides clear standards for eligibility (the cost-cost and cost-benefit tests), and clear standards on which to base the alternative requirements that they achieve an efficacy as close as practicable to the national performance standards without exceeding the cost-test or benefits-test thresholds. EPA believes that structuring a site-specific compliance alternative in this way will significantly reduce the potential areas of disagreement between permit writer and applicant that are inherent in the other site-specific approaches that it rejected, while still providing facilities with appropriate flexibility. Through the multiple compliance alternatives specified in this rule, EPA has sought to balance the statutory requirements of section 316(b) and the need for reasonable limits on the administrative burden imposed on both applicants and permit writers against the need for existing facilities to have flexibility in implementing the requirements.

[49] For example, a site-specific determination for Brayton Point, Rhode Island, has required resources for greater than two full time equivalents (FTEs) over three years for permitting and support staff, as well as approximately $400,000 in contractor costs to address technical issues and applicant experts. Similarly, development of a permit for Salem has required resources for greater than two full time equivalents (FTEs) over three years for permitting and support staff, as well as approximately $340,000 in contractor costs to address technical issues and applicant experts.

6. Flow Reduction Commensurate With the Level Achieved by Dry Cooling Systems Based on Waterbody Type

EPA conducted a full analysis for the Phase I rule and concluded that dry cooling was not an economically practicable option for new facilities on a national basis. Dry cooling systems use either a natural or a mechanical air draft to transfer heat from condenser tubes to air. In conventional closed-cycle recirculating wet cooling towers, cooling water that has been used to cool the condensers is pumped to the top of a recirculating cooling tower; as the heated water falls, it cools through an evaporative process and warm, moist air rises out of the tower, often creating a vapor plume. Hybrid wet-dry cooling towers employ both a wet section and dry section and reduce or eliminate the visible plumes associated with wet cooling towers.

For the Phase I rule, EPA evaluated zero or nearly zero intake flow regulatory alternatives, based on the use of dry cooling systems. EPA determined that the annual compliance cost to industry for this option would be at least $490 million. EPA based the costs on 121 new facilities having to install dry cooling. For the Phase II proposal, EPA estimated that total social costs for dry cooling based on waterbody type were $2.1 billion per year (or roughly double the costs for wet towers). Thus, this option would be more expensive than dry cooling for new facilities. The cost for Phase II existing facilities to install dry cooling would be significantly higher than the cost for new facilities to do so due to the complexities of retrofitting both the dry cooling equipment and components of the cooling system. At proposal, EPA estimated that 550 Phase II existing facilities would be subject to Phase II regulation. The cost would be significantly higher because existing facilities have less flexibility, thus incurring higher compliance costs (capital and operating) than new facilities. For example, existing facilities might need to upgrade or modify existing turbines, condensers, and/or cooling water conduit systems, which typically imposes greater costs than use of the same technology at a new facility. In addition, retrofitting a dry cooling tower at an existing facility would require shutdown periods during which the facility would lose both production and revenues, and decrease the thermal efficiency of an electric generating facility.

The disparity in costs and operating efficiency of dry cooling systems compared with wet cooling systems is considerable when viewed on a nationwide or regional basis. For example, under a uniform national requirement based on dry cooling, facilities in the southern regions of the United States would be at an unfair competitive disadvantage compared to those in cooler northern climates because dry cooling systems operate more efficiently in colder climates. Even under a regional subcategorization strategy for facilities in cool climatic regions of the United States, adoption of a minimum requirement based on dry cooling would likely impose unfair competitive restrictions for steam electric power generating facilities because of the elevated capital and operating costs associated with dry cooling. Adoption of requirements based on dry cooling for a subcategory of facilities under a particular capacity would pose similar competitive disadvantages for those facilities.

As explained in the preamble to the proposal, EPA does not consider performance standards based on dry cooling a reasonable option for a national requirement, nor for subcategorization under this rule, because the technology of dry cooling carries costs that would potentially cause significant closures for Phase II existing facilities. Dry cooling technology would also have a significant detrimental effect on electricity production by reducing the energy efficiency of steam turbines. Unlike a new facility that can use direct dry cooling, an existing facility that retrofits for dry cooling would most likely use indirect dry cooling which is much less efficient than direct dry cooling. In contrast to direct dry cooling, indirect dry cooling does not operate as an air-cooled condenser. In other words, the steam is not condensed within the structure of the dry cooling tower, but instead indirectly through a heat exchanger. Therefore, the indirect dry cooling system would need to overcome additional heat resistance in the shell of the condenser compared to the direct dry cooling system. Ultimately, the inefficiency (*i.e.,* energy penalty) of indirect dry cooling systems will exceed those of direct dry cooling systems in all cases.

Although the dry cooling option is extremely effective at reducing impingement and entrainment, it is not economically practicable for existing facilities and would cause additional adverse environmental impacts and serious energy impacts. Although dry cooling technology uses extremely low-

level or no cooling water intake, thereby reducing impingement and entrainment of organisms to extremely low levels, section 316(b) does not require that adverse environmental impact be completely eliminated, but that it be minimized using the best technology available. (DOE energy penalty study; DCN 4–2512). EPA does not believe that dry cooling technology is ''available'' to most Phase II existing facilities.

Although EPA has rejected dry and wet cooling tower technologies as a national minimum requirement, EPA does not intend to restrict the use of these technologies or to dispute that they may be the appropriate cooling technology for some facilities. For example, facilities that are repowering and replacing the entire infrastructure of the facility may find that dry cooling is an acceptable technology in some cases. This technology may be especially appropriate in situations where access to cooling water is limited. Wet cooling tower technology may be suitable where adverse effects of cooling water intakes are severe and where screening systems are impractical, or where thermal discharge impacts pose serious environmental problems. Under Clean Water Act section 510, a State may choose to impose more stringent standards than required by Federal regulations. States may continue to use this authority to require facilities to use dry or wet cooling systems.

F. What Is the Role of Restoration and Trading Under Today's Final Rule?

1. What Is the Role of Restoration?

EPA is providing facilities with the option to use restoration for compliance alternatives § 125.94(a)(2), (3), and (5) where the performance of the restoration measures (the production and increase of fish and shellfish in the facility's waterbody or watershed, including maintenance of community structure and function), is substantially similar to that which would have been achieved if the facility reduced impingement mortality and entrainment through the use of design and construction technologies and/or operational measures, to meet the applicable performance standards. (For a complete discussion of the legal analysis supporting restoration, see section VIII of this preamble.) The role of restoration under this rule is to provide additional flexibility to facilities in complying with the rule by eliminating or significantly offsetting the adverse environmental impact caused by the operation of a cooling water intake structure. Restoration measures that increase fish and shellfish in an impacted waterbody or watershed and result in performance substantially similar to that which would otherwise be achieved through reductions in impingement mortality and entrainment further the goal of minimizing adverse environmental impact while offering additional flexibility to both permitting authorities and facilities. Restoration measures may include such activities as removal of barriers to fish migration, reclamation of degraded aquatic organism habitat, or stocking of aquatic organisms. These are still technologies, within the meaning of that term as used in section 316(b) and as such are an appropriate means for meeting technology based performance standards. They are not analogous to water quality based effluent limitations on pollutant discharges because they are not designed to meet water quality standards or dependent on the condition of the receiving waterbody. Rather, they provide an additional means to meet the same performance standards that guide the selection of design and construction technologies and operational measures.

Restoration measures have been used at existing facilities as one of many tools to implement section 316(b) on a case-by-case, best professional judgment basis to compensate for the death and injury of fish and other aquatic organisms caused by the cooling water intake structure. Under today's rule, a Phase II existing facility may utilize restoration either in lieu of or as a supplement to design and construction technologies and/or operational measures. For example, a facility may demonstrate to the Director that velocity controls are the most feasible technology choice for the facility but that, when used on their own, the velocity controls are insufficient to meet the applicable performance standards at § 125.94(b). The facility may then, in conjunction with the use of velocity controls, implement restoration measures to increase the fish and shellfish productivity of the waterbody in order to meet the performance standards at § 125.94(b). Another facility might demonstrate to the Director that restoration measures alone achieve the greatest compliance with the performance standards. A facility may alternatively request a site-specific determination of best technology available under § 125.94(a)(5) and use restoration measures to meet the alternate requirements.

Facilities that propose to use restoration measures must demonstrate to the Director that they evaluated the use of design and construction technologies and operational measures and determined that the use of restoration measures is appropriate because meeting the applicable performance standards or requirements through the use of other technologies is less feasible, less cost-effective, or less environmentally desirable than meeting the standards in whole or in part through the use of restoration measures. Facilities must also demonstrate that the restoration measures they plan to implement, alone, or in combination with design and construction technologies and/or operational measures, will produce ecological benefits (production of fish and shellfish) at a level that is substantially similar to the level that would be achieved through compliance with the applicable impingement mortality and/or entrainment performance standards under § 125.94(b), or alternative site-specific requirements under § 125.94(a)(5). In other words, restoration measures must replace the fish and shellfish lost to impingement mortality and entrainment, either as a substitute or as a supplement to reducing impingement mortality and entrainment through design and control technologies and/or operational measures. While the species makeup of the replacement fish and shellfish may not be exactly the same as that of the impingement mortality and entrainment losses, the Director must make a determination that the net effect is to produce a level of fish and shellfish in the waterbody that is ''substantially similar'' to that which would result from meeting the performance standards through design and construction technologies and/or operational measures alone. The final rule requires that a facility use an adaptive management method for implementing restoration measures because the performance of restoration projects must be regularly monitored and potentially adjusted to ensure the projects achieve their objectives (see 67 FR 17146–17148 and 68 FR 13542).

The final rule also requires that restoration projects which replace the lost fish and shellfish with a different species mix (''out of kind'' restoration) be based on a watershed approach to restoration planning. The boundaries of a ''watershed'' should be guided by the cataloging unit of the ''Hydrologic Unit Map of the United States'' (USGS, 1980), although it may be appropriate to use another watershed or waterbody classification system developed at the state or local level if such a system compares favorably in level of detail. For example, in coastal systems that support migratory fish, a coastal

waterbody that transects a number of watersheds may be the most appropriate unit for planning restoration.

2. What Is the Role of Trading in Today's Rule?

In § 125.90(c), today's final rule provides that if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements in its NPDES program that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94, the Administrator must approve such alternative requirements. A trading program could be a part of these alternative regulatory requirements.

At proposal, EPA sought comment on the potential role of trading in the context of the section 316(b) Phase II rulemaking and possible approaches for developing a trading program. Trading under other EPA programs has been shown to provide opportunities for regulatory compliance at reduced costs. The EPA Office of Water's Water Quality Trading Policy, published in January 2003 [DCN 6–5002], fully supports trading nutrients and sediment and adopts a case-by case approach to evaluating proposals to trade other pollutants.

Trading in the context of section 316(b) raises many complex issues, for example, how to establish appropriate units of trade and how to measure these units effectively given the dynamic nature of the populations of aquatic organisms subject to impingement mortality and entrainment. Should a State choose to propose a trading program under § 125.90(c), EPA will evaluate the State's proposal on a case-by-case basis to ensure the program complies with the regulatory requirement—that it will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at § 125.94. Some commenters suggested that EPA adopt a trading program that would allow trading between aquatic organisms and pollutant discharges. EPA is concerned that such a program would introduce comparability and implementation challenges that would be difficult to overcome and therefore, EPA does not expect that such a program would work within the framework of today's final rule. In addition, EPA does not believe that it is possible at this time to quantify with adequate certainty the potential effects on ecosystem function, community structure, biodiversity, and genetic diversity of such trades, especially when threatened and/or endangered species are present. Based on the current state of the science in aquatic community ecology and ecological risk assessment, States wishing to develop trading programs within the context of 316(b) would be best off focusing on programs based on metrics of comparability between fish and shellfish gains and losses among trading facilities, rather than the much more complex metrics that would be necessary for comparability among fish and shellfish losses on the one hand, and pollutant reductions on the other.

VIII. Summary of Major Comments and Responses to the Proposed Rule and Notice of Data Availability (NODA)

A. Scope and Applicability

1. Phase II Existing Facility Definition

Numerous commenters supported limiting the scope of the Phase II rule to existing facilities that generate and transmit electric power, or generate and sell such power to another entity for transmission, but suggested that EPA has not sufficiently limited the rule to only these facilities. Commenters noted that the proposed definition of ''Phase II existing facility'' does not adequately exempt existing manufacturing facilities that may occasionally transfer power off-site during peak load events. Some commenters suggested that EPA clarify the Phase II rule to specify that it does not apply to facilities whose primary business is not power generation. Some suggested limiting applicability to specified SIC codes (*e.g.,* provided that the rule only applies to facilities in SIC 4911). Examples of facilities identified by commenters that they believe should be excluded from Phase II include manufacturers that produce electricity by co-generation, power generating units that predominantly support a manufacturer, *e.g.,* iron and steel, but also export some power, and facilities that generate power for internal use.

Commenters requested that EPA further clarify when repowering is subject to existing facility requirements. For example, some commenters viewed as inconsistent the fact that the addition of a generating unit at an existing single unit site could increase intake flows by 100% and meet the existing facility definition, while a replacement facility that increases intake flows by a much lesser amount (*e.g.,* 25%) would not meet the existing facility definition. These commenters suggested that EPA consider a facility as an existing facility unless changes to the facility result in new environmental impacts.

In § 125.91(a)(3) of today's rule, an existing facility is subject to this rule if its primary activity is either to generate and transmit electric power, or to generate electric power that it sells to another entity for transmission. This provision was included in the rule in response to comments such as those described previously in this section. EPA believes that this criterion—the primary activity being the generation of electric power—sufficiently clarifies and limits the scope of this rule to existing facilities whose primary business is power generation. As discussed in Section II of this preamble, the final rule does not apply to existing manufacturing facilities, including manufacturing facilities that generate power for their own use and transmit any surplus power, or sell it for transmission, provided the primary activity of the facility is not electric power generation. For example, in the case of a facility that operates its own power generating units and such units predominantly support that facility's manufacturing operation, its primary activity remains manufacturing, even if the facility exports some power. Whether a facility's primary activity is to generate electric power will need to be determined on a case-by-case basis. Section II also makes clear that a manufacturing facility is not covered by this final rule just because it is co-located with another Phase II facility.

EPA considered specifying SIC or NAIC codes to clarify the scope of the rule beyond that proposed in § 125.91(a)(3), but did not do so because it believes the changes in the final rule are sufficient to address many issues raised in comments and because of concerns that SIC and NAIC codes may change over time, which could unintentionally alter the scope of the rule.

With regard to repowering, section II of today's notice discusses the scope of the final rule and specifically discusses the repowering issue. Section II also addresses other Phase I versus Phase II classification issues.

2. Thresholds

Some commenters supported use of the 50 MGD design intake flow threshold and the 25 percent cooling water use criteria in § 125.91(a)(2) and (4), respectively. Some suggested that facilities agreeing to limit their actual intake to less than 50 MGD should be excluded from the rule's requirements or be allowed to request an exemption. Other commenters maintained that permitted or actual flows should be used rather than design flows. Some commenters asked that EPA clarify that,

when applicable, the lesser design value of an intake facility and conveyance structure versus the design volume of intake pumps should be used to determine the 50 MGD threshold for applicability. Alternatively, others asserted that EPA should provide guidance that a facility's design intake flow is not necessarily the flow associated with that of the intake pumps.

Several commenters stated that emergency cooling water and emergency service water intakes should be exempt from the 50 MGD design intake flow threshold. These commenters recommended that EPA distinguish between primary cooling water intakes and emergency service water intakes, for example, at nuclear facilities. They reasoned that emergency service water systems, which can have a large design capacity (*i.e.,* design capacity greater than 50 MGD), generally use an intake that normally operates a nominal amount of time to ensure that the system is in working order. Such back-up systems are required for safety, but under normal conditions do not increase the operational capacity of the facility. Thus, these commenters maintain that rarely used emergency service water should not count towards 50 MGD.

With regard to the criterion that a Phase II existing facility must use at least 25 percent of the water it withdraws exclusively for cooling, some commenters indicated that proposed § 125.91(d), which describes how to measure whether 25 percent of water withdrawn is used for cooling, was ambiguous. Commenters asserted that EPA should not require monthly determinations of applicability of the Phase II rule. One commenter suggested that EPA should assess the 25 percent cooling water use on an annual basis calculated once during permit renewal, since such an approach would provide a high degree of certainty.

As discussed in the proposed rule (67 FR 17129–17130), EPA chose the design intake flow 50 MGD threshold to focus on the largest existing power generating facilities, which the Agency believes are those with the greatest potential to cause or contribute to adverse environmental impact. EPA estimates that the 50 MGD threshold would subject approximately 543 of 902 (60 percent) of existing power generating facilities to this rule and would address 90 percent of the total flow withdrawn by existing steam electric power generating facilities. The 25 percent threshold ensures that nearly all cooling water and the most significant facilities using cooling water intake structures are addressed by these requirements. EPA notes that Phase II existing facilities, which are limited to facilities whose primary activity is power generation, typically use far more than 25 percent of the water they withdraw for cooling. Yet, as in the new facility rule, cooling water that is used in a manufacturing process either before or after it is used for cooling would not count towards calculating the percentage of a facility's intake flow that is used for cooling purposes.

EPA has retained in the final rule the 50 MGD threshold based on design intake flow, rather than actual flow, for several reasons. 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 employed at the facility. This approach provides clarity—the design intake flow does not change, except in those limited circumstances when a facility undergoes major modifications or expansion, whereas actual flows can vary significantly over sometimes short periods of time. EPA believes that an uncertain regulatory status is undesirable because it impedes both compliance by the permittee and regulatory oversight, as well as achievement of the overall environmental objectives. Further, using actual flow may result in the NPDES permit being more intrusive to facility operation than necessary since facility flow would be a permit condition and adjustments to flow would have to be permissible under such conditions and applicable NPDES procedures. It also would require additional monitoring to confirm a facility's status, which imposes additional costs and information collection burdens, and it would require additional compliance monitoring and inspection methods and evaluation criteria, focusing on operational aspects of a facility.

With regard to intake versus pump capacity, EPA notes that under § 125.93 of the final rule, design intake flow means the value assigned (during the cooling water intake structure design) to the total volume of water withdrawn from a source waterbody over a specific time period. Because numerous aspects of a cooling water intake or system can limit a facility's intake flow, and because flow is a critical factor that affects the impacts posed by each facility's cooling water intake structures, EPA has determined that it is more appropriate for the final rule to focus on a facility's total designed volume of water withdrawn over a period of time, rather than to condition applicability of the rule on more specific parameters, such as intake capacity or pump design, which individually do not fully determine total design intake flow.

The final rule does not explicitly exclude emergency cooling water and emergency service water intakes from consideration in determining which facilities are in-scope. Although EPA does not have detailed data on emergency cooling water and emergency intakes, based on other available data EPA does not believe that including consideration of emergency intakes within this rule significantly alters the scope of the rule. EPA's survey of all existing electric utilities and non-utilities indicated that 84 percent of surveyed facilities have an average flow that equals or exceeds 50 MGD. These facilities would by necessity have a design intake flow that also equals or exceeds 50 MGD. Moreover, EPA assumes that this average flow data represent normal operating conditions and does not include emergency cooling water use. Consequently, EPA believes that relatively few facilities are potentially affected by this issue.

Finally, § 125.91(a)(4), which describes how a facility must determine whether it meets the 25 percent cooling water use criterion has been changed in the final rule and provides that the percent of cooling water used be measured on an average annual basis. EPA believes this approach is more appropriate than making this determination on an average monthly basis, primarily because the annual average is an easier measurement to make. Furthermore, because all Phase II existing facilities generate power, most of the water will be used for cooling, rendering monthly evaluation of this value unnecessary. The final rule does not specify how often the facility must measure flow for this annual average. The facility is encouraged to consult the Permit Director to determine what level of data collection is needed.

B. Environmental Impact Associated With Cooling Water Intake Structures

Many comments addressed adverse environmental impact, questioning the definition and quantification of adverse environmental impacts. Several suggested defining adverse environmental impact exclusively at the population, community, or ecosystem levels, and believe that numbers of impinged and entrained organisms should not be a measure of adverse environmental impact. Some commenters argued that, if a facility can prove it does not cause adverse environmental impact at the population level, then it should be exempt from section 316(b) regulations. Commenters

cited numerous studies to illustrate whether cooling water intake structures cause adverse environmental impacts and claimed that where abundance or biomass falls, it was usually the result of some other stressor (overfishing, pollution, etc). These commenters asserted that populations are able to thrive despite high rates of impingement and entrainment because of density-dependence and compensation.

Numerous other commenters disagreed with limiting the definition of adverse environmental impact to the population, community or ecosystem levels, and contended that any measure of impingement and entrainment constitutes adverse environmental impact. They asserted that power plants contribute to fish kills directly by impingement and entrainment, and indirectly by habitat loss. These commenters maintained that the results of population or ecosystem studies are highly subjective, and have no place in determining BTA, as once such impact levels are reached, recovery is often impossible. Regardless of the severity of adverse environmental impact, these commenters argued that section 316(b) requires minimization of adverse environmental impact. They maintained that cooling water intake structures contribute to fishery collapse and vast reductions in fish biomass and abundance that are measurable at the species level. These commenters suggested that actual national impacts due to cooling water intake structures are vastly underestimated due to poor data collection methodologies utilized when the majority of the studies were performed and because studies performed on impinged and entrained organisms overlooked the vast majority of affected species.

In today's final rule, EPA has elected not to define adverse environmental impact. EPA believes that it is reasonable to interpret adverse environmental impact as the loss of aquatic organisms due to impingement and entrainment. For a further discussion of this issue, see Section IV above.

With regard to the relationship between intake flow and adverse environmental impact, some commenters asserted that the relationship of impingement and entrainment to flow is such that catch rates increase non-linearly (exponentially) in relation to the volume of water withdrawn, with entrainment rates being more strongly correlated to flow than impingement. Environmental commenters advocated for flow reduction technologies, such as retrofitting closed-cycle cooling technologies, as the most direct means of reducing fish kills from power plant intakes; they assert that reducing intake by up to 98 to 99 percent would result in a similarly high reduction of impinged and entrained organisms. Other commenters insisted that there is no statistically significant relationship between catch rate and flow, and the mathematical models that evaluate this relationship are inaccurate.

EPA believes the record contains ample evidence to support the proposition that entrainment is related to flow (see DCN 2–013L–R15 and 2–013J) while impingement is related to a combination of flow, intake velocity and fish swim speed (see DCN 2–029). Larger withdrawals of water may result in commensurately greater levels of entrainment. Entrainment impacts of cooling water intake structures are closely linked to the amount of water passing through the intake structure because the eggs and larvae of some aquatic species are free-floating and may be drawn with the flow of cooling water into an intake structure. Swim speeds of affected species as well as intake velocity must be taken into account to predict rates of impingement in relation to flow in order to account for the ability of juvenile and adult lifestages of species to avoid impingement. Due to this relationship, EPA agrees that reducing intake by installing flow reduction technologies will result in a similarly high reduction of impinged and entrained organisms, but EPA believes that other technologies that do not necessarily reduce flow but that do reduce the number of aquatic organisms impinged and entrained will also minimize adverse environmental impact associated with cooling water intake structures. As such, today's rule provides for flexibility in meeting the performance standards.

C. Performance Standards

The performance standards promulgated today are expressed as reductions of impingement and entrainment measured against a calculation baseline. The purpose of a calculation baseline is to properly credit facilities that have installed control technologies prior to the promulgation of the rule. EPA received numerous comments on the performance standards and the calculation baseline.

1. Appropriate Standards

Many commenters discussed the appropriateness of the performance standards. While many commenters acknowledged that the performance range may be attained at some facilities (using certain technologies and in appropriate conditions), several commenters stated that the technical justification for the performance standards was insufficient and may be biased towards higher performing examples of each technology. Many commenters submitted that some technologies will perform at some sites, but that no technology will meet the standards at all sites. Another commenter supported the concept of the performance standards, as long as sufficient flexibility was retained through the use of restoration measures and cost tests. Some commenters suggested allowing permit writers the flexibility to create site-specific performance standards.

EPA has selected performance standards to facilitate a more streamlined permitting process, and to provide consistent national standards. EPA has chosen to express the targets by reference to a percentage reduction in impingement and entrainment because, as discussed above, these losses can easily be traced to cooling water intake structures. Therefore, this is a convenient indicator of the efficacy of controls in reducing environmental impact. As discussed in more detail below, it is also a useful basis against which to consider the efficacy of restoration technologies, which focus on the replacement of fish and shellfish as an alternative means of minimizing adverse environmental impact of intake structures.

Additional documentation has been collected and reviewed by EPA to further support the percent reductions contained in the performance standards. EPA has added this information to the Technology Efficacy database (DCN 6–5000), which EPA has expanded to allow users to query and compare basic data on technology performance and applicability. EPA recognizes that some may disagree with basing the performance standards on the wide range of data available in the database. While many documents do show a level of success in reducing impingement mortality or entrainment, other studies have shown the deployed technology to be unsuccessful or at best inconclusive. EPA does not view the varying degrees of success with regards to a specific technology as indicative that the performance standards cannot be met, but rather as evidence that some technologies work in some applications but not in others.

It is for this reason that performance standards, rather than prescriptive technologies, were chosen. By opting for performance standards instead of requiring the deployment of specified technologies, EPA maintains a desired

flexibility in the implementation of the rule, thus allowing a facility to select measures that are appropriate to the site conditions and facility configuration. EPA believes that there are technologies available (including restoration measures) that can be used to meet the performance standards at the majority of facilities subject to the final Phase II rule. EPA believes that it will likely be the exceptional case where no technology or suite of technologies will be able to achieve the performance standards. This is not to say, however, that the technologies are always economically practicable to implement; there may be situations where the costs are not justified and it is for those situations that EPA has provided for site-specific determinations of best available technology for minimizing adverse environmental impact.

2. Application of the Performance Standards

Commenters generally noted that the application of the performance standards would be very difficult, for a number of site-specific reasons. Several commenters noted that the performance standards are not sufficiently defined to make a full evaluation of their applicability. For example, EPA has not defined the performance standards as being measured using all species or selected species, or by counting individuals versus measuring biomass. Some commenters noted that each of the methods discussed by EPA could have merit at a given facility, and that flexibility would be needed to evaluate compliance at a variety of intake configurations. Another commenter further noted that it is inappropriate for EPA to state that the performance standards are achievable when the standards are undefined. One commenter suggested that EPA has not shown that the performance standards can be met at a reasonable cost. Other commenters stated that reductions may be achievable for only some species of life stages and that this approach may not account for natural fluctuations in population. These commenters claim that implementing a uniform, nationwide performance standard would be exceedingly complex and subject to site-specific factors that could significantly affect the performance of the control technology. Several commenters noted that, for these reasons, EPA should strongly consider a site-specific approach to implement 316(b), including a risk assessment-based approach as suggested by one commenter.

A number of commenters stated that the performance standards would be best implemented as a set of goals or as a best management practice. These commenters contended that in view of the wide variety of environmental conditions at facilities, including natural fluctuations in populations, compliance with a national performance standard will be difficult. They claimed that by using the standards as a goal instead of a condition in the permit, a facility can have greater certainty as to its compliance status. Similarly, several commenters suggested that the permit contain conditions requiring proper technology selection, installation, maintenance, and adjustments instead of requiring compliance with the performance standards.

Commenters were divided over the concept of a range for the performance standards. Some commenters supported the range, arguing that a facility can achieve some reduction within the range and still be compliant, and others were opposed, claiming that a range of performance promotes uncertainty in determining compliance. Some commenters also noted that, by giving a facility a range of performance, EPA is encouraging performance in the lower end of the range and therefore not meeting the definition of ''best technology available.''

Several commenters noted that consideration of entrainment mortality is important to correctly determine compliance. One commenter also noted that natural events will affect compliance, such as moribund fish being swept into an intake or heavy debris loads following a storm.

As in the Phase I rule, EPA is setting performance standards for minimizing adverse environmental impact based on a conceptually simple and certain metric-reduction of impingement mortality and entrainment. EPA recognizes however, that there are challenges associated with measuring such reduction due to fluctuations in waterbody conditions (species abundance, composition, etc.) over time. While it is relatively straightforward to measure impingement mortality and entrainment reductions relative to past levels, it is more difficult to determine reductions relative to what would have occurred in the absence of control technologies if waterbody conditions change after the technologies are installed. Data provided with the proposed rule (DCN 4–0003) indicate that there is substantial variability over time in the numbers and species mix of impinged and entrained organisms at any given facility. While changes in operational practices and sampling methods account for some of this variability, the data indicate that there may be substantial natural variability in waterbody conditions as well. This natural variability and the changes to species composition over time may affect the ability of these technologies to perform consistently at a certain level. This is one reason why EPA has provided a compliance determination alternative under which facilities comply with the construction, operational, maintenance, monitoring, and adaptive management requirements of a Technology Installation and Operation Plan (or Restoration Plan) designed to meet the performance standards, rather than having to demonstrate quantitatively that they are consistently meeting them, which may be difficult in the face of natural variability. Under this approach, if monitoring data suggest that performance standards are not being met despite full compliance with the terms of the Technology Installation and Operations Plan or the Restoration Plan, the Plan will need to be adjusted to improve performance.

EPA has provided examples of facilities in different areas of the country sited on different waterbody types that are currently meeting or exceeding the performance standards promulgated today. The ability of these facilities to attain similar performance standards suggests that while site-specific factors can influence the performance of a given technology, it is the exceptional situation where no design or construction technology is capable of meeting the performance standards. EPA opted for performance ranges instead of specific compliance thresholds to allow both the permittee and the permitting authority a certain degree of flexibility in meeting the obligations under the final Phase II rule. EPA does not believe that performance ranges promote uncertainty. Instead, EPA has selected performance ranges out of the recognition that precise results may not be able to be replicated in different waterbody types in different areas of the country. EPA disagrees with the comment that it has not shown that the performance standards can be met at a reasonable cost. The cost and economic impact analysis for the final rule supports EPA's determination that the final rule, including the performance standards, are economically practicable at a national level. In addition, the final rule includes a site-specific compliance alternative to address any potential situation where meeting the performance standards, when evaluated on a facility-specific basis, would result in costs that are significantly greater than the costs

considered by EPA, for a like facility in establishing the standards, or that are significantly greater than the benefits of compliance with the applicable performance standards at the facility. Thus, the final rule ensures that the costs of the rule are economically practicable to the extent required by section 316(b).

In developing the final rule, EPA identified and examined a broad range of cooling water intake structure technologies and determined, at a national level, that these technologies support the final performance standards. EPA notes that, although the performance standards address all life stages of fish and shellfish, the Director has significant discretion as to how the performance standards are applied in the permit. For example, the Director may determine that all species must be considered or that only representative species are to be considered. With regard to natural fluctuations in fish and shellfish populations, and the Technology Installation and Operation Plan compliance scheme discussed above addresses the concern that natural fluctuations could impact the level of impingement mortality and entrainment at a given facility over time. Further, the Director is given considerable discretion to determine, based on the facility's Comprehensive Demonstration Study, the appropriate averaging period and precise metric for determining impingement mortality and entrainment reductions. Generally, averaging over longer time periods (*i.e.*, a full five year permit term) can substantially reduce the impact of natural variability on the determination of whether the performance standards are being met.

3. Requirements by Waterbody Type

As stated in section C. 2, different performance standards would apply for facilities located upon different waterbody types. Comments were received both in support of and against basing performance standards in part on waterbody type. Some commenters did not support the withdrawal threshold of 5 percent of the mean annual flow for facilities on freshwater rivers, as the organisms at an intake may not be subject to entrainment or may not be evenly distributed. Some State commenters supported the withdrawal threshold for freshwater rivers, and another suggested correlating the intake flow requirements with the total flow of the waterbody to better protect smaller flow rivers. One State commenter generally opposed all of the proposed thresholds on freshwater rivers as being arbitrary and stated that the regulations would be more effective by considering the impacts to the population within the waterbody. For lakes and reservoirs, one commenter opposed the requirement to not disturb the thermal stratification of the waterbody, stating that the requirement has not been defined in sufficient detail, that EPA has presented no evidence that the disruption is always detrimental, or presented any discussion of technologies that might mitigate any thermal disturbances. Some commenters did not support additional controls on the Great Lakes, stating that the Lakes are not unique and do not require greater protection. Another State commenter suggested that additional requirements be implemented for any impaired waterbody.

EPA considers location to be an important factor in addressing adverse environmental impact and one expressly included in the language of section 316(b). When cooling water is withdrawn from sensitive biological areas, there is a heightened potential for adverse environmental impact, since these areas typically have higher concentrations of impingeable and entrainable aquatic organisms. Therefore, the final rule includes performance standards that vary, in part, by waterbody type. For example, estuaries and tidal rivers have a higher potential for adverse impact because they contain essential habitat and nursery areas for a majority of commercial and recreational species of fish and shellfish. Therefore, EPA believes that these areas warrant a higher level of control that includes both impingement and entrainment controls.

EPA also included performance standards for other waterbody types. Facilities withdrawing greater than 5% of the mean annual flow from freshwater rivers and streams will have additional requirements. As described in the Phase I proposed rule (65 FR 49060) and the Phase II NODA (66 FR 28853), the withdrawal threshold is based on the concept that absent any other controls, withdrawal of a unit volume of water from a waterbody will result in the entrainment of an equivalent unit of aquatic life (such as eggs and larval organisms) suspended in that volume of the water column. Thus, facilities withdrawing greater than 5% of the mean annual flow from freshwater rivers and streams may entrain equal proportions of aquatic organisms. Freshwater rivers and streams are somewhat less susceptible to entrainment than certain other categories of waterbodies and, therefore, the final rule limits the requirement for entrainment control in fresh waters to those facilities that withdraw the largest proportion of water from freshwater rivers or streams. EPA has promulgated special requirements for facilities withdrawing from lakes and reservoirs. Facilities tend to withdraw from the deeper portions of lakes and reservoirs, as these areas hold the coolest water. The rule specifies that the intake flows must not disturb the natural stratification (thermoclines) in the waterbody, as this may disrupt the composition of dissolved oxygen and adversely affect aquatic species. While such disruption is often detrimental, this additional performance standard does not apply where the disruption does not adversely affect the management of fisheries. Intake location, the volume of water withdrawn, and other design technologies can be used to address this requirement. Facilities located on the Great Lakes are also subject to additional requirements because these waterbodies have areas of high productivity and sensitive habitat and in this respect have an ecological significance akin to estuaries.

4. Approved Design and Construction Technology Option

In response to comments on the burden to facilities and permit writers, EPA is including in the final rule an approved design and construction technology option (previously referred to as a ''streamlined technology option'' or ''pre-approved technology option'') for facilities in certain locations. Under this option, a facility installing a specified technology would be subject to reduced application requirements, including a reduced Comprehensive Demonstration Study. In addition, the final rule sets forth criteria that State Directors may use to identify and approve additional technologies.

Nearly all commenters supported the concept of an approved design and construction technology option as a positive step in facilitating implementation of section 316(b). Several commenters added that this option should not preclude the use of cost tests, restoration measures or the use of other approaches. One commenter opposed the approved design and construction technology option, arguing that the selection of only one or two technologies oversimplifies the complexity of waterbodies, and that the approach would not be sufficiently protective.

Some commenters agreed that the wedgewire screen should be an effective technology in certain situations and noted that EPA should specify screen slot openings in the approved design

and construction technology option. One of the commenters stated that research on the wedgewire screen suggests that the technology should easily meet the impingement requirements, but that further research may be necessary to confirm the effectiveness for entrainment reductions with varying slot openings.

Some commenters offered suggestions for additional changes to the option, such as developing scientifically sound, peer-reviewed criteria for evaluating pre-approved technologies, identifying the technologies in technical guidance documents as opposed to the regulation, and continuing to allow restoration measures. Some commenters also suggested specifying that any monitoring performed would be informational in nature and not affect the facility's compliance status, or that facilities only be required to ''substantially meet'' the stated goals. Other commenters suggested expanding the scope of the approved design and construction technology option to include prescribed operational or restoration measures or preapproved technologies for intakes located on man-made cooling reservoirs.

A facility that chooses to comply under the pre-approved technology option should not, in addition, need to employ restoration measures. The intent of the pre-approved technology compliance alternative is to provide a means to reduce the application and information collection requirements for facilities that are able to meet performance standards through a technology that is proven to meet performance standards for impingement mortality and entrainment in most cases. A facility that chooses to comply by meeting the conditions specified at § 125.99(a), therefore, should be able to achieve the performance standards for both impingement mortality and entrainment. Facilities that propose an alternative technology for consideration as a pre-approved technology under § 125.99(b) are encouraged by EPA to propose technologies to the Director for approval that are capable of meeting performance standards for both impingement mortality and entrainment with a high degree of confidence. However, a situation could arise where a pre-approved technology only meets performance standards for impingement mortality or entrainment. In such cases, facilities that choose to comply using an approved design and construction technology that only met a subset of applicable performance standards could either employ other (1) design and construction technologies, operational measures and/or restoration measures or (2) request a site-specific requirements for the remaining performance standards based on either the cost-cost or cost-benefit test.

Some commenters stated that EPA should specify the wedgewire screen slot opening size. EPA disagrees that it should specify a uniform screen slot opening size for all facilities that choose the approved design and construction technology alternative. The rule states in § 125.99(a)(1)(iv) that the screen slot size must be appropriate for the size of eggs, larvae, and juveniles of all fish and shellfish to be protected from entrainment at the site. Because the species to be protected differ among locations, the slot sizes will need to be tailored to the sizes of the various assemblages of species at each site. EPA therefore has determined that the Director should determine the appropriate design criteria, such as wedgewire screen slot opening size, on a case-by-case basis. Since no impingement mortality and entrainment Characterization Study is required under this streamlined option, EPA expects that this determination would be based on available information regarding species and life-stage composition of organisms within the receiving waterbodies. Facilities may wish to assemble available data and propose a screen slot opening size for the Director's consideration.

Some commenters stated that EPA should develop peer-reviewed criteria for evaluating pre-approved technologies other than the wedgewire screen technology described in § 125.99(a). EPA disagrees that it needs to develop specific criteria for evaluating pre-approved technologies. EPA believes that the Director is best equipped to determine the most appropriate technologies for approval in their jurisdictions, since these Directors are most familiar with the site-conditions and intake configurations of the facilities within their jurisdictions, and have physical access to the facilities. Under § 125.99, EPA has set forth a broad framework outlining the types of information that the permitting authority would need to evaluate specific technologies, including design criteria of the proposed technology, site characteristics and conditions necessary to ensure that the technology will meet the performance standards, and data to demonstrate that the facilities in the Director's jurisdiction with the proposed technology and site conditions will be able to meet the performance standards in § 125.94(b). EPA believes that the Directors will be able to evaluate the data and make determinations as to whether the proposed technologies are suitable for use as approved design and construction technologies in their jurisdictions. However, EPA is requiring that the Director take public comment on such determinations prior to finalizing them.

In answer to comments that EPA should not require facilities choosing the approved design and construction compliance alternative to demonstrate through monitoring that they meet the applicable performance standards, EPA disagrees. EPA believes that verification monitoring is very important because, while the pre-approved technologies are designed to meet the performance standards in most cases, the actual efficacy of any technology will be affected by site-specific circumstances and conditions, as well as proper operation and maintenance of the technology. For this reason, EPA believes that it is necessary and appropriate for these facilities to prepare a Technology Installation and Operation Plan that describes how they will operate and maintain the technology and assess success in meeting the performance standards, as well as adaptive management steps they will take if the technology does not perform as expected. They must also propose a Verification Monitoring Plan to describe the monitoring they will perform to support their performance assessment. EPA notes that facilities that select the approved technology alternative have significantly reduced application and information collection requirements relative to facilities that comply under other alternatives.

One commenter stated that the approved design and construction technology alternative will not be sufficiently protective given the complexity of waterbodies. While EPA does not agree with this comment, EPA recognizes that the efficacy of a given technology will be affected by site-specific conditions, such as biological and chemical factors in the waterbody. Because the efficacy of the technology will be affected by such site-specific conditions, EPA has required all facilities that choose to comply using the approved design and construction technology compliance alternative to submit a Technology Installation and Operation Plan and a Verification Monitoring Plan, and to determine if they are meeting the applicable performance standards through monitoring, and adjust their operations accordingly if they are not. EPA believes, based upon extensive research, that the majority of facilities with the appropriate site conditions, and that have installed and properly operated

and maintained submerged cylindrical wedgewire screen technology, should be capable of meeting the performance standards set forth in § 125.94(b). For facilities that fail to meet performance standards through the approved design and technology alternative, the Director may amend the facility's permit to require the use of additional design and construction technologies, operational measures, and/or restoration measures, in order to meet the performance standards, or if appropriate, issue a site-specific determination of BTA.

5. Capacity Utilization Threshold

In the proposed rule, EPA introduced reduced requirements for facilities that are typically not operating year-round and would therefore bear a proportionately higher cost to comply with the rule. EPA proposed that facilities that operate less than 15% of the time (also known as peaking facilities) would only be subject to impingement reductions, regardless of the waterbody type upon which the facility is located.

Generally, commenters supported the concept of reduced requirements for peaking facilities. However, commenters stated that EPA must further refine the definition of peaking facilities and in many cases suggested that EPA adopt the United States Department of Energy's definition of capacity utilization. Aspects of EPA's definition on which commenters requested clarification included how to measure the capacity rate (per intake, per facility, per generating unit, etc.), the time frame for determining historic utilization rates, and the definition of ''available'' with respect to how to calculate the capacity utilization rate. One commenter further suggested that EPA allow an expanded definition (*i.e.*, a higher capacity utilization rate) for facilities that typically operate in periods of low abundance of entrainable organisms. One commenter further requested that the reduced requirements for peaking facilities be extended to account for future operations at the plant as well. Another commenter expressed concern over the definition of the threshold, as the operational time for the facility could still coincide with periods of high abundances of organisms and therefore still result in significant entrainment. One commenter opposed the threshold, stating it could encourage facilities to reduce electricity production in order to have less stringent requirements and therefore impact energy production, prices, and energy supply nationwide.

State commenters generally supported the concept, but were divided as to the threshold utilization rate; some States preferred a lower threshold and one mentioned that it would prefer a higher threshold. One State did not support the reduced requirements for peaking facilities, noting that the time frame in which the facility operates may be more important than the volume withdrawn. Another State suggested that restoration or mitigation also be required of peaking facilities.

EPA has identified peaking facilities in the final Phase II rule as those facilities that operate at an overall capacity of less than 15 percent. EPA believes that facilities operating below 15% should be subject to less stringent compliance requirements relative to a typical base load facility. The threshold of 15% is based on these facilities' reduced operating levels, low potential for entrainment impacts, and consideration of economic practicability (*see,* 67 FR 17141). To address commenter concerns, EPA has modified the capacity utilization definition to say that the capacity utilization rate applies only to that portion of the facility that generates electricity for transmission or sale using a thermal cycle employing the steam water system as the thermodynamic medium. The Agency has amended the definition of the capacity utilization rate threshold to remove the term ''available'' from the definition, as requested by comments. Further, the Agency has allowed for calculation of the capacity utilization rate on an intake basis, when the intake is exclusively dedicated to a subset of the plant's generating units, and for determination of the capacity utilization rate based on a binding commitment of future operation below the threshold.

Peaking facilities are typically older, less efficient generating units. Because the cost of operation is higher, peaking facilities are generally employed when generating demand is greatest and economic conditions justify their use. Such usage is typically a fraction of the unit's overall generating capacity and represents significantly less cooling water used when compared to the design intake capacity. This would appear to obviate the need for entrainment controls for the facility.

Most peaking facilities are employed during the highest electrical demand period, typically mid-winter or mid-summer. It is generally accepted that while these seasons can sometimes be associated with a higher abundance of aquatic organisms or spawning events, mid-winter and mid-summer are not typically considered to be critical periods for aquatic communities. Given these operating conditions, generally entrainment controls would appear to be an unnecessary cost for these facilities because the losses, while they occur, would have minimal adverse environmental impact.

D. Site-Specific Approach

Past implementation of section 316(b) often followed the draft guidance document published in 1977, which promoted a largely site-specific approach. In this rulemaking, EPA is establishing national performance standards for best technology available for minimizing adverse environmental impacts in connection with cooling water intake structures. Many comments were received regarding a site-specific approach to implementation.

1. Approach

Many commenters favored a site-specific approach in place of national performance standards. Many of the commenters cited a need for flexibility to comply with the regulations, and stated that only a site-specific approach can represent the best framework for addressing site-specific environmental impacts in a cost-effective manner. Commenters also favored an approach that resembles current practices for implementation of 316(b), in which site-specific determinations are made without reference to national performance standards.

Some commenters did not support the concept of a site-specific rule. One commenter stated that it does not fulfill a national standard and allows a more lenient application for some facilities. Another commenter added that a site-specific approach favors industry, as the resources of the regulators and interested public groups to respond to information-intensive site-specific determinations are limited. Some States also expressed concern over a site-specific approach, as it could be less stringent than the present approach, as well as more burdensome. Some other States expressed support for site-specific approaches.

In the final rule, EPA has established national performance requirements for the reduction of impingement mortality and entrainment that reflect best technology available to minimize adverse environmental impact for Phase II existing facilities, and has authorized five different compliance alternatives to achieve those standards, including a site-specific alternative. Thus, the Agency has provided both clear national standards of environmental protection and sufficient flexibility to allow for the selection of cost-efficient approaches to compliance and permit administration. In addition, under certain compliance alternatives, Phase II existing facilities

can use restoration measures, either in lieu of, or in combination with technologies and/or operational measures, when design and construction and/or operational measures alone are less feasible, less cost-effective or less environmentally desirable. This provides additional flexibility to permittees and permitting agencies. Finally, as discussed in Section VII of this preamble, EPA does not agree that all aspects of certain site-specific approaches effectively fulfill the requirements of section 316(b).

2. Existing Programs and Determinations

Several commenters stated that there is already a successful 30-year history of implementing section 316(b). Some commenters noted that many States currently implement 316(b) using a site-specific approach and that these programs should be allowed to continue, including any restoration or enhancement programs the States have established. Others stated that existing BTA determinations (conducted using a site-specific approach) should remain valid.

EPA acknowledges that some States' existing programs and determinations have been successful in reducing adverse environmental impacts to waters of the United States associated with cooling water intake structures. EPA disagrees, however, that all existing BTA determinations should remain valid. Some historical BTA decisions may be based on physical, chemical or biological conditions that are no longer relevant at the site, or reflect BTA technology that is outdated and would not meet the performance standards set forth in today's final rule. However, the final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. (*see* § 125.90(c)). Thus, this rule provides a reasonable degree of flexibility for States to implement existing effective programs. In § 125.94(e), States are also allowed to establish more stringent BTA requirements if necessary to comply with State, tribal, or other federal law.

E. Implementation

1. Calculation Baseline

Numerous commenters indicated that they were unclear as to how to calculate the baseline conditions for impingement mortality and entrainment. Some commenters suggested that the calculation baseline should reflect unrestricted operation at full design capacity year-round to avoid continually changing the baseline, since maintenance and operational schedules change over time. Another commenter added that the baseline definition must specify that data be based upon maximum operation of a given facility, to avoid allowing a facility to withdraw more water than it has been permitted for (based on an averaged flow). Other commenters claimed that the use of a calculation baseline was problematic due to the difficulties of extrapolation between localities and waterbody types. One commenter asserted that the calculation baseline should reflect current local environmental conditions, not historical or hypothetical future conditions and should specify the level of operation that would be maintained in the absence of operational controls implemented for reducing impingement and entrainment.

Many commenters supported an ''As Built'' alternative approach where a facility would calculate entrainment reduction based on historical measurements before installation of new technology or sampling immediately in front of the new technology and enumerating the organisms of a size that will pass through a standard 3/8-inch screen. Several commenters agreed that the use of historical data would aid in estimating the calculation baseline while others cautioned against the use of historical data that may not be relevant to the current conditions. One commenter disagreed with EPA's statement that the baseline could be estimated by evaluating existing data from a nearby facility; the commenter asserted that site-specific factors determine whether an organism will interact with a cooling water intake structure and/or survive the interaction. Overall, most commenters recommended that EPA allow the Director broad discretion and flexibility in evaluating the calculation baseline due to varying site conditions.

The calculation baseline provides a standard intake configuration by which facilities can determine relative reductions in impingement and entrainment. EPA acknowledges the numerous comments on the proposed definition and has refined the definition to provide more clarity in implementing this concept. For example, the definition in the proposed rule incorporated a shoreline intake structure. In the final rule, the definition has been clarified to specify a 3/8-inch mesh traveling screen at a shoreline intake structure. Based on available data that indicate this is a common intake structure configuration at Phase II existing facilities, EPA designated a 3/8-inch screen as the standard mesh size against which reductions will be calculated. Similarly, the assumption of no impingement or entrainment controls in the definition in the proposed rule has been clarified to describe an intake where the baseline operations do not take into include any procedures or technologies to reduce impingement or entrainment. EPA recognizes that some facilities may have control technologies in place that already reduce impingement or entrainment; the final calculation baseline would allow credit for such reductions. Additionally, EPA further clarified the definition to include the potential data sources that may be used in defining the calculation baseline, such as historical data, data collected at nearby locations, or data collected at the facility. EPA is authorizing the use of existing biological data in determining the calculation baseline to minimize the impacts to facilities, provided that the data are representative of current facility and/or waterbody conditions (as applicable) and were collected using appropriate quality control procedures.

EPA has further clarified the definition to provide that the calculation baseline may be based on an intake structure located at a depth other than a surface intake if the facility can demonstrate that the standard definition (*i.e.,* a shoreline surface intake) would correspond to a higher baseline level of impingement mortality and/or entrainment.

EPA chose not to incorporate operating capacity into the calculation baseline, as the definition is not dependent upon intake flow volumes. EPA has chosen to adopt the ''as built'' approach: as stated in § 125.93, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline.

EPA recognizes that this definition cannot address the variety of intake configurations and other conditions at all facilities and therefore cannot define the calculation baseline in all settings. However, EPA believes that the calculation baseline in the final rule is clear and straightforward to implement, and allows for proactive facilities (*i.e.*, those with control technologies, operational procedures, or restoration measures already in place) to take credit for existing measures.

2. How Will Attainment of the Standards Be Measured?

At the time of the NODA, EPA was evaluating several approaches for

measuring success in meeting performance standards. EPA therefore requested comments on whether performance should be measured based on an assessment of the impacts to all fish and shellfish species (''all-species approach'') or to fish and shellfish from only a subset of species determined to be representative of all the species that have the potential to be impinged or entrained (''representative species approach''). These comments are addressed under section 2. a below. Several terms to describe the representative species approach have been used historically. To avoid confusion among the terms ''representative indicator species,'' ''representative important species,'' and ''critical aquatic organisms,'' EPA is adopting the term ''representative species'' for the purpose of simplicity in this section. EPA also requested comment as to whether enumeration of organisms or biomass should be used as the metric for measuring success in meeting the performance standards. These comments are addressed in section 2. b below. With regard to counting absolute numbers of organisms, EPA also requested comment on the option of counting undifferentiated organisms (*i.e.*, counting without specifying taxonomic identification).

