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

6. Benefits to Threatened and Endangered Species.

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

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

7. Timing of Benefits

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

I. EPA Legal Authority

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

> the age of equipment and facilities involved, the process employed, the engineering aspects . . . of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impacts (including energy requirements), and such other factors as [EPA] deems appropriate.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IX. Implementation

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

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

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

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

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

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

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

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

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

A. When Does the Final Rule Become Effective?

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

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

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

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

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

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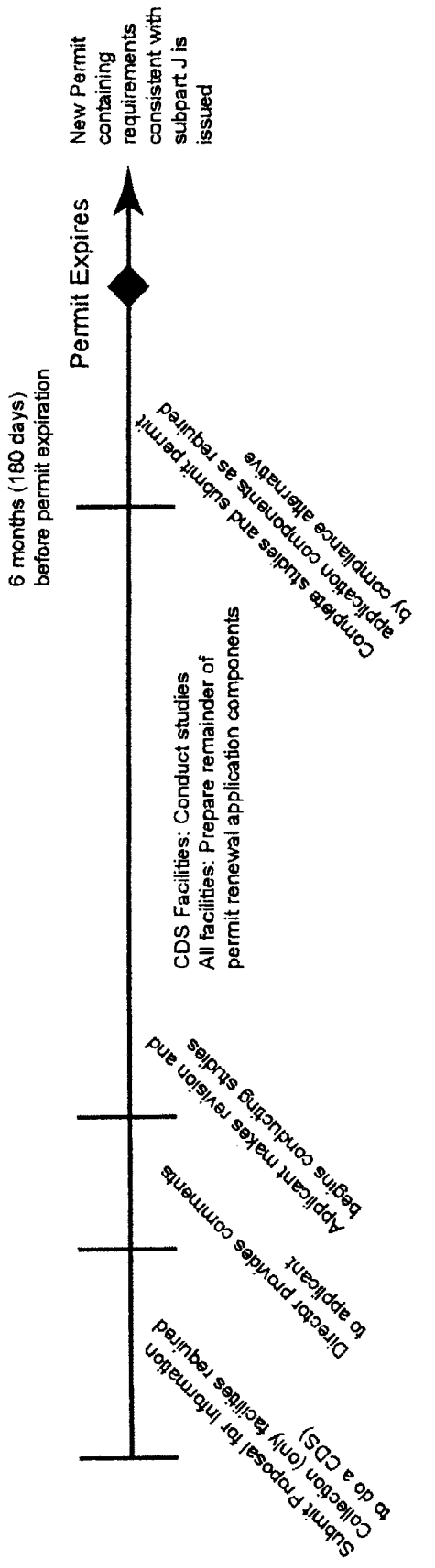
Figure 1. Sample Application Timeline



Notes

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

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

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

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

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

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

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

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

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

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

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

The applicant is required to submit the following specific data: (1) A narrative description and scaled drawings showing the physical configuration of all source waterbodies used by the facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports the facility's determination of the waterbody type where each cooling water intake structure is located; (2) an identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods used to conduct any physical studies to determine the intake's area of influence within the waterbody and the results of such studies; and (3) locational maps.

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

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

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

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

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

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

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

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

The Comprehensive Demonstration Study has seven components:

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

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

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

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

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

a. Proposal for Information Collection

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

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

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

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

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

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

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

b. Source Waterbody Flow Information

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

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

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

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

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

Impingement mortality and entrainment samples to support the calculations required by the Design and Construction Technology Plan and Restoration Plan must be collected during periods of representative operational flows for the cooling water intake structure and the flows associated with the samples must be documented. EPA recommends that the facility coordinate a review of its list of threatened, endangered, or other protected species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, or other relevant agencies to ensure that potential impacts to these species have been evaluated.

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

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

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

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

In determining compliance with any requirements to reduce impingement mortality or entrainment, you must assess the total reduction in impingement mortality and entrainment against the calculation baseline developed under the Impingement Mortality and Entrainment Characterization Study (§ 125.95(b)(3)). The calculation baseline is defined at § 125.93 as an estimate of impingement mortality and entrainment that would occur at your site assuming (1) The cooling water intake system has been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard ⅜-inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source waterbody; and (3) the baseline practices, procedures, and structural configuration are those that the facility would maintain in the absence of any structural or operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment. You may also choose to use your facility's current level of impingement mortality and entrainment as the calculation baseline. EPA has previously referred to this as the ''as-built approach.'' Reductions in impingement mortality and entrainment

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

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

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

e. Restoration Plan (§ 125.95(b)(5))

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Permit Application Review

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

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

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

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

Permitting Requirements

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

D. What Will I Be Required To Monitor?

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

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

E. How Will Compliance Be Determined?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

EPA's NPDES permitting regulations at 40 CFR 122.49 contain a list of Federal laws that might apply to Federally issued NPDES permits. These include the Wild and Scenic Rivers Act, 16 U.S.C. 1273 *et seq.;* the National Historic Preservation Act of 1966, 16 U.S.C. 470 *et seq.;* the Endangered Species Act, 16 U.S.C. 1531 *et seq.;* the Coastal Zone Management Act, 16 U.S.C. 1451 *et seq.;* and the National Environmental Policy Act, 42 U.S.C. 4321 *et seq. See* 40 CFR 122.49 for a brief description of each of these laws. In addition, the provisions of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 *et seq.,* relating to essential fish habitat might be relevant. Nothing in this final rulemaking authorizes activities that are not in compliance

with these or other applicable Federal laws (*e.g.,* Marine Mammal Protection Act, 16 U.S.C. 1361 *et seq.,* and Migratory Bird Treaty Act, 16 U.S.C. 703 *et seq.*).

H. Alternative Site-Specific Requirements

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

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

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

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

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

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

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

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

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

[1] The design flow adjustment slope (m) represents the slope that corresponds to the particular facility using the technology in column 12.
[2] Discount rate = 7%
[3] Amortization period for capital costs = 10 years
[4] Amortization period for downtime and pilot study costs = 30 years
[5] Depending on the data provided, some facilities with multiple intakes were costed separately for each intake. In such cases, the facility should calculate the costs considered by EPA for each intake separately using the steps below and sum. Note that some cost components (e.g. construction downtime losses and pilot study costs) are assigned arbitrarily to one of the intakes, since it is difficult to determine how they would be assigned to each intake separately. Since the costs for multiple intakes are summed, this will not affect the results.

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

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

TABLE 9–1.—TECHNOLOGY CODES AND DESCRIPTIONS

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

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

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

Where:

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

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

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

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

m = design flow adjustment slope (column 13).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

X. Engineering Cost Analysis

A. Technology Cost Modules

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

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

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

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

B. Model Facility Cost Development

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

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

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

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

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

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

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

C. Facility Flow Modifications

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

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

XI. Economic Analysis

A. Final Rule Costs

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

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

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

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

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

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

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

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

B. Final Rule Impacts

1. Energy Market Model Analysis

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

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

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

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

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

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

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

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

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

i. Market-level impacts of the Final Rule. The market-level analysis includes results for all generators located in each NERC region including facilities both in-scope and out-of-scope of the proposed Phase II rule. Exhibit XI–1 presents five measures used by EPA to assess market-level impacts associated with the final rule, by NERC region: (1) Incremental capacity closures, calculated as the difference between capacity closures under the final rule and capacity closures under the base case; (2) incremental capacity closures as a percentage of baseline capacity; (3) post-compliance changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by total generation; (4) post-compliance changes in energy price, where energy prices are defined as the wholesale prices received by facilities for the sale of electric generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in Chapter B3: Electricity Market Model Analysis (section B3–4.1) of the Economic and Benefits Analysis (EBA) in support of the final rule (DCN 6–0002). Chapter B3 also presents a more detailed interpretation of the results of the market-level analysis.

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

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

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

ii. Facility-level impacts of the Final Rule. The results from model run year 2010 were used to analyze impacts on Phase II facilities at two levels: (a) Potential changes in the economic and operational characteristics of the group of in-scope Phase II facilities as a whole and (b) potential changes to individual facilities within the group of Phase II facilities. Exhibit XI–2 presents five measures used by EPA to assess impacts to the group of Phase II facilities associated with the final rule, by NERC region: (1) Incremental capacity closures, calculated as the difference between capacity closures under the final rule and capacity closures under the base case; (2) incremental capacity closures as a percentage of baseline capacity; (3) post-compliance changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by total generation; (4) post-compliance changes in electricity generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in section B3–4.2 of the final EBA. Chapter B3 also presents a more detailed interpretation of the results of the analysis of Phase II facilities as a group.

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

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

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

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

Results for the group of Phase II facilities as a whole may mask shifts in economic performance among individual facilities subject to this rule. To assess potential distributional effects, EPA analyzed facility-specific changes between the base case and the post-compliance case in (1) capacity utilization, defined as generation divided by capacity times 8,760 hours, (2) electricity generation, (3) revenue, (4) variable production costs per MWh, defined as variable O&M cost plus fuel cost divided by generation, and (5) pre-tax income, defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs.

Exhibit XI–3 presents the total number of Phase II facilities with estimated degrees of change due to the final rule. This exhibit excludes 17 in-scope facilities with estimated significant status changes in 2010: Ten facilities are base case closures, one facility is a full closure as a result of the final rule, and six facilities changed their repowering decision between the base case and the post-compliance case. These facilities are either not operating at all in either the base case or the post-compliance case, or they experience fundamental changes in the type of units they operate; therefore, the measures presented in Exhibit XI–3 would not be meaningful for these facilities. In addition, the change in variable production cost per MWh of generation could not be developed for 57 facilities with zero generation in either the base case or post-compliance scenario. For these facilities, the change in variable production cost per MWh is indicated as ''n/a.''

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

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

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

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

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

2. Other Economic Analyses

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

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

a. Cost-to-revenue measure.

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

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

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

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

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

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

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

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

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

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

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

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

XII. Benefits Analysis

A. Introduction

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

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

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

B. Regional Study Design

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

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

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

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

benefits for the purposes of this rulemaking.

C. The Physical Impacts of Impingement and Entrainment

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

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

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

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

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

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

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

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

[58] Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191; Hilborn, R. and C.J. Walters. 1992. Quantitative Fisheries Stock Assessment, Choice, Dynamics and Uncertainty. Chapman and Hall, London and New York.; Quinn, T.J., II. and R.B. Deriso. 1999. Quantitative Fish Dynamics. Oxford University Press, Oxford and New York; Dixon, D.A. 1999. Catalog of Assessment Methods for Evaluating the Effects of Power Plant Operations on Aquatic Communities. Final Report. Report number TR–112013.

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

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

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

D. National Benefits of Rule

1. Overview

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

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

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

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

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

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

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

2. Timing of Benefits

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

For today's rule, benefits are discounted to calculate benefits in a manner that makes the timing comparable to the annualized cost estimates. The benefits of today's rule are estimated as the typical benefits expected once the rule takes effect. The need to discount arises from two different delays in the realization of benefits.

First, facilities will not immediately achieve compliance. Facilities will face regulatory requirements once the rule takes effect, but it will take time to make the required changes. EPA has assumed, for the purpose of estimating benefits, that it will take one year from the date when installation costs are incurred by a facility until the required cooling water technology is operational. To account for this lag, all benefits are discounted by one year from the date when costs are incurred.

