

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

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

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**COMMENTS OF RIVERKEEPER, INC., NATURAL RESOURCES DEFENSE  
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## SUMMARY OF CONTENTS<sup>1</sup>

EXECUTIVE SUMMARY .....	ii
DETAILED TABLE OF CONTENTS .....	ix
I. BACKGROUND .....	1
A. Factual Background .....	1
B. Statutory Background .....	22
C. Regulatory Background .....	33
II. SUMMARY OF THE PROPOSED RULE .....	42
III. THE PROPOSED RULE FALLS WELL SHORT OF THE CLEAN WATER ACT’S STATUTORY MANDATE, IS ARBITRARY, CAPRICIOUS, AN ABUSE OF DISCRETION, AND OTHERWISE NOT IN ACCORDANCE WITH LAW, IS SIGNIFICANTLY WEAKER THAN EPA’S PRIOR 316(b) RULES, AND WILL NOT PROTECT AQUATIC RESOURCES UNLESS IT IS SIGNIFICANTLY STRENGTHENED .....	64
A. EPA’s “Approach to BTA” .....	64
B. Entrainment Standards .....	68
C. Impingement Standards .....	96
D. Standards for New Units .....	104
E. Other Critical Provisions .....	108
F. Cost-Benefit Analysis .....	122
G. Other Applicable Federal Environmental Laws .....	135
IV. ADDITIONAL REVISIONS TO THE PHASE I RULE ARE WARRANTED IN LIGHT OF THE <i>RIVERKEEPER I</i> DECISION .....	137
V. RESPONSES TO EPA’S SPECIFIC REQUESTS FOR COMMENT .....	139
LIST OF APPENDICES .....	163
LIST OF EXHIBITS .....	164

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<sup>1</sup> To aid the reader, we have included here a one-page abridged summary of the Table of Contents, containing all of the major headings and condensed versions of some of the subheadings.

## **EXECUTIVE SUMMARY**

When EPA promulgates the final version of this rule in 2012, four decades will have passed since Congress first directed the agency to stop power plant fish kills, yet the staggering aquatic mortality continues unabated as if it were still 1972. Today, Americans use electricity to power their cell phones and tablet PCs instead of rabbit-eared televisions, but cooling water regulation remains frozen in time as the plants supplying that power continue to kill enormous numbers of fish, overheat our waterways, and severely damage aquatic ecosystems using exactly the same once-through cooling systems as they did two generations ago. Unfortunately, the proposed rule<sup>2</sup> does little to solve this problem, despite the ready availability of modern technology that can nearly eliminate it.

In January 1993, when George H. W. Bush was still president, Riverkeeper and several of the other commenters sued EPA to compel issuance of the intake structure regulations mandated by the 1972 Clean Water Act.<sup>3</sup> Late last year, Administrator Lisa Jackson wrote to Representative Fred Upton of Michigan, who had requested that EPA delay issuance of the Proposed Rule beyond the March 2011 deadline that was agreed upon after the courts remanded EPA's prior rule for existing power plant intake structures. The Administrator refused to postpone the new rule, explaining to the Congressman:

By the time the agency takes final action in July 2012, industry will have been waiting nearly twenty years [since Riverkeeper's 1993 lawsuit] for the *regulatory certainty that facilitates sound investment decisions*. The public will have been waiting just as long for *reassurance that the aquatic environment is being protected*. I do not want to delay any longer.<sup>4</sup>

Astonishingly, having recognized the need for both regulatory certainty and environmental protection – and the need to end decades of inaction – EPA has now issued a proposal that could hardly be less certain, less protective, or less expeditious. Contrary to the Clean Water Act's mandate, the Proposed Rule entrusts states with the task of stopping the annual slaughter of a trillion aquatic organisms by 1,200 power plants and manufacturers – one plant at a time. Worse yet, the Proposed Rule then burdens those state agencies with a complex yet indeterminate, subjective, standardless and undeniably lengthy case-by-case process that EPA knows full well cannot be effectively accomplished. The only “regulatory certainty” EPA has bestowed upon industry is the certainty of knowing that they can continue to run their plants with antiquated technology and thereby kill fish with impunity. Meanwhile, the public has been deprived of any semblance of reassurance that the aquatic environment is being protected.

