b. What Should Be the Spatial Scale for Trading?

EPA is considering limiting the zone within which trading may occur among Phase II existing facilities subject to section 316(b). Due to site-specific differences in species and life stages of entrained organisms, the scale of the trading zone would be set to minimize these differences as much as possible. Trading would be most protective if it occurred among Phase II existing facilities that generally entrain the same species and life stages at relatively similar densities per unit flow through the facility. Thus, EPA would prefer that trades be conducted by Phase II existing facilities sited in waterbodies that share similar ecological characteristics, regardless of the relative geographic proximity of the facilities to each other. EPA is also considering limiting trades to specific waterbodies, specific watersheds, or general waterbody types (tidal rivers, estuaries, oceans). Preliminary EPA analyses indicate that some of these options may increase the number of Phase II existing facilities eligible to trade and thus may produce sufficient opportunities to reduce the cost of meeting the performance standard, allowing for a broader range of trades.

(1) Specific Waterbody

If section 316(b) trades for Phase II existing facilities were limited on an individual waterbody basis, EPA estimates that there would be a total of 132 Phase II existing facilities in 40 specific waterbodies eligible to trade. In order to be eligible to trade, each facility involved in the trade would need to be located on the same waterbody and required to meet the performance standard of the waterbody. Further limits would have to be placed on trading in very large waterbodies (e.g., Mississippi River, Pacific Ocean, Atlantic Ocean) to ensure that the facilities are within similar climatic zones, and thus entrain similar species. Allowing trading among Phase II existing facilities and those that may be subject to Phase III regulations for cooling water intake structures could increase opportunities for facilities to trade intake control requirements.

(2) Specific Watershed

By limiting trading on a watershed basis, the problems posed by very large waterbodies are eliminated; however, the zone may include different types of waterbodies that may harbor different species of organisms. Hydrologic Unit Codes (HUC) were developed by the United States Geological Survey (USGS) to divide the conterminous United States by drainage basins. As the number of digits in the code increases, the drainage basin delineation becomes more refined. Eight-digit codes represent the fourth level of classification in the hierarchy of hydrologic units, where each code represents all or part of a surface drainage basin. There are 2,150 eight-digit HUCs in the conterminous United States. In order to be eligible to trade under this approach, all facilities involved in the trade would be located in the same eight-digit HUC. EPA invites comment on these and other potential trading zones for section 316(b) trading for Phase II existing facilities.

(3) General Waterbody Type

EPA is also considering a site-specific approach that would require facilities to study and provide data on the numbers, life stages, and species of organisms entrained in order to be properly matched for trading with another Phase II existing facility on the same waterbody type (e.g., tidal river, estuary, ocean, Great Lake) which entrains the similar numbers, life stages, and species of organisms. EPA seeks comment on this approach which allows trades to occur among facilities on the same general waterbody type, but not necessarily the same waterbody.

c. What Should Be the Unit (Credit) for Trading?

A trading option requires a definition of the trading commodity and the unit, or credit, that would be traded. In contrast to pollutant-specific trading, which is normally based on the pounds of a single pollutant released into the environment or reduced from a source, trading of entrained species can involve a variety of fish and shellfish species and their life stages, and may be highly variable among facilities. Therefore, it could be difficult to define a trading unit and substantial oversight would be needed under any of these trading units to determine if the trade complied with the underlying performance standards from year to year, or another appropriate period. In developing this proposal, EPA considered a variety of potential trading credits and invites comment on these and other potential trading units. EPA is specifically interested in comments on whether entrainment trading should be species-specific, have weighted values for different species, or simply be net biomass entrainment expressed in mass. EPA is also considering use of restoration measures in conjunction with any of the trading units discussed below. Please see section VI.E.1 of the preamble to today's proposed rule for additional information and discussion on restoration.

(1) Species Density

Trading based on the density of entrained species life stages (the number of eggs, larvae, juvenile and small fish for all fish and shellfish species entrained per unit of flow through a facility) is EPA's preferred approach because it would account for differences among facilities in the number of organisms entrained per unit flow and would, in a sense, standardize entrainment losses with intake flow withdrawals. Under this approach, trading would be restricted to those Phase II existing facilities sited at waterbodies with similar ecological zones, such as the transitional zone between saline and freshwater portions of an estuary. Because many aquatic species tend to inhabit specific zones within a waterbody during their life histories, restricting trade to individual zones would ensure that similar species at similar densities are traded. In order for a trade to occur, the facilities involved must historically entrain similar species. Under this approach the comparable worth of the unit of flow would be dependent upon the density of the species entrained (see example below). Thus, if a facility entrains twice as many organisms as another facility, its flow would be worth comparably twice as much. This approach would ensure that all species entrained are protected, but may limit the number of trades possible. It is possible that use of this approach may lead to over-protection or under-protection of some species since the average density of all fish and shellfish would be used rather than the density for individual species.

(2) Species Counts

Another option for a trading unit is entrained organism counts by species, life stage, and size. These types of measurements are routinely collected as part of historical facility demonstration studies. This option would be protective of all life stages independently, but would require significant expenditures of time and resources. Entrained organisms would need to be identified to fairly precise taxonomic levels and organized by life stage and size classes. This option would best address the question of different economic values versus ecological values of species since it would allow different monetary values to be set for each species. Although this option would allow for comparable species-by-species trading among Phase II existing facilities, EPA is concerned that it may also result in

complex trading transactions. Also, the number of each species entrained by a facility can vary substantially each year for many reasons, including facility outages and extreme weather events. Substantial oversight might be needed to determine if the trade achieved the underlying technology-based performance standard from year to year, or other appropriate period, for compliance.

(3) Biomass

Another potential measure that can be used for trading is the biomass of entrained organisms. Biomass is defined as the weight of living material (plant and animal) and can be measured in pounds or kilograms. Measuring the biomass of organisms entrained by facility intakes would be relatively fast and easy to quantify. However, the pound/kilogram as a unit of measurement does not take into account species variations found at different facility locations and within multiple waterbody types. Thus, as a result of adopting this unit of measurement, it would be impossible to distinguish between different species, or even different kingdoms. Because the weights of all entrained organisms are combined into a total mass, biomass measurement may not be equally protective of all species and life stages, and larger, heavier organisms may bias final results. Over time, biomass trading may upset the natural equilibrium of certain species and/or impact the functionality of the entire ecosystem should some species be entrained more frequently than others. However, EPA invites comment on whether biomass trading might be limited to certain zones of certain waterbodies or waterbody types, in a manner similar to that described above for species-density trading to address some of these concerns.

d. Example of Section 316(b) Trading Under EPA's Preferred Alternative (Species Density)

Facility A is an existing 750 MGD facility located in an estuary. Facility B is an existing 350 MGD facility located at the mouth of the same estuary. The performance standard for this estuary has been set by the authorized State or Tribe at a 75 percent reduction of entrainment for all facilities. Facility A determines that it can install a cooling tower at relatively low cost. The installation of the cooling tower reduces the facility's flow by 95 percent. Using the standard assumption that entrained organisms behave like passive water molecules, this flow reduction will, on a long-term average basis, reduce entrainment by 95 percent at Facility A. In effect, Facility A has reduced its entrainment by 20 percent more than it needs to in order to provide its share toward meeting the performance standard of 75 percent for the estuary. Because of its small size, Facility B determines that it is not cost effective to reduce entrainment by 75 percent. Instead, Facility B chooses to install fine mesh wedgewire screens, which reduce its entrainment by 60 percent. Facility B could possibly make up for the remaining 15 percent of its share to meet the estuary's performance standard by trading.

Based on historical monitoring data, Facility A entrains alewife, Atlantic croaker, Atlantic menhaden, bay anchovy, blueback herring, silversides, spot, striped bass, weakfish and white perch. The average number, across many years of data, of all life stages of all species entrained is 417,210 fish per day. Per gallon of water used, it entrains 0.000556 fish (417,210/750,000,000).

Facility B also entrains alewife, Atlantic croaker, Atlantic menhaden, bay anchovy, blueback herring, silversides, spot, striped bass, weakfish, and white perch as determined by historical monitoring data. Facility B historically entrains the same species of fish as Facility A as they withdraw water from the same waterbody. The average number, across many years of data, of all life stages of all species entrained is 322,620 fish per day. Per gallon of water used, it entrains 0.000922 fish (322,620/350,000,000). Based on density, Facility B entrains 1.658 times as many fish as Facility A per unit flow (0.000922/0.000556). This is the average density ratio of organisms entrained.

Facility B needs to make up for 15 percent of its share toward the estuary's performance standard for entrainment reduction. Again, using the standard assumption that entrained organisms behave like passive water molecules, the simplified 1:1 relationship between flow and entrainment from Facility A is also used for Facility B in this example. Therefore, Facility B needs to compensate for the environmental effects caused by 15 percent of its flow, or 52,500,000 gallons of resource use (0.15 * 350,000,000). Since Facility A has reduced entrainment 20 percent more than required, it has 150,000,000 gallons of resource use available for trading (0.20 * 750,000,000). A trade could be made between these two facilities because they are located on the same waterbody, they both must install entrainment controls, and the same species are present in their respective entrainment numbers. The average density ratio of organisms entrained multiplied by the gallons of resource use needed by Facility B would equal the gallons of resource use that Facility B would need to buy from Facility A in order to make up for the difference in the density of the species the two facilities entrain. Based on the discrepancy in the average density of organisms entrained as calculated above, in order to trade with Facility A, Facility B must purchase entrainment credits for 1.658 times as many gallons as it needs. Thus, Facility B needs to purchase 87,045,000 gallons of resource use from Facility A (1.658 * 52,500,000).

e. Trading Option for New Facilities

EPA is considering extending a section 316(b) trading program beyond the Phase II rule for existing electric generation facilities. Those facilities that are covered by the Phase I rule (new facilities) might be allowed to participate in a section 316(b) trading program. New facilities could implement technological controls beyond what is required under the Phase I rule. In general, if more facilities were allowed to trade, there would be an increased degree of competitiveness in trading and it would become easier to meet the performance standard because entrainment reductions would be shared by multiple facilities. EPA invites comment on the option of extending a section 316(b) trading program to new facilities.

f. Voluntary Adoption of Trading by Authorized States and Tribes

Under EPA's preferred alternative for section 316(b) trading, authorized States or Tribes would decide whether to voluntarily adopt a section 316(b) trading program. EPA notes that authorized States and Tribes would first need to adopt the appropriate legal authority to conduct a section 316(b) trading program. In general, EPA believes that States and Tribes have a better understanding of the dynamics, value, and overall quality of their local waterbodies based on assigned designated uses, 305(b) monitoring reports, and other relevant information and studies compiled over time. Thus, authorized States or Tribes may be in a better position to judge whether or not to develop and implement a section 316(b) trading program. Although EPA acknowledges that a nationally-run section 316(b) trading program may enhance uniformity, EPA is concerned that a national program may not be feasible because of differences in species; habitats; waterbody characteristics; and the variety, nature, and magnitude of environmental impacts from cooling water intake

structures found across the United States. EPA seeks comment on whether a national registry of trades and associated national trading guidance would be appropriate.

A voluntary program would be administered by the authorized State or Tribe. Authorized States and Tribes that participate could allow trading among facilities to meet the entrainment reduction performance standard. Key environmental and natural resource agencies, industry and its trade associations, and local environmental groups involved in the protection of the watershed would participate in the authorized State or Tribal section 316(b) trading program through the public comment process. The program would also include consultation with from relevant Federal, State and authorized Tribal resource agencies and neighboring authorized States and Tribes where interstate waters are affected (similar to stakeholder involvement under the NPDES permitting program).

g. When Would the Permits Be Reissued to Trading Partners?

If trades under section 316(b) are done on a watershed basis, and permits are synchronized, then permits would be reissued to trading partners at the same time according to the permitting authority's standard permit renewal cycle (e.g., every 5 years). With permitting authorities that have moved toward a watershed permitting strategy, synchronizing the permit renewal process for all trading partners in a geographic area reduces some administrative cost and burden on the permitting authorities.

Alternatively, a trading arrangement may not be specified in the permit. Instead, the permit would include the performance standard and a requirement to meet that standard. Under this approach, trades could occur between permitting cycles. Another option would allow trading of entrainment units between Phase II existing facilities within permit cycles at the discretion of each authorized State or Tribal permitting authority. A disadvantage to this approach is the additional administrative burden borne by the permitting authorities. EPA seeks comment on how to harmonize the reissuance of permits with trading among Phase II existing facilities under section 316(b).

h. Implementation and Enforcement Issues for Section 316(b) Trading

The concept of a section 316(b) trading program for Phase II existing facilities presents many challenges for the permitting program at the Federal, State, or authorized Tribe level. These challenges include development of implementation guidance, incorporation of a section 316(b) trade tracking system within EPA's Permit Compliance System or through some other tracking mechanism, self-reporting on compliance with trade agreements (similar to the self-reporting conducted through use of Discharge Monitoring Reports), determination of the administrative cost and burden of such a trading program and EPA oversight of whether regulatory requirements for impingement and entrainment reduction are met. EPA invites comment on these unique challenges and any others regarding implementation, compliance assessment, and enforcement of a section 316(b) trading program.

VII. Implementation

As in the new facility rule, section 316(b) requirements for Phase II existing facilities would be implemented through the NPDES permit program. Today's proposal would establish application requirements in § 125.95, monitoring requirements in § 125.96, and recordkeeping and reporting requirements in § 125.97 for Phase II existing facilities that have a design intake flow of 50 MGD or more. The proposed regulations also require the Director to review application materials submitted by each regulated facility and include monitoring and recordkeeping requirements in the permit (§ 125.98). EPA will develop a model permit and permitting guidance to assist Directors in implementing these requirements after they are finalized. 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 recordkeeping and reporting requirements in these proposed regulations.

A. When Does the Proposed Rule Become Effective?

Phase II existing facilities subject to today's proposed rule would need to comply with the Subpart J requirements when an NPDES permit containing requirements consistent with Subpart J is issued to the facility. See proposed § 125.92. Under existing NPDES program regulations, this would occur when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued.

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

The NPDES regulations that establish the application process at 40 CFR 122.21(d)(2) generally require that facilities currently holding a permit submit information and data 180 days prior to the end of the permit term, which is five years. If you are the owner or operator of a facility that is subject to this proposed rule, you would be required to submit the information that is required under 40 CFR 122.21(r)(2), (3), and (5) and § 125.95 of today's proposed rule with your application for permit reissuance. This section provides a general discussion of the proposed application requirements for Phase II existing facilities at the outset and then goes into more detail in subsequent subsections. The Director would review the information you provide in your application including the information submitted in compliance with 40 CFR 122.21(r) and § 125.95 and would confirm whether your facility should be regulated as an existing facility under these proposed regulations or as a new facility under regulations that were published on December 19, 2001 (66 FR 65256) and establish the appropriate requirements to be applied to the cooling water intake structure(s).

Today's proposed rule would modify regulations at 40 CFR 122.21(r) to require existing facilities to prepare and submit some of the same information required for new facilities. The proposed application requirements would require owners or operators of Phase II existing facilities to submit two general categories of information when they apply for a reissued NPDES permit. The general categories of information would include (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 the new facilities, however, Phase II existing facilities would not be required to submit the Source Water Baseline Biological Characterization Data required under 40 CFR 122.21(r)(4)). Today's proposed rule would add 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 systems and how they relate to the cooling water intake structures at the facility.

In addition, today's proposed rule would require all Phase II existing facilities to submit the information

required under § 125.95. In general, the proposed application requirements in § 125.95 require all Phase II existing facility applicants, except those that already use a closed-cycle, recirculating cooling system, to submit a Comprehensive Demonstration Study (§ 125.95(b)). This study includes a proposal for information collection; source waterbody information; a characterization of impingement morality and entrainment; a proposal for technologies, operational measures, restoration measures and estimated efficacies; and a plan to conduct monitoring to demonstrate that the proposed technologies and measures achieve the performance levels that were estimated. The following describes the proposed application requirements in more detail.

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

Under the proposed requirements at 40 CFR 122.21(r)(1)(ii), Phase II existing facilities subject to this proposed rule would be 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 would use this information to evaluate the appropriateness of the design and construction technologies proposed by the applicant.

The applicant would be required to submit the following specific data: (1) A narrative description and scale drawings showing the physical configuration of all source waterbodies used by the facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation; (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 zone of influence and the results of such studies; and (3) locational maps.

2. Cooling Water Intake Structure Data (40 CFR 122.21(r)(1)(ii))

Under the proposed requirements at 40 CFR 122.21(r)(1)(ii), Phase II existing facilities would be required to submit the cooling water intake structure data specified at 40 CFR 122.21(r)(3) to characterize the cooling water intake structure and evaluate the potential for impingement and entrainment of aquatic organisms. Information on the design of the intake structure and its location in the water column would allow the permit writer to evaluate which species or life stages would potentially be subject to impingement and entrainment. A diagram of the facility's water balance would be used to identify the proportion of intake water used for cooling, make-up, and process water. The water balance diagram also provides a picture of the total flow in and out of the facility, allowing the permit writer to evaluate compliance with the performance standards.

The applicant would be 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 your 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.

3. Phase II Existing Facility Cooling Water System Description (40 CFR 122.21(r)(1)(ii))

Under the proposed requirements at 40 CFR 122.22(r)(1)(ii), Phase II existing facilities would be 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 structures at the facility. Also proposed to be required is a description of the design intake flow that is attributed to each system and the number of days of the year in operation and any seasonal operation schedules, if applicable. This information would be used by the applicant and the Director in determining the appropriate standards that can be applied to the Phase II facility. Facilities that have closed-cycle, recirculating cooling water systems will be determined to have met the performance standards in § 125.94 if all of their systems are closed-cycle, recirculating cooling systems. These facilities are not required to submit a Comprehensive Demonstration Study. Additionally, if only a portion of the total design intake flow is water withdrawn for a closed-cycle, recirculating cooling system, such facilities may use the reduction in impingement mortality and entrainment that is attributed to the reduction in flow in complying with the performance standards in § 125.94(b).

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

Proposed application requirements at § 125.95(b) would require all existing facilities except those deemed to have met the performance standard in § 125.94(b)(1) (reduced intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling water system) to perform and submit to the Director the results of a Comprehensive Demonstration Study, including data and detailed analyses to demonstrate that you will meet applicable requirements in § 125.94.

The proposed Comprehensive Demonstration Study has seven components.

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

The information required under each of these components of the Comprehensive Demonstration Study may not be required to be submitted by all Phase II existing facilities. Required submittals for your facility would depend on the compliance option you have chosen. All Phase II existing facilities, except those deemed to have met the performance standard in § 125.94(b)(1), would be required to submit a Proposal for Information Collection; a Source Waterbody Flow Information; an Impingement Mortality and Entrainment Characterization Study; a Design and Construction Technology Plan; and a Verification Monitoring Plan. Only those Phase II existing facilities that propose to use restoration measures in whole or in part to meet the performance standards in § 125.94 would be required to submit the Information to Support Proposed Restoration Measures. Only those facilities who choose to demonstrate that a site-specific standard is appropriate for their site would be required to submit Information to Support Site-specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact.

a. Proposal for Information Collection

Before performing the study you would be required to submit to the Director for review and approval, a proposal stating what information would be collected to support the study (see § 125.96(b)(1)). This proposal would provide: (1) A description of the proposed and/or implemented technology(ies) and/or supplemental restoration measures to be evaluated; (2) 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. 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; (3) 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; and (4) 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. The sampling plan would 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. The sampling plan would include a description of the study area (including the area of influence of the cooling water intake structure), and provide taxonomic identifications of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish).

The proposed rule does not specify particular timing requirements for your information collection proposal, but does require review and approval of the proposal by the Director. In general, EPA expects that it would be submitted well in advance of the other permit application materials, so that if the Director determined that additional information was needed to support the application, the facility would have time to collect this information, including additional monitoring as appropriate. In some cases, however, where the facility intends to rely on existing data and there has been no change in conditions at the site since the last permit renewal, a long lead time might not be necessary. This would most likely be the case for subsequent permit renewals following the first renewal after the Phase II requirements go into effect. EPA requests comment on whether it should specify a particular time frame for submitting the information collection proposal, or alternatively, whether it should remove the requirement for approval by the Director.

b. Source Waterbody Flow Information

Under the proposed requirements at § 125.95(b)(2)(i), Phase II existing facilities, except those deemed to meet the performance standard in § 125.94(b)(1), with cooling water intake structures that withdraw cooling water from freshwater rivers or streams would be required to provide 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 would provide information needed to determine which requirements (§ 125.94(b)(2) or (3)) would apply to the facility. The documentation might include either publicly available flow data from a nearby U.S. Geological Survey (USGS) gauging station or actual instream flow monitoring data collected by the facility. The waterbody flow should be compared with the total design flow of all cooling water intake structures at the regulated facility.

Under the proposed requirements at § 125.95(b)(2)(ii), Phase II existing facilities subject to the proposed rule with cooling water intake structures that withdraw cooling water from a lake or reservoir and that propose to increase the facility's design intake flow would be required to submit a narrative description of the waterbody thermal stratification and any supporting documentation and engineering calculations to show that the increased flow meets the requirement not to disrupt the natural thermal stratification or turnover pattern (where present) of the source water except in cases where the disruption is determined to be beneficial to the management of fisheries for fish and shellfish by any fishery management agency(ies) (§ 125.94(b)(4)(ii)). Typically, this natural thermal stratification would 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. This information demonstrates to the permit writer that any increase in design intake flow is maintaining the thermal stratification or turnover pattern (where present) of the source water except in cases where the disruption is determined to be beneficial to the management of fisheries for fish and shellfish by any fishery management agency(ies).

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

The proposed regulations would require that you submit the results of an Impingement Mortality and Entrainment Characterization Study in accordance with § 125.96(b)(3). This characterization would include: (1) Taxonomic identifications of those species of fish and shellfish and their life stages that are in the vicinity of the cooling water intake structure and are most susceptible to impingement and entrainment; (2) a characterization of these species of fish and shellfish and life stages, including a description of the abundance and temporal/spatial characteristics in the vicinity of the cooling water intake structure, based on the collection of a sufficient number of years of data to characterize annual, seasonal, and diel variations in impingement mortality and entrainment (e.g., related to climate/weather differences, spawning, feeding and water column migration); and (3) documentation of the current impingement mortality and entrainment of all life stages of fish and shellfish at the facility and an estimate of impingement mortality and entrainment under the calculation baseline. This documentation may include historical data that are representative of the current operation of the facility and of biological conditions at the site. Impingement mortality and entrainment samples to support the calculations required in § 125.95(b)(4)(iii) and (b)(5)(ii) 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. In addition, this study must include an identification of species that are protected under Federal, State, or Tribal law (including threatened or endangered species) that might be susceptible to impingement and entrainment by the cooling water intake structure(s). The Director might coordinate a review of your 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 addressed.

d. Design and Construction Technology Plan (§ 125.96(b)(4))

If you choose to use existing and/or proposed design and construction technologies or operational measures in whole or in part to meet the requirements of § 125.94, proposed § 125.95(b)(4) would require that you develop and submit a Design and Construction Technology Plan with your application that demonstrates that your facility has selected and would implement the design and construction technologies necessary to reduce impingement mortality and/or entrainment to the levels required. The Agency recognizes that selection of the specific technology or group of technologies for your site would depend on individual facility and waterbody conditions.

Phase II existing facilities seeking to avoid entrainment reduction requirements because their capacity utilization rate is less than 15 percent, would also be required to calculate and submit the capacity utilization rate and supporting data and calculations. The data being requested include (1) the average annual net generation of the facility in (Mwh) measured over a five year period (if available) and representative of operating conditions and (2) the net capacity of the facility (in MW). These data are needed to determine whether the facility has less than a 15 percent utilization rate and would only be required to reduce impingement mortality in accordance with § 125.94(b)(1).

In its application, a Phase II existing facility choosing to use design and construction technologies or operational measures to meet the requirements of § 125.94 would be required to describe the technology(ies) or operational measures they would implement at the facility to reduce impingement mortality and entrainment based on information that demonstrates the efficacy of the technologies for those species most susceptible. Examples of appropriate technologies would include, but are not limited to, wedgewire screens, fine mesh screens, fish handling and return systems, barrier nets, aquatic filter barrier systems, 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 operations of screens, etc.

Phase II existing facilities that are required to meet the proposed ranges to reduce impingement mortality by 80 to 95 percent and entrainment by 60 to 90 percent would be required to provide calculations estimating the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved through the use of existing and/or proposed technologies or operational measures. In determining compliance with any requirements to reduce impingement mortality or entrainment, you must first determine the calculation baseline against which to assess the total reduction in impingement mortality and entrainment. The calculation baseline is defined § 125.93 as an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls. Reductions in impingement mortality and entrainment from this calculation baseline as a result of any design and construction technologies already implemented at your facility would be added to the reductions expected to be achieved by any additional design and construction technologies that would be implemented in order to determine compliance with the performance standards. Facilities that recirculate a portion of their flow 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 technology and operational measures. This estimate must include a site-specific evaluation of the suitability of the technology(ies) based on the species that are found at the site, and/or operational measures and may be determined based on representative studies (i.e., studies that have been conducted at cooling water intake structures located in the same waterbody type with similar biological characteristics) and/or site-specific technology prototype studies.

If your facility already has some existing impingement mortality and entrainment controls, you would need to estimate the calculation baseline. This 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. The proposed rule would specifically require that the following information be submitted in the Design and Construction Technology Plan: (1) A narrative description of the design and operation of all design and construction technologies existing or proposed to reduce impingement mortality; (2) a narrative description of the design and operation of all design and construction technologies existing or proposed to reduce entrainment; (3) 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 operational measures you have selected based on the Impingement Mortality and Entrainment Characterization Study in § 125.95(b)(3); (4) documentation which demonstrates that you have selected the location, design, construction, and capacity of the cooling water intake structure that reflects the best technology available for meeting the applicable requirements in § 125.94; and (5) design calculations, drawings, and estimates to support the narrative descriptions required by steps (1) and (2) above.