After attempting to select optimal approaches for both the scope and metric to use in determining attainment of the performance standards, EPA has determined site-specific factors such as biological assemblage at the site, intake location, and waterbody type must be factored into decisions regarding how to evaluate attainment. EPA has therefore decided that, in its Verification Monitoring Plan (125.95(b)(7)), the facility must propose, among other things, the parameters to be monitored for determining attainment. The Director will be best suited to review and approve proposed parameters for each facility on a case-by-case basis.

a. Scope of Evaluation: All-Species Consideration vs. Representative Species

Several commenters supported the use of a representative species evaluation, as opposed to the all-species evaluation, as the most practical approach in many cases. Another commenter stated that even with the representative species approach, factors other than simply numeric reduction in impingement mortality and entrainment must be considered when determining attainment. On the other hand, one commenter stated that an ''all species'' approach could make compliance demonstrations simpler and somewhat less expensive so long as the taxonomic identity of collected organisms is not required. The commenter noted that this would not be appropriate, however, in cases where taxonomic identification is needed, such as where eggs and larval stages are converted to age-1 equivalents.

As part of the representative species inquiry, EPA also requested comment on whether 10 to 15 species might be an appropriate number of representative species to protect all species and ecosystem functions at a facility. One commenter responded, stating that 15 was too large a number. This commenter suggested that a demonstration should focus on the four or five species and add to the list only if there was another species of special concern.

In response to the commenter who suggested that EPA should evaluate factors other than reduction in numbers of organisms impinged or entrained, EPA has selected several means by which to determine compliance with section 316(b) requirements. For facilities that choose to demonstrate compliance with the performance standards, the metric that will be used to evaluate compliance with the performance standards is the facility's reduction of impingement mortality and entrainment through the installation of design and control technologies and/or operational measures. For these facilities, compliance may then be measured against a facility's calculation baseline, which the facility estimates and submits with its permit application package. The calculation baseline is defined at § 125.93. For facilities that choose to use compliance with the terms of a Technology Installation and Operation Plan or Restoration Plan to determine compliance, the degree of success in meeting performance standards is still an important criteria for determining if adaptive management is needed, but it would not be the basis for determining compliance. For facilities that choose to use restoration measures, attainment of performance standards will be based upon whether the production of fish and shellfish from the restoration measures is substantially similar to the level of fish and shellfish the facility would achieve by meeting the applicable impingement and/or entrainment requirements. If a facility has been approved for a site-specific determination of best technology available, the Director will establish alternate requirements accordingly. EPA expects that a variety of factors will be considered in determining the appropriate compliance option for a facility, such as waterbody type, intake location, percentage withdrawal of mean annual flow of rivers or streams, capacity to upset thermal stratification in lakes, a facility's calculation baseline, and the appropriateness of existing or proposed protective technologies or measures.

EPA agrees that a single approach may not be optimal in all cases. The Agency has therefore not prescribed the methods (including a metric) for assessing success in meeting performance standards in today's final rule. Rather, the Director must determine whether a clearly defined all-species approach or representative species approach is appropriate on a case-by case basis, based upon the information and proposed methods presented by the facility. The Director may choose to require evaluation of all species or of certain representative species.

In response to comments regarding EPA's suggested number of representative species, the facility will propose the number of species to monitor, as well as decisions regarding species and life stages to monitor, for review and approval by the Director as part of Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), and, if applicable, the Restoration Plan required at 125.95(b)(5). As such, in cases where the representative species approach is applied, the Director may approve the number of representative species proposed by the facility, based upon the specifics of the waterbody from which the facility is withdrawing, the percentage volume of water withdrawn relative to the freshwater river or stream (as applicable), and other factors.

b. Metric: Absolute Counts vs. Biomass

EPA requested comment as to whether species impinged or entrained may be measured by counting the total number of individual fish and shellfish, or by weighing the total wet or dry biomass of the organisms. In response to the use of absolute counts of organisms or biomass (weight) for determining compliance, commenters offered a variety of views. Regarding the use of biomass as a metric, one commenter expressed that measuring either biomass or total undifferentiated numbers of species would be appropriate for cases where restoration was the chosen option, since restoration will never result in one-for-one species compensation. Several commenters pointed out a disadvantage of counting numbers of organisms: early life stages will dominate the numbers and thereby dominate the compliance

determination, even though most of them would have suffered large natural mortality losses even without entrainment. To correct for this, a few commenters suggested identifying the organisms and converting them to an equivalent unit to ensure that each life stage is appropriately weighed. Specifically, one commenter suggested converting to equivalent juveniles, when measuring organisms by biomass, to correct for the fact that the count will be dominated by later larval stages even though the number of these organisms per unit weight will be small compared to eggs and larvae. This commenter continued that this approach would be useful for forage species, since biomass is an appropriate measure of the organisms that serve as a food source for commercial and recreational species.

EPA received many comments regarding the need for flexibility in determining the appropriate metric to use to determine attainment of performance standards. Several commenters asserted that the rule should allow flexibility in the approach and the choice of metric should factor in whether one is assessing impingement mortality, entrainment or both; species and life stages affected, and compliance option.

EPA has decided to give the Director the authority to review and approve methods of determining compliance proposed by the facility as part of the Verification Monitoring Plan. (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), and, if applicable, the Restoration Plan required at 125.95(b)(5). Thus, the facility will propose, and the Director will review and approve, species and life stages of concern. The Director may choose to require evaluation of all species or of certain indicator species; or the Director may elect to verify attainment of performance standards using biomass as a metric. EPA believes that as each situation will be somewhat unique, it should be left to the facility to propose and the Director approve the appropriate unit, biomass or actual counts.

c. Other Means of Determining Attainment of Performance Standards

Several commenters also suggested that EPA should allow for the use of existing data for measuring attainment in lieu of requiring existing facilities to collect and develop new data. Commenters also suggested that if a facility currently implements the best technology available to minimize adverse environmental impact, it should be found in compliance even if the newly promulgated performance standards are not being met. Other commenters expressed that a facility should be considered in compliance even during occurrences of unavoidable episodic impingement and entrainment events. These commenters stated that in such unusual circumstances, the facility should be provided with an exemption from any regulatory actions.

EPA agrees with commenters that under certain circumstances, facilities' historical data may be sufficient to verify that they are meeting performance standards, as long as the historical data is reflective of current operation of the facility and of current biological conditions at the site. For example, under compliance alternative 2, a facility may use historical data to demonstrate that existing design and construction technologies, operational or restoration measures, meet the performance standards. EPA also believes that some historical data may be appropriate for determining the calculation baseline and for characterizing the nature of impingement and entrainment at the site, and therefore has given the Director the discretion to determine whether historical data are applicable to current conditions (see 125.95(b)(1)(ii), 125.95(b)(2)(i), and 125.95(b)(3)(iii)). In addition, a facility that proves, using existing data, that it has reduced its intake capacity commensurate with closed-cycle recirculating systems would be considered to be in compliance, and therefore would not be required to meet the performance standards for either impingement mortality or entrainment.

After the first permit term, facilities may submit a request for reduced information collection activities to their Director. Facilities that are able to demonstrate that conditions at their facility and in the waterbody from which their facility withdraws surface water are substantially unchanged since their previous permit application will qualify for reduced requirements (§ 125.95(a)(3)). In all these cases, historical data are used and required to measure success in meeting performance standards. However, facilities required to submit a Verification Monitoring Plan must still submit verification monitoring data for at least two years following implementation of technologies and/or operational measures.

Other commenters argued that a facility that is implementing permit conditions reflecting a historical determination of the best technology available should be considered in compliance with today's final rule even if the facility is not meeting performance standards. EPA disagrees that a historical determination of the best technology available is appropriate for complying with the requirements set forth by today's rule. Many historical determinations of the best technology available are less protective of aquatic organisms and ecosystems than the standards set by today's rule, and would undermine the national performance standards that EPA has determined reflect the current best technology available for minimizing adverse environmental impact. Furthermore, biological, chemical and physical conditions at the facilities may have changed since the earlier determinations were made, and the best technology available determinations may no longer apply. Many of the historical best technology available determinations are twenty years old or older and may not correspond with current waterbody or operating conditions.

The question whether a facility should be considered in compliance even during occurrences of unavoidable episodic impingement and entrainment events is left to the Director. At the Director's discretion, facilities that are generally in compliance, but that experience an unusual peak of impingement mortality and/or entrainment, may be considered to still be in compliance on the basis of past good performance. Moreover, the inclusion of a compliance determination alternative based on a Technology Installation and Operations Plan in the final rule also addresses these episodic issues.

d. Monitoring

One commenter stated that monitoring frequencies should be established to address the inherent variability in the rates in impingement and entrainment over the seasons of the year. Monthly or biweekly monitoring is probably appropriate in many cases. The same commenter stated that standard statistical procedures could be followed to establish sample sizes needed to establish appropriate levels of precision in the estimates (*e.g.,* 95% confidence intervals within 15–25% of the mean). In contrast, another commenter pointed out that weekly sampling would be necessary to determine compliance, as had been necessary for the Salem facility. Another commenter suggested that the most cost-effective way of conducting studies would be over the periods of peak abundance.

Some commenters stated that facilities should be allowed to cease monitoring following achievement of the performance standards. Some

suggested that facilities meeting performance standards through a closed-cycle cooling system should be exempt from monitoring. Another commenter disagreed with the two-year monitoring requirement altogether.

EPA has determined that a uniform averaging period would not be appropriate; rather, the Director will be best suited to make all such determinations by evaluating these and other factors for each facility on a case-by-case basis. The Director will be able to make determinations regarding averaging periods based upon site-specific factors, such as biological assemblage at the site, annual and diel fluctuations in concentration and populations present, and the selected compliance alternative. EPA disagrees that a facility should cease monitoring once performance standards are achieved, as site-specific conditions at any facility are bound to change with time, affecting a facility's ability to achieve performance standards. EPA agrees that facilities meeting performance standards through flow reductions commensurate with closed-cycle cooling should be exempt from monitoring (see § 125.94(a)(1)(i)). Finally, EPA believes that the two-year monitoring requirement is appropriate so that any site-specific variability in impingement and entrainment rates can be detected.

e. Timing

Some States favored flexibility in implementation including delaying the effective date for permits to be renewed soon after the rule is finalized. Some commenters suggested that the requirements of the rule must be timed so that facilities are not forced into a period of noncompliance because of the time needed to determine, design, and install new intake technology.

One commenter expressed that implementation schedules are too strict. Along the same vein, another commenter suggested that EPA should build flexibility into the implementation schedule so that facilities are not forced into periods of noncompliance.

Commenters generally wanted to see flexibility in the averaging periods (time increments for determining success in meeting the percent reduction or production specified by the performance standards and restoration requirements in § 125.94,) and a way to tailor the sampling schedules to the needs of the site. These commenters indicated that the monitoring should be frequent enough to provide useful information, but not so intensive as to make the program unnecessarily costly or time-consuming. Furthermore, several recommended that a compliance schedule be written into the permits, to allow facilities to install and test new equipment. Several commenters agreed that different facilities might require different amounts of time, as dictated by where they are in the cycle and what their circumstances are.

EPA has provided for time to comply with permitting requirements. A facility whose permit expires more than four years after the date of publication of this final rule must submit the required information 180 days before the expiration of their permit. A facility whose permit expires within four years of the date of publication of this final rule may request that the Permit Director establish a schedule for submission of the permit application. Such submission should be as expeditiously as practicable, but no later than three and one-half years from the date of publication of this final rule. It is expected that the time that facilities need to comply with permitting requirements will be variable, ranging from one year for those not needing to do an impingement mortality and entrainment study to over three years for those needing to collect more than one years worth of impingement and entrainment data.

EPA has also provided that facilities may opt to comply with the Technology Installation and Operations Plan compliance scheme that allows facilities who properly implement the Technology Installation and Operations Plan (or Restoration Plan, as applicable) to be considered in compliance with the requirements of § 125.94. As indicated above, the final rule provides the Director the flexibility to establish an appropriate averaging period to meet the particular situation present in the waterbody within which the facility is located.

3. Entrainment Survival

EPA invited comment on whether to allow Phase II existing facilities to incorporate estimates of entrainment survival when determining compliance with the applicable performance standards. Commenters responded with numerous comments regarding survival with respect to the performance standards as well as comments regarding EPA's assumption of zero percent entrainment survival (100 percent mortality) in the benefits assessment for today's rule.

Some commenters opposing the zero percent survival assumption argued that in the event a facility can demonstrate entrainment survival, it should be awarded credits towards meeting performance standards. EPA disagrees. Today's final rule sets performance standards for reducing entrainment rather than reducing entrainment mortality. EPA chose this approach because EPA does not have sufficient data to establish performance standards based on entrainment survival for the technologies used as the basis for today's rule. If EPA had incorporated entrainment survival into any of its conclusions regarding the appropriate performance standards, then the actual performance standard would most likely have been higher.

Many commenters argued that in many cases organisms survive entrainment and the zero percent survival assumption was too conservative. Some commenters suggested that EPA was biased in its approach to entrainment survival. For example, one commenter stated that EPA was biased as a result of relying heavily on old entrainment survival literature.

Based on its review of all entrainment survival studies available to the Agency, EPA believes that its assumption of zero percent survival in the benefits assessment is justified. The primary issue with regard to the studies EPA reviewed is whether the results can support a defensible estimate of survival substantially different from the value zero percent survival assumed by EPA. The review of the studies has shown that while organisms are alive in some of the discharge samples, the proportion of the organisms that are alive in the samples is highly variable and unpredictable on a national basis. In addition, some studies contain various sources of potential bias that may cause the estimated survival rates to be higher than the actual survival rates. For these reasons, EPA believes the current state of knowledge does not support reliable predictions of entrainment survival that would provide a defensible estimate for entrainment survival above zero at a national level. However, today's final rule does allow facilities to use the results of a well-constructed, sites-specific entrainment survival study, approved by the Director, in their benefits assessments when seeking site-specific entrainment requirements. The permitting authority must review and accept the study before the results may be incorporated into the benefits assessments. In cases where there is uncertainty in the survival rates, permitting authorities may want to specify that benefits be presented as a range that reflects this uncertainty.

4. Comprehensive Demonstration Study (CDS)

a. Requirements and Burden

The majority of commenters expressed two concerns regarding the CDS: (1) it was too burdensome and costly, and the volume of information required was too overwhelming, and (2) several components required clarification. These commenters generally suggested that the costs of such a study were underestimated, and many indicated that the cost estimates for completing the CDS contained misleading or incorrect information. Commenters indicated that the information required for completing the CDS was similar to the data that would be needed for implementing a purely site-specific approach and was therefore overly burdensome. Commenters suggested that EPA require a more simplified demonstration study or waive the requirement for facilities that select one of the approved technologies. Some commenters suggested, in general, that costs could be greatly reduced by streamlining this process, for example, by exempting facilities from certain components based on (1) facilities that have proven that they are not harming the aquatic community, and (2) facilities for which there exists relevant historical data.

Several States anticipated that the majority of their facilities were likely to choose the site-specific compliance alternative, and indicated that a rule that requires cost/benefit analyses for many decisions would be difficult to administer and require significant resources to implement. They claimed that the site-specific performance standards compliance option would impose a substantial review burden and would require specialized expertise. Some States questioned whether existing permitting staff resources over the first 5 years will be sufficient to review material and develop permit requirements.

Many commenters suggested that EPA could lower costs by streamlining the CDS, exempting facilities that are not causing adverse environmental impact or have historical data, and waiving the monitoring components for facilities that have installed approved technologies.

EPA believes that many efficiencies have been added to the rule since the proposal and the NODA to address concerns that the CDS is too burdensome and costly. First, EPA has provided five compliance alternatives to choose from, one of which allows a facility to install an approved design and construction technology with minimal CDS requirements. In addition, facilities with design intake flow commensurate with closed-cycle recirculating systems are exempt entirely from the CDS; facilities may only have to submit partial CDS information if they have reduced their design intake velocity to less than or equal to 0.5 feet per second and are only required to meet requirements as they relate to reductions in entrainment. In addition, requiring an early submission of the Proposal for Information Collection allows the Director to potentially minimize the amount of information required by the facility. Also, by allowing the use of historical data, EPA has minimized costs for many facilities. In the cases where new studies are required, EPA has given the permittee and the Director discretion to set conditions for the studies which will not be overly burdensome. Facilities may also reduce costs incurred through the information collection process in subsequent permit terms by submitting, one year prior to expiration of the existing permit, a request for reduced permit application information based on conditions of their cooling water intake structure and waterbody remaining substantially unchanged since the previous permit issuance.

One commenter expressed concern that historical data should not be allowed in the development of the CDS, as it may not accurately reflect current conditions. EPA believes that some historical data may be appropriate for determining the calculation baseline and for characterizing the nature of impingement and entrainment at the site, and therefore has given the Director the discretion to determine whether historical data are applicable to current conditions. EPA expects to provide guidance to Directors to help them make determinations about historical data submitted by facilities. Historical data will not be used to determine attainment of performance standards; this will be verified through a monitoring program approved by the Director.

b. Timing of Submitting Information

Commenters submitted a variety of opinions about timing. Generally, most favored limiting the submittal of CDS components to a frequency equal to or greater than once every five years (one permitting cycle) to reduce burden. Another commenter argued that there is no reason to mandate timing, and that approval of the Director should not be necessary. Other commenters suggested that a time frame is necessary, and that the information should be submitted with the renewal application for a NPDES permit. Numerous commenters asserted that consultation activities should occur prior to development of the Comprehensive Demonstration Study; that schedules and requirements should be specified in the permit for various data collection, analysis, and application submission activities; implementation schedules are too strict; and monitoring requirements need clarification. Yet another commenter suggested to ''start the clock'' with the issuance of the renewed permit. Commenters also indicated that anywhere from one year to several years might be necessary to verify success in meeting the performance standards. Several commenters suggested that given the nature of cooling water intake impacts and the proposed requirements, section 316(b) permit and BTA determinations should not be made every five years. Instead, they suggested that one-time determinations should suffice, or that facilities should be allowed to rely on previous section 316(b) demonstrations if conditions remain essentially unchanged. There was also some general confusion as to when the rule would actually become effective.

In response to the comment that EPA should not request submittal of CDS components more frequently than every five years or more, EPA has included a provision whereby a facility may be granted reduced CDS submittal requirements if it can prove that conditions at the facility and in the waterbody have not substantially changed. Facilities will be required to review whether conditions, such as biological, chemical or physical conditions, have substantially changed at each permit renewal cycle. If conditions have changed, facilities will be required to submit all of the relevant CDS components (those that would be affected by the changed conditions when they submit the application for permit renewal.

One commenter stated that the CDS should be a one-time submittal. EPA disagrees that all components of the CDS should only be researched and submitted a single time for the lifetime of the facility, regardless of potential changes in the plant and/or waterbody, because the natural and anthropogenic changes that occur in waterbodies over time may affect a facility's ability to meet performance standards using the current design and construction technologies, operational measures, and/or restoration measures in place.

In response to comments that timing was not clear in previous versions of the rule, EPA agrees, and has clarified timing issues in today's final rule. A

facility whose permit expires more than four years after the date of publication of this final rule must submit the required information 180 days before the expiration of their permit. A facility whose permit expires within four years of the date of publication of this final rule may request that the Permit Director establish a schedule for submission of the permit application, but that such submission should be as expeditiously as practicable, but no later than three and one-half years from the date of publication of this final rule. It is expected that the time that facilities need to comply with permitting requirements will be variable, ranging from one year for those not needing to do an impingement mortality and entrainment study to over three years for those needing to collect more than one years worth of impingement and entrainment data.

Some commenters felt that decisions about the timing of the CDS submittal should be left to the Director. EPA agrees and has provided only that the proposal for information collection should be submitted prior to the start of information collection activities, but that the facility may initiate information collection prior to receiving comment from the Permit Director. All other components of the Comprehensive Demonstration Study must be submitted 180 days prior to permit expiration except as noted above for the first, permit term following promulgation of the rule.

5. State Programs

Many States requested that existing State section 316(b) programs be allowed to be used to meet the requirements of Phase II. One commenter asserted that the Phase II rule should not overturn past State section 316(b) decisions at existing facilities that were made on a site-specific basis and that examined the impacts of the cooling water intake structure in relation to the specific biological community. Several commenters stated that EPA did not sufficiently recognize the work already done by the States in implementing section 316(b). Several commenters do not believe that a State should have to demonstrate that its program is ''functionally equivalent'' to today's rule (*i.e.,* that its alternative regulatory requirements achieve environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94).

In response to comments about existing State section 316(b) programs, EPA believes that § 125.90(c) in today's rule, by allowing alternative State programs, acknowledges the work already done by States. In response to the comment that a State should not have to prove that its program achieves environmental performance comparable to those that would be achieved under § 125.94, EPA disagrees. While EPA is giving significant flexibility to permitting agencies at the State level to determine how and what each facility must protect and monitor, it believes it is important to set uniform national performance standards.

F. Restoration

In the proposed rule EPA requested comments on the use of restoration measures by facilities within scope of the rulemaking (67 FR 17146). EPA received diverse comments. Many commenters supported a role for restoration measures. Several commenters stated that allowing restoration provides additional flexibility to those who must comply with the section 316(b) requirements, and may provide a more cost-effective means of minimizing adverse environmental impact than operational measures or design and construction technologies. Other commenters stated that restoration is a well-accepted concept that should have a voluntary role in section 316(b) determinations and constitutes an appropriate means for reducing the potential for causing adverse environmental impact. Several commenters felt that restoration could provide significant benefits in addition to compensating for impingement and entrainment losses. A number of commenters requested flexibility in the implementation of restoration projects. Some commenters stated that restoration should not be limited to supplementing technology or operational measures, but should instead be allowed as a complete substitute for such measures. However, other commenters stated that restoration measures should only be used once every effort has been made to use technology to avoid impacts.

Commenters further stated that restoration should not be mandatory and that EPA lacks authority under section 316(b) to require it, but also asserted that it should have an important role in section 316(b) permitting decisions. Commenters also stated that restoration should not be considered the best technology available for minimizing adverse environmental impact because it is not a technology that addresses the location, design, construction, or capacity of a cooling water intake structure. However, one commenter argued that past restoration measures should be considered during a regulator's determination of whether or not adverse environmental impact is occurring from a cooling water intake structure.

Other commenters felt restoration should have a limited role or no role in the context of section 316(b). One commenter wrote that restoration measures, in the context of section 316(b), are generally unworkable and that the only measurable restoration method would be offsetting, in which an applicant stops use of an older intake facility that does more harm than the proposed one. One commenter stated that restoration methods must reproduce the ecological value of lost organisms and that they have not seen restoration projects adequately successful in this manner in their region of the country. Many commenters pointed out uncertainties associated with compensating for those organisms impacted by a cooling water intake structure through restoration.

Some commenters suggested that, if restoration is allowed, there should be consultation with other State and Federal resource agencies to avoid inconsistent approaches and to provide useful information on the affected waterbody.

Several commenters remarked on EPA's proposal to include requirements for uncertainty analysis, adaptive management plans, and peer review in the final rule. Some commenters were in favor of the requirements and felt that they would enhance restoration measure certainty and performance. Some commenters were concerned that the requirements would be overly burdensome or would overly restrict the restoration measure options available to permit applicants.

EPA has retained restoration in the final rule and believes that the restoration requirements strike an appropriate balance between the need for flexibility and the need to ensure that restoration measures achieve ecological results that are comparable to other technologies on which the performance standards are based. Facilities that propose to use restoration measures, in whole or in part, must demonstrate to the Director that they have evaluated the use of design and construction technologies and/or operational measures and found them to be less feasible, less cost-effective, or less environmentally desirable than meeting the applicable performance standards in whole or in part through the use of restoration measures. The requirement to look at design and construction technologies and/or

operational measures in order to ensure that facilities give due consideration to the technologies on which the performance standards are based.

Facilities must also demonstrate that the use of restoration measures achieves performance levels that are substantially similar to those that would be achieved under the applicable performance standards. To address concerns regarding the uncertainty of restoration measures, EPA has included, among other things, requirements for uncertainty analysis, adaptive management plans, monitoring, and peer review, if requested by the Director. Finally, EPA does not believe the requirements for restoration measures are overly burdensome or prescriptive as there is a need to ensure that these types of measures achieve the anticipated environmental benefit. Moreover, under the rule, facilities are provided at least three and one-half years to submit their restoration plan and complete the required studies.

G. Costs

1. Facility-Level Costs

Generally, commenters were split regarding the national costs of the rule. Industry commenters stated that the cost analysis presented in the proposal underestimated the compliance costs in several facets of the analysis, including capital costs of the technology, the site-specific contingencies associated with retrofitting, and facility down time. Several commenters stated that EPA underestimated the costs for the monitoring requirements for both the characterization study in the permit application and for verification monitoring. Other commenters generally stated the opposite, arguing that EPA overestimated the compliance costs, especially for installing cooling towers. Some commenters stated that costs should not be a consideration in section 316(b) determinations.

The Agency significantly revised the approach to developing costs for the NODA. Those revisions incorporated some of the comments on the costing methodology for technologies that reduce impingement and entrainment. EPA's approach to estimating the costs of the requirements of the final rule reflect the NODA comments on the revised methodology, and additional analyses. EPA, however, did not revise its estimates for cooling towers subsequent to the NODA because it decided not to further pursue this regulatory option for the reasons outlined more specifically in Section VII. EPA believes that our costing of cooling tower technology is appropriate as it is based on vendor and engineering firm experience in developing costs for Phase II facilities.

2. Market-Level Impacts

Numerous industry commenters stated that EPA significantly underestimated the impacts to generators, consumers, reliability, and energy supply. EPA disagrees with these commenters. EPA performed an analysis of facility- and market-level impacts (including impacts to generators, consumers, reliability, and energy supply) using the Integrated Planning Model (IPM®), which has been widely used in air quality regulations and in other public policy arenas affecting the electric power generation industry.

One commenter stated that the IPM analysis does not account for the economic impacts of other regulatory programs. EPA disagrees with this assertion. The IPM base case accounts for costs associated with current federal and state air quality requirements, including future implementation of SO_2 and NO_X requirements of Title IV of the Clean Air Act and the NO_X SIP call as implemented through a cap and trade program. Because of its relative newness, it does not account for costs associated with the Phase I facility regulations.

One commenter stated that EPA justified the rule by using a cost-to-revenue comparison and that this comparison neither measures profitability nor represents the most efficient economic solution for each facility. As discussed in Section VII. above, the economic practicability of the Phase II regulation is based on the electricity market model analyses using the IPM, not the cost-to-revenue ratio. The cost-to-revenue ratio is only one of several additional measures EPA used to assess the magnitude of compliance costs.

Some commenters stated that EPA did not properly take account of differences between utilities, which own and operate rate-based facilities, and nonutilities, which own and operate competitive generating facilities. EPA disagrees with this comment. EPA believes that in a deregulated market, the distinction between utilities and nonutilities is no longer relevant. While such a distinction may have been important in the past, when only a few unregulated nonutilities competed with regulated utilities, this is no longer the case. The share of Phase II facilities that are owned by unregulated entities has increased from 2 percent in 1997 to 31 percent in 2001. By the time the final rule will take effect, even more Phase II facilities that currently operate under a rate-based system will be operating in a competitive market. Furthermore, EPA does not believe that nonutilities will be differentially impacted compared to utilities, even in the case that deregulation might not have taken effect in all markets by the time this rule is implemented. Competitive pressures, even in regulated environments, will reduce the ability of utilities to pass on costs to their consumers.

Some commenters stated that small or publicly owned facilities may be significantly affected. EPA disagrees with this statement. EPA's SBREFA analysis showed that this rule will not lead to a significant economic impact on a substantial number of small entities (See Section XIII.C below). While municipally owned facilities bear a relatively larger compliance cost per MW of generating capacity than do facilities owned by other types of entities, EPA's analyses show that these costs are not expected to lead to significant economic impacts for these facilities.

Some commenters stated that even a requirement to convert all facilities to closed-cycle cooling would not significantly affect energy supply and that the costs to facilities and consumers is small and in some cases, overstated by EPA's analysis. EPA disagrees with this statement. EPA considered several options that would require some or all facilities to install closed-cycle recirculating systems and rejected them on the basis of economic practicability and technological feasibility. See Section VII.B for more detail on why EPA rejected closed-cycle recirculating systems.

H. Benefits

In its analysis for section 316(b) Phase II Proposal, EPA relied on nine case studies to estimate the potential economic benefits of reduced impingement and entrainment. EPA extrapolated facility-specific estimates to other facilities located on the same waterbody type and summed the results for all waterbody types to obtain national estimates. During the comment period on the proposed rule EPA received numerous comments on the valuation approaches applied to evaluate the proposed rule, including commercial and recreational fishing benefits, non-use benefits, benefits to threatened and endangered species (T&E), as well as on the methods used to extrapolate case study results to the national level. EPA tried to address concerns raised by commenters on the proposal in the revised methodology presented in the NODA and the final rule analysis.

1. Benefits Analysis Design

A number of commenters expressed concern about EPA's reliance on a few case studies and the extrapolation method used for estimating benefits at the national level for the proposed rule analysis. The commenters noted that even within the same waterbody type, there are important ecological and socioeconomic differences among different regions of the country. To address this concern, EPA revised the design of its analysis to examine cooling water intake structure impacts at the regional-scale. The estimated benefits were then aggregated across all regions to yield the national benefits estimate. These analytical design changes were presented in the NODA. No major comments were received on EPA's regional benefit approach as described in the NODA.

2. Commercial Fishing Benefits

During the comment period on the proposed rule EPA received a number of comments on the methods used to estimate producer surplus and consumer surplus in the commercial fishing sector. Commenters felt that the methods overestimated benefits. The new methods used by EPA assume that producer surplus is 0% to 40% of gross revenues in the commercial fishing sector. EPA also now assumes that the Phase II rule will not create increases in commercial harvest large enough to impact prices. Thus, no consumer surplus impact is estimated. Commenters on the NODA noted these changes and agreed with them.

3. Recreational Fishing Benefits

A number of comments were received on the recreational fishing benefits estimates EPA included in the proposal, which primarily relied on a benefits transfer approach. Benefit transfer involves adapting research conducted for another purpose in the available literature to address the policy questions in hand. For more detail on the valuation methods used in the final rule analysis, see Chapter A9 of the Regional Analysis document (DCN 6–0003). For three of the nine case studies, this analysis was supplemented by original revealed preference studies. Revealed preference methods use observed behavior to infer users' value for environmental goods and services. Examples of revealed preference methods include travel cost, hedonic pricing, and random utility models (RUM). For more detail on the revealed preference methods used in the final rule analysis, see Chapters A9 and A11 of the Regional Analysis document (DCN 6–0003). Although most commenters agreed that properly executed benefits transfer is an appropriate method for valuing nonmarket goods, they pointed out that original revealed preference studies that provide site-specific recreational fishing benefit estimates provide a superior alternative to benefits transfer. In response to these comments, EPA developed original or used available region-specific recreational angler behavior models, which provide site-specific estimates of willingness-to-pay for improvements in recreational fishing opportunities, to estimate recreational fishing benefits from reduced impingement and entrainment for seven of the eight study regions. Chapter A11 of the Regional Analysis document provides detailed discussion of the methodology used in EPA's RUM analysis (DCN 6–0003). Due to data limitations, EPA used a benefit transfer approach to value recreation fishing benefits from reduced impingement and entrainment in the Inland region.

4. Non-Use Benefits

Numerous comments were received on EPA's proposed non-use benefit estimates. Most commenters agreed that non-use values are difficult to estimate and that EPA's estimates of non-use benefits using the 50% rule was inappropriate because it relies on outdated studies. Commenters, however, disagreed as to whether EPA had vastly overstated or underestimated non-use benefits in the proposed Phase II rule analysis.

Some commenters stated that EPA's approach to estimating non-use benefits of the proposed rule significantly overestimates total benefits and that ecological benefits of the section 316(b) regulation are negligible. Other commenters asserted that EPA's benefits estimates significantly undervalued the total ecological benefits (including use and non-use) of preventing fish kills. These commenters indicated that it would be impossible to claim that the value of the unharvested commercial and recreational and forage species lost to impingement and entrainment was equal to zero. Reasons some commenters gave for the underestimation of total benefits included the following: total losses were underestimated by using outdated monitoring data for periods when population levels (and therefore impingement and entrainment) were much lower than the present; cumulative impacts were not sufficiently considered; recreational and commercial values were underestimated; commercial invertebrate species were ignored; ecological value of forage species was not considered; non-use benefits were underestimated; and secondary economic impacts were not included. Overall these commenters argued that a net benefit underestimation could be corrected by (1) assuming that non-use values were two times the estimated value of recreation, commercial and forage values; and (2) assuming that unharvested fish had a value greater than zero.

In response to public comments regarding the analysis of non-use values in the proposed rule, EPA considered the results of several different approaches to quantifying non-use values. The Agency points out that none of the available methods for estimating either use or non-use values of ecological resources is perfectly accurate; all have shortcomings.

EPA has determined that none of the methods it considered for assessing non-use benefits provided results that were appropriate to include in this final rule, and has thus decided to rely on a qualitative discussion of non-use benefits. The uncertainties and methodological issues raised in the approaches considered could not be resolved in time for inclusion in the rule. EPA continues to evaluate various approaches for evaluating non-use benefits of CWA rules.

5. Habitat Replacement Cost (HRC)

Some commenters argued that the HRC methods are not legitimate valuation methods because they concern costs, not benefits. However, other commenters argued that although HRC analysis is not a benefit's analysis in the strict economic sense it can provide a practical approach to capturing the full range of ecosystem services and, thus, is appropriate for evaluating the benefits of this rule. These commenters further pointed out that ''restoration cost is used as a measure of damages under CERCLA for Superfund sites, under the National Marine Sanctuaries Act, and under the oil spill provisions of the Clean Water Act. Use of restoration costs was explicitly upheld in the landmark Ohio vs. Interior court decision of 1989.''

EPA has removed the disputed results of the HRC analyses from its benefits estimates for the final rule. For the NODA, EPA revised the HRC analysis presented in the proposed rule (see 67 FR 17191). Instead of the costs of habitat replacement, EPA used estimated willingness-to-pay values for the resource improvements that would be achieved by the habitat replacement/restoration equivalents.

During the comment period on the NODA, EPA received a number of comments on the revised habitat-based valuation method. Specifically, several commenters questioned the appropriateness of using willingness to pay values for habitat restoration as a ''proxy'' for either the total value or the non-use value of the fishery resources that would be preserved due to reduced impingement and entrainment. EPA explored this approach to estimating non-use values for three case study regions: the North Atlantic, Mid-Atlantic, and Great Lakes Regions. However, due to limitations and uncertainties regarding the application of this methodology, EPA elected not to include benefits based on this approach in the costs and benefits analysis of the final section 316(b) rule.

6. Benefits to Threatened and Endangered Species.

Similarly to the HRC approach, commenters strongly disagreed about the appropriateness of EPA using the societal revealed preference (SRP) method to value benefits from reducing impingement and entrainment of threatened and endangered species because these methods concern costs not benefits. The SRP method uses (1) evidence of actions taken to benefit a resource that were developed, approved, and implemented voluntarily by government and quasi-government agencies and (2) data on anticipated and actual expenditures required to complete the actions. EPA has removed the disputed results of the societal revealed preference analyses from its benefits estimates for the final rule because the uncertainties and methodological issues raised in the approaches considered could not be resolved in time for inclusion in the rule.

Some commenters argued that benefits transfer is the second best approach to estimating benefits from improved protection of threatened and endangered species if conducting an original stated preference study is not feasible. Specifically, the commenters recommended that EPA use benefits transfer for valuing improved protection of threatened and endangered species instead of the societal revealed preference method. In response to these comments, EPA has explored a benefits transfer approach to valuing improved protection of threatened and endangered species due to the final section 316(b) regulation. For detail, see Chapters A13 and B6 of the Regional Analysis document (DCN 6–0003). EPA, however, notes that benefits based on this method were not included in the benefit cost analysis of the final section 316(b) rule due to the uncertainties and limitations discussed in Section A13–6.1 of the Regional Study document (see DCN 6–0003).

7. Timing of Benefits

During the comment period on the proposed rule, EPA received a number of comments on the time at which benefits of the rule accrue to society. The commenters assert that the estimated commercial and recreational fishing benefits are overstated because timing of benefits was not taken into account. Specifically, the commenters argue that benefits could not be fully realized until installation of the cooling technology is completed and enough years pass after that first year of reduced impingement and entrainment mortality such that every fish avoiding impingement and entrainment in that year can be harvested by commercial and recreational fishermen. In response to public comments on the proposed rule analysis, EPA revised recreational and commercial fishing benefits analysis to account for a one-year construction period required to install CWIS technology to reduce impingement and entrainment, and a time lag between impingement and entrainment cessation and the time when recreational and commercial fish species will be large enough to be harvested. In accounting for a delay in benefits, EPA used both a three percent and a seven percent discount rate as recommended by OMB requirements.

I. EPA Legal Authority

1. Authority To Set a National Standard for Cooling Water Intake Structures

Some commenters challenged EPA's authority to set a national standard for cooling water intake structures, arguing that CWA section 316(b) requires EPA to provide a site-specific assessment of ''best technology available to minimize adverse environmental impact.'' These commenters maintain that the language and legislative history of CWA section 316(b), the objectives of the CWA, and prior EPA practice of site-specific application of CWA section 316(b) preclude EPA from setting a national standard under this rule.

EPA is authorized under section 501(a) of the Clean Water Act ''to prescribe such regulations as are necessary to carry out [its] functions'' under the Clean Water Act. Moreover, EPA interprets CWA section 316(b) to authorize national requirements for cooling water intake structures. CWA section 316(b) applies to sources subject to CWA sections 301 and 306, which authorize EPA to promulgate national categorical effluent limitations guidelines and standards for direct dischargers of pollutants. The reference in CWA section 316(b) to these sections indicates that Congress expected that CWA section 316(b) requirements, like those of CWA sections 301 and 306, could be applied as a national, categorical standard. *Cronin* v. *Browner,* 898 F. Supp. 1052, 1060 (1995) (''EPA was also free to choose, as it did, to implement section 316(b) by issuing one overarching regulation that would apply to all categories of point source subject to sections 301 and 306 that utilize cooling water intake structures.''); *see also Virginia Electric Power Co.* v. *Costle,* 566 F. 2d 446 (1977).

2. Authority To Consider Cost in Establishing Performance Standards and Compliance Options

Some commenters objected to EPA's consideration of costs in the determination of BTA. These commenters note that CWA section 316(b) does not expressly mention compliance costs, in contrast to other technology-based provisions of the CWA, which explicitly direct EPA to consider such costs. If Congress had intended that EPA consider costs under section 316(b), they argue, it would have expressly directed the EPA to do so.

EPA believes that it legitimately considered costs in establishing ''best technology available'' under CWA section 316(b). Although CWA section 316(b) does not define the term ''available,'' it expressly refers to CWA sections 301 and 306—both of which require EPA to consider costs in determining the ''availability'' of a technology. Specifically, CWA section 301(b)(1)(A) requires certain existing facilities to meet effluent limitations based on ''best practicable control technology currently available,'' which requires ''consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application.'' 33 U.S.C. 1314(b)(1)(B). Similarly, CWA section 301(b)(2)(A) requires application of the ''best available technology economically achievable,'' which in turn requires consideration of ''the cost of achieving such effluent reduction.'' 33 U.S.C. 1314(b)(2)(B). Finally, CWA section 306(b)(1)(B), which governs the effluent discharge standards for new sources, expressly states that in establishing the ''best available demonstrated control technology'' the Administrator shall take into consideration ''the cost of achieving such effluent reduction'' 33 U.S.C. 1316(b)(1)(B). Although these standards

are somewhat different, each mandates the consideration of costs in establishing the technology-based standard. Because CWA sections 301 and 306 are expressly cross-referenced in CWA section 316(b), EPA believes that it reasonably interpreted CWA section 316(b) as authorizing consideration of the same factors considered under CWA sections 301 and 306, including cost. EPA's interpretation of section 316(b) as authorizing a consideration of costs was explicitly upheld in litigation on the Phase I new facilities rule. *Riverkeeper* v. *EPA,* slip op. at 28 (2nd Cir., Feb. 3, 2004).

EPA's interpretation is supported by the legislative history of CWA section 316(b): '' 'best technology available' should be interpreted as best technology available at an economically practicable cost.'' *See* 118 Cong. Rec. 33,762 (1972), *reprinted in* 1 Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. at 264 (Comm. Print 1973) (Statement of Representative Don H. Clausen). EPA's interpretation of CWA section 316(b) is also consistent with judicial interpretations of the section. *See, e.g., Seacoast Anti-Pollution League* v. *Costle,* 597 F.2d 306, 311 (1st Cir. 1979) (''The legislative history clearly makes cost an acceptable consideration in determining whether the intake design 'reflect[s] the best technology available' ''); *Hudson Riverkeeper Fund, Inc.* v. *Orange & Rockland Util., Inc.* 835 F. Supp. 160, 165–66 (S.D.N.Y. 1993).

3. Authority To Allow Site-Specific Determination of BTA To Minimize AEI Based on a Cost-Cost Comparison

The final rule allows a facility to pursue a site-specific determination of ''best technology available to minimize adverse environmental impact'' where the facility can demonstrate that its costs of compliance under the compliance alternatives in §125.94(a)(2) through (4) would be significantly greater than the costs considered by the Administrator for a like facility in establishing the performance standard.

Some commenters argue that CWA section 316(b) does not authorize EPA to provide for a site-specific assessment of ''best technology available.'' These commenters argued that EPA was required under CWA section 316(b) to set a national standard for ''best technology available'' (BTA), at least as stringent as the national standard for ''best available technology'' (BAT) under CWA section 301. These commenters asserted that the similar wording of the BTA and BAT requirements, and the fact that CWA section 316(b) explicitly references CWA section 301 as the basis for its application, indicates legislative intent to equate BTA with BAT and thus requires a national—not site-specific—standard.

EPA disagrees. The CWA section 316(b) authorizes a site-specific determination of BTA. Although, the CWA section 316(b) authorizes EPA to promulgate national categorical requirements, EPA also notes that the variety of factors to be considered in determining these requirements—such as location and design—indicate that site-specific conditions can be highly relevant to the determination of BTA to minimize adverse environmental impact. In addition to specifying ''best technology available'' in relation to a national categorical performance standard, today's rule also authorizes a site-specific determination of BTA when conditions at the site lead to a more costly array of controls than EPA had expected would be necessary to achieve the applicable performance standards.

This site-specific compliance option is similar to the ''fundamentally different factors'' provision in CWA section 301(n), which authorizes alternative requirements for sources subject to national technology-based standards for effluent discharges, if the facility can establish that it is fundamentally different with respect to factors considered by EPA in promulgating the national standard. The fundamentally different factors provision was added to the CWA in 1987, but prior to the amendment, both the Second Circuit and the Supreme Court upheld EPA's rules containing provisions for alternative requirements as reasonable interpretations of the statute. *NRDC* v. *EPA,* 537 F.2d 642, 647 (2d Cir. 1976) (''the establishment of the variance clause is a valid exercise of the EPA's rulemaking authority pursuant to section 501(a) which authorizes the Administrator to promulgate regulations which are necessary and proper to implement the Act''); *EPA* v. *National Crushed Stone Ass'n,* 449 U.S. 64 (1980) (approving EPA's alternative requirements provision in a standard adopted pursuant to CWA section 301(b)(1), even though the statute did not expressly permit a variance.) EPA's alternative site-specific compliance option in this rule is similarly a reasonable interpretation of section 316(b) and a valid exercise of its rulemaking authority under CWA section 501.

Based on this interpretation, EPA and State permitting authorities have been implementing CWA section 316(b) on a case by case basis for over 25 years. Such a case-by-case determination of BTA has been recognized by courts as being consistent with the statute. See *Hudson Riverkeeper Fund* v. *Orange and Rockland Util,* 835 F. Supp. 160, 165 (S.D.N.Y. 1993) (''This leaves to the permit writer an opportunity to impose conditions on a case by case basis, consistent with the statute'').

Some commenters specifically challenged EPA's authority to consider costs in its site-specific assessment of best technology available. However, as discussed earlier, EPA reasonably interprets CWA section 316(b) to authorize it to consider costs of compliance in determining best technology ''available.'' Therefore, where EPA fails to consider a facility's unusual or disproportionate costs in setting the national requirements for ''best technology available,'' it reasonably authorizes permit authorities to set site-specific alternative limits to account for these costs. See *Riverkeeper* v. *EPA,* slip op. at 25 (2nd Cir. Feb. 3, 2004) (upholding site-specific alternative limits under the Phase I rule for new facilities where a particular facility faces disproportionate compliance costs.)

In addition, EPA notes that—contrary to some commenters' assertions—the rule does not in fact authorize permitting authorities to consider a facility's ''ability to pay'' in its site-specific assessment of BTA. It only allows consideration of whether the facility has unusual or disproportionate compliance costs relative to those considered in establishing the performance standards—not whether the facility has the financial resources to pay for the required technology. Moreover, in setting the alternative BTA requirements, the permit authorities may depart from the rule's national technology-based standards only insofar as necessary to account for the unusual circumstances not considered by the Agency during its rulemaking.

4. Authority To Allow Site-Specific Assessment of BTA Where Facility's Costs of Compliance Are Significantly Greater Than Benefits of Compliance

Some commenters objected to the second site specific regulatory option—authorizing a site-specific determination of best technology available where the facility can demonstrate that its costs of compliance under §125.94(a)(2) through (4) would be significantly greater than the benefits of complying with the applicable performance requirements at the facility. These commenters argue that a cost-benefit decision making criterion is not authorized under the CWA. Many of these commenters assert

that while it may be reasonable for EPA to exclude technologies if their costs are ''wholly disproportionate'' to the benefits to be achieved, EPA lacks the statutory authority to conduct a formal cost/benefit analysis to determine the best technology available on a site-specific basis.

EPA believes that the Clean Water Act authorizes a site-specific determination of the best technology available to *minimize* adverse environmental impact where the costs of compliance with the rule's performance standards are significantly greater than its benefits. This authority stems from the statutory language of CWA section 316(b). As discussed in Section III above, Section 316(b) requires that cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. 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. In contrast, under section 301 the goal of BAT is explicitly articulated by reference to a different purpose, to make reasonable further progress toward the national goal of eliminating the discharge of all pollutants (section 301(b)(2)(A)). Similarly, under section 304, the goal of BPT and BCT is explicitly articulated by reference to the degree of effluent reduction attainable. (section 304(b)(1)(A) and section 304(b)(4)(A)). 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 have been done on a case-by-case basis. *See, e.g., In Re Public Service Co. of New Hampshire,* 10 ERC 1257 (June 17, 1977); *In Re Public Service Co. of New Hampshire,* 1 EAD 455 (Aug. 4, 1978); *Seacoast Anti-Pollution League* v. *Costle,* 597 F. 2d 306 (1st Cir. 1979). Under CWA section 316(b), EPA may consider the benefits that the technology-based standard would produce in a particular waterbody, to ensure that it will ''minimize adverse environmental impact.'' EPA believes that the technology-based standards established in this final rule will, as a national matter, ''minimize adverse environmental impact.'' However, the degree of minimization contemplated by the national performance standards may not be justified by site-specific conditions. In other words, depending on the circumstances of the receiving water, it may be that application of less stringent controls than those that would otherwise be required by the performance standards will achieve the statutory requirement to ''minimize'' adverse environmental impact, when considered in light of economic practicability. An extreme example is a highly degraded ship channel with few fish and shellfish, but such situations can only be identified and addressed through a site-specific assessment.

For these reasons, EPA reasonably interprets the phrase ''minimize adverse environmental impact'' in section 316(b) to authorize a site-specific consideration of the benefits of the technology-based standard on the receiving water. EPA continues to believe that any impingement or entrainment would be an adverse environmental impact, but has determined that 316(b) does not require minimization of adverse environmental impact beyond that which can be achieved at a cost that is economically practicable. EPA believes that the relationship between costs and benefits is one component of economic practicability for purposes of section 316(b), and as noted previously, the legislative history indicates that economic practicability may be considered in determining what is best technology *available* for purposes of 316(b). EPA believes that allowing a relaxation of the performance standards when costs significantly exceed benefits, but only to the extent justified by the significantly greater costs, is a reasonable way of ensuring that adverse environmental impact be minimized at an economically practicable cost. This does not mean that there is a need to make a finding of ''adverse environmental impact'' before performance standard based CWA section 316(b) requirements would apply. Rather, EPA is authorizing an exception to performance standard based requirements on a site-specific basis in limited circumstances: when the costs of complying with the national performance standards are significantly greater than the benefits of compliance at a particular site.

5. Authority To Allow Restoration To Comply With the Rule Requirements

The final rule authorizes the use of restoration measures that produce and result in increases of fish and shellfish in a facility's watershed in place of, or as a supplement to, installing design and control technologies and/or operational measures that reduce impingement mortality and entrainment. Restoration measures can include a wide range of activities including measures to enhance fish habitat and reduce stresses on aquatic life; creation of new habitats to serve as spawning or nursery areas, and creation of a fish hatchery and/or restocking of fish being impinged and entrained with fish that perform a substantially similar function in the aquatic community.

While the Phase I rule also authorized use of restoration measures, today's rule includes additional regulatory controls on the use of restoration measures to ensure that they are used appropriately to comply with the applicable performance requirements or site specific alternative requirements. For example, restoration measures are authorized only after a facility demonstrates to the permitting authority that it has evaluated other design and construction technologies and operational measures and determined that they are less feasible, less cost-effective, or less environmentally desirable than meeting the performance standards or alternative site-specific requirements in whole or in part through the use of restoration measures. The facility must also demonstrate that the proposed restoration measures will produce ecological benefits (*i.e.*, the production of fish and shellfish for the facility's waterbody or watershed, including maintenance of community structure and function) at a level that is substantially similar to the level a facility would achieve through compliance with the applicable performance standards or alternative site-specific requirements. Further, the permitting authority must review and approve the restoration plan to determine whether the proposed restoration measures will meet the applicable performance standards or site specific alternative requirements. Consequently, the restoration provisions of today's rule are designed to minimize adverse environmental impact to a degree that is comparable to the other technologies on which the rule is based.

The use of restoration to meet the requirements of section 316(b) is consistent with the goals of the Clean Water Act: measures that restore fish and shellfish to compensate for those that are impinged and entrained further the objective of the Clean Water Act ''to restore, maintain, and protect the biological integrity of the nation's waters.'' 33 U.S.C. 1251(a) (emphasis added). It is also consistent with EPA's and States' past practices in implementing section 316(b) in individual permit decisions. For at least twenty years, EPA and States have authorized existing facilities to comply with section 316(b) requirements, at least in part, through the use of restoration measures. For example, the Chalk Point Generating Station, located on the Patuxent River in Prince George's

County, Maryland constructed a fish rearing facility in partial compliance of its 316(b) obligations (DCN–1–5023–PR).