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<sup>2</sup> See 76 Fed. Reg. 22,174 (April 20, 2011) (National Pollutant Discharge Elimination System – Cooling Water Intake Structures at Existing Facilities and Phase I Facilities) (the “Proposed Rule”).

<sup>3</sup> See *Cronin v. Reilly*, 93 Civ. 0314 (SDNY).

<sup>4</sup> Letter from Administrator Lisa P. Jackson to Congressman Fred Upton, December 16, 2010, at 1 (emphasis added), submitted as Exhibit 1 to these comments. Hereinafter, all citations to comment exhibits include the exhibit number in this format: (Exh. #). In addition, Appendices A through I are also submitted herewith.

These comments make the following key points:<sup>5</sup>

## **The Proposed Rule is Illegal and Will Not Protect the Environment**

### **Approach to “Best Technology Available” (BTA)**

- ***EPA proposes to unlawfully reject uniform, national, categorical, technology-based, and technology-forcing standards*** in favor of case-by-case assessments of consequential water quality effects. EPA begins with an unlawful premise that a technology must be capable of being implemented universally as a prerequisite for setting national categorical standards and proceeds to ignore nearly all of the fundamental precepts that Congress established as the foundation of the Clean Water Act’s technology-based framework.
- ***EPA’s reliance on open-ended cost-benefit considerations is unlawful.*** While not prohibited, cost-benefit analysis can be used only as a secondary tool to screen out absurd results and not as a primary decision-making criterion based on the flawed cost-benefit balancing exercise EPA has attempted here. Congress knew that attempts to quantify and monetize environmental benefits would hinder regulation, rather than improve it. EPA’s cost-benefit folly in this rulemaking illustrates exactly why Congress meant to constrain EPA’s discretion in that regard.

### **Entrainment**

- ***The Proposed Rule does little to change the unacceptable status quo and protect the aquatic environment from entrainment. EPA should establish an entrainment standard based on closed-cycle cooling as envisioned in the agency’s Option 3.*** The agency had before it a regulatory option – a national categorical standard based on the performance of closed-cycle cooling systems (Option 3) – that would protect the environment at a reasonable cost to industry, create jobs, and cause no significant adverse effects on the environment, electric reliability, or consumer prices. EPA unlawfully rejected that option in favor of preserving the status quo. Closed-cycle cooling is a feasible and readily affordable technology. A national, categorical entrainment standard based on that technology could include a narrow safety-valve variance to properly take account of site-specific factors for those plants fundamentally different than the majority. Parameters for such a variance are proposed below.
- ***Contrary to industry’s hyperbolic claims, Option 3 would not cause electric reliability problems and would barely increase electricity prices.*** EPA estimates that if the total cost of Option 3 were to be passed on to ratepayers, those costs would total only \$1.47 per month per household. Conversely, if 100 percent of the costs fell upon power companies, the majority of parent entities would incur annualized costs of less than one percent of revenues. Further, assuming none of those costs could be passed on, plant retirements caused by Option

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<sup>5</sup> These comments are submitted without waiver of, or prejudice to, any previously stated positions (or, potentially, any future positions) taken in litigation or adjudication with respect to contested aspects of power plant permitting and cooling water intake regulation (including, without limitation, the illegality of formal cost-benefit analyses in this context). The commenters reserve all rights in this regard.

3 would represent less than 1.5 percent of total capacity, which could be easily replaced by new, cleaner generation.