Second, an additional time lag will result between the time of technology implementation and resulting increased fishery yields. This lag stems from the fact that one or more years may pass between the time an organism is spared impingement and entrainment and the time of its ultimate harvest. For example, a larval fish spared from entrainment (in effect, at age 0) may be caught by a recreational angler at age 3, meaning that a 3-year time lag arises between the incurred technology cost and the realization of the estimated recreational benefit. Likewise, if a 1-year old fish is spared from impingement and is then harvested by a commercial waterman at age 2, there is a 1-year lag between the incurred cost and the subsequent commercial fishery benefit. To account for this growth period, EPA applied discounting by species groups in each regional study. EPA conducted this analysis using two alternative discount rates as recommended by OMB: 3% and 7%. The Agency notes that discounting was applied to recreational and commercial fishing benefits only. Non-use benefits are independent of fish age and size and, thus start as soon as impingement and entrainment ceases.

3. Recreational Fishing Valuation

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

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

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

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

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

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

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

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

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

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

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

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

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

EXHIBIT XII–3.—POST REGULATION RECREATIONAL FISHING BENEFITS FROM REDUCING IMPINGEMENT AND ENTRAINMENT LOSSES

Region	Baseline recreational fishery losses (number of fish)	Reduction in recreational fishery losses (number of fish)	Benefits of final rule (million 2002$)		
			0% Discount rate	3% Discount rate	7% Discount rate
California	5,787,661	1,735,668	$3.01	$2.45	$1.91
North Atlantic	916,396	267,536	1.59	1.38	1.17
Mid Atlantic	20,468,540	9,990,333	47.69	43.37	38.48
South Atlantic	4,314,983	985,769	7.49	6.85	6.17
Gulf of Mexico	3,854,850	1,201,806	6.79	6.18	5.53
Great Lakes	4,743,384	2,283,896	15.51	13.95	12.21
Inland	3,188,097	930,610	3.34	2.98	2.58
Total for 554 facilities [a]	44,513,814	17,908,496	87.83	79.34	69.96

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

The total for all regions, discounted at three percent, is $79.3 million; and the total for all regions, discounted at seven percent, is $70.0 million.

e. Limitations and uncertainties. Because of the uncertainties and assumptions of EPA's analysis, the estimates of benefits presented in this section may understate the benefits to recreational anglers. In estimating the benefits of improved recreational angling for the California and Great Lakes regions, the Agency assigned a monetary benefit only to the increases in consumer surplus for the baseline number of fishing days. This approach omits the portion of recreational fishing benefits that arise when improved conditions lead to higher levels of participation. However, EPA's analysis of changes in recreational fishing participation due to the section 316(b) regulation for other coastal regions shows that the practical effect of this omission is likely to be very small with respect to the total recreational benefits assessment.

4. Commercial Fishing Valuation

Reductions in impingement and entrainment at cooling water intake structures are expected to benefit the commercial fishing industry. The effect is straightforward: reducing the number of fish killed will increase the number of fish available for harvest. Measuring the benefits of this effect is less straightforward. The next section summarizes the methods EPA used to estimate benefits to the commercial fishing sector. The following section presents the estimated commercial fishing benefits for each region.

a. Methods. EPA estimated commercial benefits by first estimating the value of total losses under current impingement and entrainment conditions (or the total benefits of eliminating all impingement and entrainment). Then, based on review of the empirical literature, EPA assumed that producer surplus is equal to 0% to 40% of baseline losses. Finally, EPA estimated benefits by applying the estimated percentage reduction in impingement and entrainment to the estimated producer surplus to obtain the estimated increase in producer surplus attributable to the rule. This methodology was applied in each region in the final analysis: the North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, California, Great Lakes, and Inland. Additional detail on the methods EPA used for this analysis can be found in Chapter A10 ''Methods For Estimating Commercial Fishing Benefits'' in the Regional Analysis Document.

The process used to estimate regional losses and benefits to commercial fisheries is as follows:

1. Estimate losses to commercial harvest (in pounds of fish) attributable to impingement and entrainment under current conditions. The basic approach is to apply a linear stock-to-harvest assumption, such that if 10% of the current commercially targeted stock were harvested, then 10% of the commercially targeted fish lost to impingement and entrainment would also have been harvested absent impingement and entrainment. The percentage of fish harvested is based on data on historical fishing mortality rates.

2. Estimate gross revenue of lost commercial catch. The approach EPA

uses to estimate the value of the commercial catch lost due to impingement and entrainment relies on landings and dockside price ($/lb) as reported by NOAA Fisheries for the period 1991–2001. These data are used to estimate the revenue of the lost commercial harvest under current conditions (*i.e.*, the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated).

3. Estimate lost economic surplus. The conceptually suitable measure of benefits is the sum of any changes in producer and consumer surplus. The methods used for estimating the change in surplus depend on whether the physical impact on the commercial fishery market appears sufficiently small such that it is reasonable to assume there will be no appreciable price changes in the markets for the impacted fisheries.

For the regions and magnitude of losses included in this analysis, it is reasonable to assume no change in price, which implies that the welfare change is limited to changes in producer surplus. The change in producer surplus is assumed to be equivalent to a portion of the change in gross revenues, as developed under step 2. EPA assumes a range of 0% to 40% of the gross revenue losses estimated in step 2 as a means of estimating the change in producer surplus. This is based on a review of empirical literature (restricted to only those studies that compared producer surplus to gross revenue) and is consistent with recommendations made in comments on the EPA analysis at proposal.

4. Estimate increase in surplus attributable to the Phase II regulations. Once the commercial surplus losses associated with impingement and entrainment under baseline conditions have been estimated according to the approaches outlined in steps 2 and 3, EPA estimates the percentage reduction in impingement and entrainment at a regional level.

b. Results. Exhibit XII–4 presents the estimated commercial fishing benefits attributable to today's rule for each region. The results reported include the total reduction in losses in pounds of fish, and the value of this reduction discounted at 0%, 3%, and 7%. Total commercial fishing benefits for the U.S., applying a 3% discount rate, are estimated to range from $0 to $3.5 million. Applying a 7% rate they range from $0 to $3.5 million.

EXHIBIT XII–4.—ANNUAL COMMERCIAL FISHING BENEFITS [a]

Region [c]	Current (baseline) lost yield (million lbs)	Reduction in lost yield (million lbs)	Benefits (millions of 2002$) [b]		
			0% discount rate	3% discount rate	7% discount rate
California	11.5	2.4	0.7	0.5	0.4
North Atlantic	0.6	0.2	0.1	0.1	0.0
Mid Atlantic	48.7	25.3	1.8	1.7	1.5
South Atlantic	9.6	3.5	0.2	0.2	0.2
Gulf of Mexico	7.6	3.6	0.8	0.7	0.6
Great Lakes	1.6	0.8	0.2	0.2	0.2
Inland U.S.	n/a	n/a	n/a	n/a	n/a
Total for 554 facilities	82.8	37.0	4.1	3.5	3.0

[a] Benefits are upper bound benefits based on 40% of gross revenue. The lower bound is $0.
[b] Discounted to account for lag in implementation and lag in time required for fish lost to I&E to reach a harvestable age. Assumed it will take one year from the date when installation costs are incurred to the date of installation. Thus, all benefits are discounted by one year from the date when installation costs are incurred.
[c] Regional totals are unweighted. National total estimates are weighted and include Hawaii.

c. Limitations and uncertainties. Some of the major uncertainties and assumptions of EPA's commercial fishing analysis include:

- Projected changes in harvest may be under-estimated because the cumulative impacts of impingement and entrainment over time are not considered.
- The analysis only includes individuals that are directly killed by impingement and entrainment, not their progeny, though given the complexities of population dynamics, the significance of this omission is not clear.
- Projected changes in harvest may be too high or too low because interactions with other stressors are not considered.
- EPA used impingement and entrainment data provided by the facilities. While EPA used the most current data available, in some cases these data are 20 years old or older. Thus, they may not reflect current conditions.
- EPA assumes a linear stock-to-harvest relationship (*i.e.*, a 13% change in stock would have a 13% change in landings); this may be low or high, depending on the condition of the stocks. Region-specific fisheries regulations also will affect the validity of the linear assumption.
- EPA assumes that NOAA Fisheries landings data are accurate and complete. However, in some cases prices and/or quantities may be reported incorrectly.
- EPA currently estimates that the increase in producer surplus as a result of the rule will be between 0% and 40% of the estimated change in gross revenues. The research used to develop this range is not region-specific; thus the true value may be higher for some regions and species.

5. Non-Use Benefits

As discussed by Freeman (1993), ''Non-use values, like use values, have their basis in the theory of individual preferences and the measurement of welfare changes. According to theory, use values and non-use values are additive,'' and ''* * * there is a real possibility that ignoring non-use values could result in serious misallocation of resources.'' This statement by Freeman aptly conveys the importance of non-use benefits outlined in EPA's own economic valuation guidance documents. A comprehensive estimate of total resource value should include both use and non-use values, so that the resulting appropriate total benefit value estimates may be compared to total social cost.

It is clear that reducing impingement and entrainment losses of fish and shellfish may result in both use and non-use benefits. Of the organisms which are anticipated to be protected by the section 316(b) Phase II rule, it is projected that approximately 1.8 percent will eventually be harvested by commercial and recreational fishers and

therefore can be valued with direct use valuation techniques. The Agency's direct use valuation does not account for the benefits from the remaining 98.2% of the age 1 equivalent aquatic organisms estimated to be protected nationally under today's rule. A portion of the total benefits of these unharvested commercial, recreational, and forage species, can be derived indirectly from the estimated use values of the harvested animals. A percentage of these unlanded organisms become prey or serve as breeding stock in the production of those commercial and recreational species that will eventually be caught, therefore their indirect use value as biological input into the production process is represented in the estimated direct use values of the harvested fish.

EPA was unable to value the non-use benefits associated with this rule. In order to provide an estimate of the quantified (but not monetized) effects of the rule, Exhibit XII–5 summarizes information about total impingement and entrainment losses, and Exhibit XII–6 presents estimates of reductions in impingement and entrainment losses under the final rule.

EXHIBIT XII–5.—DISTRIBUTION OF BASELINE IMPINGEMENT AND ENTRAINMENT

Region[a]	Current I&E of annual age-one equivalents (millions)				I&E of harvested species as a percentage of total I&E
	All species (total)	Forage species	Commercial and recreational species	Harvested commercial and recreational species	
California	312.9	170.6	142.3	14.9	4.8
North Atlantic	65.7	49.7	16.0	0.7	1.0
Mid Atlantic	1,733.1	1,115.6	617.6	28.4	1.6
South Atlantic	342.5	208.1	134.5	6.5	1.9
Gulf of Mexico	191.2	53.5	137.8	8.1	4.2
Great Lakes	319.1	300.8	18.3	0.5	0.2
Inland	369.0	284.8	84.2	0.2	0.1
Total for 554 facilities[a]	3,449.4	2,255.8	1,193.6	62.1	1.8

[a] Regional totals are unweighted. National total estimates are weighted and include Hawaii.

EXHIBIT XII–6.—DISTRIBUTION OF REDUCTIONS IN IMPINGEMENT AND ENTRAINMENT

Region[a]	Reductions in I&E of annual age-one equivalents (millions)				Reduction in I&E of harvested species as a percentage of total reduction in I&E
	All species (total)	Forage species	Commercial and recreational species	Harvested commercial and recreational species	
California	66.4	36.0	30.4	3.2	4.8
North Atlantic	19.3	14.6	4.7	0.2	1.0
Mid Atlantic	846.4	537.5	308.8	13.9	1.6
South Atlantic	76.7	38.5	38.2	1.6	2.0
Gulf of Mexico	89.5	20.5	69.0	3.6	4.0
Great Lakes	159.5	151.7	7.8	0.2	0.1
Inland	116.8	101.2	15.7	0.1	0.1
Total for 554 facilities	1,420.2	928.9	491.3	23.7	1.7

[a] Regional numbers are unweighted. National totals are sample-weighted and include Hawaii.