Today's proposed rule allows for the Director to evaluate, with information submitted in your application, the performance of any technologies you may have implemented in previous permit terms. Additional or different design and construction technologies may be required if the Director determines that the initial technologies you selected and implemented would not meet the requirements of § 125.94.

e. Information To Support Proposed Restoration Measures (§ 125.94(b)(5))

Under proposed § 125.94(d), Phase II existing facilities subject to the proposed rule may propose to implement restoration measures in lieu of or in combination with design and construction or operational measures to meet the performance standards in § 125.94(b) or site-specific requirements imposed under § 125.94(c). Facilities proposing to use restoration measures would be required to submit the following information to the Director for review as proposed in § 125.95(b)(5). The Director must approve any use of restoration measures.

First, the Phase II existing facility must submit a list and narrative description of the restoration measures the facility has selected and proposes to implement. This list and description should identify the species and other aquatic resources targeted under any restoration measures. The facility also must submit a summary of any past, ongoing, or voluntary consultation with appropriate Federal, State, and Tribal fish and wildlife agencies regarding the

proposed restoration measures that is relevant to the Comprehensive Demonstration Study and a copy of any written comments received as a result of such consultation.

Second, the facility must submit a quantification of the combined benefits from implementing design and construction technologies, operational measures and/or restoration measures and the proportion of the benefits that can be attributed to each. This quantification must include: (1) The percent reduction in impingement mortality and entrainment that would be achieved through the use of any design and construction technologies or operational measures that the facility has selected (i.e., the benefits that would be achieved through impingement and entrainment reduction); (2) a demonstration of the benefits that could be attributed to the restoration measures selected; and (3) a demonstration that the combined benefits of the design and construction technology(ies), operational measures, and/or restoration measures would maintain fish and shellfish at a level comparable to that which you would achieve were you to implement the requirements of § 125.94. They also must establish that biotic community structure and function would be maintained to a level comparable or substantially similar to that which would be achieved through § 125.94 (b) or (c).

If it is not possible to demonstrate quantitatively that restoration measures such as creation of new habitats to serve as spawning or nursery areas or establishment of riparian buffers would achieve comparable performance, a facility may make a qualitative demonstration that such measures would maintain fish and shellfish in the waterbody at a level substantially similar to that which would be achieved under § 125.94. Any qualitative demonstration must be sufficiently substantive to support a demonstration under § 125.94(d).

Third, the facility must submit a plan for implementing and maintaining the efficacy of the restoration measures it has selected as well as supporting documentation to show that the restoration measures, or the restoration measures in combination with design and construction technology(ies) and operational measures, would maintain the fish and shellfish in the waterbody, including the community structure and function, to a level comparable or substantially similar to that which would be achieved through § 125.94(b) and (c). This plan should be sufficient to ensure that any beneficial effects would continue for at least the term of the permit.

Finally, the facility must provide design and engineering calculations, drawings, and maps documenting that the proposed restoration measures would meet the restoration performance standard at § 125.94(d).

The proposed regulations at § 125.98(b)(1)(ii) would require that this information be reviewed by the Director to determine whether the documentation demonstrates that the proposed restoration measures, in conjunction with design and construction technologies and operational measures would maintain the fish and shellfish in the waterbody to a level substantially similar to that which would be achieved under § 125.94.

f. Information To Support Site-Specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact

Under the third compliance option, the owner or operator of a Phase II existing facility may demonstrate to the Director that a site-specific determination of best technology available is appropriate for the cooling water intake structures at that facility if the owner or operator can meet one of the two cost tests specified under § 125.94(c)(1). To be eligible to pursue this approach, the Phase II existing facility must first demonstrate to the Director either (1) that its cost of compliance with the applicable performance standards specified in § 125.94(b) would be significantly greater than the costs considered by the Administrator in establishing such performance standards, or (2) that the existing facility's costs would be significantly greater than benefits of complying with the performance standards at the facility's site. A discussion of applying this cost test is provided in Section VI.A of this proposed rule. Where a Phase II existing facility demonstrates that it meets either of these cost tests, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact. This determination would be based on less costly design and construction technologies, operational measures, and/or restoration measures proposed by the facility and approved by the Director. The Director can approve less costly technologies to the extent justified by the significantly greater cost, and could determine that technologies and measures in addition to those already in place are not justified because of the significantly greater cost.

A Phase II existing facility that meets one of the two cost tests described above must select less costly design and construction technologies, operational measures, and/or restoration measures that would minimize adverse environmental impact to the extent justified by the significantly greater cost. In order to do this, Phase II existing facilities that pursue this option would have to assess the nature and degree of adverse environmental impact associated with their cooling water intake structures, and then identify the best technology available to minimize such impact. Phase II existing facilities would assess adverse environmental impact associated with their cooling water intake structures in the Comprehensive Demonstration Study that would be required to be submitted to the Director under § 125.95(b). This study would include source waterbody flow information, and a characterization of impingement mortality and entrainment, as described in this section of this preamble.

Such facilities also must submit to the Director for approval a Site-Specific Technology Plan. This plan would be based on the Comprehensive Cost Evaluation Study and, for those facilities seeking a site-specific determination of best technology available based on costs significantly greater than benefits, a valuation of monetized benefits (see Section VI.A). It would describe the design and operation of all design and construction technologies, operational measures, and restoration measures selected, and provide information that demonstrates the effectiveness of the selected technologies or measures for reducing the impacts on the species of concern. Existing facilities would be required to submit design calculations, drawings, and estimates to support these descriptions. This plan also would need to include engineering estimates of the effectiveness of the technologies or measures for reducing impingement mortality and entrainment of all life stages of fish and shellfish. It also would need to include a site-specific evaluation of the suitability of the technologies or measures for reducing impingement mortality and entrainment based on representative studies and/or site-specific technology prototype studies. Again, design calculations, drawings and estimates would be required to support such estimates. If a Phase II existing facility intends to use restoration measures in its site-specific approach, it also must submit the information required under

§ 125.95(b)(5). See preamble Section VII.B.4.e. Finally, the Site-Specific Technology Plan would have to include documentation that the technologies, operational measures or restoration measures selected would reduce impingement mortality and entrainment to the extent necessary to satisfy the requirements of § 125.94 (i.e., the level of performance would be reduced only to the extent justified by the significantly greater cost).

g. Verification Monitoring Plan

Finally, proposed § 125.95(b)(7) would require all Phase II existing facilities, except those deemed to meet the performance standard in § 125.94(b)(1), to submit a Verification Monitoring Plan to measure the efficacy of the implemented design and construction technologies, operational measures, and restoration measures. The plan would include a monitoring study lasting at least two years to verify the full-scale performance of the proposed or already implemented technologies and of any additional operational and restoration measures. The plan would be required to describe the frequency of monitoring and the parameters to be monitored and the bases for determining these. The Director would use the verification monitoring to confirm that the facility is meeting the level of impingement mortality and entrainment reduction expected and that fish and shellfish are being maintained at the level expected (as required in § 125.94(b)). Verification monitoring would be required to begin once the technologies, operational measures, or supplemental restoration measures are implemented and continue for a sufficient period of time (but at least two years) to demonstrate that the facility is reducing impingement mortality and entrainment to the level of reduction required at § 125.94(b) or (c).

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

The Director's first step would be to determine whether the facility is covered by this rule. If the answer to all the following questions is yes, the facility would be required to comply with the requirements of this proposed rule.

(1) Does the facility both generate and transmit electric power or generate electric power but sell it to another entity for transmission?

(2) Is the facility an ''existing facility'' as defined in § 125.93?

(3) Does the facility withdraw cooling water from waters of the U.S.; *or* does the facility obtain cooling water by any sort of contract or arrangement with an independent (supplier or multiple suppliers) of cooling water if the supplier(s) withdraw(s) water from waters of the U.S. and is not a public water system?

(4) Is at least 25 percent of the water withdrawn by the facility used for cooling purposes?

(5) Does the facility have a design intake flow of 50 million gallons or more per day (MGD)? [70]

(6) Does the facility discharge pollutants to waters of the U.S., including storm water-only discharges, such that the facility has or is required to have an NPDES permit?

The Director's second step would be to determine whether the facility proposes to comply by demonstrating that its existing design and construction technologies, operational measures, or restoration measures meet the proposed performance standards (Option 1); by implementing design and construction technologies, operational measures, or restoration measures that, in combination with existing technologies and operational measures, meet the proposed performance standards (Option 2); or by seeking a site-specific determination of best technology available to minimize adverse environmental impact (Option 3) (see, § 125.98(1)). The Director also would need to determine whether the facility's utilization rate is less than 15 percent, since such facilities are only subject to impingement mortality performance requirements.

Where a Phase II existing facility selects Option 1 and chooses to demonstrate that its existing design and construction technologies, operational measures, or restoration measures meet the proposed performance standards, the Director would verify either that the existing facility satisfies the reduced intake capacity requirement, or that the facility meets the impingement and entrainment reduction and other requirements. Facilities that have closed-cycle, recirculating cooling water systems would meet the reduced intake capacity requirement, and would not be subject to further performance standards. Other methods of reducing intake capacity also could be used but would need to be commensurate with the level that can be attained by a closed-cycle, recirculating cooling water system.

Under Option 1, to verify that existing controls meet the impingement and entrainment reduction requirements in the proposed rule, the Director would need to (1) verify the facility's baseline calculation; (2) confirm the location of the facility's cooling water intake structure(s); (3) verify the withdrawal percentage of mean annual flow; (4) review impingement and/or entrainment rates or estimates; and (5) consider any use of restoration. These same steps also would be part of determining requirements under Options 2 and 3, as discussed below.

The Director would initially review and verify the calculation baseline estimate submitted by the facility under § 125.95(b)(iii). This estimate must be consistent with the proposed definition of the term ''calculation baseline'' and must be representative of current biological conditions at the facility. The Director would then review the information that the facility provides to validate the source waterbody type in which the cooling water intake structure is located (freshwater river or stream; lake or reservoir; or estuary, tidal river, ocean, or Great Lake). The Director would review the supporting material the applicant provided in the permit application to document the physical placement of the cooling water intake structure. For existing facilities with one or more cooling water intake structures located in a freshwater river or stream, the Director would need to determine whether the facility withdraws more or less than five percent of the mean annual flow, which determines whether impingement, or impingement and entrainment controls would apply. For facilities with cooling water intake structures located on lakes or reservoirs other than a Great Lake for which the facility seeks to increase the design flow, the Director would need to determine whether the increased intake flow would disrupt the natural thermal stratification or turnover pattern of the source waterbody. In making this determination the Director would need to consider anthropogenic factors that can influence the occurrence and location of a thermocline, and would need to coordinate with appropriate Federal, State, or Tribal fish and wildlife agencies to determine if the disruption is beneficial to the management of the fisheries. Both of these determinations would be based on the source waterbody flow information required under proposed § 125.95(b)(2).

For Phase II existing facilities that use or propose to implement restoration measures to meet the requirements of § 125.94(b), the Director would review the evaluation of any current or proposed restoration measures submitted under proposed

[70] If the answer is no to these flow parameters and yes to all the other questions, the Director would use best professional judgment on a case-by-case basis to establish permit conditions that ensure compliance with section 316(b).

§ 125.95(b)(5). The Director could gather additional information and solicit input for the review from appropriate fishery management agencies as necessary. The Director would need to determine whether the current or proposed measures would maintain the fish and shellfish in the waterbody at comparable levels to those that would be achieved under § 125.94, as well as review and approve the proposed Verification and Monitoring Plan to ensure the restoration measures meet § 125.94(d) and 125.95(b)(3).

Finally, the Director would review impingement and/or entrainment data or estimates to determine whether in-place or identified controls achieve the performance standards proposed for the different categories of source waterbodies. This step would involve comparing the calculation baseline with the impingement and/or entrainment data or estimates provided as part of the Comprehensive Demonstration Study required under § 125.95(b) and the Impingement Mortality and Entrainment Characterization Study required under § 125.95(b)(3). It may also entail considering whether, how, and to what extent restoration would allow the facility to meet applicable performance standards.

If the Director determines that the Comprehensive Demonstration Study submitted does not demonstrate that the technologies, operational measures, and supplemental restoration measures employed would achieve compliance with the applicable performance standards, the Director may issue a permit requiring such compliance. If such studies are approved and a permit is issued but the Director later determines, based on the results of subsequent monitoring, that the technologies, operational measures, and supplemental restoration measures did not meet the rule standards, the Director could require the existing facility to implement additional technologies and operational measures as necessary to meet the rule requirements. In general, this would occur at the next renewal of the permit. The Director would also review the facility's Technology Verification Plan for post-operational monitoring to demonstrate that the technologies are performing as predicted.

Under compliance Option 2, the same general steps would be followed as described above for assessing compliance of existing controls with applicable performance standards except that under this option the Phase II existing facility would be demonstrating that the technologies and measures identified would meet (rather than currently meet) the applicable performance standards. This review would also be based on data submitted in the Comprehensive Demonstration Study required under § 125.95(b).

These same basic steps also apply to facilities seeking to comply under Option 3, however, the Director must make two additional determinations under this option, including whether the facility meets one of the applicable cost tests and whether any alternative requirements are justified by significantly greater costs. Under Option 3, a Director must first determine whether a Phase II existing facility satisfies either of the cost tests proposed at § 125.94(c). Phase II existing facilities seeking to comply under this option are required to submit a Comprehensive Cost Evaluation Study under § 125.95(b)(6), which includes data that document the cost of implementing design and construction technologies or operational measures to meet the requirements of § 125.94, as well as the costs of alternative technologies or operational measures proposed. The Director would need to review these data, including detailed engineering cost estimates, and compare these with the costs the Agency considered in establishing these requirements. Where the Director finds that the facility's cost of implementation are significantly greater than those considered during rule development, he or she must approve site-specific requirements and could approve alternative technologies or operational measures. Such alternative technologies or operational measures could be those proposed by the facility in the Site-Specific Technology Plan, but less protective requirements would have to be justified by the significantly greater costs.

Where a Phase II existing facility seeks site-specific requirements based on facility costs that are significantly greater than the environmental benefits of compliance, the facility must submit a Valuation of Monetized Benefits of Reducing Impingement and Entrainment. The Director must review this valuation to determine whether it fully values the impacts of the cooling water intake structures at issue, as required in § 125.95(b)(6)(ii), and whether the facility's cost of implementation are significantly greater than the environmental benefits of complying with the requirements of § 125.94. If the Director determines that the implementation costs are significantly greater than the environmental benefits, the Director must approve site-specific requirements and could approve alternative technologies or operational measures. Such alternative technologies or operational measures could be those proposed by the facility in the Site-Specific Technology Plan, but less protective requirements would have to be justified by the significantly greater costs. EPA is interested in ways to decrease application review time and make this process both efficient and effective.

D. What Would I Be Required To Monitor?

Proposed § 125.96 provides that Phase II existing facilities would have to perform monitoring to demonstrate compliance with the requirements of § 125.94 as prescribed by the Director. In establishing such monitoring requirements, the Director should consider the need for biological monitoring data, including impingement and entrainment sampling data sufficient to assess the presence, abundance, life stages, and mortality (including eggs, larvae, juveniles, and adults) of aquatic organisms (fish and shellfish) impinged or entrained during operation of the cooling water intake structure. These data could be used by the Director in developing permit conditions to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit. The Director should ensure, where appropriate, that any required sampling would 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 should also consider if a reduced frequency in biological monitoring may be justified over time if the supporting data show that the technologies are consistently performing as projected under all operating and environmental conditions and less frequent monitoring would still allow for the detection of any future performance fluctuations. The Director should further consider whether weekly visual or remote or similar inspections should be required to ensure that any technologies that have been implemented to reduce impingement mortality or entrainment are being maintained and operated in a manner that ensures that they function as designed. Monitoring requirements could be imposed on Phase II existing facilities that have been deemed to meet the performance standard in § 125.94(b)(1) to the extent consistent with the provisions of the NPDES program.

E. How Would Compliance Be Determined?

This proposed rule would be implemented by the Director placing conditions consistent with this proposed rule in NPDES permits. To demonstrate compliance, the proposed rule would require that the following information be submitted to the Director:

- Data submitted with the NPDES permit application to show that the facility is in compliance with location, design, construction, and capacity requirements;
- Compliance monitoring data and records as prescribed by the Director.

Proposed § 125.97 would require existing facilities to keep records and report compliance monitoring data in a yearly status report. In addition, Directors may perform their own compliance inspections as deemed appropriate (see CFR 122.41).

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

Section 316(b) requirements are implemented through NPDES permits. Today's proposed regulations would 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 proposed rule would affect 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 proposed 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 requested.

EPA recognizes that some States have invested considerable effort in developing section 316(b) regulations and implementing programs. EPA is proposing regulations that would allow States to continue to use these programs by including in this national rule a provision that allows States to use their existing program if the State establishes that such programs would achieve comparable environmental performance. Specifically, the proposed rule would allow any State to demonstrate to the Administrator that it has adopted alternative regulatory requirements that would result in environmental performance within each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that would be achieved under § 125.94. EPA invites comment on such ''functionally equivalent'' programs. In particular, EPA invites comment on the proposed alternative and on decision criteria EPA should consider in determining whether a State program is functionally equivalent. If EPA adopts such an approach, the Agency would also need to specify the process through which an existing State program is evaluated and whether such process can occur under the existing State program regulations or whether additional regulations to provide the evaluation criteria are needed.

Finally, EPA invites comment on the role of restoration and habitat enhancement projects as part of any ''functionally equivalent'' State programs.

In addition to updating their programs to be consistent with today's proposed rule, States and Tribes authorized to implement the NPDES program would be required to implement the cooling water intake structure requirements following promulgation of the proposed regulations. The requirements would have to be implemented upon the issuance or reissuance of permits containing the requirements of proposed subpart J. 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 or volume of certain waterbodies at the point of the intake;
- Determination of the standards in § 125.94 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 Design and Construction Technology Plan demonstrates that the proposed alternative technologies would reduce the impacts to fish and shellfish to levels required;
- Verification that a permit applicant meets the cost test and that permit conditions developed on a site-specific basis are justified based on documented costs, and, if applicable, benefits;
- Verification that a permit applicant's proposed restoration measures would meet regulatory standards;
- Development of draft and final NPDES permit conditions for the applicant implementing applicable section 316(b) requirements pursuant to this rule; and
- Ensuring compliance with permit conditions based on section 316(b) requirements.

EPA would implement these requirements where States or Tribes are not authorized to implement the NPDES program. EPA also would 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 proposed rulemaking would authorize activities that are not in compliance with these or other applicable Federal laws.

H. Alternative Site-Specific Requirements

Today's proposed rule would establish national requirements for Phase II existing facilities. EPA has taken into account all the information that it was able to collect, develop, and solicit regarding the location, design, construction, and capacity of cooling water intake structures at these existing facilities. EPA concludes that these proposed requirements would reflect the best technology available for minimizing adverse environmental impact on a national level. In some cases, however, data that could affect the economic practicability of requirements might not have been available to be considered by EPA during the development of today's proposed rule. Therefore, where a facility's cost would be significantly greater than the cost considered by EPA in establishing the applicable performance standards, proposed § 125.94(c)(2) would require the Director

to make a site-specific determination of the best technology available based on less costly design and construction technologies, operational measures, and/or restoration measures. Less costly technologies or measures would be allowable to the extent justified by the significantly greater cost. Similarly, § 125.94(c)(3) provides that where an existing facility's cost would be significantly greater than the benefits of complying with the applicable performance standards, the Director must make a site-specific determination of the best technology available based on less costly technologies or measures. These provisions would allow the Director, in the permit development process, to set alternative best technology available requirements that are less stringent than the nationally applicable requirements.

Under proposed § 125.94(c), alternative requirements would not be granted based on a particular facility's ability to pay for technologies that would result in compliance with the requirements of proposed § 125.94. Thus, so long as the costs of compliance are not significantly greater than the costs EPA considered and determined to be economically practicable, and are not significantly greater than the benefits of compliance with the proposed performance standards, the ability of an individual facility to pay in order to attain compliance with the rule would not support the imposition of alternative requirements. Conversely, if the costs of compliance for a particular facility are significantly higher than those considered by EPA in establishing the presumptive performance standards, then regardless of the facility's ability to afford the significantly higher costs, the Director should make a site-specific determination of best technology available based on less costly technologies and measures to the extent justified by the significantly higher costs.

The burden is on the person requesting the site-specific alternative requirement to demonstrate that alternative requirements should be imposed and that the appropriate requirements of proposed § 125.94 have been met. The person requesting the site-specific alternative requirements should refer to all relevant information, including the support documents for this proposed rulemaking, all associated data collected for use in developing each requirement, and other relevant information that is kept on public file by EPA.

VIII. Economic Analysis

EPA used an electricity market model, the Integrated Planning Model 2000 (IPM 2000), to identify potential economic and operational impacts of various regulatory options considered for proposal. Analyzed characteristics include changes in capacity, generation, revenue, cost of generation, and electricity prices. These changes are identified by comparing two scenarios: (1) The base case scenario (in the absence of Section 316(b) regulation); and (2) the post compliance scenario (after the implementation of Section 316(b) regulation). The results of these comparisons were used to assess the impacts of the proposed rule and two of the five alternative regulatory options considered by EPA. The following sections present EPA's economic analyses of the proposed rule and the alternative options.

A. Proposed Rule

Today's proposed rule would provide three compliance options for Phase II existing facilities. Such facilities could: (1) Demonstrate that their existing cooling water intake structure design and construction technologies, operational measures, and/or restoration measures meet the proposed performance standards; (2) implement design and construction technologies, operational measures, and/or restoration measures that meet the proposed performance standards; or (3) where the facility can demonstrate that its costs of complying with the proposed performance standards are significantly greater than either the costs EPA considered in establishing these requirements or the benefits of meeting the performance standards, seek a site-specific determination of best technology available to minimize adverse environmental impact. The applicable performance standards are described in Section VI.A., above.

Section VIII.A.1 below presents the analysis of national costs associated with the proposed section 316(b) Phase II Rule. Section VIII.A.2 presents a discussion of the impact analysis of the proposed rule at the market level and for facilities subject to this rule.

1. Costs

EPA estimates that facilities subject to this proposed rule will incur annualized post-tax compliance costs of approximately $178 million. These costs include one-time technology costs of complying with the rule, annual operating and maintenance costs, and permitting costs (including initial permit costs, annual monitoring costs, and repermitting costs). This cost estimate does not include the costs of administering the rule by permitting authorities and the federal government. Also excluded are compliance costs for 11 facilities that are projected to be baseline closures (see discussion below). Including compliance costs for projected baseline closure facilities would result in a total annualized compliance cost of approximately $182 million.

2. Economic Impacts

EPA used an electricity market model to account for the dynamic nature of the electricity market when analyzing the potential economic impacts of Section 316(b) regulation. The IPM 2000 is a long-term general equilibrium model of the domestic electric power market which simulates the least-cost dispatch solution for all generation assets in the market given a suite of user-specified constraints.[71] The impacts of compliance with a given regulatory option are defined as the difference between the model output for the base case scenario and the model output for the post-compliance scenario.[72]

Due to the lead time required in running an integrated electricity market model, EPA first completed an electricity market model analysis of two options with costs higher than those in today's proposed option: the ''Closed-Cycle, Recirculating Wet Cooling based on Waterbody type and Intake Capacity'' Option (waterbody/capacity-based option) and the ''Closed-Cycle, Recirculating Wet Cooling Everywhere'' Option (all cooling towers option). Both of the analyzed options are more stringent in aggregate than the proposed rule and provide a ceiling on its potential economic impacts. Because of limited time after final definition of the rule as proposed herein, EPA was unable to rerun the IPM model with an analytic option that completely matches the proposed rule's specifications. As a result, EPA adopted a two-step approach for the aggregate impact analysis. First, EPA identified that for certain regional electricity markets that

[71] For a more detailed description of IPM 2000 see the EBA document.

[72] The IPM model simulates electricity market function for a period of 25 years. Model output is provided for five user specified model run years. EPA selected three run years to provide output across the ten year compliance period for the rule. Analyses of regulatory options are based on output for model run years which reflect a scenario in which all facilities are operating in their post-compliance condition. Options requiring the installation of cooling towers are analyzed using output from model run year 2013. All other options are analyzed using output from model run years 2008. See the EBA document for a detailed discussion of IPM 2000 model run years.

do not have any facilities costed with a closed-cycle recirculating cooling water system, the waterbody/capacity-based option, as analyzed, matches the technology compliance requirements of the proposed rule.[73] These are the North American Electric Reliability Council (NERC) regions that do not border oceans and estuaries: ECAR, MAIN, MAPP, SPP.[74] Accordingly, EPA was able to interpret the results of the IPM analysis for the waterbody/capacity-based option for these four NERC regions as representative of the proposed rule in these regions. As shown below, EPA found very small or no impacts in these NERC regions. Second, EPA identified and compared data relevant to determination of rule impacts for these four NERC regions and the remaining NERC regions for which the IPM analysis would not be indicative of the proposed rule. Finding no material differences in these underlying characteristics between the two groups of NERC regions, EPA concluded that the finding of no significant impacts from the IPM-based analysis of the four NERC regions identified above, could also be extended to the remaining six NERC regions. Therefore, EPA believes that the proposed option, which would apply the same requirements (e.g., based on technologies such as fine mesh screens, filter fabric barrier nets, or fish return systems) to facilities in all NERC regions, would, in total, have very small or no impacts. The remainder of this section presents an assessment of the impacts of the proposed rule using the market and Phase II existing facility-level results from the IPM 2000 analysis of the alternative waterbody/capacity-based option for these four NERC regions. A more detailed analysis of all NERC regions under the alternative waterbody/capacity-based option is presented in Section VIII.B.2 below.

i. Market Level Impacts

This section presents the results of the IPM 2000 analysis for the four NERC regions with no cooling tower requirements under the alternative waterbody/capacity-based option: ECAR, MAIN, MAPP, and SPP.[75] As indicated above, the compliance requirements of this analyzed option are identical to those of the proposed rule for these four regions. Given the similarity in compliance requirements and the limited electricity exchanges between NERC regions modeled in IPM 2000, EPA concludes that the impacts modeled for the alternative waterbody/capacity-based option would be representative of potential impacts associated with the proposed rule for each of these regions.