Although the United States Court of Appeals for the Second Circuit recently remanded the portion of EPA's Phase I new facility rule that authorized restoration measures to meet that rule's requirements, EPA believes that portion of the decision should not apply to this Phase II rulemaking. Indeed, the Second Circuit explicitly stated that ''[i]n no way [does it] mean to predetermine the factors and standard applicable to Phase II and III of the rulemaking.'' *Riverkeeper* v. *EPA*, slip op. at 12, note 13 (2nd Cir. Feb. 3, 2004). This is probably because there are important differences between new and existing facilities that warrant interpreting section 316(b) more broadly to give existing facilities additional flexibility to comply with section 316(b). As noted above, restoration measures have been used to comply with section 316(b) limits at existing facilities for several years because of the more limited availability of other technologies for existing facilities. Costs to retrofit an existing facility to install a ''hard'' technology can be much higher than costs to install one at the time a facility is constructed, and those costs can vary considerably from site to site. Thus, the range of technologies that are ''available'' to existing facilities to meet the performance standards is narrower than the range of technologies available to new facilities.

In recognition of the vast differences between existing and new facilities, Congress established separate sections in the Clean Water Act for establishing discharge limitations on existing and new facilities. Effluent limitations guidelines for existing facilities are established under sections 301 and 304, whereas new source performance standards are established under section 306. Those sections set out two distinct sets of factors for developing effluent limitations guidelines for existing facilities and new source performance standards for new facilities. Notably, there are only two factors explicitly stated in section 306 for the Administrator to consider in establishing new source performance standards—cost and non-water quality impacts, whereas for existing facilities Congress calls upon EPA to consider a much broader range of factors in section 304(b)(2)(b):

> 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.

This list reflects the wide range of facility characteristics and circumstances that can influence the feasibility and availability of a particular technology across a particular industry. Existing facilities generally face more and different problems than new facilities because of the technological challenges and high costs associated with retrofitting as compared to building a new facility. Indeed, by including the phrase ''and such other factors as [EPA] deems appropriate,'' Congress made certain that EPA would have sufficient flexibility in establishing limitations for existing facilities to consider all relevant factors.

For several other reasons, EPA believes the Second Circuit decision is not binding on this Phase II rule. First, section 316(b) requires the design of a cooling water intake structure to reflect the best technology available to ''minimize adverse environmental impact.'' The phrase ''minimize adverse environmental impact ''is not defined in section 316(b). For the Phase II rule, EPA interprets this phrase to allow facilities to minimize adverse environmental impact by reducing impingement and entrainment, or to minimize adverse environmental impact by compensating for those impacts after the fact. Section 316(b) does not explicitly state when the adverse environmental impact of cooling water structures must be minimized—that is whether they must be prevented from occurring in the first place or compensated for after the fact or where the minimization most occurs—at the point of intake or at some other location in the same watershed. Therefore, under *Chevron*, EPA is authorized to define ''minimize'' to authorize restoration at existing facilities to minimize the effects of adverse environmental impact.

In another context under the Clean Water Act, EPA has interpreted authority to ''minimize adverse effects'' as including authority to require environmental restoration. Section 404 of the CWA authorizes the Army Corps of Engineers to issue permits for discharges of dredged or fill material into waters of the United States. EPA was granted authority to establish regulations containing environmental guidelines to be met by the Corps in issuing section 404 permits. See CWA section 404(b)(1). Current regulations, in place since 1980, prohibit a discharge unless, among other requirements, all practicable steps are taken to avoid, minimize and mitigate for the environmental effects of a discharge. See 40 CFR 230.10. Of particular relevance here, the regulations require that steps be taken to ''minimize potential adverse effects of the discharge on the aquatic ecosystem'' 40 CFR 230.10(d). EPA has specifically defined minimization steps to include environmental restoration. See 40 CFR 230.75(d) (''Habitat development and restoration techniques can be used to minimize adverse impacts and to compensate for destroyed habitat'').

Moreover, at the time of the Phase I litigation, EPA had not interpreted the term ''reflect'' in section 316(b), and therefore, the Second Circuit did not consider its meaning in determining whether restoration could be used as a design technology to meet the Phase I rule requirements. Section 316(b) requires that ''the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.'' (emphasis supplied). The term ''reflect'' is significant in two respects. First, it indicates that the design, location, construction and capacity of the cooling water intake structure itself must be based on the best technology available for such structures. This authorizes EPA to identify technologies that can be incorporated into the physical structure of the intake equipment. It also indicates that the choice of what actually is the best physical configuration of a particular cooling water intake structure can take into account, *i.e.*, reflect, other technologies—and their effects—that are not incorporated into the structure itself. For example, barrier nets are not incorporated into the physical design of the cooling water intake structure, but their use—and effectiveness—influences the physical design of the cooling water intake structure. Another relevant example is the technology known as ''closed-cycle'' cooling. Although this technology is physically independent of the cooling water intake structure, it directly influences decisions regarding the design capacity of the cooling water intake structure: as more cooling water is recycled, less needs to be withdrawn. Both barrier nets and closed-cycle cooling are considered ''design'' technologies. Similarly, properly designed restoration measures can be best technologies available that can influence the design of the physical cooling water intake structure. To put it another way, for purposes of minimizing adverse environmental impact, requirements for cooling water intake structures reflect a variety of best technologies available, which EPA

construes to include restoration measures. A dry cooling system is another example of a technology that although physically independent of the cooling water intake structure is nonetheless considered an acceptable method to minimize adverse environmental impacts. In fact, since a dry cooling system uses air as a cooling medium, it uses little or no water, dispensing altogether with the need for a cooling water intake structure.

EPA has discretion to characterize restoration measures as technologies for purposes of section 316(b). Section 316(b) does not define either the phrase ''cooling water intake structure'' or the term ''technology'' and, therefore, leaves their interpretation to EPA. EPA has defined the phrase cooling water intake structure in today's rule to mean the total physical structure and any associated waterways used to withdraw cooling water from waters of the United States. This definition embraces elements both internal and external to the intake equipment. EPA did not define the term technology in today's rule, but looked for guidance to section 304(b), which the Second Circuit has recognized can help illuminate section 316(b). Section 301(b)(2) best available technology limitations are based on factors set forth in section 304(b). Section 304(b), while not using the term technology, discusses the ''application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives.'' This is a broad, non-exclusive list. Indeed, BAT effluent limitations guidelines under this authority have been based on a vast array of treatment techniques, operation practices (including chemical substitution), and management practices. See 40 CFR Part 420 (effluent guidelines for concentrated animal feeding operations); 40 CFR Part 430, Subparts B & E (effluent guideline for pulp and paper industry); See also 62 FR 18504 (April 15, 1998).

Employing this broad concept of technology, in today's rule EPA has determined that the design of cooling water intake structures may reflect technologies relating to the restoration of fish and shellfish in the waters from which cooling water is withdrawn. Restoration is not included in the definition of ''design and construction technology'' in today's rule so as to distinguish restoration from ''hard'' technologies for purposes of the rule. Under the regulatory scheme of the final rule, restoration is treated differently than other technologies for several purposes, all of which are to help ensure that restoration projects achieve substantially similar performance as design and construction technologies and/or operational measures. When these restoration technologies are used they must produce ecological benefits (the production of fish and shellfish for a facility's waterbody or watershed, including maintenance of community structure and function) at a level that is substantially similar to the level the facility would achieve by using other design and construction technologies and/or operational measures to achieve the applicable performance standards or alternative site-specific performance requirements in § 125.94. In other words, the operation of the cooling water intake structure together with these restoration technologies will achieve the overall performance objective of the statute: to minimize the adverse environmental impact of withdrawing cooling water. For facilities using this authority, their hardware decisions for the cooling water intake structure thus take into account—or reflect—the impacts of restoration technology.

EPA acknowledges that in 1982, when Congress was considering substantial amendments to the Clean Water Act, EPA testified in support of a proposed amendment to CWA section 316(b) that would have expressly authorized the use of restoration measures as a compliance option, suggesting that EPA may have interpreted section 316(b) at that time as not authorizing restoration measures to minimize the adverse environmental impact of cooling water intake structures. In EPA's view, the Second Circuit gave undue weight to that testimony, particularly because it was provided before the Supreme Court's decision in *Chevron U.S.A.* v. *Natural Resources Defense Council,* 467 U.S. 837 (1984), which gave administrative agencies latitude to fill in the gaps created by ambiguities in statutes the agencies have been charged by Congress to implement. For at least twenty years, EPA and States have authorized existing facilities to comply with section 316(b) requirements, at least in part, through the use of restoration measures. Additionally, since 1982 EPA has gathered substantially more data to inform its judgment regarding cooling water intake structures, the environmental impact resulting from them, and various technologies available to reduce impingement and entrainment. Finally, EPA notes that, in contrast to water quality based effluent limitations that are included in NPDES permits to meet water quality standards, the required performance of restoration measures under this final rule is not tied to conditions in the water body. Rather it is tied directly to the performance standards, just as is the performance of the other technologies that facilities may use to meet the standards. While the design and operation of restoration measures will necessarily be linked to conditions in the waterbody (as is also the case for ''hard'' technologies) the performance standards that restoration measures must meet are not.

6. Authority To Apply CWA Section 316(b) Requirements to Existing Facilities

Some commenters argued that CWA § 316(b) does not apply to existing facilities, but rather authorizes only a one-time, pre-construction review of cooling water intake structure location, design, construction and capacity.

EPA disagrees with this assertion. CWA section 316(b) applies to ''any standard established pursuant to section 1311 [CWA section 301] or section 1316 [CWA section 306].'' CWA section 301 establishes the statutory authority for EPA to promulgate technology-based standards for effluent discharges from existing sources. Therefore, CWA section 316(b) requirements can, and indeed must, apply to existing facilities. Given that section 316(b) requirements apply to existing facilities, such requirements cannot reasonably be viewed as mandating only a one-time, pre-construction review. Moreover, as the court noted in *Riverkeeper* v. *EPA*, slip op. at 44–45 (2nd Cir. Feb. 3, 2004), ''if Congress intended to grandfather in new or modified intake structures as well as the related point sources that discharge heat, it could have done so in section 316(c).''

7. Authority To Regulate ''Capacity'' of the ''Intake Structure'' Through Restrictions on Flow Volume

Some commenters asserted that EPA was not authorized to require closed-cycle cooling systems, pointing out that CWA section 316(b) addresses cooling water ''intake structures,'' not cooling systems or cooling operations. EPA's performance standards based on closed-cycle cooling, they argued, constitutes an impermissible restriction of the cooling system or operation, which is not part of the ''intake structure'' itself. Others asserted that the term ''capacity,'' as used in CWA section 316(b), refers to the size of the cooling water intake structure, not the volume of flow through the intake. They therefore questioned EPA's authority to regulate flow volume by requiring the use of closed-cycle cooling systems.

The rule does not in fact require the use of closed-cycle cooling systems. Rather, the rule provides facilities with five different compliance options, only one of which is based on closed-cycle cooling technology. Moreover, EPA is authorized to set performance standards based on closed-cycle cooling technology, as it did in the Phase I rule, which was upheld in *Riverkeeper* v. *EPA*, slip op. (2nd Cir. Feb. 3, 2004). See also Section III.

8. Authority To Determine That Technologies Short of Closed-cycle Cooling Constitute ''Best Technology Available To Minimize Adverse Environmental Impact''

Many commenters asserted that closed-cycle cooling is the ''best technology available to minimize adverse environmental impact,'' and that EPA must therefore require facilities to reduce their cooling water intake capacity to a level commensurate with closed-cycle cooling. According to these commenters, this rule violates CWA section 316(b) by adopting performance standards less protective than ''best technology available.''

EPA reasonably rejected closed-cycle cooling systems as ''best technology available'' based on consideration of relevant factors, including the costs of closed-cycle cooling, the energy impacts, the relative effectiveness of closed-cycle cooling in minimizing impingement and entrainment in variable waterbodies, and the availability of other design and control technologies that can be effective in significantly reducing environmental impacts. As the court held in *Riverkeeper* v. *EPA*, slip op. at 29 (2nd Cir. Feb. 3, 2004), ''the Clean Water Act allows EPA to make a choice among alternatives based on more than impingement and entrainment.'' In short, EPA has discretion to consider a variety of factors besides the efficacy of technologies, including cost, and to compare the relative effectiveness of technologies that reduce impingement and entrainment. EPA's weighing of the factors is entitled to a high degree of deference. See also Section III and VII.

9. Authority To Require Implementation of CWA Section 316(b) Through NPDES Permits

Some commenters argued that EPA lacks authority to include section 316(b) requirements in section 402 NPDES permits, because—unlike sections 301, 306, and 402—section 316(b) regulates ''intakes'' and not ''discharges.''

EPA disagrees with this comment. This rule properly requires implementation of CWA section 316(b) standards through CWA section 402 NPDES permits. CWA section 402(a)(1) authorizes the issuance of NPDES permits for discharges that comply with effluent guidelines limitations under CWA sections 301 and 306. CWA section 316(b) requirements can be implemented through CWA section 402 because they apply to all point sources subject to standards issued under CWA sections 301 and 306. *See, U.S. Steel Corp* v. *Train,* 556 F.2d 822, 850 (7th Cir. 1977) (finding that CWA section 402 implicitly requires that CWA section 316(b) be implemented through NPDES permits). EPA's choice of NPDES permits, which already reflect CWA sections 301 and 306 effluent limitations, is reasonable.

10. Authority To Implement CWA Section 316(b) Requirements Without Compensating Regulated Entities for ''Taking'' of Property

Several commenters suggest that this rule authorizes an impermissible regulatory taking. Specifically, they argue that the rule requires facilities to limit their intake flows, thus impairing their property rights to the water and entitling them to compensation under the Fifth Amendment to the U.S. Constitution.

EPA notes, however, that the rule does not in fact require a facility to limit its intake flows. Rather, it provides a facility with a variety of compliance options, only one of which is based on flow limitations. While a facility could choose to comply with the section 316(b) requirements by reducing its intake flow to a level commensurate with a closed-cycle cooling system (the first compliance option), it could also select one of the other compliance options that does not require flow restrictions. EPA therefore believes that this rule does not authorize a compensable ''taking'' of property within the meaning of the Fifth Amendment.

IX. Implementation

As in the Phase I rule, section 316(b) requirements for Phase II existing facilities will be implemented through the NPDES permit program. Today's final rule establishes application requirements in §§ 122.21 and 125.95, monitoring requirements in § 125.96, and record keeping and reporting requirements in § 125.97 for Phase II existing facilities. The final regulations also require the Director to review application materials submitted by each regulated facility and include monitoring and record keeping requirements in the permit (§ 125.98). EPA will develop a model permit and permitting guidance to assist Directors in implementing these requirements. In addition, the Agency will develop implementation guidance for owners and operators that will address how to comply with the application requirements, the sampling and monitoring requirements, and the record keeping and reporting requirements in these final regulations.

In this final rule, an existing facility may choose one of five compliance alternatives for establishing best technology available for minimizing adverse environmental impact at the site:

(1) Demonstrate that it will reduce or has reduced its intake flow commensurate with a closed-cycle recirculating system and is therefore deemed to have met the impingement mortality and entrainment performance standards, or that it will reduce or has reduced the design intake velocity of its cooling water intake structure to 0.5 feet per second (ft/s) and is therefore deemed to have met the impingement mortality performance standards;

(2) Demonstrate that its existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards and/or restoration requirements;

(3) Demonstrate that it has selected and will install and properly operate and maintain design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the specified performance standards and/or restoration requirements;

(4) Demonstrate that it meets the applicability criteria for a rule-specified technology or a technology that has been pre-approved by the Director and that it has installed, or will install, and will properly operate and maintain the technology; or,

(5) Demonstrate that it is eligible for a site-specific determination of best technology available to minimize adverse environmental impact and that it has selected, installed, and is properly operating and maintaining, or will install and properly operate and maintain design and construction technologies, operational measures, and/or restoration measures that the Director has determined to be the best technology available to minimize adverse environmental impact for the facility.

The application, monitoring, record keeping, and reporting requirements for

each of the compliance alternatives are detailed in the following sections.

A. When Does the Final Rule Become Effective?

This rule becomes effective sixty (60) days after the date of publication in the **Federal Register**. After the effective date of the regulation, existing facilities will need to comply when an NPDES permit containing requirements consistent with Subpart J is issued to the facility (see § 125.92). Under current NPDES program regulations, this will occur when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued. Under today's rule, a facility that is required to comply with this rule within the first four years after the publication date of this rule may request that the Director approve an extended schedule for submitting its Comprehensive Demonstration Study. This schedule must be as expeditious as practicable and not extend beyond three years and 180 days after the publication date of the final rule. The Comprehensive Demonstration Study, once submitted, forms the basis for the Director's determination of specific requirements consistent with Subpart J to be included in the permit. EPA has included this provision to afford facilities time to collect information and perform studies, including pilot studies where necessary, needed to support the development of the Comprehensive Demonstration Study.

Between the time the existing permit expires and the time an NPDES permit containing requirements consistent with this subpart is issued to the facility, permit requirements reflecting the best technology available to minimize adverse environmental impact will continue to be determined based on the Director's best professional judgement.

B. What Information Must I Submit to the Director When I Apply for My Reissued NPDES Permit?

The NPDES regulations governing the permit application process at 40 CFR 122.21 require that facilities currently holding a permit submit an application for permit renewal 180 days prior to the end of the current permit term, which is five years (see § 122.21(d)(2)). If you are the owner or operator of a facility that is subject to this final rule, you will be required to submit the information specified at 40 CFR 122.21(r)(2), (3), and (5) and all applicable sections of § 125.95, except for the Proposal for Information Collection, with your application for permit reissuance.

The Proposal for Information Collection component of § 125.95 should be submitted to the Director for review and comment prior to the start of information collection activities. For a typical facility that plans to install a technology, it is estimated that a facility would need to submit this Proposal for Information Collection about fifteen (15) months prior to the submission of the remainder of the required information, which is about twenty-one (21) months prior to the expiration of your current permit. This approximate timing is based on the sequential Comprehensive Demonstration Study requirements and the estimated level of effort required to complete the studies and allow time for the Director's review and approval. The timing provided in this section is for illustrative purposes only and represents a schedule that the average facility may need to follow to meet the deadlines established in today's rule. Some facilities may require more, or less time to perform the studies and prepare the application requirements. All facilities, except those that choose to comply with the rule by reducing intake capacity to a level commensurate with a closed-cycle recirculating system in accordance with § 125.94(a)(1)(i), or by adopting a pre-approved technology in accordance with § 125.94(a)(4) must submit a Proposal for Information Collection for review and comment by the Director (§ 125.95(b)(1)). Facilities that comply with impingement mortality requirements by reducing intake velocity to 0.5 ft/s or less in accordance with § 125.95(a)(1)(ii) will only need to submit a Comprehensive Demonstration Study, including a Proposal for Information Collection, for entrainment reduction requirements, if applicable. The Proposal for Information Collection requirements are detailed later in this section. Figure 1 presents an example of a possible timeframe a facility may follow in preparing and submitting application components.

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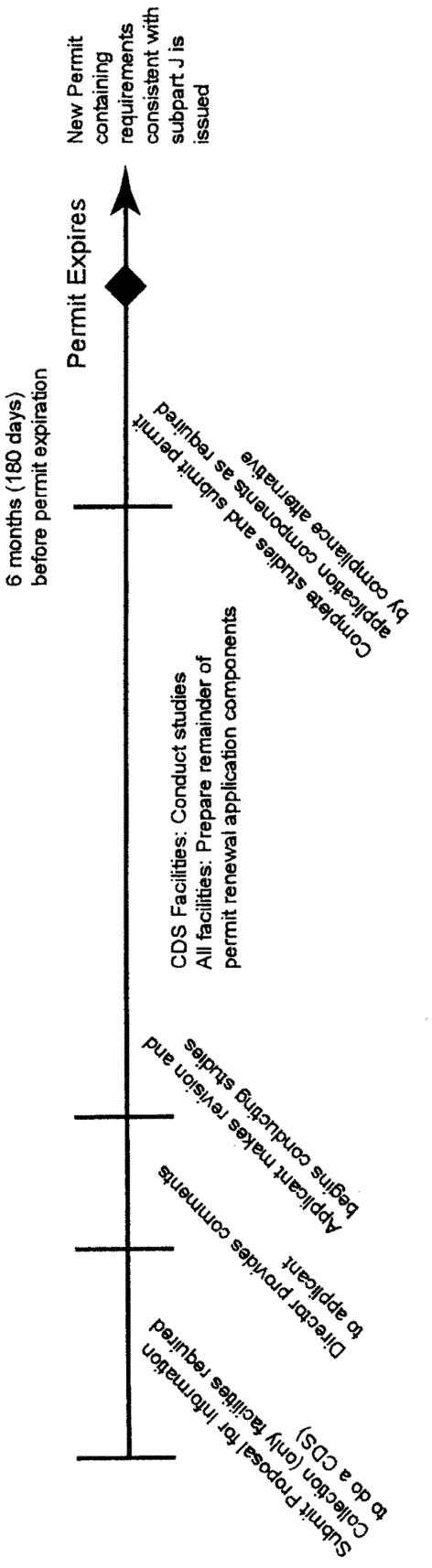
Figure 1. Sample Application Timeline



Notes

1. The timeframes provided in this figure are approximate.
2. The remainder of the permit renewal application (to be submitted 180 days prior to permit expiration) includes Source Water Physical Data; Cooling Water Intake Structure Data; and Cooling Water System Description. The applicant must submit all components of the permit application as appropriate for the compliance alternative selected.
3. The Director may alter the application timeline as necessary.

Following submission of the Proposal for Information Collection, the Director will review and provide comments on the proposal. During this time, the facility may proceed with planning, assessment, and data collection

activities in fulfillment of Comprehensive Demonstration Study requirements. The Director is encouraged to provide comments expeditiously (*i.e.,* within 60 days) so the permit applicant can make responsive modifications to its information gathering activities.

It is assumed that most facilities would need approximately one year to complete the studies outlined in the Proposal for Information Collection. These must be completed at least 180 days prior to the end of the current permit term, by which time the remainder of required application information must be submitted. If the facility requires more than one year to complete studies described in the Proposal for Information Collection, the facility are encouraged to consult with the Director. Facilities are also encouraged to consult with the Director regarding their schedule for study completion.

After the first permit containing requirements consistent with Subpart J is issued, facilities may submit a request to their Director soliciting a reduced information collection effort for subsequent permit applications in accordance with § 125.95(a)(3), which allows facilities to demonstrate that the conditions at their facility and within the waterbody in which their intake is located remain substantially unchanged since their previous permit application. The request for reduced cooling water intake structure and waterbody application information must contain a list and justification for each information item in §§ 122.21(r) and 125.95(b) that has not changed since the previous permit application. The applicant must submit this request at least one year prior to the expiration of the current permit term and the Director is required to act on the request within 60 days.

The Director must review and approve the information you provide in your permit application, confirm whether your facility should be regulated as an existing facility under these final regulations, or under Phase III regulations for existing facilities that will be developed in the future, or as a new facility under regulations that were published on December 19, 2001 (66 FR 65256), and confirm the compliance alternative selected (compliance alternatives 1, 2, 3, 4, or 5). Following review and approval of your permit application, the Director will develop a draft permit for public notice and comment. The comment period will allow the facility and other interested parties to review the draft permit conditions and provide comments to the Director. The Director will consider all public comments received on the draft permit and develop a final permit based upon the application studies submitted and other information submitted during the comment period, as appropriate. The Director will incorporate the relevant requirements for the facility's cooling water intake structure(s) into the final permit.

Today's final rule modifies regulations at 40 CFR 122.21(r) to require Phase II existing facilities to prepare and submit some of the same information required for new facilities. Phase II existing facilities are required to submit two general categories of information when they apply for a reissued NPDES permit: (1) Physical data to characterize the source waterbody in the vicinity where the cooling water intake structures are located (40 CFR 122.21(r)(2)), and (2) data to characterize the design and operation of the cooling water intake structures (40 CFR 122.21(r)(3)). Unlike new facilities, however, Phase II existing facilities are not required to submit the Source Water Baseline Biological Characterization Data required under 40 CFR 122.21(r)(4). Today's final rule adds a new requirement at 40 CFR 122.21(r)(5) to require a facility to submit information describing the design and operating characteristics of its cooling water system(s) and how it/they relate to the cooling water intake structure(s) at the facility.

In addition, today's final rule requires all Phase II existing facilities to submit the information required under § 125.95 consistent with the compliance alternative selected. In general, the final application requirements in § 125.95 require most Phase II existing facility applicants to submit some or all of the components of a Comprehensive Demonstration Study (§ 125.95(b), see also Exhibit II in section V). As noted in section V, facilities that do not need to conduct a Comprehensive Demonstration Study are those that (1) reduce their flow commensurate with a closed cycle, recirculating cooling system, (2) install a rule-specified or Director-approved technology in accordance with § 125.99 (except that these facilities must still submit a Technology Installation and Operation Plan and Verification Monitoring Plan), or (3) reduce intake velocity to 0.5 ft/s or less (except that these facilities must still submit a Comprehensive Demonstration Study for entrainment requirements, if applicable).

Each component of the Comprehensive Demonstration Study and its applicability is described later in this section. In addition, the requirements for each of the five compliance alternatives are detailed, with respect to which components are required for each alternative.

1. Source Water Physical Data (40 CFR 122.21(r)(2))

Under the final requirements at 40 CFR 122.21(r)(1)(ii), Phase II existing facilities subject to this final rule are required to provide the source water physical data specified at 40 CFR 122.21(r)(2) in their application for a reissued permit. These data are needed to characterize the facility and evaluate the type of waterbody and species potentially affected by the cooling water intake structure. The Director is expected to use this information to evaluate the appropriateness of the design and construction technologies, operational measures, and/or restoration measures proposed by the applicant.

The applicant is required to submit the following specific data: (1) A narrative description and scaled drawings showing the physical configuration of all source waterbodies used by the facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports the facility's determination of the waterbody type where each cooling water intake structure is located; (2) an 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 (3) locational maps.

2. Cooling Water Intake Structure Data (40 CFR 122.21(r)(3))

Under the final requirements at 40 CFR 122.21(r)(1)(ii), Phase II existing facilities are required to submit the data specified at 40 CFR 122.21(r)(3) to characterize the cooling water intake structure which should assist in the evaluation of its potential for impingement and entrainment of aquatic organisms. Information on the design of the intake structure and its location in the water column, in conjunction with biological information, will allow the permit writer to evaluate which species, or life stages of a species, are potentially subject to impingement and entrainment. A diagram of the facility's water balance should 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,

allowing the permit writer to evaluate the suitability of proposed design and construction technologies and/or operational measures.

The applicant is required to submit the following specific data: (1) A narrative description of the configuration of each of its cooling water intake structures and where they are located in the waterbody and in the water column; (2) latitude and longitude in degrees, minutes, and seconds for each of its cooling water intake structures; (3) a narrative description of the operation of each of the cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation, and seasonal operation schedules, if applicable; (4) a flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and (5) engineering drawings of the cooling water intake structure(s).

3. Cooling Water System Data (40 CFR 122.21(r)(5))

Under the final requirements at 40 CFR 122.22(r)(1)(ii), Phase II existing facilities are required to submit the cooling water system data specified at 40 CFR 122.21(r)(5) to characterize the operation of cooling water systems and their relationship to the cooling water intake structure(s) at the facility. Also required is a narrative description of the proportion of design intake flow that is used in the system, the number of days of the year that the cooling water system is in operation, and any seasonal changes in the operation of the system, if applicable. The facility must also submit design and engineering calculations prepared by a qualified expert, such as a professional engineer, and supporting data to support the narrative description. This information is expected to be used by the applicant and the Director in determining the appropriate standards that can be applied to the Phase II facility.

4. Comprehensive Demonstration Study (§ 125.95(b))

Final requirements at § 125.95(b) require all existing facilities, except those deemed to have met the performance standards by reducing intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling water system, or by reducing intake velocity to 0.5 ft/s or less (impingement mortality standards only), or facilities that select an approved technology in accordance with § 125.94(a)(4), to perform and submit to the Director all applicable components of a Comprehensive Demonstration Study, including data and detailed analyses to demonstrate that they will meet applicable requirements in § 125.94(b). As noted in section V, Comprehensive Demonstration Study requirements vary depending on the compliance alternative selected.

The Comprehensive Demonstration Study has seven components:

- Proposal for Information Collection;
- Source Waterbody Flow Information;
- Impingement Mortality and/or Entrainment Characterization Study;
- Technology and Compliance Assessment Information;
- Restoration Plan;
- Information to Support Site-specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact; and
- Verification Monitoring Plan.

All Phase II existing facilities, except those mentioned above, are required to submit at a minimum the following: a Proposal for Information Collection (§ 125.95(b)(1)); Source Waterbody Flow Information (§ 125.95(b)(2)); an Impingement Mortality and/or Entrainment Characterization Study (§ 125.95(b)(3)); and a Verification Monitoring Plan (§ 125.95(b)(7)). Note that facilities selecting restoration measures provide a monitoring plan as part of their Restoration Plan, in accordance with § 125.95(b)(5)(v), rather than a Verification Monitoring Plan in accordance with § 125.95(b)(7). The requirements in these two provisions are similar, but tailored specifically to the monitoring needs of restoration projects, and design and construction technologies and operational measures, respectively. Phase II existing facilities that have reduced their intake velocity to less than or equal to 0.5 ft/s but are still required to reduce entrainment (if the standard applies), must submit only those components of the Impingement Mortality and/or Entrainment Characterization Study pertaining to entrainment, in addition to the other required components of the Comprehensive Demonstration Study. Facilities that are required to meet only the impingement mortality reduction requirements in § 125.94(b), are required to submit a study only for the impingement reduction requirements.

Facilities that comply with applicable requirements either wholly or in part through the use of existing or proposed design and construction technologies or in part through the use of existing or proposed design and construction technologies, and/or operational measures must submit the Technology and Compliance Assessment Information in § 125.95(b)(4), consisting of a Design and Construction Technology Plan (§ 125.95(b)(4)(i)) and a Technology Installation and Operation Plan (§ 125.95(b)(4)(ii)). (Facilities that use a pre-approved technology in accordance with § 125.94(b)(4) need only submit the Technology Installation and Operation Plan.) The Technology Installation and Operation Plan explains how the facility intends to install, operate, maintain, monitor, and adaptively manage the selected technologies to meet the applicable performance standards or site-specific technology requirements, and in most cases will provide the basis for determining compliance with § 125.94(b).

Only those Phase II existing facilities that propose to use restoration measures wholly or in part to meet the performance standards in § 125.94(b) or site-specific requirements developed pursuant to § 125.94(a)(5) are required to submit the Restoration Plan (§ 125.95(b)(5)). This Plan serves an analogous function for restoration measures to that served by the Technology and Compliance Assessment Information for design and construction technologies and operational measures, in that it shows the design of the measures, explains how the facility will construct, maintain, monitor, and adaptively manage the measures to meet applicable performance standards and/or site specific requirements, and serves as a basis for determining compliance.

Only those Phase II existing facilities who request a site-specific determination of the best technology available are required to submit Information to Support Site-specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact (§ 125.95(b)(6)). Facilities that select the compliance alternative at § 125.94(a)(4) (Approved Technology), are required to submit only two items: the Technology Installation and Operation Plan (§ 125.95(b)(4)(ii)) and the Verification Monitoring Plan (§ 125.95(b)(7)).

a. Proposal for Information Collection

As a facility, you are required to submit to the Director for review and comment, a proposal stating what information will be collected to support the Comprehensive Demonstration Study (see § 125.95(b)(1)). This proposal must provide the following:

- A description of the proposed and/or implemented technology(ies) and/or restoration measures to be evaluated in the study (§ 125.95(b)(1)(i));

• A list and description of any historical studies characterizing impingement and entrainment and/or the physical and biological conditions in the vicinity of the cooling water intake structures and their relevance to this proposed study (§ 125.95(b)(1)(ii)). If you propose to use existing data, you must demonstrate the extent to which the data are representative of current conditions and that the data were collected using appropriate quality assurance/quality control procedures;

• A summary of any past, ongoing, or voluntary consultations with appropriate Federal, State, and Tribal fish and wildlife agencies that are relevant to this study and a copy of written comments received as a result of such consultation (§ 125.95(b)(1)(iii));

• A sampling plan for any new field studies you propose to conduct in order to ensure that you have sufficient data to develop a scientifically valid estimate of impingement and entrainment at your site (§ 125.95(b)(1)(iv)). The sampling plan must document all methods and quality assurance/quality control procedures for sampling and data analysis. The sampling and data analysis methods you propose must be appropriate for a quantitative survey and must take into account the methods used in other studies performed in the source waterbody. Also, the methods must be consistent with any methods required by the Director. The sampling plan must include a description of the study area (including the area of influence of the cooling water intake structure(s)), and provide taxonomic identifications of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish) to the extent this is known in advance and relevant to the development of the plan.

In addition, the proposal should provide other information, where available, that would aid the Director in reviewing and commenting on your plans for conducting the Comprehensive Demonstration Study (*e.g.*, information on how you plan to conduct a Benefits Valuation Study, or gather additional data to support development of a Restoration Plan). EPA recognizes that in some cases collection and analysis of information will be an iterative process and plans for information collection may change as new data needs are identified. For example, a facility may not be able to design a Benefits Valuation Study and determine what additional data are needed (*e.g.*, quantified information on non-use benefits) until it has first collected and analyzed the data for its Impingement Mortality and/or Entrainment Characterization Study. While the Proposal for Information Collection is only required to be submitted once, EPA encourages permit applicants to consult with the Director as appropriate after the proposal has been submitted, in order to ensure that the Director has complete and appropriate information to develop permit conditions once the permit is submitted.

As stated previously, the proposal for information collection must be submitted prior to the start of information collection activities and should allow sufficient time for review and comment by the Director, although facilities are permitted to begin data collection activities before receiving the Director's comments. Directors are encouraged to provide their comments expeditiously (*i.e.*, within 60 days) to allow facilities time to make responsive modifications in their information collection plans. Adequate time for data collection efforts identified in the proposal for information collection prior to the due date for the permit application should also be scheduled.

b. Source Waterbody Flow Information

Under the requirements at § 125.95(b)(2)(i), Phase II existing facilities (except those that comply with the rule under § 125.94(a)(1)(i) with cooling water intake structures that withdraw cooling water from freshwater rivers or streams are required to provide the documentation showing the mean annual flow of the waterbody and any supporting documentation and engineering calculations that allow a determination of whether they are withdrawing less than or greater than five (5) percent of the annual mean flow. This will provide information needed to determine whether the entrainment performance standards of § 125.94(b)(2) apply to the facility. Two potential sources of the documentation are publicly available flow data from a nearby U.S. Geological Survey (USGS) gauging station or actual instream flow monitoring data collected by the facility. Representative historical data (from a period of time up to 10 years, if available) must be used to make this determination.

Under § 125.95(b)(2)(ii), Phase II existing facilities with cooling water intake structures that withdraw cooling water from a lake (other than one of the Great Lakes) or reservoir and that propose to increase the facility's design intake flow are required to submit a narrative description of the thermal stratification of the waterbody and any supporting documentation and engineering calculations showing that the increased total design intake flow meets the requirement to not disrupt the natural thermal stratification or turnover pattern (where present) of the source water in a way that adversely impacts fisheries, including the results of any consultations with Federal, State, or Tribal fish or wildlife management agencies. Typically, this natural thermal stratification will be defined by the thermocline, which may be affected to a certain extent by the withdrawal of cooler water and the discharge of heated water into the system. If increased total design intake flow is proposed, and disruption of the natural thermal stratification is a positive or neutral impact, the facility should include this information with the data submitted in this section.

c. Impingement Mortality and/or Entrainment Characterization Study (§ 125.95(b)(3))

The final regulations require that you submit the results of an Impingement Mortality and/or Entrainment Characterization Study in accordance with § 125.95(b)(3). If your facility has reduced its design, through-screen intake velocity to less than or equal to 0.5 ft/s, you are not required to submit the impingement mortality component of this study (§ 125.94(a)(1)(ii)). Facilities whose capacity utilization rate is less than 15 percent, facilities that withdraw cooling water only from a lake or reservoir other than one of the Great Lakes, and those facilities that withdraw less than 5 percent of the mean annual flow of a freshwater river or stream would only be required to submit the impingement mortality component of this study because no performance standards for entrainment apply. This Impingement Mortality and Entrainment characterization must include the following: (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 impingement and entrainment; (2) a characterization of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) identified in the taxonomic identification noted above, 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 impingement mortality and entrainment (*e.g.*, related to climate and weather differences, spawning, feeding and water column migration); and (3)

documentation of the current impingement mortality and entrainment of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) identified above and an estimate of impingement mortality and entrainment to be used as the calculation baseline. The documentation may include historical data that are representative of the current operation of your facility and of biological conditions at the site. This information must be provided in sufficient detail to support development of the other elements of the Comprehensive Demonstration Study. Thus, while the taxonomic identification in item 1 will need to be fairly comprehensive, the quantitative data required in items 2 and 3 may be more focused on species of concern, and/or species for which data are available.

Impingement mortality and entrainment samples to support the calculations required by the Design and Construction Technology Plan and Restoration Plan 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. EPA recommends that the facility coordinate a review of its list of threatened, endangered, or other protected species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, or other relevant agencies to ensure that potential impacts to these species have been evaluated.

d. Technology and Compliance Assessment Information (§ 125.95(b)(4))

The Technology and Compliance Assessment Information required under § 125.95(b)(4) is comprised of two parts: (1) The Design and Construction Technology Plan; and (2) the Technology Installation and Operation Plan. If you plan to utilize the compliance alternative in § 125.94(a)(4), you need only submit the Technology Installation and Operation Plan. If you plan to utilize the compliance alternative in § 125.94(a)(2) or (3) using design and construction technologies and/or operational measures (either existing or new), you must submit both parts. Note that facilities seeking a site-specific determination of BTA in accordance with § 125.94(a)(5), must submit a Site-Specific Technology Plan in accordance with § 125.95(b)(6)(iii) rather than a Design and Construction Technology Plan. The two plans contain similar requirements, but are tailored to the compliance alternative selected. Facilities seeking a site-specific determination of the best technology available must submit a Technology Installation and Operation Plan along with their Site-Specific Technology Plan.

The Design and Construction Technology Plan must explain the technologies or operational measures selected by a facility to meet the requirements in § 125.94(a)(2) and (3). The Agency recognizes that selection of the specific technology or group of technologies for your site will depend on individual facility and waterbody conditions. Examples of appropriate technologies may include, but are not limited to, wedgewire screens, fine mesh screens, fish handling and return systems, barrier nets, aquatic filter barrier systems, and enlargement of the cooling water intake structure to reduce velocity. Examples of operational measures include, but are not limited to, seasonal shutdowns or reductions in flow, and continuous or more frequent rotation of travelling screens. Information required as part of your Design and Construction Technology Plan includes the following: (1) capacity utilization rate for your facility (or for individual intake structures where appropriate) and supporting data, including average annual net generation of the facility in megawatt hours (MWh) as measured over a five-year period (if available) of representative operating conditions and the total net capacity of the facility in megawatts (MW) and calculations (§ 125.95(b)(4)(i)); (2) a narrative description of the design and operation of all design and construction technologies and/or operational measures that you have or will put into place to meet the performance standards for reduction of impingement mortality of those species most susceptible to impingement, and information that demonstrates the efficacy of those technologies and/or operational measures for those species; (3) a description of the design and operation of all design and construction technologies or operational measures that you have or will put into place, to meet the performance standards for reduction of entrainment for those species most susceptible to entrainment, if applicable to your facility, and information that demonstrates the efficacy of those technologies and/or operational measures for those species; (4) calculations of the reduction in impingement mortality and/or entrainment of all life stages of fish and shellfish that would be achieved by the technologies and/or operational measures you have selected based on the Impingement Mortality and/or Entrainment Characterization Study in § 125.95(b)(3); and (5) design and engineering calculations, drawings, and estimates to support the narrative descriptions required in the Design and Construction Technology Plan prepared by a qualified expert such as a professional engineer.

If your facility has multiple intake structures and each is dedicated exclusively to the cooling water needs of one of more generating units, you may calculate the capacity utilization rate separately for each structure, for purposes of determining whether entrainment reduction performance standards are applicable. Note that you would still be required to consider the total design intake flow at all structures combined in determining whether your design intake flow exceeds 5 percent of the mean annual flow of a freshwater river or stream. If your capacity utilization rate, for either a single intake structure or the facility as a whole, is 15 percent or greater based on the historical 5 year annual average, but you make a binding commitment to the Director to maintain your capacity utilization rate below 15 percent for the duration of the permit, you may base your capacity utilization rate determination on that commitment.

In determining compliance with any requirements to reduce impingement mortality or entrainment, you must assess the total reduction in impingement mortality and entrainment against the calculation baseline developed under the Impingement Mortality and Entrainment Characterization Study (§ 125.95(b)(3)). The calculation baseline is defined at § 125.93 as an estimate of impingement mortality and entrainment that would occur at your site assuming (1) The cooling water intake system has been designed as a once-through system; (2) 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 (3) the baseline practices, procedures, and structural configuration are those that the 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 of reducing impingement mortality and entrainment. You may also choose to use your facility's current level of impingement mortality and entrainment as the calculation baseline. EPA has previously referred to this as the ''as-built approach.'' Reductions in impingement mortality and entrainment

from the calculation baseline as a result of any design and construction technologies and/or operational measures already implemented at your facility should be added to the reductions expected to be achieved by any additional design and construction technologies and operational measures that will be implemented in order to meet the applicable performance standards (§ 125.95(b)(4)(i)(C)). In this case, the calculation baseline could be estimated by evaluating existing data from a facility nearby without impingement and/or entrainment control technology (if relevant) or by evaluating the abundance of organisms in the source waterbody in the vicinity of the intake structure that may be susceptible to impingement and/or entrainment. Additionally, if a portion of the total design intake flow is water withdrawn for a closed-cycle, recirculating cooling system (but flow is not sufficiently reduced to satisfy the compliance option in § 125.94(a)(1)(i)), such facilities may use the reduction in impingement mortality and entrainment that is attributed to the reduction in flow in meeting the performance standards in § 125.94(b). The calculation baseline may be estimated using: historical impingement mortality and entrainment data from your facility or from another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of your cooling water intake structure; or current impingement mortality and entrainment data collected at your facility. A facility may request that the calculation baseline be modified to be based on a location of the opening of the cooling water intake structure at a depth other than at or near the surface if they can demonstrate to the Director that the other depth would correspond to a higher baseline level of impingement mortality and/or entrainment.

The Technology Installation and Operation Plan is required for all facilities that choose the compliance alternative in § 125.94(a)(2), (3), (4), or (5), propose to use design and construction technologies and/or operational measures (either existing or new) to meet performance standards or site specific requirements. Such facilities must submit the following information to the Director for review and approval: (1) A schedule for the installation and maintenance of any new design and construction technologies; (2) a list of the operational parameters that will be monitored, including the location and the frequency at which you will monitor them; (3) a list of activities you will undertake to ensure to the degree practicable the efficacy of the installed design and construction technologies and operational measures, and the schedule for implementing them; (4) a schedule and methodology for assessing the efficacy of any installed design and construction technologies and operational measures in achieving applicable performance standards, including an adaptive management plan for revising design and construction technologies and/or operational technologies if your assessment indicates that applicable performance standards are not being met; and (5) for facilities that select a pre-approved technology in accordance with § 125.94(a)(4), documentation that appropriate site conditions (as specified by EPA or the Director in accordance with § 125.99) exist at your facility. In developing the schedule for installation and maintenance of any new design and construction technologies in item 1, you should schedule any downtime to coincide with otherwise necessary downtime (*e.g.*, for repair, overhaul, or routine maintenance of the generating units) to the extent practicable. Where additional downtime is required, you may coordinate scheduling of this downtime with the North American Electric Reliability Council and/or other generators in your area to ensure that impacts to energy reliability and supply are minimized. The Director should approve any reasonable scheduling provision included for this purpose. Those facilities that propose to use restoration measures must submit the Restoration Plan required at § 125.95(b)(5).

Today's final rule requires the Director to evaluate, using information submitted in your application, bi-annual status reports, and any other available information, the performance of any technologies, operational measures, and/or restoration measures you may have implemented in previous permit terms. Additional or different design and construction technologies, operational measures, and/or restoration measures may be required if the Director determines that the initial technologies, operational measures, and/or restoration measures you selected and implemented will not meet the requirements of § 125.94(b) and (c), as provided in § 125.98(b)(1)(i). The rule also requires that your permit contain a condition requiring your facility to reduce impingement mortality and entrainment commensurate with the efficacy of the installed design and construction technologies and/or operational measures. This is designed to ensure that technologies are operated and maintained to ensure their efficacy to the degree practicable, and not merely to meet the low end of the applicable performance standard range, if better performance is practicable. The Technology Installation and Operation Plan is one of the most important pieces of documentation for implementing the requirements of this final rule. It serves to (1) guide facilities in the installation, operation, maintenance, monitoring, and adaptive management of selected design and construction technologies and/or operational measures; (2) provide a schedule and methodology for assessing success in meeting applicable performance standards and site-specific requirements; and (3) provide a basis for determining compliance with the requirements of § 125.94(a)(2)–(5). Facilities and Directors are encouraged to take appropriate care in developing, reviewing and approving the plan. Note that for facilities employing restoration measures, the Restoration Plan serves the same required functions.

e. Restoration Plan (§ 125.95(b)(5))

EPA views restoration measures as part of the ''design'' of a cooling water intake structure, and considers restoration measures one of several technologies that may be employed, in combination with others, to minimize adverse environmental impact. The consideration of restoration measures is relevant to the section 316(b) determination of the requisite design of cooling water intake structures because restoration measures help minimize the adverse environmental impact attributable to such structures. Facilities may use restoration measures that produce and/or result in levels of fish and shellfish in the facility's waterbody or watershed that are substantially similar to those that would result through compliance with the applicable performance standards or alternative site-specific requirements. In order to employ restoration measures, the facility must demonstrate to the Director that it has evaluated the use of design and construction technologies and/or operational measures and determined that the use of restoration measures is appropriate because meeting the applicable performance standards or site-specific requirements through the use of design and construction technologies and/or operational measures alone is less feasible, less cost-effective or less environmentally desireable than meeting the standards in whole or in part through the use of restoration measures. Facilities must

also demonstrate to the Director that the restoration measures, alone or in combination with any feasible design and construction technologies and/or restoration measures, will produce ecological benefits and maintain fish and shellfish in the waterbody, including community structure and function, at a substantially similar level to that which would be achieved by meeting the applicable performance standards at § 125.94(b) or the site-specific requirements developed pursuant to § 125.94(a)(5). The Director must approve any use of restoration measures.

To help all parties review the proposed or existing restoration measures and to help ensure adequate performance of those measures, § 125.95(b)(5) requires facilities proposing to use restoration measures to submit a Restoration Plan with their applications to the Director for review and approval. In the submittal, the facility must address species identified, in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by its the facility's cooling water intake structures, as species of concern. The level of complexity of the Restoration Plan likely will be commensurate with the restoration measures considered or proposed.

First, the facility must demonstrate that it has evaluated the use of design and construction technologies and/or operational measures and explain how it determined that the use of restoration measures would be more feasible, cost-effective, or environmentally desirable than meeting the applicable performance standards or site-specific requirements wholly through the use of design and construction technologies, and/or operational measures.

Second, the facility must submit a narrative description of the design and operation of all restoration measures the facility has in place or has selected and proposes to implement to produce fish and shellfish. If the ecological benefits from an existing restoration project are required to compensate for some environmental impact other than the impact from impingement and entrainment by the cooling water intake structure (*e.g.*, a wetland created to satisfy section 404 of the Clean Water Act requirements), those ecological benefits should not be counted towards meeting the applicable performance standards or site-specific requirements. The narrative description should identify the species targeted under any restoration measures.

Third, the facility must submit a quantification of the ecological benefits of the existing and/or proposed restoration measures. The facility must estimate the reduction in fish and shellfish impingement mortality and entrainment that would be necessary to comply with applicable performance standards or site-specific requirements, using information from the Impingement Mortality and Entrainment Characterization Study and any other available and appropriate information. The facility must then calculate the production of fish and shellfish from existing and proposed restoration measures. The quantification must also include a discussion of the nature and magnitude of uncertainty associated with the performance of the restoration measures and a discussion of the time frame within which ecological benefits are expected to accrue from the restoration project.

Fourth, the facility must provide design calculations, drawings, and estimates documenting that the proposed restoration measures, in combination with design and construction technologies and/or operational measures, or alone, will meet the requirements for production of fish and shellfish. Production of fish and shellfish as a result of relevant restoration measures already implemented at the facility should be added to the production expected to be achieved by the additional restoration measures. If the restoration measures address the same fish and shellfish species identified in the Impingement Mortality and Entrainment Characterization Study (in-kind restoration), the facility must demonstrate that the restoration measures will produce a level of these fish and shellfish substantially similar to that which would result from meeting applicable performance standards or site-specific requirements. In this case, the calculations should include a site-specific evaluation of the suitability of the restoration measures based on the species that are found at the site. If the restoration measures address fish and shellfish species different from those identified in the Impingement Mortality and Entrainment Characterization Study (out-of-kind restoration), the facility must demonstrate that the restoration measures produce ecological benefits substantially similar to or greater than those that would be realized through in-kind restoration. Such a demonstration should be based on a watershed approach to restoration planning and consider applicable multi-agency watershed restoration plans, site-specific peer-reviewed ecological studies, and/or consultation with appropriate Federal, State, and Tribal natural resource agencies. While both in-kind and out-of-kind restoration require a quantification of the levels of fish and shellfish the restoration measures are expected to produce, out-of-kind restoration may include a qualitative demonstration that these ecological benefits are substantially similar to or greater than those that would be realized through in-kind restoration, because different species are being produced that may not be directly comparable to those identified in the Impingement Mortality and/or Entrainment Characterization Study.

Fifth, the facility must submit a plan utilizing an adaptive management method for implementing, maintaining, and demonstrating the efficacy of the restoration measures it has selected and for determining the extent to which restoration measures, or the restoration measures in combination with design and construction technologies and operational measures, have met the applicable performance standards or site-specific requirements. Adaptive management is a process in which a facility chooses an approach for meeting a project goal, monitors the effectiveness of that approach, and then, based on monitoring and any other available information, makes any adjustments necessary to ensure continued progress toward the project's goal. This cycle is repeated as necessary until the goal is met.