Lack of direct use values for the unharvested commercial, recreational and forage species means that EPA did not directly value a substantial percentage of the total age-one equivalent impingement and entrainment losses. Given that aquatic organisms without any direct uses account for the majority of cooling water intake structure losses and indirect valuation of these species may only represent a fraction of their total value, comprehensive monetization of the benefits of reduced impingement and entrainment losses is incomplete without developing a reliable estimate of non-use benefits. Although individuals do not use these resources directly, they may value changes in their status or quality. Both users (commercial and recreational fishermen) as well as non-users (those who do not use the resource) may have non-use values for these species. Non-use benefit valuation is challenging, but the existence and potential importance of non-use benefits is supported by EPA's Guidelines for Preparing Economic Analysis (EPA 240–R–00–003) and OMB Circular A–4, Regulatory Analysis, also available as Appendix D of Informing Regulatory Decisions: 2003 Report to Congress on The Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local and Tribal Entities, OMB, 2003, pp 118–165.

Market valuation approaches are used to estimate use benefits. The theory and practice of nonmarket valuation is well developed, and typically plays a pivotal role in benefit-cost analysis conducted by public and private agencies. Non-use values are often considered more difficult to estimate. The preferred technique for estimating non-use values is to conduct original stated preference surveys, but benefit transfer of values from existing stated preference studies can be considered when original studies are not feasible.

Stated preference methods rely on surveys, which ask people to state their willingness-to-pay for particular ecological improvements, such as increased protection of aquatic species or habitats with particular attributes. The Agency was not able to perform an original stated preference study for this regulation, so benefit transfer was explored as an alternative means to estimate non-use benefits. Benefits transfer involves adapting the findings from research conducted for another

purpose to address the policy questions in hand.

One of the specific benefit transfer techniques explored by EPA for estimation of non-use benefits in Phase II of the 316(b) rulemaking was meta regression analysis. Meta regressions are designed to statistically define the relationship between values and a set of resource, demographic and other characteristics compiled from original primary study sources. The resulting mathematical relationship allows the researcher to forecast estimates of non-use values specific to the resource changes projected to occur as a consequence of the final rule. EPA's Guidelines for Preparing Economic Analysis (EPA 240–R–00–003) discusses the use of meta-analysis and notes that this approach is the most rigorous benefit transfer exercise.

The meta analysis conducted by EPA for this rule identifies a set of elements that may influence willingness-to-pay; the analysis found both statistically significant and intuitive patterns that appeared to influence non-use values for water quality improvements in aquatic habitats. However, the Agency encountered various limitations when trying to apply the meta analysis model to this final rule, and these limitations could not be thoroughly analyzed within the publication time-frame established for this rule. EPA therefore does not present estimates of non-use values for this final rule.

Due to the various difficulties associated with estimating indirect and non-use benefits for this rule, final benefits do not reflect reduced impacts to a variety of potential ecological and public services that are a function, in part, of healthy fish stocks and other organisms affected by cooling water intake structures. Examples of other potential ecosystem services that may potentially be adversely affected by impingement and entrainment losses but which could not be monetized include:

- Decreased numbers of ecological keystone, rare, or sensitive species;
- Increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
- Disruption of ecological niches and ecological strategies used by aquatic species;
- Disruption of organic carbon, nutrient, and energy transfer through the food web;
- Decreased local biodiversity;
- Disruption of predator-prey relationships;
- Disruption of age class structures of species; and
- Disruption of public satisfaction with a healthy ecosystem.

The existence and potential magnitude of each of these benefits categories is highly dependent on site-specific factors which could not be assessed.

Today's rule may help preserve threatened and endangered species, but primary research, using stated preference methods, and data collection regarding threatened and endangered species impacts, could not be conducted for the final rule at the national level. As a result, EPA explored other methods for valuing threatened and endangered species. Details about possible non-use benefits valuation approaches are presented in the 316(b) Regional Analysis document (DCN 6–0003).

6. National Monetized Benefits

Quantifying and monetizing reduction in impingement and entrainment losses due to today's final rule is extremely challenging, and the preceding sections discuss specific limitations and uncertainties associated with estimation of commercial and recreational benefits categories (presented in Exhibit XII–7), and non-use benefits. National benefit estimates are subject to uncertainties inherent in valuation approaches used for assessing the three benefits categories. The combined effect of these uncertainties is of unknown magnitude or direction (*i.e.*, the estimates may over or under state the anticipated national-level benefits); however, EPA has no data to indicate that the results for each benefit category are atypical or unreasonable.

Exhibit XII–7 presents EPA's estimates of the total monetized benefits from impingement and entrainment reduction of the final regulation. Although EPA believes non-use benefits exist, the Agency was not able to monetize them. The estimated impingement and entrainment reduction monetized benefits post regulation are $83 million (2002$) per year, discounted at three percent, and $73 million, discounted at seven percent.

EXHIBIT XII–7.—SUMMARY OF MONETIZED SOCIAL BENEFITS

[Millions; 2002$]

Region [a]	Commercial fishing benefits	Recreational fishing benefits	Total value of monetizable impingement and entrainment reductions [b]
Evaluated at a 3 percent discount rate			
California	$0.5	$2.5	$3.0
North Atlantic	0.1	1.4	1.5
Mid-Atlantic	1.7	43.4	45.1
South Atlantic	0.2	6.9	7.1
Gulf of Mexico	0.7	6.2	6.9
Great Lakes	0.2	14.0	14.2
Inland	.....	3.0	3.0
Total for 554 facilities	3.5	79.3	82.5
Evaluated at a 7 percent discount rate			
California	0.4	1.9	2.3
North Atlantic	0.0	1.2	1.2
Mid-Atlantic	1.5	38.5	40.0
South Atlantic	0.2	6.2	6.4
Gulf of Mexico	0.6	5.5	6.1
Great Lakes	0.2	12.2	12.4

EXHIBIT XII–7.—SUMMARY OF MONETIZED SOCIAL BENEFITS—Continued

[Millions; 2002$]

Region [a]	Commercial fishing benefits	Recreational fishing benefits	Total value of monetizable impingement and entrainment reductions [b]
Inland	.....	2.6	2.6
Total for 554 facilities	3.0	70.0	73.0

[a] Regional benefit estimates are unweighted. National benefits are sample-weighted and include Hawaii.
[b] The monetized benefits of the final rule may be significantly under-estimated due to the inability to monetize the non-use values.

E. Other Considerations

This section presents two additional analyses that consider the benefits and costs of the final rule: (1) An analysis of the costs per age-one equivalent fish saved (equivalent to a cost-effectiveness analysis) and (2) a break-even analysis of the minimum non-use benefits required for total annual benefits to equal total annualized costs, on a per household basis. Each measure is presented by study region.

1. Cost Per Age-One Equivalent Fish Saved—Cost-Effectiveness Analysis

EPA also analyzed the cost per organism saved as a result of compliance with the final rule. This analysis estimates the cost-effectiveness of the rule, by study region. Organisms saved are measured as ''age-one equivalents.'' The costs used for the regional comparisons are the annualized pre-tax compliance costs incurred by facilities subject to the final rule, and the cost used for the national comparison is the total social cost of the final rule (including facility compliance costs and administrative costs).

Exhibit XII–8 shows that the estimated cost per age-one equivalent ranges from $0.07 in the Mid Atlantic region to $1.46 in the Inland region. At the national level, the estimated average cost is $0.27 per age-one equivalent saved.

EXHIBIT XII–8.—COST PER AGE-ONE EQUIVALENT SAVED

Study region [a]	Annual social cost [b] (millions; 2002$)	Age-one equivalents (millions)	Cost/age-one equivalent saved
California	$31.7	66.4	$0.48
North Atlantic	13.3	19.3	0.69
Mid Atlantic	62.6	846.4	0.07
South Atlantic	9.0	76.7	0.12
Gulf of Mexico	22.8	89.5	0.25
Great Lakes	58.7	159.5	0.37
Inland	170.4	116.8	1.46
Total for 554 facilities	389.4	1,420	0.27

[a] Regional benefit and cost estimates are unweighted; total national estimates are sample-weighted and include Hawaii.
[b] The regional costs include only annual compliance costs incurred by facilities. The national cost includes the total social cost of the final rule (facility compliance costs and administrative costs).

2. Break-Even Analysis

Due to the uncertainties of providing estimates of the magnitude of non-use values associated with the final rule, this section provides an alternative approach of evaluating the potential relationship between benefits and costs. The approach used here applies a ''break-even'' analysis to identify what the unmonetized non-use values would have to be in order for the final rule to have benefits that are equal to costs.

The break-even approach uses EPA's estimated or monetized, commercial and recreational use benefits for the rule and subtracts them from the estimated annual compliance costs incurred by facilities subject to the final rule. The resulting ''net cost'' enables one to work backwards to estimate what the unmonetized non-use values would need to be (in terms of willingness-to-pay per household per year) in order for total annual benefits to equal annualized costs. Exhibit XII–9 provides this assessment for the seven study regions. The exhibit shows benefits values using a 3 percent social discount rate. Use of a 7% discount rate would produce somewhat higher breakeven numbers. Section XII.D.5 presents undiscounted benefits and benefits discounted using a 7 percent discount rate.

EXHIBIT XII–9.—IMPLICIT NON-USE VALUE—BREAK-EVEN ANALYSIS

[Million; 2002$]

Study region [a]	Use benefits [b]	Annual social cost [c]	Annual non-use benefits necessary to break even [d,g]	Number of households (millions) [e]	Annual break-even non-use WTP per household [f]
California	$3.0	$31.7	$28.7	8.1	$3.55
North Atlantic	1.4	13.3	11.9	3.9	3.02

EXHIBIT XII–9.—IMPLICIT NON-USE VALUE—BREAK-EVEN ANALYSIS—Continued

[Million; 2002$]

Study region [a]	Use benefits [b]	Annual social cost [c]	Annual non-use benefits necessary to break even [d,g]	Number of households (millions) [e]	Annual break-even non-use WTP per household [f]
Mid Atlantic	45.0	62.6	17.5	9.6	1.82
South Atlantic	7.1	9.0	1.9	3.8	0.50
Gulf of Mexico	6.9	22.8	15.9	5.4	2.92
Great Lakes	14.1	58.7	44.6	8.6	5.17
Inland	3.0	170.4	167.4	20.9	8.01
Total for 554 facilities	82.9	389.4	306.5	60.4	5.07

[a] Regional benefit and cost estimates are unweighted; total national estimates are sample-weighted and include Hawaii.
[b] Benefits are discounted using a 3 percent discount rate.
[c] The regional costs include only annual compliance costs incurred by facilities. The national cost includes the total social cost of the final rule (facility compliance costs and administrative costs).
[d] Annualized compliance costs minus annual use benefits.
[e] Millions of households, including anglers fishing in the region and households in abutting counties. From U.S. Census 2000 (BLS): *http://factfinder.census.gov.*
[f] Dollars per household per year that, when added to use benefits, would yield a total annual benefit (use plus non-use) equal to the annualized costs.
[g] Non-use benefits may also include unmonetized use benefits, *i.e.*, improvements in bird watching.

As shown in Exhibit XII–9, for total annual benefits to equal total annualized costs, non-use values per household would have to be $0.50 in the South Atlantic region and $8.01 in the Inland region. At the national level, the annual willingness-to-pay per affected household would have to be $5.07 for total annual benefits to equal total annualized costs.