Five measures developed from the IPM 2000 output are used to assess market level impacts associated with Section 316(b) regulation: (1) Total capacity, defined as the total available capacity of all facilities not identified as either baseline closures or economic closures resulting from the regulatory option; (2) new capacity, defined as total capacity additions from new facilities; (3) total generation, calculated as the sum of generation from all facilities not identified as baseline closures or economic closures resulting from the regulatory option; (4) production costs per MWh of generation, calculated as the sum of total fuel and variable O&M costs divided by total generation; and (5) energy prices, defined as the prices received by facilities for the sale of electricity. Exhibit 6 presents the base case and post compliance results for each of these economic measures.

EXHIBIT 6.—MARKET-LEVEL IMPACTS OF THE PROPOSED RULE

[Four Nerc Regions; 2008]

NERC region	Base case	Option 1	Difference	% Change
(ECAR)				
Total Capacity (MW)	118,390	118,570	180	0.2
New Capacity (MW)	8,310	8,490	180	2.2
Total Generation (GWh)	649,140	649,140	0	0.0
Production Costs ($2001/MWh)	$12.53	$12.53	$0.00	0.0
Energy Prices ($2001/MWh)	$22.58	$22.56	($0.02)	−0.1
(MAIN)				
Total Capacity (MW)	60,230	60,210	−20	0.0
New Capacity (MW)	6,540	6,530	−10	−0.2
Total Generation (GWh)	284,920	284,860	−60	0.0
Production Costs ($2001/MWh)	$12.29	$12.29	$0.00	0.0
Energy Prices ($2001/MWh)	$22.54	$22.55	$0.01	0.0
(MAPP)				
Total Capacity (MW)	35,470	35,470	0	0.0
New Capacity (MW)	2,760	2,760	0	0.0
Total Generation (GWh)	179,110	179,170	60	0.0
Production Costs ($2001/MWh)	$11.67	$11.68	$0.01	0.0
Energy Prices ($2001/MWh)	$22.25	$22.20	($0.05)	−0.2
(SPP)				
Total Capacity (MW)	49,110	49,110	0	0.0
New Capacity (MW)	160	160	0	0.0

[73] While the compliance requirements are identical under the proposed rule and the alternative waterbody/capacity-based option, permitting costs associated with the proposed rule are higher than those for the alternative option analyzed using the IPM 2000. The cost differential averages approximately 30 percent of total compliance costs associated with the alternative option. Despite the higher permitting costs, EPA concludes that the results of the alternative analysis are representative of impacts that could be expected under the proposed rule.

[74] ECAR (East Central Area Reliability Coordination Agreement) includes the states of Kentucky, Ohio, and West Virginia, and portions of Michigan, Maryland, Virginia, and Pennsylvania. MAIN (Mid-America Interconnected Network, Inc.) includes the state of Illinois and portions of Missouri, Wisconsin, Iowa, Minnesota and Michigan. MAPP (Mid-Continent Area Power Pool) includes the states of Nebraska and North Dakota, and portions of Iowa, South Dakota, Wisconsin, Montana and Minnesota. SPP (Southwest Power Pool) includes the states of Kansas and Oklahoma, and portions of Arkansas, Louisiana, Texas, and New Mexico.

[75] The market level results include results for all units located in each of the four NERC regions including facilities both in scope and out of scope of the alternative waterbody/capacity-based option.

EXHIBIT 6.—MARKET-LEVEL IMPACTS OF THE PROPOSED RULE—Continued

[Four Nerc Regions; 2008]

NERC region	Base case	Option 1	Difference	% Change
Total Generation (GWh)	217,670	217,750	80	0.0
Production Costs ($2001/MWh)	$14.43	$14.43	$0.00	0.0
Energy Prices ($2001/MWh)	$25.00	$24.99	($0.01)	0.0%

The results presented in Exhibit 6 reveal no significant changes in any of the economic measures used to assess the impacts of the alternative waterbody/capacity-based option in any of the four NERC regions.[76] One region, SPP, experienced no change of any consequence to any of the five impact measures as a result of the alternative option. Post compliance changes in total capacity and new capacity were experienced in both ECAR and MAIN. Each of these measures decreased by insignificant amounts in MAIN while ECAR experienced a slight increase of 0.2 percent in total capacity and a slightly larger increase of 2.2 percent in new capacity additions. While the slight increases in total and new capacity seen in ECAR did not result in changes in either generation or production costs, energy prices did decrease slightly. Energy prices also decreased slightly in MAPP despite no appreciable difference in any other measure for that region. Based on these results, EPA concludes that there are no significant impacts associated with the proposed section 316(b) Phase II Rule in these regions.

While the waterbody/capacity-based option, as analyzed in IPM, matches the technology specifications of the proposed rule for the four regions discussed above, this is not the case for the other six NERC regions: ERCOT, FRCC, MAAC, NPCC, SERC, and WSCC.[77] Under the waterbody/capacity-based option, as analyzed, some facilities in these regions were analyzed with more stringent and costly compliance requirements, including recirculating wet cooling towers, than would required by the proposed rule. As a result, the IPM waterbody/capacity-based option overstates the expected rule impacts in these remaining six regions. To provide an alternative approach to estimating the rule's impacts in these regions, EPA compared characteristics relevant to the determination of rule impacts for the four NERC regions explicitly analyzed in the IPM analysis and the six NERC regions for which the IPM analysis otherwise overstates impacts. EPA found no material differences between the two groups of regions in (1) the percentage of total base case capacity subject to the proposed rule, (2) the ratio of the annualized compliance costs of the proposed rule to total base case generation, and (3) the compliance requirements of the proposed rule (see Exhibit 7 below). EPA therefore concludes that the results for the four regions would be representative of the other NERC regions as well.[78]

EXHIBIT 7.—COMPARISON OF COMPLIANCE REQUIREMENTS BY NERC REGION—2008

NERC region	Percent of total capacity subject to the rule	Total annualized compliance cost per MWh generation ($2001)	Percentage of facilities subject to each compliance requirement—proposed rule				
			Total facilities	Both impingement and entrainment controls	Entrainment controls only (percent)	Impingement controls only (percent)	None (percent)
ECAR	66.5	0.05	99	32.4	7.1	23.9	36.6
MAIN	60.9	0.04	49	30.6	6.1	22.7	40.7
MAPP	42.1	0.04	42	9.5	7.1	28.5	54.8
SPP	40.7	0.03	32	12.6	0.0	46.9	40.5
Average	57.1	0.04	.....	24.8	5.8	27.8	41.5
ERCOT	57.8	0.04	51	2.0	11.8	60.8	25.5
FRCC	49.8	0.07	30	40.0	13.3	16.7	30.0
MAAC	50.7	0.06	43	26.2	19.1	28.8	25.9
NPCC	49.6	0.08	54	22.1	34.2	16.5	27.1
SERC	53.8	0.03	95	16.8	7.4	31.6	44.2
WSCC	18.3	0.02	33	52.9	3.0	16.6	27.5
Average	43.6	0.04	.....	22.8	14.6	30.3	32.3
Average of All NERC Regions	47.7	0.04	.....	23.6	10.9	29.3	36.2

[76] In addition to the five impact measures presented in Exhibit 6, EPA utilized IPM 2000 to identify changes in other economic and operational characterisitcs, including revenues, average fuel costs, changes in repowering, and the number and capacity of facilities identfiied as economic closures. The IPM results showed no economic closures and no changes in repowering associated with compliance with the alternative waterbody/capacity-based option in any of the four NERC regions presented in Exhibit 6. For a detailed discussion of the results of the IPM 2000 analysis of the alternative waterbody/capacity based option see section VIII.B.2 and the EBA document.

[77] The six other NERC regions are: Electric Reliability Council of Texas (ERCOT), Florida Reliability Coordinating Council (FRCC), Mid Atlantic Area Council (MAAC), Northeast Power Coordination Council (NPCC), Southeastern Electricity Reliability Council (SERC), and Western Systems Coordinating Council (WSCC).

[78] The comparison presented in Exhibit 7 includes information for facilities modeled in IPM 2000 only. Of the 539 existing facilities subject to the section 316(b) Phase II rule, nine are not modeled in the IPM 2000: Three facilities are in Hawaii, and one is in Alaska. Neither state is represented in the IPM 2000. One facility is identified as an ''Unspecified Resource'' and does not report on any EIA forms. Four facilities are on-site facilities that do not provide electricity to the grid. The 530 existing facilities were weighted to account for facilities not sampled and facilities that did not respond to the EAP's industry survey and thus represent a total of 540 facilities industry-wide.

Exhibit 7 indicates that, on average, the percentage of total capacity is slightly higher and the percentage of facilities subject to the proposed rule is slightly lower in the four analyzed NERC regions compared to the other six regions. In addition, the average annualized compliance costs per MWh of generation is very similar in all NERC regions. Based on this comparison and the limited amount electricity exchanges between regions modeled in IPM 2000, EPA concluded that the analysis of impacts under the proposed rule for the four NERC regions is representative of likely impacts in the other NERC regions. As the analysis of the impacts of the alternative waterbody/capacity-based option revealed no significant impacts at the market level, EPA concluded that there would be no significant impacts on any NERC region associated with the proposed rule.

ii. Impacts on Facilities Subject to the Proposed Rule

This section presents the results of the facility impact analysis for the proposed rule, again using the IPM 2000 analysis of the alternative waterbody/capacity-based option for the four NERC regions where the compliance requirements of the proposed rule and the analyzed option are identical.[79] EPA used the IPM 2000 results to analyze two potential facility level impacts of the proposed section 316(b) Phase II Rule: (1) potential changes in the economic and operational characteristics of the group of Phase II existing facilities and (2) potential changes to individual facilities within the group of Phase II existing facilities.

EPA used output from model run year 2008 to develop four measures used to identify changes in the economic and operational characteristics of the group of Phase II existing facilities. These measures include: (1) Total capacity, defined as the total available capacity of all facilities not identified as either baseline closures or economic closures resulting from the regulatory option; (2) total generation, calculated as the sum of generation from all facilities not identified as baseline closures or economic closures resulting from the regulatory option; (3) revenues, calculated as the sum of energy and capacity revenues; and (4) production costs per MWh of generation, calculated as the sum of total fuel and variable O&M costs divided by total generation. Exhibit 8 presents the base case and post compliance results for each of these economic measures.

EXHIBIT 8.—IMPACTS ON PHASE II EXISTING FACILITIES OF THE PROPOSED RULE

[Four NERC Regions; 2008]

	Base case	Proposed rule	Difference	% Change
(ECAR)				
Total Capacity (MW)	78,710	78,710	0.00	0.0
Total Generation (GWh)	515,020	515,030	10.00	0.0
Revenues (Million $2001)	$17,650	$17,650	0.00	0.0
Production Costs ($2001/MWh)	$12.34	$12.34	0.00	0.0
(MAIN)				
Total Capacity (MW)	36,700	36,700	0.00	0.0
Total Generation (GWh)	226,360	226,350	−10.00	0.0
Revenues (Million $2001)	$7,890	$7,890	0.00	0.0
Production Costs ($2001/MWh)	$11.74	$11.74	0.00	0.0
(MAPP)				
Total Capacity (MW)	14,920	14,920	0.00	0.0
Total Generation (GWh)	103,430	103,470	40.00	0.0
Revenues (Million $2001)	$3,420	$3,420	0.00	0.0
Production Costs ($2001/MWh)	$11.78	$11.78	0.00	0.0
(SPP)				
Total Capacity (MW)	19,990	19,990	0.00	0.0
Total Generation (GWh)	112,250	112,350	100.00	0.1
Revenues (Million $2001)	$3,930	$3,930	0.00	0.0
Production Costs ($2001/MWh)	$13.32	$13.34	0.01	0.1

Note: Total capacity, total generation, and revenues have been rounded to the closest 10.

The results for the four NERC regions presented in Exhibit 8 reveal no significant changes in any of the economic measures used to assess the impacts of the alternative waterbody/capacity-based option to the group of Phase II existing facilities. None of the four NERC regions analyzed experienced any post compliance change in either capacity or revenues. Further, while there were some variations in total generation derived from Phase II existing facilities in these regions, no region experienced an increase or decrease in generation of more than one tenth of one percent. Similarly, there was no significant change to the production costs of Phase II existing facilities in any of the analyzed regions. Given EPA's earlier noted finding of no material differences between these four NERC regions and the remaining six NERC regions in important characteristics relevant to rule impacts, EPA again concluded that the finding of no significant impact for these four regions could be extended to the remaining six regions. As a result, EPA concludes that the proposed rule will not pose significant impacts in any NERC region.

While the group of Phase II existing facilities as a whole is not expected to experience impacts under the proposed rule, it is possible that there would be shifts in economic performance among individual facilities subject to this rule. To examine the range of possible impacts to individual Phase II existing facilities, EPA analyzed facility-specific changes in generation, production costs, capacity utilization, revenue, and

[79] These results only pertain to the steam electric component of the Phase II existing facilities and thus do not provide complete measures for facilities with both steam electric and non-steam electric generation.

operating income. Exhibit 9 presents the number of Phase II existing facilities located in the four analyzed NERC regions by category of change for each economic measure.

EXHIBIT 9.—OPERATIONAL CHANGES AT PHASE II EXISTING FACILITIES FROM THE PROPOSED RULE

[Four NERC Regions; 2008]

Economic measures	Reduction		Increase		No change
	0–1%	1%	0–1%	1%	
Change in Generation	2	0	1	2	218
Change in Production Costs	0	0	27	0	178
Change in Capacity Utilization	2	0	2	1	218
Change in Revenue	56	0	44	2	121
Change in-Operating Income	66	0	58	1	98

Note: IPM 2000 output for run year 2008 provides data for 223 Phase II existing facilities located in the four NERC regions with identical compliance requirements under the alternative option and proposed rule. Eighteen facilities had zero generation in either the base case or post compliance scenario. As such it was not possible to calculate production costs in dollars per MWh of generation for these facilities. For all measures, the percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.

Exhibit 9 shows that there is almost no shift in economic activity between facilities subject to this rule in the four analyzed NERC regions. No facility experiences a decrease in generation, capacity utilization, revenues, or operating income, or an increase in production costs of more than one percent. These findings, together with the findings from the comparison of compliance costs and requirements across all regions above, further confirm EPA's conclusion that the proposed rule would not result in economic impacts to Phase II existing facilities located in the four analyzed NERC regions.

B. Alternative Regulatory Options

EPA is considering four alternative options that would establish substantive requirements for best technology available for minimizing adverse environmental impact by specific rule rather than by site-specific analysis. These include: (1) Requiring existing facilities located on estuaries and tidal rivers to reduce intake capacity commensurate with the use of a closed-cycle recirculating cooling system; (2) requiring all Phase II existing facilities to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling systems; (3) requiring all Phase II existing facilities to reduce impingement and entrainment to levels established based on the use of design and construction (e.g., fine mesh screens, fish return systems) or operational measures; and (4) requiring all existing facilities to reduce their intake capacity to a level commensurate with the use of a dry cooling system.

EPA conducted an electricity market model analysis of alternative options one and two as defined above. Section VIII.B.1 below presents the national costs of these two alternative regulatory options considered by EPA. Section VIII.B.2 discusses the impacts associated with these two alternative regulatory options.

1. Costs

EPA estimated total national annualized post-tax cost of compliance for two alternative options: (1) The ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System based on Waterbody Type/Capacity'' Option (waterbody/capacity-based option) and (2) the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities'' Option (all closed-cycle option). The estimated total annualized post-tax cost of compliance for the waterbody/capacity-based option is approximately $585 million. EPA further estimates that the total annualized post-tax cost of compliance for the all cooling tower option is approximately $2.26 billion. Not included in either estimate are 9 facilities that are projected to be baseline closures. Including compliance costs for these 9 facilities would increase the total cost of compliance with the waterbody/capacity-based option to approximately $595 million, and to roughly $2.32 billion for the all cooling tower option.

2. Economic Impacts

As stated in Section VIII.A.2 above, EPA used the IPM 2000 electricity market model to assess impacts associated with the proposed rule and regulatory options. These impacts are assessed by comparing model output for the base case and post compliance scenarios for each regulatory option. In support of this rule, EPA completed an electricity market model analysis of two post compliance scenarios: (1) The ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System based on Waterbody Type/Capacity'' Option (waterbody/capacity-based option) and (2) the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities'' Option (all closed-cycle option). This section presents the results of the IPM 2000 analysis of these two post-compliance scenarios.

a. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling System Based on Waterbody Type/Capacity

This section presents the market level and Phase II existing facility level impacts of the alternative waterbody/capacity-based option. This option would require facilities that withdraw water from an estuary, tidal river, or ocean and that meet certain intake flow requirements, to reduce their intake capacity to a level that can be attained by a closed-cycle, recirculating cooling system. This requirement would be met within five to ten years of promulgation of the final rule (2004 to 2012) depending on when a permittee's first NPDES permit after promulgation expires. The impacts of compliance with this option are calculated using base case and post compliance results for model run year 2013. This run year reflects the long-term operational changes of the regulatory option with all in-scope facilities operating in their post compliance condition.

(1) Market Level Impacts

EPA used five measures to identify changes to economic and operational characteristics of existing facilities and assess market level impacts due to compliance with the alternative waterbody/capacity-based option: (1) Capacity retirements, calculated as the total capacity of facilities identified as economic closures due to the alternative

option; (2) capacity retirements as a percentage of baseline capacity; (3) post compliance changes in total production costs per MWh, where production costs are 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 prices received by facilities for the sale of electric generation; and (5) post compliance changes in capacity price, where capacity prices are defined as the price paid to facilities for making unloaded capacity available as reserves to ensure system reliability. Exhibit 10 presents the market level summary of these impact measures by NERC region.

EXHIBIT 10.—MARKET-LEVEL IMPACTS OF THE ALTERNATIVE WATERBODY/CAPACITY-BASED OPTION (2013)

NERC region	Baseline capacity (MW)	Capacity closures (MW)	Closures as % of baseline capacity	Change in production cost ($/MWh) (percent)	Change in energy price ($/MWh) (percent)	Change in capacity price ($/MWh) (percent)
ECAR	122,080	0	0.0	0.0	0.0	−0.2
ERCOT	80,230	0	0.0	0.0	0.0	−0.2
FRCC	52,850	0	0.0	0.4	0.5	−2.0
MAAC	65,270	0	0.0	0.7	0.6	−1.5
MAIN	61,380	0	0.0	0.2	0.1	−0.1
MAPP	36,660	0	0.0	0.0	0.0	−0.1
NPCC	74,080	840	1.1	0.5	−0.3	13.2
SERC	205,210	0	0.0	0.1	0.0	0.0
SPP	51,380	0	0.0	0.0	0.0	0.0
WSCC	173,600	2,170	1.3	1.9	−0.1	2.0
Total	922,740	3,010	0.3	0.5	n/a	n/a

Note: Baseline Capacity and Closure Capacity have been rounded to the nearest 10 MW.

Exhibit 10 shows that with the exception of an increase in the capacity price paid in NPCC, no significant change in market-level operation would result from the alternative waterbody/capacity-based option. Two of the ten NERC regions modeled, NPCC and WSCC, would experience economic closures of existing facilities as a result of the alternative option. However, these closures represent an insignificant percentage of total baseline capacity in these regions (1.1 percent and 1.3 percent respectively). Of the capacity retirements in NPCC, 400 MW would be nuclear capacity and 440 MW would be oil/gas-fired capacity. The vast majority of the closures in WSCC, 2,150 MW, represents nuclear capacity. Six NERC regions would experience slight increases in production costs per MWh. Production cost per MWh in WSCC would increase the most, by almost 2 percent. In addition, three NERC regions would experience a slight increase in energy price while NPCC and WSCC both would both see a slight decrease in post compliance energy prices due to the economic closure of existing capacity. Further, NPCC and WSCC are the only regions that would experience an increase in capacity price. The increase in capacity prices would be the highest in NPCC with 13.2 percent.

(2) Phase II Existing Facility Level Impacts

The IPM 2000 results from model run year 2013 were used to analyze two potential facility level impacts associated with the alternative waterbody/capacity-based option: (1) Potential changes in the economic and operational characteristics of the group of Phase II existing facilities and (2) potential changes to individual facilities within the group of Phase II existing facilities. EPA analyzed economic closures and changes in production costs to assess impacts to all Phase II existing facilities resulting from the alternative option. Exhibit 11 below presents the results from this analysis, by NERC region.

EXHIBIT 11.—IMPACTS ON PHASE II EXISTING FACILITIES OF THE ALTERNATIVE WATERBODY/CAPACITY-BASED OPTION (2013)

NERC region	Baseline capacity (MW)	Closure Analysis			Change in production cost ($/MWh) (percent)
		# Facilities	Capacity (MW)	Percent of baseline capacity	
ECAR	78,680	0	0	0.0	−0.1
ERCOT	42,330	0	0	0.0	0.0
FRCC	24,460	0	0	0.0	0.7
MAAC	30,310	0	0	0.0	0.0
MAIN	33,650	0	0	0.0	0.0
MAPP	14,900	0	0	0.0	0.0
NPCC	36,360	(1)	650	1.8	−0.2
SERC	100,780	0	0	0.0	0.0
SPP	19,990	0	0	0.0	0.0
WSCC	30,110	2	2,170	7.2	3.9
Total	411,570	1	2,820	0.7	−0.3

Note: Baseline Capacity and Closure Capacity have been rounded to the nearest 10 MW.

Exhibit 11 shows that impacts under the waterbody/capacity-based option would be small. Similar to the market level, WSCC and NPCC are the only regions that would experience capacity retirements at Phase II existing facilities under this regulatory option. It should be noted that retirements presented in these exhibits are net retirements, accounting for both a potential increase and decrease in the number of retirements, post compliance. For example, NPCC is projected to experience a capacity loss of 650 MW under this option. However, one facility fewer than under the base case is projected to retire: Two facilities that would have retired in the baseline remain operational under the analyzed option, because their compliance costs are low compared to that of other facilities in the same region and they would therefore become relatively more profitable. WSCC is the other region with projected Phase II retirements under this option. The combined capacity retirements of both regions would be 2,820 MW, or 0.7 percent of all Phase II capacity.

While the group of Phase II existing facilities as a whole is not expected to experience impacts under the waterbody/capacity-based option, it is possible that there would be shifts in economic performance among individual facilities subject to this rule. To assess potential distributional effects, EPA analyzed facility-specific changes in generation, production costs, capacity utilization, revenue, and operating income. Exhibit 12 presents the total number of Phase II existing facilities with different degrees of change in each of these measures. [80]

EXHIBIT 12.—OPERATIONAL CHANGES AT PHASE II EXISTING FACILITIES FROM THE WATERBODY/CAPACITY-BASED OPTION (2013)

Economic measures	Reduction			Increase			No change
	0–1%	1–3%	>3%	0–1%	1–3%	>3%	
Change in Generation	7	17	21	4	4	9	444
Change in Production Costs	6	5	1	13	16	3	380
Change in Capacity Utilization	10	7	12	7	3	5	462
Change in Revenue	57	43	17	48	15	20	306
Change in Operating Income	75	42	10	46	15	22	296

Note: IPM 2000 output for model run year 2013 provides output for 506 Phase II existing facilities. Eighty-two facilities had zero generation in either the base case or post compliance scenario. As such it was not possible to calculate production costs in dollars per MWh of generation for these facilities. For all measures percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.

Exhibit 12 indicates that the majority of Phase II existing facilities would not experience changes in generation, production costs, or capacity utilization due to compliance with the alternative option. Of those facilities with changes in post compliance generation and capacity utilization, most would experience decreases in these measures. In addition, while approximately 40 percent of Phase II existing facilities would experience an increase or decrease in revenues and/or operating income, the magnitude of such changes would be small.

Under the alternative waterbody/capacity-based option, facilities withdrawing water from an estuary, tidal river, or ocean are required to meet standards for reducing impingement mortality and entrainment based on the performance of wet cooling towers. These facilities would have the choice to comply with Track I or Track II requirements. Facilities that choose to comply with Track I would be required to reduce their intake flow to a level commensurate with that which can be attained by a closed-cycle, recirculating system. Facilities that choose to comply with Track II would have to demonstrate that alternative technologies would reduce impingement and entrainment to comparable levels that would be achieved with a closed-cycle recirculating system. EPA's estimation of impacts associated with the alternative waterbody/capacity-based option is based on an electricity market model analysis that assumes all facilities withdrawing water from an estuary, tidal river, or ocean choose to comply with the requirements of Track I. While these impacts represent the worst case scenario under this option, it is reasonable to assume that a number of facilities would choose to comply with the requirements of Track II. EPA therefore also considered an additional scenario in which 33 of the 54 existing facilities costed with a cooling tower, or 61 percent, would choose to comply with the requirements of Track II. While this scenario was not explicitly analyzed, the absence of significant impacts under the more expensive scenario, where all 54 facilities are costed with cooling towers, suggests the alternative scenario would have similar or lower impacts.

b. Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities

This section presents the market level and Phase II existing facility level impacts of the closed-cycle, recirculating wet cooling everywhere option. This option requires that existing facilities with a design intake flow 50 MGD or more reduce their total design intake flow to a level that can be attained by a closed-cycle recirculating cooling water system. In addition, facilities in specified circumstances would have to install design and construction technologies to minimize impingement mortality and entrainment. Existing facilities would be required to comply within five to ten years of promulgation of the final rule (2004 to 2012) depending on when a permittee's first NPDES permit after promulgation expires. The impacts of compliance with this option are calculated using base case and post compliance results for model run year 2013 in order to reflect the long-term operational changes of the rule with all in-scope facilities operating in their post compliance condition.