- ***EPA’s economic findings are unambiguous: the stronger the regulation, the greater the boost to the economy and job creation.*** At either discount rate EPA used in its analysis, Option 3 creates jobs and stimulates the economy to a greater degree than any of the other options. At a 7 percent discount rate, it produces 10,102 new jobs under EPA’s analysis, but the actual benefits to the economy of Option 3 are likely much greater. Option 3 is therefore a job-creating rule that will improve the economy.
- ***EPA’s national cost-benefit analysis is deeply flawed and illegal.*** These comments and the attached reports of the Stockholm Environment Institute (“SEI”) and Powers Engineering identify significant flaws in EPA’s national cost-benefit analysis. Making only partial and conservative corrections to EPA’s analysis, the monetizable benefits of a national standard based on the performance of closed-cycle cooling systems (Option 3) exceed its costs.
- ***In place of Option 3 (or Option 2, a watered-down version of Option 3), EPA has illegally substituted Option 1, a case-by-case decision making process that is legally infirm.*** A nationally uniform entrainment standard based on the performance of closed-cycle cooling systems, like Option 3, is technologically and economically feasible. Therefore, EPA’s case-by-case approach to standard setting (Option 1) is a wholesale abdication of its statutory duties.
- ***The Proposed Rule will turn permitting proceedings into an endless quagmire because states are incapable of developing permit requirements in the absence of national categorical standards.*** As states repeatedly have told EPA and EPA has itself recognized, state permitting agencies lack the resources to undertake or review the multiple engineering, biological, economic and other studies that the Proposed Rule requires as a condition of permitting. States are particularly incapable of conducting cost-benefit analysis in the context of NPDES permit proceedings, but the Proposed Rule contemplates 1,200 such analyses in the coming years (one for every plant subject to the rule), even though EPA itself, with all of its resources and many years to do it, has still never come close to monetizing more than a few percent of the benefits in its national rulemakings under Section 316(b).
- ***OMB took EPA’s illegal and weak proposal and made it worse.*** The agency sent OMB a proposal designed around a case-by-case format in which state permitting authorities would begin with a rebuttable presumption that closed-cycle cooling was the best technology available. EPA also sought to avoid making cost-benefit analysis a primary consideration, using it only to eliminate extreme results under a “wholly disproportionate” test. That regulatory approach was insufficient to begin with, but OMB further weakened it, leaving a completely rudderless decision-making process that allows state agencies to consider an open-ended set of factors the director deems to be “relevant” and then choose the technologies the agency deems “warranted.” The Proposed Rule now invites those permitting directors to determine that “no additional control requirements are necessary beyond what a facility is already doing.” OMB’s changes thus render the entire rule an elaborate ruse for doing nothing at all.

## **Impingement**

- ***EPA should establish a national categorical impingement standard based on closed-cycle cooling.*** The Proposed Rule does not do this, but instead provides a choice among options that are clearly less protective.
- ***EPA should also establish an additional impingement standard based on the 0.5 ft/s velocity limit*** and allow a carefully crafted variance for facilities that legitimately cannot meet it. Because the velocity limit will not eliminate impingement, EPA should also retain the requirements to install protective devices on travelling screens, install barrier nets for shellfish in marine waters, and provide a mechanism for “entrapped” fish (for example, those caught in a forebay) to escape.
- ***Although EPA found that reducing intake velocity to 0.5 feet per second would be more protective than other impingement mortality standards it considered, EPA nevertheless gave existing facilities the choice between the velocity limit and meeting a twelve-percent-annual impingement mortality standard (i.e., meaning that no more than twelve percent of impinged fish may die in a given year).*** The twelve-percent standard, however, is not only weaker than the velocity limit but would also require extensive monitoring and latent mortality testing that will inevitably lead to vague, controversial and inconclusive results as to the percentage of impinged fish that have survived impingement.
- ***To measure performance against the twelve percent standard, plant operators would be required to hold impinged organisms for 24 to 48 hours, yet latent impingement mortality can occur 96 hours after the impingement event.*** Moreover, there are no agreed-upon protocols for handling and holding impinged fish, and it is difficult to determine whether fish have died from impingement or some other cause. Because certain species are more susceptible to impingement and less likely to survive, the twelve percent standard would disproportionately affect those species, and would cause plant operators to seek to invoke a provision of the Proposed Rule that would allow permit writers to exclude certain species from monitoring requirements and calculations.

## **Definition of “New Unit”**

- ***EPA should revert to the new units definition and standards that it proposed to OMB with minor revisions suggested below.*** The version of the proposed rule that EPA sent to OMB would have required all replacements, repowerings, and rebuilt power plants to meet standards based on closed-cycle cooling because those plants have the ability to include closed-cycle cooling systems as part of the initial design of the rebuilt, repowered or replacement plant. But OMB modified those provisions such that only “new units at existing facilities,” a very narrowly defined class of entities, now have to meet the closed-cycle cooling standards. That OMB change would allow the operators of the worst fish-killing plants in the country to demolish their plants and rebuild entirely new plants from scratch without having to install modern equipment.