While this approach of backing out the ''break-even'' non-use value per household does not answer the question of what non-use values might actually be for the final rule, these results do frame the question for policy-making decisions. The break-even approach poses the question: ''Is the true per household willingness-to-pay for the non-use amenities (existence and bequest) associated with the final rule likely to be greater or less than the ''breakeven'' benefit levels displayed in Exhibit XII–9?'' Unfortunately, the existing body of empirical research is inadequate to answer this question on behalf of the nation as a whole, but EPA is providing the analysis to aid policy makers and the public in forming their own judgment.

XIII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether a regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines a ''significant regulatory action'' as one that is likely to result in a rule that may:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action.'' As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

B. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved the information collection requirements contained in this rule under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number 2060.02, or DCN 6–0001. Compliance with the applicable information collection requirements imposed under this final rule (*see* §§ 122.21(r), 125.95, 125.96, 125.97, 125.98, 125.99) is mandatory. Existing facilities are required to perform several data-gathering activities as part of the permit renewal application process. Today's final rule requires several distinct types of information collection as part of the NPDES renewal application. In general, the information will be used to identify which of the requirements in today's final rule apply to the existing facility, how the existing facility will meet those requirements, and whether the existing facility's cooling water intake structure reflects the best technology available for minimizing adverse environmental impact. Categories of data required by today's final rule follow.

- Source waterbody data for determining appropriate requirements to apply to the facility, evaluating ambient conditions, and characterizing potential for impingement and entrainment of all life stages of fish and shellfish by the cooling water intake structure;
- Intake structure and cooling water system data, consisting of intake structure design, cooling water system operational data and relationship of each intake to the cooling water system, and a facility water balance diagram, to determine appropriate requirements and characterize potential for impingement and entrainment of all life stages of fish and shellfish;
- Information on design and construction technologies implemented to ensure compliance with applicable requirements set forth in today's final rule; and
- Information on supplemental restoration measures proposed for use with design and construction technologies or alone to minimize adverse environmental impact.

In addition to the information requirements of the permit renewal application, NPDES permits normally

specify monitoring and reporting requirements to be met by the permitted entity. Existing facilities that fall within the scope of this final rule would be required to perform biological monitoring for at least two years, and as required by the Director, to demonstrate compliance. Additional ambient water quality monitoring may also be required of facilities depending on the specifications of their permits. The facility is expected to analyze the results from its monitoring efforts and provide these results in a bi-annual status report to the permitting authority. Finally, facilities are required to maintain records of all submitted documents, supporting materials, and monitoring results for at least three years. (Note that the Director may require more frequent reporting and that records be kept for a longer period to coincide with the life of the NPDES permit.)

All facilities carry out the activities necessary to fulfill the general information collection requirements. The estimated burden includes developing a water balance diagram that can be used to identify the proportion of intake water used for cooling, make-up, and process water. Facilities will also gather data (as required by the compliance alternative selected) to calculate the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved by the technologies and operational measures they select. The burden estimates include sampling, assessing the source waterbody, estimating the magnitude of impingement mortality and entrainment, and reporting results in a comprehensive demonstration study. For some facilities, the burden also includes conducting a pilot study to evaluate the suitability of the technologies and operational measures based on the species that are found at the site.

Some of the facilities (those choosing to use restoration measures to maintain fish and shellfish) will need to prepare a plan documenting the restoration measures they implement and how they demonstrate that the restoration measures are effective. Restoration is a voluntary alternative. Since facilities would most likely choose restoration only if other alternatives are more costly or infeasible, EPA has not assessed facility burden for this activity. However, burden estimates have been included for the Director's review of restoration activities.

Some facilities may choose to request a site-specific determination of best technology available because of costs significantly greater than those EPA considered in establishing the performance standards or because costs are significantly greater than the benefits of complying with the performance standards. These facilities must perform a comprehensive cost evaluation study and submit a site-specific technology plan characterizing the design and construction technologies, operational measures and/or restoration measures they have selected. In addition, facilities that request a site-specific determination because of costs significantly greater than the benefits must also perform a valuation of the monetized benefits of reducing impingement mortality and entrainment and an assessment of non-monetized benefits. Site-specific determinations are voluntary. Since facilities would choose site-specific determinations only if other alternatives are more costly, EPA has not assessed a facility burden for these activities; however, EPA has incorporated burden into the activities that the Director will perform in reviewing site-specific information.

The total average annual burden of the information collection requirements associated with today's final rule is estimated at 1,700,392 hours. The annual average reporting and record keeping burden for the collection of information by facilities responding to the section 316(b) Phase II existing facility final rule is estimated to be 5,428 hours per respondent (*i.e.,*, an annual average of 1,595,786 hours of burden divided among an anticipated annual average of 294 facilities). The Director reporting and record keeping burden for the review, oversight, and administration of the rule is estimated to average 2,615 hours per respondent (*i.e.*, an annual average of 104,606 hours of burden divided among an anticipated 40 States on average per year).

Respondent activities are separated into those activities associated with the NPDES permit application and those activities associated with monitoring and reporting after the permit is issued. The reason for this is that the permit cycle is every five years, while Information Collection Requests (ICRs) must be renewed every three years. Therefore, the application activities occur only once per facility during an ICR approval period, and so they are considered one-time burden for the purpose of this ICR. By contrast, the monitoring and reporting activities that occur after issuance of the permit occur on an annual basis. The burden and costs are for the information collection, reporting, and recordkeeping requirements for the three-year period beginning with the effective date of today's rule. Additional information collection requirements will occur after this initial three-year period as existing facilities continue to be issued permit renewals and such requirements will be counted in a subsequent information collection request. EPA does not consider the specific data that would be collected under this final rule to be confidential business information. However, if a respondent does consider this information to be confidential, the respondent may request that such information be treated as confidential. All confidential data will be handled in accordance with 40 CFR 122.7, 40 CFR Part 2, and EPA's Security Manual Part III, Chapter 9, dated August 9, 1976.

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An Agency may not conduct or sponsor, and a person is not required to respond to a collection of information, unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9. EPA is amending the table in 40 CFR Part 9 of currently approved OMB control numbers for various regulations to list the information requirements contained in this final rule.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 *et seq.*, generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions. For the purposes of assessing the impacts of today's rule on

small entities, small entity is defined as: (1) A small business according to RFA default definitions for small business (based on Small Business Administration (SBA) size standards); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, I certify that this action will not have a significant economic impact on a substantial number of small entities. This final rule applies to existing power producing facilities that employ a cooling water intake structure and are design to withdraw 50 million gallons per day (MGD) or more from waters of the United States for cooling purposes. EPA expects this final rule to regulate 25 small entities that own electric generators. We estimate that 17 of the small entities are governmental jurisdictions (*i.e.*, 16 municipalities and one political subdivision), two are private businesses (*i.e.,* one nonutility and one investor-owned entity), and six are not-for-profit enterprises (*i.e.,* rural electric cooperative).

Of the 25 small entities, one entity is estimated to incur annualized post-tax compliance costs of greater than three percent of revenues; eight are estimated to incur compliance costs of between one and three percent of revenues; and 16 small entities are estimated to incur compliance costs of less than one percent of revenues. Eleven small entities are estimated to incur no costs other than permitting and monitoring costs.

Although this final rule will not have a significant economic impact on a substantial number of small entities, EPA nonetheless has tried to reduce the impact of this rule on small entities. EPA has divided implementation of section 316(b) of the Clean Water Act (CWA) into three phases where the majority of small entities will be addressed in Phase III. Under the Phase III rule, EPA will convene a SBREFA panel that will evaluate impacts to small entities.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and Tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including Tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant intergovernmental mandates, and informing, educating, and advising small governments on compliance with regulatory requirements.

EPA estimates the total annualized (post-tax) costs of compliance for facilities subject to the final rule to be $249.5 million (2002$), of which $216.3 million is incurred by the private sector (including investor-owned utilities, nonutilities, and rural electric cooperatives) and $23.1 million is incurred by State and local governments that operate in-scope facilities.[59] Additionally, permitting authorities incur $4.1 million to administer the rule, including labor costs to write permits and to conduct compliance monitoring and enforcement activities. EPA estimates that the highest undiscounted post-tax cost incurred by the private sector in any one year is approximately $419.1 million in 2009. The highest undiscounted cost incurred by the government sector in any one year is approximately $43.5 million in 2008. Thus, EPA has determined that this rule contains a Federal mandate that may result in expenditures of $100 million or more for State, local, and Tribal governments, in the aggregate, or the private sector in any one year. Accordingly, EPA has prepared a written statement under § 202 of the UMRA, which is summarized as follows. See Economic and Benefits Analysis, Chapter B5, UMRA Analysis, for detailed information.

1. Summary of Written Statement

a. Authorizing Legislation

This final rule is issued under the authority of sections 101, 301, 304, 306, 308, 316, 401, 402, 501, and 510 of the Clean Water Act (CWA), 33 U.S.C. 1251, 1311, 1314, 1316, 1318, 1326, 1341, 1342, 1361, and 1370. This rule partially fulfills the obligations of the U.S. Environmental Protection Agency (EPA) under a consent decree in *Riverkeeper, Inc. et al.* v. *Whitman,* United States District Court, Southern District of New York, No. 93 Civ. 0314. See section III of this preamble for detailed information on the legal authority of this regulation.

b. Cost-Benefit Analysis

The final rule is expected to have total annualized pre-tax (social) costs of $389.2 million (2002$), including direct costs incurred by facilities and implementation costs incurred by State and Federal governments. The total use benefits of the rule are estimated to be $82.9 million. EPA was not able to estimate the monetary value of non-use benefits resulting from the rule, although the Agency believes non-use benefits may be significant. Thus, the total social costs exceed the total use benefits of the rule by $306.3 million, and the benefit-cost ratio, calculated by dividing total use benefits by total social costs, is 0.2. EPA notes that these analyses are based on a comparison of a partial measure of benefits with a complete measure of costs; therefore, the results must be interpreted with caution. For a more detailed comparison of the costs and benefits of the final rule, refer to section XII.E of this preamble.

EPA notes that States may be able to use existing sources of financial assistance to revise and implement the final rule. Section 106 of the Clean Water Act authorizes EPA to award grants to States, Tribes, intertribal consortia, and interstate agencies for administering programs for the prevention, reduction, and elimination of water pollution. These grants may be used for various activities to develop

[59] In addition, 14 facilities owned by Tennessee Valley Authority (TVA), a Federal entity, incur $10.1 million in compliance costs. The costs incurred by the Federal government are not included in this section.

and carry out a water pollution control program, including permitting, monitoring, and enforcement. Thus, State and Tribal NPDES permit programs represent one type of State program that can be funded by section 106 grants.

c. Macro-Economic Effects

EPA estimates that this regulation will not have an effect on the national economy, including productivity, economic growth, employment and job creation, and international competitiveness of U.S. goods and services. Macroeconomic effects on the economy are generally not considered to be measurable unless the total economic impact of a rule reaches at least 0.25 percent to 0.5 percent of Gross Domestic Product (GDP). In 2002, U.S. GDP was $10.4 trillion (2002$), according to the U.S. Bureau of Labor Statistics. Thus, in order to be considered measurable, the final rule would have to generate costs of at least $26 billion to $52 billion. Since EPA estimates the final rule will generate total annual pre-tax costs of only $389.2 million, the Agency does not believe that the final rule will have an effect on the national economy.

d. Summary of State, Local, and Tribal Government Input

EPA consulted with State governments and representatives of local governments in developing the regulation. The outreach activities are discussed in section III of this preamble.

e. Least Burdensome Option

EPA considered and analyzed several alternative regulatory options to determine the best technology available for minimizing adverse environmental impact. These regulatory options are discussed in the proposed rule at 67 FR 17154–17168, as well as in section VII of this preamble. These options included a range of technology-based approaches (*e.g.*, reducing intake flow to a level commensurate with the use of a closed-cycle cooling system for all facilities; facilities located on certain waterbody types; facilities located on certain waterbody types that withdraw a specified percentage of flow; and the use of impingement and entrainment controls at all facilities). EPA also included consideration of at least four distinct site-specific options, including several proposed by industry. As discussed in detail in section VII., EPA did not select these options because ultimately they are not the most cost-effective among the options that fulfill the requirements of section 316(b). EPA selected the final rule because it meets the requirement of section 316(b) of the CWA that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact, and it is economically practicable. EPA believes the final rule reflects the most cost-effective and flexible approach among the options considered. By providing five compliance alternatives the final rule offers Phase II existing facilities a high degree of flexibility in selecting the most cost-effective approach to meeting section 316(b) requirements. Under the rule, these facilities can demonstrate that existing flow or CWIS technologies fulfill section 316(b), identify design and control technologies, and/or use operational measures or restoration measures to fulfill the rule requirements. The final rule also ensures that any applicable requirements are economically practicable through the inclusion of the site-specific compliance alternative at § 125.94(a)(5). EPA further notes that the compliance alternative specified in § 125.94(a)(4) and 125.99(a) and (b) was included in part to provide additional flexibility to Phase II existing facilities as well as to reduce the burden of determining, implementing, and administering section 316(b) requirements among all relevant parties. Finally, the Agency believes that the rule extends additional flexibility to States by providing that where a State has adopted alternative regulatory requirements that achieve environmental performance comparable to that required under the rule, the Administrator will approve such alternative requirements.