[80] Note that the facility-level exhibit excludes in-scope facilities with significant status changes (including baseline closures, avoided closures, and facilities that repower) to allow for a better comparison of operational changes as a result of the analyzed option. Status changes are discussed separately in this section and the supporting Economic and Benefits Analysis Document.

(1) Market Level Impacts

EPA used IPM output to examine changes to economic and operational characteristics of existing facilities and to assess market level impacts due to compliance with the all cooling towers option. The measures used to assess market level responses to this option include capacity retirements, capacity retirements as a percentage of baseline capacity, and post compliance changes in total production costs per MWh, energy price, and capacity price. Exhibit 13 presents the market level summary of these impact measures by NERC region.

EXHIBIT 13.—MARKET-LEVEL IMPACTS OF THE ALTERNATIVE ALL COOLING TOWERS OPTION (2013)

NERC region	Baseline capacity (MW)	Capacity closures (MW)	Closures as % of baseline capacity percent	Change in production cost ($/MWh) percent	Change in energy price ($/MWh) percent	Change in capacity price ($/MWh) percent
ECAR	122,080	2,190	1.8	2.4	1.9	0.7
ERCOT	80,230	510	0.6	0.3	0.4	−0.1
FRCC	52,850	90	0.2	0.7	1.1	−3.8
MAAC	65,270	0	0.0	1.8	0.6	−0.2
MAIN	61,380	490	0.8	2.3	0.9	0.3
MAPP	36,660	0	0.0	1.0	0.1	3.0
NPCC	74,080	890	1.2	1.0	0.1	16.6
SERC	205,210	0	0.0	1.2	0.4	0.0
SPP	51,380	20	0.0	0.5	0.3	−0.7
WSCC	173,600	2,370	1.4	1.9	0.1	1.0
Total	922,740	6,560	0.7	1.4		

Note: Baseline Capacity and Closure Capacity have been rounded to the nearest 10 MW.

Exhibit 13 indicates that, of the ten NERC regions modeled, only MAAC, MAPP, and SERC would not experience economic closures of existing capacity as a result of the all cooling towers option. ECAR and WSCC would experience the highest closures with 2,370 MW and 2,190 MW, respectively. Of the 6,560 MW of capacity projected to retire as a result of this option, 5,150 MW, or 79 percent, would be nuclear capacity. The remainder would be oil/gas steam capacity. In addition, every NERC region would experience an increase in both production costs per MWh and energy prices. The increases in production costs would range from a 0.3 percent increase in ERCOT to an increase of more than 2 percent in ECAR. The most substantial changes would occur in the prices paid for capacity reserves. The highest capacity price increase would occur in NPCC with 16.6 percent.

(2) Phase II Existing Facility Level Impacts:

As with the alternative waterbody/capacity-based option analysis, the IPM 2000 results from model run year 2013 were used to analyze two potential facility level impacts associated with the alternative all cooling towers option: (1) Potential changes in the economic and operational characteristics of the Phase II existing facilities and (2) potential changes to individual facilities within the group of Phase II existing facilities. EPA analyzed economic closures and changes in production costs to assess impacts to all Phase II existing facilities resulting from the alternative option. Exhibit 14 below presents the results from this analysis, by NERC region.

EXHIBIT 14.—IMPACTS ON PHASE II EXISTING FACILITIES OF THE ALTERNATIVE ALL COOLING TOWERS OPTION (2013)

NERC region	Baseline capacity	Closure analysis			Change in production Cost ($/MWh) (percent)
		# Facilities	Capacity (MW)	Percent of baseline capacity	
ECAR	78,680	1	2,060	2.6	1.4
ERCOT	42,330	1	420	1.0	−0.5
FRCC	24,460	0	0	0.0	0.8
MAAC	30,310	0	0	0.0	−1.0
MAIN	33,650	0	490	1.5	1.4
MAPP	14,900	0	0	0.0	1.3
NPCC	36,360	0	720	2.0	−0.3
SERC	100,780	0	0	0.0	1.0
SPP	19,990	1	20	0.1	0.1
WSCC	30,110	2	2,170	7.2	2.6
Total	411,570	5	5,880	1.4	−0.2

Note: Baseline Capacity and Closure Capacity have been rounded to the nearest 10 MW.

Exhibit 14 shows that economic impacts under the all cooling tower option would be higher than under the proposed rule and the alternative waterbody/capacity-based option. Overall, seven Phase II existing facilities would retire under this option. An additional two facilities that retire in the base case would find it profitable to remain operating under this option. The net retirements are therefore five facilities and 5,880 MW of capacity. ECAR would experience the highest impact with capacity closures of over 2,000 MW while WSCC would experience the highest percentage retirement, with 7.2 percent of its total Phase II capacity.

While the group of Phase II existing facilities as a whole is not expected to experience impacts under the all

cooling towers option, it is possible that this option would lead to shifts in economic performance among individual facilities subject to this rule. To identify these shifts, EPA analyzed facility-specific changes in generation, production costs, capacity utilization, revenue, and operating income. Exhibit 15 presents the total number of Phase II existing facilities with different degrees of change in each of these measures.

EXHIBIT 15.—OPERATIONAL CHANGES AT PHASE II EXISTING FACILITIES FROM THE ALL COOLING TOWERS OPTION (2013)

Economic Measures	Reduction			Increase			No Change
	0 – 1%	1 – 3%	> 3%	0 – 1%	1–3%	> 3%	
Change in Generation	18	251	53	3	4	22	151
Change in Production Costs	16	12	4	64	257	17	51
Change in Capacity Utilization	15	25	25	8	12	15	402
Change in Revenue	154	121	55	88	39	35	10
Change in-Operating Income	118	160	50	83	47	29	15

Note: IPM 2000 output for model run year 2013 provides output for 502 Phase II existing facilities. Eighty-one facilities had zero generation in either the base case or post compliance scenario. As such it was not possible to calculate production costs in dollars per MWh of generation for these facilities. For all measures percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.

Exhibit 15 indicates that under the all cooling tower option, more facilities would experience changes in their operations and economic performance than under the other two analyzed options. For example, 322 out of 502 facilities, or 64 percent, would experience a reduction in generation.[81] In addition, 328 facilities would experience a reduction in operating income while 338 facilities would see their production cost per MWh increase. However, some facilities subject to today's rule would also benefit from regulation under this option: 162 facilities would experience an increase in revenues and 159 would experience an increase in operating income.

IX. Benefit Analysis

A. Overview of Benefits Discussion

This section presents EPA's estimates of the national environmental benefits of the proposed section 316(b) regulations for Phase II existing facilities. The 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 aquatic organisms. By reducing the levels of impingement and entrainment, today's proposed rule would increase the number of fish, shellfish, and other aquatic life in local aquatic ecosystems. This, in turn, will directly and indirectly improve direct use benefits such as those associated with recreational and commercial fisheries. Other types of benefits, including ecological and nonuse values, would also be enhanced. The text below provides an overview of types and sources of benefits anticipated, how these benefits were estimated, what level of benefits have been estimated for the proposed rule, and how benefits compare to costs. Additional detail and EPA's complete benefits assessment can be found in the EBA for the proposed rule.

B. The Physical Impacts of Impingement and Entrainment

Impingement and entrainment can have adverse impacts on many kinds of aquatic organisms, including fish, shrimp, crabs, birds, sea turtles, and marine mammals. Adult fish and larger organisms are trapped against intake screens, where they often die from the immediate impact of impingement, residual injuries, or from exhaustion and starvation. Entrained organisms that are carried through the facility's intakes die from physical damage, thermal shock, or chemical toxicity induced by antifouling agents.

The extent of harm to aquatic organisms depends on species characteristics, the environmental setting in which the facilities are located, and facility location, design, and capacity. Species that spawn in nearshore areas, have planktonic eggs and larvae, and are small as adults experience the greatest impacts, since both new recruits and reproducing adults are affected (e.g., bay anchovy in estuaries and oceans). In general, higher impingement and entrainment are observed in estuaries and near coastal waters because of the presence of spawning and nursery areas. By contrast the young of freshwater species are epibenthic and/or hatchel from attached egg masses rather than existing as free-floating individuals, and therefore freshwater species may be less susceptible to entrainment.

The likelihood of impingement and entrainment also depends on facility characteristics. If the quantity of water withdrawn is large relative to the flow of the source waterbody, a larger number of organisms will be affected. Intakes located in nearshore areas tend to have greater ecological impacts than intakes located offshore, since nearshore areas are usually more biologically productive and have higher concentrations of aquatic organisms.

In general, the extent and value of reducing impingement and entrainment at existing cooling water intake structure locations depends on intake and species characteristics that influence the intensity, time, and spatial extent of interactions of aquatic organisms with a facility's cooling water intake structure and the physical, chemical, and biological characteristics of the source waterbody. A once-through cooling system withdraws water from a source waterbody, circulates it through the condenser system, and then discharges the water back to the waterbody without recirculation. By contrast, closed-cycle cooling systems (which are one part of the basis for best technology available in some circumstances) withdraw water from the source waterbody, circulate the water through the condensers, and then sends it to a cooling tower or cooling pond before recirculating it back through the condensers. Because cooling water is recirculated, closed-cycle systems generally reduce the water flow from 72 percent to 98 percent, thereby using only 2 percent to 28 percent of the water used by once-through systems. It is generally assumed that this would result in a comparable reduction in impingement and entrainment.

[81] As explained earlier, facilities with significant status changes (including baseline closures, avoided closures, and facilities that repower) are excluded from this comparison.

C. Impingement and Entrainment Impacts and Regulatory Benefits are Site-Specific

Site-specific information is critical in predicting benefits, because studies at existing facilities demonstrate that benefits are highly variable across facilities and locations. Even similar facilities on the same waterbody can have very different impacts depending on the aquatic ecosystem in the vicinity of the facility and intake-specific characteristics such as location, design, construction, and capacity.

Some of the important factors that make benefits highly site-specific include important differences across the regulated facilities themselves. Many of these facility-specific characteristics that affect benefits add additional stressors to the aquatic systems in which they operate. Benefits occur through the reduction of the stressors through the application of impingement and entrainment reduction technologies. Stressor-related factors that make benefits site-specific include:

- Cooling water intake structure size and scale of operation (e.g., flow volume and velocity)
- Cooling water intake structure technologies and/or operational practices in place (if any) for impingement and entrainment reduction at baseline (i.e., absent any new regulations)
- Cooling water intake structure intake location in relation to local zones of ecological activity and significance (e.g., depth and orientation of the intake point, and its distance from shore)
- Cooling water intake structure flow volumes in relation to the size of the impacted waterbody

Many of the key factors that make impingement and entrainment impacts site-specific reflect the receptors exposed to the stressor-related impacts. Receptors include the types of waterbodies impacted, the aquatic species that are affected in those waterbodies, and the people who use and/or value the status of the water resources and aquatic ecosystems affected. Receptor-oriented factors that make impingement and entrainment impacts highly site-specific include:

- The aquatic species present near a facility
- The ages and life stages of the aquatic species present near the intakes
- The timing and duration of species' exposure to the intakes
- The ecological value of the impacted species in the context of the aquatic ecosystem
- Whether any of the impacted species are threatened, endangered, or otherwise of special concern and status (e.g., depleted commercial stocks)
- Local ambient water quality issues that may also affect the fisheries and their uses

All of these factors, as well as several others, have important impacts on the level and significance of impingement and entrainment. These factors determine baseline impacts, and the size and value of regulation-related reductions in those impacts.

The regulatory framework proposed by EPA recognizes the site-specific nature of impingement and entrainment impacts and is designed to accommodate these factors to the greatest degree practicable in a national rulemaking. For example, EPA's proposed regulatory approach accounts for the types of waterbodies that a cooling water intake structure impacts, the proportion of the source water flow supplied to the cooling water intake structure, and technological design parameters related to the impingement and entrainment from the intake. The Agency's benefits analysis attempts to accommodate and reflect these site-specific parameters.

D. Data and Methods Used to Estimate Benefits

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 can be challenging because of the many steps that need to be analyzed to link a reduction 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 benefit estimates for this rule are derived from a series of case studies from a range of waterbody types at a number of locations around the country including:

- The Delaware Estuary (Mid-Atlantic Estuaries)
- The Ohio River (Large Freshwater Rivers)
- Tampa Bay (Gulf Coast Estuaries)
- New England Coast (Oceans)
- Mount Hope Bay, New England (North Atlantic Estuaries)
- San Francisco Bay/Delta (Pacific Coast Estuaries)
- The Great Lakes

The following sections describe the methods used by EPA used to evaluate impingement and entrainment impacts at section 316(b) case study Phase II existing facilities and to derive an economic value associated with any such losses.

1. Estimating Losses of Aquatic Organisms

The first set of steps in estimating the benefits of the proposed rule involves estimating the magnitude of impingement and entrainment. EPA's analysis involved compiling facility-reported empirical impingement and entrainment counts and life history information for affected species. Life history data typically included species-specific growth rates, the fractional component of each life stage vulnerable to harvest, fishing mortality rates, and natural (nonfishing) mortality rates.

It is important to note that impingement and entrainment monitoring data are often limited to a subset of species, and monitoring is often of very limited duration (e.g., confined to a single year). This implies that the magnitude of impingement and entrainment is often underestimated. In addition, in many cases data are over two decades old (e.g., from 1979). Therefore the data may not always reflect current fishery conditions, including changes in fisheries due to water quality improvements since the monitoring period. The limited temporal extent of the data also omits the high variability often seen in aquatic populations. If data are collected only in a year of low abundance, impingement and entrainment rates will also be low, and may not reflect the long term average. The data also may not represent potential cumulative long-term impacts of impingement and entrainment.

In EPA's analysis of impingement and entrainment impacts, these facility-derived impingement and entrainment counts were modeled with relevant life history data to derive estimates of age 1 equivalent losses (the number of individuals that would have survived to age 1 if they had not been impinged and entrained by facility intakes), foregone fishery yield (the amount in pounds of commercial and recreational fish and shellfish that is not harvested due to impingement and entrainment losses) and foregone production (losses 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).

2. Estimating Baseline Losses and the Economic Benefits of the Proposed Rule

Given the projected physical impact on aquatic organisms (losses of age 1 equivalents resulting from impingement and entrainment), the second set of steps in the benefits analysis entails assigning monetary values to the estimated losses. These economic loss estimates are subsequently converted into estimated benefits for the proposed rule by examining the extent to which impingement and entrainment is reduced by adoption of the best technology available in accordance with the options defined in this proposed rule.

Economic benefits can be broadly defined according to several categories of goods and services furnished by the impacted species, including those that pertain to the direct use or indirect use of the impacted resources. There also are benefits that are independent of any current or anticipated use (direct or indirect) of the resource; these are known as nonuse or passive use values. The benefits can be further categorized according to whether or not affected goods and services are traded in the market. ''Direct use'' benefits 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. ''Nonuse'' benefits include only ''nonmarketed'' goods and services, reflecting human values associated with existence and bequest motives.

The economic value of benefits is estimated using a range of traditional methods, with the specific approach being dependent on the type of benefit category, data availability, and other suitable factors. Accordingly, some benefits are valued using market data (e.g., for commercial fisheries), and others are valued using secondary nonmarket valuation data (e.g., benefits transfer of nonmarket valuation studies of the value of recreational angling). Some benefits are described only qualitatively, because it was not feasible to derive reliable quantitative estimates of the degree of impact and/or the monetary worth of reducing those impacts. In addition, some nonmarket benefits are estimated using primary research methods. Specifically, recreational values are estimated for some of the case studies (those that are examined on a watershed-scale) using a Random Utility Model (RUM). Also, some benefits estimates are developed using habitat restoration costing or similar approaches that use replacement costs as a proxy for beneficial values. Variations of these general methodologies have been applied to better reflect site-specific circumstances or data availability.

In the case of forage species, benefits valuation is 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. Therefore, two general approaches were used to translate estimated impingement and entrainment losses to forage species into monetary values. The first approach examines replacement costs as a proxy for the value of estimated forage species losses (expressed as the total number of age 1 equivalents) and was valued based on hatchery costs. This approach does not take into consideration ecological problems associated with introducing hatchery fish into wild populations. The second approach used two distinct estimates of trophic transfer efficiency to relate foregone forage production to foregone commercial and recreational fishery yields. A portion of total forage production has relatively high trophic transfer efficiency because it is consumed directly by harvested species. The remaining portion of total forage production has low trophic transfer efficiency because it reaches harvested species indirectly following multiple interactions at different parts of the food web. Ultimately, the production foregone approach assigns a value to reduced forage species losses based on their indirect contribution to higher commercial and recreational fishery values.

Benefits analyses for rulemakings under the Clean Water Act have been limited in the range of benefits addressed, which has hindered EPA's ability to compare the benefits and costs of rules comprehensively. The Agency is working to improve its benefits analyses, including applying methodologies that have now become well established in the natural resources valuation field, but have not been used previously in the rulemaking process. EPA was particularly interested in expanding its benefits analysis for this rule to include more primary research along with the use of secondary (e.g., benefits transfer) methods to estimate recreation benefits. EPA has therefore expanded upon its traditional methodologies in the benefits analysis for this proposed rule by applying an original travel cost study using data from the National Marine Fishery Service in the Delaware and Tampa Estuaries and data from the National Recreational Demand Survey (NDS) in Ohio in a Random Utility Model (RUM) of recreational behavior, to estimate the changes in consumer valuation of water resources that would result from reductions in impingement and entrainment-related fish losses. These studies are presented in detail in the Case Study Document.

The Agency also improved its analyses by performing several Habitat-Based Replacement Cost analyses. A complete Habitat-Based Replacement Cost analysis develops values for impingement and entrainment losses based on the combined costs for implementing habitat restoration actions, administering the programs, and monitoring the increased production after the restoration actions. These costs are developed by identifying the preferred habitat restoration alternative for each species with impingement and entrainment, and then scaling the level of habitat restoration until the losses across all species have been offset fully by expected increases in the production of those species. The total value of the impingement and entrainment losses is then calculated as the sum of the costs across the categories of preferred habitat restoration alternatives. An in-depth discussion of the Habitat-Based Replacement Cost methodology is in Chapter A11 of the Case Study Document. Examples of estimating benefits using the Habitat-Based Replacement Cost methodology can be found in the case studies for the Pilgrim Nuclear facility (Part G) and the Brayton Point facility (Part F). A stream-lined version of the methodology can be found in the J.R. Whiting case study (Part H) and the Monroe case study (Part I) of the Case Study Document.

The primary strength of the Habitat-Based Replacement Cost method is the explicit recognition that impingement and entrainment losses have impacts on all components of the aquatic ecosystem, and the public's use and enjoyment of that ecosystem, beyond that estimated by reduced commercial and recreational fish catches. Results depend on the quality of the impingement and entrainment data collected, the availability of data on the habitat requirements of impinged or entrained species, and the program for defining expected production increases for species following implementation of restoration activities.

3. EPA's Estimates of Impingement and Entrainment Losses and Benefits Probably are Underestimates

EPA's estimates of fish losses due to impingement and entrainment, and of the benefits of the proposed regulations, are subject to considerable uncertainties. As a result, the Agency's benefits estimates could be either over- or under-estimated. However, because of the many factors omitted from the analysis (typically because of data limitations) and the manner in which several key uncertainties were addressed, EPA believes that its analysis is likely to lead to a potentially significant underestimate of baseline losses and, therefore lead to understated estimates of regulatory benefits.

Several of the key factors that are likely to lead EPA's analysis to underestimate benefits include:

Data Limitations

• EPA's analysis is based on facility-provided biological monitoring data. These facility-furnished data typically focus on a subset of the fish species impacted by impingement and entrainment, resulting in an underestimate of the total magnitude of losses.

• Industry biological studies often lack a consistent methodology for monitoring impingement and entrainment. Thus, there are often substantial uncertainties and potential biases in the impingement and entrainment estimates. Comparison of results between studies is therefore very difficult and sometimes impossible, even among facilities that impinge and entrain the same species.

• The facility-derived biological monitoring data often pertain to conditions existing many years ago (e.g., the available biological monitoring often was conducted by the facilities 20 or more years ago, before activities under the Clean Water Act had improved aquatic conditions). In those locations where water quality was relatively degraded at the time of monitoring relative to current conditions, the numbers and diversity of fish are likely to have been depressed during the monitoring period, resulting in low impingement and entrainment. In most of the nation's waters, current water quality and fishery levels have improved, so that current impingement and entrainment losses are likely to be greater than available estimates for depressed populations.

Estimated Technology Effectiveness

• The only technology effectiveness that is certain is reductions in impingement and entrainment with cooling towers.

• Potential latent mortality rates are unknown for most technologies.

• Installed technologies may not operate at the maximum efficiency assumed by EPA in its estimates of technology effectiveness.

Potential Cumulative Impacts

• Impingement and entrainment impacts often have cumulative impacts that are usually not considered. Cumulative impacts refer to the temporal and spatial accumulation of changes in ecosystems that can be additive or interactive. Cumulative impacts can result from the effects of multiple facilities located within the same waterbody and from individually minor but collectively significant impingement and entrainment impacts taking place over a period or time.

• Relatively low estimates of impingement and entrainment impacts may reflect a situation where cumulative impingement and entrainment impacts (and other stresses) have appreciably reduced fishery populations so that there are fewer organisms present in intake flows.

• In many locations (especially estuary and coastal waters), many fish species migrate long distances. As such, these species are often subject to impingement and entrainment risks from a large number cooling water intake structures. EPA's analyses reflect the impacts of a limited set of facilities on any given fishery, whereas many of these fish are subjected to impingement and entrainment at a greater number of cooling water intake structures than are included in the boundaries of the Agency's case studies.

Recreational Benefits

• The proportion of impingement and entrainment losses of fishery species that were valued as lost recreational catch was determined from stock-specific fishing mortality rates, which indicate the fraction of a stock that is harvested. Because fishing mortality rates are typically less than 20%, a large proportion of the losses of fishery species were not valued in the benefits transfer and RUM analyses.

• Only selected species were evaluated because impingement and entrainment or valuation data were limited.

• In applying benefits transfer to value the benefits of improved recreational angling, the Agency only assigned a monetary benefit to the increases in consumer surplus for the baseline number of fishing days. Changes in participation (except where the RUM is estimated) are not considered. Thus, benefits will be understated if participation increases in response to increased availability of fishery species as a result of reduced impingement and entrainment. This approach omits the portion of recreational fishing benefits that arise when improved conditions lead to higher levels of participation. Empirical evidence suggests that the omission of increased angling days can lead to an underestimate of total recreational fishing benefits. Where EPA has been able to apply its RUM analyses, the recreational angling benefits are more indicative of the full range of beneficial angling outcomes.

Secondary (Indirect) Economic Impacts

Secondary impacts, are not calculated (effects on marinas, bait sales, property values, and so forth are not included, even though they may be significant and applicable on a regional scale).

Commercial Benefits

• The proportion of impingement and entrainment losses of fishery species that were valued as lost commercial catch was determined from stock-specific fishing mortality rates, which indicate the fraction of a stock that is harvested. Because fishing mortality rates are typically less than 20%, a large proportion of the losses of fishery species were not valued in the benefits transfer analyses.

• In most cases, invertebrate species (e.g, lobsters, mussels, crabs, shrimp) were not included because of a lack of impingement and entrainment data and/or life history information.

• Impingement and entrainment impacts and associated reductions in fishery yields are probably understated even for those species EPA could evaluate because of a lack of monitoring data to capture population variability and cumulative impingement and entrainment impacts over time.

• Current fishing mortality rates (and resulting estimates of yield) often reflect depleted fisheries, not what the fisheries should or could be if not adversely impacted by impingement and entrainment and other stressors. As such, yield estimates may be artificially low because of significantly curtailed recreational and/or commercial catch of key species impinged and entrained (e.g., winter flounder in Mount Hope Bay).

Forage Species

• Forage species often make up the predominant share of losses due to impingement and entrainment. However, impingement and entrainment

losses of forage species are usually not known because many facility studies focus on commercial and recreational fishery species only.

• Even when forage species are included in loss estimates, the monetary value assigned to forage species is likely to be understated because the full ecological value of the species as part of the food web is not considered.

• Forage losses are often valued at only a fraction of their potential full value because of partial ''replacement'' cost (even if feasible to replace).

• Low production foregone assumptions (no inherent value, only added biomass to landed recreational and commercial species is considered).

• In one valuation approach EPA applied to forage species, only the small share of these losses are valued—namely the contribution of the forage species to the increased biomass of landed recreational and commercial species.

• This does not apply to benefits derived by the Habitat-Based Replacement Cost approach, which provides a more comprehensive indication of the benefits of reducing impingement and entrainment on all species, including forage fish. EPA has applied this approach to a limited number of settings, and in those settings the findings suggest benefits appreciably greater than derived from the more traditional, partial benefits approaches applied by the Agency.

Nonuse Benefits

• Nonuse benefits are most likely understated using the 50 percent rule because the recreational values used are likely to be understated.