The adaptive management plan must include (1) A monitoring plan that includes a list of the restoration parameters that the facility will monitor, the frequency at which they will be monitored, and the success criteria for each parameter; (2) a list of activities the facility will undertake to ensure the efficacy of the restoration measures, a description of the linkages between these activities and the items described in the monitoring plan, and an implementation schedule for the activities; and (3) a process for revising the restoration plan as new information, including monitoring data, becomes available, and if the applicable performance standards or site-specific requirements are not being met.

Sixth, the facility must submit a summary of any past or ongoing consultation with Federal, State, and Tribal fish and wildlife management agencies on its use of restoration measures, including any written comments received as a result of such consultations.

Seventh, if requested by the Director, the facility must conduct a peer review

of items to be submitted as part of the Restoration Plan. Written comments from peer reviewers must be submitted to the Director and made available to the public as part of the permit application. Peer reviewers must be selected in consultation with the Director who may consult with EPA, Federal, State and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by the facility's cooling water intake structure(s). Peer reviewers must have appropriate qualifications (*e.g.*, in the fields of geology, engineering and/or biology) depending upon the materials to be reviewed.

Finally, the facility must include in the Plan a description of information to be included in a status report to the Director every two years. The final regulations at § 125.98(b)(1)(ii) require that this information be reviewed by the Director to determine whether the proposed restoration measures, in conjunction with (or in lieu of) design and construction technologies and/or operational measures, will meet the applicable performance standards or site-specific requirements, or, if the restoration is out-of-kind, will produce ecological benefits (fish and shellfish) including maintenance or protection of community structure and function in your facility's waterbody or watershed.

f. Compliance Using a Pre-approved Technology (§ 125.94(a)(4))

If you choose to comply with the fourth compliance alternative, you must submit documentation to the Director that your facility meets the appropriate site conditions and you have installed and will properly operate and maintain submerged cylindrical wedgewire screen technology (as described in § 125.99(a)(1)) or other technologies as approved by the Director under § 125.99(b)). If you are subject to impingement mortality performance standards only, and plan to install wedgewire screens with a maximum through-screen design intake velocity of 0.5 ft/s or less, you should choose the compliance alternative in § 125.94(a)(1)(i), and do not need to demonstrate that you meet the other criteria in § 125.99(a)(1) or prepare a Technology Installation and Operation Plan or Verification Monitoring Plan.

Facilities subject to entrainment performance standards seeking compliance under this alternative must submit a Technology Installation and Operation Plan and a Verification Monitoring Plan that address entrainment reduction, and document that all of the appropriate site conditions in § 125.99(a)(1) exist at their facility. To qualify for compliance using the cylindrical wedgewire screen technology, your facility must meet the following conditions: (1) Your cooling water intake structure is located in a freshwater river or stream; (2) your cooling water intake structure is situated such that sufficient ambient counter-currents exist to promote cleaning of the screen face; (3) your maximum through-screen design intake velocity is 0.5 ft/s or less; (4) the slot size is appropriate for the size of eggs, larvae, and juveniles of all fish and shellfish to be protected at the site; and (5) your entire main condenser cooling water flow is directed through the technology. Note that small flows totalling less than 2 MGD for auxiliary plant cooling do not necessarily have to be included. Facilities should demonstrate that they meet these criteria in the Technology Installation and Operation Plan.

In addition, any interested person may submit a request that a technology be approved for use in accordance with the compliance alternative in § 125.94(a)(4). If the Director approves, the technology may be used by all facilities that have similar site conditions under the Director's jurisdiction. To do this, the interested person must submit the following as required by § 125.99(b): (1) A detailed description of the technology; (2) a list of design criteria for the technology and site characteristics and conditions that each facility must have in order to ensure that the technology can consistently meet the appropriate impingement mortality and entrainment performance standards in § 125.94(b); and (3) information and data sufficient to demonstrate that all facilities under the jurisdiction of the Director can meet the applicable impingement mortality and entrainment performance standards in § 125.94(b) if the applicable design criteria and site characteristics and conditions are present at the facility.

EPA has adopted this compliance alternative in response to comments suggesting that EPA provide an additional, more streamlined compliance option under which a facility could implement certain specified technologies that are deemed highly protective in exchange for reducing the scope of the Comprehensive Demonstration Study. (See, 68 FR 13522, 13539; March 19, 2003).

g. Verification Monitoring Plan (§ 125.95(b)(7))

Finally, § 125.95(b)(7) requires all Phase II existing facilities complying under §§ 125.94(a)(2), (3), (4), or (5) using design and construction technologies and/or operational measures, to submit a Verification Monitoring Plan to measure the efficacy of the implemented design and construction technologies and/or operational measures. The plan must include at least two years of monitoring to verify the full-scale performance of the proposed or already implemented design and construction technologies and/or operational measures. Note that verification monitoring is also required for restoration measures but the requirements for this monitoring are included as part of the Restoration Plan in § 125.95(b)(5)(v). Components of the Verification Monitoring Plan must include:

(i) Description of the frequency and duration of monitoring, the parameters to be monitored, and the basis for determining the parameters and the frequency and duration of monitoring. The parameters selected and the duration and frequency of monitoring must be consistent with any methodology for assessing success in meeting applicable performance standards in your Technology Installation and Operation Plan as required by § 125.95(b)(4)(ii);

(ii) A proposal on how naturally moribund fish and shellfish that enter the cooling water intake structure would be identified and taken into account in assessing success in meeting the performance standards in § 125.94(b); and,

(iii) A description of the information to be included in a bi-annual status report to the Director.

The facility and the Director will use the results of verification monitoring to assess the facility's success in meeting the performance standards for impingement mortality and entrainment reduction or alternate site-specific requirements and to guide adaptive management in accordance with the requirements in the facility's Technology Installation and Operation Plan. Restoration monitoring is discussed separately under § 125.95(b)(5)(v). Verification monitoring is required to begin once the technologies and/or operational measures are implemented and continue for a sufficient period of time (but at least two years) to assess success in reducing impingement mortality and entrainment.

C. How Will the Director Determine the Appropriate Cooling Water Intake Structure Requirements?

Initially, the Director must determine whether the facility is covered by this rule. If the answer to all the following

questions is yes, the facility will be required to comply with the requirements of this final rule (§ 125.91).

- Is the facility a point source?
- Does the facility use or propose to use a cooling water intake structure(s) with a total design intake flow of 50 million gallons per day (MGD) or more to withdraw cooling water from waters of the United States?
- As its primary activity, does the facility both generate and transmit electric power or generate electric power but sell it to another entity for transmission?
- Is at least 25 percent of the water withdrawn used solely for cooling purposes?

In the case of a Phase II existing facility that is co-located with a manufacturing facility, only that portion of the cooling water intake flow that is used by the Phase II facility to generate electricity for sale to another entity will be considered for purposes of determining the 50 MGD and 25 percent criteria.

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 withdraws water from waters of the United States (except as provided below) but is not itself a Phase II existing facility. This provision is intended to prevent circumvention of these requirements by creating arrangements to receive cooling water from an entity that is not itself a Phase II existing facility. However, for purposes of this provision, a public water system or any entity that sells treated effluent to be used as cooling water is not a ''supplier.'' Thus, obtaining cooling water from a public water system or treated effluent used as cooling water does not constitute use of a cooling water intake structure. This rule is not intended to discourage the beneficial reuse of treated effluent, nor is it intended to impose requirements on public water systems.

Permit Application Review

The Director must review the application materials submitted under § 122.21(r) and § 125.95 and determine the appropriate performance standards to apply to the facility and approve a set of design and construction technologies, operational measures, and/or restoration measures to meet these standards. The first step is to review the Proposal for Information Collection and determine if the technologies, operational measures, and/or restoration measures to be evaluated seem appropriate for the site and if the data gathering activities (including the sampling plan) seem adequate to support the development of the other components of the Comprehensive Demonstration Study, including impingement mortality and entrainment estimates. The Director will also review any existing data submitted. The Director must review and provide comment on the Proposal for Information Collection; however, a facility may proceed with planning, assessment, and data collection activities in fulfillment of Comprehensive Demonstration Study requirements prior to receiving comments from the Director. The Director is encouraged to provide comments expeditiously (*i.e.*, within 60 days) so the facility can make responsive modifications to its information collection plans.

If a facility submits a request in accordance with § 125.95(a)(3) to reduce information about its cooling water intake structures and the source waterbody required to be submitted in its permit application (other than for the first permit term after promulgation of this rule, for which complete information is required), the Director must approve the request within 60 days if conditions at the facility and in the waterbody remain substantially unchanged since the facility's previous application.

The Director must also review all information submitted under § 122.21(r)(2), (3), and (5) and § 125.95, as appropriate, to determine appropriate permit conditions based on the requirements in this subpart. At each permit renewal, or more frequently as appropriate, the Director must assess success in meeting applicable performance standards, restoration requirements, and/or alternate site-specific requirements.

At each permit renewal, the Director must review the application materials and monitoring data to determine whether additional requirements should be included in the permit to meet the applicable performance standards. Additional requirements may include, but are not limited to, additional design and construction technologies, operational measures, and/or restoration measures, improved operation and maintenance of existing technologies and measures, and/or increased monitoring.

Permitting Requirements

Following consideration of the information submitted by the Phase II existing facility in its NPDES permit application, the Director must determine the appropriate requirements and conditions to include in the permit based on the compliance alternatives in § 125.94(a) for establishing best technology available chosen by the facility. The following requirements must be included in each permit:

(1) *Cooling Water Intake Structure Requirements.* Requirements that implement the applicable provisions of § 125.94 must be included in the permit conditions. To accomplish this, the Director must evaluate the performance of the design and construction technologies, operational measures, and/or restoration measures proposed and implemented by the facility and require additional or different design and construction technologies, operational measure, and/or restoration measures, and/or improved operation and maintenance of existing technologies and measures, if needed to meet the applicable impingement mortality and entrainment performance standards, restoration requirements for fish and shellfish production, or alternate site-specific requirements.

In determining compliance with the performance standards for facilities proposing to increase withdrawals of cooling water from a lake (other than a Great Lake) or a reservoir in § 125.94(b)(3), the Director must consider anthropogenic factors (those not considered ''natural'') unrelated to the Phase II existing facility's cooling water intake structures that can influence the occurrence and location of a thermocline. Anthropogenic factors may include source water inflows, other water withdrawals, managed water uses, wastewater discharges, and flow/level management practices (*e.g.,* some reservoirs release water from deeper bottom layers). The Director must coordinate with appropriate Federal, State, or Tribal fish and wildlife agencies to determine if any disruption of the natural thermal stratification resulting from the increased withdrawal of cooling water does not adversely affect the management of fisheries.

To develop appropriate requirements for the cooling water intake structure(s), the Director must do the following:

(i) Review and approve the Design and Construction Technology Plan required in § 125.95(b)(4) to evaluate the suitability and feasibility of the design and construction technology and/or operational measures proposed to meet the performance standards of § 125.94(b), or site-specific requirements developed pursuant to § 125.94(a)(5);

(ii) If the facility proposes restoration measures in accordance with § 125.94(c), review and approve the Restoration Plan required under § 125.95(b)(5) to determine whether the proposed measures, alone or in

combination with design and construction technologies and/or operational measures, will meet the requirements under § 125.94(c);

(iii) In each reissued permit, include a condition in the permit requiring the facility to reduce impingement mortality and entrainment (or to increase fish and shellfish production, if applicable) commensurate with the efficacy at the facility of the installed design and construction technologies, operational measures, and/or restoration measures;

(iv) If the facility implements design and construction technologies and/or operational measures and requests that compliance with the requirements of § 125.94 be measured for the first permit (or subsequent permit terms, if applicable) employing the Technology Installation and Operation Plan in accordance with § 125.95(b)(4)(ii), the Director must review and approve the plan and require the facility to meet the terms of the plan including any revisions to the plan that may be necessary if applicable performance standards or site-specific requirements are not being met. If the facility implements restorations measures and requests that compliance with the requirements in § 125.94 be measured for the first permit term (or subsequent permit terms, if applicable) employing a Restoration Plan in accordance with § 125.95(b)(5), the Director must review and approve the plan and require the facility to meet the terms of the plan including any revision to the plan that may be necessary if applicable performance standards or site-specific requirements are not being met. In determining whether to approve a Technology Installation and Operation Plan or Restoration Plan, the Director must evaluate whether the design and construction technologies, operational measures, and/or restoration measures the facility has installed, or proposes to install, can reasonably be expected to meet the applicable performance standards in § 125.94(b), restoration requirements in § 125.94(c)(2), and/or alternative site-specific requirements established pursuant to § 125.94(a)(5), and whether the Technology Installation and Operation Plan and/or Restoration Plan complies with the applicable requirements of § 125.95(b). In reviewing the Technology Installation and Operation Plan, the Director must approve any reasonable scheduling provisions that are designed to ensure that impacts to energy reliability and supply are minimized, in accordance with § 125.95(b)(4)(ii)(A). If the facility does not request that compliance with the requirements in § 125.94 be measured employing a Technology Installation and Operation Plan and/or Restoration Plan, or the facility has not been in compliance with the terms of its current Technology Installation and Operation Plan and/or Restoration Plan during the preceding permit term, the Director must require the facility to comply with the applicable performance standards in § 125.94(b), restoration requirement in § 125.94(c)(2), and/or alternative site-specific requirements developed pursuant to § 125.94(a)(5). In considering a permit application, the Director must review the performance of the design and construction technologies, operational measures, and/or restoration measures implemented and require additional or different design and construction technologies, operational measures, and/or restoration measures, and/or improved operation and maintenance of existing technologies and measures, if needed to meet the applicable performance standards, restoration requirements, and/or alternative site-specific requirements.

(v) Review and approve the proposed Verification Monitoring Plan submitted under § 125.95(b)(7) (for design and construction technologies) and/or monitoring provisions of the Restoration Plan submitted under § 125.95(b)(5)(v) and require that the monitoring continue for a sufficient period of time to demonstrate whether the design and construction technology, operational measures, and/or restoration measures meet the applicable performance standards in § 125.94(b), restoration requirements in § 125.94(c)(2) and/or site-specific requirements established pursuant to § 125.94(a)(5);

(vi) If a facility requests requirements based on a site-specific determination of best technology available for minimizing adverse environmental impact, the Director must review the application materials submitted under § 125.95(b)(6) and any other information submitted, including quantitative and qualitative benefits, that would be relevant to a determination of whether alternative requirements are appropriate for the facility. If a facility submits a study to support entrainment survival at the facility, the Director must review and approve the results of that study. If the Director determines that alternative requirements are appropriate, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact in accordance with § 125.94(a)(5). The Director may request revisions to the information submitted by the facility in accordance with § 125.95(b)(6) if it does not provide an adequate basis to make this determination. Any site-specific requirements established based on new and/or existing design and construction technologies, operational measures, and/or restoration measures, must achieve an efficacy that is, in the Director's judgement, as close as practicable to the applicable performance standards without resulting in costs that are significantly greater than the costs considered by the Administrator for a like facility to achieve the applicable performance standards or the benefits of complying with the applicable performance standards in § 125.94(b);

(vii) The Director must review information on the proposed methods for assessing success in meeting applicable performance standards and/or restoration requirements submitted by the facility under § 125.95(b)(4)(ii)(D) and/or (b)(5)(v)(A), evaluate those and other available methods, and specify how success in meeting the performance standards and/or restoration requirements must be determined including the averaging period for determining the percent reduction in impingement mortality and entrainment and/or the production of fish and shellfish. Compliance for facilities who request that compliance be measured employing a Technology Installation and Operation Plan and/or Restoration Plan must be determined in accordance with § 125.98(b)(1)(iv).

(2) *Monitoring Conditions.* The Director must require the facility to perform monitoring in accordance with the Technology Installation and Operation Plan in § 125.95(b)(4)(ii), the Restoration Plan required by § 125.95(b)(5), if applicable, and the Verification Monitoring Plan required by § 125.95(b)(7). In determining any additional applicable monitoring requirements in accordance with § 125.96, the Director must consider the monitoring facility's Verification Monitoring, Technology Installation and Operation, and/or Restoration Plans, as appropriate. The Director may modify the monitoring program based on changes in physical or biological conditions in the vicinity of the cooling water intake structure.

(3) *Record Keeping and Reporting.* At a minimum, the permit must require the facility to report and keep records specified in § 125.97.

(4) *Pre-Approved Design and Construction Technologies.* Section 125.94(a)(4) offers facilities the choice of adopting a protective, pre-approved design and construction technology, and preparing a significantly streamlined Comprehensive Demonstration Study. Section 125.99 lists one pre-approved

technology (wedgewire screens) and provides an opportunity for the Director to pre-approve other technologies.

For a facility that chooses to demonstrate that they have installed and properly operate and maintain a design and construction technology approved in accordance with § 125.99, the Director must review and approve the information submitted in the Technology Installation and Operation Plan in § 125.95(b)(4)(ii) and determine if they meet the criteria in § 125.99.

If a person/facility requests approval of a technology under § 125.99(b), the Director must review and approve the information submitted and determine its suitability for widespread use at facilities with similar site conditions in its jurisdiction with minimal study. The Director must evaluate the adequacy of the technology when installed in accordance with the required design criteria and site conditions to consistently meet the performance standards in § 125.94(b). The Director may only approve a technology following public notice and consideration of comment regarding such approval.

(5) *Bi-Annual Status Report.* The Director must specify monitoring data and other information to be included in a status report every two years. The other information may include operation and maintenance records, summaries of adaptive management activities, or any other information that is relevant to determining compliance with the terms of the facility's Technology Installation and Operation Plan and/or Restoration Plan.

D. What Will I Be Required To Monitor?

Section 125.96 of today's final rule provides that Phase II existing facilities must perform monitoring in accordance with the Verification Monitoring Plan required by § 125.95(b)(7), the Technology Installation and Operation Plan required by § 125.95(b)(4)(ii), if applicable, the Restoration Plan required by § 125.95(b)(5), and any additional monitoring specified by the Director to demonstrate compliance with the applicable requirements of § 125.94. In developing monitoring conditions, the Director should consider the need for biological monitoring data, including impingement and entrainment sampling data sufficient to assess the presence, abundance, life stages (including eggs, larvae, juveniles, and adults), and mortality of aquatic organisms (fish and shellfish or other organisms required to be monitored by the Director) impinged or entrained during operation of the cooling water intake structure. This type of data may be used to develop permit conditions to implement the requirements of this rule. The Director should ensure, where appropriate, that any required monitoring will allow for the detection of any annual, seasonal, and diel variations in the species and numbers of individuals that are impinged or entrained.

The Director may modify the monitoring program based on changes in physical or biological conditions in the vicinity of the cooling water intake structure. The Director may also require monitoring of operational parameters for facilities that employ a Technology Installation and Operation Plan or Restoration Plan to comply with the requirements of § 125.94. The Director must specify what monitoring or other data is to be included in a status report every two years.

E. How Will Compliance Be Determined?

This final rule will be implemented by the Director placing conditions consistent with the requirements of this part in NPDES permits. A facility may demonstrate compliance by meeting the performance standards in § 125.94(b) applicable to the facility. The application information, including components of the Comprehensive Demonstration Study, as appropriate, should demonstrate that the facility is already meeting the performance standards, or that it will install and properly operate and maintain design and construction technologies, operational measures, and/or restoration measures to meet the performance standards, or that a site-specific determination of best technology available is necessary. To support this demonstration, the facility should submit the following information to the Director:

- Data submitted with the NPDES permit application to show that the facility meets location, design, construction, and capacity requirements consistent with the compliance alternative selected;
- Data to demonstrate that the facility is meeting the performance standards consistent with the compliance alternative selected;
- Compliance monitoring data and records as prescribed by the Director.

The specifics of how success in meeting the performance standards shall be measured (i.e, the number of species, whether critical species or all species) and the method of measurement (*e.g.,* total biomass, total counts, etc.) must be determined by the Director based on review of the proposed methodology submitted by the facility in its Technology Installation and Operation Plan and/or Restoration Plan, and any other methods the Director considers appropriate.

Alternatively, the facility may request that compliance be determined based on whether it has complied with the construction, operational, maintenance, monitoring, and adaptive management requirements of its Technology Installation and Operation Plan (for design and construction technologies and/or operational measures) or Restoration Plan (for restoration measures). In this case, the facility must still assess success in meeting applicable performance standards or restoration requirements but this assessment serves to guide the adaptive management process rather than as a basis for determining compliance. After the first permit term following promulgation of this subpart, facilities are only eligible for this compliance determination alternative if they have been in compliance with the terms of their Technology Installation and Operation Plan and/or Restoration Plan during the preceding permit term. Under this compliance determination alternative, the Technology Installation and Operation Plan or Restoration Plan must specify construction, operational, maintenance, monitoring, and adaptive management requirements that can reasonably be expected to achieve success in meeting the applicable performance standards, restoration requirements and/or site-specific requirements. These construction, operational, maintenance, monitoring, and adaptive management requirements must also be approved by the Director, who will also specify what monitoring data and other information must be included in the facility's biannual status report.

The required elements of the Technology Installation and Operation Plan include (1) a schedule for installation and maintenance of any new technologies; (2) operational parameters to be monitored; (3) activities to ensure the efficacy of technologies and measures; (4) a schedule and methodology for assessing the efficacy of installed technologies and measures in meeting the performance standards; (5) an adaptive management plan; and (6) for facilities using a pre-approved compliance technology, documentation that they meet the conditions for its use. The Restoration Plan requires corresponding information as appropriate for restoration measures.

EPA believes that it is important for facilities to consider and document each of the components of the Technology

Installation and Operation Plan, regardless of which compliance determination approach is used. However, the level of detail appropriate for some of the components may be different for the two different approaches. For facilities that comply by demonstrating success in meeting performance standards, particularly in cases where they are already meeting the standards and no significant changes in technologies or operations are needed, brief summaries may be sufficient for most components, though they will still need detailed documentation of their schedule and methodology for assessing efficacy of installed technologies and measures for meeting the standards. Conversely, for facilities where compliance is determined based on whether they have complied with the construction, operation, maintenance, monitoring, and adaptive management approaches required in the Technology Installation and Operation Plan or Restoration Plan, a fairly detailed specification of these requirements will be appropriate. The Director should ensure that the level of detail in the Technology Installation and Operation Plan or Restoration Plan is sufficient to support whichever compliance determination approach is selected.

Section 125.97 requires existing facilities to keep records and report monitoring data and other information specified by the Director in a bi-annual status report although Directors may require more frequent reports. Facilities must also keep records of all data used to complete the permit application and show compliance with the requirements of § 125.94, any supplemental information developed under § 125.95, and any compliance monitoring data submitted under § 125.96, for a period of at least three (3) years from date of permit issuance. The Director may require that these records be kept for a longer period.

F. What Are the Respective Federal, State, and Tribal Roles?

Today's final regulations amend 40 CFR 123.25(a)(36) to add a requirement that authorized State and Tribal programs have sufficient legal authority to implement today's requirements (40 CFR part 125, subpart J). Therefore, today's final rule affects authorized State and Tribal NPDES permit programs. Under 40 CFR 123.62(e), any existing approved section 402 permitting program must be revised to be consistent with new program requirements within one year from the date of promulgation, unless the NPDES-authorized State or Tribe must amend or enact a statute to make the required revisions. If a State or Tribe must amend or enact a statute to conform with today's final rule, the revision must be made within two years of promulgation. States and Tribes seeking new EPA authorization to implement the NPDES program must comply with the requirements when authorization is approved. This final regulation does not alter State authority under section 510 of the Clean Water Act.

EPA recognizes that some States have invested considerable effort in developing and implementing section 316(b) regulatory programs. This final regulation allows States to use these programs to fulfill section 316(b) requirements where the State demonstrates to the Administrator that such programs will achieve comparable environmental performance. Specifically, the final rule allows any State to demonstrate to the Administrator that it has adopted alternative regulatory requirements in its NPDES program that will result in environmental performance within each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that would otherwise be achieved under § 125.94.

In addition to updating their programs to be consistent with today's final rule, States and Tribes authorized to implement the NPDES program are required under NPDES State program requirements to implement the cooling water intake structure requirements of subpart J following promulgation of the final regulations. The permit requirements in this final rule must be implemented upon the first issuance or reissuance of permits following promulgation.

Duties of an authorized State or Tribe under this regulation may include:

- Review and verification of permit application materials, including a permit applicant's determination of source waterbody classification and the flow of a freshwater river or stream at the point of the intake;
- Determination of the performance standards in § 125.94(b) that apply to the facility;
- Verification of a permit applicant's determination of whether it meets or exceeds the applicable performance standards;
- Verification that a permit applicant's Technology and Compliance Assessment Information, including the Design and Construction Technology Plan and Technology Installation and Operation Plan, demonstrates that the proposed technologies and measures will reduce the impacts to fish and shellfish to levels required;
- Verification that a permit applicant is eligible for site-specific requirements, and if so, development of site-specific requirements that achieve an efficacy as close as practicable to the applicable performance standards;
- Verification that the Technology Installation and Operation Plan can reasonably be expected to meet performance standards or alternative site-specific requirements;
- Verify that the facility meets the requirements of the approved compliance alternative it selected;
- Verify that any Restoration Plan meets all applicable requirements;
- Verify that the Verification Monitoring Plan is sufficient to assess technology efficacy;
- Development of draft and final NPDES permit conditions for the applicant implementing applicable section 316(b) requirements pursuant to this rule including whether compliance with the requirements of § 125.94 will be determined based on success in meeting applicable performance standards or based on complying with a Technology Installation and Operation Plan or Restoration Plan; and,
- Ensuring compliance with permit conditions based on section 316(b) requirements.

EPA will implement these requirements where States or Tribes are not authorized to implement the NPDES program. EPA also will implement these requirements where States or Tribes are authorized to implement the NPDES program but do not have sufficient authority to implement these requirements.

G. Are Permits for Existing Facilities Subject to Requirements Under Other Federal Statutes?

EPA's NPDES permitting regulations at 40 CFR 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* 40 CFR 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 final rulemaking authorizes 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.*).

H. Alternative Site-Specific Requirements

Under § 125.94(a)(5), an existing facility may demonstrate to the Director that it has selected, installed, and is properly operating and maintaining, or will install and properly operate and maintain, design and construction technologies, operational measures, and/or restoration measures that the Director determines to be the best technology available to minimize adverse environmental impact for the facility based on the cost-cost test specified in sub-section (a)(5)(i) or the cost-benefit test specified in (a)(5)(ii) of the rule.

Section 125.94(a)(5)(i) provides that an existing facility may demonstrate that the costs of compliance under the compliance alternatives in § 125.94(a)(2) through (4) of the rule would be significantly greater than the costs considered by the Administrator for a like facility in establishing the applicable performance standards. In such cases, the Director must make a site-specific determination of the best technology available for minimizing adverse environmental impact. The Director must establish site-specific alternative requirements based on new and/or existing design and construction technologies, operational measures, and/or restoration measures that achieve an efficacy that is, in the judgment of the Director, as close as practicable to the applicable performance standards in § 125.94(b) of the rule.

Section 125.94(a)(5)(ii) provides that an existing facility may demonstrate that the costs of compliance under alternatives in § 125.94(a)(2) through (4) of the rule would be significantly greater than the benefits of complying with the applicable performance standards at that facility. In such cases, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact. The Director must establish site-specific alternative requirements based on new and/or existing design and construction technologies, operational measures, and/or restoration measures that achieve an efficacy that, in the judgment of the Director, is as close as practicable to the applicable performance standards in § 125.94(b) of the rule.

1. Facility's Costs Significantly Greater Than Costs Considered by EPA

If the Director determines that data specific to your facility indicate that the costs of compliance under § 125.94(a)(2) through (4) would be significantly greater than the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards in § 125.94(b) you may request a site-specific determination of best technology available for minimizing adverse environmental impacts. A facility requesting this determination must submit a Comprehensive Cost Evaluation Study (§ 125.94(b)(6)(i)) and a Site Specific Technology Plan (§ 125.94(b)(6)(iii)). The Comprehensive Cost Evaluation Study must include engineering cost estimates in sufficient detail to document the costs of implementing design and construction technologies, operational measures, and/or restoration measures at the facility that would be needed to meet the applicable performance standards of § 125.94(b); a demonstration that the documented costs significantly exceed the costs considered by EPA for a facility like yours in establishing the applicable performance standards; and engineering cost estimates in sufficient detail to document the costs of implementing alternative design and construction technologies, operational measures, and/or restoration measures in the facility's Site-Specific Technology Plan developed in accordance with § 125.95(b)(6)(iii).

To make the demonstration that compliance costs are significantly greater than those considered by EPA, the facility must first determine its actual compliance costs. To do this, the facility first should determine the costs for any new design and construction technologies, operational measures, and/or restoration measures that would be needed to comply with the requirements of § 125.94(a)(2) through (4), which may include the following cost categories: The installed capital cost of the technologies or measures, the *net* operation and maintenance (O&M) costs for the technologies or measures (that is, the O&M costs for the final suite of technologies and measures once all new technologies and measures have been installed less the O&M costs of any existing technologies and measures), the *net* revenue losses (lost revenues minus saved variable costs) associated with *net* construction downtime (actual construction downtime minus that portion which would have been needed anyway for repair, overhaul or maintenance) and any pilot study costs associated with on-site verification and/or optimization of the technologies or measures. Costs should be annualized using a 7 percent discount rate, with an amortization period of 10 years for capital costs and 30 years for pilot study costs and construction downtime net revenue losses. Annualized costs should be converted to 2002 dollars ($2002), using the engineering news record construction cost index (see *Engineering News-Record.* New York: McGraw Hill. Annual average value is 6538 for year 2002). Costs for permitting and post-construction monitoring should not be included in this estimate, as these are not included in the EPA-estimated costs against which they will be compared, as described below. Because existing facilities already incur monitoring and permitting costs, and these are largely independent of the specific performance standards adopted and technologies selected to meet them, EPA believes it is both simpler and more appropriate to conduct the cost comparison required in this provision using direct compliance costs (capital, net O&M, net construction downtime, and pilot study) only. Adding permitting and monitoring costs to both sides of the comparison would complicate the methodology without substantially changing the results.

To calculate the costs that the Administrator considered for a like facility in establishing the applicable performance standards, the facility must follow the steps laid out below, based on the information in the table provided in Appendix A: Costs considered by EPA in Establishing Performance Standards. A sample of the table is provided below (see sample table). Note that those facilities that claimed the flow data that they submitted to EPA, and which EPA used to calculate compliance costs, as confidential business information (CBI), are not listed in the table provided in Appendix A, unless the total calculated compliance costs were zero. If these facilities wish to request a site-specific determination of best technology available based on significantly greater compliance costs, they will need to waive their claim of confidentiality prior to submitting the Comprehensive Cost Evaluation Study so that EPA can make the necessary data available to the facility, Director, and public.

SAMPLE TABLE.—COSTS CONSIDERED BY EPA IN ESTABLISHING PERFORMANCE STANDARDS ($2002)

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa})	Capital cost	Baseline O&M annual cost	Post construction O&M annual cost	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa})	Net revenue losses from net construction downtime	Pilot study costs	Annualized downtime and pilot study costs [2,4]	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
Fac 1 ID		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fac 2 ID		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fac 3 ID [5]	Intake 1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fac 3 ID [5]	Intake 2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Etc.		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] The design flow adjustment slope (m) represents the slope that corresponds to the particular facility using the technology in column 12.

[2] Discount rate = 7%

[3] Amortization period for capital costs = 10 years

[4] Amortization period for downtime and pilot study costs = 30 years

[5] Depending on the data provided, some facilities with multiple intakes were costed separately for each intake. In such cases, the facility should calculate the costs considered by EPA for each intake separately using the steps below and sum. Note that some cost components (e.g. construction downtime losses and pilot study costs) are assigned arbitrarily to one of the intakes, since it is difficult to determine how they would be assigned to each intake separately. Since the costs for multiple intakes are summed, this will not affect the results.

The data in Appendix A is keyed to both a facility name and survey ID number. Facilities should be able to determine their ID number from the survey they submitted to EPA during the rule development process.

Step 1: Determine which technology EPA modeled as the most appropriate compliance technology for your facility (§ 125.94(a)(5)(i)(A)). To do this, use the code in column 12 of Appendix A to look up the modeled technology in Table 9–1 below.

TABLE 9–1.—TECHNOLOGY CODES AND DESCRIPTIONS

Technology codes	Technology description
1	Addition of fish handling and return system to an existing traveling screen system.
2	Addition of fine-mesh screens to an existing traveling screen system.
3	Addition of a new, larger intake with fine-mesh and fish handling and return system in front of an existing intake system.
4	Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 1.75 mm.
5	Addition of a fish net barrier system.
6	Addition of an aquatic filter barrier system.
7	Relocation of an existing intake to a submerged offshore location with passive fine-mesh screen inlet with mesh width of 1.75 mm.
8	Addition of a velocity cap inlet to an existing offshore intake.
9	Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 1.75 mm.
10	[Module 10 not used].
11	Addition of dual-entry, single-exit traveling screens (with fine-mesh) to a shoreline intake system.
12	Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 0.76 mm.
13	Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 0.76 mm.
14	Relocation of an existing intake to a submerged offshore location with passive fine-mesh screen inlet with mesh width of 0.76 mm.

Step 2: Using EPA's costing equations, calculate the annualized capital and net operation and maintenance costs for a facility with your design flow using this technology (§ 125.94(a)(5)(i)(B)). To do this, you should use the following formula, which is derived from the results of EPA's costing equations for a facility like yours using the selected technology:

$$y_f = y_{epa} + m * \left(x_f - x_{epa}\right), (1)$$

Where:

y_f = annualized capital and net O&M costs using actual facility design intake flow,

x_f = actual facility design intake flow (in gallons per minute),

x_{epa} = EPA assumed facility design intake flow (in gallons per minute) (column 3),

y_{epa} = Annualized capital and net O&M costs using EPA design intake flow (column 7),and

m = design flow adjustment slope (column 13).

Rather than providing the detailed costing equations that EPA used to calculate annualized capital and net O&M costs for facilities to use each of the 14 modeled technologies, EPA has provided the simplified formula above, which collapses the results of those equations for the particular facility and technology into a single result (y_{epa}) and then allows the facility to adjust this result to reflect its actual design intake flow, using a technology specific slope for a facility like yours that is derived from the costing equations. This allows facilities to perform the flow adjustment required by § 125.94(a)(5)(i)(B) in a straightforward and transparent manner. Facilities, Directors, or members of the public who wish to review the detailed costing equations should consult the Technical Development Document, Chapter 3.

EPA has provided some additional information in Appendix A, beyond that which is needed to perform the calculations in § 125.95(a)(5)(ii), to facilitate comparison of the results obtained using formula 1 to the detailed costing equations in the TDD, for those who wish to do so. EPA does not expect facilities or permit writers to do this, and has in fact provided the simplified formula to preclude the need for doing so, but is providing the additional information to increase transparency. Thus, for informational purposes, the total capital cost (not annualized), baseline O&M cost, and post construction O&M cost from which the annualized capital and net O&M costs using EPA design intake flow (y_{epa} in column 7) are derived are listed separately in columns 4 through 6. To calculate y_{epa}, EPA annualized the total capital cost using a 7 percent discount rate and 10 year amortization period, and added the result to the difference between the post construction O&M costs and the baseline O&M costs.

Note that some entries in Appendix A have NA indicated for the EPA assumed design intake flow in column 2. These are facilities for which EPA projected that they would already meet otherwise applicable performance standards based on existing technologies and measures. EPA projected zero compliance costs for these facilities, irrespective of design intake flow, so no flow adjustment is needed. These facilities should use $0 as their value for the costs considered by EPA for a like facility in establishing the applicable performance standards. EPA recognizes that these facilities will still incur permitting and monitoring costs, but these are not included in the cost comparison for the reasons stated above.

Step 3: Determine the annualized net revenue loss associated with net construction downtime that EPA modeled for the facility to install the technology (§ 125.94(a)(5)(i)(C)) and the annualized pilot study costs that EPA modeled for the facility to test and optimize the technology (§ 125.94(a)(5)(i)(D)). The sum of these two figures is listed in column 10. For informational purposes, the total (not annualized) net revenue losses from construction downtime, and total (not annualized) pilot study costs are listed separately in columns 8 and 9. These two figures were annualized using a 7 percent discount rate and 30 year amortization period and the results added together to get the annualized facility downtime and pilot study costs in column 10.

Step 4: Add the annualized capital and O&M costs using actual facility design intake flow (y_f from step 2), and the annualized facility downtime and pilot study costs (column 10 from step 3) to get the preliminary costs considered by EPA for a facility like yours (§ 125.94(a)(5)(i)(E)).

Step 5: Determine which performance standards in § 125.94(b)(1) and (2) (*i.e.,* impingement mortality only, or impingement mortality and entrainment) are applicable to your facility, and compare these to the performance standards on which EPA's cost estimates are based, listed in column 11 (§ 125.94(a)(5)(i)(F)). If the applicable performance standards and those on which EPA's cost estimates are based are the same, then the preliminary costs considered by EPA for a facility like yours are the final costs considered by EPA for a facility like yours. If only the impingement mortality performance standards are applicable to your facility, but EPA based its cost estimates on

impingement mortality and entrainment performance standards, then you should divide the preliminary costs by a factor of 2.148 to get the final costs. If impingement mortality and entrainment performance standards are applicable to your facility, but EPA based its cost estimates on impingement mortality performance standards only, then you should multiply the preliminary costs by 2.148 to get the final costs. In calculating compliance costs, EPA projected what performance standards would be applicable to the facility based on available data. However, because of both variability and uncertainty in the underlying parameters that determine which performance standards apply (*e.g.,* capacity utilization rate, mean annual flow), it is possible that in some cases the performance standards that EPA projected are not correct. The adjustment factor of 2.148 was determined by taking the ratio of median compliance costs for facilities to meet impingement mortality and entrainment performance standards over median compliance costs for facilities to meet impingement mortality performance standards only. While using this adjustment factor will not necessarily yield the exact compliance costs that EPA would have calculated had it had current information, EPA believes the results are accurate enough for determining whether a facility's actual compliance costs are ''significantly greater than'' the costs considered by EPA for a like facility in establishing the applicable performance standards. EPA believes it is preferable to provide a simple and transparent methodology for making this adjustment that yields reasonably accurate results, rather than a much more complex methodology that would be difficult to use and understand (for the facility, Director, and public), even if the more complex methodology would yield slightly more accurate results.

The Site-Specific Technology Plan is developed based on the results of the Comprehensive Cost Evaluation Study and must contain the following information:

- A narrative description of the design and operation of all existing and proposed design and construction technologies, operational measures, and/or restoration measures that you have selected in accordance with § 125.94(a)(5);
- An engineering estimate of the efficacy of the proposed and/or implemented design and construction technologies or operational measures, and/or restoration measures. This estimate must include a site-specific evaluation of the suitability of the technologies or operational measures for reducing impingement mortality and/or entrainment (as applicable) of all life stages of fish and shellfish based on representative studies (*e.g.,* studies that have been conducted at cooling water intake structures located in the same waterbody type with similar biological characteristics) and, if applicable, site-specific technology prototype or pilot studies. If restoration measures will be used, you must provide a Restoration Plan that includes the elements described in § 125.95 (b)(5);
- A demonstration that the proposed and/or implemented design and construction technologies, operational measures, and/or restoration measures achieve an efficacy that is as close as practicable to the applicable performance standards of § 125.94(b) without resulting in costs significantly greater than either the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards, or as appropriate, the benefits of complying with the applicable performance standards at your facility; and,
- Design and engineering calculations, drawings, and estimates prepared by a qualified professional to support the elements of the Plan.

2. Facility's Costs Significantly Greater Than the Benefits of Complying With Performance Standards

A facility demonstrating that its costs are significantly greater than the benefits of complying with performance standards must perform and submit a Comprehensive Cost Evaluation Study, a Benefits Valuation Study, and a Site-Specific Technology Plan.

The Comprehensive Cost Evaluation Study is discussed in the previous section. It requires the same information for a cost-benefit site-specific determination as for a cost-cost site-specific determination, except that the demonstration in § 125.95(b)(6)(i)(B) must show that the facility's actual compliance costs significantly exceed the benefits of meeting the applicable performance standards at the facility.

The Benefits Valuation Study requires that a facility use a comprehensive methodology to fully value the impacts of impingement mortality and entrainment at its site and the benefits of complying with the applicable performance standards. In addition to the valuation estimates, the benefit study must include the following:

- A description of the methodology(ies) used to value commercial, recreational, and ecological benefits (including any non-use benefits, if applicable);
- Documentation of the basis for any assumptions and quantitative estimates. If you plan to use an entrainment survival rate other than zero, you must submit a determination of entrainment survival at your facility based on a study approved by the Director;
- An analysis of the effects of significant sources of uncertainty on the results of the study;
- If requested by the Director, a peer review of the items you submit in the Benefits Valuation Study. You must choose the peer reviewers 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 your cooling water intake structure. Peer reviewers must have appropriate qualifications depending upon the materials to be reviewed.
- A narrative description of any non-monetized benefits that would be realized at your site if you were to meet the applicable performance standards and a qualitative assessment of their magnitude and significance.

All benefits, whether expressed qualitatively or quantitatively, should be addressed in the Benefits Valuation Study and considered by the Director in determining whether compliance costs significantly exceed benefits.

The benefits assessment should begin with an impingement and entrainment mortality study, which quantifies both the baseline mortality as well as the expected change from rule compliance. The benefits assessment should include a qualitative and/or quantitative description of the benefits that would be produced by compliance with the applicable performance standards at the facility site and, to the extent feasible, monetized (dollar) estimates of all significant benefits categories using well established and generally accepted valuation methodologies. The first benefit category to consider is use benefits, which includes such benefits as those to commercial and recreational fishermen. Well-established revealed preference and market proxy methods exist for valuing use benefits, and these should be used in all cases where the impingement and entrainment mortality study identifies substantial impacts to harvested or other relevant species.

The second benefit category to consider is non-use benefits. Non-use benefits may arise from reduced impacts to ecological resources that the public considers important, such as threatened and endangered species. Non-use benefits can generally only be monetized through the use of stated

preference methods. When determining whether to monetize non-use benefits, permittees and permit writers should consider the magnitude and character of the ecological impacts implied by the results of the impingement and entrainment mortality study and any other relevant information.

- In cases where an impingement mortality and entrainment characterization study identifies substantial harm to a threatened or endangered species, to the sustainability of populations of important species of fish, shellfish or wildlife, or to the maintenance of community structure and function in a facility's waterbody or watershed, non-use benefits should be monetized.[50]
- In cases where an impingement mortality and entrainment characterization study does not identify substantial harm to a threatened or endangered species, to the sustainability of populations of important species of fish, shellfish or wildlife, or to the maintenance of community structure and function in a facility's waterbody or watershed, monetization is not necessary.

Permittees should consult with their permitting authority regarding their plans for assessing ecological and non-use benefits, including whether they plan to conduct a stated preference study and if so, the basic design of the study, including such items as target population, sampling strategy, approximate sample size, general survey design, and other relevant information. When conducting quantitative benefits assessments, permittees should carefully review and follow accepted best practices for such studies. A discussion of best practices regarding valuation can be found in EPA's Guidelines for Preparing Economic Analyses (EPA 2000, EPA 240–R–00–003, September 2000) and OMB Circular A–4: Regulatory Analysis (September 17, 2003, *www.whitehouse.gov/omb/inforeg/circular_a4.pdf).* In their benefits assessment, the permittee should present the results, as well as clearly describe the methods used, the assumptions made, and the associated uncertainties.

It is recommended that the permittee and Director seek peer review of the major biological and economic aspects of the final benefits assessment. The goal of the peer review process is to ensure that scientific and technical work products receive appropriate levels of critical scrutiny from independent scientific and technical experts as part of the overall decision-making process. In designing and implementing peer reviews, permittees and permit writers can look to EPA's Science Policy Council Handbook—Peer Review (EPA 100–B–98–00, January 1998, *www.epa.gov*) for guidance.

The Site-Specific Technology Plan is described in the previous section. It requires the same information for a cost-benefit site-specific determination as for a cost-cost site-specific determination, except that the demonstration in § 125.95(b)(6)(iii)(C) must show that the proposed and/or implemented technologies and measures achieve an efficacy that is as close as practicable to the applicable performance standards without resulting in costs significantly greater than the benefits of complying with the applicable performance standards at your facility.

X. Engineering Cost Analysis

A. Technology Cost Modules

In the Notice of Data Availability (NODA) (68 FR 13522, March 19, 2003), the Agency presented an approach for developing compliance costs that included a broad range of compliance technologies for calculating compliance costs as opposed to the approach used for the proposal, which was based on a limited set of technologies. In response to comments, EPA revised the costing modules that were presented in the NODA and used to develop the engineering costs for the final rule. Modifications made include adding a new set of costing modules to address the installation of fine-mesh wedgewire screens with open mesh sizes less than 1 mm in width; revising construction down time needed to relocate cooling water intake structures offshore; and reconsidering the applicability of the double-entry, single-exit technology and its ability to compensate for through-screen velocity issues for fine-mesh applications.

The following modules were used to develop compliance costs for the Agency's engineering cost analysis for the final rule:

- Addition of fish handling and return system to an existing traveling screen system;
- Addition of fine-mesh screens (both with and without a fish handling and return system) to an existing traveling screen system;
- Addition of a new, larger intake in front of an existing intake screen system;
- Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 1.75 mm;
- Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 0.76 mm;
- Addition of a fish net barrier system;
- Addition of an aquatic filter barrier system;
- Relocation of an existing intake to a submerged offshore location (with velocity cap inlet, passive fine-mesh screen inlet with mesh width of 1.75 mm, passive fine-mesh screen inlet with mesh width of 0.76 mm, or onshore traveling screens);
- Addition of a velocity cap inlet to an existing offshore intake;
- Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 1.75 mm;
- Addition of passive fine-mesh screen to an existing offshore intake with mesh width of 0.76 mm;
- Addition or modification of a shoreline-based traveling screen for an offshore intake system; and
- Addition of dual-entry, single-exit traveling screens (with fine-mesh) to a shoreline intake system.

Further explanation and derivation of each of these costing modules and their application for the purposes of assessing costs is discussed in the Technical Development Document. For explanation of how the Agency applied these technology cost modules to determine compliance costs, see section X.B below.

B. Model Facility Cost Development

In order to implement the technology costing modules discussed in section X.A, the Agency used the same basic approach which was described in the NODA for the estimation of costs at the model facility level. This approach focuses as much as possible on site-specific characteristics for which the Agency obtained data through the section 316(b) questionnaires. In addition, EPA used available geographic information, including detailed topographic mapping and overhead satellite imagery, to better utilize site-specific characteristics of each model facility's intake(s) to determine the appropriate costing modules for that facility. The Agency also utilized facility-specific information collected for the regional benefits studies to further inform the selection of compliance technology at model facilities. The Technical Development Document provides the background and a more detailed explanation of the

[50] In cases where harm cannot be clearly explained to the public, monetization is not feasible because stated preference methods are not reliable when the environmental improvement being valued cannot be characterized in a meaningful way for survey respondents.

Agency's approach to model facility level costing, which has not changed dramatically from that published in the NODA (68 FR 13522).

EPA's approach to model facility-level costing may be described as follows. In order to project upgrades to technologies as a result of compliance with today's final rule, the Agency utilized as much information as was available about the characteristics of the facilities expected to be within the scope of the rule. By incorporating as many site-specific features as possible into the design and implementation of its costing approach, the Agency has been able to capture a representative range of compliance costs at what it deems ''model facilities.'' However, it is infeasible for the Agency to visit and study in detail all of the engineering aspects of each facility complying with this rule (over 400 facilities could incur technology-related compliance costs as a result of this rule). Therefore, although the Agency has developed costs that represent EPA's best effort to develop a site-specific engineering assessment for a particular facility, this assessment does not address any site-specific characteristics that only long-term study of each facility would reveal. Hence, the Agency refers to its approach as a ''model'' facility approach.

In selecting technology modules for each model facility, EPA, to a degree departed from its traditional least cost approach. The least cost approach, traditionally utilized for estimating compliance technology choices, relies on the principle that the complying plant will choose to install the least cost technology that meets the minimum standard. While the Agency is confident that the suite of available technologies can achieve the performance standards on § 125.94(b) generally, EPA lacks sufficient data to determine the precise performance of each technology on a site-specific basis for over 400 different applications. The Agency thus selected, based on criteria published in the NODA, one of a set of best performing technologies (rather than the least costly technology) that was suitable for each model facility (or intake), in order to ensure that the technology on which costs were based would in fact achieve compliance at that model site. The criteria for selecting the best performing technology for a model facility (or intake) utilized questionnaire data as the primary tool in the assessment. For those facilities utilizing recirculating cooling systems in-place, the Agency assigned no compliance actions as they met the standards at baseline. The Agency then determined those intakes (facilities) that met compliance requirements with technologies in-place. These facilities received no capital or annual operating and maintenance compliance upgrade costs (although they may receive administrative or monitoring costs). The Agency categorized facilities according to waterbody type from which they withdraw cooling water. The Agency then sorted the intakes (facilities) within each waterbody type based on their configuration as reported in the questionnaires. Generally, the categories of intakes within one waterbody type are as follows: canal/channel, bay/embayment/cove, shoreline, and offshore. Once the intake (facility) is classified to this level the Agency examines the type of technology in-place and compares that against the compliance requirements of the particular intake (facility). For the case of entrainment requirements, the intake technologies (outside of recirculating cooling) that qualify to meet the requirements at baseline are fine mesh screen systems, and combinations of far-offshore inlets with passive intakes or fish handling/return systems. A small subset of intakes has entrainment qualifying technologies in-place at baseline (for the purposes of this costing effort). Therefore, in the case of entrainment requirements, most facilities with the requirement would receive technology upgrades. The methodology for choosing these entrainment technologies is explained further on in this discussion. For the case of impingement requirements, there are a variety of intake technologies that qualify (for the purposes of this costing effort) to meet the requirements at baseline. The intake types meeting impingement requirements at baseline include the following: barrier net (the only fish diversion system which qualifies), passive intakes (of a variety of types), and fish handling and return systems. A significant number of intakes (facilities) have impingement technology in-place that meets the qualifications for this costing effort. Therefore, some intakes (facilities) require no technology upgrades when only impingement requirements apply. For facilities that do not pre-qualify for impingement and/or entrainment technology in-place (for the purposes of this costing effort), the Agency focuses next on questionnaire data relating to the intake type—canal/channel, bay/embayment/cove, shoreline, and offshore. Within each intake type, the Agency further classifies according to certain specific characteristics. For the case of bays, embayments, and coves, the Agency determined if the intake is flush, protruding, or recessed from shoreline. For the case of canals and channels, the Agency similarly focuses on whether the intake is flush, protruding, or recessed from a shoreline. For the case of shoreline intakes, the Agency necessarily assessed whether the intake is flush, protruding, or recessed. For the case of offshore intakes, the Agency examines whether or not the intake has an onshore terminus (or well) and assesses the characteristics of the onshore system. The information the Agency gathers up to this point is sufficient to narrow down the likely technology applications for each intake (facility). However, in order to determine the best technology application, the Agency also utilizes commercially available satellite images and maps where available. The use of the satellite images and maps aided the Agency in determining the potential for the construction of expanded intakes in-front of existing intakes and the potential for an intake modification to protrude into the waterbody (such as a near-shore t-screen) due to the degree of navigational traffic in the near vicinity of the intake and whether a protrusion might be tolerated, the possibility of installing a barrier net system, obvious signs of strong currents, the relative distance of a potentially relocated intake inlet, the possibility for fish return installations of moderate length, etc. The Agency was able to collect satellite images for most intakes (facilities) for which it required the resource. However, in some cases (especially those in the rural, mid-western U.S.), only maps were available. Hence, for the case of a significant number facilities located near small freshwater rivers/streams and lakes/reservoirs, the Agency utilized only the questionnaire data and the overhead maps available.