## Other Critical Provisions

- ***EPA should define and protect “species of concern.”*** Previously, EPA has explained that “species of concern” are species that may be “in need of conservation actions, but are not currently listed as threatened or endangered under State or Federal law.”<sup>6</sup> Sadly, a decades-long backlog of endangered species listings means that hundreds of species whose claims to endangered or threatened status are supported by substantial scientific evidence fit into this category. EPA should define and extend additional protections to species of concern, as it did in the original Phase II rulemaking.
- ***EPA should prevent states from excluding any species from the rule’s scope.*** The provision contained in proposed 40 CFR § 125.98(c)(6), mentioned above in the context of impingement, should be revised to prevent state permit directors from excluding “other specific species,” which are neither invasive nor naturally moribund, from monitoring, sampling, and study requirements. Since BTA determinations and compliance with BTA standards will be in large part determined through monitoring, sampling and studies, this “species of [no] concern” provision would allow states to simply ignore, rather than minimize, mortality to certain species.
- ***EPA should assume that entrainment mortality is 100 percent in all cases.*** Assessing entrainment mortality on a site-specific and species-specific basis is administratively unworkable. It will lead to significant delays in the permitting of cooling water intake structures, for little, if any, gain. EPA should presuppose, in all cases, that entrainment mortality is 100 percent.
- ***EPA should specify minimum monitoring requirements.*** EPA lays out its minimum expectations with respect to monitoring practices in the preamble, but then, inexplicably, leaves the final determination to state regulators. It is inefficient for each state to reinvent monitoring requirements dozens of times – once for each facility. EPA should specify in the rule uniform minimum monitoring requirements that meet the expectations it laid out in the preamble.
- ***EPA should prohibit the use of freshwater for once-through cooling in arid regions or those at risk of drought.*** BTA must be defined to require reclaimed water use as the potential benefits of using reclaimed water for power plant cooling are immense and would result in additional environmental protection and water savings and improved reliability at both once-through and closed-cycle facilities that utilize freshwater intake. EPA’s proposed approach fails to fully recognize either the availability of reclaimed water or the public and environmental benefits of using reclaimed water for cooling and fails explicitly to require local consideration of this readily available option.
- ***EPA should not exempt cooling water withdrawals that are also used for desalination.*** The proposed exclusion of seawater used for both cooling and desalination from the definition of “cooling water” would allow the power plant to contend that the water is drinking water and

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<sup>6</sup> 69 Fed. Reg. 41,576, 41,587 (col. 1) (July 9, 2004) (National Pollutant Discharge Elimination System – Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities).

the desalination plant to contend that the water is cooling water, leaving the withdrawal completely unregulated, contrary to the intent of Section 316(b).

- ***EPA should require that if a calculation baseline is used by permit writers, it must reflect the actual operation of the facility, not a fictional “full flow” baseline.*** EPA acknowledges that one of the most “challenging” aspects of the 2004 Phase II rule was the calculation baseline; EPA claims to have developed an approach that does not use a calculation baseline. In fact, EPA has just punted the calculation baseline issue to the states. Consequently, EPA should either make clear in the rule that no calculation baseline can be used in implementing the rule or, if a calculation baseline may be used, then the rule should require that the operational component of the calculation baseline – which is the most controversial baseline issue – reflect actual plant operation, not a fictional “full-flow” baseline.
- ***EPA should remove the special site-specific BTA determination for nuclear facilities.*** It is extremely unlikely that a BTA requirement could conflict with NRC requirements because the cooling water system used to condense steam used in generating electricity (which is the subject of this rulemaking) is completely separate from and independent of the “service water” system which cools reactors, spent fuel pools and other critical plant systems in the event of an accident. Moreover, existing NRC regulations adequately address proposed changes to a nuclear facility, rendering an additional process unnecessary and potentially confusing as part of a BTA determination. At a minimum, EPA should revert to the version of the nuclear facility provision contained in the version of the proposed rule sent to OMB.
- ***EPA should require interim measures to protect aquatic ecosystems until long term compliance solutions are in place.*** We request that EPA include in the rule a requirement for interim measures that most plants can use to reduce their intake of cooling water, particularly at peak spawning times. Such measures could include installation of variable speed pumps or drives at peaking facilities or scheduling regular maintenance outages during peak spawning periods whenever feasible. Until full compliance at a site is achieved, these interim measures should be implemented as NPDES permit conditions, without allowing them to supplant permanent measures.
- ***EPA should clarify that only offshore seafood processing facilities, not onshore facilities, are exempt from the Rule.*** EPA intended to exempt seagoing vessels from the rule because of concerns about space limitations and retrofits that could compromise the seaworthiness of drilling rigs, liquefied natural gas terminals, and fishing boats. But EPA should include the word “offshore” before “seafood processing facilities” in its exemption at 40 C.F.R. § 125.91(d) to make it clear that only vessels, and not coastal fish processing plants, are exempt.
- ***EPA must consult with the National Marine Fisheries Service and the Fish and Wildlife Service.*** EPA must obtain the opinions of its sister federal agencies on the Proposed Rule’s impact upon threatened and endangered species and the advisability of reasonable and prudent alternatives, such as a nationally uniform closed-cycle cooling standard. In declining to set such a standard, EPA is authorizing existing facilities to continue to take endangered species and to adversely modify habitat that is critical to multiple endangered species.