• The 50 percent rule itself is conservative (e.g., only reflects nonuse component of total value to recreational users. It does not reflect any nonuse benefits to recreational nonusers).

• Impacts on threatened and endangered species are not fully captured.

Incidental Benefits

• EPA has not accounted for thermal impact reductions, which will be incidental benefits in places where once-through facilities are replaced with recirculating water regimes.

E. Summary of Benefits Findings: Case Studies

As noted above, EPA developed benefits estimates for various case studies, and key results are described below.

1. The Delaware Estuary (Mid-Atlantic Estuaries)

The results of EPA's evaluation of impingement and entrainment rates at cooling water intake structures in the Delaware Estuary transition zone indicate that cumulative impacts can be substantial. EPA's analysis shows that even when losses at individual facilities appear insignificant, the total of all impingement and entrainment impacts on the same fish populations can be sizable. For example, nearly 44,000 age 1 equivalents of weakfish are lost as a result of entrainment at Hope Creek, which operates with closed-cycle cooling and therefore has relatively low entrainment rates. However, the number of total weakfish age 1 equivalents lost as a result of entrainment at all transition zone cooling water intake structures is over 2.2 million individuals. Cumulative impacts of all species at Delaware Estuary transition zones facilities is 14.3 million age 1 equivalent fish impinged per year and entrainment is 616 million age 1 equivalent fish entrained per year.

EPA has conservatively estimated cumulative impacts on Delaware Estuary species by considering the impingement and entrainment impacts of only transition zone cooling water intake structures. In fact, many of the species affected by cooling water intake structures within the transition zone move in and out of this area, and therefore may be exposed to many more cooling water intake structures than considered here. Regardless of the geographic extent of an evaluation of cumulative impacts, it is important to consider how impingement and entrainment rates relate to the relative abundance of species in the source waterbody. Thus, low impingement and entrainment does not necessarily imply low impact, since it may reflect low population abundance, which can result from numerous natural and anthropogenic factors, including long-term impingement and entrainment impacts of multiple cooling water intake structures. On the other hand, high population abundance in the source waterbody and associated high impingement and entrainment may reflect waterbody improvements that are independent of impacts from or improvements in cooling water intake structure technologies. High levels of impingement and entrainment impacts on a species may also indicate a high susceptibility of that given species to cooling water intake structure effects.

In addition to estimating the physical impact of impingement and entrainment in terms of numbers of fish lost because of the operation of all in scope and out-of-scope cooling water intake structures in the Delaware Estuary transition zone, EPA also examined the estimated economic value of the losses from impingement and entrainment. The estimated cumulative impact of impingement and entrainment at the 12 cooling water intake structures located in the Delaware case study area was based on data available for the Salem facility and then extrapolated to the other facilities on the basis of flow. Average losses at all transition zone cooling water intake structures from impingement are valued (using benefits transfer) at between roughly $0.5 million and $1.1 million per year, and between approximately $23.9 million and $49.5 million per year for entrainment (all in 2001$). Average losses at the four in scope facilities (using benefits transfer combined with RUM recreation estimates) range from $0.5 million to $0.8 million per year for impingement and from $26.0 to $46.2 million per year for entrainment (all in 2001$) (see Exhibit 13).

In this estuarine setting, benefits attributed to reducing losses due to both impingement and entrainment may be quite large in terms of numbers of fish and in terms of the portion of benefits that could be monetized. Entrainment losses are over 40 times greater than impingement losses. This reflects the typical richness of estuary waters as important nursery locations for early life stages of many important aquatic species, coupled with the significant adverse impact that entrainment can have on such life stages. This result indicates the relative importance of entrainment controls in estuary areas.

EXHIBIT 13.—BASELINE IMPACTS (ANNUAL AVERAGE) AT FOUR IN SCOPE FACILITIES IN THE TRANSITION ZONE OF THE DELAWARE ESTUARY

	Impingement	Entrainment
Four In Scope Facilities		
a. age 1 equivalent fish lost	>14.3 mil/yr	>616 mil/yr.

EXHIBIT 13.—BASELINE IMPACTS (ANNUAL AVERAGE) AT FOUR IN SCOPE FACILITIES IN THE TRANSITION ZONE OF THE DELAWARE ESTUARY—Continued

	Impingement	Entrainment
b. # lbs lost to landed fishery	>438,000 lbs/yr	>16 mil lbs/yr.
c. $ value of loss (2001$)	$0.5 mil–$0.8 mil	$26.0 mil—$46.2 mil.

In part, EPA's recreational benefits estimates for the Delaware Estuary is based on a RUM analysis of recreational fishing benefits from reduced impingement and entrainment. The RUM application in the Delaware Estuary focuses on weakfish and striped bass fishing valuation. Several recreational fishing studies have valued weakfish and striped bass, but values specific to these studies are not available. The study area includes recreational fishing sites at the Delaware River Estuary and the Atlantic coasts of Delaware and New Jersey.

EPA uses data for this case study from the Marine Recreational Fishery Statistics Survey (MRFSS), combined with the 1994 Add-on MRFSS Economic Survey (AMES). The study uses MFRSS information on angler characteristics and angler preferences, such as where they go fishing and what species they catch, to infer their values for changes in recreational fishing quality. EPA estimated angler behavior using a RUM for single-day trips. The study used standard assumptions and specifications of the RUM model that are readily available from the recreation demand literature. Among these assumptions are that anglers choose fishing mode and then the site in which to fish; and that anglers' choice of target species is exogenous to the model. EPA modeled an angler's decision to visit a site as a function of site-specific cost, fishing trip quality, presence of boat launching facilities, and water quality.

The quality of a recreational fishing trip is expressed in terms of the number of fish caught per hour of fishing. Catch rate is the most important attribute 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 may be affected by fish mortality caused by impingement and entrainment.

The Agency combined the estimated model coefficients with the estimated changes in impingement and entrainment associated with various cooling water intake structure technologies to estimate per trip welfare losses from impingement and entrainment at the cooling water intake structures located in the Delaware Estuary transition zone. The estimated economic values of recreational losses from impingement and entrainment at the 12 cooling water intake structures located in the case study area are $0.75, $2.04, and $9.97 per trip for anglers not targeting any particular species and anglers targeting weakfish and striped bass, respectively (all in 2001$). EPA then estimated benefits of reducing impingement and entrainment of two species —weakfish and striped bass—at the four in scope cooling water intake structures in the case study area. The estimated values of an increase in the quality of fishing sites from reducing impingement and entrainment at the in scope cooling water intake structures are $0.52, $1.40 and $6.90 per trip for no target anglers and anglers targeting weakfish and striped bass, respectively (all in 2001$).

EPA also examined the effects of changes in fishing circumstances on fishing participation during the recreational season. First, the Agency used the negative binomial form of the Poisson model to model an angler's decision concerning the number of fishing trips per recreation season. The number of fishing trips is modeled as function of the individual's socioeconomic characteristics and estimates of individual utility derived from the site choice model. The Agency then used the estimated model coefficients to estimate percentage changes in the total number of recreational fishing trips due to improvements in recreational site quality. EPA combined fishing participation data for Delaware and New Jersey obtained from MFRSS with the estimated percentage change in the number of trips under various policy scenarios to estimate changes in total participation stemming from changes in the fishing site quality in the study area. The MRFSS fishing participation data include information on both single-day and multiple-day trips. The Agency assumed that per day welfare gain from improved fishing site quality is independent of trip length. EPA therefore calculated total fishing participation for this analysis as the sum of the number of single day trips and the number of fishing days corresponding to multiple day trips. Analysis results indicate that improvements in fishing site quality from reducing impingement and entrainment at all in scope facilities will increase the total number of fishing days in Delaware and New Jersey by 9,464.

EPA combined fishing participation estimates with the estimated per trip welfare gain under various policy scenarios to estimate the value to recreational anglers of changes in catch rates resulting from changes in impingement and entrainment in the Delaware Estuary transition zone. EPA calculated low and high estimates of economic values of recreational losses from impingement and entrainment by multiplying the estimated per trip welfare gain by the baseline and policy scenario number of trips, respectively. The estimated recreational losses (2001$) to Delaware and New Jersey anglers from impingement and entrainment of 2 species at all Phase II existing facilities in the transitional estuary, and all facilities in the transitional estuary range from $0.2 to $0.3 and from $7.2 to $13.2 million, respectively. Using similar calculations, the Agency estimated that reducing impingement and entrainment of weakfish and striped bass at the four in scope cooling water intake structures in the transition zone will generate $5.2 to $9.3 million (2001$) annually, in recreational fishing benefits alone, to Delaware and New Jersey anglers.

In interpreting the results of the case study analysis, it is important to consider several critical caveats and limitations of the analysis. For example, in the economic valuation component of the analysis, valuation of impingement and entrainment losses is often complicated by the lack of market value for forage species, which may comprise a large proportion of total losses. EPA estimates that more than 500 million age 1 equivalents of bay anchovy may be lost to entrainment at transition zone cooling water intake structure each year (over 85 percent of the total of over 616 million estimated lost age 1 individuals for all species combined). Bay anchovy has no direct market value, but it is nonetheless a critical component of estuarine food webs. EPA included forage species impacts in the economic benefits calculations, but the final

estimates may well underestimate the full value of the losses imposed by impingement and entrainment. Thus, on the whole, EPA believes the estimates developed here probably underestimate the economic benefits of reducing impingement and entrainment in the Delaware transition zone.

2. Ohio River (Large Rivers)

EPA evaluated the impacts of impingement and entrainment using facility-generated data at 9 cooling water intake structures along a 500 mile stretch of the Ohio River, spanning from the western portion of Pennsylvania, along the southern border of Ohio, and into eastern Indiana. The results were then extrapolated to the 20 other in scope facilities along this stretch of the river (a total of 29 facilities are expected to be in scope for this rulemaking, and another 19 facilities are out-of-scope).

To estimate impingement and entrainment impacts for the Ohio, EPA evaluated the available impingement and entrainment monitoring data at 9 case study facilities (W.C. Beckjord, Cardinal, Clifty Creek, Kammer, Kyger Creek, Miami Fort, Philip Sporn, Tanners Creek, and WH Sammis). The results from these 9 facilities with impingement and entrainment data were then extrapolated to the remaining in scope facilities to derive an impingement and entrainment baseline for all facilities subject to the proposed rule (additional extrapolations were also made to out-of-scope facilities so that total impingement and entrainment could be estimated as well). The extrapolations were made on the basis of relative operating size (operating MGD) and by river pool (Hannibal, Markland, McAlpine, New Cumberland, Pike Island, and Robert C. Byrd pools).

The results indicate that impingement at all facilities (in scope and out-of-scope) causes the mortality of approximately 11.6 million fish (age 1 equivalents) per year. This translates into over 1.11 million pounds of fishery production foregone per year, and over 15,000 pounds of lost fishery yield annually.

For in scope facilities only, the results indicate that impingement causes the mortality of approximately 11.3 million fish (age 1 equivalents) per year (97.8 percent of all impingement). This translates into nearly 1.09 million pounds of fishery production foregone per year, and nearly 15,000 pounds of lost fishery yield annually (98.1 percent and 97.1 percent of the total, respectively).

For entrainment, the results indicate that all facilities combined (in scope and out-of-scope) cause the mortality of approximately 24.4 million fish (age 1 equivalents) per year. This translates into over 10.08 million pounds of fishery production foregone per year, and over 39,900 pounds of lost fishery yield annually.

For in scope facilities only, the results indicate that entrainment causes the mortality of approximately 23.0 million fish (age 1 equivalents) per year (94.2 percent of all entrainment). This translates into nearly 9.89 million pounds of fishery production foregone per year, and over 39,000 pounds of lost fishery yield annually (98.1 percent and 97.7 percent of the total, respectively).

In addition to estimating the physical impact of impingement and entrainment in terms of numbers of fish lost because of the operation of all in scope and out-of-scope cooling water intake structures in the Ohio River case study area, EPA also estimated the baseline economic value of the losses from impingement and entrainment. The economic value of these losses is based on benefits transfer-based values applied to losses to the recreational fishery, nonuse values, and the partial value of forage species impacts (measured as partial as replacement costs or production foregone). This provides an indication of the estimated cumulative impact of impingement and entrainment at the all in scope and out-of-scope cooling water intake structures in the case study area, based on data available for the 9 case study facilities with usable impingement and entrainment data, and then extrapolated to the other facilities on the basis of flow and river pool.

Average historical losses from all in scope facilities in the case study area for impingement are valued using benefits transfer at between roughly $0.1 million and $1.4 million per year (in 2001$). Average historical losses from entrainment are valued using benefits transfer at between approximately $0.8 million and $2.4 million per year (all in 2001$) for in scope facilities.

EPA also estimated a random utility model (RUM) to provide primary estimates of the recreational fishery losses associated with impingement and entrainment in the Ohio River case study area. This primary research results supplement the benefits transfer estimates derived by EPA. The average annual recreation-related fishery losses at all facilities in the case study amount to approximately $8.4 million (in 2001$) per year (impingement and entrainment impacts combined). For the in scope facilities covered by the proposed Phase II rule, the losses due to impingement and entrainment were estimated via the RUM to amount to approximately $8.3 million per year (in 2001$). Results for the RUM analysis were merged with the benefits transfer-based estimates in a manner that avoids double counting, and indicate that baseline losses at in scope facilities amount to between $3.5 million and $4.7 million per year for impingement and between $9.3 and $9.9 million per year for entrainment (in 2001$) (see Exhibit 14).

EXHIBIT 14.—BASELINE IMPACTS (ANNUAL AVERAGE) IN THE OHIO RIVER AT IN SCOPE FACILITIES

	Impingement	Entrainment
29 In Scope Facilities		
a. age 1 equivalent fish lost	> 11.3 mil/yr	> 23.0 mil/yr
b. # lbs lost to landed fishery	> 1.1 mil lbs/yr	> 9.9 mil lbs/yr
c. $ value of loss (2001$)	$3.5 mil—$4.7 mil/yr	$9.3 mil—$9.9 mil/yr

In interpreting the results of the case study analysis, it is important to consider several critical caveats and limitations of the analysis. In the economic valuation component of the analysis, valuation of impingement and entrainment losses is often complicated by the lack of market value for forage species, which may comprise a large proportion of total losses. Forage species have no direct market value, but are nonetheless a critical component of aquatic food webs. EPA included forage species impacts in the economic benefits calculations, but because techniques for valuing such losses are limited, the final estimates may well underestimate the full ecological and economic value of these losses.

In addition, the Ohio River case study is intended to reflect the level of impingement and entrainment, and

hence the benefits associated with reducing impingement and entrainment impacts, for cooling water impact structures along major rivers of the U.S. However, there are several factors that suggest that the Ohio River case study findings may be a low-end scenario in terms of estimating the benefits of the proposed regulation at facilities along major inland rivers of the U.S. These factors include the following:

- The impingement and entrainment data developed by the facilities were limited to one year only, and are from 1977 (nearly 25 years ago) and pertain to a period of time when water quality in the case study area was worse than it is currently. This suggests that the numbers of impinged and entrained fish today (the regulatory baseline) would be appreciably higher than observed in the data collection period. In addition, the reliance on a monitoring period of one year or less implies that the naturally high variability in fishery populations is not captured in the analysis, and the results may reflect a year of above or below average impingement and entrainment.
- The Ohio River is heavily impacted by numerous significant anthropogenic stressors in addition to impingement and entrainment. The river's hydrology has been extensively modified by a series of 20 dams and pools, and the river also has been extensively impacted by municipal and industrial wastewater discharges along this heavily populated and industrialized corridor. To the degree to which these multiple stressors were atypically extensive along the Ohio River (in 1977) relative to those along other cooling water intake structure-impacted rivers in the U.S. (in 2002), the case study will yield smaller than typical impingement and entrainment impact estimates.
- The Ohio River is very heavily impacted by cumulative effects of impingement and entrainment over time and across a large number of cooling water intake structures. The case study segment of the river has 29 facilities that are in scope for the Phase II rulemaking, plus an additional 19 facilities that are out of scope. Steam electric power generation accounted for 5,873 MGD of water withdrawal from the river basin, more than 90 percent of the total surface water withdrawals, according to 1995 data from USGS.

In conclusion, several issues and limitations in the impingement and entrainment data for the Ohio case study (e.g., the reliance on data for one year, nearly 25 years ago), and the many stressors that affect the river (especially in the 1977 time frame), suggest that the results obtained by EPA underestimate the benefits of the rule relative to current Ohio River conditions. The results are also likely to underestimate the benefits value of impingement and entrainment reductions at other inland river facilities.

3. San Francisco Bay/Delta (Pacific Coast Estuaries)

The results of EPA's evaluation of impingement and entrainment of striped bass, and threatened and endangered and other special status fish species at the Pittsburg and Contra Costa facilities in the San Francisco Bay/Delta demonstrate the significant economic benefits that can be achieved if losses of highly valued species are reduced by the proposed section 316(b) rule. The benefits were estimated by reference to other programs already in place to protect and restore the declining striped bass population and threatened and endangered fish species of the San Francisco Bay/Delta region. The special status species that were evaluated included delta smelt, threatened and endangered runs of chinook salmon and steelhead, sacramento splittail, and longfin smelt.

Based on limited facility data, EPA estimates that the striped bass recreational catch is reduced by about 165,429 fish per year due to impingement at the two facilities and 185,073 fish per year due to entrainment. Estimated impingement losses of striped bass are valued at between $379,000 and $589,000 per year, and estimated entrainment losses are valued at between $2.58 million to $4.01 million per year (all in 2001$).

EPA estimates that the total loss of special status fish species at the two facilities is 145,003 age 1 equivalents per year resulting from impingement and 269,334 age 1 equivalents per year due to entrainment. Estimated impingement losses of these species are valued at between $12.38 million and $42.65 million per year, and estimated entrainment losses are valued at between $23.1 million and $79.2 million per year (all in 2001$).

The estimated value of the recreational losses and the special status species losses combined range from $12.8 million to $43.2 million per year for impingement and from $25.6 million to $83.2 million per year for entrainment (all in 2001$) (see Exhibit 15).

EXHIBIT 15.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR SPECIAL STATUS FISH SPECIES AT 2 FACILITIES IN THE SAN FRANCISCO BAY/DELTA

	Impingement	Entrainment
Two In Scope Facilities		
a. age 1 equivalent fish lost	> 145,000/yr	> 269,000/yr
b. number of striped bass lost to recreational catch	165,429	185,073
c. $ value of combined loss (2001$)	$12.8 mil—$43.2 mil/yr	$25.6 mil—$83.2 mil/yr

In interpreting these results, it is important to consider several critical caveats and limitations of the analysis. No commercial fisheries losses or non-special status forage species losses are included in the analysis. Recreational losses are analyzed only for striped bass. There are also uncertainties about the effectiveness of restoration programs in terms of meeting special status fishery outcome targets.

It is also important to note that under the Endangered Species Act, losses of all life stages of endangered fish are of concern, not simply losses of adults. However, because methods are unavailable for valuing losses of fish eggs and larvae, EPA valued the losses of threatened and endangered species based on the estimated number of age 1 equivalents that are lost. Because the number of age 1 equivalents can be substantially less than the original number of eggs and larvae lost to impingement and entrainment, and because the life history data required to calculate age 1 equivalent are uncertain for these rare species, this method of quantifying impingement and entrainment losses may result in an underestimate of the true benefits to society of the proposed section 316(b) regulation.

4. The Great Lakes

EPA examined the estimated economic value of impingement and entrainment at J.R. Whiting before installation of a deterrent net to reduce impingement to estimate the historical losses of the facility and potential impingement and entrainment damages at other Great Lakes facilities that do not employ technologies to reduce impingement or entrainment. Average impingement without the net is valued at between $0.4 million and $1.2 million per year, and average entrainment is valued at between $42,000 and $1.7 million per year (all in 2001$) (see Exhibit 16).

The midpoints of the pre-net results from the benefits transfer approach were used as the lower ends of the valuations losses. The upper ends of the valuation of losses reflect results of the Habitat-based Replacement Cost (HRC) method for valuing impingement and entrainment losses. HRC-based estimates of the economic value of impingement and entrainment losses at J.R. Whiting were included with the transfer-based estimates to provide a better estimate of loss values, particularly for forage species for which valuation techniques are limited. The HRC technique is designed to provide a more comprehensive, ecological-based valuation of impingement and entrainment losses than valuation by traditional commercial and recreational impacts methods. Losses are valued on the basis of the combined costs for implementing habitat restoration actions, administering the programs, and monitoring the increased production after the restoration actions. In a complete HRC, these costs are developed by identifying the preferred habitat restoration alternative for each species with impingement and entrainment losses and then scaling the level of habitat restoration until the losses across all the species in that category have been offset by expected increases in production of each species. The total value of impingement and entrainment losses at the facility is then calculated as the sum of the costs across the categories of preferred habitat restoration alternatives.

The HRC method is thus a supply-side approach for valuing impingement and entrainment losses in contrast to the more typically used demand-side valuation approaches (e.g., commercial and recreational fishing impacts valuations). An advantage of the HRC method is that the HRC values can easily address losses for species lacking a recreational or commercial fishery value (e.g., forage species that typically are a large proportion of impingement and entrainment impacts, but that are not readily valued in a traditional benefits analysis). Further, the HRC explicitly recognizes and captures the fundamental ecological relationships between impinged and entrained organisms and their surrounding environment by valuing losses through the cost of the actions required to provide an offsetting increase in the existing populations of those species in their natural environment.

Impingement losses at J.R. Whiting with an aquatic barrier net are estimated to be reduced by 92 percent, while entrainment losses are not significantly affected. Thus, losses with a net are valued at between $29,000 and $99,000 for impingement and between $42,000 and $1.7 million per year for entrainment (all in 2001$) (see Exhibit 17).

EXHIBIT 16.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR J.R. WHITING WITHOUT NET

	Impingement	Entrainment
One Great Lakes Facility		
a. age 1 equivalent fish lost	>1.8 mil/yr	>290,000/yr.
b. # lbs lost to landed fishery	>21.4 mil lbs/yr	> 404,000 lbs/yr.
c. $ value of loss (2001$)	$0.4 mil–$1.2 mil/yr	$42,000–$1.7 mil/yr.

EXHIBIT 17.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR J.R. WHITING WITHOUT NET

	Impingement	Entrainment
One Great Lakes Facility		
a. age 1 equivalent fish lost	>0.1 mil/yr	>290,000/yr.
b. # lbs lost to landed fishery	>1.7 mil lbs/yr	>404,000 lbs/yr.
c. $ value of loss (2001$)	$29,000–$99,000/yr	$42,000–$1.7 mil/yr.

5. Tampa Bay

To evaluate potential impingement and entrainment impacts of cooling water intake structures in estuaries of the Gulf Coast and Southeast Atlantic, EPA evaluated impingement and entrainment rates at the Big Bend facility in Tampa Bay. EPA estimated that the impingement impact of Big Bend is 420,000 age 1 equivalent fish and over 11,000 pounds of lost fishery yield per year. The entrainment impact is 7.71 billion age 1 equivalent fish and over nearly 23 million pounds of lost fishery yield per year. Extrapolation of these losses to other Tampa Bay facilities indicated a cumulative impingement impact of 1 million age 1 fish (27,000 pounds of lost fishery yield) and a cumulative entrainment impact of 19 billion age 1 equivalent fish (56 million pounds of lost fishery yield) each year.

The results of EPA's evaluation of the dollar value of impingement and entrainment losses at Big Bend, as calculated using benefits transfer, indicate that baseline economic losses range from $61,000 to $67,000 per year for impingement and from $7.1 million to $7.4 million per year for entrainment (all in 2001$). Baseline economic losses using benefits transfer for all in scope facilities in Tampa Bay (Big Bend, PL Bartow, FJ Gannon, and Hookers Point) range from $150,000 to $165,000 for impingement and from $17.5 million to $18.5 million per year for entrainment (all in 2001$).

EPA also developed a random utility model (RUM) approach to estimate the effects of improved fishing opportunities due to reduced impingement and entrainment in the Tampa Bay Region. Cooling water intake structures withdrawing water from Tampa Bay impinge and entrain many of the species sought by recreational

anglers. These species include spotted seatrout, black drum, sheepshead, pinfish, and silver perch. The study area includes Tampa Bay itself and coastal sites to the north and south of Tampa Bay.

The study's main assumption is that anglers will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher, 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's analysis of improvements in recreational fishing opportunities in the Tampa Bay Region relies on a subset of the 1997 Marine Recreational Fishery Statistics Survey (MRFSS) combined with the 1997 Add-on MRFSS Economic Survey (AMES) and the follow-up telephone survey for the Southeastern United States. The Agency evaluated five species and species groups in the model: drums (including red and black drum), spotted seatrout, gamefish, snapper-grouper, and all other species. Impingement and entrainment was found to affect black drum, spotted seatrout, and sheepshead which is included in the snapper-grouper species category.

EPA estimated both a random utility site choice model and a negative binomial trip participation model. The random utility model assumes that anglers choose the site that provides them with the greatest satisfaction, based on the characteristics of different sites and the travel costs associated with visiting different sites. The trip participation model assumes that the total number of trips taken in a year are a function of the value of each site to the angler and characteristics of the angler.

To estimate changes in the quality of fishing sites under different policy scenarios, EPA relied on the recreational fishery landings data by State and the estimates of recreational losses from impingement and entrainment on the relevant species at the Tampa Bay cooling water intake structures. The Agency estimated changes in the quality of recreational fishing sites under different policy scenarios in terms of the percentage change in the historic catch rate. EPA divided losses to the recreational fishery from impingement and entrainment by the total recreational landings for the Tampa Bay area to calculate the percent change in historic catch rate from baseline losses (i.e., eliminating impingement and entrainment completely).