Once the Agency gathered the intake (facility) specific information to this degree, the applicable list of technologies for each intake was small (and in some cases only one technology would apply). Therefore, the Agency examined any other sources of information, such as those obtained for the regional benefits studies, to further narrow down the best technology to meet the requirements of the rule for each model intake (facility). Often, the decision was between just two or three potential technologies. If there was no evidence in the Agency's possession to suggest that the least-cost technology would not function, then the Agency would select this technology. However, should evidence imply that the least cost technology not be able to function reliably or have a feasibility issue

related to site deployment (for example, a barrier net across a navigable waterway or a fish handling and return system with an extremely long return trough), then the Agency departed from the ''least-cost'' decision process and assigned the ''best-performing'' technology. In cases where more than one technology still remained after ruling out a least-cost alternative due to evidence (which was a rare occurrence), then the Agency attempted to balance the application of the remaining technologies about a median, thereby assigning moderately high costs for some cases and moderately low costs in others. Therefore, for the case of national costs, the Agency's application of technology cost modules reflect a reasonable national average.

C. Facility Flow Modifications

In developing costs and benefits for the NODA, the Agency revised intake flow information for a small subset of inscope facilities in an effort to ensure the accuracy and quality of the data. In developing costs and benefits for the final rule, the Agency has further refined the intake flow information used.

Since the NODA, the Agency re-evaluated its original decision to use the reported 1998 (the most recent of three years collected) annual flows for Detailed Questionnaire (DQ) recipients for the calculation of benefits. This, in turn, had an impact on the development of estimated design intake flows for short-technical questionnaire (STQ) recipients. As presented in the NODA, the Agency estimated design intake flows for STQ facilities using a statistical methodology based on linear regression of DQ recipients' annual intake flows and DQ recipients' design intake flows to assess the design intake flow information for facilities that responded to the short technical questionnaire. Because the Agency asked STQ respondents for only their actual annual intake flow for the 1998 reporting year only (or a typical operational year), it was necessary to calculate design intake flow information for the purpose of accurately assessing compliance costs. Therefore, for the NODA and proposal, the Agency calculated design intake flows for STQ facilities based on a model derived from only the 1998 DQ flow data. In retrospect, the Agency determined that a more robust approach would be to use all three years of annual DQ flows collected (1996—1998) and to take advantage of the statistical abilities afforded by the expanded data set (that is, to determine and exclude outliers). Hence, for this final rule, the Agency has estimated the costs and benefits of the rule using improved flow data over the NODA and proposal. For the case of STQ facilities, the Agency has utilized an improved data set for the calculation of design intake flows, and, in turn, the calculation of compliance costs.

XI. Economic Analysis

A. Final Rule Costs

EPA estimates that the final rule will have total annualized social (pre-tax) costs of $389 million ($2002). Of this total, $385 million are direct costs incurred by facilities and $4 million are implementation costs incurred by State and Federal government. On a post-tax basis, direct costs incurred by facilities subject to the final rule are expected to be $249 million, including one-time technology costs of complying with the rule, a one-time cost of installation downtime, annual operating and maintenance costs, and permitting costs (initial permit costs, annual monitoring costs, and permit reissuance costs).

These cost estimates include compliance costs for eight facilities that are projected to be base case closures.[51] Excluding compliance costs for projected base case closure facilities would result in annualized pre-tax facility compliance costs of approximately $376 million and annualized post-tax facility compliance costs of approximately $244 million. The equivalent annualized post-tax facility compliance costs were $178 million at proposal and $265 million for the NODA preferred option. The cost difference between proposal and the NODA is due primarily to the expanded range of technology options considered for the NODA and the ''best performing technology'' selection criteria used to assign cost modules to model facilities (*see* section IV of the NODA, 68 FR 13522, 13526).

In selecting technology modules for each model facility, EPA, to a degree departed from its traditional least cost approach. The least cost approach, traditionally utilized for estimating compliance technology choices relies on the principle that the complying plant will choose to install the least cost technology that meets the minimum standard. While the Agency is confident that the suite of available technologies can achieve compliance with the proposed performance requirements (60–90% reduction in entrainment and 80–95% reduction in impingement mortality relative to the calculation baseline), EPA lacks sufficient data and resources to determine the precise performance of each technology on a site-specific basis for over 400 different applications. The Agency thus selected, for subset of sites where multiple technologies could be under consideration to meet the requirements, a best performing technology (rather than the least costly technology of the choices). The best performing technology concept, when necessary to apply, relied on assigning technologies about a median cost, with some choices above and below. Therefore, for each model facility (or intake), in order to ensure that the technology on which costs were based would in fact achieve compliance at that model site, the Agency could not rely on a one-size fits all, least-cost approach. The cost difference between the NODA and the final rule is primarily a result of decreases in capital and permitting cost estimates.

Capital and O&M costs changed between NODA and final primarily due to three factors. The Agency revised its application of certain technology cost modules (especially the dual-entry, single-exist traveling screen module) between NODA and final, in response to comments received. The Agency revised its costs for some passive screen technology costs utilizing finer mesh screens, in response to comments received. In addition, the Agency credited facilities with far offshore intakes plus certain impingement controls in-place (such as fish handling or passive inlet screens) as having met the requirements for entrainment reduction at baseline. This final change was also in response to comments that recommended that the Agency correlate the benefits assessment more closely with the engineering cost estimates. The overall net result of these changes was to slightly decrease total capital and total O&M costs of the rule. However, on the basis of facilities expected to upgrade technologies to meet the rule requirements, the capital and O&M costs did increase slightly.

There are many uncertainties surrounding any forecast. The national annualized costs estimated for today's rule were necessarily developed using several major assumptions which are subject to uncertainty. The Agency attempted to develop a plausible range of costs focusing on four major cost assumptions surrounding the direct private cost of $385 million that may be incurred when facilities implement this rule. Uncertainty factors were analyzed for the cost assumptions affecting technology capital, technology O&M, downtime for connection outages, initial permitting, and pilot studies. This

[51] There are eight base case closures in 2008, the first model run year of the IPM. *See* section XI.B.1 for further discussion of analyses using the IPM.

uncertainty analysis provided a range of costs for the national private (direct) annualized compliance costs of $377 to $437 million. This range was developed by examining the effect of capacity utilization assumptions on technology capital and O&M costs; the effects of annualization time frame for initial permitting and downtime connection outages; the effects of sampling frequency and data analysis on pilot study costs; and excluding costs for facilities that have partial recirculating systems. For more information on the Agency's analysis of this issue, see DCN 6–5045.

Cost assumption	Base case facility compliance cost estimate	Sensitivity estimate
Annualization time frame for initial permitting and downtime.	30 years	20 years.
Partial recirculation system credit	No	Yes.
Capacity utilization rate used to estimate technology capital and O&M.	Based on 2008 IPM Forecast	Based on historic utilization.
Pilot study costs	Moderate sampling frequency	High sampling frequency.

B. Final Rule Impacts

1. Energy Market Model Analysis

At proposal and for the NODA, EPA used an electricity market model, the Integrated Planning Model (IPM®), to identify potential economic and operational impacts of various regulatory options considered for the Phase II regulation.[52] Electric reliability impact analyses could not be performed using the IPM model. EPA does recognize that due to down time or connection outages estimated to install several of the technologies, and the number of facilities that will need to come into compliance over the first few years after today's rule is promulgated, there may be short-term electric reliability issues unless care is taken within each region to coordinate outages with the North American Electric Reliability Council (NERC) and where possible with normal scheduled maintenance operations. Noting this, EPA has provided flexibility in today's rule so that facilities can develop workable construction schedules with their permit writers and coordinate with NERC to appropriately schedule down times (*see* § 125.95(b)(4)(ii)). As noted in the NERC 2003 Long-term Reliability Assessment, the overall impact on reliability of any new environmental requirements will ''* * * depend on providing sufficient time to make the necessary modifications and the commercial availability of control technologies.'' [53] EPA conducted impact analyses at the market level, by NERC region,[54] and for facilities subject to the Phase II regulation. Analyzed characteristics include changes in electricity prices, capacity, generation, revenue, cost of generation, and income. These changes were identified by comparing two scenarios: (1) The base case scenario (in the absence of any section 316(b) Phase I and Phase II regulation) and (2) the post compliance scenario (after the implementation of the new section 316(b) Phase II regulations). At proposal, EPA used the results of these comparisons to assess the impacts of the proposed rule and two of the five alternative compliance options considered by EPA: (1) The ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System based on Waterbody Type/Capacity'' option and (2) the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities'' option. For the NODA, EPA assessed the impacts of the preferred option and the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System based on Waterbody Type/Capacity'' option, making several changes to the analysis (major changes included changes in IPM model aggregation, capacity utilization assumptions, and treatment of installation downtime; see section V.A of the NODA).

Since publication of the NODA, EPA has conducted further IPM analyses. The following sections present a discussion of changes to the analysis since the NODA and the results of the re-analysis of the final rule.

a. Changes to the IPM analyses since the NODA. EPA did not change its IPM assumptions and modeling procedures for this final rule. EPA continued to use the 2000 version of the IPM model to perform the final rule analysis. In the 2003 current version of the IPM, the model has been updated to include, among other things, effects of the State Multi-Pollutant regulations and the New Source Review settlements on environmental compliance costs associated with the IPM base case. Further, the 2003 version of the IPM model includes updated costs for existing facilities such as life extension costs. However, a few general changes affect the results presented in the following subsection. These changes are outlined in section VI.A and include the following: An increase in the estimated number of in-scope Phase II facilities from 551 to 554; revisions of technology, operating and maintenance, and permitting/monitoring costs; and changes to the assumption of construction downtimes for compliance technologies other than recirculating cooling towers.

b. Revised results for the Final Rule. This section presents the revised impact analysis of the final rule. The impacts of compliance with the final rule are defined as the difference between the modeling results for the base case scenario and the modeling results for the post-compliance scenario. Two base case scenarios were used to analyze the impacts associated with the final rule. The first base case scenario was developed using EPA's electricity demand assumption. Under this assumption, demand for electricity is based on the Annual Energy Outlook (AEO) 2001 forecast adjusted to account for efficiency improvements not factored into AEO's projections of electricity sales. The second base case was developed using the unadjusted electricity demand from the AEO 2001. The results presented in this section use the first, EPA-adjusted base case.

[52] For a detailed description of the IPM see Chapter B3 of the Economic and Benefits Analysis (EBA) document in support of the proposed rule (DCN 4–0002; *http://www.epa.gov/ost/316b/econbenefits/b3.pdf*).

[53] North American Electric Reliability Council (NERC). 2003. 2003 Long-term Reliability Assessment: The Reliability of Bulk Electric Systems in North America; prepared December 2003.

[54] The IPM models the ten NERC regions that cover the continental U.S.: ECAR (East Central Area Reliability Coordination Agreement), ERCOT (Electric Reliability Council of Texas), FRCC (Florida Reliability Coordinating Council), MAAC (Mid-Atlantic Area Council), MAIN (Mid-America Interconnected Network, Inc.), MAPP (Mid-Continent Area Power Pool), NPCC (Northeast Power Coordination Council), SERC (Southeastern Electricity Reliability Council), SPP (Southwest Power Pool), and WSCC (Western Systems Coordinating Council). Electric generators in Alaska and Hawaii are not interconnected with these regions and are not modeled by the IPM.

Results using the second base case are presented in the Appendix of Chapter B3 of the final EBA.

EPA analyzed impacts of the final rule using data from model run year 2010. Model run year 2010 was chosen to represent the effects of the final rule for a typical year in which all facilities are expected to be in compliance (for this analysis, EPA assumed that facilities come into compliance between 2005 and 2009; in reality, compliance is expected to begin in 2008).[55] The analysis was conducted at two levels: the market level including all facilities (by NERC region) and the Phase II facility level (including analyses of the in-scope Phase II facilities as a group and of individual Phase II facilities). The results of these analyses are presented in the following subsections.

i. Market-level impacts of the Final Rule. The market-level analysis includes results for all generators located in each NERC region including facilities both in-scope and out-of-scope of the proposed Phase II rule. Exhibit XI–1 presents five measures used by EPA to assess market-level impacts associated with the final rule, by NERC region: (1) Incremental capacity closures, calculated as the difference between capacity closures under the final rule and capacity closures under the base case; (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 total 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 revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in Chapter B3: Electricity Market Model Analysis (section B3–4.1) of the Economic and Benefits Analysis (EBA) in support of the final rule (DCN 6–0002). Chapter B3 also presents a more detailed interpretation of the results of the market-level analysis.

EXHIBIT XI–1.—MARKET-LEVEL IMPACTS OF THE FINAL RULE (2010)

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (percent)	Change in energy price per MWh (percent)	Change in pre-tax income ($2002) (percent
		Capacity (MW)	% of baseline capacity			
ECAR	118,529	.....	−0.0	0.1	0.3	−0.8
ERCOT	75,290	.....	−0.0	0.0	5.8	−5.6
FRCC	50,324	.....	−0.0	0.4	0.6	−3.0
MAAC	63,784	.....	−0.0	0.4	0.1	−0.9
MAIN	59,494	94	0.2	0.1	−0.3	−0.3
MAPP	35,835	.....	−0.0	−0.1	−0.3	0.1
NPCC	72,477	.....	−0.0	−0.5	−0.1	−1.9
SERC	194,485	.....	−0.0	0.0	−0.1	−0.5
SPP	49,948	.....	−0.0	−0.1	−0.2	−0.4
WSCC	167,748	58	0.0	0.0	0.0	−0.5
Total	887,915	152	0.0	0.0	n/a	−1.0

Two of the ten NERC regions modeled, MAIN and WSCC, are estimated to experience economic closures of existing capacity as a result of the final rule. These closures represent negligible percentages of regional baseline capacity (0.2% in MAIN and less than 0.1% in WSCC) and of total U.S. baseline capacity (less than 0.1%). EPA estimates that four NERC regions will experience increases in variable production costs per MWh, although the largest increase will not exceed 0.4 percent. In addition, four NERC regions will experience an increase in energy prices under the final rule. Of these, only ERCOT is estimated to experience an increase of more than 1.0 percent (5.8 percent). Pre-tax incomes are estimated to decrease in all but one region, but the majority of these changes will be less than 1.0 percent. ERCOT is estimated to experience the largest decrease in pre-tax income (−5.6 percent). Only one region, MAPP, will experience an increase in market-level pre-tax income (0.1 percent).

ii. Facility-level impacts of the Final Rule. The results from model run year 2010 were used to analyze impacts on Phase II facilities at two levels: (a) Potential changes in the economic and operational characteristics of the group of in-scope Phase II facilities as a whole and (b) potential changes to individual facilities within the group of Phase II facilities. Exhibit XI–2 presents five measures used by EPA to assess impacts to the group of Phase II facilities associated with the final rule, by NERC region: (1) Incremental capacity closures, calculated as the difference between capacity closures under the final rule and capacity closures under the base case; (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 total generation; (4) post-compliance changes in electricity generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in section B3–4.2 of the final EBA. Chapter B3 also presents a more detailed interpretation of the results of the analysis of Phase II facilities as a group.

[55] EPA also analyzed potential market-level impacts of the final rule for a year during which some Phase II facilities experience installation downtimes. This analysis used output from model run year 2008. See Chapter B3, section B3–4.3 of the final EBA for the results of this analysis.

EXHIBIT XI–2.—IMPACTS ON PHASE II FACILITIES OF THE FINAL RULE (2010)

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (percent)	Change in generation (percent)	Change in pre-tax income (percent)
		Capacity (MW)	% of baseline capacity			
ECAR	82,313	0	0.0	0.0	−0.2	−1.0
ERCOT	43,522	0	0.0	−0.7	−1.8	−10.4
FRCC	27,537	0	0.0	0.3	−0.8	−4.0
MAAC	34,376	0	0.0	0.0	0.2	−1.4
MAIN	36,498	94	0.3	0.1	−0.3	−0.6
MAPP	15,749	0	0.0	−0.1	0.0	−0.3
NPCC	37,651	0	0.0	−1.7	−3.6	−4.3
SERC	107,450	0	0.0	−0.3	−0.2	−0.7
SPP	20,471	0	0.0	−0.4	−0.7	−1.0
WSCC	28,431	58	0.2	−0.9	−4.3	−10.4
Total	433,998	152	0.0	−0.6	−0.8	−1.8

Identical to the market-level results, EPA estimates that 152 MW, or less than 0.1%, of capacity at Phase II facilities will close as a result of the final rule. (If the AEO's higher demand forecast is utilized, it would result in a larger capacity of early closures of 493 MW or more than 0.1%. *See* EBA B3 appendix Table B3–A–3.) MAIN (94 MW) and WSCC (58 MW) are the only regions that are estimated to experience incremental capacity closures. In both regions, these incremental closures represent less than 0.3% of baseline capacity at Phase II facilities. Variable production costs per MWh at Phase II facilities increase in two regions and decrease in six regions under the final rule. No region experiences an increase in Phase II facility production costs that exceeds 0.5 percent, while Phase II facilities in NPCC and WSCC see reductions of 1.7 percent and 0.9 percent, respectively. Phase II facilities in three NERC regions are estimated to experience decreases in generation in excess of 1.0 percent as a result of the final rule. The largest is estimated to be in WSCC, where Phase II facilities experience a 4.3 percent reduction in generation. Overall, EPA estimates that pre-tax income will decrease by 1.8 percent for the group of Phase II facilities. The effects of this change are concentrated in a few regions: WSCC and ERCOT each experience reductions in pre-tax income of 10.4 percent, which is driven by a reduction in revenues (not presented in this exhibit) rather than an increase in costs. NPCC and FRCC are estimated to experience a reduction of 4.3 and 4.0 percent, respectively.

Results for the group of Phase II facilities as a whole may mask shifts in economic performance among individual facilities subject to this rule. To assess potential distributional effects, EPA analyzed facility-specific changes between the base case and the post-compliance case in (1) capacity utilization, defined as generation divided by capacity 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 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 XI–3 presents the total number of Phase II facilities with estimated degrees of change due to the final rule. This exhibit excludes 17 in-scope facilities with estimated significant status changes in 2010: Ten facilities are base case closures, one facility is a full closure as a result of the final rule, and six facilities changed their repowering decision between the base case and the post-compliance case. These facilities are either not operating at all in either the base case or the post-compliance case, or they experience fundamental changes in the type of units they operate; therefore, the measures presented in Exhibit XI–3 would not be meaningful for these facilities. In addition, the change in variable production cost per MWh of generation could not be developed for 57 facilities with zero generation in either the base case or post-compliance scenario. For these facilities, the change in variable production cost per MWh is indicated as ''n/a.''

EXHIBIT XI–3.—OPERATIONAL CHANGES AT PHASE II FACILITIES FROM THE FINAL RULE (2010) [a]

Economic measures	Reduction			Increase			No change	N/A
	</=1%	1–3%	> 3%	</=1%	1–3%	> 3%		
Change in Capacity Utilization [b]	6	21	25	7	7	11	441	0
Change in Generation	4	6	46	11	5	18	428	0
Change in Revenue	83	30	45	142	8	16	194	0
Change in Variable Production Costs/MWh	38	16	9	145	11	17	225	57
Change in Pre-Tax Income	115	109	213	44	11	15	11	0

[a] For all measures percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.
[b] The change in capacity utilization is the difference between the capacity utilization percentages in the base case and post-compliance case. For all other measures, the change is expressed as the percentage change between the base case and post-compliance values.

EPA estimates that the majority of Phase II facilities will not experience changes in capacity utilization or generation due to compliance with the final rule. Of those facilities with changes in post-compliance capacity utilization and generation, most will experience decreases in these measures. Exhibit XI–3 also indicates that the majority of facilities with changes in variable production costs will experience increases. However, about 85

percent of those increases are estimated to be 1.0 percent or less. Changes in revenues at a majority of Phase II facilities will also not exceed 1.0 percent. The largest effect of the final rule is estimated to be on facilities' pre-tax income: the model projects that over 80 percent of facilities will experience a reduction in pre-tax income, with about 40 percent of the overall total experiencing a reduction of 3.0 percent or greater.

2. Other Economic Analyses

EPA updated its other economic analyses conducted at proposal and for the NODA to determine the effect of changes made to the assumptions for the final rule on steam electric generating facilities. This section discusses changes made to EPA's methodology and assumptions and presents the updated results. For complete results of this analysis, refer to Chapter B2 of the final EBA. For complete results of the proposal and the NODA analyses, refer to the chapters in Part B of the EBA document in support of the proposed rule at *http://www.epa.gov/waterscience/316b/econbenefits/* and DCN 5–3004 of the NODA docket.

It should be noted that the measures presented in this section are provided in addition to the economic impact measures based on the Integrated Planning Model (IPM®) analyses (*see* section XI.B.1). The following measures are used to assess the magnitude of compliance costs; they are not used to predict closures or other types of economic impacts on facilities subject to Phase II regulation.

a. Cost-to-revenue measure.

i. Facility-level analysis. EPA examined the annualized post-tax compliance costs of the final rule as a percentage of baseline annual revenues, for each of the 554 facilities expected to be subject to Phase II of the section 316(b) regulation. This measure allows for a comparison of compliance costs incurred by each facility with its revenues in the absence of the Phase II regulation. The revenue estimates are facility-specific baseline projections from the IPM base case for 2008 (*see* section XI.B.1 for a discussion of EPA's analyses using the IPM).[56]

Similar to the findings at proposal and for the NODA preferred option, EPA estimates that a majority of the facilities subject to the final rule, 413 out of 554 (75 percent), will incur annualized costs of less than one percent of revenues. Of these, 314 facilities incur compliance costs of less than 0.5 percent of revenues. In addition, 94 facilities (17 percent) are estimated to incur costs of between one and three percent of revenues, and 39 facilities (7 percent) are estimated to incur costs of greater than three percent. Eight facilities are estimated to be base case closures.

ii. Firm-level analysis. The firms owning the facilities subject to Phase II regulation may experience greater impacts than individual in-scope facilities if they own more than one facility with compliance costs. EPA therefore also analyzed the cost-to-revenue ratios at the firm level. EPA identified the domestic parent entity of each in-scope facility and obtained their sales revenue from publicly available data sources (the Dun and Bradstreet database for parent firms of investor-owned utilities and nonutilities; and Form EIA–861 for all other parent entities). This analysis showed that 126 unique domestic parent entities own the facilities subject to Phase II regulation. EPA compared the aggregated annualized post-tax compliance costs for each facility owned by the 126 parent entities to the firms' total sales revenue.

Since proposal, EPA has updated the parent firm determination for Phase II facilities. EPA also updated the average Form EIA–861 data used for this analysis from 1996–1998 (used at proposal) to 1997–1999 (used for the NODA) and 1999–2001 (used for the final rule). In addition, EPA made one modification to the sources of revenue data used in this analysis: At proposal, EPA used sales volume from Dun and Bradstreet (D&B) for any parent entity listed in the database. If D&B data were not available, EPA used the EIA database or the section 316(b) survey. For the NODA and final rule analyses, EPA used the D&B database for privately-owned entities only. For other entities, EPA used the EIA database. For the final rule analysis, EPA conducted additional research (*e.g.,* Securities and Exchange Commission 10–K filings; company web sites) to collect revenue data for those firms whose revenue was not reported in either D&B or Form EIA 861.

For the final rule, EPA estimates that of the 126 parent entities, 115 entities (91 percent) will incur annualized costs of less than one percent of revenues. Of these, 105 entities incur compliance costs of less than 0.5 percent of revenues. In addition, 10 entities (8 percent) are estimated to incur costs of between one and three percent of revenues, and only one entity (1 percent) is estimated to incur costs of greater than three percent. The highest estimated cost-to-revenue ratio for the final rule is 6.7 percent of the entities' annual sales revenue (for the proposed rule, this value was 5.3 percent; for the NODA preferred option, this value was 7.4 percent).

b. Cost per household. EPA also conducted an analysis that evaluates the potential cost per household, if Phase II facilities were able to pass compliance costs on to their customers. This analysis estimates the average compliance cost per household for each North American Electricity Reliability Council (NERC) region,[57] using two data inputs: (1) The average annual pre-tax compliance cost per megawatt hour (MWh) of total electricity sales and (2) the average annual MWh of residential electricity sales per household. For the proposal and NODA analyses, EPA used 2000 electricity sales information from Form EIA–861 (Annual Electric Power Industry Report); for the final rule, EPA updated the electricity sales information to 2001.

The results of this analysis show that the average annual cost of the final rule per residential household is expected to range from $0.50 in Alaska to $8.18 in Hawaii. The U.S. average is estimated to be $1.21 per household.

c. Electricity price analysis. EPA also considered potential effects of the final Phase II rule on electricity prices. EPA used three data inputs in this analysis: (1) Total pre-tax compliance cost incurred by facilities subject to Phase II regulation, (2) total electricity sales, based on the Annual Energy Outlook (AEO), and (3) prices by end use sector (residential, commercial, industrial, and transportation), also from the AEO. All three data elements were calculated by NERC region. For the proposal and NODA analyses, EPA used the AEO 2002; for the final rule, EPA updated the data with the AEO 2003.

The results of the final rule analysis show that the annualized costs of complying (in cents per KWh sales) range from 0.007 cents in the SPP region to 0.019 cents in the NPCC region. To determine potential effects of these

[56] EPA used 2008 rather than 2010 baseline revenues for this analysis because 2008 is the first model run year specified in the IPM analyses. EPA used the first model run year because it more closely resembles the current operating conditions of in-scope facilities than later run years (over time, facilities may be increasingly affected by factors other than the Phase II regulation).

[57] There are twelve NERC regions: ASCC (Alaska Systems Coordinating Council), ECAR (East Central Area Reliability Coordination Agreement), ERCOT (Electric Reliability Council of Texas), FRCC (Florida Reliability Coordinating Council), HI (Hawaii), MAAC (Mid-Atlantic Area Council), MAIN (Mid-America Interconnected Network, Inc.), MAPP (Mid-Continent Area Power Pool), NPCC (Northeast Power Coordination Council), SERC (Southeastern Electricity Reliability Council), SPP (Southwest Power Pool), and WSCC (Western Systems Coordinating Council).

compliance costs on electricity prices, EPA compared the per KWh compliance cost to baseline electricity prices by end use sector and for the average of the sectors (the detailed results are presented in Chapter B2 of the final EBA). This analysis projects that the greatest increase in electricity prices will be in the WSCC region (0.3 percent). The average increase in electricity prices is estimated to be 0.16 percent (for the proposed rule, this value was 0.11 percent; for the NODA preferred option, this value was 0.17 percent).

XII. Benefits Analysis

A. Introduction

This section presents EPA's estimates of the national environmental benefits of the final section 316(b) regulations for Phase II existing facilities. The assessed benefits occur due to the reduction in impingement and entrainment at cooling water intake structures affected by this rulemaking. Impingement and entrainment kills or injures large numbers of all life stages of aquatic organisms. By reducing the levels of impingement and entrainment, today's final rule will increase the number of fish, shellfish, and other aquatic life in local aquatic ecosystems. This, in turn, directly and indirectly improves use benefits such as those associated with recreational and commercial fisheries. Other types of benefits, including ecological and non-use values, would also be enhanced. Section D provides an overview of the types and sources of benefits anticipated, how these benefits are estimated, the level of benefits achieved by the final rule, and how monetized benefits compare to costs. The analysis was based on impingement and entrainment data from facility studies. Most of these studies counted losses of fish species only and considered only a limited subset of the species impinged and entrained.

To estimate the economic benefits of reducing impingement and entrainment at existing cooling water intake structures, all the beneficial outcomes need to be identified and, where possible, quantified and assigned appropriate monetary values. Estimating economic benefits is challenging because of the many steps necessary to link reductions in impingement and entrainment to changes in impacted fisheries and other aspects of relevant aquatic ecosystems, and then to link these ecosystem changes to the resulting changes in quantities and values for the associated environmental goods and services that ultimately are linked to human welfare. The methodologies used in the estimation of benefits of the final rule are largely built upon those used for estimating use benefits of the proposed rule (*see* 67 FR 17121) and the Notice of Data Availability (*see* 67 FR 38752). The Regional Analysis Document for the Proposed Section 316 (b) Phase II Existing Facilities Rule (*see* DCN 6–0003), hereafter known as the Regional Study or Regional Analysis, provides EPA's complete benefit assessment for the final rule.

National benefit estimates for this rule are derived from a series of regional studies across the country from a range of waterbody types. Section XII.B provides detail on the regional study design. Sections XII.C through XII.E of this preamble describe the methods EPA used to evaluate impingement and entrainment impacts at section 316(b) Phase II existing facilities and to derive an economic value associated with any such losses. Regional benefits are estimated using a set of statistical weights for each in-scope facility that were developed as part of the survey design. National benefit estimates are obtained by summing regional benefits.

B. Regional Study Design

In its analysis for the section 316(b) Phase II proposal, EPA relied on case studies of 19 facilities grouped by waterbody type (oceans, estuaries/tidal rivers, lakes/reservoirs, and rivers/streams) to estimate the potential economic benefits of reduced impingement and entrainment. For the proposal analysis, EPA extrapolated estimates of impingement and entrainment for each of the case study facilities to other facilities located on the same waterbody type, including those in different regions. However, a number of commenters expressed concern about this method of extrapolation, noting that there are important ecological and socioeconomic differences among different regions of the country, even within the same waterbody type. To address this concern, EPA revised the design of its analysis to examine cooling water intake structure impacts and regulatory benefits at the regional level. This involved the evaluation of impingement and entrainment data collected by the industry for another 27 facilities in addition to the 19 facilities evaluated for proposal (for a total of 46 facilities). Regional results were then combined to develop national estimates.

The Agency evaluated the benefits of today's rule in seven study regions (North Atlantic, Mid Atlantic, South Atlantic, Gulf of Mexico, California, Great Lakes, and Inland) based on similarities in the affected ecosystems, aquatic species present, and characteristics of commercial and recreational fishing activities within each of the seven regions (*see* the background chapter of each study region in Parts B-H of the Regional Analysis Document for maps of the study regions). The five coastal regions (California, North Atlantic, Mid-Atlantic, South Atlantic, and Gulf of Mexico) correspond to those of the National Oceanographic and Atmospheric Association (NOAA) Fisheries. The Great Lakes region includes all facilities in scope of the Phase II rule that withdraw water from Lakes Ontario, Erie, Michigan, Huron, and Superior or are located on a waterway with open fish passage to a Great Lake and within 30 miles of the lake. The Inland region includes the remaining facilities that withdraw water from freshwater lakes, rivers, and reservoirs.

Based on comments on the proposal about study gaps, EPA used available life history data to construct representative regional life histories for groups of similar species with a common life history type and groups used by NOAA Fisheries for landings data. Aggregation of species into groups facilitated evaluation of facility impingement and entrainment monitoring data. DCN 6–0003 provides a listing of the species in each life history group evaluated by EPA and tables of the life history data and data sources used for each group.

To obtain regional impingement and entrainment estimates, EPA extrapolated losses from selected facilities with impingement and entrainment data to all other facilities within the same region. Impingement and entrainment data were extrapolated on the basis of operational flow, in millions of gallons per day (MGD), where MGD is the average operational flow over the period 1996–1998 as reported by facilities in response to EPA's Section 316(b) Detailed Questionnaire and Short Technical Questionnaire. Operational flow at each facility was scaled using factors reflecting the relative effectiveness of currently in-place technologies for reducing impingement and entrainment. DCN 6–0003 provides details of the extrapolation procedure. The goal of the analysis was to provide regional and national estimates, so although there may be variability in the actual losses (and benefits) per MGD across particular individual facilities, EPA believes that this method of extrapolation is a reasonable basis for developing an estimate of regional- and national-level

benefits for the purposes of this rulemaking.

C. The Physical Impacts of Impingement and Entrainment

EPA's benefits analysis is based on facility-provided biological monitoring data. Facility data consist of records of impinged and entrained organisms sampled at intake structures. However, factors such as sampling methods and equipment, the number of samples taken, the duration of the sampling period, and the unit of time and volume of intake flow used to express impingement and entrainment, and other aspects of facility sampling programs, are highly variable. The data available covered organisms of all ages and life stages from newly laid eggs to mature adults. Therefore, EPA converted sampling counts into standardized estimates of the annual numbers of fish impinged or entrained and then expressed these estimates in terms of metrics suitable for the environmental assessment and economic benefits analysis.

EPA notes that the facility studies evaluated may under or over estimate impingement and entrainment rates. For example, facility studies typically focus on only a subset of the fish species impacted by impingement and entrainment, resulting in an underestimate of the number of species and total losses. Studies often did not count early life stages of organisms that were hard to identify. In addition, most studies EPA found were conducted over 30 years ago, before activities under the Clean Water Act improved aquatic conditions. In those locations where water quality was degraded relative to current conditions, the numbers and diversity of fish may have been depressed during the monitoring period, resulting in low impingement and entrainment estimates. On the other hand, use of linear methods for projecting losses to fish and shellfish in the waterbody may overstate or understate impacts. Nevertheless, EPA believes that the data from the facility studies were sufficient for developing an estimate of the relative magnitude of impingement and entrainment losses nation-wide.

Using standard fishery modeling techniques,[58] EPA constructed models that combined facility-derived impingement and entrainment counts with relevant life history data to derive estimates of (1) age-one equivalent losses (the number of individuals of different ages impinged and entrained by facility intakes expressed as age-one equivalents), (2) foregone fishery yield (pounds of commercial harvest and numbers of recreational fish and shellfish that are not harvested due to impingement and entrainment), and (3) foregone biomass production (pounds 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 these harvested species that is lost due to losses of forage species. Details of the methods used for these analyses are provided in Chapter A5 of Part A of the Regional Analysis document. For all analyses, EPA used the impingement and entrainment estimates provided by the facility and assumed 100% entrainment mortality based on the analysis of entrainment survival studies presented in Chapter A7 of Part A of the Regional Analysis document.

Exhibit XII–1 presents EPA's estimates of the current level of total annual impingement and entrainment in the study regions.

EXHIBIT XII–1.—TOTAL CURRENT ANNUAL IMPINGEMENT AND ENTRAINMENT, BY REGION

Region	Age-one equivalents (millions)	Foregone fishery yield (million lbs)	Biomass production foregone (million lbs)
California	312.94	28.87	43.62
North Atlantic	65.70	1.26	289.12
Mid Atlantic	1,733.14	67.2	110.90
South Atlantic	342.54	18.34	28.31
Gulf of Mexico	191.23	35.81	48.12
Great Lakes	319.11	3.59	19.34
Inland	369	3.53	122.0
Total for 554 facilities[a]	3,449.38	164.97	717.07

[a] National totals are sample-weighted and include Hawaii. Hawaii benefits are calculated based on average loss per MGD in North Atlantic, Mid Atlantic, Gulf of Mexico, California and the total intake flow in Hawaii.

Exhibit XII–2 presents EPA's estimates of annual combined impingement and entrainment reductions associated with the rule, by region.

[58] 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.

EXHIBIT XII–2.—REDUCTIONS IN ANNUAL IMPINGEMENT AND ENTRAINMENT, BY REGION

Region	Age-one equivalents (millions)	Foregone fishery yield (million lbs)	Biomass production foregone (million lbs)
California	66.39	6.10	9.19
North Atlantic	19.34	0.37	84.28
Mid Atlantic	846.37	34.28	54.66
South Atlantic	76.67	5.31	6.31
Gulf of Mexico	89.55	13.84	16.50
Great Lakes	159.52	1.73	8.51
Inland	116.83	1.06	20.90
Total for 554 facilities [a]	1,420.20	64.92	217.09

[a] National totals are sample-weighted and include Hawaii. Hawaii losses are estimates based on average loss rates per MGD at mainland coastal facilities and the total intake flow of the Hawaii facilities.

D. National Benefits of Rule

1. Overview

Economic benefits of today's rule can be broadly defined according to categories of goods and services provided by the species affected by impingement and entrainment at cooling water intake structures (CWIS). The first category includes benefits that pertain to the use (direct or indirect) of the affected fishery resources. The direct use benefits can be further categorized according to whether or not affected goods and services are traded in the market. The ''direct use'' benefits of the 316(b) regulation include both ''market'' commodities (*e.g.,* commercial fisheries) and ''nonmarket'' goods (*e.g.,* recreational angling). Indirect use benefits also can be linked to either market or nonmarket goods and services—for example, the manner in which reduced impingement- and entrainment-related losses of forage species leads through the aquatic ecosystem food web to enhance the biomass of species targeted for commercial (market) and recreational (nonmarket) uses. The second category includes benefits that are independent of any current or anticipated use of the resource; these are known as ''non-use'' or ''passive use'' values. Non-use benefits reflect human values associated with existence and bequest motives.

The economic value of benefits is estimated using a range of valuation methods, with the specific approach being dependent on the type of benefit category, data availability, and other suitable factors. Commercial fishery benefits are valued using market data. Recreational angling benefits are valued using a combination of primary and secondary research methods. For four of the seven study regions, EPA developed original Random Utility Models (RUM) of recreational angling behavior to estimate changes in recreational fishing values resulting from improved fishing opportunities due to reductions in impingement and entrainment. For the remaining three study regions (Inland, North Atlantic, and South Atlantic), EPA used secondary nonmarket valuation data (*e.g.,* benefits transfer of nonmarket valuation studies of the value of recreational angling). Because methodologies for estimating use values for recreational and commercial species are well developed, and some of these species have been extensively studied, these values are relatively straightforward to estimate. Sections XII.D.3 and XII.D.4 briefly summarize EPA's approaches to measuring direct use benefits. A detailed description of these approaches can be found in the 316(b) Regional Analysis document.

Estimating benefits from reduced impingement and entrainment of forage species is more challenging because these species are not targeted directly by commercial or recreational anglers and have no direct use values that can be observed in markets or inferred from revealed actions of anglers. To estimate indirect use benefits from reducing impingement and entrainment losses to forage species, EPA used a simple trophic transfer model that translates changes in impingement and entrainment losses of forage fish into changes in the harvest of commercial and recreational species that are subject to impingement and entrainment (*i.e.,* not the whole food web). Agency benefits estimates are based on projected numbers of age 1 equivalent fish saved under the final rule.

Neither forage species nor the unlanded portion of recreational and commercial species have direct uses; therefore, they do not have direct use values. Their potential value to the public is derived from two alternative sources: their indirect use as both food and breeding population for those fish harvested; and, the willingness of individuals to pay for the protection of fish based on a sense of altruism, stewardship, bequest, or vicarious consumption (non-use benefits). To estimate non-use benefits from reducing losses to forage species, and landed and unlanded commercial and recreational species, EPA explored benefits transfer from nonmarket valuation studies of non-use values of aquatic ecosystem improvements. EPA also explored the transfer of secondary nonmarket valuation data to value losses of threatened and endangered species. These efforts generated evidence that non-use values could occur as a result of this rule, but EPA was unable, by the time of publication of this final rule, to estimate reliable valuations for the resource changes associated with the expected results of this rule. EPA also investigated additional approaches to illustrate public willingness-to-pay for potential aquatic resource improvements that might occur because of this rule, but the Agency did not have sufficient time to fully develop and analyze these non-use benefit approaches for the final rule. Section XII.D.5 briefly summarizes the approaches EPA considered for measuring non-use benefits. Additional details about all approaches explored for estimating benefits can be found in Section XII.F and the 316(b) Regional Analysis document (DCN 6–0003).

As a consequence of the challenges associated with estimating benefits, some benefits are described only qualitatively, because it was not feasible, by the time of publication of this final rule, to derive reliable quantitative estimates of the degree of impact and/or the monetary value of reducing those impacts at the national level.

The remaining parts of Section XII.D below discuss details about discounting future benefits, valuation of recreational fishing, valuation of commercial fishing,

potential non-use benefits, and estimation of national benefits.

2. Timing of Benefits

Discounting refers to the economic conversion of future benefits and costs to their present values, accounting for the fact that individuals tend to value future outcomes less than comparable near-term outcomes. Discounting is important when benefits and costs occur in different years, and enables a comparison of benefits to costs across different time periods.

For today's rule, benefits are discounted to calculate benefits in a manner that makes the timing comparable to the annualized cost estimates. The benefits of today's rule 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 immediately achieve compliance. Facilities will face regulatory requirements once the rule takes effect, but it will take time to make the required changes. EPA has assumed, for the purpose of estimating benefits, that it will take one year from the date when installation costs are incurred by a facility until the required cooling water technology is operational. To account for this lag, all benefits are discounted by one year from the date when costs are incurred.

Second, an additional time lag will result between the time of technology implementation and resulting increased fishery yields. This lag stems from the fact that one or more years may pass between the time an organism is spared impingement and entrainment and the time of its ultimate 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. EPA conducted this analysis using two alternative discount rates as recommended by OMB: 3% and 7%. The Agency notes that discounting was applied to recreational and commercial fishing benefits only. Non-use benefits are independent of fish age and size and, thus start as soon as impingement and entrainment ceases.

3. Recreational Fishing Valuation

a. Recreational fishery methods for marine regions. For the five coastal regions, EPA's analysis of recreational fishing benefits from reduced impingement and entrainment is based on region-specific random utility models (RUM) of recreational anglers' behavior, combined with benefit function transfer. EPA developed original RUM models for four of the five coastal regions: California, the Mid-Atlantic, the South Atlantic, and the Gulf of Mexico. For the North Atlantic region, EPA used a model developed by the National Marine Fisheries Service (NMFS) by Hicks *et al.* (Hicks, Steinback, Gautam, and Thunberg, 1999. Volume II: The Economic Value of New England and Mid-Atlantic Sportfishing in 1994—DCN 5–1271). Chapter A11 of the Regional Analysis document provides detailed discussion of the methodology used in EPA's RUM analysis.

The regional recreational fishing studies use information on recreational anglers' behavior to infer anglers' economic value for the quality of fishing in the case study areas. The models' main assumption is that anglers will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher due to reduced impingement and entrainment, all else being equal. This benefit may occur in two ways: first, an angler may get greater enjoyment from a given fishing trip when catch rates are higher, and thus get a greater value per trip; second, anglers may take more fishing trips when catch rates are higher, resulting in greater overall value for fishing in the region. EPA modeled an angler's decision to visit a site as a function of site-specific cost, fishing trip quality, and additional site attributes such as presence of boat launching facilities or fish stocking at the site.

The Agency used 5-year historical catch rates per hour of fishing as a measure of baseline fishing quality in the regional studies. Catch rate is one of the most important attributes of a fishing site from the angler's perspective. This attribute is also a policy variable of concern because catch rate is a function of fish abundance, which is affected by fish mortality caused by impingement and entrainment.

The Agency used the estimated model coefficients in conjunction with the estimated changes in impingement and entrainment in a given region to estimate per-day welfare gain to recreational anglers due to the final rule. For the North Atlantic region, EPA used model coefficients estimated by Hicks *et al.* (1999) (DCN 4–1603).

To estimate the total economic value to recreational anglers for changes in catch rates resulting from changes in impingement and entrainment in a given region, EPA multiplied the total number of fishing days for a given region by the estimated per-day welfare gain due to the regulation. Because of data limitations, EPA was unable to estimate participation models for all regions. For the California and Great Lakes regions, the welfare estimates presented in the following section are based on the estimates of baseline recreational fishing participation provided by NOAA Fisheries. Thus, welfare estimates for these two regions presented in today's rule do not account for changes in recreational fishing participation due to the improved quality of the fishing sites; however, these changes are likely to be small based on results for other regions.

For the North Atlantic, Mid-Atlantic, South-Atlantic, and Gulf regions, estimates are based on an average of baseline and predicted increased fishing days. For these regions, EPA also estimated a trip frequency model, which captures the effect of changes in catch rates on the number of fishing trips taken per recreational season.

b. Recreational Fishery methods for the Great Lakes region. For the Great Lakes region, EPA developed an original RUM model for the state of Michigan, and transferred benefits to other Great Lakes states. EPA's RUM model for the Great Lakes used data from the 2001 Michigan Recreational Anglers survey, and information on historical catch rates at Michigan fishing sites on Lakes Michigan, Huron, Superior, and Erie provided by the Michigan Department of Natural Resources (MDNR, 2002, DCN 4–1863). For the Great Lakes, EPA estimated a single RUM site choice model for boat, shore, and ice-fishing modes. To transfer values from the Michigan study to other Great Lakes states, EPA used harvest information from state-level anglers' creel surveys, and participation information from the U.S. Fish and Wildlife Service's Annual Survey of Fishing, Hunting, and Wildlife-Related Recreation (U.S. Department of the Interior, 2001, DCN 1–3082–BE).

c. Recreational fishery methods for the Inland region. For the Inland region, EPA used a benefit transfer approach to value post regulation recreational impingement and entrainment losses. EPA conducted this analysis for five aggregate species groups: panfish, perch, walleye/pike, bass, and anadromous gamefish. The panfish group includes

species commonly classified as panfish, except perch, and includes species that did not clearly fit in one of the other groups. Using estimates collected from ten studies, the Agency calculated measures of central tendency for the marginal value of catching one additional fish for each species group. For detail see Chapter H4, of the Regional Study Document, DCN 6–0003.

The mean marginal value per additional fish caught is $2.55 for panfish, $0.38 for perch, $6.54 for walleye/pike, $4.18 for bass, and $11.95 for anadromous gamefish. EPA combined these marginal values per fish with estimates of recreational fishing losses that would be prevented by the regulation to calculate the value of post regulation recreational fishing benefits.

d. Results. As noted earlier in this section, anglers will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher, all else being equal. Decreasing impingement and entrainment increases the number of fish available to be caught by recreational anglers, thus increasing angler welfare.

Exhibit XII–3 shows the benefits that would result from reducing impingement and entrainment losses by installing cooling water intake technology under the final regulation. These values were discounted at a 3 percent discount rate and a 7 percent discount rate to reflect the fact that fish must grow to a certain size before they will be caught by recreational anglers and to account for the one-year lag between the date when installation costs are incurred and technology implementation.

The greatest recreational fishing benefits from reducing impingement and entrainment losses occur in the Mid-Atlantic, South Atlantic, and Great Lakes regions. For more detailed information on the models and results for each region, see Chapter 4 in Parts B through H of the 316(b) Regional Analysis document.

EXHIBIT XII–3.—POST REGULATION RECREATIONAL FISHING BENEFITS FROM REDUCING IMPINGEMENT AND ENTRAINMENT LOSSES

Region	Baseline recreational fishery losses (number of fish)	Reduction in recreational fishery losses (number of fish)	Benefits of final rule (million 2002$)		
			0% Discount rate	3% Discount rate	7% Discount rate
California	5,787,661	1,735,668	$3.01	$2.45	$1.91
North Atlantic	916,396	267,536	1.59	1.38	1.17
Mid Atlantic	20,468,540	9,990,333	47.69	43.37	38.48
South Atlantic	4,314,983	985,769	7.49	6.85	6.17
Gulf of Mexico	3,854,850	1,201,806	6.79	6.18	5.53
Great Lakes	4,743,384	2,283,896	15.51	13.95	12.21
Inland	3,188,097	930,610	3.34	2.98	2.58
Total for 554 facilities [a]	44,513,814	17,908,496	87.83	79.34	69.96

[a] National totals are sample-weighted and include Hawaii. Hawaii benefits are calculated based on average loss per MGD in North Atlantic, Mid Atlantic, Gulf of Mexico, California and the total intake flow in Hawaii.

The total for all regions, discounted at three percent, is $79.3 million; and the total for all regions, discounted at seven percent, is $70.0 million.

e. Limitations and uncertainties. Because of the uncertainties and assumptions of EPA's analysis, the estimates of benefits presented in this section may understate the benefits to recreational anglers. In estimating the benefits of improved recreational angling for the California and Great Lakes regions, the Agency assigned a monetary benefit only to the increases in consumer surplus for the baseline number of fishing days. This approach omits the portion of recreational fishing benefits that arise when improved conditions lead to higher levels of participation. However, EPA's analysis of changes in recreational fishing participation due to the section 316(b) regulation for other coastal regions shows that the practical effect of this omission is likely to be very small with respect to the total recreational benefits assessment.

4. Commercial Fishing Valuation

Reductions in impingement and entrainment at cooling water intake structures are expected to benefit the commercial fishing industry. The effect is straightforward: reducing the number of fish killed will increase the number of fish available for harvest. Measuring the benefits of this effect is less straightforward. 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 for each region.

a. Methods. EPA estimated commercial benefits by first estimating the value of total losses under current impingement and entrainment conditions (or the total benefits of eliminating all impingement and entrainment). Then, based on review of the empirical literature, EPA assumed that producer surplus is equal to 0% to 40% of baseline losses. Finally, EPA estimated benefits by applying the estimated percentage reduction in impingement and entrainment to the estimated producer surplus to obtain the estimated increase in producer surplus attributable to the rule. This methodology was applied in each region in the final analysis: the North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, California, Great Lakes, and Inland. Additional detail on the methods EPA used for this analysis can be found in Chapter A10 ''Methods For Estimating Commercial Fishing Benefits'' in the Regional Analysis Document.

The process used to estimate regional losses and benefits to commercial fisheries is as follows:

1. Estimate losses to commercial harvest (in pounds of fish) attributable to impingement and entrainment under current conditions. The basic approach is to apply a linear stock-to-harvest assumption, such that if 10% of the current commercially targeted stock were harvested, then 10% of the commercially targeted fish lost to impingement and entrainment would also have been harvested absent impingement and entrainment. The percentage of fish harvested is based on data on historical fishing mortality rates.

2. Estimate gross revenue of lost commercial catch. The approach EPA

uses to estimate the value of the commercial catch lost due to impingement and entrainment relies on landings and dockside price ($/lb) as reported by NOAA Fisheries for the period 1991–2001. These data are used to estimate the revenue of the lost commercial harvest under current conditions (*i.e.*, the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated).

3. Estimate lost economic surplus. The conceptually suitable measure of benefits is the sum of any changes in producer and consumer surplus. The methods used for estimating the change in surplus depend on whether the physical impact on the commercial fishery market appears sufficiently small such that it is reasonable to assume there will be no appreciable price changes in the markets for the impacted fisheries.