## Cost-Benefit Analysis

- ***If EPA persists in employing a cost-benefit analysis for the national rulemaking (which is neither required, nor useful) that analysis must be significantly improved by valuing more of the benefits in the manner suggested by economists Frank Ackerman and Elizabeth Stanton in their attached Stockholm Environmental Institute (SEI) comments.*** Not only does EPA’s approach to cost-benefit analysis exceed the restrictions imposed by Congress (as noted above), EPA also vastly underestimated the benefits and overestimated the costs of the rulemaking options. EPA used old data which do not reflect current conditions and fish kill levels and then monetized only a very small fraction of the benefits. EPA also used a misleading and distorted industry model, rather than its own model, and thereby overstated the costs by approximately a factor of two. A more accurate cost-benefit analysis, (although still limited by existing economic tools) shows that the benefits of Option 3 clearly exceed the costs.
- ***The substantial shortcomings in EPA’s cost-benefit analysis demonstrate conclusively why state permitting agencies should be forbidden from considering costs in relation to benefits in the site-specific context.*** No cost-benefit analysis is to be conducted under EPA’s Phase I rule for new facilities, the new oil rig regulations in the Phase III rule, or the “new units” requirements of this rule. None should be conducted by states under this rule either.
- ***However, to the extent that states are authorized to conduct site-specific cost-benefit analyses for existing facilities, EPA should set very specific requirements for states to follow,*** as suggested by Ackerman and Stanton in the attached SEI comments, so that such analyses do not undermine the purpose of the rule and of Section 316(b) – to minimize the adverse environmental impacts of cooling water intake structures using the best technology available.

## Revision to the Phase I Rule

- ***EPA should make clear in the regulatory text of the Phase I rule that a facility choosing Track II must aim for 100 percent of the entrainment and impingement reductions of Track I, and if it falls short within 10 percent, that will be acceptable, but may not aim for 90 percent and achieve only an 89 percent reduction.*** EPA is proposing to delete the references to “restoration measures” in the Phase I rule because the Second Circuit held in *Riverkeeper I* (and again in *Riverkeeper II*) that the statute does not authorize use of such measures to comply with Section 316(b). At the same time, EPA should make an additional revision to the Phase I rule in order to implement the finding of the Second Circuit in *Riverkeeper I* that under Track II, it would be inappropriate for EPA to use 90 percent as a benchmark and allow an additional margin of error in measuring compliance with that benchmark.