2. Impact on Small Governments

EPA has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. EPA estimates that 17 of the 62 government-owned facilities subject to the final rule are owned by small governments (*i.e.*, governments with a population of less than 50,000). The total annualized post-tax compliance cost for all small government-owned facilities incurring costs under the final rule is $5.4 million, or approximately $316,000 per facility. The highest annualized compliance costs for a small government-owned facility is $1.3 million. These costs are lower than the corresponding costs for large governments and private entities. EPA therefore concludes that these costs do not significantly or uniquely affect small governments, and that today's rule is not subject to the requirement of section 203 of UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Rather, this rule would result in minimal administrative costs on States that have an authorized NPDES program; would result in minimal costs to States and local government entities that own facilities subject to the regulation; it maintains the existing relationship between the national government and the States in the administration of the NPDES program; and it preserves the existing distribution of power and responsibilities among various levels of government. Thus, Executive Order 13132 does not apply to this rule.

The national cooling water intake structure requirements will be implemented through permits issued under the NPDES program. Forty-five States and the Virgin Islands are currently authorized pursuant to section 402(b) of the CWA to implement the NPDES program. In States not authorized to implement the NPDES program, EPA issues NPDES permits. Under the CWA, States are not required to become authorized to administer the NPDES program. Rather, such authorization (and potential funding to support administration) is available to States if they operate their programs in a manner consistent with section 402(b) and applicable regulations. Generally, these provisions require that State NPDES programs include requirements that are as stringent as Federal program requirements. States retain the ability to implement requirements that are broader in scope or more stringent than Federal requirements. (*See* section 510 of the CWA). EPA expects an average annual burden of 104,606 hours with total average annual cost of $4.8 million

for States to collectively administer this rule during the first three years after promulgation.

EPA has identified 62 Phase II existing facilities that are owned by State or local government entities. The estimated average annual compliance cost incurred by these facilities is $372,000 per facility.

Today's rule would not have substantial direct effects on either authorized or nonauthorized States or on local governments because it would not change how EPA and the States and local governments interact or their respective authority or responsibilities for implementing the NPDES program. Today's rule establishes national requirements for Phase II existing facilities with cooling water intake structures. NPDES-authorized States that currently do not comply with the final regulations based on today's rule will need to amend their regulations or statutes to ensure that their NPDES programs are consistent with Federal section 316(b) requirements. *See* 40 CFR 123.62(e).

For purposes of this rule, the relationship and distribution of power and responsibilities between the Federal government and the States and local governments are established under the CWA (*e.g.*, sections 402(b) and 510), and nothing in this rule alters this established relationship and distribution of power and responsibilities. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

Although Executive Order 13132 does not apply to this rule, EPA did consult with representatives of State and local governments in developing this rule. EPA also met with the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) and, with the assistance of ASIWPCA, conducted a conference call in which representatives from 17 States or interstate organizations participated. A summary of consultation activities is provided in section III of this preamble. In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA also specifically solicited comments on the proposed rule from State and local officials. A summary of the concerns raised during that consultation and subsequent public comment periods and EPA's response to those concerns is provided in section VIII of this preamble and in the response to comment document in the record.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.'' ''Policies that have tribal implications'' are defined in the Executive Order to include regulations that have ''substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or the distribution of power and responsibilities between Federal government and Indian tribes.''

This rule does not have Tribal implications. It will not have substantial direct effects on Tribal governments, on the relationship between the Federal government and the Indian Tribes, or the distribution of power and responsibilities between the Federal government and Indian Tribes as specified in Executive Order 13175. The national cooling water intake structure requirements will be implemented through permits issued under the NPDES program. No Tribal governments are currently authorized pursuant to section 402(b) of the CWA to implement the NPDES program. In addition, EPA's analyses show that no facility subject to this rule is owned by Tribal governments and thus this rule does not affect Tribes in any way in the foreseeable future. Thus, Executive Order 13175 does not apply to this rule.

Nevertheless, in the spirit of Executive Order 13175 and consistent with EPA policy to promote communications between EPA and Tribal governments, EPA solicited comment on the proposed rule from all stakeholders. EPA did not receive any comments from Tribal governments.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

Executive Order 13405 does not apply to this rule because the rule does not concern an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. This rule establishes requirements for cooling water intake structures to protect aquatic organisms.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, (''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The final rule does not contain any compliance requirements that will:

- Reduce crude oil supply in excess of 10,000 barrels per day;
- Reduce fuel production in excess of 4,000 barrels per day;
- Reduce coal production in excess of 5 million tons per day;
- Reduce electricity production in excess of 1 billion kilowatt hours per day or in excess of 500 megawatts of installed capacity;
- Increase energy prices in excess of 10 percent;
- Increase the cost of energy distribution in excess of 10 percent;
- Significantly increase dependence on foreign supplies of energy; or
- Have other similar adverse outcomes, particularly unintended ones.

EPA analyzed the final rule for each of these potential effects and found that this rule will not lead to any adverse outcomes. Based on the analyses, EPA concludes that this final rule will have minimal energy effects at a national and regional level. As a result, EPA did not prepare a Statement of Energy Effects. For more detail on the potential energy effects of this rule, see section XI.B.1 of this preamble or the *Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule.*

I. National Technology Transfer and Advancement Act

As noted in the proposed rule, section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Pub. L. No. 104–113, section 12(d), (15 U.S.C. 272 note), directs EPA to use voluntary consensus standards in its regulatory activities unless to do so

would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standard bodies. The NTTAA directs EPA to provide Congress, through the Office of Management and Budget (OMB), explanations when the Agency decides not to use available and applicable voluntary consensus standards. This rule does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 requires that, to the greatest extent practicable and permitted by law, each Federal agency must make achieving environmental justice part of its mission. E.O. 12898 states that each Federal agency must conduct its programs, policies, and activities that substantially affect human health or the environment in a manner that ensures such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities because of their race, color, or national origin.

Today's final rule would require that the location, design, construction, and capacity of cooling water intake structures (CWIS) at Phase II existing facilities reflect the best technology available for minimizing adverse environmental impact. For several reasons, EPA does not expect that this final rule would have an exclusionary effect, deny persons the benefits of participating in a program, or subject persons to discrimination because of their race, color, or national origin.

To assess the impact of the rule on low-income and minority populations, EPA calculated the poverty rate and the percentage of the population classified as non-white for populations living within a 50-mile radius of each of the 543 in-scope facilities for which survey data are available. The results of the analysis, presented in the Economic Benefits Analysis, show that the populations affected by the in-scope facilities have poverty levels and racial compositions that are quite similar to the U.S. population as a whole. A relatively small subset of the facilities are located near populations with poverty rates (23 of 543, or 4.2%), or non-white populations (105 of 543, or 19.3%), or both (13 of 543, or 2.4%) that are significantly higher than national levels. Based on these results, EPA does not believe that this rule will have an exclusionary effect, deny persons the benefits of the NPDES program, or subject persons to discrimination because of their race, color, or national origin.

In fact, because EPA expects that this final rule would help to preserve the health of aquatic ecosystems located in reasonable proximity to Phase II existing facilities, it believes that all populations, including minority and low-income populations, would benefit from improved environmental conditions as a result of this rule. Under current conditions, EPA estimates over 1.5 billion fish (expressed as age 1 equivalents) of recreational and commercial species are lost annually due to impingement and entrainment at the inscope Phase II existing facilities. Under the final rule, more than 0.5 billion individuals of these commercially and recreationally sought fish species (age 1 equivalents) will now survive to join the fishery each year. These additional fish will provide increased opportunities for subsistence anglers to increase their catch, thereby providing some benefit to low income households located near regulation-impacted waters.

K. Executive Order 13158: Marine Protected Areas

Executive Order 13158 (65 FR 34909, May 31, 2000) requires EPA to ''expeditiously propose new science-based regulations, as necessary, to ensure appropriate levels of protection for the marine environment.'' EPA may take action to enhance or expand protection of existing marine protected areas and to establish or recommend, as appropriate, new marine protected areas. The purpose of the Executive Order is to protect the significant natural and cultural resources within the marine environment, which means ''those areas of coastal and ocean waters, the Great Lakes and their connecting waters, and submerged lands thereunder, over which the United States exercises jurisdiction, consistent with international law.''

Today's final rule recognizes the biological sensitivity of tidal rivers, estuaries, oceans, and the Great Lakes and their susceptibility to adverse environmental impact from cooling water intake structures. This rule provides the most stringent requirements to minimize adverse environmental impact for cooling water intake structures located on these types of waterbodies, including potential reduction of intake flows to a level commensurate with that which can be attained by a closed-cycle recirculating cooling system for facilities that withdraw certain proportions of water from estuaries, tidal rivers, and oceans.

EPA expects that this rule will reduce impingement mortality and entrainment at facilities with design intake flows of 50 MGD or more. The rule would afford protection of aquatic organisms at individual, population, community, or ecosystem levels of ecological structure. Therefore, EPA expects today's rule would advance the objective of the Executive Order to protect marine areas.

L. Congressional Review Act

The Congressional Review Act, 5. U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule can not take effect until 60 days after it is published in the **Federal Register**. This action is a ''major rule'' as defined by 5 U.S.C. 804(2). This will be effective September 7, 2004.

Dated: February 16, 2004.

Michael O. Leavitt,

Administrator.

Note: The following appendices A and B will not appear in the Code of Federal Regulations.