For the regions and magnitude of losses included in this analysis, it is reasonable to assume no change in price, which implies that the welfare change is limited to changes in producer surplus. The change in producer surplus is assumed to be equivalent to a portion of the change in gross revenues, as developed under step 2. EPA assumes a range of 0% to 40% of the gross revenue losses estimated in step 2 as a means of estimating the change in producer surplus. This is based on a review of empirical literature (restricted to only those studies that compared producer surplus to gross revenue) and is consistent with recommendations made in comments on the EPA analysis at proposal.

4. Estimate increase in surplus attributable to the Phase II regulations. Once the commercial surplus losses associated with impingement and entrainment under baseline conditions have been estimated according to the approaches outlined in steps 2 and 3, EPA estimates the percentage reduction in impingement and entrainment at a regional level.

b. Results. Exhibit XII–4 presents the estimated commercial fishing benefits attributable to today's rule for each region. The results reported include the total reduction in losses in pounds of fish, and the value of this reduction discounted at 0%, 3%, and 7%. Total commercial fishing benefits for the U.S., applying a 3% discount rate, are estimated to range from $0 to $3.5 million. Applying a 7% rate they range from $0 to $3.5 million.

EXHIBIT XII–4.—ANNUAL COMMERCIAL FISHING BENEFITS [a]

Region [c]	Current (baseline) lost yield (million lbs)	Reduction in lost yield (million lbs)	Benefits (millions of 2002$) [b]		
			0% discount rate	3% discount rate	7% discount rate
California	11.5	2.4	0.7	0.5	0.4
North Atlantic	0.6	0.2	0.1	0.1	0.0
Mid Atlantic	48.7	25.3	1.8	1.7	1.5
South Atlantic	9.6	3.5	0.2	0.2	0.2
Gulf of Mexico	7.6	3.6	0.8	0.7	0.6
Great Lakes	1.6	0.8	0.2	0.2	0.2
Inland U.S.	n/a	n/a	n/a	n/a	n/a
Total for 554 facilities	82.8	37.0	4.1	3.5	3.0

[a] Benefits are upper bound benefits based on 40% of gross revenue. The lower bound is $0.
[b] Discounted to account for lag in implementation and lag in time required for fish lost to I&E to reach a harvestable age. Assumed it will take one year from the date when installation costs are incurred to the date of installation. Thus, all benefits are discounted by one year from the date when installation costs are incurred.
[c] Regional totals are unweighted. National total estimates are weighted and include Hawaii.

c. Limitations and uncertainties. Some of the major uncertainties and assumptions of EPA's commercial fishing analysis include:

- Projected changes in harvest may be under-estimated because the cumulative impacts of impingement and entrainment over time are not considered.
- The analysis only includes individuals that are directly killed by impingement and entrainment, not their progeny, though given the complexities of population dynamics, the significance of this omission is not clear.
- Projected changes in harvest may be too high or too low because interactions with other stressors are not considered.
- EPA used impingement and entrainment data provided by the facilities. While EPA used the most current data available, in some cases these data are 20 years old or older. Thus, they may not reflect current conditions.
- EPA assumes a linear stock-to-harvest relationship (*i.e.*, a 13% change in stock would have a 13% change in landings); this may be low or high, depending on the condition of the stocks. Region-specific fisheries regulations also will affect the validity of the linear assumption.
- EPA assumes that NOAA Fisheries landings data are accurate and complete. However, in some cases prices and/or quantities may be reported incorrectly.
- EPA currently estimates that the increase in producer surplus as a result of the rule will be between 0% and 40% of the estimated change in gross revenues. The research used to develop this range is not region-specific; thus the true value may be higher for some regions and species.

5. Non-Use Benefits

As discussed by Freeman (1993), ''Non-use values, like use values, have their basis in the theory of individual preferences and the measurement of welfare changes. According to theory, use values and non-use values are additive,'' and ''* * * there is a real possibility that ignoring non-use values could result in serious misallocation of resources.'' This statement by Freeman aptly conveys the importance of non-use benefits outlined in EPA's own economic valuation guidance documents. A comprehensive estimate of total resource value should include both use and non-use values, so that the resulting appropriate total benefit value estimates may be compared to total social cost.

It is clear that reducing impingement and entrainment losses of fish and shellfish may result in both use and non-use benefits. Of the organisms which are anticipated to be protected by the section 316(b) Phase II rule, it is projected that approximately 1.8 percent will eventually be harvested by commercial and recreational fishers and

therefore can be valued with direct use valuation techniques. The Agency's direct use valuation does not account for the benefits from the remaining 98.2% of the age 1 equivalent aquatic organisms estimated to be protected nationally under today's rule. A portion of the total benefits of these unharvested commercial, recreational, and forage species, can be derived indirectly from the estimated use values of the harvested animals. A percentage of these unlanded organisms become prey or serve as breeding stock in the production of those commercial and recreational species that will eventually be caught, therefore their indirect use value as biological input into the production process is represented in the estimated direct use values of the harvested fish.

EPA was unable to value the non-use benefits associated with this rule. In order to provide an estimate of the quantified (but not monetized) effects of the rule, Exhibit XII–5 summarizes information about total impingement and entrainment losses, and Exhibit XII–6 presents estimates of reductions in impingement and entrainment losses under the final rule.

EXHIBIT XII–5.—DISTRIBUTION OF BASELINE IMPINGEMENT AND ENTRAINMENT

Region[a]	Current I&E of annual age-one equivalents (millions)				I&E of harvested species as a percentage of total I&E
	All species (total)	Forage species	Commercial and recreational species	Harvested commercial and recreational species	
California	312.9	170.6	142.3	14.9	4.8
North Atlantic	65.7	49.7	16.0	0.7	1.0
Mid Atlantic	1,733.1	1,115.6	617.6	28.4	1.6
South Atlantic	342.5	208.1	134.5	6.5	1.9
Gulf of Mexico	191.2	53.5	137.8	8.1	4.2
Great Lakes	319.1	300.8	18.3	0.5	0.2
Inland	369.0	284.8	84.2	0.2	0.1
Total for 554 facilities[a]	3,449.4	2,255.8	1,193.6	62.1	1.8

[a] Regional totals are unweighted. National total estimates are weighted and include Hawaii.

EXHIBIT XII–6.—DISTRIBUTION OF REDUCTIONS IN IMPINGEMENT AND ENTRAINMENT

Region[a]	Reductions in I&E of annual age-one equivalents (millions)				Reduction in I&E of harvested species as a percentage of total reduction in I&E
	All species (total)	Forage species	Commercial and recreational species	Harvested commercial and recreational species	
California	66.4	36.0	30.4	3.2	4.8
North Atlantic	19.3	14.6	4.7	0.2	1.0
Mid Atlantic	846.4	537.5	308.8	13.9	1.6
South Atlantic	76.7	38.5	38.2	1.6	2.0
Gulf of Mexico	89.5	20.5	69.0	3.6	4.0
Great Lakes	159.5	151.7	7.8	0.2	0.1
Inland	116.8	101.2	15.7	0.1	0.1
Total for 554 facilities	1,420.2	928.9	491.3	23.7	1.7

[a] Regional numbers are unweighted. National totals are sample-weighted and include Hawaii.

Lack of direct use values for the unharvested commercial, recreational and forage species means that EPA did not directly value a substantial percentage of the total age-one equivalent impingement and entrainment losses. Given that aquatic organisms without any direct uses account for the majority of cooling water intake structure losses and indirect valuation of these species may only represent a fraction of their total value, comprehensive monetization of the benefits of reduced impingement and entrainment losses is incomplete without developing a reliable estimate of non-use benefits. Although individuals do not use these resources directly, they may value changes in their status or quality. Both users (commercial and recreational fishermen) as well as non-users (those who do not use the resource) may have non-use values for these species. Non-use benefit valuation is challenging, but the existence and potential importance of non-use benefits is supported by EPA's Guidelines for Preparing Economic Analysis (EPA 240–R–00–003) and OMB Circular A–4, Regulatory Analysis, also available as Appendix D of Informing Regulatory Decisions: 2003 Report to Congress on The Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local and Tribal Entities, OMB, 2003, pp 118–165.

Market valuation approaches are used to estimate use benefits. The theory and practice of nonmarket valuation is well developed, and typically plays a pivotal role in benefit-cost analysis conducted by public and private agencies. Non-use values are often considered more difficult to estimate. The preferred technique for estimating non-use values is to conduct original stated preference surveys, but benefit transfer of values from existing stated preference studies can be considered when original studies are not feasible.

Stated preference methods rely on surveys, which ask people to state their willingness-to-pay for particular ecological improvements, such as increased protection of aquatic species or habitats with particular attributes. The Agency was not able to perform an original stated preference study for this regulation, so benefit transfer was explored as an alternative means to estimate non-use benefits. Benefits transfer involves adapting the findings from research conducted for another

purpose to address the policy questions in hand.

One of the specific benefit transfer techniques explored by EPA for estimation of non-use benefits in Phase II of the 316(b) rulemaking was meta regression analysis. Meta regressions are designed to statistically define the relationship between values and a set of resource, demographic and other characteristics compiled from original primary study sources. The resulting mathematical relationship allows the researcher to forecast estimates of non-use values specific to the resource changes projected to occur as a consequence of the final rule. EPA's Guidelines for Preparing Economic Analysis (EPA 240–R–00–003) discusses the use of meta-analysis and notes that this approach is the most rigorous benefit transfer exercise.

The meta analysis conducted by EPA for this rule identifies a set of elements that may influence willingness-to-pay; the analysis found both statistically significant and intuitive patterns that appeared to influence non-use values for water quality improvements in aquatic habitats. However, the Agency encountered various limitations when trying to apply the meta analysis model to this final rule, and these limitations could not be thoroughly analyzed within the publication time-frame established for this rule. EPA therefore does not present estimates of non-use values for this final rule.

Due to the various difficulties associated with estimating indirect and non-use benefits for this rule, final benefits do not reflect reduced impacts to a variety of potential ecological and public services that are a function, in part, of healthy fish stocks and other organisms affected by cooling water intake structures. Examples of other potential ecosystem services that may potentially be adversely affected by impingement and entrainment losses but which could not be monetized include:

- Decreased numbers of ecological keystone, rare, or sensitive species;
- Increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
- Disruption of ecological niches and ecological strategies used by aquatic species;
- Disruption of organic carbon, nutrient, and energy transfer through the food web;
- Decreased local biodiversity;
- Disruption of predator-prey relationships;
- Disruption of age class structures of species; and
- Disruption of public satisfaction with a healthy ecosystem.

The existence and potential magnitude of each of these benefits categories is highly dependent on site-specific factors which could not be assessed.

Today's rule may help preserve threatened and endangered species, but primary research, using stated preference methods, and data collection regarding threatened and endangered species impacts, could not be conducted for the final rule at the national level. As a result, EPA explored other methods for valuing threatened and endangered species. Details about possible non-use benefits valuation approaches are presented in the 316(b) Regional Analysis document (DCN 6–0003).

6. National Monetized Benefits

Quantifying and monetizing reduction in impingement and entrainment losses due to today's final rule is extremely challenging, and the preceding sections discuss specific limitations and uncertainties associated with estimation of commercial and recreational benefits categories (presented in Exhibit XII–7), and non-use benefits. National benefit estimates are subject to uncertainties inherent in valuation approaches used for assessing the three benefits categories. The combined effect of these uncertainties is of unknown magnitude or direction (*i.e.*, the estimates may over or under state the anticipated national-level benefits); however, EPA has no data to indicate that the results for each benefit category are atypical or unreasonable.

Exhibit XII–7 presents EPA's estimates of the total monetized benefits from impingement and entrainment reduction of the final regulation. Although EPA believes non-use benefits exist, the Agency was not able to monetize them. The estimated impingement and entrainment reduction monetized benefits post regulation are $83 million (2002$) per year, discounted at three percent, and $73 million, discounted at seven percent.

EXHIBIT XII–7.—SUMMARY OF MONETIZED SOCIAL BENEFITS

[Millions; 2002$]

Region [a]	Commercial fishing benefits	Recreational fishing benefits	Total value of monetizable impingement and entrainment reductions [b]
Evaluated at a 3 percent discount rate			
California	$0.5	$2.5	$3.0
North Atlantic	0.1	1.4	1.5
Mid-Atlantic	1.7	43.4	45.1
South Atlantic	0.2	6.9	7.1
Gulf of Mexico	0.7	6.2	6.9
Great Lakes	0.2	14.0	14.2
Inland	.....	3.0	3.0
Total for 554 facilities	3.5	79.3	82.5
Evaluated at a 7 percent discount rate			
California	0.4	1.9	2.3
North Atlantic	0.0	1.2	1.2
Mid-Atlantic	1.5	38.5	40.0
South Atlantic	0.2	6.2	6.4
Gulf of Mexico	0.6	5.5	6.1
Great Lakes	0.2	12.2	12.4

EXHIBIT XII–7.—SUMMARY OF MONETIZED SOCIAL BENEFITS—Continued

[Millions; 2002$]

Region [a]	Commercial fishing benefits	Recreational fishing benefits	Total value of monetizable impingement and entrainment reductions [b]
Inland	.....	2.6	2.6
Total for 554 facilities	3.0	70.0	73.0

[a] Regional benefit estimates are unweighted. National benefits are sample-weighted and include Hawaii.
[b] The monetized benefits of the final rule may be significantly under-estimated due to the inability to monetize the non-use values.

E. Other Considerations

This section presents two additional analyses that consider the benefits and costs of the final rule: (1) An analysis of the costs per age-one equivalent fish saved (equivalent to a cost-effectiveness analysis) and (2) a break-even analysis of the minimum non-use benefits required for total annual benefits to equal total annualized costs, on a per household basis. Each measure is presented by study region.

1. Cost Per Age-One Equivalent Fish Saved—Cost-Effectiveness Analysis

EPA also analyzed the cost per organism saved as a result of compliance with the final rule. This analysis estimates the cost-effectiveness of the rule, by study region. Organisms saved are measured as ''age-one equivalents.'' The costs used for the regional comparisons are the annualized pre-tax compliance costs incurred by facilities subject to the final rule, and the cost used for the national comparison is the total social cost of the final rule (including facility compliance costs and administrative costs).

Exhibit XII–8 shows that the estimated cost per age-one equivalent ranges from $0.07 in the Mid Atlantic region to $1.46 in the Inland region. At the national level, the estimated average cost is $0.27 per age-one equivalent saved.

EXHIBIT XII–8.—COST PER AGE-ONE EQUIVALENT SAVED

Study region [a]	Annual social cost [b] (millions; 2002$)	Age-one equivalents (millions)	Cost/age-one equivalent saved
California	$31.7	66.4	$0.48
North Atlantic	13.3	19.3	0.69
Mid Atlantic	62.6	846.4	0.07
South Atlantic	9.0	76.7	0.12
Gulf of Mexico	22.8	89.5	0.25
Great Lakes	58.7	159.5	0.37
Inland	170.4	116.8	1.46
Total for 554 facilities	389.4	1,420	0.27

[a] Regional benefit and cost estimates are unweighted; total national estimates are sample-weighted and include Hawaii.
[b] The regional costs include only annual compliance costs incurred by facilities. The national cost includes the total social cost of the final rule (facility compliance costs and administrative costs).

2. Break-Even Analysis

Due to the uncertainties of providing estimates of the magnitude of non-use values associated with the final rule, this section provides an alternative approach of evaluating the potential relationship between benefits and costs. The approach used here applies a ''break-even'' analysis to identify what the unmonetized non-use values would have to be in order for the final rule to have benefits that are equal to costs.

The break-even approach uses EPA's estimated or monetized, commercial and recreational use benefits for the rule and subtracts them from the estimated annual compliance costs incurred by facilities subject to the final rule. The resulting ''net cost'' enables one to work backwards to estimate what the unmonetized non-use values would need to be (in terms of willingness-to-pay per household per year) in order for total annual benefits to equal annualized costs. Exhibit XII–9 provides this assessment for the seven study regions. The exhibit shows benefits values using a 3 percent social discount rate. Use of a 7% discount rate would produce somewhat higher breakeven numbers. Section XII.D.5 presents undiscounted benefits and benefits discounted using a 7 percent discount rate.

EXHIBIT XII–9.—IMPLICIT NON-USE VALUE—BREAK-EVEN ANALYSIS

[Million; 2002$]

Study region [a]	Use benefits [b]	Annual social cost [c]	Annual non-use benefits necessary to break even [d,g]	Number of households (millions) [e]	Annual break-even non-use WTP per household [f]
California	$3.0	$31.7	$28.7	8.1	$3.55
North Atlantic	1.4	13.3	11.9	3.9	3.02

EXHIBIT XII–9.—IMPLICIT NON-USE VALUE—BREAK-EVEN ANALYSIS—Continued

[Million; 2002$]

Study region [a]	Use benefits [b]	Annual social cost [c]	Annual non-use benefits necessary to break even [d,g]	Number of households (millions) [e]	Annual break-even non-use WTP per household [f]
Mid Atlantic	45.0	62.6	17.5	9.6	1.82
South Atlantic	7.1	9.0	1.9	3.8	0.50
Gulf of Mexico	6.9	22.8	15.9	5.4	2.92
Great Lakes	14.1	58.7	44.6	8.6	5.17
Inland	3.0	170.4	167.4	20.9	8.01
Total for 554 facilities	82.9	389.4	306.5	60.4	5.07

[a] Regional benefit and cost estimates are unweighted; total national estimates are sample-weighted and include Hawaii.
[b] Benefits are discounted using a 3 percent discount rate.
[c] The regional costs include only annual compliance costs incurred by facilities. The national cost includes the total social cost of the final rule (facility compliance costs and administrative costs).
[d] Annualized compliance costs minus annual use benefits.
[e] Millions of households, including anglers fishing in the region and households in abutting counties. From U.S. Census 2000 (BLS): *http://factfinder.census.gov.*
[f] Dollars per household per year that, when added to use benefits, would yield a total annual benefit (use plus non-use) equal to the annualized costs.
[g] Non-use benefits may also include unmonetized use benefits, *i.e.*, improvements in bird watching.

As shown in Exhibit XII–9, for total annual benefits to equal total annualized costs, non-use values per household would have to be $0.50 in the South Atlantic region and $8.01 in the Inland region. At the national level, the annual willingness-to-pay per affected household would have to be $5.07 for total annual benefits to equal total annualized costs.

While this approach of backing out the ''break-even'' non-use value per household does not answer the question of what non-use values might actually be for the final rule, these results do frame the question for policy-making decisions. The break-even approach poses the question: ''Is the true per household willingness-to-pay for the non-use amenities (existence and bequest) associated with the final rule likely to be greater or less than the ''breakeven'' benefit levels displayed in Exhibit XII–9?'' Unfortunately, the existing body of empirical research is inadequate to answer this question on behalf of the nation as a whole, but EPA is providing the analysis to aid policy makers and the public in forming their own judgment.

XIII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether a regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines a ''significant regulatory action'' as one that is likely to result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action.'' As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

B. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved the information collection requirements contained in this rule under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number 2060.02, or DCN 6–0001. Compliance with the applicable information collection requirements imposed under this final rule (*see* §§ 122.21(r), 125.95, 125.96, 125.97, 125.98, 125.99) is mandatory. Existing facilities are required to perform several data-gathering activities as part of the permit renewal application process. Today's final rule requires several distinct types of information collection as part of the NPDES renewal application. In general, the information will be used to identify which of the requirements in today's final rule apply to the existing facility, how the existing facility will meet those requirements, and whether the existing facility's cooling water intake structure reflects the best technology available for minimizing adverse environmental impact. Categories of data required by today's final rule follow.

- Source waterbody data for determining appropriate requirements to apply to the facility, evaluating ambient conditions, and characterizing potential for impingement and entrainment of all life stages of fish and shellfish by the cooling water intake structure;
- Intake structure and cooling water system data, consisting of intake structure design, cooling water system operational data and relationship of each intake to the cooling water system, and a facility water balance diagram, to determine appropriate requirements and characterize potential for impingement and entrainment of all life stages of fish and shellfish;
- Information on design and construction technologies implemented to ensure compliance with applicable requirements set forth in today's final rule; and
- Information on supplemental restoration measures proposed for use with design and construction technologies or alone to minimize adverse environmental impact.

In addition to the information requirements of the permit renewal application, NPDES permits normally

specify monitoring and reporting requirements to be met by the permitted entity. Existing facilities that fall within the scope of this final rule would be required to perform biological monitoring for at least two years, and as required by the Director, to demonstrate compliance. Additional ambient water quality monitoring may also be required of facilities depending on the specifications of their permits. The facility is expected to analyze the results from its monitoring efforts and provide these results in a bi-annual status report to the permitting authority. Finally, facilities are required to maintain records of all submitted documents, supporting materials, and monitoring results for at least three years. (Note that the Director may require more frequent reporting and that records be kept for a longer period to coincide with the life of the NPDES permit.)

All facilities carry out the activities necessary to fulfill the general information collection requirements. The estimated burden includes developing a water balance diagram that can be used to identify the proportion of intake water used for cooling, make-up, and process water. Facilities will also gather data (as required by the compliance alternative selected) to calculate the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved by the technologies and operational measures they select. The burden estimates include sampling, assessing the source waterbody, estimating the magnitude of impingement mortality and entrainment, and reporting results in a comprehensive demonstration study. For some facilities, the burden also includes conducting a pilot study to evaluate the suitability of the technologies and operational measures based on the species that are found at the site.

Some of the facilities (those choosing to use restoration measures to maintain fish and shellfish) will need to prepare a plan documenting the restoration measures they implement and how they demonstrate that the restoration measures are effective. Restoration is a voluntary alternative. Since facilities would most likely choose restoration only if other alternatives are more costly or infeasible, EPA has not assessed facility burden for this activity. However, burden estimates have been included for the Director's review of restoration activities.

Some facilities may choose to request a site-specific determination of best technology available because of costs significantly greater than those EPA considered in establishing the performance standards or because costs are significantly greater than the benefits of complying with the performance standards. These facilities must perform a comprehensive cost evaluation study and submit a site-specific technology plan characterizing the design and construction technologies, operational measures and/or restoration measures they have selected. In addition, facilities that request a site-specific determination because of costs significantly greater than the benefits must also perform a valuation of the monetized benefits of reducing impingement mortality and entrainment and an assessment of non-monetized benefits. Site-specific determinations are voluntary. Since facilities would choose site-specific determinations only if other alternatives are more costly, EPA has not assessed a facility burden for these activities; however, EPA has incorporated burden into the activities that the Director will perform in reviewing site-specific information.

The total average annual burden of the information collection requirements associated with today's final rule is estimated at 1,700,392 hours. The annual average reporting and record keeping burden for the collection of information by facilities responding to the section 316(b) Phase II existing facility final rule is estimated to be 5,428 hours per respondent (*i.e.,*, an annual average of 1,595,786 hours of burden divided among an anticipated annual average of 294 facilities). The Director reporting and record keeping burden for the review, oversight, and administration of the rule is estimated to average 2,615 hours per respondent (*i.e.*, an annual average of 104,606 hours of burden divided among an anticipated 40 States on average per year).

Respondent activities are separated into those activities associated with the NPDES permit application and those activities associated with monitoring and reporting after the permit is issued. The reason for this is that the permit cycle is every five years, while Information Collection Requests (ICRs) must be renewed every three years. Therefore, the application activities occur only once per facility during an ICR approval period, and so they are considered one-time burden for the purpose of this ICR. By contrast, the monitoring and reporting activities that occur after issuance of the permit occur on an annual basis. The burden and costs are for the information collection, reporting, and recordkeeping requirements for the three-year period beginning with the effective date of today's rule. Additional information collection requirements will occur after this initial three-year period as existing facilities continue to be issued permit renewals and such requirements will be counted in a subsequent information collection request. EPA does not consider the specific data that would be collected under this final rule to be confidential business information. However, if a respondent does consider this information to be confidential, the respondent may request that such information be treated as confidential. All confidential data will be handled in accordance with 40 CFR 122.7, 40 CFR Part 2, and EPA's Security Manual Part III, Chapter 9, dated August 9, 1976.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

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 are listed in 40 CFR Part 9. EPA is amending the table in 40 CFR Part 9 of currently approved OMB control numbers for various regulations to list the information requirements contained in this final rule.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 *et seq.*, 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. For the purposes of assessing the impacts of today's rule on

small entities, small entity is defined as: (1) A small business according to RFA default definitions for small business (based on Small Business Administration (SBA) size standards); (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; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This final rule applies to existing power producing facilities that employ a cooling water intake structure and are design to withdraw 50 million gallons per day (MGD) or more from waters of the United States for cooling purposes. EPA expects this final rule to regulate 25 small entities that own electric generators. We estimate that 17 of the small entities are governmental jurisdictions (*i.e.*, 16 municipalities and one political subdivision), two are private businesses (*i.e.,* one nonutility and one investor-owned entity), and six are not-for-profit enterprises (*i.e.,* rural electric cooperative).

Of the 25 small entities, one entity is estimated to incur annualized post-tax compliance costs of greater than three percent of revenues; eight are estimated to incur compliance costs of between one and three percent of revenues; and 16 small entities are estimated to incur compliance costs of less than one percent of revenues. Eleven small entities are estimated to incur no costs other than permitting and monitoring costs.

Although this final rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities. EPA has divided implementation of section 316(b) of the Clean Water Act (CWA) into three phases where the majority of small entities will be addressed in Phase III. Under the Phase III rule, EPA will convene a SBREFA panel that will evaluate impacts to small entities.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and Tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant intergovernmental mandates, and informing, educating, and advising small governments on compliance with regulatory requirements.

EPA estimates the total annualized (post-tax) costs of compliance for facilities subject to the final rule to be $249.5 million (2002$), of which $216.3 million is incurred by the private sector (including investor-owned utilities, nonutilities, and rural electric cooperatives) and $23.1 million is incurred by State and local governments that operate in-scope facilities.[59] Additionally, permitting authorities incur $4.1 million to administer the rule, including labor costs to write permits and to conduct compliance monitoring and enforcement activities. EPA estimates that the highest undiscounted post-tax cost incurred by the private sector in any one year is approximately $419.1 million in 2009. The highest undiscounted cost incurred by the government sector in any one year is approximately $43.5 million in 2008. Thus, EPA has determined that 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 a written statement under § 202 of the UMRA, which is summarized as follows. See Economic and Benefits Analysis, Chapter B5, UMRA Analysis, for detailed information.

1. Summary of Written Statement

a. Authorizing Legislation

This final 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. This rule partially fulfills the obligations of the U.S. Environmental Protection Agency (EPA) under a consent decree in *Riverkeeper, Inc. et al.* v. *Whitman,* United States District Court, Southern District of New York, No. 93 Civ. 0314. See section III of this preamble for detailed information on the legal authority of this regulation.

b. Cost-Benefit Analysis

The final rule is expected to have total annualized pre-tax (social) costs of $389.2 million (2002$), including direct costs incurred by facilities and implementation costs incurred by State and Federal governments. The total use benefits of the rule are estimated to be $82.9 million. EPA was not able to estimate the monetary value of non-use benefits resulting from the rule, although the Agency believes non-use benefits may be significant. Thus, the total social costs exceed the total use benefits of the rule by $306.3 million, and the benefit-cost ratio, calculated by dividing total use benefits by total social costs, is 0.2. EPA notes that these analyses are based on a comparison of a partial measure of benefits with a complete measure of costs; therefore, the results must be interpreted with caution. For a more detailed comparison of the costs and benefits of the final rule, refer to section XII.E of this preamble.

EPA notes that States may be able to use existing sources of financial assistance to revise and implement the final 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

[59] In addition, 14 facilities owned by Tennessee Valley Authority (TVA), a Federal entity, incur $10.1 million in compliance costs. The costs incurred by the Federal government are not included in this section.

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. Macro-Economic Effects

EPA estimates that this regulation will not have an effect on the national economy, including productivity, economic growth, employment and job creation, and international competitiveness of U.S. goods and services. Macroeconomic effects on the economy are generally not considered to be measurable unless the total economic impact of a rule reaches at least 0.25 percent to 0.5 percent of Gross Domestic Product (GDP). In 2002, U.S. GDP was $10.4 trillion (2002$), according to the U.S. Bureau of Labor Statistics. Thus, in order to be considered measurable, the final rule would have to generate costs of at least $26 billion to $52 billion. Since EPA estimates the final rule will generate total annual pre-tax costs of only $389.2 million, the Agency does not believe that the final rule will have an effect on the national economy.

d. Summary of State, Local, and Tribal Government Input

EPA consulted with State governments and representatives of local governments in developing the regulation. The outreach activities are discussed in section III of this preamble.

e. 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 the proposed rule at 67 FR 17154–17168, as well as in section VII of this preamble. These options included a range of technology-based approaches (*e.g.*, reducing intake flow to a level commensurate with the use of a closed-cycle cooling system for all facilities; facilities located on certain waterbody types; facilities located on certain waterbody types that withdraw a specified percentage of flow; and the use of impingement and entrainment controls at all facilities). EPA also included consideration of at least four distinct site-specific options, including several proposed by industry. As discussed in detail in section VII., EPA did not select these options because ultimately they are not the most cost-effective among the options that fulfill the requirements of section 316(b). EPA selected the final rule because it meets the requirement of section 316(b) of the CWA that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact, and it is economically practicable. EPA believes the final rule reflects the most cost-effective and flexible approach among the options considered. By providing five compliance alternatives the final rule offers Phase II existing facilities a high degree of flexibility in selecting the most cost-effective approach to meeting section 316(b) requirements. Under the rule, these facilities can demonstrate that existing flow or CWIS technologies fulfill section 316(b), identify design and control technologies, and/or use operational measures or restoration measures to fulfill the rule requirements. The final rule also ensures that any applicable requirements are economically practicable through the inclusion of the site-specific compliance alternative at § 125.94(a)(5). EPA further notes that the compliance alternative specified in § 125.94(a)(4) and 125.99(a) and (b) was included in part to provide additional flexibility to Phase II existing facilities as well as to reduce the burden of determining, implementing, and administering section 316(b) requirements among all relevant parties. Finally, the Agency believes that the rule extends additional flexibility to States by providing that where a State has adopted alternative regulatory requirements that achieve environmental performance comparable to that required under the rule, the Administrator will approve such alternative requirements.

2. Impact on Small Governments

EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. EPA estimates that 17 of the 62 government-owned facilities subject to the final rule are owned by small governments (*i.e.*, governments with a population of less than 50,000). The total annualized post-tax compliance cost for all small government-owned facilities incurring costs under the final rule is $5.4 million, or approximately $316,000 per facility. The highest annualized compliance costs for a small government-owned facility is $1.3 million. These costs are lower than the corresponding costs for large governments and private entities. EPA therefore concludes that these costs do not significantly or uniquely affect small governments, and that today's rule is not subject to the requirement of section 203 of UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that 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.''

This final 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. Rather, this rule would result in minimal administrative costs on States that have an authorized NPDES program; would result in minimal costs to States and local government entities that own facilities subject to the regulation; it maintains the existing relationship between the national government and the States in the administration of the NPDES program; and it preserves the existing distribution of power and responsibilities among various levels of government. Thus, Executive Order 13132 does not apply to this rule.

The national cooling water intake structure requirements will be implemented through permits issued under the NPDES program. Forty-five States and the Virgin Islands are currently authorized pursuant to section 402(b) of the CWA to implement the NPDES program. In States not authorized to implement the NPDES program, EPA issues NPDES permits. Under the CWA, States are not required to become authorized to administer the NPDES program. Rather, such authorization (and potential funding to support administration) is available to States if they operate their programs in a manner consistent with section 402(b) and applicable regulations. Generally, these provisions require that State NPDES programs include requirements that are as stringent as Federal program requirements. States retain the ability to implement requirements that are broader in scope or more stringent than Federal requirements. (*See* section 510 of the CWA). EPA expects an average annual burden of 104,606 hours with total average annual cost of $4.8 million

for States to collectively administer this rule during the first three years after promulgation.

EPA has identified 62 Phase II existing facilities that are owned by State or local government entities. The estimated average annual compliance cost incurred by these facilities is $372,000 per facility.

Today's rule would not have substantial direct effects on either authorized or nonauthorized States or on local governments because it would not change how EPA and the States and local governments interact or their respective authority or responsibilities for implementing the NPDES program. Today's rule establishes national requirements for Phase II existing facilities with cooling water intake structures. NPDES-authorized States that currently do not comply with the final regulations based on today's rule will need to amend their regulations or statutes to ensure that their NPDES programs are consistent with Federal section 316(b) requirements. *See* 40 CFR 123.62(e).

For purposes of this rule, the relationship and distribution of power and responsibilities between the Federal government and the States and local governments are established under the CWA (*e.g.*, sections 402(b) and 510), and nothing in this rule alters this established relationship and distribution of power and responsibilities. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

Although Executive Order 13132 does not apply to this rule, EPA did consult with representatives of State and local governments in developing this rule. EPA also met with the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and, with the assistance of ASIWPCA, conducted a conference call in which representatives from 17 States or interstate organizations participated. A summary of consultation activities is provided in section III of this preamble. In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA also specifically solicited comments on the proposed rule from State and local officials. A summary of the concerns raised during that consultation and subsequent public comment periods and EPA's response to those concerns is provided in section VIII of this preamble and in the response to comment document in the record.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' ''Policies that have tribal implications'' are defined in the Executive Order to include regulations that have ''substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or the distribution of power and responsibilities between Federal government and Indian tribes.''

This rule does not have Tribal implications. It will 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 will 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 this 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 rule.

Nevertheless, in the spirit of Executive Order 13175 and consistent with EPA policy to promote communications between EPA and Tribal governments, EPA solicited comment on the proposed rule from all stakeholders. EPA did not receive any comments from Tribal governments.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

Executive Order 13405 does not apply to this rule because the rule does not concern an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. 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

This rule is not a ''significant energy action'' as defined in Executive Order 13211, (''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The final rule does not contain any compliance requirements that will:

- Reduce crude oil supply in excess of 10,000 barrels per day;
- Reduce fuel production in excess of 4,000 barrels per day;
- Reduce coal production in excess of 5 million tons per day;
- Reduce electricity production in excess of 1 billion kilowatt hours per day or in excess of 500 megawatts of installed capacity;
- Increase energy prices in excess of 10 percent;
- Increase the cost of energy distribution in excess of 10 percent;
- Significantly increase dependence on foreign supplies of energy; or
- Have other similar adverse outcomes, particularly unintended ones.

EPA analyzed the final rule for each of these potential effects and found that this rule will not lead to any adverse outcomes. Based on the analyses, EPA concludes that this final rule will have minimal energy effects at a national and regional level. As a result, EPA did not prepare a Statement of Energy Effects. For more detail on the potential energy effects of this rule, see section XI.B.1 of this preamble or the *Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule.*

I. National Technology Transfer and Advancement Act

As noted in the proposed rule, section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Pub. L. No. 104–113, section 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 standard bodies. The NTTAA directs EPA to provide Congress, through the Office of Management and Budget (OMB), explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 requires that, to the greatest extent practicable and permitted by law, each Federal agency must make achieving environmental justice part of its mission. E.O. 12898 states that each Federal agency must conduct its programs, policies, and activities that substantially affect human health or the environment in a manner that ensures such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin.

Today's final rule would require that the location, design, construction, and capacity of cooling water intake structures (CWIS) at Phase II existing facilities reflect the best technology available for minimizing adverse environmental impact. For several reasons, EPA does not expect that this final rule would have an exclusionary effect, deny persons the benefits of participating in a program, or subject persons to discrimination because of their race, color, or national origin.

To assess the impact of the rule on low-income and minority populations, EPA calculated the poverty rate and the percentage of the population classified as non-white for populations living within a 50-mile radius of each of the 543 in-scope facilities for which survey data are available. The results of the analysis, presented in the Economic Benefits Analysis, show that the populations affected by the in-scope facilities have poverty levels and racial compositions that are quite similar to the U.S. population as a whole. A relatively small subset of the facilities are located near populations with poverty rates (23 of 543, or 4.2%), or non-white populations (105 of 543, or 19.3%), or both (13 of 543, or 2.4%) that are significantly higher than national levels. Based on these results, EPA does not believe that this rule will have an exclusionary effect, deny persons the benefits of the NPDES program, or subject persons to discrimination because of their race, color, or national origin.

In fact, because EPA expects that this final rule would help to preserve the health of aquatic ecosystems located in reasonable proximity to Phase II existing facilities, it believes that all populations, including minority and low-income populations, would benefit from improved environmental conditions as a result of this rule. Under current conditions, EPA estimates over 1.5 billion fish (expressed as age 1 equivalents) of recreational and commercial species are lost annually due to impingement and entrainment at the inscope Phase II existing facilities. Under the final rule, more than 0.5 billion individuals of these commercially and recreationally sought fish species (age 1 equivalents) will now survive to join the fishery each year. These additional fish will provide increased opportunities for subsistence anglers to increase their catch, thereby providing some benefit to low income households located near regulation-impacted waters.

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 final 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 the most stringent requirements to minimize adverse environmental impact for cooling water intake structures located on these types of waterbodies, including potential reduction of intake flows to a level commensurate with that which can be attained by a closed-cycle recirculating cooling system for facilities that withdraw certain proportions of water from estuaries, tidal rivers, and oceans.

EPA expects that this rule will reduce impingement mortality and entrainment at facilities with design intake flows of 50 MGD or more. The rule would afford protection of aquatic organisms at individual, population, community, or ecosystem levels of ecological structure. Therefore, EPA expects today's rule would advance the objective of the Executive Order to protect marine areas.

L. Congressional Review Act

The Congressional Review Act, 5. U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule can not take effect until 60 days after it is published in the **Federal Register**. This action is a ''major rule'' as defined by 5 U.S.C. 804(2). This will be effective September 7, 2004.

Dated: February 16, 2004.

Michael O. Leavitt,

Administrator.

Note: The following appendices A and B will not appear in the Code of Federal Regulations.

Appendix A

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0001		401,881	322,884	699,866	795,393	141,498				I&E	2	0.8639
AUT0002		549,533	5,750,259	68,489	104,063	854,282	6,650,155	290,459	559,082	I&E	12	3.6581
AUT0004		239,107	528,427	30,725	104,458	148,969				I	1	1.1604
AUT0011		453,758	967,675	55,545	193,660	275,890				I	1	1.1604
AUT0012		2,018,917	48,835,329	360,813	989,876	7,582,115	110,716,357	4,933,578	9,315,779	I&E	12	3.6581
AUT0014		572,383	2,732,729	91,057	110,893	408,915		276,073	22,022	I&E	11	0.7352
AUT0015		1,296,872	510,784		134,070	206,794				I	5	0.1286
AUT0016		301,127	41,613		28,195	34,120				I	5	0.1286
AUT0019		848,784	11,094,343	271,045	994,876	2,303,416				I	1	1.1604
AUT0020		207,514	1,517,779	34,859	42,089	223,327		153,333	12,231	I&E	11	0.7352
AUT0021		267,138	1,187,727	65,395	263,140	366,851		150,000	11,965	I&E	2	0.8639
AUT0024		639,702	72,402		47,164	57,472				I	5	0.1286
AUT0027		404,214	2,362,864	147,563	532,881	721,737				I	1	1.1604
AUT0044		457,869	183,653		57,997	84,145				I	5	0.1286
AUT0049		820,866	6,080,054	196,361	797,241	1,466,543		204,745	16,332	I&E	2	0.8639
AUT0051		348,052	11,832,011	17,181	50,842	1,718,273				I	4	2.5787
AUT0053		147,762	454,296	27,346	108,078	145,413				I&E	2	0.8639
AUT0057		56,391	271,166	19,811	65,525	84,322				I	1	1.1604
AUT0058		624,376	8,582,766	68,231	225,908	1,379,670	7,092,806	867,072	640,749	I&E	12	3.6581
AUT0064		553,145	3,039,302	195,656	695,636	932,709				I	1	1.1604
AUT0066		65,571	2,006,184	80,531	63,685	268,790	23,985,660	150,000	1,944,883	I&E	4	2.5787
AUT0078		288,792	5,683,876	267,577	1,083,987	1,625,667		574,212	45,804	I&E	2	0.8639
AUT0084		2,100,000	2,976,122	3,003,550	3,318,577	738,760		150,331	11,992	I&E	2	0.8639
AUT0085		975,261	23,279,870	341,127	452,608	3,426,011	52,842,026	2,351,844	4,445,953	I&E	4	2.5787
AUT0092		2,786,349	929,777		269,122	401,501				I	5	0.1286
AUT0095		67,369	55,826	120,772	140,422	27,598				I&E	2	0.8639
AUT0106		325,449	1,104,684	55,757	223,858	325,383		150,000	11,965	I&E	2	0.8639
AUT0110		551,114	6,445,617	70,141	104,066	951,636	5,297,741	651,167	478,869	I&E	12	3.6581
AUT0120		207,333	2,085,862	55,736	225,656	466,900		210,724	16,809	I&E	2	0.8639
AUT0123		62,226	106,975	7,021	20,122	28,333				I	1	1.1604
AUT0127		104,672	573,136	34,651	118,506	165,457				I	1	1.1604
AUT0130		929,723	8,127,384	402,025	1,628,672	2,383,804		821,067	65,496	I&E	2	0.8639
AUT0131		492,987	3,299,931	195,321	694,407	968,921				I	1	1.1604
AUT0134		99,252	3,334,593	8,170	35,218	501,819	238,035		19,182	I	3	3.4562
AUT0137		401,222	1,916,441	117,385	475,099	630,572		193,608	15,444	I&E	2	0.8639
AUT0139		369,074	117,095		49,945	66,617				I	5	0.1286
AUT0142		407,669	9,461,494	66,798	78,036	1,358,342	3,421,735	955,845	351,992	I&E	14	6.9559
AUT0143		289,294	971,645	50,004	200,412	288,748		150,000	11,965	I&E	2	0.8639
AUT0146		213,207	1,618,126	88,506	313,588	455,467				I	1	1.1604
AUT0148		1,036,476	12,443,192		288,984	2,060,615				I&E	9	5.973
AUT0149		848,079	109,389		58,838	74,413				I	5	0.1286
AUT0151		482,911	1,465,485	95,774	340,264	453,142				I	1	1.1604
AUT0161		555,680	1,600,167	101,254	360,434	487,008				I	1	1.1604
AUT0168		329,758	5,156,763	39,196	51,388	746,399	492,266	260,480	60,448	I&E	12	3.6581
AUT0171		1,189,016	14,989,478	120,512	398,517	2,412,170	15,890,363		1,280,547	I&E	7	2.504
AUT0174		1,341,997	934,469	1,387,449	1,537,156	282,755		150,000	11,965	I&E	2	0.8639
AUT0175		258,008	2,505,868	134,658	484,461	706,582				I	1	1.1604
AUT0176		1,652,395	6,892,691	425,370	1,533,553	2,089,548				I	1	1.1604
AUT0183		118,504	196,689	7,303	21,121	41,823				I	1	1.1604
AUT0185		810,911	97,503		56,756	70,638				I	5	0.1286
AUT0187		1,242,691	257,332		107,659	144,297				I	5	0.1286
AUT0190		511,950	27,779,896	616,589	191,870	3,530,513				I&E	9	5.973
AUT0191		692,335	19,255,865	184,161	66,491	2,623,932				I&E	9	5.973

AUT0192	....	359,686	959,625	71,963	253,183	317,849	.....	.....	.....	I	1	1.1604
AUT0193	....	1,006,084	19,112,665	90,728	323,635	2,954,121	3,278,888	.....	264,234	I	3	3.4562
AUT0196	....	230,120	374,975	.....	10,672	64,060	.....	.....	.....	I	8	0.3315
AUT0197	....	407,061	4,773,876	248,548	891,410	1,322,554	.....	.....	.....	I	1	1.1604
AUT0202	....	2,080,399	106,025,028	477,625	769,048	15,387,001	.....	.....	.....	I&E	9	5.973
AUT0203	....	1,083,174	4,847,332	232,706	851,244	1,308,689	.....	.....	.....	I	1	1.1604
AUT0205	....	313,218	720,557	37,147	127,449	192,893	.....	.....	.....	I&E	1	1.1604
AUT0208	....	220,683	3,140,556	27,181	51,205	471,169	3,544,915	.....	285,672	I&E	4	2.5787
AUT0222	....	156,464	299,274	.....	9,554	52,164	.....	.....	.....	I	8	0.3315
AUT0227	....	82,468	523,999	30,107	102,249	146,748	.....	.....	.....	I	1	1.1604
AUT0228	....	147,594	837,743	41,023	163,811	242,064	.....	.....	.....	I&E	2	0.8639
AUT0229	....	483,349	1,784,794	87,496	391,634	558,253	.....	.....	.....	I&E	2	0.8639
AUT0238	....	376,148	757,400	51,856	180,342	236,323	.....	.....	.....	I	1	1.1604
AUT0242	....	1,113,045	8,239,161	291,327	1,039,947	1,921,691	.....	.....	.....	I	1	1.1604
AUT0244	....	49,980	426,844	22,868	76,413	114,318	.....	.....	.....	I	1	1.1604
AUT0245	....	491,302	1,459,999	50,879	61,192	218,185	.....	150,000	11,965	I&E	11	0.7352
AUT0254	....	145,838	353,928	22,339	74,527	102,580	.....	.....	.....	I	1	1.1604
AUT0255	....	194,919	258,805	.....	10,232	47,080	.....	.....	.....	I	8	0.3315
AUT0261	....	201,229	943,433	57,335	230,290	307,278	.....	150,000	11,965	I&E	2	0.8639
AUT0264	....	840,000	21,384,690	1,502,211	185,672	1,728,160	43,525,468	2,160,384	3,679,892	I&E	12	3.6581
AUT0266	....	653,994	139,380	307,951	351,075	62,969	.....	.....	.....	I&E	2	0.8639
AUT0268	....	712,677	2,998,753	114,173	417,470	730,253	.....	.....	.....	I	1	1.1604
AUT0273	....	173,689	994,534	52,039	208,703	298,263	.....	150,000	11,965	I&E	2	0.8639
AUT0277	....	88,831	1,192,106	45,779	51,021	174,971	186,802	.....	15,054	I&E	4	2.5787
AUT0278	....	1,642,492	6,410,550	771,895	257,586	398,409	.....	647,624	51,660	I&E	11	0.7352
AUT0284	....	728,495	3,743,165	208,370	742,487	1,067,059	.....	.....	.....	I	1	1.1604
AUT0292	....	556,596	2,227,636	99,379	350,087	567,874	.....	.....	.....	I	1	1.1604
AUT0295	....	359,098	3,584,905	53,365	114,232	571,276	5,005,800	.....	403,399	I&E	4	2.5787
AUT0297	....	184,293	1,172,223	63,592	255,790	359,096	.....	150,000	11,965	I&E	2	0.8639
AUT0298	....	897,819	100,769	.....	61,625	75,972	.....	.....	.....	I	5	0.1286
AUT0299	....	864,873	9,012,107	150,709	127,282	1,259,694	15,622,548	227,612	1,277,121	I&E	12	3.6581
AUT0302	....	71,413	91,562	6,933	19,813	25,916	.....	.....	.....	I	1	1.1604
AUT0305	....	762,197	42,822,242	146,012	281,593	6,232,505	49,751,104	4,326,108	4,354,352	I&E	14	6.9559
AUT0308	....	394,361	3,381,768	151,364	77,961	408,085	3,407,223	.....	274,576	I&E	7	2.504
AUT0309	....	789,860	81,433	.....	55,577	67,171	.....	.....	.....	I	5	0.1286
AUT0314	....	1,039,315	2,438,597	134,759	484,839	697,281	.....	.....	.....	I	1	1.1604
AUT0319	....	468,117	1,326,662	88,025	355,386	456,248	.....	150,000	11,965	I&E	2	0.8639
AUT0321	....	669,493	2,092,630	88,910	107,698	316,732	.....	150,000	11,965	I&E	11	0.7352
AUT0331	....	178,562	24,860	.....	21,328	24,867	.....	.....	.....	I	5	0.1286
AUT0333	....	336,448	786,807	46,794	162,104	227,333	.....	.....	.....	I	1	1.1604
AUT0337	....	1,110,944	131,046	.....	73,566	92,224	.....	.....	.....	I	5	0.1286
AUT0341	....	405,256	2,429,275	115,249	412,169	642,794	.....	.....	.....	I	1	1.1604
AUT0345	....	610,223	5,103,322	267,506	952,013	1,411,106	.....	.....	.....	I	1	1.1604
AUT0349	....	2,429,925	8,146,829	424,696	1,514,477	2,249,706	.....	.....	.....	I	1	1.1604
AUT0351	....	301,024	6,389,631	42,269	99,196	966,667	700,911	.....	56,484	I&E	3	3.4562
AUT0358	....	210,439	2,170,195	117,833	421,759	612,913	.....	.....	.....	I	1	1.1604
AUT0361	....	433,165	7,652,621	59,105	140,320	1,170,775	893,934	.....	72,039	I&E	3	3.4562
AUT0362	....	312,830	1,566,464	51,821	185,883	357,091	.....	.....	.....	I	1	1.1604
AUT0364	....	505,137	5,447,440	170,196	611,090	1,216,487	.....	.....	.....	I	1	1.1604
AUT0365	....	140,093	445,526	29,331	116,166	150,268	.....	.....	.....	I&E	2	0.8639
AUT0368	....	83,406	2,715,938	146,752	529,832	769,768	.....	.....	.....	I	1	1.1604
AUT0370	....	322,374	1,816,861	79,915	289,868	468,633	.....	.....	.....	I	1	1.1604
AUT0379	....	351,933	41,890	.....	31,041	37,006	.....	.....	.....	I	5	0.1286
AUT0381	....	50,143	960,912	9,964	22,083	148,931	506,182	.....	40,791	I&E	4	2.5787
AUT0384	....	146,511	66,229	91,020	104,211	22,620	.....	.....	.....	I&E	2	0.8639
AUT0385	....	130,966	1,823,217	20,420	25,983	265,149	1,445,463	.....	116,485	I&E	4	2.5787
AUT0387	....	576,057	5,283,933	122,322	496,655	1,126,646	.....	533,808	42,581	I&E	2	0.8639
AUT0398	....	537,402	6,842,592	63,631	75,697	986,297	6,440,309	.....	519,001	I&E	4	2.5787
AUT0399	....	140,486	232,496	.....	9,212	42,314	.....	.....	.....	I	8	0.3315
AUT0401	....	613,529	578,957	.....	72,110	154,541	.....	.....	.....	I	5	0.1286
AUT0404	....	291,400	4,124,975	44,642	51,995	594,657	3,259,312	.....	262,656	I&E	4	2.5787
AUT0408	....	73,728	900,969	13,020	49,057	164,315	803,968	.....	64,789	I&E	4	2.5787
AUT0416	....	143,562	41,835	96,659	112,954	22,251	.....	.....	.....	I&E	2	0.8639
AUT0423	....	564,501	29,714,518	122,524	248,148	4,356,303	.....	.....	.....	I&E	9	5.973
AUT0427	....	148,668	291,697	.....	9,392	50,923	.....	.....	.....	I	8	0.3315
AUT0431	....	143,775	356,208	20,913	69,450	99,253	.....	.....	.....	I	1	1.1604