The results show that anglers targeting black drum have the largest per trip welfare gain ($7.18 in 2001$) from eliminating impingement and entrainment in the Tampa region. Anglers targeting spotted seatrout and sheepshead have smaller per-trip gains ($1.80 and $1.77 respectively, in 2001$). The large gains for black drum are due to the large predicted increase in catch rates. In general, based on a hypothetical one fish per trip increase in catch rate, gamefish and snapper-grouper are the most highly valued fish in the study area, followed by drums and spotted seatrout.

EPA calculated total economic values by combining the estimated per trip welfare gain with the total number of trips to sites in the Tampa Bay region. EPA used the estimated trip participation model to estimate the percentage change in the number of fishing trips with the elimination of impingement and entrainment. These estimated percentage increases are 0.93 percent for anglers who target sheepshead, 0.94 percent for anglers who target spotted seatrout, and 3.82 percent for anglers who target black drum.

If impingement and entrainment is eliminated in the Tampa region, total benefits are estimated to be $2,428,000 per year at the baseline number of trips, and $2,458,000 per year at the predicted increased number of trips (all in 2001$). At the baseline number of trips, the impingement and entrainment benefits to black drum anglers are $270,000 per year; benefits to spotted seatrout anglers are $2,016,000 per year; and benefits to sheepshead anglers are $143,000 per year (all in 2001$).

Results for the RUM analysis were merged with the benefits transfer-based estimates to create an estimate of recreational fishery losses from impingement and entrainment in a manner that avoids double counting of the recreation impacts. Baseline economic losses combining both approaches for all in scope facilities in Tampa Bay (Big Bend, PL Bartow, FJ Gannon, and Hookers Point) range from $0.80 million to $0.82 million for impingement and from $20.0 million to $20.9 million per year for entrainment (all in 2001$) (see Exhibit 18).

For a variety of reasons, EPA believes that the estimates developed here underestimate the value of impingement and entrainment losses at Tampa Bay facilities. EPA assumed that the effects of impingement and entrainment on fish populations are constant over time (i.e., that fish kills do not have cumulatively greater impacts on diminished fish populations). EPA also did not analyze whether the number of fish affected by impingement and entrainment would increase as populations increase in response to improved water quality or other improvements in environmental conditions. In the economic analyses, EPA also assumed that fishing is the only recreational activity affected.

EXHIBIT 18.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR TAMPA BAY

	Impingement	Entrainment
Four In Scope Facilities		
a. age 1 equivalent fish lost	>1 mil/yr	>19 billion/yr.
b. # lbs lost to landed fishery	>27,000 lbs/yr	>56 million lbs/yr.
c. $ value of loss (2001$)	$0.80 mil–$0.82 mil/yr	$20.0 mil–$20.9 mil/yr.

6. Brayton Point

EPA evaluated cumulative impingement and entrainment impacts at the Brayton Point Station facility in Mount Hope Bay in Somerset, Massachusetts. EPA estimates that the cumulative impingement impact is 69,300 age 1 equivalents and 5,100 pounds of lost fishery yield per year. The cumulative entrainment impact amounts to 3.8 million age 1 equivalents and 70,400 pounds of lost fishery yield each year.

The results of EPA's evaluation of the dollar value of impingement and entrainment losses at Brayton Point (as calculated using benefits transfer) indicate that baseline economic losses range from $7,000 to $12,000 per year for impingement and from $166,000 to

$303,000 per year for entrainment (all in 2001$).

EPA also developed an Habitat-based Replacement Cost (HRC) analysis to examine the costs of restoring impingement and entrainment losses at Brayton Point. These HRC estimates were merged with the benefits transfer results to develop a more comprehensive range of loss estimates. The HRC results were used as an upper bound and the midpoint of the benefits transfer method was used as a lower bound (HRC annualized at 7 percent over 20 years). Combining both approaches, the value of impingement and entrainment losses at Brayton Point range from approximately $9,000 to $890,00 per year for impingement, and from $0.2 million to $28.3 million per year for entrainment (all in 2001$) (see Exhibit 19).

For a variety of reasons, EPA believes that the estimates developed here underestimate the total economic benefits of reducing impingement and entrainment at Brayton Point. EPA assumed that the effects of impingement and entrainment on fish populations are constant over time (i.e., that fish kills do not have cumulatively greater impacts on diminished fish populations). EPA also did not analyze whether the number of fish affected by impingement and entrainment would increase as populations increase in response to improved water quality or other improvements in environmental conditions. In the economic analyses, EPA also assumed that fishing is the only recreational activity affected.

EXHIBIT 19.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR BRAYTON POINT

	Impingement	Entrainment
One In Scope Facility		
a. age 1 equivalent fish lost	>69,300/yr	>3.8 mil/yr.
b. # lbs lost to landed fishery	>5,100 lbs/yr	>70,400 lbs/yr.
c. $ value of loss (2001$)	$9,000–$890,000/yr	$0.2 mil–$28.3 mil/yr.

7. Seabrook Pilgrim

The results of EPA's evaluation of impingement and entrainment rates at Seabrook and Pilgrim indicate that impingement and entrainment at Seabrook's offshore intake is substantially less than impingement and entrainment at Pilgrim's nearshore intake. Impingement per MGD averages 68 percent less and entrainment averages 58 percent less at Seabrook. The species most commonly impinged at both facilities are primarily winter flounder, Atlantic herring, Atlantic menhaden, and red hake. These are species of commercial and recreational interest. However, the species most commonly entrained at the facilities are predominately forage species. Because it is difficult to assign an economic value to such losses, and because entrainment losses are much greater than impingement losses, the benefits of an offshore intake or other technologies that may reduce impingement and entrainment at these facilities are likely to be underestimated. There also are several important factors in addition to the intake location (nearshore versus offshore) that complicate the comparison of impingement and entrainment at the Seabrook facility to impingement and entrainment at Pilgrim (e.g., entrainment data are based on different flow regimes, different years of data collection, and protocols for reporting monitoring results).

Average impingement losses at Seabrook are valued at between $3,500 and $5,200 per year, and average entrainment losses are valued at between $142,000 and $315,000 per year (all in 2001$) (see Exhibit 20). Average impingement losses at Pilgrim are valued at between $3,300 and $5,000 per year, and average entrainment losses are valued at between $523,500 and $759,300 per year (all in 2001$). These values reflect estimates derived using benefits transfer.

EPA also developed an HRC analysis to examine the costs of restoring impingement and entrainment losses at Pilgrim. Using the HRC approach, the value of impingement and entrainment losses at Pilgrim are approximately $507,000 for impingement, and over $9.3 million per year for entrainment (HRC annualized at 7 percent over 20 years) (all in 2001$). These HRC estimates were merged with the benefits transfer results to develop a more comprehensive range of loss estimates.

These HRC estimates were merged with the benefits transfer results to develop a more comprehensive range of loss estimates. The HRC results were used as an upper bound and the midpoint of the benefits transfer method was used as a lower bound (HRC annualized at 7 percent over 20 years). Combining both approaches, the value of impingement and entrainment losses at Pilgrim range from approximately $4,000 to $507,00 per year for impingement, and from $0.6 million to $9.3 million per year for entrainment (all in 2001$) (see Exhibit 21).

EXHIBIT 20.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR SEABROOK

	Impingement	Entrainment
One In Scope Facility: Seabrook		
a. age 1 equivalent fish lost	> 1.8 mil/yr	> 290,000/yr
b. # lbs lost to landed fishery	> 21.4 mil lbs/yr	> 404,000 lbs/yr
c. $ value of loss (2001$)	$3,000–$5,000	$142,000–$315,000

EXHIBIT 21.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR PILGRIM

	Impingement	Entrainment
One In Scope Facility: Pilgrim Losses Using Benefits Transfer		
a. age 1 equivalent fish lost	> 1.8 mil/yr	> 290,000/yr

EXHIBIT 21.—BASELINE IMPACTS (ANNUAL AVERAGE) FOR PILGRIM—Continued

	Impingement	Entrainment
b. # lbs lost to landed fishery	> 21.4 mil lbs/yr	> 404,000 lbs/yr
c. $ value of loss (2001$)	$3,000–$5,000/yr	$0.5 mil–$0.7 mil/yr
Pilgrim Losses Using HRC as Upper Bounds and Benefits Transfer Midpoints as Lower		
a. age 1 equivalent fish lost	> 1.8 mil/yr	> 290,000/yr
b. # lbs lost to landed fishery	> 21.4 mil lbs/yr	> 404,000 lbs/yr
c. $ value of loss (2001$)	$4,000–$507,000/yr	$0.6 mil–$9.3 mil/yr

8. Monroe

EPA estimates that the baseline impingement losses at the Monroe facility are 35.8 million age 1 equivalents and 1.4 million pounds of lost fishery yield per year. Baseline entrainment impacts amount to 11.6 million age 1 equivalents and 608,300 pounds of lost fishery yield each year.

The results of EPA's evaluation of the dollar value of baseline impingement and entrainment losses at Monroe (as calculated using benefits transfer) indicate that baseline economic losses range from $502,200 to $981,750 per year for impingement and from $314,600 to $2,298,500 per year for entrainment (all in 2001$).

EPA also developed an HRC analysis to examine the costs of restoring impingement and entrainment losses at Pilgrim. These HRC estimates were merged with the benefits transfer results to develop a more comprehensive range of loss estimates. These HRC estimates were merged with the benefits transfer results to develop a more comprehensive range of loss estimates. The HRC results were used as an upper bound and the midpoint of the benefits transfer method was used as a lower bound (HRC annualized at 7 percent over 20 years). Combining both approaches, the value of impingement and entrainment losses at Monroe range from approximately $0.7 million to $5.6 per year for impingement, and from $1.3 million to $13.9 million per year for entrainment (all in 2001$) (see Exhibit 22).

For a variety of reasons, EPA believes that the estimates developed here underestimate the total economic benefits of reducing impingement and entrainment at the Monroe facility. EPA assumed that the effects of impingement and entrainment on fish populations are constant over time (i.e., that fish kills do not have cumulatively greater impacts on diminished fish populations). EPA also did not analyze whether the number of fish affected by impingement and entrainment would increase as populations increase in response to improved water quality or other improvements in environmental conditions. In the economic analyses, EPA also assumed that fishing is the only recreational activity affected.

EXHIBIT 22.—BASELINE LOSSES AT (ANNUAL AVERAGE) MONROE (USING HRC VALUES AS UPPER BOUNDS)

	Impingement	Entrainment
One In Scope Facility		
a. age 1 equivalent fish lost	> 1.8 mil/yr	> 290,000/yr
b. # lbs lost to landed fishery	> 21.4 mil lbs/yr	> 404,000 lbs/yr
c. $ value of loss (2001$)	$0.7 mil–$5.6 mil	$1.3 mil–$13.9 mil

F. Estimates of National Benefits

1. Methodology

In order to compare benefits to costs for a national rulemaking such as the section 316(b) proposed rule for Phase II existing facilities, there is a need to generate national estimates of both costs and benefits. This section describes the methodology EPA has developed to provide national estimates of benefits.

Because benefits are very site-specific, there are limited options for how EPA can develop national-level benefits estimates from a diverse set of over 500 regulated entities. EPA could only develop a limited number of case studies, and to interpret these cases in a national context, the Agency identified a range of settings that reflect the likely benefits potential of a given type of facility (and its key stressor-related attributes) in combination with the waterbody characteristics (receptor attributes) in which it is located. Benefits potential settings can thus be defined by the various possible combinations of stressor (facility) and receptor (waterbody, etc) combinations.

Ideally, case studies would be selected to represent each of these ''benefits potential'' settings and then could be used to extrapolate to like-characterized facility-waterbody setting cooling water intake structure sites. However, data limitations and other considerations precluded EPA from developing enough case studies to reflect the complete range of benefits-potential settings. Data limitations also made it difficult to reliably assign facilities to the various benefits potential categories.

Based on the difficulties noted above, EPA adopted a more practical, streamlined extrapolation version of its preferred approach, as this is the only viable approach available to the Agency. To develop a feasible, tractable manner for developing national benefits estimates from a small number of case study investigations, EPA made its national extrapolations on the basis of a combination of three relevant variables: (1) The volume of water (operational flow) drawn by a facility; (2) the level of recreational angling activity within the vicinity of the facility; and (3) the type of waterbody on which the facility is located. Extrapolations were then made across facilities according to their respective waterbody type.

The first of these variables—operational flow (measured as millions of gallons per day, or MGD)—reflects the degree of stress caused by a facility. The second variable —the number of angler days in the area (measured as the number of recreational angling days within a 120 mile radius) — reflects the degree to which there is a demand

(value) by local residents to use the fishery that is impacted. The third variable—waterbody type (e.g., estuary, ocean, freshwater river or lake, or Great Lakes)—reflects the types, numbers, and life stages of fish and other biological receptors that are impacted by the facilities. Accordingly, the extrapolations based on these three variables reflect the key factors that affect benefits: the relevant stressor, the biological receptors, and the human demands for the natural resources and services impacted.

Flow: The flow variable the Agency developed is the monetized benefits per volume of water flowing through cooling water intake structures, in specific, applying a metric of ''dollars per million gallons per day'' ($/MGD), where MGD levels are based on average operational flows as reported by the facilities in the EPA Section 316(b) Detailed Questionnaire and Short Technical Questionnaire responses, or through publically available data.

Angler days. The angler day variable the Agency used is based on data developed by the U.S. Fish and Wildlife Survey as part of its 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. These data were interpreted within a GIS-based approach to estimate the level of recreational angling pursued by populations living within 120 miles of each facility (additional detail is provided in the EBA).

In developing the index, EPA used a GIS analysis to identify counties within a 120 mile radius of each facility. The area for each facility included the county the facility is located in and any other county with 50 percent or more of its population residing within 120 miles of the facility. EPA estimated angling activity levels for two types of angling days for each county: freshwater angling days and saltwater angling days. Estimated angling days for the appropriate waterbody type were summed across all counties in a facility's area to yield estimated angling days near the facility. For each type of angling, EPA estimated angling days by county residents as a percentage of the State angling days by residents 16 years and older reported in the 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USFWS, 1997). Angling days in each State were partitioned into days by urban anglers and days by rural anglers based on the U.S. percentages reported in the 1996 National Survey.

For urban counties,

Angling Days = State Urban Angling Days * County Pop/State Pop in Urban Counties

For rural counties,

Angling Days = State Rural Angling Days * County Pop/State Pop in Rural Counties

EPA determined urban and rural population by State by summing the 1999 county populations for the State's urban and rural counties respectively. EPA determined each county's urban/rural status using definitions developed by the U.S. Department of Agriculture (as included in NORSIS 1997). These index values are based upon the estimated number of angling days by residents living near the facility. The index value for each facility is a measure of the facility's share of the total angling days estimated at all in scope facilities located on a similar waterbody.

The analysis then proceeded by waterbody type.

Estuaries

National baseline losses and benefits for estuaries were based on the Salem and Tampa Bay case studies. The case studies were extrapolated to other facilities on the basis of regional fishery types, in an effort to reflect the different types of fisheries that are impacted in various regions of the country's coastal waters. As such, the Tampa Bay case study results were applied to estuary facilities located in Florida and other Gulf Coast States, and the Salem results were applied to all remaining estuary facilities (note that the Salem results used for the extrapolation differ from the case study results presented above in order to reflect losses without a screen currently in place at the facility). Ideally, a West Coast facility would have served as the basis of extrapolation to estuarine facilities along the Pacific Coast, but EPA could not develop a suitable case study for that purpose in time for this proposal. However, EPA intends to develop such a western estuary case study and report its findings in an anticipated forthcoming Notice of Data Availability.

In order to extrapolate baseline losses from the Salem and Big Bend facilities to all in scope facilities on estuaries, EPA calculated an index of angling activity for each of these in scope facilities. The angling index is a percentage value that ranges from 0 to 1. Dividing baseline losses at a facility by the index value provides an estimate of total baseline losses at all in scope facilities located on waterbodies in the same category.

Rivers and Lakes

EPA combined rivers, lakes and reservoirs into one class of freshwater-based facilities (Great Lakes are not included in this group, and were considered separately). The waterbody classifications for freshwater rivers and lakes/reservoirs were grouped together for the extrapolation due to similar ecological and hydrological characteristics of freshwater systems used as cooling water. The majority of these hydrologic systems have undergone some degree of modification for purposes such as water storage, flood control, and navigation. The degree of modification can vary very little or quite dramatically. A facility falling into the lake/reservoir category may withdraw cooling water from a lake that has been reclassified as a reservoir due to the addition of an earthen dam, or from a reservoir created by the diversion of a river through a diversion canal for use as a cooling lake. The species composition and ecology of these two waterbodies may vary greatly. While the ecology of river systems and lakes or reservoirs are considerably different, due to structural modifications these two classifications may be quite similar ecologically depending on the waterbody in question. For example, many river systems, including the Ohio River, are now broken up into a series of navigational pools controlled by dams that may function more similarly to a reservoir than a naturally flowing river.

Baseline losses and benefits in the Ohio case study were based on 29 in scope facilities in the Ohio River case study area. The Agency extrapolated these losses to all in scope facilities on other freshwater rivers, lakes, and reservoirs.

Oceans and Great Lakes

Oceans and Great Lakes estimates were based on extrapolations from the Pilgrim and JR Whiting facility case studies, respectively. For these two facilities (and their associated waterbody types), the valuation method applied by EPA in the national extrapolations was based on the Habitat-based Replacement Cost approach, which reflects values for addressing a much greater number of impacted species (not just the small share that are recreational or commercial species that are landed by anglers). For example, at JR Whiting, the benefits transfer approach developed values for recreational angling amounted to only 4 percent of the estimated total impingement losses, and reflected only 0.02 percent of the age 1 fish lost due to impingement. At Pilgrim, the benefits transfer approach reflected recreational losses for only 0.5 percent of the entrained age 1 equivalent fish at that site. Because the Agency was able to

develop HRC values for these sites and recreational fishery impacts were such a small part of the impacts, EPA extrapolated only based on HRC estimates and used only the flow-based (MGD) index for oceans and the Great Lakes.

Results

The results of the index calculations for operational flow and angling effort used for extrapolating case study baseline losses to national baseline losses for all in scope facilities are reported in Exhibit 23 below.

EXHIBIT 23.—FLOW AND ANGLING INDICES

Waterbody Type	Based on	Normalized MGD percent	Percent of in scope angling base
Estuary-N. Atlantic	Salem	4.39	2.10
Estuary-S. Atlantic	4 Tampa Bay facilities	19.24	20.28
Freshwater systems	29 Ohio River facilities	9.30	12.34
Great Lake	JR Whiting	3.92	13.89
Ocean	Pilgrim	3.42	6.54

Waterbody

EPA further tailored its extrapolation approach, so that monetized benefits estimates are based on available data for similar types of waterbody settings. Thus, for example, the case study results for the Salem facility (located in the Delaware Estuary) and the Tampa facilities are applied (on a per MGD and angling day index basis) only to other facilities located in estuary waters. Likewise, results from Ohio River facilities are applied to inland freshwater water cooling water intake structures (excluding facilities on the Great Lakes), and losses estimated for the Pilgrim facility are applied to facilities using ocean waters at their intakes, and results for J.R. Whiting are used for the Great Lakes facilities.

As noted above, the waterbody classifications for freshwater rivers and lakes or reservoirs were grouped together for the extrapolation due to similar ecological and hydrological characteristics of freshwater systems used as cooling water. The majority of these hydrologic systems have undergone some degree of modification for purposes such as water storage, flood control, and navigation. Due to structural modifications, these freshwater waterbody types be quite similar ecologically. For example, many river systems, including the Ohio River, are now broken up into a series of navigational pools controlled by dams that may function more similarly to a reservoir than a naturally flowing river.

The natural species distribution, genetic movement, and seasonal migration of aquatic organisms that may be expected in a natural system is affected by factors such as dams, stocking of fish, and water diversions. Since the degree of modification of inland waterbodies and the occurrence of fish stocking could not be determined for every cooling water source, the waterbody categories ''freshwater rivers'', and ''lakes/reservoirs'' were grouped together.

The facilities chosen for extrapolation are expected to have relatively average benefits per MGD and angling day index, for their respective waterbody types. Benefits per MGD and angling day index are not expected to be extremely high or low relative to other facilities. EPA was careful not to use facilities that were unusual in this regard. Salem is located in the transitional zone of the estuary, a lesser productive part of the estuary.

The use of flow and angler day basis for extrapolation has some practical advantages and basis in logic; however, it also has some less than fully satisfactory implications. The advantages of using this extrapolation approach include:

- Feasibility of application, because the extrapolation relies on waterbody type, angler demand, and MGD data that are available for all in scope facilities.
- Selectively extrapolating case study results to facilities on like types of waterbodies reflects the type of aquatic setting impacted, which is intended to capture the number and types of species impacted by impingement and entrainment at such facilities (i.e., impacts at facilities on estuaries are more similar to impacts at other estuary-based cooling water intake structures than they are to facilities on inland waters).
- Flow in MGD is a useful proxy for the scale of operation at cooling water intake structures, a variable that typically will have a large impact on baseline losses and potential regulatory benefits.
- While there may be a high degree of variability in the actual losses (and benefits) per MGD across facilities that impact similar waterbodies, the extrapolations are expected to be reasonably accurate on average for developing an order-of-magnitude national-level estimate of benefits.
- The recreational participation level (angler day) variable provides a logical basis to reflect the extent of human user demands for the fishery and other resources affected by impingement and entrainment.
- The estimates are not biased in either direction.

Some of the disadvantages of the use of extrapolating results on the basis of waterbody type, recreational angling day data, and operational flows (MGD) include:

- The approach may not reflect all of the variability that exists in impingement and entrainment impacts (and monetized losses or benefits) within waterbody classifications. For example, within and across U.S. estuaries, there may be different species, numbers of individuals, and life stages present at different cooling water intake structures.
- The approach may not reflect all of the variability that exists in impingement and entrainment impacts (and monetized losses or benefits) across operational flow levels (MGD) at different facilities within a given waterbody type.

Extrapolating to national benefits according to flow (MGD), angling levels, and waterbody type, as derived from estimates for a small number of case studies, may introduce inaccuracies into national estimates. This is because the three variables used as the basis for the extrapolation (MGD, recreational angling days, and waterbody type) may not account for all of the variability expected in site-specific benefits levels. The case studies may not reflect the average or ''typical'' cooling water intake structures impacts on a given type of waterbody (i.e., the extrapolated results might under- or over-state the physical and dollar value of impacts per MGD and fishing day index, by

waterbody type). The inaccuracies introduced to the national-level estimates by this extrapolation approach are of unknown magnitude or direction (i.e., the estimates may over- or understate the anticipated national-level benefits), however EPA has no data to indicate that the case study results are atypical for each waterbody type.

2. Results of National Benefits Extrapolation

National benefits for 3 regulatory compliance options were estimated for the 539 facilities found to be in scope of the section 316(b) Phase II rulemaking. The benefits estimates were derived in a multi-step process that used operational flows and the recreational fishing index as the basis for extrapolating case study results to the national level.

In the first step, EPA used the baseline losses (dollars per year) derived from the analysis of facilities examined in the case studies. In some instances, the case study facilities had already implemented some measures to reduce impingement and/or entrainment. In such cases, baseline losses as appropriate to the national extrapolation were estimated using data for years prior to the facilities' actions (e.g., based on impingement and entrainment before the impingement deterrent net was installed at JR Whiting). These pre-action baselines provide a basis for examining other facilities that have not yet taken actions to reduce impingement and/or entrainment. Baseline losses at the selected case study facilities are summarized in Exhibit 24.

EXHIBIT 24.—BASELINE LOSSES FROM SELECTED CASE STUDIES

[Baseline losses from selected case studies, values in thousands of 2001$]

Case study	Impingement			Entrainment		
	Low	Mid	High	Low	Mid	High
Salem	$528	$704	$879	$16,766	$23,657	$30,548
Brayton	9	450	890	235	14,261	28,288
Contra Costa	2,666	5,726	8,785	6,413	13,630	20,847
Pittsburgh	10,096	22,268	34,440	19,166	40,760	62,354
4 Tampa Bay Facilities	801	809	817	20,007	20,454	20,901
29 Ohio Facilities	3,452	4,052	4,652	9,257	9,584	9,912
Monroe	742	3,190	5,639	1,307	7,604	13,902
JR Whiting	358	797	1,235	42	873	1,703
Pilgrim Nuclear	4	256	507	642	4,960	9,279

In the second step, EPA extrapolated the baseline dollar loss estimates from the case study models to all of the remaining 539 facilities by multiplying the index of operational flow for each facility by the estimated dollar losses at baseline per unit flow, based on each facility's source waterbody type, were extrapolated. This resulted in a national estimate of baseline monetizable losses for all 539 in scope facilities as summarized in Exhibit 25.