Appendix A

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Perform-ance standards on which EPA cost estimates are based	EPA modeled tech-nology code	Design flow adjust-ment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0001	.....	401,881	322,884	699,866	795,393	141,498	.....	.....	.....	I&E	2	0.8639
AUT0002	.....	549,533	5,750,259	68,489	104,063	854,282	6,650,155	290,459	559,082	I&E	12	3.6581
AUT0004	.....	239,107	528,427	30,725	104,458	148,969	.....	.....	.....	I	1	1.1604
AUT0011	.....	453,758	967,675	55,545	193,660	275,890	.....	.....	.....	I	1	1.1604
AUT0012	.....	2,018,917	48,835,329	360,813	989,876	7,582,115	110,716,357	4,933,578	9,315,779	I&E	12	3.6581
AUT0014	.....	572,383	2,732,729	91,057	110,893	408,915	.....	276,073	22,022	I&E	11	0.7352
AUT0015	.....	1,296,872	510,784	.....	134,070	206,794	.....	.....	.....	I	5	0.1286
AUT0016	.....	301,127	41,613	.....	28,195	34,120	.....	.....	.....	I	5	0.1286
AUT0019	.....	848,784	11,094,343	271,045	994,876	2,303,416	.....	.....	.....	I	1	1.1604
AUT0020	.....	207,514	1,517,779	34,859	42,089	223,327	.....	153,333	12,231	I&E	11	0.7352
AUT0021	.....	267,138	1,187,727	65,395	263,140	366,851	.....	150,000	11,965	I&E	2	0.8639
AUT0024	.....	639,702	72,402	.....	47,164	57,472	.....	.....	.....	I	5	0.1286
AUT0027	.....	404,214	2,362,864	147,563	532,881	721,737	.....	.....	.....	I	1	1.1604
AUT0044	.....	457,869	183,653	.....	57,997	84,145	.....	.....	.....	I	5	0.1286
AUT0049	.....	820,866	6,080,054	196,361	797,241	1,466,543	.....	204,745	16,332	I&E	2	0.8639
AUT0051	.....	348,052	11,832,011	17,181	50,842	1,718,273	.....	.....	.....	I	4	2.5787
AUT0053	.....	147,762	454,296	27,346	108,078	145,413	.....	.....	.....	I&E	2	0.8639
AUT0057	.....	56,391	271,166	19,811	65,525	84,322	.....	.....	.....	I	1	1.1604
AUT0058	.....	624,376	8,582,766	68,231	225,908	1,379,670	7,092,806	867,072	640,749	I&E	12	3.6581
AUT0064	.....	553,145	3,039,302	195,656	695,636	932,709	.....	.....	.....	I	1	1.1604
AUT0066	.....	65,571	2,006,184	80,531	63,685	268,790	23,985,660	150,000	1,944,883	I&E	4	2.5787
AUT0078	.....	288,792	5,683,876	267,577	1,083,987	1,625,667	.....	574,212	45,804	I&E	2	0.8639
AUT0084	.....	2,100,000	2,976,122	3,003,550	3,318,577	738,760	.....	150,331	11,992	I&E	2	0.8639
AUT0085	.....	975,261	23,279,870	341,127	452,608	3,426,011	52,842,026	2,351,844	4,445,953	I&E	4	2.5787
AUT0092	.....	2,786,349	929,777	.....	269,122	401,501	.....	.....	.....	I	5	0.1286
AUT0095	.....	67,369	55,826	120,772	140,422	27,598	.....	.....	.....	I&E	2	0.8639
AUT0106	.....	325,449	1,104,684	55,757	223,858	325,383	.....	150,000	11,965	I&E	2	0.8639
AUT0110	.....	551,114	6,445,617	70,141	104,066	951,636	5,297,741	651,167	478,869	I&E	12	3.6581
AUT0120	.....	207,333	2,085,862	55,736	225,656	466,900	.....	210,724	16,809	I&E	2	0.8639
AUT0123	.....	62,226	106,975	7,021	20,122	28,333	.....	.....	.....	I	1	1.1604
AUT0127	.....	104,672	573,136	34,651	118,506	165,457	.....	.....	.....	I	1	1.1604
AUT0130	.....	929,723	8,127,384	402,025	1,628,672	2,383,804	.....	821,067	65,496	I&E	2	0.8639
AUT0131	.....	492,987	3,299,931	195,321	694,407	968,921	.....	.....	.....	I	1	1.1604
AUT0134	.....	99,252	3,334,593	8,170	35,218	501,819	238,035	.....	19,182	I	3	3.4562
AUT0137	.....	401,222	1,916,441	117,385	475,099	630,572	.....	193,608	15,444	I&E	2	0.8639
AUT0139	.....	369,074	117,095	.....	49,945	66,617	.....	.....	.....	I	5	0.1286
AUT0142	.....	407,669	9,461,494	66,798	78,036	1,358,342	3,421,735	955,845	351,992	I&E	14	6.9559
AUT0143	.....	289,294	971,645	50,004	200,412	288,748	.....	150,000	11,965	I&E	2	0.8639
AUT0146	.....	213,207	1,618,126	88,506	313,588	455,467	.....	.....	.....	I	1	1.1604
AUT0148	.....	1,036,476	12,443,192	.....	288,984	2,060,615	.....	.....	.....	I&E	9	5.973
AUT0149	.....	848,079	109,389	.....	58,838	74,413	.....	.....	.....	I	5	0.1286
AUT0151	.....	482,911	1,465,485	95,774	340,264	453,142	.....	.....	.....	I	1	1.1604
AUT0161	.....	555,680	1,600,167	101,254	360,434	487,008	.....	.....	.....	I	1	1.1604
AUT0168	.....	329,758	5,156,763	39,196	51,388	746,399	492,266	260,480	60,448	I&E	12	3.6581
AUT0171	.....	1,189,016	14,989,478	120,512	398,517	2,412,170	15,890,363	.....	1,280,547	I&E	7	2.504
AUT0174	.....	1,341,997	934,469	1,387,449	1,537,156	282,755	.....	150,000	11,965	I&E	2	0.8639
AUT0175	.....	258,008	2,505,868	134,658	484,461	706,582	.....	.....	.....	I	1	1.1604
AUT0176	.....	1,652,395	6,892,691	425,370	1,533,553	2,089,548	.....	.....	.....	I	1	1.1604
AUT0183	.....	118,504	196,689	7,303	21,121	41,823	.....	.....	.....	I	1	1.1604
AUT0185	.....	810,911	97,503	.....	56,756	70,638	.....	.....	.....	I	5	0.1286
AUT0187	.....	1,242,691	257,332	.....	107,659	144,297	.....	.....	.....	I	5	0.1286
AUT0190	.....	511,950	27,779,896	616,589	191,870	3,530,513	.....	.....	.....	I&E	9	5.973
AUT0191	.....	692,335	19,255,865	184,161	66,491	2,623,932	.....	.....	.....	I&E	9	5.973

AUT0192	....	359,686	959,625	71,963	253,183	317,849	.....	.....	.....	I	1	1.1604
AUT0193	....	1,006,084	19,112,665	90,728	323,635	2,954,121	3,278,888	.....	264,234	I	3	3.4562
AUT0196	....	230,120	374,975	.....	10,672	64,060	.....	.....	.....	I	8	0.3315
AUT0197	....	407,061	4,773,876	248,548	891,410	1,322,554	.....	.....	.....	I	1	1.1604
AUT0202	....	2,080,399	106,025,028	477,625	769,048	15,387,001	.....	.....	.....	I&E	9	5.973
AUT0203	....	1,083,174	4,847,332	232,706	851,244	1,308,689	.....	.....	.....	I	1	1.1604
AUT0205	....	313,218	720,557	37,147	127,449	192,893	.....	.....	.....	I&E	1	1.1604
AUT0208	....	220,683	3,140,556	27,181	51,205	471,169	3,544,915	.....	285,672	I&E	4	2.5787
AUT0222	....	156,464	299,274	.....	9,554	52,164	.....	.....	.....	I	8	0.3315
AUT0227	....	82,468	523,999	30,107	102,249	146,748	.....	.....	.....	I	1	1.1604
AUT0228	....	147,594	837,743	41,023	163,811	242,064	.....	.....	.....	I&E	2	0.8639
AUT0229	....	483,349	1,784,794	87,496	391,634	558,253	.....	.....	.....	I&E	2	0.8639
AUT0238	....	376,148	757,400	51,856	180,342	236,323	.....	.....	.....	I	1	1.1604
AUT0242	....	1,113,045	8,239,161	291,327	1,039,947	1,921,691	.....	.....	.....	I	1	1.1604
AUT0244	....	49,980	426,844	22,868	76,413	114,318	.....	.....	.....	I	1	1.1604
AUT0245	....	491,302	1,459,999	50,879	61,192	218,185	.....	150,000	11,965	I&E	11	0.7352
AUT0254	....	145,838	353,928	22,339	74,527	102,580	.....	.....	.....	I	1	1.1604
AUT0255	....	194,919	258,805	.....	10,232	47,080	.....	.....	.....	I	8	0.3315
AUT0261	....	201,229	943,433	57,335	230,290	307,278	.....	150,000	11,965	I&E	2	0.8639
AUT0264	....	840,000	21,384,690	1,502,211	185,672	1,728,160	43,525,468	2,160,384	3,679,892	I&E	12	3.6581
AUT0266	....	653,994	139,380	307,951	351,075	62,969	.....	.....	.....	I&E	2	0.8639
AUT0268	....	712,677	2,998,753	114,173	417,470	730,253	.....	.....	.....	I	1	1.1604
AUT0273	....	173,689	994,534	52,039	208,703	298,263	.....	150,000	11,965	I&E	2	0.8639
AUT0277	....	88,831	1,192,106	45,779	51,021	174,971	186,802	.....	15,054	I&E	4	2.5787
AUT0278	....	1,642,492	6,410,550	771,895	257,586	398,409	.....	647,624	51,660	I&E	11	0.7352
AUT0284	....	728,495	3,743,165	208,370	742,487	1,067,059	.....	.....	.....	I	1	1.1604
AUT0292	....	556,596	2,227,636	99,379	350,087	567,874	.....	.....	.....	I	1	1.1604
AUT0295	....	359,098	3,584,905	53,365	114,232	571,276	5,005,800	.....	403,399	I&E	4	2.5787
AUT0297	....	184,293	1,172,223	63,592	255,790	359,096	.....	150,000	11,965	I&E	2	0.8639
AUT0298	....	897,819	100,769	.....	61,625	75,972	.....	.....	.....	I	5	0.1286
AUT0299	....	864,873	9,012,107	150,709	127,282	1,259,694	15,622,548	227,612	1,277,121	I&E	12	3.6581
AUT0302	....	71,413	91,562	6,933	19,813	25,916	.....	.....	.....	I	1	1.1604
AUT0305	....	762,197	42,822,242	146,012	281,593	6,232,505	49,751,104	4,326,108	4,354,352	I&E	14	6.9559
AUT0308	....	394,361	3,381,768	151,364	77,961	408,085	3,407,223	.....	274,576	I&E	7	2.504
AUT0309	....	789,860	81,433	.....	55,577	67,171	.....	.....	.....	I	5	0.1286
AUT0314	....	1,039,315	2,438,597	134,759	484,839	697,281	.....	.....	.....	I	1	1.1604
AUT0319	....	468,117	1,326,662	88,025	355,386	456,248	.....	150,000	11,965	I&E	2	0.8639
AUT0321	....	669,493	2,092,630	88,910	107,698	316,732	.....	150,000	11,965	I&E	11	0.7352
AUT0331	....	178,562	24,860	.....	21,328	24,867	.....	.....	.....	I	5	0.1286
AUT0333	....	336,448	786,807	46,794	162,104	227,333	.....	.....	.....	I	1	1.1604
AUT0337	....	1,110,944	131,046	.....	73,566	92,224	.....	.....	.....	I	5	0.1286
AUT0341	....	405,256	2,429,275	115,249	412,169	642,794	.....	.....	.....	I	1	1.1604
AUT0345	....	610,223	5,103,322	267,506	952,013	1,411,106	.....	.....	.....	I	1	1.1604
AUT0349	....	2,429,925	8,146,829	424,696	1,514,477	2,249,706	.....	.....	.....	I	1	1.1604
AUT0351	....	301,024	6,389,631	42,269	99,196	966,667	700,911	.....	56,484	I&E	3	3.4562
AUT0358	....	210,439	2,170,195	117,833	421,759	612,913	.....	.....	.....	I	1	1.1604
AUT0361	....	433,165	7,652,621	59,105	140,320	1,170,775	893,934	.....	72,039	I&E	3	3.4562
AUT0362	....	312,830	1,566,464	51,821	185,883	357,091	.....	.....	.....	I	1	1.1604
AUT0364	....	505,137	5,447,440	170,196	611,090	1,216,487	.....	.....	.....	I	1	1.1604
AUT0365	....	140,093	445,526	29,331	116,166	150,268	.....	.....	.....	I&E	2	0.8639
AUT0368	....	83,406	2,715,938	146,752	529,832	769,768	.....	.....	.....	I	1	1.1604
AUT0370	....	322,374	1,816,861	79,915	289,868	468,633	.....	.....	.....	I	1	1.1604
AUT0379	....	351,933	41,890	.....	31,041	37,006	.....	.....	.....	I	5	0.1286
AUT0381	....	50,143	960,912	9,964	22,083	148,931	506,182	.....	40,791	I&E	4	2.5787
AUT0384	....	146,511	66,229	91,020	104,211	22,620	.....	.....	.....	I&E	2	0.8639
AUT0385	....	130,966	1,823,217	20,420	25,983	265,149	1,445,463	.....	116,485	I&E	4	2.5787
AUT0387	....	576,057	5,283,933	122,322	496,655	1,126,646	.....	533,808	42,581	I&E	2	0.8639
AUT0398	....	537,402	6,842,592	63,631	75,697	986,297	6,440,309	.....	519,001	I&E	4	2.5787
AUT0399	....	140,486	232,496	.....	9,212	42,314	.....	.....	.....	I	8	0.3315
AUT0401	....	613,529	578,957	.....	72,110	154,541	.....	.....	.....	I	5	0.1286
AUT0404	....	291,400	4,124,975	44,642	51,995	594,657	3,259,312	.....	262,656	I&E	4	2.5787
AUT0408	....	73,728	900,969	13,020	49,057	164,315	803,968	.....	64,789	I&E	4	2.5787
AUT0416	....	143,562	41,835	96,659	112,954	22,251	.....	.....	.....	I&E	2	0.8639
AUT0423	....	564,501	29,714,518	122,524	248,148	4,356,303	.....	.....	.....	I&E	9	5.973
AUT0427	....	148,668	291,697	.....	9,392	50,923	.....	.....	.....	I	8	0.3315
AUT0431	....	143,775	356,208	20,913	69,450	99,253	.....	.....	.....	I	1	1.1604