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0434		400,472	763,363	40,353	138,952	207,284				I	1	1.1604
AUT0435		183,306	483,907	27,166	107,346	149,077				I&E	2	0.8639
AUT0441		108,296	276,983	17,492	57,275	79,220				I	1	1.1604
AUT0446		278,043	3,528,075	28,547	111,202	584,973	1,404,150		113,155	I&E	4	2.5787
AUT0449		487,640	1,738,410	110,263	393,700	530,948				I	1	1.1604
AUT0472		239,620	218,958	453,683	511,926	89,417				I&E	2	0.8639
AUT0476		233,631	489,074	27,565	93,169	135,237				I	1	1.1604
AUT0483		1,146,722	2,715,801	112,654	136,742	410,757		274,363	21,886	I&E	11	0.7352
AUT0489		211,629	1,477,232	84,570	299,177	424,931				I	1	1.1604
AUT0490		405,350	3,527,610	73,321	78,027	506,958	3,548,991		286,000	I&E	4	2.5787
AUT0493		257,137	1,429,134	51,159	206,956	359,274		150,000	11,965	I&E	2	0.8639
AUT0496		603,432	1,649,804	57,304	206,130	383,721				I	1	1.1604
AUT0499		45,374	171,551	9,346	48,606	63,685				I&E	2	0.8639
AUT0501		346,213	115,781	205,027	230,840	42,297				I&E	2	0.8639
AUT0513		1,296,772	27,395,451	170,929	603,316	4,332,883	36,923,245		2,975,512	I&E	4	2.5787
AUT0517		98,553	1,040,022	20,976	72,416	199,516				I	1	1.1604
AUT0518		193,413	435,346	28,467	96,388	129,905				I	1	1.1604
AUT0522		237,692	856,098	40,165	162,010	243,734				I&E	2	0.8639
AUT0523		608,373	7,741,521		189,045	1,291,263				I&E	9	5.973
AUT0529		422,181	3,402,665	144,308	530,442	870,598				I	1	1.1604
AUT0534		70,565	230,241	17,175	56,150	71,756				I	1	1.1604
AUT0535		196,084	3,706,283	25,082	66,100	568,710	604,316		48,700	I&E	3	3.4562
AUT0539		1,056,137	13,978,398	183,682	342,369	2,148,896	2,343,730	1,412,165	301,520	I&E	12	3.6581
AUT0541		117,759	3,346,437	108,327	37,393	405,523	27,152,758	169,037	2,201,627	I&E	12	3.6581
AUT0547		780,279	9,747,498	118,281	129,393	1,398,937	17,882,815		1,441,112	I&E	4	2.5787
AUT0551		295,707	823,114	30,125	35,820	122,888		150,000	11,965	I&E	11	0.7352
AUT0552		1,226,625	133,029		80,047	98,987				I	5	0.1286
AUT0553		71,128	230,549	10,379	32,023	54,468				I	1	1.1604
AUT0554		429,991	8,840,925	249,963	170,468	1,179,253	1,498,242		120,738	I&E	3	3.4562
AUT0557		37,500	20,033		19,881	22,734				I	5	0.1286
AUT0564		1,129,749	14,903,816	170,408	396,749	2,348,309	15,236,406		1,227,847	I&E	7	2.504
AUT0567		441,177	5,817,871	67,488	77,963	838,809	4,139,441		333,583	I&E	4	2.5787
AUT0568		584,525	2,308,321	342,703	382,141	368,091		150,000	11,965	I&E	2	0.8639
AUT0570		951,201	4,021,857	164,817	591,048	998,853				I	1	1.1604
AUT0577		741,931	10,647,710	113,337	129,884	1,532,542				I&E	7	2.504
AUT0583		222,087	2,210,305	36,279	51,245	329,663	9,610,528		774,478	I&E	4	2.5787
AUT0585		128,015	1,561,382	49,933	54,853	227,225	1,102,473		88,844	I&E	4	2.5787
AUT0588		396,576	1,788,685	191,759	66,639	129,548		180,701	14,414	I&E	11	0.7352
AUT0590		147,803	315,803	22,592	75,430	97,801				I	1	1.1604
AUT0599		198,681	3,040,887	21,121	104,455	516,288		307,205	24,505	I	4	2.5787
AUT0600		711,801	1,717,012	80,592	284,636	448,508				I	1	1.1604
AUT0601		1,151,214	541,482	677,194	742,753	142,654				I&E	2	0.8639
AUT0603		1,228,633	684,562	720,077	802,140	179,529		150,000	11,965	I&E	2	0.8639
AUT0607		635,364	9,044,216	111,819	226,342	1,402,216	3,693,163	456,845	334,061	I&E	12	3.6581
AUT0611		547,114	3,195,898	88,288	320,973	687,709				I	1	1.1604
AUT0612		186,464	6,614,075		85,670	1,027,365				I&E	13	7.0567
AUT0613		493,923	4,341,494	155,354	572,021	1,034,798				I	1	1.1604
AUT0617		2,292,812	37,040,390	1,403,836	741,877	4,611,760	2,161,531	1,247,332	273,688	I&E	12	3.6581
AUT0619		159,600	62,547	98,454	112,506	22,957				I&E	2	0.8639
AUT0620		551,528	2,198,869	264,319	90,714	139,464		222,140	17,720	I&E	11	0.7352
AUT0621		391,137	2,018,600	70,658	245,595	462,340				I	1	1.1604
AUT0623		73,622	267,379	13,006	49,653	74,715				I	2	0.8639
AUT0625		562,255	2,841,330	104,168	380,113	680,487				I	1	1.1604

AUT0630	.....	569,211	16,086,712	94,881	227,787	2,423,292	974,792	.....	78,555	I&E	3	3.4562
AUT0631	.....	480,721	11,721,529	77,934	190,232	1,781,179	193,002	.....	15,553	I&E	3	3.4562
AUT0635	.....	72,550	1,057,088	50,149	201,000	301,357	.....	150,000	11,965	I&E	2	0.8639
AUT0638	.....	201,395	2,336,881	50,154	202,851	485,416	.....	236,083	18,832	I&E	2	0.8639
AUT0639	.....	479,860	2,960,066	143,531	527,524	805,439	.....	.....	.....	I	1	1.1604
DMU3244 ...	1	22,222	138,465	.....	27,927	47,641	.....	.....	.....	I	1	1.1604
DMU3244 ...	2	56,250	163,334	.....	33,357	56,612	.....	.....	.....	I	1	1.1604
DMU3310 ...	.....	41,319	25,594	8,793	27,169	22,020	.....	.....	.....	I	1	1.1604
DNU2003	.....	156,944	68,455	.....	30,711	40,458	.....	.....	.....	I	5	0.1286
DNU2010	.....	67,000	1,010,938	11,787	23,430	155,578	543,834	.....	43,826	I	4	2.5787
DNU2011	.....	181,250	2,707,585	21,222	102,473	466,750	5,223,420	273,533	442,756	I&E	12	3.6581
DNU2013	.....	65,000	588,369	.....	24,812	108,583	.....	150,000	11,965	I&E	11	0.7352
DNU2014	.....	42,798	531,997	64,365	22,327	33,707	.....	150,000	11,965	I&E	11	0.7352
DNU2017	.....	38,194	984,494	.....	13,803	153,973	.....	.....	.....	I&E	13	7.0567
DNU2018	.....	44,260	446,336	11,513	13,633	65,668	.....	.....	.....	I&E	11	0.7352
DNU2021	.....	55,750	292,158	18,165	59,671	83,103	.....	.....	.....	I	1	1.1604
DNU2025	.....	120,689	7,720,257	.....	825,174	1,924,365	.....	779,937	62,215	I&E	2	0.8639
DNU2032	Units 1 & 2	156,250	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DNU2032	Unit 3	124,306	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DNU2032	Unit 4	136,806	143,049	.....	54,324	74,691	.....	.....	.....	I	5	0.1286
DNU2038	.....	41,667	465,858	50,489	58,892	74,730	.....	.....	.....	I&E	2	0.8639
DUT0062	1	72,917	1,069,902	8,527	48,944	192,747	5,279,493	.....	425,455	I&E	4	2.5787
DUT0062	2	156,250	1,922,088	14,312	56,483	315,834	5,279,493	.....	425,455	I&E	4	2.5787
DUT0576	5&6	50,000	1,434,192	51,770	185,694	338,121	.....	.....	.....	I	1	1.1604
DUT0576	7	43,056	866,245	29,000	101,863	196,197	.....	.....	.....	I	1	1.1604
DUT0576	CT	2,083	202,358	.....	25,785	54,596	.....	.....	.....	I	1	1.1604
DUT1002	Screenhouse 1	685,833	166,652	322,571	367,337	68,493	.....	.....	.....	I&E	2	0.8639
DUT1002	Screenhouse 2	685,833	166,652	322,571	367,337	68,493	.....	.....	.....	I&E	2	0.8639
DUT1003	.....	38,500	703,237	15,912	20,989	105,202	236,360	.....	19,047	I	4	2.5787
DUT1006	Unit 1/2	173,611	1,286,341	54,154	153,027	282,018	.....	.....	.....	I	1	1.1604
DUT1006	Unit 3/4	20,833	281,263	12,914	39,309	66,440	.....	.....	.....	I	1	1.1604
DUT1007	.....	242,778	680,059	32,861	39,165	103,129	.....	150,000	11,965	I&E	11	0.7352
DUT1008	.....	60,000	1,016,367	26,935	107,846	225,619	.....	150,000	11,965	I&E	2	0.8639
DUT1011	.....	283,611	1,350,484	76,112	267,481	383,648	.....	.....	.....	I	1	1.1604
DUT1012	.....	173,611	522,205	29,576	100,351	145,125	.....	.....	.....	I	1	1.1604
DUT1014	.....	87,000	920,321	40,859	163,140	253,315	.....	150,000	11,965	I&E	2	0.8639
DUT1022	.....	2,200,000	8,268,801	291,801	1,051,593	1,937,083	.....	.....	.....	I	1	1.1604
DUT1023	CWS #535	478,444	28,961,166	360,609	274,535	4,037,344	.....	.....	.....	I&E	3	3.4562
DUT1023	DWS #536	520,000	39,708,776	97,288	361,137	5,917,486	4,830,432	.....	389,267	I&E	3	3.4562
DUT1029	CRS	638,000	14,391,478	63,709	254,538	2,239,852	.....	.....	.....	I&E	3	3.4562
DUT1029	CR Nuc	680,000	6,740,847	162,470	659,152	1,456,426	.....	.....	.....	I&E	2	0.8639
DUT1029	CRN	68,000	649,893	13,914	16,340	94,956	.....	.....	.....	I&E	11	0.7352
DUT1029	HCT	735,000	4,654,560	159,675	194,358	697,388	21,796,254	667,692	1,809,743	I&E	11	0.7352
DUT1031	1	59,000	808,777	17,797	22,826	120,181	.....	.....	.....	I&E	4	2.5787
DUT1031	2	140,000	1,524,044	24,132	26,017	218,874	5,399,114	.....	435,095	I&E	4	2.5787
DUT1033	.....	240,000	1,076,251	43,293	55,502	165,443	.....	150,000	11,965	I&E	11	0.7352
DUT1034	.....	1,231,944	4,990,608	202,923	820,337	1,327,964	.....	504,175	40,218	I&E	2	0.8639
DUT1036	.....	444,000	753,297	41,568	141,630	207,314	.....	.....	.....	I	1	1.1604
DUT1038	.....	65,972	213,848	12,804	38,918	56,561	.....	.....	.....	I	1	1.1604
DUT1041	.....	188,958	433,167	27,973	94,625	128,325	.....	.....	.....	I	1	1.1604
DUT1043	.....	280,556	36,345	.....	27,042	32,217	.....	.....	.....	I	5	0.1286
DUT1044	.....	756,944	76,726	.....	53,732	64,656	.....	.....	.....	I	5	0.1286
DUT1047	.....	614,306	16,998,704	151,032	103,667	2,372,868	4,783,541	.....	385,488	I&E	7	2.504
DUT1048	HI-1	256,944	1,766,372	113,534	405,813	543,770	.....	.....	.....	I	1	1.1604
DUT1048	HI-2	170,139	473,836	33,127	113,050	147,387	.....	.....	.....	I	1	1.1604
DUT1050	.....	2,104,167	407,068	.....	171,852	229,809	.....	.....	.....	I	5	0.1286
DUT1051	.....	374,000	1,027,013	55,468	193,382	284,137	.....	.....	.....	I	1	1.1604
DUT1057	.....	340,000	2,844,898	35,159	51,102	420,993	7,997,712	.....	644,507	I&E	4	2.5787
DUT1062	.....	670,139	67,658	.....	48,869	58,502	.....	.....	.....	I	5	0.1286
DUT1066	.....	1,712,000	32,777,974	260,695	678,771	5,084,922	845,987	.....	68,175	I&E	3	3.4562
DUT1067	1	63,611	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1067	2	31,667	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1067	3	69,653	23,159	.....	20,564	23,862	.....	.....	.....	I	5	0.1286
DUT1068	.....	91,528	360,536	56,351	20,060	15,042	.....	.....	.....	I&E	11	0.7352
DUT1072	.....	366,597	691,381	40,319	137,184	195,303	.....	.....	.....	I	1	1.1604
DUT1084	.....	264,583	835,764	54,494	189,863	254,363	.....	.....	.....	I	1	1.1604

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
DUT1085		297,000	2,410,696	159,608	619,834	803,455		243,540	19,427	I&E	2	0.8639
DUT1086	Unit 1	57,292	667,197	29,048	122,691	188,637				I&E	2	0.8639
DUT1086	Unit 2	57,292	667,197	29,048	122,691	188,637		150,000	11,965	I&E	2	0.8639
DUT1088	#4	49,280	865,324	11,129	22,007	134,081				I&E	7	2.504
DUT1088	#5	99,458	1,438,399	12,058	25,232	217,970	1,601,167		129,032	I&E	7	2.504
DUT1093		307,760	9,456,466		33,762	1,380,150				I&E	9	5.973
DUT1097		106,007	2,349,646		242,606	577,143		237,372	18,935	I&E	6	5.0065
DUT1098		71,528	507,025	29,461	99,942	142,669				I	1	1.1604
DUT1100	Units 1 & 2	188,000								I	5	0.1286
DUT1100	Units 3 & 4	188,000	136,878		50,573	70,062				I	5	0.1286
DUT1103	Unit 1 Screenhouse	118,000								I		
DUT1103	Unit 2 Screenhouse	250,000	47,060		31,941	38,642				I	5	0.1286
DUT1103	Hvdc Lake Intake	1,200	34,615		4,734	9,662				I	8	0.3315
DUT1103	Hvdc Separator Dike	1,200	34,615		4,734	9,662				I	8	0.3315
DUT1103	River Intake	7,800	75,587	5,734	15,570	20,597				I	1	1.1604
DUT1109		58,333	873,553	32,385	130,170	222,159		150,000	11,965	I	2	0.8639
DUT1111	Unit 1&2	199,716	764,700	99,547	37,851	47,181				I&E	11	0.7352
DUT1111	Unit 3	189,842	717,221	93,277	35,552	44,391		150,000	11,965	I&E	11	0.7352
DUT1112		193,750	501,403	28,510	96,543	139,421				I	1	1.1604
DUT1113	System 27	1,125,000	6,518,329	281,013	1,001,831	1,648,882				I	1	1.1604
DUT1113	System 67	44,028	181,599		8,508	34,364				I	8	0.3315
DUT1116		355,556	2,886,459	69,804	84,921	426,084		291,604	23,261	I&E	11	0.7352
DUT1118		667,361	140,959		64,789	84,858				I	5	0.1286
DUT1122		120,000	23,134		18,047	21,341				I	5	0.1286
DUT1123	6	111,806	4,071,741	15,536	39,240	603,428				I&E	3	3.4562
DUT1123	7	256,250	5,809,773		431,082	1,258,263				I&E	6	5.0065
DUT1123	8	220,139	5,590,610	27,185	73,721	842,513	1,136,010		91,547	I&E	3	3.4562
DUT1132		1,896,000	3,995,072	197,552	927,311	1,298,568		403,601	32,195	I&E	2	0.8639
DUT1133		213,889	1,180,537	44,631	57,260	180,711		150,000	11,965	I&E	11	0.7352
DUT1138		77,083	264,532	12,475	37,753	62,942				I	1	1.1604
DUT1140	Mc2-4	131,250	334,100	20,512	66,264	93,320				I	1	1.1604
DUT1140	Mc5&6	383,958	1,450,787	82,444	290,867	414,982				I	1	1.1604
DUT1145		178,472	2,702,979	38,035	57,101	403,909	1,565,614	273,068	147,950	I&E	12	3.6581
DUT1146		181,944	325,271	276,184	309,256	79,383				I&E	2	0.8639
DUT1152		399,306	10,606,982	355,225	1,321,682	2,476,653				I	1	1.1604
DUT1156		496,000	16,234,946	67,033	77,047	2,321,504	9,287,608		748,455	I&E	7	2.504
DUT1157	6	110,000	1,262,753	47,827	25,593	157,553				I&E	4	2.5787
DUT1157	7	5,833	305,286	13,438	17,201	47,229				I&E	4	2.5787
DUT1165	1	480,000	9,356,403	220,447	189,951	1,301,645				I&E	3	3.4562
DUT1165	2	489,233					9,426,676		759,662	I&E		
DUT1169		620,000	14,855,719	47,990	185,073	2,252,203	1,896,934		152,867	I&E	3	3.4562
DUT1173		37,986	312,285	18,521	72,119	98,061				I&E	2	0.8639
DUT1179		390,278	1,204,485	74,177	261,241	358,556				I	1	1.1604
DUT1185		225,000	3,496,693	21,560	51,324	527,614	1,266,125		102,032	I&E	7	2.504
DUT1186	Unit 4	62,000	577,654	26,371	88,907	144,780				I	1	1.1604
DUT1186	Unit 5	62,000	577,654	26,371	88,907	144,780				I	1	1.1604
DUT1187	Mt 2&3	147,014								I	5	0.1286
DUT1187	Mt 6-8	500,000	78,370		47,573	58,732				I	5	0.1286
DUT1189	Unit 6 & 8	72,222								I	5	0.1286
DUT1189	Unit 7	80,000	22,427		19,852	23,045				I	5	0.1286
DUT1198		279,511	5,198,159	27,451	92,443	805,093	268,118		21,607	I&E	3	3.4562
DUT1202	Power Plant	36,000	1,154,817		13,668	178,088				I&E	11	0.7352
DUT1202	Filtration Plant	30,000	987,137		13,284	153,830				I&E	9	5.973

DUT1206	1	85,972	53,440	56,705	65,852	16,756	.....	.....	.....	I&E	2	0.8639
DUT1206	2	85,000	59,054	56,155	65,236	17,489	.....	.....	.....	I&E	2	0.8639
DUT1206	3	120,972	87,045	76,530	88,027	23,890	.....	.....	.....	I&E	2	0.8639
DUT1209	Plant A	640,000	2,227,053	89,172	116,036	343,947	.....	.....	.....	I&E	11	0.7352
DUT1209	Plant B	515,972	10,503,729	51,204	184,394	1,628,685	5,849,051	.....	471,354	I&E	3	3.4562
DUT1211	.....	1,666,667	32,926,766	3,240,832	1,072,136	2,519,335	.....	3,326,419	265,345	I&E	11	0.7352
DUT1212	.....	687,500	2,000,922	85,020	302,122	501,987	.....	.....	.....	I	1	1.1604
DUT1214	.....	51,944	754,488	34,900	22,241	94,763	7,829,721	.....	630,969	I	4	2.5787
DUT1217	Unit 1	.....	.....	.....	.....	.....	.....	.....	.....	I&E	.....	.....
DUT1217	Unit 6-8	104,861	848,612	.....	16,547	137,371	.....	.....	.....	I&E	13	7.0567
DUT1217	Unit 4	.....	.....	.....	.....	.....	.....	.....	.....	I&E	.....	.....
DUT1219	.....	550,000	2,862,608	108,307	438,079	737,343	.....	289,194	23,069	I&E	2	0.8639
DUT1223	1	142,000	1,422,632	8,898	55,779	249,432	.....	.....	.....	I&E	12	3.6581
DUT1223	2	224,800	2,121,274	22,284	56,502	336,239	376,088	179,011	44,587	I&E	12	3.6581
DUT1227	1 & 2	130,000	373,205	21,493	71,516	103,159	.....	.....	.....	I	1	1.1604
DUT1227	3	185,000	512,326	29,084	98,594	142,454	.....	.....	.....	I	1	1.1604
DUT1229	.....	73,000	30,638	82,612	96,918	18,668	.....	.....	.....	I&E	2	0.8639
DUT1238	A	676,000	386,447	531,800	688,788	212,010	.....	.....	.....	I	2	0.8639
DUT1238	B	334,000	344,428	525,715	662,610	185,934	.....	.....	.....	I	2	0.8639
DUT1248	.....	452,083	49,114	.....	36,652	43,645	.....	.....	.....	I	5	0.1286
DUT1249	.....	43,900	10,765	.....	13,783	15,316	.....	.....	.....	I	5	0.1286
DUT1250	.....	360,000	12,788,752	160,063	151,944	1,812,711	17,224,807	.....	1,388,085	I&E	7	2.504
DUT1252	.....	112,000	157,353	10,988	32,494	43,910	.....	.....	.....	I	1	1.1604
DUT1258	Screen House No.1	287,083	6,665,603	171,249	116,490	894,273	.....	.....	.....	I&E	3	3.4562
DUT1258	Screen House No.2	422,708	9,009,434	248,577	168,448	1,202,611	.....	.....	.....	I&E	3	3.4562
DUT1258	Screen House No.3	243,056	4,842,849	108,025	73,278	654,766	4,429,893	.....	356,989	I&E	3	3.4562
DUT1259	.....	71,181	2,706,303	20,742	26,203	390,778	81,723	.....	6,586	I&E	3	3.4562
DUT1261	U12	79,000	49,889	119,643	139,137	26,598	.....	.....	.....	I&E	2	0.8639
DUT1261	U34	139,750	1,735,631	101,580	26,018	171,552	1,650,821	.....	133,034	I&E	4	2.5787
DUT1265	.....	70,000	495,281	35,987	143,288	177,818	.....	150,000	11,965	I&E	2	0.8639
DUT1268	.....	2,400,000	20,911,797	1,793,928	623,613	1,807,054	.....	2,112,610	168,521	I&E	11	0.7352
DUT1269	.....	456,000	3,012,280	107,765	130,761	451,877	.....	304,315	24,275	I&E	11	0.7352
DUT1270	.....	89,583	18,084	.....	16,343	18,918	.....	.....	.....	I	5	0.1286
DUT1271	.....	186,000	14,970,016	30,165	49,913	2,151,142	4,337,253	1,512,343	470,162	I&E	7	2.504
DUT1272	Mo1 & 2	713,889	1,238,695	76,910	270,425	369,877	.....	.....	.....	I	1	1.1604
DUT1272	Mo3	528,472	849,029	53,826	185,965	253,021	.....	.....	.....	I	1	1.1604
DUT1273	.....	444,444	2,752,775	164,719	582,187	809,401	.....	.....	.....	I	1	1.1604
DUT1274	.....	330,556	1,564,234	62,476	225,250	385,486	.....	.....	.....	I	1	1.1604
DUT1275	.....	1,992,500	6,739,793	.....	355,766	1,315,361	.....	680,886	54,314	I	2	0.8639
DUT1276	.....	62,500	412,277	23,754	26,574	61,518	.....	.....	.....	I&E	11	0.7352
DUT1278	.....	559,722	4,962,033	193,479	688,069	1,201,071	.....	.....	.....	I	1	1.1604
Facilities Receiving No EPA Technology Upgrade Costs												
AUT0010	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0013	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0018	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0022	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0033	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0036	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0041	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0047	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0050	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0054	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0067	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0068	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0071	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0072	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0073	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0077	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0079	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0080	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0083	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0087	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0091	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
AUT0093	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0097		n/a									n/a	n/a
AUT0101		n/a									n/a	n/a
AUT0104		n/a									n/a	n/a
AUT0111		n/a									n/a	n/a
AUT0114		n/a									n/a	n/a
AUT0125		n/a									n/a	n/a
AUT0126		n/a									n/a	n/a
AUT0129		n/a									n/a	n/a
AUT0152		n/a									n/a	n/a
AUT0156		n/a									n/a	n/a
AUT0157		n/a									n/a	n/a
AUT0160		n/a									n/a	n/a
AUT0163		n/a									n/a	n/a
AUT0170		n/a									n/a	n/a
AUT0173		n/a									n/a	n/a
AUT0178		n/a									n/a	n/a
AUT0181		n/a									n/a	n/a
AUT0182		n/a									n/a	n/a
AUT0199		n/a									n/a	n/a
AUT0201		n/a									n/a	n/a
AUT0215		n/a									n/a	n/a
AUT0216		n/a									n/a	n/a
AUT0221		n/a									n/a	n/a
AUT0226		n/a									n/a	n/a
AUT0230		n/a									n/a	n/a
AUT0232		n/a									n/a	n/a
AUT0235		n/a									n/a	n/a
AUT0240		n/a									n/a	n/a
AUT0241		n/a									n/a	n/a
AUT0246		n/a									n/a	n/a
AUT0248		n/a									n/a	n/a
AUT0257		n/a									n/a	n/a
AUT0260		n/a									n/a	n/a
AUT0270		n/a									n/a	n/a
AUT0275		n/a									n/a	n/a
AUT0276		n/a									n/a	n/a
AUT0285		n/a									n/a	n/a
AUT0286		n/a									n/a	n/a
AUT0287		n/a									n/a	n/a
AUT0296		n/a									n/a	n/a
AUT0300		n/a									n/a	n/a
AUT0304		n/a									n/a	n/a
AUT0307		n/a									n/a	n/a
AUT0310		n/a									n/a	n/a
AUT0315		n/a									n/a	n/a
AUT0343		n/a									n/a	n/a
AUT0344		n/a									n/a	n/a
AUT0350		n/a									n/a	n/a
AUT0355		n/a									n/a	n/a
AUT0356		n/a									n/a	n/a
AUT0359		n/a									n/a	n/a
AUT0363		n/a									n/a	n/a
AUT0373		n/a									n/a	n/a

AUT0380		n/a									n/a	n/a
AUT0388		n/a									n/a	n/a
AUT0390		n/a									n/a	n/a
AUT0394		n/a									n/a	n/a
AUT0396		n/a									n/a	n/a
AUT0397		n/a									n/a	n/a
AUT0403		n/a									n/a	n/a
AUT0405		n/a									n/a	n/a
AUT0406		n/a									n/a	n/a
AUT0411		n/a									n/a	n/a
AUT0415		n/a									n/a	n/a
AUT0419		n/a									n/a	n/a
AUT0424		n/a									n/a	n/a
AUT0433		n/a									n/a	n/a
AUT0440		n/a									n/a	n/a
AUT0443		n/a									n/a	n/a
AUT0444		n/a									n/a	n/a
AUT0453		n/a									n/a	n/a
AUT0455		n/a									n/a	n/a
AUT0459		n/a									n/a	n/a
AUT0462		n/a									n/a	n/a
AUT0463		n/a									n/a	n/a
AUT0467		n/a									n/a	n/a
AUT0473		n/a									n/a	n/a
AUT0477		n/a									n/a	n/a
AUT0478		n/a									n/a	n/a
AUT0481		n/a									n/a	n/a
AUT0482		n/a									n/a	n/a
AUT0492		n/a									n/a	n/a
AUT0500		n/a									n/a	n/a
AUT0507		n/a									n/a	n/a
AUT0512		n/a									n/a	n/a
AUT0515		n/a									n/a	n/a
AUT0521		n/a									n/a	n/a
AUT0531		n/a									n/a	n/a
AUT0536		n/a									n/a	n/a
AUT0537		n/a									n/a	n/a
AUT0538		n/a									n/a	n/a
AUT0540		n/a									n/a	n/a
AUT0544		n/a									n/a	n/a
AUT0546		n/a									n/a	n/a
AUT0555		n/a									n/a	n/a
AUT0559		n/a									n/a	n/a
AUT0561		n/a									n/a	n/a
AUT0571		n/a									n/a	n/a
AUT0573		n/a									n/a	n/a
AUT0575		n/a									n/a	n/a
AUT0580		n/a									n/a	n/a
AUT0582		n/a									n/a	n/a
AUT0595		n/a									n/a	n/a
AUT0602		n/a									n/a	n/a
AUT0604		n/a									n/a	n/a
AUT0606		n/a									n/a	n/a
AUT0608		n/a									n/a	n/a
AUT0618		n/a									n/a	n/a
AUT0636		n/a									n/a	n/a
AUT0637		n/a									n/a	n/a
AUT0755		n/a									n/a	n/a
DNU2002		n/a									n/a	n/a
DNU2005		n/a									n/a	n/a
DNU2006		n/a									n/a	n/a
DNU2015		n/a									n/a	n/a
DNU2031		n/a									n/a	n/a
DNU2047		n/a									n/a	n/a
DUT1010		n/a									n/a	n/a
DUT1013		n/a									n/a	n/a

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
DUT1021		n/a									n/a	n/a
DUT1026		n/a									n/a	n/a
DUT1027		n/a									n/a	n/a
DUT1032		n/a									n/a	n/a
DUT1039		n/a									n/a	n/a
DUT1046		n/a									n/a	n/a
DUT1049		n/a									n/a	n/a
DUT1053		n/a									n/a	n/a
DUT1056		n/a									n/a	n/a
DUT1070		n/a									n/a	n/a
DUT1071		n/a									n/a	n/a
DUT1078		n/a									n/a	n/a
DUT1081		n/a									n/a	n/a
DUT1087		n/a									n/a	n/a
DUT1092		n/a									n/a	n/a
DUT1104		n/a									n/a	n/a
DUT1105		n/a									n/a	n/a
DUT1106		n/a									n/a	n/a
DUT1117		n/a									n/a	n/a
DUT1120		n/a									n/a	n/a
DUT1129		n/a									n/a	n/a
DUT1130		n/a									n/a	n/a
DUT1142		n/a									n/a	n/a
DUT1143		n/a									n/a	n/a
DUT1148		n/a									n/a	n/a
DUT1149		n/a									n/a	n/a
DUT1153		n/a									n/a	n/a
DUT1154		n/a									n/a	n/a
DUT1155		n/a									n/a	n/a
DUT1161		n/a									n/a	n/a
DUT1167		n/a									n/a	n/a
DUT1170		n/a									n/a	n/a
DUT1172		n/a									n/a	n/a
DUT1174		n/a									n/a	n/a
DUT1175		n/a									n/a	n/a
DUT1176		n/a									n/a	n/a
DUT1177		n/a									n/a	n/a
DUT1183		n/a									n/a	n/a
DUT1188		n/a									n/a	n/a
DUT1191		n/a									n/a	n/a
DUT1192		n/a									n/a	n/a
DUT1194		n/a									n/a	n/a
DUT1199		n/a									n/a	n/a
DUT1201		n/a									n/a	n/a
DUT1213		n/a									n/a	n/a
DUT1220		n/a									n/a	n/a
DUT1222		n/a									n/a	n/a
DUT1224		n/a									n/a	n/a
DUT1225		n/a									n/a	n/a
DUT1228		n/a									n/a	n/a
DUT1233		n/a									n/a	n/a
DUT1234		n/a									n/a	n/a
DUT1235		n/a									n/a	n/a

DUT1239	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
DUT1243	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
DUT1254	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
DUT1257	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a
DUT1262	.....	n/a	.....	.....	.....	.....	.....	.....	.....	.....	n/a	n/a

[1] The design flow adjustment slope (m) represents the slope that corresponds to the particular facility using the technology in column 3
[2] Discount rate = 7%
[3] Amortization period for capital costs = 10 years
[4] Amortization period for downtime and pilot study costs = 30 years

Note: Depending on the data provided, some facilities with multiple intakes were costed separately for each intake. In such cases, the facility should calculate the costs considered by EPA for each intake using the steps below and sum. Note that some costs (e.g., construction downtime) are assigned evenly to each intake for convenience.

Appendix B: Facility ID and Facility Name for All Facilities Not Claiming Survey Information CBI

Facility ID	Facility name
AUT0001 ...	Cane Run
AUT0002 ...	Chesapeake
AUT0004 ...	Hennepin
AUT0010 ...	Bowen
AUT0011 ...	Shawville
AUT0012 ...	Diablo Canyon Nuclear
AUT0013 ...	Montville
AUT0014 ...	Williams
AUT0015 ...	Northport
AUT0016 ...	Cholla
AUT0018 ...	R M Heskett Station
AUT0019 ...	Charles Poletti
AUT0020 ...	B L England
AUT0021 ...	B C Cobb
AUT0022 ...	St Johns River Power
AUT0024 ...	Bull Run
AUT0027 ...	Lake Hubbard
AUT0033 ...	Muscatine
AUT0036 ...	Edgewater
AUT0041 ...	Edwin I Hatch
AUT0044 ...	Hunters Point
AUT0047 ...	Michoud
AUT0049 ...	Chalk Point
AUT0050 ...	Wyandotte
AUT0051 ...	Suwannee River
AUT0053 ...	Nelson Dewey
AUT0054 ...	Flint Creek
AUT0057 ...	Thomas Fitzhugh
AUT0058 ...	Mercer
AUT0064 ...	Decordova
AUT0066 ...	Fermi Nuclear
AUT0067 ...	Henry D King
AUT0068 ...	Scattergood
AUT0071 ...	Oswego
AUT0072 ...	Sioux
AUT0073 ...	Lake Catherine
AUT0078 ...	Missouri City
AUT0079 ...	Eagle Mountain
AUT0080 ...	Lone Star
AUT0083 ...	Schiller
AUT0084 ...	Salem Nuclear
AUT0085 ...	Point Beach Nuclear
AUT0092 ...	Linden
AUT0093 ...	Perry Nuclear
AUT0095 ...	Tyrone
AUT0097 ...	Little Gypsy
AUT0101 ...	Lakeside
AUT0106 ...	Cheswick
AUT0110 ...	C P Crane
AUT0111 ...	Cape Fear
AUT0114 ...	Kewaunee Nuclear
AUT0120 ...	Norwalk Harbor
AUT0123 ...	Warren
AUT0125 ...	Beaver Valley Nuclear
AUT0127 ...	Lake Road
AUT0129 ...	Susquehanna Nuclear
AUT0130 ...	Elmer W Stout
AUT0131 ...	Hammond
AUT0134 ...	Mount Tom
AUT0137 ...	Mitchell
AUT0139 ...	Albany
AUT0142 ...	Lauderdale
AUT0143 ...	Wood River
AUT0146 ...	Meredosia
AUT0148 ...	Tanners Creek
AUT0149 ...	Thomas Hill
AUT0151 ...	Decker Creek
AUT0152 ...	Duck Creek
AUT0156 ...	Waterford 1 & 2
AUT0157 ...	Pulliam
AUT0160 ...	L V Sutton
AUT0161 ...	Valley
AUT0163 ...	Belle River
AUT0168 ...	E F Barrett
AUT0170 ...	O W Sommers
AUT0171 ...	New Madrid
AUT0173 ...	Fort Calhoun Nuclear
AUT0174 ...	Herbert a Wagner
AUT0175 ...	R E Burger
AUT0176 ...	Martin Lake
AUT0178 ...	Mt Storm
AUT0181 ...	Prairie Creek
AUT0182 ...	Arsenal Hill
AUT0183 ...	Schuylkill
AUT0185 ...	Gallatin
AUT0187 ...	North Anna Nuclear
AUT0190 ...	Ginna
AUT0191 ...	J H Campbell
AUT0192 ...	R W Miller
AUT0193 ...	Joliet 29
AUT0196 ...	Southside
AUT0197 ...	Austin-dt
AUT0201 ...	Cope
AUT0202 ...	Donald C Cook Nuclear
AUT0203 ...	Riverside
AUT0205 ...	Joliet 9
AUT0208 ...	New Castle
AUT0215 ...	Coleto Creek
AUT0216 ...	Fort St Vrain
AUT0221 ...	Polk
AUT0222 ...	Marion
AUT0226 ...	Sooner
AUT0227 ...	Silver Lake
AUT0228 ...	High Bridge
AUT0229 ...	Dan E Karn
AUT0230 ...	McWilliams
AUT0232 ...	V H Braunig
AUT0235 ...	Sam Rayburn
AUT0238 ...	North Lake
AUT0240 ...	Lee
AUT0241 ...	J B Sims
AUT0242 ...	Quad Cities Nuclear
AUT0244 ...	Elk River
AUT0245 ...	Avon Lake
AUT0246 ...	Canaday
AUT0248 ...	Sam Bertron
AUT0254 ...	Chamois
AUT0255 ...	Cooper
AUT0257 ...	Gerald Gentleman
AUT0260 ...	Marshall
AUT0261 ...	Dale
AUT0264 ...	Indian Point 3 Nucler
AUT0266 ...	North Omaha
AUT0268 ...	Cutler
AUT0270 ...	Possum Point
AUT0273 ...	Stanton
AUT0275 ...	Seabrook Nuclear
AUT0276 ...	River Rouge
AUT0277 ...	Dubuque
AUT0278 ...	Morgantown
AUT0284 ...	Handley
AUT0285 ...	Conners Creek
AUT0286 ...	Welsh
AUT0287 ...	Horseshoe Lake
AUT0292 ...	Harris Nuclear
AUT0295 ...	Jack Mcdonough
AUT0296 ...	W H Zimmer
AUT0297 ...	Quindaro
AUT0298 ...	Harllee Branch
AUT0299 ...	Chesterfield
AUT0300 ...	Eckert Station
AUT0302 ...	U.S. DOE SRS (D-area)
AUT0304 ...	Lansing
AUT0305 ...	Kahe
AUT0307 ...	Rodemacher
AUT0308 ...	W S Lee
AUT0309 ...	Wilkes
AUT0310 ...	A B Paterson
AUT0314 ...	Philip Sporn
AUT0315 ...	Sabine
AUT0319 ...	Cliffside
AUT0321 ...	J E Corette
AUT0331 ...	Lake Creek
AUT0333 ...	Hamilton
AUT0337 ...	Johnsonville
AUT0341 ...	Montrose
AUT0343 ...	John E Amos
AUT0344 ...	Weston
AUT0345 ...	Summer Nuclear
AUT0349 ...	McGuire Nuclear
AUT0350 ...	Clinton Nuclear
AUT0351 ...	Portland
AUT0355 ...	Limerick Nuclear
AUT0356 ...	Byron Nuclear
AUT0358 ...	H T Pritchard
AUT0359 ...	Hookers Point
AUT0361 ...	Hawthorn
AUT0362 ...	Teche
AUT0363 ...	Wansley
AUT0364 ...	Dresden Nuclear
AUT0365 ...	Arkwright
AUT0368 ...	Kaw
AUT0370 ...	Deepwater
AUT0373 ...	Valmont
AUT0379 ...	Lake Pauline
AUT0380 ...	Will County
AUT0381 ...	Healy
AUT0384 ...	Somerset
AUT0385 ...	Hutsonville
AUT0387 ...	Haynes
AUT0388 ...	Lewis Creek
AUT0390 ...	Fort Churchill
AUT0394 ...	Nebraska City
AUT0396 ...	Bremo Power Station
AUT0397 ...	George Neal North
AUT0398 ...	Iatan
AUT0399 ...	Boomer Lake
AUT0401 ...	Fort Myers
AUT0403 ...	Nine Mile Point Nuclear
AUT0404 ...	Mitchell
AUT0405 ...	Fisk
AUT0406 ...	Merom
AUT0408 ...	Cameo
AUT0411 ...	Roseton
AUT0415 ...	Rochester 7
AUT0416 ...	Noblesville
AUT0419 ...	Brunswick Nuclear
AUT0423 ...	James A Fitzpatrick
AUT0424 ...	Davis-besse
AUT0427 ...	Blount Street
AUT0431 ...	San Angelo
AUT0433 ...	Mistersky
AUT0434 ...	Paradise
AUT0435 ...	Shiras
AUT0440 ...	Eaton
AUT0441 ...	Piqua
AUT0443 ...	Milton L Kapp
AUT0444 ...	Gibbons Creek
AUT0446 ...	Richard H. Gorsuch
AUT0449 ...	Big Brown
AUT0453 ...	Four Corners
AUT0455 ...	Seminole
AUT0459 ...	Vogtle Nuclear
AUT0462 ...	Warrick
AUT0463 ...	Rex Brown
AUT0467 ...	Vero Beach
AUT0472 ...	Miami Fort
AUT0473 ...	Palisades Nuclear

Facility ID	Facility name
AUT0476 ...	Trinidad
AUT0477 ...	Fair Station
AUT0478 ...	Dansby
AUT0481 ...	Powerlane
AUT0482 ...	Gen J M Gavin
AUT0483 ...	Shawnee
AUT0489 ...	Nearman Creek
AUT0490 ...	Buck
AUT0492 ...	Collins
AUT0493 ...	E S Joslin
AUT0496 ...	Indian River
AUT0499 ...	Bay Front
AUT0500 ...	Big Cajun 2
AUT0501 ...	Jack Watson
AUT0507 ...	Crawford
AUT0512 ...	J K Spruce
AUT0513 ...	Waterford #3 Nuclear
AUT0515 ...	Rockport
AUT0517 ...	Humboldt Bay
AUT0518 ...	James River
AUT0521 ...	Menasha
AUT0522 ...	Jefferies
AUT0523 ...	Walter C Beckjord
AUT0529 ...	Gould Street
AUT0531 ...	Braidwood Nuclear
AUT0534 ...	Crisp
AUT0535 ...	Urquhart
AUT0536 ...	Rush Island
AUT0537 ...	Dallman
AUT0538 ...	Genoa
AUT0539 ...	Edge Moor
AUT0540 ...	J P Madgett
AUT0541 ...	Indian Point Nuclear
AUT0544 ...	Eddystone
AUT0546 ...	Watts Bar Nuclear
AUT0547 ...	Muskingum River
AUT0551 ...	Allen S King
AUT0552 ...	Kingston
AUT0553 ...	Hunlock Pwr Station
AUT0554 ...	Potomac River
AUT0555 ...	Zuni
AUT0557 ...	Sayreville
AUT0561 ...	J T Deely
AUT0564 ...	Kyger Creek
AUT0567 ...	F B Culley
AUT0568 ...	Northside
AUT0570 ...	Peach Bottom Nuclear
AUT0571 ...	Baxter Wilson
AUT0573 ...	San Onofre Nuclear
AUT0575 ...	Trenton Channel
AUT0577 ...	Middletown
AUT0580 ...	Sixth Street
AUT0582 ...	E W Brown
AUT0583 ...	Dave Johnston
AUT0585 ...	Burlington
AUT0588 ...	Monticello
AUT0590 ...	C D McIntosh Jr
AUT0599 ...	Kearny
AUT0600 ...	Kincaid
AUT0601 ...	Bridgeport Harbor
AUT0602 ...	Mason Steam
AUT0603 ...	Astoria
AUT0604 ...	C R Huntley
AUT0606 ...	Hmp&l Station 2
AUT0607 ...	Moss Landing
AUT0608 ...	Pilgrim Nuclear
AUT0611 ...	New Boston
AUT0612 ...	Huntington Beach
AUT0613 ...	Morro Bay
AUT0617 ...	Ravenswood
AUT0618 ...	New Haven Harbor
AUT0619 ...	William F Wyman
AUT0620 ...	Dunkirk
AUT0621 ...	Contra Costa
AUT0623 ...	Kendall Square
AUT0625 ...	Encina
AUT0630 ...	Lovett
AUT0631 ...	Salem Harbor
AUT0635 ...	Aes Hickling
AUT0637 ...	Ormond Beach
AUT0638 ...	Mandalay
AUT0639 ...	Pittsburg
DMU3244 ..	University of Notre Dame Power Plant
DMU3310 ..	University of Iowa—Main Power Plant
DNU2002 ...	Brooklyn Navy Yard Cogeneration Partners, L.P.
DNU2011 ...	Long Beach Generation
DNU2013 ...	Maine Energy Recovery Company
DNU2014 ...	Baltimore Resco
DNU2015 ...	Southern Energy-Canal
DNU2017 ...	Westchester Resco Co.
DNU2018 ...	Grays Ferry Cogeneration Partnership
DNU2021 ...	Morgantown
DNU2025 ...	Sparrows Point Div Bethlehem Steel Corp
DNU2031 ...	Ch Resources—Beaver Falls
DNU2032 ...	Duke Energy South Bay
DNU2038 ...	Saugus Resco
DNU2047 ...	El Segundo Power
DUT0062 ...	Leland Olds Station
DUT0576 ...	Sam O. Purdom Generating Station
DUT1002 ...	Monroe
DUT1003 ...	Peru
DUT1006 ...	Martins Creek
DUT1007 ...	Presque Isle
DUT1008 ...	Far Rockaway
DUT1011 ...	Stryker Creek
DUT1012 ...	Grand Tower
DUT1014 ...	Dolphus M Grainger
DUT1021 ...	Alma
DUT1022 ...	Comanche Peak Nuclear
DUT1023 ...	Oyster Creek Nuclear
DUT1026 ...	Delaware
DUT1029 ...	Crystal River
DUT1031 ...	Merrimack
DUT1033 ...	J C Weadock
DUT1034 ...	South Oak Creek
DUT1036 ...	Allen
DUT1038 ...	North Texas
DUT1041 ...	Elmer Smith
DUT1043 ...	Ray Olinger
DUT1044 ...	Tradinghouse
DUT1046 ...	Labadie
DUT1047 ...	Elrama
DUT1048 ...	Holly Street
DUT1049 ...	Joppa Steam
DUT1050 ...	Browns Ferry Nuclear
DUT1051 ...	Havana
DUT1056 ...	Webster
DUT1057 ...	Wateree
DUT1062 ...	Fayette Power Prj
DUT1066 ...	F J Gannon
DUT1067 ...	Paint Creek
DUT1068 ...	Harbor
DUT1070 ...	Millstone
DUT1072 ...	Graham
DUT1084 ...	Fort Phantom
DUT1085 ...	Petersburg
DUT1086 ...	Valley
DUT1088 ...	Seward
DUT1093 ...	Bailly
DUT1097 ...	Rock River
DUT1098 ...	Blackhawk
DUT1100 ...	Sewaren
DUT1103 ...	Milton R Young
DUT1109 ...	Riverside
DUT1111 ...	E D Edwards
DUT1112 ...	Lieberman
DUT1113 ...	Sequoyah Nuclear
DUT1116 ...	Waiau
DUT1117 ...	Columbia
DUT1118 ...	Cooper
DUT1122 ...	Edgewater
DUT1123 ...	Waukegan
DUT1132 ...	Cumberland
DUT1133 ...	J R Whiting
DUT1138 ...	Harbor
DUT1140 ...	Morgan Creek
DUT1142 ...	Victoria
DUT1143 ...	East River
DUT1145 ...	Honolulu
DUT1146 ...	Devon
DUT1148 ...	Council Bluffs
DUT1152 ...	Coffeen
DUT1153 ...	Mill Creek
DUT1154 ...	McClellan
DUT1155 ...	P H Robinson
DUT1156 ...	John Sevier
DUT1157 ...	Sterlington
DUT1161 ...	Robert E Ritchie
DUT1165 ...	Big Bend
DUT1167 ...	Ninemile Point
DUT1169 ...	Hudson
DUT1170 ...	Carl Bailey
DUT1172 ...	Barney M Davis
DUT1173 ...	Logansport
DUT1174 ...	Arkansas Nuclear One
DUT1175 ...	Fox Lake
DUT1179 ...	Pirkey
DUT1185 ...	Cromby
DUT1186 ...	Glenwood
DUT1187 ...	Mountain Creek
DUT1189 ...	Larsen Memorial
DUT1191 ...	Monroe
DUT1192 ...	Meramec
DUT1194 ...	Gerald Andrus
DUT1198 ...	O H Hutchings
DUT1202 ...	Manitowoc
DUT1206 ...	Indian River
DUT1209 ...	Widows Creek
DUT1211 ...	Surry Nuclear
DUT1212 ...	J M Stuart
DUT1213 ...	Riverside
DUT1214 ...	Charles R Lowman
DUT1217 ...	Deepwater
DUT1219 ...	Port Washington
DUT1223 ...	Nueces Bay
DUT1225 ...	Burlington
DUT1227 ...	Sibley
DUT1228 ...	Willow Glen
DUT1229 ...	Riverton
DUT1235 ...	Riverside
DUT1238 ...	Cedar Bayou
DUT1248 ...	Knox Lee
DUT1249 ...	Oak Creek
DUT1250 ...	Vermont Yankee Nuclear
DUT1252 ...	Muskogee
DUT1258 ...	St Clair
DUT1259 ...	James De Young
DUT1261 ...	Green River
DUT1265 ...	River Crest
DUT1268 ...	Calvert Cliffs Nuclear
DUT1269 ...	Dean H Mitchell
DUT1270 ...	Pueblo
DUT1271 ...	Michigan City
DUT1272 ...	Monticello
DUT1273 ...	Sim Gideon

Facility ID	Facility name
DUT1274 ...	P L Bartow
DUT1275 ...	Anclote
DUT1276 ...	Animas
DUT1278 ...	Newton

List of Subjects

40 CFR Part 9

Environmental protection, Reporting and recordkeeping requirements.

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 123

Environmental protection, Administrative practice and procedure, Confidential business information, Hazardous substances, Indians-lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Water pollution control.

40 CFR Part 124

Environmental protection, Administrative practice and procedure, Air pollution control, Hazardous waste, Indians-lands, Reporting and recordkeeping requirements, Water pollution control, Water supply.

40 CFR Part 125

Environmental protection, Cooling water intake structure, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

■ For the reasons set forth in the preamble, chapter I of title 40 of the Code of Federal Regulations is amended as follows:

PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT

■ 1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671, 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

■ 2. In § 9.1 the table is amended by revising the entry for ''122.21(r)'' and by adding entries in numerical order under the indicated heading to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB Control No.
* * * * *	
EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	
* * * * *	
122.21(r)	2040–0241, 2040–0257
* * * * *	
Criteria and Standards for the National Pollutant Discharge Elimination System	
* * * * *	
125.95	2040–0257
125.96	2040–0257
125.97	2040–0257
125.98	2040–0257
125.99	2040–0257
* * * * *	

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. Section 122.21 is amended by revising paragraph (r)(1) and by adding a new paragraph (r)(5) to read as follows:

§ 122.21 Application for a permit (applicable to State programs, see § 123.25)

* * * * *

(r) *Application requirements for facilities with cooling water intake structures*—(1)(i) *New facilities with new or modified cooling water intake structures.* New facilities with cooling water intake structures as defined in part 125, subpart I, of this chapter must submit to the Director for review the information required under paragraphs (r)(2), (3), and (4) of this section and § 125.86 of this chapter as part of their application. Requests for alternative requirements under § 125.85 of this chapter must be submitted with your permit application.