EXHIBIT 25.—BASELINE LOSSES EXTRAPOLATED TO ALL IN SCOPE FACILITIES USING MGD ONLY

[Baseline losses extrapolated to all in scope facilities—MGD only, values in thousands of 2001$]

Facility	Case study	Impingement			Entrainment		
		Low	Mid	High	Low	Mid	High
Estuary, Non Gulf							
Salem	Delaware	$528	$704	$879	$16,766	$23,657	$30,548
Brayton Point	Brayton	9	450	890	235	14,261	28,288
Contra Costa	California	2,666	5,726	8,785	6,413	13,630	20,847
Pittsburgh	California	10,096	22,268	34,440	19,166	40,760	62,354
All Other In Scope		11,167	14,875	18,583	354,346	499,991	645,636
All 78 In Scope		24,467	44,022	63,578	396,925	592,298	787,672
Estuary, Gulf Coast							
4 Tampa Facilities	Tampa Bay	801	809	817	20,007	20,454	20,901
All Other In Scope		3,361	3,395	3,429	83,982	85,857	87,732
All 30 In Scope		4,162	4,204	4,247	103,989	106,311	108,633
Freshwater							
29 Ohio Facilities	Ohio	3,452	4,052	4,652	9,257	9,584	9,912
Monroe	Monroe	742	3,190	5,639	1,307	7,604	13,902
All Other In Scope		33,317	39,111	44,906	89,348	92,514	95,679
All 393 In Scope		37,511	46,353	55,196	99,911	109,702	119,493
Great Lake							
JR Whiting	JR Whiting	358	797	1,235	42	873	1,703
All Other In Scope		8,774	19,523	30,271	1,025	21,385	41,745
All 16 In Scope		9,132	20,319	31,506	1,067	22,257	43,448

EXHIBIT 25.—BASELINE LOSSES EXTRAPOLATED TO ALL IN SCOPE FACILITIES USING MGD ONLY—Continued

[Baseline losses extrapolated to all in scope facilities—MGD only, values in thousands of 2001$]

Facility	Case study	Impingement			Entrainment		
		Low	Mid	High	Low	Mid	High
Ocean							
Pilgrim Nuclear	Pilgrim	4	256	507	642	4,960	9,279
All Other In Scope		115	7,219	14,323	18,127	140,146	262,165
All 22 In Scope		119	7,475	14,830	18,769	145,106	271,444
Total All Facilities							
All 539 In Scope		75,390	122,374	169,357	620,661	975,675	1,330,690

In the third step, the Agency extrapolated baseline losses from the case studies were also developed using the angling index values for each case study. The calculation of the index is described above. The results are summarized in Exhibit 26.

EXHIBIT 26.—BASELINE LOSSES EXTRAPOLATED—ANGLING DAYS ONLY

[Values in thousands of 2001$]

Facility	Case Study	Impingement			Entrainment		
		Low	Mid	High	Low	Mid	High
Estuary, Non Gulf							
Salem	Delaware	$528	$704	$879	$16,766	$23,657	$30,548
Brayton Point	Brayton	9	450	890	235	14,261	28,288
Contra Costa	California	2,666	5,726	8,785	6,413	13,630	20,847
Pittsburgh	California	10,096	22,268	34,440	19,166	40,760	62,354
All Other In Scope		23,840	31,755	39,671	756,471	1,067,399	1,378,327
All 78 In Scope		37,139	60,903	84,667	799,050	1,159,706	1,520,363
Estuary, Gulf Coast							
4 Tampa Facilities	Tampa Bay	$801	$809	$817	$20,007	$20,454	$20,901
All Other In Scope		3,148	3,180	3,212	78,664	80,421	82,177
All 30 In Scope		3,949	3,989	4,029	98,672	100,875	103,078
Freshwater							
29 Ohio Facilities	Ohio	$3,452	$4,052	$4,652	$9,257	$9,584	$9,912
Monroe	Monroe	742	3,190	5,639	1,307	7,604	13,902
All Other In Scope		23,203	27,238	31,273	62,224	64,429	66,633
All 393 In Scope		27,396	34,480	41,564	72,787	81,617	90,447
Great Lake							
JR Whiting	JR Whiting	$358	$797	$1,235	$42	$873	$1,703
All Other In Scope		2,231	4,965	7,698	261	5,438	10,616
All 16 In Scope		2,589	5,761	8,933	302	6,311	12,319
Ocean							
Pilgrim Nuclear	Pilgrim	$4	$256	$507	$642	$4,960	$9,279
All Other In Scope		56	3,529	7,001	8,861	68,504	128,147
All 22 In Scope		60	3,784	7,508	9,502	73,464	137,426
Total All Facilities							
All 539 In Scope		$71,134	$108,918	$146,701	$980,314	$1,421,974	$1,863,633

As a fourth step, EPA calculated the average baseline losses of the flow-based results and the angling-based results. This develops results that reflect an equal-weighted extrapolation measure of each case study facility's baseline loss, based on it's percent share of flow and recreational fishing relative to all in scope facilities in each waterbody type. The results of this average are reported in Exhibit 27.

EXHIBIT 27.—BASELINE LOSSES EXTRAPOLATED TO ALL IN SCOPE FACILITIES—MEANS OF MGD AND ANGLING

[Values in thousands of 2001$]

Facility	Case Study	Impingement			Entrainment		
		Low	Mid	High	Low	Mid	High
Estuary, Non Gulf							
Salem	Delaware	$528	$704	$879	$16,766	$23,657	$30,548
Brayton Point	Brayton	9	450	890	235	14,261	28,288
Contra Costa	California	2,666	5,726	8,785	6,413	13,630	20,847
Pittsburgh	California	10,096	22,268	34,440	19,166	40,760	62,354
All Other In Scope		17,503	23,315	29,127	555,409	783,695	1,011,981
All 78 In Scope		30,803	52,463	74,122	597,988	876,002	1,154,017
Estuary. Gulf Coast							
4 Tampa Facilities	Tampa Bay	$801	$809	$817	$20,007	$20,454	$20,901
All Other In Scope		3,255	3,288	3,321	81,323	83,139	84,955
All 30 In Scope		4,055	4,097	4,138	101,330	103,593	105,856
Freshwater							
29 Ohio Facilities	Ohio	$3,452	$4,052	$4,652	$9,257	$9,584	$9,912
Monroe	Monroe	742	3,190	5,639	1,307	7,604	13,902
All Other In Scope		28,260	33,175	38,089	75,786	78,471	81,156
All 393 In Scope		32,453	40,417	48,380	86,349	95,660	104,970
Great Lake							
JR Whiting	JR Whiting	$358	$797	$1,235	$42	$873	$1,703
All Other In Scope		5,503	12,244	18,985	643	13,412	26,180
All 16 In Scope		5,861	13,040	20,220	685	14,284	27,884
Ocean							
Pilgrim Nuclear	Pilgrim	$4	$256	$507	$642	$4,960	$9,279
All Other In Scope		86	5,374	10,662	13,494	104,325	195,156
All 22 In Scope		90	5,629	11,169	14,135	109,285	204,435
Total All Facilities							
All 539 In Scope		$73,262	$115,642	$158,029	$800,487	$1,198,824	$1,597,162

In the fifth step, EPA selected the set of extrapolation values the Agency believes are the most reflective of the baseline loss scenarios that applied in each waterbody type. For estuaries and freshwater facilities, EPA used the midpoint of its loss estimates of impingement and entrainment at the case study facilities, and then applied the average of the MGD- and angler-based extrapolation results. This provides estimates of national baseline losses that reflect the broadest set of values and parameters (i.e., the full range of loss estimates, plus the application of all three extrapolation variables).

For oceans and the Great Lakes, EPA developed national-scale estimates using its HRC-based loss estimates, because EPA was able to develop HRC estimates for these sites, and because these HRC values are more comprehensive than the values derived using the more traditional benefits transfer approach. The HRC estimates cover losses for a much larger percentage of fish lost due to impingement and entrainment, whereas the benefits transfer approach addressed losses only for a small share of the impacted fish. Since recreational fish impacts were an extremely small share of the total fish impacts at these sites, EPA extrapolated the HRC findings using only the MGD-based index (i.e., the angler-based index was not relevant).

The results of EPA's assessment of its best estimates for baseline losses due to impingement and entrainment are shown in Exhibit 28.

EXHIBIT 28.—BEST ESTIMATE BASELINE LOSSES

[Best estimate baseline losses, values in thousands of 2001$]

Facility	Case study	Impingement	Entrainment
Salem	Delaware	$704	$23,657
Brayton Point	Brayton	450	14,261
Contra Costa	California	5,726	13,630
Pittsburgh	California	22,268	40,760
All Other In Scope		23,315	783,695
All 78 In Scope		52,463	876,002

EXHIBIT 28.—BEST ESTIMATE BASELINE LOSSES—Continued

[Best estimate baseline losses, values in thousands of 2001$]

Facility	Case study	Impingement	Entrainment
Estuary and Gulf Coast			
4 Tampa Facilities	Tampa Bay	$809	$20,454
All Other In Scope		3,288	83,139
All 30 In Scope		4,097	103,593
Freshwater			
29 Ohio Facilities	Ohio	$4,052	$9,584
Monroe	Monroe	3,190	7,604
All Other In Scope		30,891	73,069
All 393 In Scope		38,133	90,258
Great Lake			
JR Whiting	JR Whiting	$1,235	$1,703
All Other In Scope		30,271	41,745
All 16 In Scope		31,506	43,448
Ocean			
Pilgrim Nuclear	Pilgrim	$507	$9,279
All Other In Scope		14,323	262,165
All 22 In Scope		14,830	271,444
Total All Facilities			
All 539 In Scope		$141,029	$1,384,745

In the sixth and final step, EPA estimated the potential benefits of each regulatory option by applying a set of estimated percent reductions in baseline losses. The percent reduction in baseline losses for each facility reflects EPA assessment of (1) regulatory baseline conditions at the facility (i.e., current practices and technologies in place), and (2) the percent reductions in impingement and entrainment that EPA estimated would be achieved at each facility that the Agency believes would be adopted under each regulatory option. The options portrayed in the Exhibits correspond to the following technical descriptions of each alternative:

Option 1 requires all Phase II existing facilities located on different categories of waterbodies to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling water systems based on location and the percentage of the source waterbody they withdraw for cooling;

Option 2 is variation of Option 1, but embodies a two-track approach whereby some facilities may use site-specific studies to comply using alternative approaches;

Option 3 (the Agency's preferred option) requires all Phase II existing facilities to reduce impingement and entrainment to levels established based on the use of design and construction or operational measures, except for facilities that are below flow thresholds for lakes and rivers;

Option 3a is a variation of Option 3, wherein all Phase II existing facilities are required to reduce impingement and entrainment to levels established based on the use of design and construction or operational measures;

Option 4 requires all Phase II existing facilities to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling water systems;

Option 5 requires that all Phase II existing facilities reduce intake capacity commensurate with the use of dry cooling systems.

The results of EPA approach to estimating national benefits are shown in Exhibits 29 through 32 (note that the percent reductions shown in these exhibits are the flow-weighted average reductions across all facilities in each waterbody category for each regulatory option).

EXHIBIT 29.—IMPINGEMENT BENEFITS FOR VARIOUS OPTIONS—BY REDUCTION LEVEL

Waterbody Type	Facility	Baseline impingement loss	Percentage Reductions					
			OPTION 1 percent	OPTION 2 percent	OPTION 3 percent	OPTION 3a percent	OPTION 4 percent	OPTION 5 percent
Estuary—NonGulf	All 78 In Scope	$52,463	64.5	47.5	33.2	25.0	40.9	97.5
Estuary—Gulf	All 30 In Scope	4,097	63.2	45.9	26.5	30.0	45.3	96.7
Freshwater	All 393 In Scope	40,417	47.3	47.3	47.3	46.7	59.0	98.0
Great Lake	All 16 In Scope	31,506	80.0	80.0	80.0	77.0	88.6	96.3
Ocean	All 22 In Scope	14,830	73.2	59.0	50.6	47.2	59.7	88.8
ALL	All 539 In Scope	143,312						

EXHIBIT 30.—IMPINGEMENT BENEFITS FOR VARIOUS OPTIONS—BY BENEFIT LEVEL

Waterbody type	Facility	Baseline impingement loss	Benefits (Values in thousands of 2001$)					
			OPTION 1	OPTION 2	OPTION 3	OPTION 3a	OPTION 4	OPTION 5
Estuary—NonGulf	All 78 In Scope	$52,463	$33,834	$24,909	$17,418	$13,125	$21,470	$51,141
Estuary—Gulf	All 30 In Scope	4,097	2,588	1,882	1,087	1,230	1,856	3,961
Freshwater	All 393 In Scope ...	40,417	19,117	19,117	19,117	18,855	23,828	39,605
Great Lake	All 16 In Scope	31,506	25,205	25,205	25,205	24,260	27,900	30,326
Ocean	All 22 In Scope	14,830	10,849	8,746	7,503	6,995	8,858	13,168
ALL	All 539 In Scope ...	143,312	91,593	79,858	70,329	64,465	83,911	138,201

EXHIBIT 31.—ENTRAINMENT BENEFITS FOR VARIOUS OPTIONS—BY REDUCTION LEVEL

Waterbody type	Facility	Baseline loss	Entrainment percentage reductions					
			OPTION 1 percent	OPTION 2 percent	OPTION 3 percent	OPTION 3a percent	OPTION 4 percent	OPTION 5 percent
Estuary—NonGulf	All 78 In Scope	$876,002	67.2	59.1	48.5	47.1	79.2	97.5
Estuary—Gulf	All 30 In Scope	103,593	66.9	52.3	47.0	47.8	79.3	96.7
Freshwater	All 393 In Scope ...	95,660	12.4	12.4	12.4	44.2	72.7	98.0
Great Lake	All 16 In Scope	43,448	57.8	57.8	57.8	57.8	88.6	96.3
Ocean	All 22 In Scope	271,444	74.2	58.9	45.0	45.0	74.1	88.8
ALL	All 539 In Scope ...	1,390,147						

EXHIBIT 32.—ENTRAINMENT BENEFITS FOR VARIOUS OPTIONS—BY BENEFIT LEVEL

Waterbody type	Facility	Baseline loss	Entrainment benefit (Values in thousands of 2001$)					
			OPTION 1	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6
Estuary—NonGulf	All 78 In Scope	$876,002	$588,552	$517,960	$424,708	$412,696	$693,420	$853,940
Estuary—Gulf	All 30 In Scope	103,593	69,324	54,206	48,645	49,508	82,186	100,175
Freshwater	All 393 In Scope ...	95,660	11,883	11,883	11,883	42,277	69,575	93,738
Great Lake	All 16 In Scope	43,448	25,092	25,092	25,092	25,092	38,474	41,820
Ocean	All 22 In Scope	271,444	201,301	159,809	122,098	122,098	201,025	241,020
ALL	All 539 In Scope ...	1,390,147	896,152	768,950	632,426	651,671	1,084,681	1,330,694

In addition, EPA developed a more generic illustration of potential benefits, based on a broad range (from 10 percent to 90 percent) of potential reductions in impingement and entrainment. These illustrative results are shown in Exhibit 33. Finally, the benefits estimated for Option 3, the Agency's preferred option, are detailed in Exhibit 34.

EXHIBIT 33.—SUMMARY OF POTENTIAL BENEFITS ASSOCIATED WITH VARIOUS IMPINGEMENT AND ENTRAINMENT REDUCTION LEVELS

Reduction level percent		Benefits (values in thousands of 2001$)	
		Impingement	Entrainment
10	All 539 In Scope	$14,331	$139,015
20	All 539 In Scope	28,662	278,029
30	All 539 In Scope	42,994	417,044
40	All 539 In Scope	57,325	556,059
50	All 539 In Scope	71,656	695,073
60	All 539 In Scope	85,987	834,088
70	All 539 In Scope	100,319	973,103
80	All 539 In Scope	114,650	1,112,118
90	All 539 In Scope	128,981	1,251,132

EXHIBIT 34.—SUMMARY OF BENEFITS FROM IMPINGEMENT CONTROLS ASSOCIATED WITH OPTION 3

Waterbody type	Facility	Benefits (values in thousands of 2001$)	
		Impingement	Entrainment
Estuary—NonGulf	All 78 In Scope	$17,418	$424,708
Estuary—Gulf	All 30 In Scope	1,087	48,645
Freshwater	All 393 In Scope	19,117	11,883

EXHIBIT 34.—SUMMARY OF BENEFITS FROM IMPINGEMENT CONTROLS ASSOCIATED WITH OPTION 3—Continued

Waterbody type	Facility	Benefits (values in thousands of 2001$)	
		Impingement	Entrainment
Great Lake	All 16 In Scope	25,205	25,092
Ocean	All 22 In Scope	7,503	122,098
ALL	All 539 In Scope	70,329	632,426

Under today's proposal, facilities can choose the Site-Specific Determination of Best Technology Available in § 125.94(a) in which a facility can demonstrate to the Director that the cost of compliance with the applicable performance standards in § 125.94(b) would be significantly greater than the costs considered by EPA when establishing these performance standards, or the costs would be significantly greater than the benefits of complying with these performance standards. EPA expects that if facilities were to choose this approach, then the overall national benefits of this rule will decrease markedly. This is because under this approach facilities would choose the lowest cost technologies possible and not necessarily the most effective technologies to reduce impingement and entrainment at the facility.

X. Administrative Requirements

A. E.O. 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the 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:

- 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;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- 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 proposed 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 information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. EPA has prepared an Information Collection Request (ICR) document (EPA ICR No. 2060.01) and you may obtain a copy from Susan Auby by mail at Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW.; Washington, DC 20007, by e-mail at *auby.susan@epamail.epa.gov,* or by calling (202) 260–49011. You also can download a copy off the Internet at *http://www.epa.gov/icr.* The information collection requirements relate to existing electric generation facilities with design intake flows of 50 million gallons per day or more collecting information for preparing comprehensive demonstration studies, monitoring of impingement and entrainment, verifying compliance, and preparing yearly reports.

The total burden of the information collection requirements associated with today's proposed rule is estimated at 4,251,240 hours. The corresponding estimates of cost other than labor (labor and non-labor costs are included in the total cost of the proposed rule discussed in Section VIII of this preamble) is $191 million for 539 facilities and 44 States and one Territory for the first three years after promulgation of the rule. Non-labor costs include activities such as capital costs for remote monitoring devices, laboratory services, photocopying, and the purchase of supplies. The burden and costs are for the information collection, reporting, and recordkeeping requirements for the three-year period beginning with the assumed 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 proposed 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 is defined as 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.

Compliance with the applicable information collection requirements imposed under this proposed rule (see §§ 122.21(r), 125.95, 125.96, 125.97, and 125.98) is mandatory. Existing facilities would be required to perform several data-gathering activities as part of the permit renewal application process. Today's proposed rule would require several distinct types of information collection as part of the NPDES renewal application. In general, the information would be used to identify which of the requirements in today's proposed rule apply to the existing facility, how the existing facility would meet those requirements, and whether the existing facility's cooling water intake structure reflects the best technology available for minimizing environmental impact.

Categories of data required by today's proposed 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 data, consisting of intake structure design 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 proposed rule; and
- Information on supplemental restoration measures proposed for use with or in lieu of design and construction technologies to minimize adverse.

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 proposed rule would be required to perform biological monitoring as required by the Director to demonstrate compliance, and visual or remote inspections of the cooling water intake structure and any additional technologies. Additional ambient water quality monitoring may also be required of facilities depending on the specifications of their permits. The facility would be expected to analyze the results from its monitoring efforts and provide these results in an annual status report to the permitting authority. Finally, facilities would be required to maintain records of all submitted documents, supporting materials, and monitoring results for at least three years. (Note that the Director may require that records be kept for a longer period to coincide with the life of the NPDES permit.)

All impacted facilities would carry out the specific 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 would also gather data 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. 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) would need to prepare a plan documenting the restoration measures they would implement and how they would demonstrate that the restoration measures were effective. The burden estimates incorporate the cost of preparing calculations, drawings, and other materials supporting the proposed restoration measures, as well as performing monitoring to verify the effectiveness of the restoration measures.

Some facilities may choose to request a site-specific determination of BTA 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/or a valuation of the monetized benefits of reducing impingement and entrainment, as well as submitting a site-specific technology plan characterizing the design and construction technologies, operational measures and restoration measures they have selected.

Exhibit 35 presents a summary of the maximum burden estimates for a facility to prepare a permit application and monitor and report on cooling water intake structure operations as required by this rule.

EXHIBIT 35.—MAXIMUM BURDEN AND COSTS PER FACILITY FOR NPDES PERMIT APPLICATION AND MONITORING AND REPORTING ACTIVITIES

Activities	Burden (hr)	Labor cost	Other direct costs (lump sum) [a]
Start-up activities	43	$1,964	$50
Permit application activities	242	9,071	500
Source water baseline biological characterization data	265	10,622	750
Proposal for collection of information for comprehensive demonstration study [b]	271	11,407	1,000
Source waterbody flow information	116	3,794	100
Design and construction technology plan	146	5,260	50
Impingement mortality and entrainment characterization study [b]	5,264	289,061	13,000
Evaluation of potential cooling water intake structure effects [b]	2,578	144,838	500
Information for site-specific determination of BTA	692	32,623	200
Site-specific technology plan	177	6,963	75
Verification monitoring plan	128	5,489	1,000
Subtotal	9,922	521,092	17,225
Biological monitoring (impingement sampling)	388	20,973	650
Biological monitoring (entrainment sampling)	776	42,044	4,000
Visual or remote inspections [c]	253	8,994	100
Verification study [d]	122	5,927	500
Yearly status report activities	324	14,906	750
Subtotal	1,863	92,844	$6,000

[a] Cost of supplies, filing cabinets, photocopying, boat renting, etc.

[b] The Impingement Mortality and Entrainment Characterization Study and Evaluation of Potential CWIS Effects also have capital, O&M and contracted service costs associated with them.
[c] Remote monitoring equipment also has capital and O&M costs associated with it.
[d] The verification monitoring also has contracted services associated with it.

EPA believes that all 44 States and one Territory with NPDES permitting authority will undergo start-up activities in preparation for administering the provisions of the proposed rule. As part of these start-up activities, States and Territories are expected to train junior technical staff to review materials submitted by facilities, and then use these materials to evaluate compliance with the specific conditions of each facility's NPDES permit.

Each State's/Territory's actual burden associated with reviewing submitted materials, writing permits, and tracking compliance depends on the number of new in-scope facilities that will be built in the State/Territory during the ICR approval period. EPA expects that State and Territory technical and clerical staff will spend time gathering, preparing, and submitting the various documents. EPA's burden estimates reflect the general staffing and level of expertise that is typical in States/Territories that administer the NPDES permitting program. EPA considered the time and qualifications necessary to complete various tasks such as reviewing submitted documents and supporting materials, verifying data sources, planning responses, determining specific permit requirements, writing the actual permit, and conferring with facilities and the interested public. Exhibit 36 provides a summary of the maximum burden estimates for States/Territories performing various activities with the proposed rule.

EXHIBIT 36.—ESTIMATING STATE/TERRITORY MAXIMUM BURDEN AND COSTS FOR ACTIVITIES

Activities	Burden (hr)	Labor cost	Other direct costs (lump sum) [a]
Start-up activities (per State/Territory)	100	$3,496	$50
State/Territory permit issuance activities (per facility)	811	32,456	300
Verification study review (per facility)	21	689	50
Review of alternative regulatory requirements (per facility)	192	6,237	50
Annual State/Territory activities (per facility)	50	1,662	50
Subtotal	1,174	44,540	500

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 and 48 CFR Chapter 15.

EPA requests comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques. Send comments on the ICR to the Director, Collection Strategies Division; U.S. Environmental Protection Agency (2822); 1200 Pennsylvania Ave., NW. Washington, DC 20460; and to the Office of Information and Regulatory Affairs; Office of Management and Budget; 725 17th Street, NW.; Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' Include the ICR number in any correspondence. Because OMB is required to make a decision concerning the ICR between 30 and 60 days after April 9, 2002, a comment is best assured of having its full effect if OMB receives it by May 9, 2002. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

C. Unfunded Mandates Reform Act

1. UMRA Requirements

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 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 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 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 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 estimated total annualized (post-tax) costs of compliance for the proposed rule to be $182 million ($2001). Of this total, $153 million is incurred by the private sector and $19.6 million is incurred by State and local governments that operate in-scope facilities.[82] Permitting authorities incur an additional $3.6 million to administer the rule, including labor costs to write permits and to conduct compliance monitoring and enforcement activities. EPA estimates that the highest

[82] In addition, 13 facilities owned by Tennessee Valley Authority (TVA), a federal entity, incur $9.8 million in compliance costs. The costs incurred by the federal government are not included in this section.

undiscounted cost incurred by the private sector in any one year is approximately $480 million in 2005. The highest undiscounted cost incurred by government sector in any one year is approximately $42 million in 2005. 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 UMRA, which is summarized below.

2. Analysis of Impacts on Government Entities

Governments may incur two types of costs as a result of the proposed regulation: (1) Direct costs to comply with the rule for facilities owned by government entities; and (2) administrative costs to implement the regulation. Both types of costs are discussed below.

a. Compliance Costs for Government-Owned Facilities

Exhibit 37 below provides an estimate of the number of government entities that operate facilities subject to the proposed rule, by ownership type and size of government entity. The exhibit shows that 23 large government entities operate 43 facilities subject to the proposed regulation. There are 22 small government entities that operate 22 facilities subject to regulation. No small government entity operates more than one affected facility. Of the 65 facilities that are owned by government entities, 48 are owned by municipalities, eight are owned by political subdivisions, seven are owned by state governments, and two are owned by municipal marketing authorities.

EXHIBIT 37.—NUMBER OF GOVERNMENT ENTITIES AND GOVERNMENT-OWNED FACILITIES

Ownership type	Number of government entities (by size)			Number of facilities (by government entity size)		
	Large	Small	Total	Large	Small	Total
Municipality	16	19	35	29	19	48
Municipal marketing authority	0	2	2	0	2	2
State Government	4	0	4	7	0	7
Political Subdivision	3	1	4	7	1	8
Total	23	22	45	43	22	65

Exhibit 38 summarizes the annualized compliance costs incurred by State, local, and Tribal governments for the proposed rule. The exhibit shows that the estimated annualized compliance costs for all government-owned facilities are $19.6 million. The 43 facilities owned by large governments would incur costs of $13.6 million; the 22 facilities owned by small governments would incur costs of $6 million.