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Perform-ance standards on which EPA cost estimates are based	EPA modeled tech-nology code	Design flow adjust-ment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
AUT0434		400,472	763,363	40,353	138,952	207,284				I	1	1.1604
AUT0435		183,306	483,907	27,166	107,346	149,077				I&E	2	0.8639
AUT0441		108,296	276,983	17,492	57,275	79,220				I	1	1.1604
AUT0446		278,043	3,528,075	28,547	111,202	584,973	1,404,150		113,155	I&E	4	2.5787
AUT0449		487,640	1,738,410	110,263	393,700	530,948				I	1	1.1604
AUT0472		239,620	218,958	453,683	511,926	89,417				I&E	2	0.8639
AUT0476		233,631	489,074	27,565	93,169	135,237				I	1	1.1604
AUT0483		1,146,722	2,715,801	112,654	136,742	410,757		274,363	21,886	I&E	11	0.7352
AUT0489		211,629	1,477,232	84,570	299,177	424,931				I	1	1.1604
AUT0490		405,350	3,527,610	73,321	78,027	506,958	3,548,991		286,000	I&E	4	2.5787
AUT0493		257,137	1,429,134	51,159	206,956	359,274		150,000	11,965	I&E	2	0.8639
AUT0496		603,432	1,649,804	57,304	206,130	383,721				I	1	1.1604
AUT0499		45,374	171,551	9,346	48,606	63,685				I&E	2	0.8639
AUT0501		346,213	115,781	205,027	230,840	42,297				I&E	2	0.8639
AUT0513		1,296,772	27,395,451	170,929	603,316	4,332,883	36,923,245		2,975,512	I&E	4	2.5787
AUT0517		98,553	1,040,022	20,976	72,416	199,516				I	1	1.1604
AUT0518		193,413	435,346	28,467	96,388	129,905				I	1	1.1604
AUT0522		237,692	856,098	40,165	162,010	243,734				I&E	2	0.8639
AUT0523		608,373	7,741,521		189,045	1,291,263				I&E	9	5.973
AUT0529		422,181	3,402,665	144,308	530,442	870,598				I	1	1.1604
AUT0534		70,565	230,241	17,175	56,150	71,756				I	1	1.1604
AUT0535		196,084	3,706,283	25,082	66,100	568,710	604,316		48,700	I&E	3	3.4562
AUT0539		1,056,137	13,978,398	183,682	342,369	2,148,896	2,343,730	1,412,165	301,520	I&E	12	3.6581
AUT0541		117,759	3,346,437	108,327	37,393	405,523	27,152,758	169,037	2,201,627	I&E	12	3.6581
AUT0547		780,279	9,747,498	118,281	129,393	1,398,937	17,882,815		1,441,112	I&E	4	2.5787
AUT0551		295,707	823,114	30,125	35,820	122,888		150,000	11,965	I&E	11	0.7352
AUT0552		1,226,625	133,029		80,047	98,987				I	5	0.1286
AUT0553		71,128	230,549	10,379	32,023	54,468				I	1	1.1604
AUT0554		429,991	8,840,925	249,963	170,468	1,179,253	1,498,242		120,738	I&E	3	3.4562
AUT0557		37,500	20,033		19,881	22,734				I	5	0.1286
AUT0564		1,129,749	14,903,816	170,408	396,749	2,348,309	15,236,406		1,227,847	I&E	7	2.504
AUT0567		441,177	5,817,871	67,488	77,963	838,809	4,139,441		333,583	I&E	4	2.5787
AUT0568		584,525	2,308,321	342,703	382,141	368,091		150,000	11,965	I&E	2	0.8639
AUT0570		951,201	4,021,857	164,817	591,048	998,853				I	1	1.1604
AUT0577		741,931	10,647,710	113,337	129,884	1,532,542				I&E	7	2.504
AUT0583		222,087	2,210,305	36,279	51,245	329,663	9,610,528		774,478	I&E	4	2.5787
AUT0585		128,015	1,561,382	49,933	54,853	227,225	1,102,473		88,844	I&E	4	2.5787
AUT0588		396,576	1,788,685	191,759	66,639	129,548		180,701	14,414	I&E	11	0.7352
AUT0590		147,803	315,803	22,592	75,430	97,801				I	1	1.1604
AUT0599		198,681	3,040,887	21,121	104,455	516,288		307,205	24,505	I	4	2.5787
AUT0600		711,801	1,717,012	80,592	284,636	448,508				I	1	1.1604
AUT0601		1,151,214	541,482	677,194	742,753	142,654				I&E	2	0.8639
AUT0603		1,228,633	684,562	720,077	802,140	179,529		150,000	11,965	I&E	2	0.8639
AUT0607		635,364	9,044,216	111,819	226,342	1,402,216	3,693,163	456,845	334,061	I&E	12	3.6581
AUT0611		547,114	3,195,898	88,288	320,973	687,709				I	1	1.1604
AUT0612		186,464	6,614,075		85,670	1,027,365				I&E	13	7.0567
AUT0613		493,923	4,341,494	155,354	572,021	1,034,798				I	1	1.1604
AUT0617		2,292,812	37,040,390	1,403,836	741,877	4,611,760	2,161,531	1,247,332	273,688	I&E	12	3.6581
AUT0619		159,600	62,547	98,454	112,506	22,957				I&E	2	0.8639
AUT0620		551,528	2,198,869	264,319	90,714	139,464		222,140	17,720	I&E	11	0.7352
AUT0621		391,137	2,018,600	70,658	245,595	462,340				I	1	1.1604
AUT0623		73,622	267,379	13,006	49,653	74,715				I	2	0.8639
AUT0625		562,255	2,841,330	104,168	380,113	680,487				I	1	1.1604