(ii) *Phase II existing facilities.* Phase II existing facilities as defined in part 125, subpart J, of this chapter must submit to the Director for review the information required under paragraphs (r)(2), (3), and (5) of this section and all applicable provisions of § 125.95 of this chapter as part of their application except for the Proposal for Information Collection which must be provided in accordance with § 125.95(b)(1).

* * * * *

(5) *Cooling water system data.* Phase II existing facilities as defined in part 125, subpart J of this chapter must provide the following information for each cooling water intake structure they use:

(i) A narrative description of the operation of the cooling water system, its relationship to cooling water intake structures, the proportion of the design intake flow that is used in the system, 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; and

(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.

■ 3. Section 122.44 is amended by revising paragraph (b)(3) to read as follows:

§ 122.44 Establishing limitations, standards, and other permit conditions (applicable to State NPDES programs, see § 123.25).

* * * * *

(b) * * *

(3) Requirements applicable to cooling water intake structures under section 316(b) of the CWA, in accordance with part 125, subparts I and J, of this chapter.

* * * * *

PART 123—STATE PROGRAM REQUIREMENTS

■ 1. The authority citation for part 123 continues to read as follows:

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

■ 2. Section 123.25 is amended by revising paragraphs (a)(4) and (36) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(4) § 122.21 (a)-(b), (c)(2), (e)-(k), (m)-(p), (q), and (r)—(Application for a permit);

* * * * *

(36) Subparts A, B, D, H, I, and J of part 125 of this chapter;

* * * * *

PART 124—PROCEDURES FOR DECISIONMAKING

■ 1. The authority citation for part 124 continues to read as follows:

Authority: Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*; Safe Drinking Water Act, 42 U.S.C. 300f *et seq.*; Clean Water Act, 33 U.S.C. 1251 *et seq.*; Clean Air Act, 42 U.S.C. 7401 *et seq.*

■ 2. Section 124.10 is amended by revising paragraph (d)(1)(ix) to read as follows:

§ 124.10 Public notice of permit actions and public comment period.

* * * * *

(d) * * *

(1) * * *

(ix) Requirements applicable to cooling water intake structures under section 316(b) of the CWA, in accordance with part 125, subparts I and J, of this chapter.

* * * * *

PART 125—CRITERIA AND STANDARDS FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

■ 1. 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.

■ 2. Add subpart J to part 125 to read as follows:

Subpart J—Requirements Applicable to Cooling Water Intake Structures for Phase II Existing Facilities Under Section 316(b) of the Act

Sec.

Subpart J—Requirements Applicable to Cooling Water Intake Structures for Phase II Existing Facilities Under Section 316(b) of the Act

§ 125.90 What are the purpose and scope of this subpart?

(a) This subpart establishes requirements that apply to the location, design, construction, and capacity of cooling water intake structures at existing facilities that are subject to this subpart (*i.e.*, Phase II existing facilities). The purpose of these requirements is to establish the best technology available for minimizing adverse environmental impact associated with the use of cooling water intake structures. These requirements are implemented through National Pollutant Discharge Elimination System (NPDES) permits issued under section 402 of the Clean Water Act (CWA).

(b) Existing facilities that are not subject to requirements under this or another subpart of this part must meet requirements under section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPJ) basis.

(c) *Alternative regulatory requirements.* Notwithstanding any other provision of this subpart, if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements in its NPDES program that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94, the Administrator must approve such alternative regulatory requirements.

(d) 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 not less stringent than those required by Federal law.

§ 125.91 What is a ''Phase II Existing Facility''?

(a) An existing facility, as defined in § 125.93, is a Phase II existing facility 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 of 50 million gallons per day (MGD) or more to withdraw cooling water from waters of the United States;

(3) As its primary activity, the facility both generates and transmits electric power, or generates electric power but sells it to another entity for transmission; and

(4) It uses at least 25 percent of water withdrawn exclusively for cooling purposes, measured on an average annual basis.

(b) In the case of a Phase II existing facility that is co-located with a manufacturing facility, only that portion of the combined cooling water intake flow that is used by the Phase II facility to generate electricity for sale to another entity will be considered for purposes of determining whether the 50 MGD and 25 percent criteria in paragraphs (a)(2) and (4) of this section have been exceeded.

(c) 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 withdraws water from waters of the United States but is not itself a Phase II existing facility, except as provided in paragraph (d) of this section. This provision is intended to prevent circumvention of these requirements by creating arrangements to receive cooling water from an entity that is not itself a Phase II existing facility.

(d) Notwithstanding paragraph (c) of this section, obtaining cooling water from a public water system or using treated effluent as cooling water does not constitute use of a cooling water intake structure for purposes of this subpart.

§ 125.92 [Reserved]

§ 125.93 What special definitions apply to this subpart?

In addition to the definitions provided in § 122.3 of this chapter, the following special definitions apply to this subpart:

Adaptive management method is a type of project management method where a facility chooses an approach to meeting the project goal, monitors the effectiveness of that approach, and then based on monitoring and any other relevant information, makes any adjustments necessary to ensure continued progress toward the project's goal. This cycle of activity is repeated as necessary to reach the project's goal.

Annual mean flow means the average of daily flows over a calendar year.

All life stages means eggs, larvae, juveniles, and adults.

Calculation baseline means 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 your 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 of reducing impingement mortality and entrainment. You may also choose to use the current level of impingement mortality and entrainment as the calculation baseline. The calculation baseline may be estimated using: historical impingement mortality and entrainment data from your facility or from another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of your cooling water intake structure; or current impingement mortality and entrainment data collected at your facility. You may request that the calculation baseline be modified to be based on a location of the opening of the cooling water intake structure at a depth other than at or near the surface if you can demonstrate to the Director that the other depth would correspond to a higher baseline level of impingement mortality and/or entrainment.

Capacity utilization rate means the ratio between the average annual net generation of power by the facility (in MWh) and the total net capability of the facility to generate power (in MW) multiplied by the number of hours during a year. In cases where a facility has more than one intake structure, and each intake structure provides cooling water exclusively to one or more generating units, the capacity utilization rate may be calculated separately for each intake structure, based on the capacity utilization of the units it services. Applicable requirements under this subpart would then be determined separately for each intake structure. The average annual net generation should be measured over a five year period (if available) of representative operating conditions, unless the facility makes a binding commitment to maintain capacity utilization below 15 percent for the life of the permit, in which case the rate may be based on this commitment. For purposes of this subpart, the capacity utilization rate applies to only that portion of the facility that generates electricity for transmission or sale using a thermal cycle employing the steam water system as the thermodynamic medium.

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 and/or noncontact cooling uses within a facility. The water is usually sent to a cooling canal or channel, lake, pond, or tower to allow waste heat to be dissipated to the atmosphere and then is returned to the system. (Some facilities divert the waste heat to other process operations.) New source water (make-up water) is added to the system to replenish losses that have occurred 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 that is 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 in § 125.91(a)(4).

Cooling water intake structure means the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the U.S. 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.

Design and construction technology means any physical configuration of the cooling water intake structure, or a technology that is placed in the water body in front of the cooling water intake structure, to reduce impingement mortality and/or entrainment. Design and construction technologies include, but are not limited to, location of the intake structure, intake screen systems, passive intake systems, fish diversion and/or avoidance systems, and fish handling and return systems. Restoration measures are not design and construction technologies for purposes of this definition.

Design intake flow means the value assigned (during the cooling water intake structure design) to the total volume of water withdrawn from a source waterbody over a specific time period.

Design intake velocity means the value assigned (during the design of a cooling water intake structure) to the average speed at which intake water passes through the open area of the intake screen (or other device) against which organisms might be impinged or through which they might be entrained.

Diel means daily and refers to variation in organism abundance and density over a 24-hour period due to the influence of water movement, physical or chemical changes, and changes in light intensity.

Entrainment means the incorporation of any life stages of fish and shellfish with intake water flow entering and passing through a cooling water intake structure and into a cooling water system.

Estuary means a semi-enclosed body of water that has a free connection with open seas and within which the seawater is measurably diluted with fresh water derived from land drainage. The salinity of an estuary exceeds 0.5 parts per thousand (by mass) but is typically less than 30 parts per thousand (by mass).

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 does not meet the definition of a new facility at § 125.83.

Freshwater river or stream means a lotic (free-flowing) system that does not receive significant inflows of water from oceans or bays due to tidal action. For the purposes of this rule, a flow-through reservoir with a retention time of 7 days or less will be considered a freshwater river or stream.

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.

Lake or reservoir means any inland body of open water with some minimum surface area free of rooted vegetation and with an average hydraulic retention time of more than 7 days. Lakes or reservoirs might be natural water bodies or impounded streams, usually fresh, surrounded by land or by land and a man-made retainer (*e.g.*, a dam). Lakes or reservoirs might be fed by rivers, streams, springs, and/or local precipitation.

Moribund means dying; close to death.

Natural thermal stratification means the naturally occurring and/or existing division of a waterbody into horizontal layers of differing densities as a result of variations in temperature at different depths.

Ocean means marine open coastal waters with a salinity greater than or

equal to 30 parts per thousand (by mass).

Once-through cooling water system means a system designed to withdraw water from a natural or other water source, use it at the facility to support contact and/or noncontact cooling uses, and then discharge it to a waterbody without recirculation. Once-through cooling systems sometimes employ canals/channels, ponds, or non-recirculating cooling towers to dissipate waste heat from the water before it is discharged.

Operational measure means a modification to any operation at a facility that serves to minimize impact to fish and shellfish from the cooling water intake structure. Examples of operational measures include, but are not limited to: reductions in cooling water intake flow through the use of variable speed pumps and seasonal flow reductions or shutdowns; and more frequent rotation of traveling screens.

Phase II existing facility means any existing facility that meets the criteria specified in § 125.91.

Source water means the waters of the U.S. from which the cooling water is withdrawn.

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 sells 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.

Thermocline means the middle layer of a thermally stratified lake or a reservoir. In this layer, there is a rapid change in temperatures between the top and bottom of the layer.

Tidal river means the most seaward reach of a river or stream where the salinity is typically less than or equal to 0.5 parts per thousand (by mass) at a time of annual low flow and whose surface elevation responds to the effects of coastal lunar tides.

§ 125.94 How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?

(a) *Compliance alternatives.* You must select and implement one of the following five alternatives for establishing best technology available for minimizing adverse environmental impact at your facility:

(1)(i)You may demonstrate to the Director that you have reduced, or will reduce, your flow commensurate with a closed-cycle recirculating system. In this case, you are deemed to have met the applicable performance standards and will *not* be required to demonstrate further that your facility meets the impingement mortality and entrainment performance standards specified in paragraph (b) of this section. In addition, you are not subject to the requirements in §§ 125.95, 125.96, 125.97, or 125.98. However, you may still be subject to any more stringent requirements established under paragraph (e) of this section; or

(ii) You may demonstrate to the Director that you have reduced, or will reduce, your maximum through-screen design intake velocity to 0.5 ft/s or less. In this case, you are deemed to have met the impingement mortality performance standards and will not be required to demonstrate further that your facility meets the performance standards for impingement mortality specified in paragraph (b) of this section and you are not subject to the requirements in §§ 125.95, 125.96, 125.97, or 125.98 as they apply to impingement mortality. However, you are still subject to any applicable requirements for entrainment reduction and may still be subject to any more stringent requirements established under paragraph (e) of this section.

(2) You may demonstrate to the Director that your existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards specified in paragraph (b) of this section and/or the restoration requirements in paragraph (c) of this section.

(3) You may demonstrate to the Director that you have selected, and will install and properly operate and maintain, design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the performance standards specified in paragraph (b) of this section and/or the restoration requirements in paragraph (c) of this section;

(4) You may demonstrate to the Director that you have installed, or will install, and properly operate and maintain an approved design and construction technology in accordance with § 125.99(a) or (b); or

(5) You may demonstrate to the Director that you have selected, installed, and are properly operating and maintaining, or will install and properly operate and maintain design and construction technologies, operational measures, and/or restoration measures that the Director has determined to be the best technology available to minimize adverse environmental impact for your facility in accordance with paragraphs (a)(5)(i) or (ii) of this section.

(i) If the Director determines that data specific to your facility demonstrate that the costs of compliance under alternatives in paragraphs (a)(2) through (4) of this section would be significantly greater than the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards in paragraph (b) of this section, the Director must make a site-specific determination of the best technology available for minimizing adverse environmental impact. This determination must be based on reliable, scientifically valid cost and performance data submitted by you and any other information that the Director deems appropriate. The Director must establish site-specific alternative requirements based on new and/or existing design and construction technologies, operational measures, and/or restoration measures that achieve an efficacy that is, in the judgment of the Director, as close as practicable to the applicable performance standards in paragraph (b) of this section, without resulting in costs that are significantly greater than the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards. The Director's site-specific determination may conclude that design and construction technologies, operational measures, and/or restoration measures in addition to those already in place are not justified because of the significantly greater costs. To calculate the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards you must:

(A) Determine which technology the Administrator modeled as the most appropriate compliance technology for your facility;

(B) Using the Administrator's costing equations, calculate the annualized capital and net operation and maintenance (O&M) costs for a facility with your design intake flow using this technology;

(C) Determine the annualized net revenue loss associated with net construction downtime that the Administrator modeled for your facility to install this technology;

(D) Determine the annualized pilot study costs that the Administrator modeled for your facility to test and optimize this technology;

(E) Sum the cost items in paragraphs (a)(5)(i)(B), (C), and (D) of this section; and

(F) Determine if the performance standards that form the basis of these estimates (*i.e.*, impingement mortality reduction only or impingement mortality and entrainment reduction) are applicable to your facility, and if necessary, adjust the estimates to correspond to the applicable performance standards.

(ii) If the Director determines that data specific to your facility demonstrate that the costs of compliance under alternatives in paragraphs (a)(2) through (4) of this section would be significantly greater than the benefits of complying with the applicable performance standards at your facility, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact. This determination must be based on reliable, scientifically valid cost and performance data submitted by you and any other information the Director deems appropriate. The Director must establish site-specific alternative requirements based on new and/or existing design and construction technologies, operational measures, and/or restoration measures that achieve an efficacy that, in the judgment of the Director, is as close as practicable to the applicable performance standards in paragraph (b) of this section without resulting in costs that are significantly greater than the benefits at your facility. The Director's site-specific determination may conclude that design and construction technologies, operational measures, and/or restoration measures in addition to those already in place are not justified because the costs would be significantly greater than the benefits at your facility.

(b) *National performance standards.*—(1) *Impingement mortality performance standards.* If you choose compliance alternatives in paragraphs (a)(2), (a)(3), or (a)(4) of this section, you must reduce impingement mortality for all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline.

(2) *Entrainment performance standards.* If you choose compliance alternatives in paragraphs (a)(1)(ii), (a)(2), (a)(3), or (a)(4) of this section, you must also reduce entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline if:

(i) Your facility has a capacity utilization rate of 15 percent or greater, and

(ii)(A) Your facility uses cooling water withdrawn from a tidal river, estuary, ocean, or one of the Great Lakes; or

(B) Your facility uses cooling water withdrawn from a freshwater river or stream and the design intake flow of your cooling water intake structures is greater than five percent of the mean annual flow.

(3) *Additional performance standards for facilities withdrawing from a lake (other than one of the Great Lakes) or a reservoir.* If your facility withdraws cooling water from a lake (other than one of the Great Lakes) or a reservoir and you propose to increase the design intake flow of cooling water intake structures it uses, your increased design intake flow must not disrupt the natural thermal stratification or turnover pattern (where present) of the source water, except in cases where the disruption does not adversely affect the management of fisheries. In determining whether any such disruption does not adversely affect the management of fisheries, you must consult with Federal, State, or Tribal fish and wildlife management agencies).

(4) *Use of performance standards for site-specific determinations of best technology available.* The performance standards in paragraphs (b)(1) through (3) of this section must also be used for determining eligibility for site-specific determinations of best technology available for minimizing adverse environmental impact and establishing site specific requirements that achieve an efficacy as close as practicable to the applicable performance standards without resulting in costs that are significantly greater than those considered by the Administrator for a facility like yours in establishing the performance standards or costs that are significantly greater than the benefits at your facility, pursuant to § 125.94(a)(5).

(c) *Requirements for restoration measures.* With the approval of the Director, you may implement and adaptively manage restoration measures that produce and result in increases of fish and shellfish in your facility's watershed in place of or as a supplement to installing design and control technologies and/or adopting operational measures that reduce impingement mortality and entrainment. You must demonstrate to the Director that:

(1) You have evaluated the use of design and construction technologies and operational measures for your facility and determined that the use of restoration measures is appropriate because meeting the applicable performance standards or site-specific requirements through the use of design and construction technologies and/or operational measures alone is less feasible, less cost-effective, or less environmentally desirable than meeting the standards or requirements in whole or in part through the use of restoration measures; and

(2) The restoration measures you will implement, alone or in combination with design and construction technologies and/or operational measures, will produce ecological benefits (fish and shellfish), including maintenance or protection of community structure and function in your facility's waterbody or watershed, at a level that is substantially similar to the level you would achieve by meeting the applicable performance standards under paragraph (b) of this section, or that satisfies alternative site-specific requirements established pursuant to paragraph (a)(5) of this section.

(d)(1) *Compliance using a technology installation and operation plan or restoration plan.* If you choose one of the compliance alternatives in paragraphs (a)(2), (3), (4), or (5) of this section, you may request that compliance with the requirements of § 125.94(b) during the first permit containing requirements consistent with this subpart be determined based on whether you have complied with the construction, operational, maintenance, monitoring, and adaptive management requirements of a Technology Installation and Operation Plan developed in accordance with § 125.95(b)(4)(ii) (for any design and construction technologies and/or operational measures) and/or a Restoration Plan developed in accordance with § 125.95(b)(5) (for any restoration measures). The Technology Installation and Operation Plan must be designed to meet applicable performance standards in paragraph (b) of this section or alternative site-specific requirements developed pursuant to paragraph (a)(5) of this section. The Restoration Plan must be designed to achieve compliance with the applicable requirements in paragraph (c) of this section.

(2) During subsequent permit terms, if you selected and installed design and construction technologies and/or operational measures and have been in compliance with the construction, operational, maintenance, monitoring, and adaptive management requirements of your Technology Installation and Operation Plan during the preceding permit term, you may request that compliance with the requirements of § 125.94 during the following permit term be determined based on whether you remain in compliance with your Technology Installation and Operation Plan, revised in accordance with your adaptive management plan in § 125.95(b)(4)(ii)(C) if applicable performance standards are not being

met. Each request and approval of a Technology Installation and Operation Plan shall be limited to one permit term.

(3) During subsequent permit terms, if you selected and installed restoration measures and have been in compliance with the construction, operational, maintenance, monitoring, and adaptive management requirements in your Restoration Plan during the preceding permit term, you may request that compliance with the requirements of this section during the following permit term be determined based on whether you remain in compliance with your Restoration Plan, revised in accordance with your adaptive management plan in § 125.95(b)(5)(v) if applicable performance standards are not being met. Each request and approval of a Restoration Plan shall be limited to one permit term.

(e) *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.

(f) *Nuclear facilities.* If you demonstrate to the Director based on 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 Nuclear Regulatory Commission's safety requirement.

§ 125.95 As an owner or operator of a Phase II existing facility, what must I collect and submit when I apply for my reissued NPDES permit?

(a)(1) You must submit to the Director the Proposal for Information Collection required in paragraph (b)(1) of this section prior to the start of information collection activities;

(2) You must submit to the Director the information required in 40 CFR 122.21(r)(2), (r)(3) and (r)(5) and any applicable portions of the Comprehensive Demonstration Study (Study), except for the Proposal for Information Collection required by paragraph (b)(1) of this section; and

(i) You must submit your NPDES permit application in accordance with the time frames specified in 40 CFR 122.21(d)(2).

(ii) If your existing permit expires before [Insert date 4 years after date of publication in the FR], you may request that the Director establish a schedule for you to submit the information required by this section as expeditiously as practicable, but not later than [Insert date 3 years and 180 days after date of publication in the FR]. Between the time your existing permit expires and the time an NPDES permit containing requirements consistent with this subpart is issued to your facility, the best technology available to minimize adverse environmental impact will continue to be determined based on the Director's best professional judgment.

(3) In subsequent permit terms, the Director may approve a request to reduce the information required to be submitted in your permit application on the cooling water intake structure(s) and the source waterbody, if conditions at your facility and in the waterbody remain substantially unchanged since your previous application. You must submit your request for reduced cooling water intake structure and waterbody application information to the Director at least one year prior to the expiration of the permit. Your request must identify each required information item in § 122.21(r) and this section that you determine has not substantially changed since the previous permit application and the basis for your determination.

(b) *Comprehensive Demonstration Study.* The purpose of the Comprehensive Demonstration Study (The Study) is to characterize impingement mortality and entrainment, to describe the operation of your cooling water intake structures, and to confirm that the technologies, operational measures, and/or restoration measures you have selected and installed, or will install, at your facility meet the applicable requirements of § 125.94. All facilities except those that have met the applicable requirements in accordance with §§ 125.94(a)(1)(i), 125.94(a)(1)(ii), and 125.94(a)(4) must submit all applicable portions of the Comprehensive Demonstration Study to the Director in accordance with paragraph (a) of this section. Facilities that meet the requirements in § 125.94(a)(1)(i) by reducing their flow commensurate with a closed-cycle, recirculating system are not required to submit a Comprehensive Demonstration Study. Facilities that meet the requirements in § 125.94(a)(1)(ii) by reducing their design intake velocity to 0.5 ft/sec or less are required to submit a Study only for the entrainment requirements, if applicable. Facilities that meet the requirements in § 125.94(a)(4) and have installed and properly operate and maintain an approved design and construction technology (in accordance with § 125.99) are required to submit only the Technology Installation and Operation Plan in paragraph (b)(4) of this section and the Verification Monitoring Plan in paragraph (b)(7) of this section. Facilities that are required to meet only impingement mortality performance standards in § 125.94(b)(1) are required to submit only a Study for the impingement mortality reduction requirements. The Comprehensive Demonstration Study must include:

(1) *Proposal For Information Collection.* You must submit to the Director for review and comment a description of the information you will use to support your Study. The Proposal for Information must be submitted prior to the start of information collection activities, but you may initiate such activities prior to receiving comment from the Director. The proposal must include:

(i) A description of the proposed and/or implemented technologies, operational measures, and/or restoration measures to be evaluated in the Study;

(ii) A list and description of any historical studies characterizing impingement mortality and entrainment and/or the physical and biological conditions in the vicinity of the cooling water intake structures and their relevance to this proposed Study. If you propose to use existing data, you must demonstrate the extent to which the data are representative of current conditions and that the data were collected using appropriate quality assurance/quality control procedures;

(iii) A summary of any past or ongoing consultations with appropriate Federal, State, and Tribal fish and wildlife agencies that are relevant to this Study and a copy of written comments received as a result of such consultations; and

(iv) A sampling plan for any new field studies you propose to conduct in order to ensure that you have sufficient data to develop a scientifically valid estimate of impingement mortality and entrainment at your site. The sampling plan must document all methods and quality assurance/quality control procedures for sampling and data analysis. The sampling and data analysis methods you propose must be appropriate for a quantitative survey and include consideration of the methods used in other studies performed in the source waterbody. The sampling plan must 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).

(2) *Source waterbody flow information.* You must submit to the Director the following source waterbody flow information:

(i) If your cooling water intake structure is located in a freshwater river or stream, you must provide the annual mean flow of the waterbody and any supporting documentation and engineering calculations to support your analysis of whether your design intake flow is greater than five percent of the mean annual flow of the river or stream for purposes of determining applicable performance standards under paragraph (b) of this section. Representative historical data (from a period of time up to 10 years, if available) must be used; and

(ii) If your cooling water intake structure is located in a lake (other than one of the Great Lakes) or a reservoir and you propose to increase its design intake flow, you must provide a description of the thermal stratification in the waterbody, and any supporting documentation and engineering calculations to show that the total design intake flow after the increase will not disrupt the natural thermal stratification and turnover pattern in a way that adversely impacts fisheries, including the results of any consultations with Federal, State, or Tribal fish and wildlife management agencies.

(3) *Impingement Mortality and/or Entrainment Characterization Study.* You must submit to the Director an Impingement Mortality and/or Entrainment Characterization Study whose purpose is to provide information to support the development of a calculation baseline for evaluating impingement mortality and entrainment and to characterize current impingement mortality and entrainment. The Impingement Mortality and/or Entrainment Characterization Study must include the following, in sufficient detail to support development of the other elements of the Comprehensive Demonstration Study:

(i) 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 impingement and entrainment;

(ii) A characterization of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) identified pursuant to paragraph (b)(3)(i) of this section, 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 impingement mortality and 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;

(iii) Documentation of the current impingement mortality and entrainment of all life stages of fish, shellfish, and any species protected under Federal, State, or Tribal Law (including threatened or endangered species) identified pursuant to paragraph (b)(3)(i) of this section and an estimate of impingement mortality and entrainment to be used as the calculation baseline. The documentation may include historical data that are representative of the current operation of your facility and of biological conditions at the site. Impingement mortality and entrainment samples to support the calculations required in paragraphs (b)(4)(i)(C) and (b)(5)(iii) of this section 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;

(4) *Technology and compliance assessment information*—(i) *Design and Construction Technology Plan.* If you choose to use design and construction technologies and/or operational measures, in whole or in part to meet the requirements of § 125.94(a)(2) or (3), you must submit a Design and Construction Technology Plan to the Director for review and approval. In the plan, you must provide the capacity utilization rate for your facility (or for individual intake structures where applicable, in accordance with § 125.93) and provide supporting data (including the average annual net generation of the facility (in MWh) measured over a five year period (if available) of representative operating conditions and the total net capacity of the facility (in MW)) and underlying calculations. The plan must explain the technologies and/or operational measures you have in place and/or have selected to meet the requirements in § 125.94. (Examples of potentially appropriate technologies may include, but are not limited to, wedgewire screens, fine mesh screens, fish handling and return systems, barrier nets, aquatic filter barrier systems, vertical and/or lateral relocation of the cooling water intake structure, and enlargement of the cooling water intake structure opening to reduce velocity. Examples of potentially appropriate operational measures may include, but are not limited to, seasonal shutdowns, reductions in flow, and continuous or more frequent rotation of traveling screens.) The plan must contain the following information:

(A) A narrative description of the design and operation of all design and construction technologies and/or operational measures (existing and proposed), including fish handling and return systems, that you have in place or will use to meet the requirements to reduce impingement mortality of those species expected to be most susceptible to impingement, and information that demonstrates the efficacy of the technologies and/or operational measures for those species;

(B) A narrative description of the design and operation of all design and construction technologies and/or operational measures (existing and proposed) that you have in place or will use to meet the requirements to reduce entrainment of those species expected to be the most susceptible to entrainment, if applicable, and information that demonstrates the efficacy of the technologies and/or operational measures for those species;

(C) Calculations of the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved by the technologies and/or operational measures you have selected based on the Impingement Mortality and/or Entrainment Characterization Study in paragraph (b)(3) of this section. In determining compliance with any requirements to reduce impingement mortality or entrainment, you must assess the total reduction in impingement mortality and entrainment against the calculation baseline determined in accordance with paragraph (b)(3) of this section. Reductions in impingement mortality and entrainment from this calculation baseline as a result of any design and construction technologies and/or operational measures already implemented at your facility should be added to the reductions expected to be achieved by any additional design and/or construction technologies and operational measures that will be implemented, and any increases in fish and shellfish within the waterbody attributable to your restoration measures. Facilities that recirculate a portion of their flow, but do not reduce

flow sufficiently to satisfy the compliance option in § 125.94(a)(1)(i) may take into account the reduction in impingement mortality and entrainment associated with the reduction in flow when determining the net reduction associated with existing design and construction technologies and/or operational measures. This estimate must include a site-specific evaluation of the suitability of the technologies and/or operational measures based on the species that are found at the site, and may be determined based on representative studies (*i.e.*, studies that have been conducted at a similar facility's cooling water intake structures located in the same waterbody type with similar biological characteristics) and/or site-specific technology prototype or pilot studies; and

(D) Design and engineering calculations, drawings, and estimates prepared by a qualified professional to support the descriptions required by paragraphs (b)(4)(i)(A) and (B) of this section.

(ii) *Technology Installation and Operation Plan.* If you choose the compliance alternative in § 125.94(a)(2), (3), (4), or (5) and use design and construction technologies and/or operational measures in whole or in part to comply with the applicable requirements of § 125.94, you must submit the following information with your application for review and approval by the Director:

(A) A schedule for the installation and maintenance of any new design and construction technologies. Any downtime of generating units to accommodate installation and/or maintenance of these technologies should be scheduled to coincide with otherwise necessary downtime (*e.g.*, for repair, overhaul, or routine maintenance of the generating units) to the extent practicable. Where additional downtime is required, you may coordinate scheduling of this downtime with the North American Electric Reliability Council and/or other generators in your area to ensure that impacts to reliability and supply are minimized;

(B) List of operational and other parameters to be monitored, and the location and frequency that you will monitor them;

(C) List of activities you will undertake to ensure to the degree practicable the efficacy of installed design and construction technologies and operational measures, and your schedule for implementing them;

(D) A schedule and methodology for assessing the efficacy of any installed design and construction technologies and operational measures in meeting applicable performance standards or site-specific requirements, including an adaptive management plan for revising design and construction technologies, operational measures, operation and maintenance requirements, and/or monitoring requirements if your assessment indicates that applicable performance standards or site-specific requirements are not being met; and

(E) If you choose the compliance alternative in § 125.94(a)(4), documentation that the appropriate site conditions in § 125.99(a) or (b) exist at your facility.

(5) *Restoration Plan.* If you propose to use restoration measures, in whole or in part, to meet the applicable requirements in § 125.94, you must submit the following information with your application for review and approval by the Director. You must address species of concern identified in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by your cooling water intake structure(s).

(i) A demonstration to the Director that you have evaluated the use of design and construction technologies and/or operational measures for your facility and an explanation of how you determined that restoration would be more feasible, cost-effective, or environmentally desirable;

(ii) A narrative description of the design and operation of all restoration measures (existing and proposed) that you have in place or will use to produce fish and shellfish;

(iii) Quantification of the ecological benefits of the proposed restoration measures. You must use information from the Impingement Mortality and/or Entrainment Characterization Study required in paragraph (b)(3) of this section, and any other available and appropriate information, to estimate the reduction in fish and shellfish impingement mortality and/or entrainment that would be necessary for your facility to comply with § 125.94(c)(2). You must then calculate the production of fish and shellfish that you will achieve with the restoration measures you will or have already installed. You must include a discussion of the nature and magnitude of uncertainty associated with the performance of these restoration measures. You must also include a discussion of the time frame within which these ecological benefits are expected to accrue;

(iv) Design calculations, drawings, and estimates to document that your proposed restoration measures in combination with design and construction technologies and/or operational measures, or alone, will meet the requirements of § 125.94(c)(2). If the restoration measures address the same fish and shellfish species identified in the Impingement Mortality and/or Entrainment Characterization Study (in-kind restoration), you must demonstrate that the restoration measures will produce a level of these fish and shellfish substantially similar to that which would result from meeting applicable performance standards in § 125.94(b), or that they will satisfy site-specific requirements established pursuant to § 125.94(a)(5). If the restoration measures address fish and shellfish species different from those identified in the Impingement Mortality and/or Entrainment Characterization Study (out-of-kind restoration), you must demonstrate that the restoration measures produce ecological benefits substantially similar to or greater than those that would be realized through in-kind restoration. Such a demonstration should be based on a watershed approach to restoration planning and consider applicable multi-agency watershed restoration plans, site-specific peer-reviewed ecological studies, and/or consultation with appropriate Federal, State, and Tribal fish and wildlife management agencies.

(v) A plan utilizing an adaptive management method for implementing, maintaining, and demonstrating the efficacy of the restoration measures you have selected and for determining the extent to which the restoration measures, or the restoration measures in combination with design and construction technologies and operational measures, have met the applicable requirements of § 125.94(c)(2). The plan must include:

(A) A monitoring plan that includes a list of the restoration parameters that will be monitored, the frequency at which you will monitor them, and success criteria for each parameter;

(B) A list of activities you will undertake to ensure the efficacy of the restoration measures, a description of the linkages between these activities and the items in paragraph (b)(5)(v)(A) of this section, and an implementation schedule; and

(C) A process for revising the Restoration Plan as new information, including monitoring data, becomes available, if the applicable requirements under § 125.94(c)(2) are not being met.

(vi) A summary of any past or ongoing consultation with appropriate Federal, State, and Tribal fish and wildlife management agencies on your use of restoration measures including a copy of

any written comments received as a result of such consultations;

(vii) If requested by the Director, a peer review of the items you submit for the Restoration Plan. You must choose the peer reviewers 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 your cooling water intake structure(s). Peer reviewers must have appropriate qualifications (*e.g.*, in the fields of geology, engineering, and/or biology, etc.) depending upon the materials to be reviewed; and

(viii) A description of the information to be included in a bi-annual status report to the Director.

(6) *Information to support site-specific determination of best technology available for minimizing adverse environmental impact.* If you have requested a site-specific determination of best technology available for minimizing adverse environmental impact pursuant to § 125.94(a)(5)(i) because of costs significantly greater than those considered by the Administrator for a facility like yours in establishing the applicable performance standards of § 125.94(b), you are required to provide to the Director the information specified in paragraphs (b)(6)(i) and (b)(6)(iii) of this section. If you have requested a site-specific determination of best technology available for minimizing adverse environmental impact pursuant to § 125.94(a)(5)(ii) because of costs significantly greater than the benefits of meeting the applicable performance standards of § 125.94(b) at your facility, you must provide the information specified in paragraphs (b)(6)(i), (b)(6)(ii), and (b)(6)(iii) of this section:

(i) *Comprehensive Cost Evaluation Study.* You must perform and submit the results of a Comprehensive Cost Evaluation Study, that includes:

(A) Engineering cost estimates in sufficient detail to document the costs of implementing design and construction technologies, operational measures, and/or restoration measures at your facility that would be needed to meet the applicable performance standards of § 125.94(b);

(B) A demonstration that the costs documented in paragraph (b)(6)(i)(A) of this section significantly exceed either those considered by the Administrator for a facility like yours in establishing the applicable performance standards or the benefits of meeting the applicable performance standards at your facility; and

(C) Engineering cost estimates in sufficient detail to document the costs of implementing the design and construction technologies, operational measures, and/or restoration measures in your Site-Specific Technology Plan developed in accordance with paragraph (b)(6)(iii) of this section.

(ii) *Benefits Valuation Study.* If you are seeking a site-specific determination of best technology available for minimizing adverse environmental impact because of costs significantly greater than the benefits of meeting the applicable performance standards of § 125.94(b) at your facility, you must use a comprehensive methodology to fully value the impacts of impingement mortality and entrainment at your site and the benefits achievable by meeting the applicable performance standards. In addition to the valuation estimates, the benefit study must include the following:

(A) A description of the methodology(ies) used to value commercial, recreational, and ecological benefits (including any non-use benefits, if applicable);

(B) Documentation of the basis for any assumptions and quantitative estimates. If you plan to use an entrainment survival rate other than zero, you must submit a determination of entrainment survival at your facility based on a study approved by the Director;

(C) An analysis of the effects of significant sources of uncertainty on the results of the study; and

(D) If requested by the Director, a peer review of the items you submit in the Benefits Valuation Study. You must choose the peer reviewers 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 your cooling water intake structure. Peer reviewers must have appropriate qualifications depending upon the materials to be reviewed.

(E) A narrative description of any non-monetized benefits that would be realized at your site if you were to meet the applicable performance standards and a qualitative assessment of their magnitude and significance.

(iii) *Site-Specific Technology Plan.* Based on the results of the Comprehensive Cost Evaluation Study required by paragraph (b)(6)(i) of this section, and the Benefits Valuation Study required by paragraph (b)(6)(ii) of this section, if applicable, you must submit a Site-Specific Technology Plan to the Director for review and approval. The plan must contain the following information:

(A) A narrative description of the design and operation of all existing and proposed design and construction technologies, operational measures, and/or restoration measures that you have selected in accordance with § 125.94(a)(5);

(B) An engineering estimate of the efficacy of the proposed and/or implemented design and construction technologies or operational measures, and/or restoration measures. This estimate must include a site-specific evaluation of the suitability of the technologies or operational measures for reducing impingement mortality and/or entrainment (as applicable) of all life stages of fish and shellfish based on representative studies (*e.g.*, studies that have been conducted at cooling water intake structures located in the same waterbody type with similar biological characteristics) and, if applicable, site-specific technology prototype or pilot studies. If restoration measures will be used, you must provide a Restoration Plan that includes the elements described in paragraph (b)(5) of this section.

(C) A demonstration that the proposed and/or implemented design and construction technologies, operational measures, and/or restoration measures achieve an efficacy that is as close as practicable to the applicable performance standards of § 125.94(b) without resulting in costs significantly greater than either the costs considered by the Administrator for a facility like yours in establishing the applicable performance standards, or as appropriate, the benefits of complying with the applicable performance standards at your facility;

(D) Design and engineering calculations, drawings, and estimates prepared by a qualified professional to support the elements of the Plan.

(7) *Verification Monitoring Plan.* If you comply using compliance alternatives in § 125.94(a)(2), (3), (4), or (5) using design and construction technologies and/or operational measures, you must submit a plan to conduct, at a minimum, two years of monitoring to verify the full-scale performance of the proposed or already implemented technologies and/or operational measures. The verification study must begin once the design and construction technologies and/or operational measures are installed and continue for a period of time that is sufficient to demonstrate to the Director whether the facility is meeting the applicable performance standards in § 125.94(b) or site-specific requirements

developed pursuant to § 125.94(a)(5). The plan must provide the following:

(i) Description of the frequency and duration of monitoring, the parameters to be monitored, and the basis for determining the parameters and the frequency and duration for monitoring. The parameters selected and duration and frequency of monitoring must be consistent with any methodology for assessing success in meeting applicable performance standards in your Technology Installation and Operation Plan as required by paragraph (b)(4)(ii) of this section.

(ii) A proposal on how naturally moribund fish and shellfish that enter the cooling water intake structure would be identified and taken into account in assessing success in meeting the performance standards in § 125.94(b).

(iii)A description of the information to be included in a bi-annual status report to the Director.

§ 125.96 As an owner or operator of a Phase II existing facility, what monitoring must I perform?

As an owner or operator of a Phase II existing facility, you must perform monitoring, as applicable, in accordance with the Technology Installation and Operation Plan required by § 125.95(b)(4)(ii), the Restoration Plan required by § 125.95(b)(5), the Verification Monitoring Plan required by § 125.95(b)(7), and any additional monitoring specified by the Director to demonstrate compliance with the applicable requirements of § 125.94.

§ 125.97 As an owner or operator of a Phase II existing facility, what records must I keep and what information must I report?

As an owner or operator of a Phase II existing facility you are required to keep records and report information and data to the Director as follows:

(a) You must keep records of all the data used to complete the permit application and show compliance with the requirements of § 125.94, any supplemental information developed under § 125.95, and any compliance monitoring data submitted under § 125.96, for a period of at least three (3) years from date of permit issuance. The Director may require that these records be kept for a longer period.

(b) You must submit a status report to the Director for review every two years that includes appropriate monitoring data and other information as specified by the Director in accordance with § 125.98(b)(5).

§ 125.98 As the Director, what must I do to comply with the requirements of this subpart?

(a) *Permit application.* As the Director, you must review materials submitted by the applicant under 40 CFR 122.21(r) and § 125.95 before each permit renewal or reissuance.

(1) You must review and comment on the Proposal for Information Collection submitted by the facility in accordance with § 125.95(a)(1). You are encouraged to provide comments expeditiously so that the permit applicant can make responsive modifications to its information gathering activities. If a facility submits a request in accordance with § 125.95(a)(2)(ii) for an alternate schedule for submitting the information required in § 125.95, you must approve a schedule that is as expeditious as practicable, but does not extend beyond January 7, 2008. If a facility submits a request in accordance with § 125.95(a)(3) to reduce the information about their cooling water intake structures and the source waterbody required to be submitted in their permit application (other than with the first permit application after September 7, 2004), you must approve the request within 60 days if conditions at the facility and in the waterbody remain substantially unchanged since the previous application.

(2) After receiving the permit application from the owner or operator of a Phase II existing facility, you must determine which of the requirements specified in § 125.94 apply to the facility. In addition, you must review materials to determine compliance with the applicable requirements.

(3) At each permit renewal, you must review the application materials and monitoring data to determine whether new or revised requirements for design and construction technologies, operational measures, or restoration measures should be included in the permit to meet the applicable performance standards in § 125.94(b) or alternative site-specific requirements established pursuant to § 125.94(a)(5).

(b) *Permitting requirements.* Section 316(b) requirements are implemented for a facility through an NPDES permit. As the Director, you must consider the information submitted by the Phase II existing facility in its permit application, and determine the appropriate requirements and conditions to include in the permit based on the compliance alternatives in § 125.94(a). The following requirements must be included in each permit:

(1) *Cooling water intake structure requirements.* The permit conditions must include the requirements that implement the applicable provisions of § 125.94. You must evaluate the performance of the design and construction technologies, operational measures, and/or restoration measures proposed and implemented by the facility and require additional or different design and construction technologies, operational measure, and/or restoration measures, and/or improved operation and maintenance of existing technologies and measures, if needed to meet the applicable performance standards, restoration requirements, or alternative site-specific requirements. In determining compliance with the performance standards for facilities proposing to increase withdrawals of cooling water from a lake (other than a Great Lake) or a reservoir in § 125.94(b)(3), you must consider anthropogenic factors (those not considered ''natural'') unrelated to the Phase II existing facility's cooling water intake structures that can influence the occurrence and location of a thermocline. These include source water inflows, other water withdrawals, managed water uses, wastewater discharges, and flow/level management practices (*e.g.*, some reservoirs release water from deeper bottom layers). As the Director, you must coordinate with appropriate Federal, State, or Tribal fish and wildlife management agencies to determine if any disruption of the natural thermal stratification resulting from the proposed increased withdrawal of cooling water does not adversely affect the management of fisheries. Specifically:

(i) You must review and approve the Design and Construction Technology Plan required in § 125.95(b)(4) to evaluate the suitability and feasibility of the design and construction technology and/or operational measures proposed to meet the performance standards in § 125.94(b) or site-specific requirements developed pursuant to § 125.94(a)(5).

(ii) If the facility proposes restoration measures in accordance with § 125.94(c), you must review and approve the Restoration Plan required under § 125.95(b)(5) to determine whether the proposed measures, alone or in combination with design and construction technologies and/or operational measures, will meet the requirements under § 125.94(c).

(iii) In each reissued permit, you must include a condition in the permit requiring the facility to reduce impingement mortality and entrainment (or to increase fish production, if applicable) commensurate with the efficacy at the facility of the installed design and construction technologies,

operational measures, and/or restoration measures.

(iv) If the facility implements design and construction technologies and/or operational measures and requests that compliance with the requirements in § 125.94 be measured for the first permit term (or subsequent permit terms, if applicable) employing the Technology Installation and Operation Plan in accordance with § 125.95(b)(4)(ii), you must review the Technology Installation and Operation Plan to ensure it meets the requirements of § 125.95(b)(4)(ii). If the Technology Installation and Operation Plan meets the requirements of § 125.95(b)(4)(ii), you must approve the Technology Installation and Operation Plan and require the facility to meet the terms of the plan including any revision to the plan that may be necessary if applicable performance standards or alternative site-specific requirements are not being met. If the facility implements restoration measures and requests that compliance with the requirements in § 125.94 be measured for the first permit term (or subsequent permit terms, if applicable) employing a Restoration Plan in accordance with § 125.95(b)(5), you must review the Restoration Plan to ensure it meets the requirements of § 125.95(b)(5). If the Restoration Plan meets the requirements of § 125.95(b)(5), you must approve the plan and require the facility to meet the terms of the plan including any revision to the plan that may be necessary if applicable performance standards or site-specific requirements are not being met. In determining whether to approve a Technology Installation and Operation Plan or Restoration Plan, you must evaluate whether the design and construction technologies, operational measures, and/or restoration measures the facility has installed, or proposes to install, can reasonably be expected to meet the applicable performance standards in § 125.94(b), restoration requirements in § 125.94(c)(2), and/or alternative site-specific requirements established pursuant to § 125.94(a)(5), and whether the Technology Installation and Operation Plan and/or Restoration Plan complies with the applicable requirements of § 125.95(b). In reviewing the Technology Installation and Operation Plan, you must approve any reasonable scheduling provisions that are designed to ensure that impacts to energy reliability and supply are minimized, in accordance with § 125.95(b)(4)(ii)(A). If the facility does not request that compliance with the requirements in § 125.94 be measured employing a Technology Installation and Operation Plan and/or Restoration Plan, or the facility has not been in compliance with the terms of its current Technology Installation and Operation Plan and/or Restoration Plan during the preceding permit term, you must require the facility to comply with the applicable performance standards in § 125.94(b), restoration requirement in § 125.94(c)(2), and/or alternative site-specific requirements developed pursuant to § 125.94(a)(5). In considering a permit application, you must review the performance of the design and construction technologies, operational measures, and/or restoration measures implemented and require additional or different design and construction technologies, operational measures, and/or restoration measures, and/or improved operation and maintenance of existing technologies and measures, if needed to meet the applicable performance standards, restoration requirements, and/or alternative site-specific requirements.

(v) You must review and approve the proposed Verification Monitoring Plan submitted under § 125.95(b)(7) (for design and construction technologies) and/or monitoring provisions of the Restoration Plan submitted under § 125.95(b)(5)(v) and require that the monitoring continue for a sufficient period of time to demonstrate whether the design and construction technology, operational measures, and/or restoration measures meet the applicable performance standards in § 125.94(b), restoration requirements in 125.94(c)(2) and/or site-specific requirements established pursuant to § 125.94(a)(5).

(vi) If a facility requests requirements based on a site-specific determination of best technology available for minimizing adverse environmental impact, you must review the application materials submitted under § 125.95(b)(6) and any other information you may have, including quantitative and qualitative benefits, that would be relevant to a determination of whether alternative requirements are appropriate for the facility. If a facility submits a study to support entrainment survival at the facility, you must review and approve the results of that study. If you determine that alternative requirements are appropriate, you must make a site-specific determination of best technology available for minimizing adverse environmental impact in accordance with § 125.94(a)(5). You, as the Director, may request revisions to the information submitted by the facility in accordance with § 125.95(b)(6) if it does not provide an adequate basis for you to make this determination. Any alternative site-specific requirements established based on new and/or existing design and construction technologies, operational measures, and/or restoration measures, must achieve an efficacy that is, in your judgement, as close as practicable to the applicable performance standards of § 125.94(b) without resulting in costs that are significantly greater than the costs considered by the Administrator for a like facility in establishing the applicable performance standards in § 125.94(b), determined in accordance with § 125.94(a)(5)(i)(A) through (F), or the benefits of complying with the applicable performance standards at the facility; and

(vii) You must review the proposed methods for assessing success in meeting applicable performance standards and/or restoration requirements submitted by the facility under § 125.95(b)(4)(ii)(D) and/or (b)(5)(v)(A), evaluate those and other available methods, and specify how assessment of success in meeting the performance standards and/or restoration requirements must be determined including the averaging period for determining the percent reduction in impingement mortality and entrainment and/or the production of fish and shellfish. Compliance for facilities who request that compliance be measured employing a Technology Installation and Operation Plan and/or Restoration Plan must be determined in accordance with § 125.98(b)(1)(iv).

(2) *Monitoring conditions.* You must require the facility to perform monitoring in accordance with the Technology Installation and Operation Plan in § 125.95(b)(4)(ii), the Restoration Plan required by § 125.95(b)(5), if applicable, and the Verification Monitoring Plan required by § 125.95(b)(7). In determining any additional applicable monitoring requirements in accordance with § 125.96, you must consider the monitoring facility's Verification Monitoring, Technology Installation and Operation, and/or Restoration Plans, as appropriate. You may modify the monitoring program based on changes in physical or biological conditions in the vicinity of the cooling water intake structure.

(3) *Recordkeeping and reporting.* At a minimum, the permit must require the facility to report and keep records specified in § 125.97.

(4) *Design and construction technology approval*—(i) For a facility that chooses to demonstrate that it has installed and properly operate and maintain a design and construction technology approved in accordance with § 125.99, the Director must review

and approve the information submitted in the Technology Installation and Operation Plan in § 125.95(b)(4)(ii) and determine if it meets the criteria in § 125.99.

(ii) If a person requests approval of a technology under § 125.99(b), the Director must review and approve the information submitted and determine its suitability for widespread use at facilities with similar site conditions in its jurisdiction with minimal study. As the Director, you must evaluate the adequacy of the technology when installed in accordance with the required design criteria and site conditions to consistently meet the performance standards in § 125.94. You, as the Director, may only approve a technology following public notice and consideration of comment regarding such approval.

(5) *Bi-annual status report.* You must specify monitoring data and other information to be included in a status report every two years. The other information may include operation and maintenance records, summaries of adaptive management activities, or any other information that is relevant to determining compliance with the terms of the facility's Technology Operation and Installation Plan and/or Restoration Plan.

§ 125.99 What are approved design and construction technologies?

(a) The following technologies constitute approved design and construction technologies for purposes of § 125.94(a)(4):

(1) Submerged cylindrical wedge-wire screen technology, if you meet the following conditions:

(i) Your cooling water intake structure is located in a freshwater river or stream;

(ii) Your cooling water intake structure is situated such that sufficient ambient counter currents exist to promote cleaning of the screen face;

(iii)Your maximum through-screen design intake velocity is 0.5 ft/s or less;

(iv) The slot size is appropriate for the size of eggs, larvae, and juveniles of all fish and shellfish to be protected at the site; and

(v) Your entire main condenser cooling water flow is directed through the technology. Small flows totaling less than 2 MGD for auxiliary plant cooling uses are excluded from this provision.

(2) A technology that has been approved in accordance with the process described in paragraph (b) of this section.

(b) You or any other interested person may submit a request to the Director that a technology be approved in accordance with the compliance alternative in § 125.94(a)(4) after providing the public with notice and an opportunity to comment on the request for approval of the technology. If the Director approves the technology, it may be used by all facilities with similar site conditions under the Director's jurisdiction. Requests for approval of a technology must be submitted to the Director and include the following information:

(1) A detailed description of the technology;

(2) A list of design criteria for the technology and site characteristics and conditions that each facility must have in order to ensure that the technology can consistently meet the appropriate impingement mortality and entrainment performance standards in § 125.94(b); and

(3) Information and data sufficient to demonstrate that facilities under the jurisdiction of the Director can meet the applicable impingement mortality and entrainment performance standards in § 125.94(b) if the applicable design criteria and site characteristics and conditions are present at the facility.

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