EXHIBIT 38.—NUMBER OF REGULATED GOVERNMENT-OWNED FACILITIES AND COMPLIANCE COSTS BY SIZE OF GOVERNMENT FOR PROPOSED RULE

Size of Government	Number of facilities subject to regulation	Compliance costs (million $2001)
Facilities Owned by Large Governments	43	$13.6
Facilities Owned by Small Governments	22	6.0
All Government-Owned Facilities	65	19.6

EPA's analysis also considered whether the proposed rule may significantly or uniquely affect small governments. EPA estimates that 22 facilities subject to the proposed rule are owned by small governments (i.e., governments with a population of less than 50,000). The total compliance cost for all the small government-owned facilities incurring costs under the proposed rule is $6.0 million, or approximately $273,000 per facility. The highest annualized compliance costs for a government-owned facility is $965,000. In comparison, all non-government-owned facilities subject to this rule are expected to incur annualized compliance costs of $176 million, or $330,000 per facility. The highest annualized cost for a facility not owned by a small government is $4.3 million. EPA therefore concludes that these costs do not significantly or uniquely affect small governments. The *Economic and Benefits Assessment* provides more detail on EPA's analysis of impacts on governments.

b. Administrative Costs

The requirements of Section 316(b) are implemented through the NPDES (National Pollutant Discharge Elimination System) permit program. Forty-five states and territories currently have NPDES permitting authority under section 402(b) of the Clean Water Act (CWA). EPA estimates that states and territories will incur four types of costs associated with implementing the requirements of the proposed rule: (1) Start-up activities; (2) first permit issuance activities; (3) repermitting activities, and (4) annual activities. EPA estimates that the total annualized cost for these activities will be $3.6 million. Exhibit 39 below presents the annualized costs of the major administrative activities.

EXHIBIT 39.—ANNUALIZED GOVERNMENT ADMINISTRATIVE COSTS (MILLION $2001)

Activity	Cost
Start-up Activities	$0.02
First Permit Issuance Activities	1.61
Repermitting Activities	1.05
Annual Activities	0.94
Total	3.62

3. Consultation

EPA consulted with State governments and representatives of local governments in developing the regulation. The outreach activities are discussed in Section XI.E (E.O. 13131 addressing Federalism) of this preamble.

4. Alternatives Considered

In addition to the proposed rule, EPA considered and analyzed several alternative regulatory options to determine the best technology available for minimizing adverse environmental impact. EPA selected the proposed rule because it meets the requirement of section 316(b) of the CWA that the location, design, construction, and capacity of CWIS reflect the BTA for minimizing AEI, and it is economically practicable.

D. Regulatory Flexibility Act as Amended by SBREFA (1996)

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

After considering the economic impacts of today's proposed rule on small entities, the Agency certifies that this action will not have a significant economic impact on a substantial number of small entities for reasons explained below.

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 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 a not-for-profit enterprise which is independently owned and operated and is not dominant in its field. The SBA thresholds define minimum employment, sales revenue, or MWh output sizes below which an entity qualifies as small. The thresholds used in this analysis are firm-level four-digit Standard Industrial Classification (SIC) codes.[83] Exhibit 40 below presents the SBA size standards used in this analysis.

EXHIBIT 40.—UNIQUE PHASE II ENTITY SMALL BUSINESS SIZE STANDARDS (BY STANDARD INDUSTRY CLASSIFICATION CODES (SIC)) [84]

SIC code	SIC description	SBA size standard
1311	Crude Petroleum and Natural Gas	500 Employees
3312	Steel Works, Blast Furnaces (Including Coke Ovens), and Rolling Mills.	1,000 Employees.
4911	Electric Services	4 million MWh.
4924	Natural Gas Distribution	500 Employees.
4931	Electric and Other Services Combined	$5.0 Million.
4932	Gas and Other Services Combined	$5.0 Million.
4939	Combination Utilities, NEC	$5.0 Million.
4953	Refuse Systems	$10.0 Million.
6512	Operators of Nonresidential Buildings	$5.0 Million.
8711	Engineering Services	$6.0 Million.

[84] Information Source: U.S. Small Business Administration, Office of Size Standards, Exhibit of Size Standards (www.sba.gov/regulations/siccodes/siccodes.html)

EPA used publicly available data from the 1999 Forms EIA–860A and EIA–860B as well as information from EPA's 2000 Section 316(b) Industry Survey to identify the parent entities of electric generators subject to this proposed rule. EPA also conducted research to identify recent changes in ownership, including the current owner of each generator, and each owner's primary SIC code, sales revenues, employment, and/or electricity sales. Based on the parent entity's SIC code and the related size standard set by the SBA, EPA identified facilities that are owned by small entities.

Based on this analysis, EPA expects this proposed rule to regulate only a small absolute number of facilities owned by small entities, representing only 1.3 percent of all facilities owned by small entities in the electric power industry. EPA has estimated that 28 in-scope electric generators owned by small entities would be regulated by this proposed rule. Of the 28 generators, 19 are projected to be owned by a municipality, six by a rural electric cooperative, two by a municipal marketing authority, and one by a political subdivision.

Only facilities with design intake flows of 50 MGD or more are subject to this rule. In addition, only a small percentage of all small entities in the electric power industry, 1.3 percent, is subject to this rule. Finally, of the 28 small entities, two entities would incur annualized post-tax compliance costs of greater than three percent of revenues; nine would incur compliance costs of between one and three percent of revenues; and the remaining 17 small entities would incur compliance costs of less than one percent of revenues. The estimated compliance costs that facilities owned by small entities would likely incur represent between 0.12 and 5.29 percent of the entities' annual sales revenue.

Exhibit 41 summarizes the results of Regulatory Flexibility Act analysis. From the small absolute number of facilities owned by small entities that would be affected by the proposed rule, the low percentage of all small entities, and the very low impacts, EPA concludes that the proposed rule will not have a significant economic impact on a substantial number of small entities.

EXHIBIT 41.—SUMMARY OF RFA ANALYSIS

Type of Entity	(A) Number of in-scope facilities owned by small entities	(B) Number of small entities with in-scope facilities	(C) Total number of small entities	(D) Percent of small entities in-scope of rule [(B)/(C)]	(E) Annual compliance costs/annual sales revenue
Municipality	19	19	1,110	1.7	0.4 to 5.3%

[83] The North American Industry Classification System (NAICS) replaced trhe Standard Industrial Classification (SIC) System as of October 1, 2000. The data sources EPA used to identify the parent entities of the facilities subject to this rule did not provide NAICS codes at the time of analysis.

EXHIBIT 41.—SUMMARY OF RFA ANALYSIS—Continued

Type of Entity	(A) Number of in-scope facilities owned by small entities	(B) Number of small entities with in-scope facilities	(C) Total number of small entities	(D) Percent of small entities in-scope of rule [(B)/(C)]	(E) Annual compliance costs/annual sales revenue
Municipal Marketing Authority	2	2	22	9.1	0.1 to 0.1%
Rural Electric Cooperative	6	6	877	0.7	0.2 to 0.5%
Political Subdivision	1	1	104	1.0	1.2 to 1.2%
Other Types	0	0	97	0.0	n/a
Total	28	28	2,210	1.3	0.1–5.3%

The *Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule* presents more detail on EPA's small entity analysis in support of this proposed rule.

E. E.O. 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 provides 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 the 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 539 in-scope facilities. The results of the analysis, presented in the EBA, 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 (24 of 539, or 4.5%), or non-white populations (101 of 539, or 18.7%), or both (13 of 539, 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 approximately 2.2 billion fish (expressed as age 1 equivalents) of recreational and commercial species are lost annually due to impingement and entrainment at the 529 in scope Phase II existing facilities. Under the Agency's preferred option, over 1.2 billion individuals of these commercially and recreationally sought fish species (age 1 equivalents) will now survive to join the fishery each year (435 million fish due to reduced impingement impacts, and 789 million fish due to reduced entrainment). These additional 1.2 billion 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.

F. E.O. 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 (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 might have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health and 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. This proposed rule is an economically significant rule as defined under Executive Order 12866. However, it does not concern an environmental health or safety risk that would have a disproportionate effect on children. Therefore, it is not subject to Executive Order 13045.

G. E.O. 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 6, 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'' is 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 on the distribution of power and responsibilities between the Federal government and Indian Tribes.''

This proposed rule does not have tribal implications. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian Tribes, or on the distribution of power and responsibilities between the Federal government and Indian Tribes,

as specified in Executive Order 13175. EPA's analyses show that no facility subject to this proposed rule is owned by tribal governments. This proposed rule does not affect Tribes in any way in the foreseeable future. Accordingly, the requirements of Executive Order 13175 do not apply to this rule.

H. E.O. 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.''

This proposed rule recognizes the biological sensitivity of tidal rivers, estuaries, oceans, and the Great Lakes and their susceptibility to adverse environmental impact from cooling water intake structures. This proposal provides the most stringent requirements to minimize adverse environmental impact for cooling water intake structures located on these types of water bodies, 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 proposed rule will reduce impingement 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 structures. Therefore, EPA expects today's proposed rule would advance the objective of the Executive Order to protect marine areas.

I. E.O. 13211: Energy Effects

Executive Order 13211 on ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' requires EPA to prepare a Statement of Energy Effects when undertaking regulatory actions identified as ''significant energy actions.'' For the purposes of Executive Order 13211, ''significant energy action'' means (66 FR 28355; May 22, 2001):

> any action by an agency (normally published in the **Federal Register**) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking:
>
> (1)(i) That is a significant regulatory action under Executive Order 12866 or any successor order, and
>
> (ii) Is likely to have a significant adverse effect on the supply, distribution, or use of energy; or
>
> (2) That is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action.

For those regulatory actions identified as ''significant energy actions,'' a Statement of Energy Effects must include a detailed statement relating to (1) any adverse effects on energy supply, distribution, or use (including a shortfall in supply, price increases, and increased use of foreign supplies), and (2) reasonable alternatives to the action with adverse energy effects and the expected effects of such alternatives on energy supply, distribution, and use.

This proposed rule does not qualify as a ''significant energy action'' as defined in Executive Order 13211 because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The proposed rule does not contain any compliance requirements that would directly reduce the installed capacity or the electricity production of U.S. electric power generators, for example through parasitic losses or auxiliary power requirements. In addition, based on the estimated costs of compliance, EPA currently projects that the rule will not lead to any early capacity retirements at facilities subject to this rule or at facilities that compete with them. As described in detail in Section VIII, EPA estimates small effects of this rule on installed capacity, generation, production costs, and electricity prices. EPA's therefore concludes that this proposed rule will have small energy effects at a national, regional, and facility-level. As a result, EPA did not prepare a Statement of Energy Effects. EPA recognizes that some of the alternative regulatory options discussed in the preamble would have much larger effects and might well quality as ''significant energy actions'' under Executive Order 13211. If EPA decides to revise the proposed requirements for the final rule, it will reconsider its determination under Executive Order 13211 and prepare a Statement of Energy Effects as appropriate.

For more detail on the potential energy effects of this proposed rule or the alternative regulatory options considered by EPA, see Section VIII above or the *Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule.*

J. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) of 1995, Pub. L. 104–113, Sec. 12(d) 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 proposed rule does not involve such technical standards. Therefore, EPA is not considering the use of any voluntary consensus standards. EPA welcomes comments on this aspect of the proposed rule and, specifically, invites the public to identify potentially applicable voluntary consensus standards and to explain why such standards should be used in this proposed rule.

K. Plain Language Directive

Executive Order 12866 and the President's memorandum of June 1, 1998, require each agency to write all rules in plain language. We invite your comments on how to make this proposed rule easier to understand. For example: Have we organized the material to suit your needs? Are the requirements in the rule clearly stated? Does the rule contain technical language or jargon that is not clear? Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand? Would more (but shorter) sections be better? Could we improve clarity by adding tables, lists, or diagrams? What else could we do to make the rule easier to understand?

L. Executive Order 13132: Federalism

Executive Order 13132 (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'' are 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.''

Under section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Rather, this proposed rule would result in minimal administrative costs on States that have an authorized NPDES program. EPA expects an annual burden of 146,983 hours with an annual cost of $41,200 (non-labor costs) for States to collectively administer this proposed rule. EPA has identified 65 Phase II existing facilities that are owned by federal, state or local government entities. The annual impacts on these facilities is not expected to exceed 2,252 burden hours and $56,739 (non-labor costs) per facility.

The proposed national cooling water intake structure requirements would be implemented through permits issued under the NPDES program. Forty-three 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 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.)

Today's proposed 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 proposed 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 proposal might 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 proposed 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); nothing in this proposed rule would alter that. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

Although section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with State governments and representatives of local governments in developing the proposed rule. During the development of the proposed section 316(b) rule for new facilities, EPA conducted several outreach activities through which State and local officials were informed about this proposal and they provided information and comments to the Agency. The outreach activities were intended to provide EPA with feedback on issues such as adverse environmental impact, BTA, and the potential cost associated with various regulatory alternatives.

EPA has made presentations on the section 316(b) rulemaking effort in general at eleven professional and industry association meetings. EPA also conducted two public meetings in June and September of 1998 to discuss issues related to the section 316(b) rulemaking effort. In September 1998 and April 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 industry representatives, and met on a number of occasions with representatives of 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 meetings with environmental groups attended by representatives from between 3 and 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. EPA also met with OMB and utility representatives and other federal agencies (the Department of Energy, the Small Business Administration, the Tennessee Valley Authority, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service and the Department of Interior's U.S. Fish and Wildlife Service). After publication of the proposed Phase I rule, EPA continued to meet with stakeholders at their request.

EPA received more than 2000 comments on the Phase I proposed rule and NODA. In some cases these comments have informed the development of the Phase II rule proposal.

In January, 2001, EPA also attended technical workshops organized by the Electric Power Research Institute and the Utilities Water Action 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 316(b) requirements.

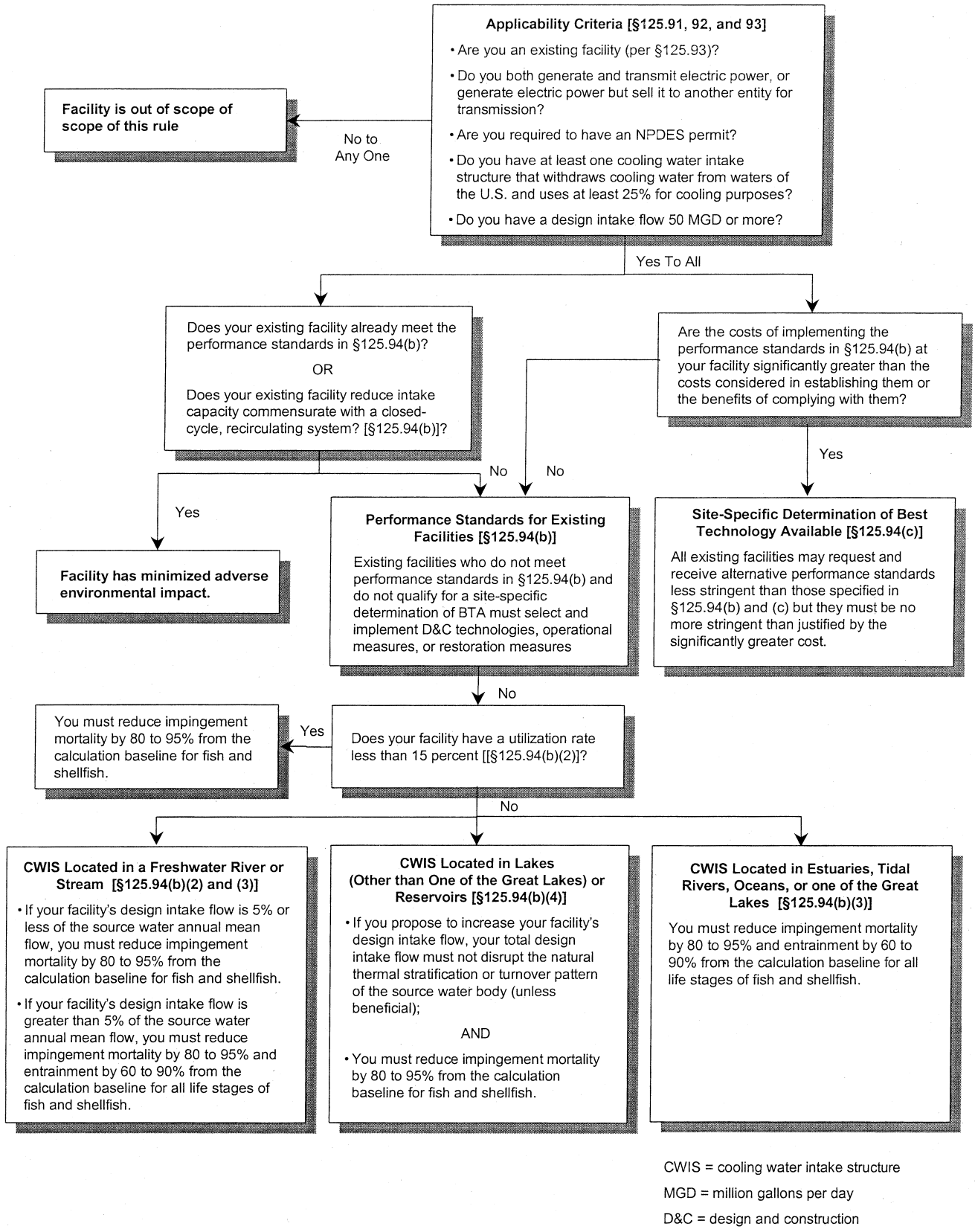
On May 23, 2001, EPA held a day-long forum to discuss specific issues associated with the development of regulations under section 316(b). At the meeting, 17 experts from industry, public interest groups, States, and academia reviewed and discussed the Agency's preliminary data on cooling water intake 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.

Finally, 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 for section 316(b) of the CWA.

In the spirit of this Executive Order and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

BILLING CODE 6560–50–P

APPENDIX 1.—SECTION 316(B) PHASE II EXISTING FACILITY RULE FRAMEWORK



CWIS = cooling water intake structure

MGD = million gallons per day

D&C = design and construction

BILLING CODE 6560–50–C

List of Subjects

40 CFR Part 9

Reporting and recordkeeping requirements.

40 CFR Part 122

Administrative practice and procedure, Confidential business information, Hazardous substances, Reporting and recordkeeping requirements, Water pollution control.

40 CFR Part 123

Administrative practice and procedure, Confidential business information, Hazardous substances, Indian-lands, Intergovernmental relations, Penalties, Reporting and recordkeeping requirements, Water pollution control.

40 CFR Part 124

Administrative practice and procedure, Air pollution control, Hazardous waste, Indians-lands, Reporting and recordkeeping requirements, Water pollution control, Water supply.

40 CFR Part 125

Cooling Water Intake Structure, Reporting and recordkeeping requirements, Waste treatment and disposal, Water pollution control.

Dated: February 28, 2002.

Christine Todd Whitman,

Administrator.

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 Paper Work Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * * * *	
EPA Administered Permit Programs: The National Pollutant Discharge Elimination System	
* * * * * * *	
122.21(r)	2040–0241, xxxxx–xxxxx
* * * * * * *	
Criteria and Standards for the National Pollutant Discharge Elimination System	
* * * * * * *	
125.95	xxxx–xxxx
125.96	xxxx–xxxx
125.97	xxxx–xxxx
125.98	xxxx–xxxx
* * * * * * *	

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 by revising paragraph (r) to read as follows:

§ 122.21 Application for a permit (applicable to State programs, see § 123.25)

* * * * *

(r) *Applications 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 report the information required under paragraphs (r)(2), (3), and (4) of this section and § 125.86 of this chapter. 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 report the information required under paragraphs (r)(2), (3), and (5) of this section and § 125.95 of this chapter. Requests for site-specific determination of best technology available for minimizing adverse environmental impact under § 125.94(c) of this chapter must be submitted with your permit application.

(2) *Source Water Physical Data* including:

(i) A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located;

(ii) Identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods you used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies; and

(iii) Locational maps.

(3) *Cooling Water Intake Structure Data* including:

(i) A narrative description of the configuration of each of your cooling water intake structures and where it is located in the water body and in the water column;

(ii) Latitude and longitude in degrees, minutes, and seconds for each of your cooling water intake structures;

(iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable;

(iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and

(v) Engineering drawings of the cooling water intake structure.

(4) *Source Water Baseline Biological Characterization Data.* This information is required to characterize the biological community in the vicinity of the cooling water intake structure and to characterize the operation of the cooling water intake structures. The Director may also use this information in subsequent permit renewal proceedings to determine if your Design and Construction Technology Plan as required in § 125.86(b)(4) should be revised. This supporting information must include existing data (if they are available). However, you may supplement the data using newly conducted field studies if you choose to do so. The information you submit must include:

(i) A list of the data in paragraphs (r)(4)(ii) through (vi) of this section that are not available and efforts made to identify sources of the data;

(ii) A list of species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the cooling water intake structure;

(iii) Identification of the species and life stages that would be most susceptible to impingement and entrainment. Species evaluated should include the forage base as well as those most important in terms of significance to commercial and recreational fisheries;

(iv) Identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa;

(v) Data representative of the seasonal and daily activities (e.g., feeding and water column migration) of biological organisms in the vicinity of the cooling water intake structure;

(vi) Identification of all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at your cooling water intake structures;

(vii) Documentation of any public participation or consultation with Federal or State agencies undertaken in development of the plan; and

(viii) If you supplement the information requested in paragraph (r)(4)(i) of this section with data collected using field studies, supporting documentation for the Source Water Baseline Biological Characterization must include a description of all methods and quality assurance procedures for sampling, and data analysis including a description of the study area; taxonomic identification of sampled and evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods.

The sampling and/or data analysis methods you use must be appropriate for a quantitative survey and based on consideration of methods used in other biological studies performed within the same source water body. The study area should include, at a minimum, the area of influence of the cooling water intake structure.

(5) *Phase II Existing Facility Cooling Water System Data.* Phase II existing facilities, as defined in part 125, subpart J of this chapter, must provide the following information:

(i) A narrative description of the operation of each of your cooling water systems, relationship to cooling water intake structures, proportion of the design intake flow that is used in the system, number of days of the year in operation and seasonal changes, if applicable;

(ii) Engineering calculations 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: The Clean Water Act, 33 U.S.C. 1251 *et seq.*

2. Section 123.25 is amended by revising paragraph (a)(4) (a) and (36) to read as follows:

§ 123.25 Requirements for permitting.

(a) * * *

(4) § 122.21 (a) (b), (c)(2), (e) (k), (m) (p), 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. Section 125.83 is amended by revising the definition of cooling water as follows:

§ 125.83 What special definitions apply to this subpart?

* * * * *

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 new facility's intake flow that is used for cooling purposes in §§ 125.81(c) and 125.91(c).

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3. 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.
125.90 What are the purpose and scope of this subpart?
125.91 What is a Phase II existing facility subject to this subpart?
125.92 When must I comply with this subpart?
125.93 What special definitions apply to this subpart?
125.94 How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?
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?
125.96 As an owner or operator of a Phase II existing facility, what monitoring must I perform?
125.97 As an owner or operator of a Phase II existing facility, what records must I keep and what information must I report?
125.98 As the Director, what must I do to comply with the requirements of this subpart?

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 (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) This subpart implements section 316(b) of the CWA for Phase II existing facilities. Section 316(b) of the CWA provides that any standard established pursuant to sections 301 or 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.

(c) Existing facilities that are not subject to this subpart must meet requirements under section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPJ) basis.

(d) Notwithstanding any other provision of this subpart, if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements 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 shall approve such alternative regulatory requirements.

(e) 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'' subject to this subpart?

(a) This subpart applies to an existing facility, as defined in § 125.93, if it:

(1) Is a point source that uses or proposes to use a cooling water intake structure;

(2) Both generates and transmits electric power, or generates electric power but sells it to another entity for transmission;

(3) Has at least one cooling water intake structure that uses at least 25 percent of the water it withdraws for cooling purposes as specified in paragraph (c) of this section; and

(4) Has a design intake flow of 50 million gallons per day (MGD) or more. Facilities that meet these criteria are referred to as ''Phase II existing facilities.''

(b) In the case of a cogeneration facility that shares a cooling water intake structure with another existing facility, only that portion of the cooling water intake flow that is used in the cogeneration process shall be considered for purposes of determining whether the 50 MGD and 25 percent criteria in paragraphs (a)(3) and (4) of this section are met.

(c) Use of a cooling water intake structure includes obtaining cooling water by any sort of contract or arrangement with an independent supplier (or multiple suppliers) of cooling water if the supplier or suppliers withdraw(s) water from waters of the United States. Use of cooling water does not include obtaining cooling water from a public water system or use of treated effluent that otherwise would be discharged to a water of the U.S. 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 point source.

(d) Whether or not 25 percent of water withdrawn is used for cooling purposes must be measured on an average monthly basis. The 25 percent threshold is met if any monthly average of cooling water over any 12 month period is 25 percent or more of the total water withdrawn.

§ 125.92 When must I comply with this subpart?

You must comply with this subpart when an NPDES permit containing requirements consistent with this subpart is issued to you.

§ 125.93 What special definitions apply to this subpart?

The definitions in Subpart I of Part 125, except the definitions of *cooling water* and *existing facility,* apply to this subpart. The following definitions also apply to this subpart:

Administrator means the same as defined in 40 CFR 122.2.

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 you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls.

Capacity utilization rate means the ratio between the average annual net generation of the facility (in MWh) and the total net capability of the facility (in MW) multiplied by the number of available hours during a year. The average annual generation must be measured over a five year period (if available) of representative operating conditions.

Cogeneration facility means a facility that operates equipment used to produce, from the same fuel source: electric energy used for industrial, commercial, and/or institutional purposes at one or more host facilities and/or for sale to another entity for transmission; and forms of useful thermal energy (such as heat or steam), used for industrial commercial,