AUT0630	.....	569,211	16,086,712	94,881	227,787	2,423,292	974,792	.....	78,555	I&E	3	3.4562
AUT0631	.....	480,721	11,721,529	77,934	190,232	1,781,179	193,002	.....	15,553	I&E	3	3.4562
AUT0635	.....	72,550	1,057,088	50,149	201,000	301,357	.....	150,000	11,965	I&E	2	0.8639
AUT0638	.....	201,395	2,336,881	50,154	202,851	485,416	.....	236,083	18,832	I&E	2	0.8639
AUT0639	.....	479,860	2,960,066	143,531	527,524	805,439	.....	.....	.....	I	1	1.1604
DMU3244 ...	1	22,222	138,465	.....	27,927	47,641	.....	.....	.....	I	1	1.1604
DMU3244 ...	2	56,250	163,334	.....	33,357	56,612	.....	.....	.....	I	1	1.1604
DMU3310 ...	.....	41,319	25,594	8,793	27,169	22,020	.....	.....	.....	I	1	1.1604
DNU2003	.....	156,944	68,455	.....	30,711	40,458	.....	.....	.....	I	5	0.1286
DNU2010	.....	67,000	1,010,938	11,787	23,430	155,578	543,834	.....	43,826	I	4	2.5787
DNU2011	.....	181,250	2,707,585	21,222	102,473	466,750	5,223,420	273,533	442,756	I&E	12	3.6581
DNU2013	.....	65,000	588,369	.....	24,812	108,583	.....	150,000	11,965	I&E	11	0.7352
DNU2014	.....	42,798	531,997	64,365	22,327	33,707	.....	150,000	11,965	I&E	11	0.7352
DNU2017	.....	38,194	984,494	.....	13,803	153,973	.....	.....	.....	I&E	13	7.0567
DNU2018	.....	44,260	446,336	11,513	13,633	65,668	.....	.....	.....	I&E	11	0.7352
DNU2021	.....	55,750	292,158	18,165	59,671	83,103	.....	.....	.....	I	1	1.1604
DNU2025	.....	120,689	7,720,257	.....	825,174	1,924,365	.....	779,937	62,215	I&E	2	0.8639
DNU2032	Units 1 & 2	156,250	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DNU2032	Unit 3	124,306	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DNU2032	Unit 4	136,806	143,049	.....	54,324	74,691	.....	.....	.....	I	5	0.1286
DNU2038	.....	41,667	465,858	50,489	58,892	74,730	.....	.....	.....	I&E	2	0.8639
DUT0062	1	72,917	1,069,902	8,527	48,944	192,747	5,279,493	.....	425,455	I&E	4	2.5787
DUT0062	2	156,250	1,922,088	14,312	56,483	315,834	5,279,493	.....	425,455	I&E	4	2.5787
DUT0576	5&6	50,000	1,434,192	51,770	185,694	338,121	.....	.....	.....	I	1	1.1604
DUT0576	7	43,056	866,245	29,000	101,863	196,197	.....	.....	.....	I	1	1.1604
DUT0576	CT	2,083	202,358	.....	25,785	54,596	.....	.....	.....	I	1	1.1604
DUT1002	Screenhouse 1	685,833	166,652	322,571	367,337	68,493	.....	.....	.....	I&E	2	0.8639
DUT1002	Screenhouse 2	685,833	166,652	322,571	367,337	68,493	.....	.....	.....	I&E	2	0.8639
DUT1003	.....	38,500	703,237	15,912	20,989	105,202	236,360	.....	19,047	I	4	2.5787
DUT1006	Unit 1/2	173,611	1,286,341	54,154	153,027	282,018	.....	.....	.....	I	1	1.1604
DUT1006	Unit 3/4	20,833	281,263	12,914	39,309	66,440	.....	.....	.....	I	1	1.1604
DUT1007	.....	242,778	680,059	32,861	39,165	103,129	.....	150,000	11,965	I&E	11	0.7352
DUT1008	.....	60,000	1,016,367	26,935	107,846	225,619	.....	150,000	11,965	I&E	2	0.8639
DUT1011	.....	283,611	1,350,484	76,112	267,481	383,648	.....	.....	.....	I	1	1.1604
DUT1012	.....	173,611	522,205	29,576	100,351	145,125	.....	.....	.....	I	1	1.1604
DUT1014	.....	87,000	920,321	40,859	163,140	253,315	.....	150,000	11,965	I&E	2	0.8639
DUT1022	.....	2,200,000	8,268,801	291,801	1,051,593	1,937,083	.....	.....	.....	I	1	1.1604
DUT1023	CWS #535	478,444	28,961,166	360,609	274,535	4,037,344	.....	.....	.....	I&E	3	3.4562
DUT1023	DWS #536	520,000	39,708,776	97,288	361,137	5,917,486	4,830,432	.....	389,267	I&E	3	3.4562
DUT1029	CRS	638,000	14,391,478	63,709	254,538	2,239,852	.....	.....	.....	I&E	3	3.4562
DUT1029	CR Nuc	680,000	6,740,847	162,470	659,152	1,456,426	.....	.....	.....	I&E	2	0.8639
DUT1029	CRN	68,000	649,893	13,914	16,340	94,956	.....	.....	.....	I&E	11	0.7352
DUT1029	HCT	735,000	4,654,560	159,675	194,358	697,388	21,796,254	667,692	1,809,743	I&E	11	0.7352
DUT1031	1	59,000	808,777	17,797	22,826	120,181	.....	.....	.....	I&E	4	2.5787
DUT1031	2	140,000	1,524,044	24,132	26,017	218,874	5,399,114	.....	435,095	I&E	4	2.5787
DUT1033	.....	240,000	1,076,251	43,293	55,502	165,443	.....	150,000	11,965	I&E	11	0.7352
DUT1034	.....	1,231,944	4,990,608	202,923	820,337	1,327,964	.....	504,175	40,218	I&E	2	0.8639
DUT1036	.....	444,000	753,297	41,568	141,630	207,314	.....	.....	.....	I	1	1.1604
DUT1038	.....	65,972	213,848	12,804	38,918	56,561	.....	.....	.....	I	1	1.1604
DUT1041	.....	188,958	433,167	27,973	94,625	128,325	.....	.....	.....	I	1	1.1604
DUT1043	.....	280,556	36,345	.....	27,042	32,217	.....	.....	.....	I	5	0.1286
DUT1044	.....	756,944	76,726	.....	53,732	64,656	.....	.....	.....	I	5	0.1286
DUT1047	.....	614,306	16,998,704	151,032	103,667	2,372,868	4,783,541	.....	385,488	I&E	7	2.504
DUT1048	HI-1	256,944	1,766,372	113,534	405,813	543,770	.....	.....	.....	I	1	1.1604
DUT1048	HI-2	170,139	473,836	33,127	113,050	147,387	.....	.....	.....	I	1	1.1604
DUT1050	.....	2,104,167	407,068	.....	171,852	229,809	.....	.....	.....	I	5	0.1286
DUT1051	.....	374,000	1,027,013	55,468	193,382	284,137	.....	.....	.....	I	1	1.1604
DUT1057	.....	340,000	2,844,898	35,159	51,102	420,993	7,997,712	.....	644,507	I&E	4	2.5787
DUT1062	.....	670,139	67,658	.....	48,869	58,502	.....	.....	.....	I	5	0.1286
DUT1066	.....	1,712,000	32,777,974	260,695	678,771	5,084,922	845,987	.....	68,175	I&E	3	3.4562
DUT1067	1	63,611	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1067	2	31,667	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1067	3	69,653	23,159	.....	20,564	23,862	.....	.....	.....	I	5	0.1286
DUT1068	.....	91,528	360,536	56,351	20,060	15,042	.....	.....	.....	I&E	11	0.7352
DUT1072	.....	366,597	691,381	40,319	137,184	195,303	.....	.....	.....	I	1	1.1604
DUT1084	.....	264,583	835,764	54,494	189,863	254,363	.....	.....	.....	I	1	1.1604

Facility ID	Intake ID	EPA assumed design intake flow, gpm (X_{epa}) ($)	Capital cost ($)	Baseline O&M annual cost ($)	Post construction O&M annual cost ($)	Annualized capital [3] + net O&M using EPA design intake flow [2] (y_{epa}) ($)	Net revenue losses from net construction downtime ($)	Pilot study costs ($)	Annualized downtime and pilot study costs [2,4] ($)	Performance standards on which EPA cost estimates are based	EPA modeled technology code	Design flow adjustment slope (m) [1]
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
DUT1085	.....	297,000	2,410,696	159,608	619,834	803,455	.....	243,540	19,427	I&E	2	0.8639
DUT1086	Unit 1	57,292	667,197	29,048	122,691	188,637	.....	.....	.....	I&E	2	0.8639
DUT1086	Unit 2	57,292	667,197	29,048	122,691	188,637	.....	150,000	11,965	I&E	2	0.8639
DUT1088	#4	49,280	865,324	11,129	22,007	134,081	.....	.....	.....	I&E	7	2.504
DUT1088	#5	99,458	1,438,399	12,058	25,232	217,970	1,601,167	.....	129,032	I&E	7	2.504
DUT1093	.....	307,760	9,456,466	.....	33,762	1,380,150	.....	.....	.....	I&E	9	5.973
DUT1097	.....	106,007	2,349,646	.....	242,606	577,143	.....	237,372	18,935	I&E	6	5.0065
DUT1098	.....	71,528	507,025	29,461	99,942	142,669	.....	.....	.....	I	1	1.1604
DUT1100	Units 1 & 2	188,000	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1100	Units 3 & 4	188,000	136,878	.....	50,573	70,062	.....	.....	.....	I	5	0.1286
DUT1103	Unit 1 Screenhouse	118,000	.....	.....	.....	.....	.....	.....	.....	I		
DUT1103	Unit 2 Screenhouse	250,000	47,060	.....	31,941	38,642	.....	.....	.....	I	5	0.1286
DUT1103	Hvdc Lake Intake	1,200	34,615	.....	4,734	9,662	.....	.....	.....	I	8	0.3315
DUT1103	Hvdc Separator Dike	1,200	34,615	.....	4,734	9,662	.....	.....	.....	I	8	0.3315
DUT1103	River Intake	7,800	75,587	5,734	15,570	20,597	.....	.....	.....	I	1	1.1604
DUT1109	.....	58,333	873,553	32,385	130,170	222,159	.....	150,000	11,965	I	2	0.8639
DUT1111	Unit 1&2	199,716	764,700	99,547	37,851	47,181	.....	.....	.....	I&E	11	0.7352
DUT1111	Unit 3	189,842	717,221	93,277	35,552	44,391	.....	150,000	11,965	I&E	11	0.7352
DUT1112	.....	193,750	501,403	28,510	96,543	139,421	.....	.....	.....	I	1	1.1604
DUT1113	System 27	1,125,000	6,518,329	281,013	1,001,831	1,648,882	.....	.....	.....	I	1	1.1604
DUT1113	System 67	44,028	181,599	.....	8,508	34,364	.....	.....	.....	I	8	0.3315
DUT1116	.....	355,556	2,886,459	69,804	84,921	426,084	.....	291,604	23,261	I&E	11	0.7352
DUT1118	.....	667,361	140,959	.....	64,789	84,858	.....	.....	.....	I	5	0.1286
DUT1122	.....	120,000	23,134	.....	18,047	21,341	.....	.....	.....	I	5	0.1286
DUT1123	6	111,806	4,071,741	15,536	39,240	603,428	.....	.....	.....	I&E	3	3.4562
DUT1123	7	256,250	5,809,773	.....	431,082	1,258,263	.....	.....	.....	I&E	6	5.0065
DUT1123	8	220,139	5,590,610	27,185	73,721	842,513	1,136,010	.....	91,547	I&E	3	3.4562
DUT1132	.....	1,896,000	3,995,072	197,552	927,311	1,298,568	.....	403,601	32,195	I&E	2	0.8639
DUT1133	.....	213,889	1,180,537	44,631	57,260	180,711	.....	150,000	11,965	I&E	11	0.7352
DUT1138	.....	77,083	264,532	12,475	37,753	62,942	.....	.....	.....	I	1	1.1604
DUT1140	Mc2-4	131,250	334,100	20,512	66,264	93,320	.....	.....	.....	I	1	1.1604
DUT1140	Mc5&6	383,958	1,450,787	82,444	290,867	414,982	.....	.....	.....	I	1	1.1604
DUT1145	.....	178,472	2,702,979	38,035	57,101	403,909	1,565,614	273,068	147,950	I&E	12	3.6581
DUT1146	.....	181,944	325,271	276,184	309,256	79,383	.....	.....	.....	I&E	2	0.8639
DUT1152	.....	399,306	10,606,982	355,225	1,321,682	2,476,653	.....	.....	.....	I	1	1.1604
DUT1156	.....	496,000	16,234,946	67,033	77,047	2,321,504	9,287,608	.....	748,455	I&E	7	2.504
DUT1157	6	110,000	1,262,753	47,827	25,593	157,553	.....	.....	.....	I&E	4	2.5787
DUT1157	7	5,833	305,286	13,438	17,201	47,229	.....	.....	.....	I&E	4	2.5787
DUT1165	1	480,000	9,356,403	220,447	189,951	1,301,645	.....	.....	.....	I&E	3	3.4562
DUT1165	2	489,233	.....	.....	.....	.....	9,426,676	.....	759,662	I&E		
DUT1169	.....	620,000	14,855,719	47,990	185,073	2,252,203	1,896,934	.....	152,867	I&E	3	3.4562
DUT1173	.....	37,986	312,285	18,521	72,119	98,061	.....	.....	.....	I&E	2	0.8639
DUT1179	.....	390,278	1,204,485	74,177	261,241	358,556	.....	.....	.....	I	1	1.1604
DUT1185	.....	225,000	3,496,693	21,560	51,324	527,614	1,266,125	.....	102,032	I&E	7	2.504
DUT1186	Unit 4	62,000	577,654	26,371	88,907	144,780	.....	.....	.....	I	1	1.1604
DUT1186	Unit 5	62,000	577,654	26,371	88,907	144,780	.....	.....	.....	I	1	1.1604
DUT1187	Mt 2&3	147,014	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1187	Mt 6-8	500,000	78,370	.....	47,573	58,732	.....	.....	.....	I	5	0.1286
DUT1189	Unit 6 & 8	72,222	.....	.....	.....	.....	.....	.....	.....	I	5	0.1286
DUT1189	Unit 7	80,000	22,427	.....	19,852	23,045	.....	.....	.....	I	5	0.1286
DUT1198	.....	279,511	5,198,159	27,451	92,443	805,093	268,118	.....	21,607	I&E	3	3.4562
DUT1202	Power Plant	36,000	1,154,817	.....	13,668	178,088	.....	.....	.....	I&E	11	0.7352
DUT1202	Filtration Plant	30,000	987,137	.....	13,284	153,830	.....	.....	.....	I&E	9	5.973