**DETAILED TABLE OF CONTENTS**

I. BACKGROUND ..... 1

    A. Factual Background: Once-Through Cooling Causes Adverse Environmental Impacts of Staggering Proportions..... 1

        1. Massive Water Withdrawals ..... 2

        2. Impingement and Entrainment..... 3

        3. Taking of Endangered and Threatened Species ..... 7

        4. Fish Population Declines ..... 8

        5. Depressed Commercial and Recreational Fishing Yields..... 9

        6. Aquatic Community and Ecosystem Impacts ..... 9

        7. Reduced Ecological Resilience ..... 10

        8. Thermal Discharges ..... 11

        9. Chemical Discharges ..... 13

        10. Cumulative Impacts ..... 14

        11. Habitat Loss ..... 15

        12. Altered Flow Patterns in Source and Receiving Waters ..... 15

        13. Water Availability and Related Energy Impacts ..... 16

            a. Impacts on Upstream Beneficial Uses of Water ..... 16

            b. Threats to Power Generation and Grid Reliability ..... 18

            c. Water Supply Sustainability Risks in a Changing Climate ..... 21

        14. Industrial Use of Valuable, Scenic Waterfront Land..... 22

    B. Statutory Background: Congress Enacted Section 316(b) as Part of the 1972 Clean Water Act Amendments to Standardize Permitting and Minimize Once-Through Cooling’s Massive Water Withdrawals and Fish Kills. .... 22

1.	In 1972 Congress Was Well Aware of the Enormous Damage Caused by Once-Through Cooling. ....	23
2.	The 1972 CWA Amendments Fundamentally Restructured U.S. Water Pollution Regulation by Replacing Ineffectual Site-Specific Assessments of Water Quality with National Technology-Based Standards.....	24
3.	As Part of the CWA’s Technology-Based Regime, Section 316(b) Requires EPA to Adopt Uniform, National, Categorical, Technology-Based and Technology-Forcing BTA Standards for Cooling Water Intake Structures. ....	30
a.	Section 316(b) Requires EPA to Establish National Standards.....	30
b.	The National Standards Section 316(b) Requires Are a Form of Limitation Required by Sections 301 and 306.....	30
c.	The National Standards Section 316(b) Requires Must Be Uniform and Categorical. ....	32
C.	Regulatory Background: For Forty Years, Regulation on a Case-by-Case Site-Specific Basis Has Caused Bureaucratic Paralysis, Litigation Quagmires, and the Perpetuation of the Unacceptable Status Quo, Contrary to Congress’s Intent. ....	33
II.	SUMMARY OF THE PROPOSED RULE .....	42
A.	The Proposed Rule .....	42
1.	Entrainment Provisions for Existing Facilities (Existing Units).....	42
2.	Entrainment Standards for “New Units at Existing Facilities.”.....	45
3.	Impingement Standards for Existing Facilities (Existing Units) and “New Units at Existing Facilities.” .....	45
4.	Other Provisions.....	47
a.	Exclusion of Species/”Species of Concern” .....	47
b.	Monitoring Provisions .....	48
c.	Nuclear Safety.....	48
d.	Exempted Offshore Facilities .....	48
5.	Revisions to Phase I Rule .....	48

B.	EPA’s Option Selection .....	49
1.	In Considering Technological Options, EPA Set a “Universal Availability” Requirement for BTA Candidate Technologies, then Rejected Closed-Cycle Systems and Velocity Limits Because EPA Found that They Are Not Univerally Capable of Being Implemented. ....	49
2.	The Four Regulatory Options EPA Considered.....	51
C.	The Regulatory Impact Analysis .....	52
D.	The Rulemaking Process: Changes Made at the Direction of OMB. ....	53
1.	Changes Relating to EPA’s National Cost-Benefit Analysis .....	54
2.	Changes Relating to the Case-by-Case BTA Determination of Entrainment Standards.....	55
a.	EPA Sought to Require All Facilities to Use the “Best Performing Technology” So Long As its Costs Were Not Wholly Disproportionate to its Benefits. ....	55
b.	OMB Directed EPA to Abandon its “Wholly Disproportionate” Test and Let States Reject Any Technology After an Open-Ended, Multi-Factor Evaluation if its Costs “Are Not Justified” by its Benefits. ....	56
c.	EPA Determined that Closed-Cycle Cooling is the “Best Performing Technology,” but OMB Deleted this Conclusion.....	57
d.	OMB Also Deleted EPA’s Statement that Most Facilities Should Install Closed-Cycle Systems. ....	57
e.	Although OMB Put Cost-Benefit Analysis at the Heart of the Decision Making Process, it Deleted EPA’s Guidance on How to Perform Cost-Benefit Analysis. ....	58
3.	Changes Relating to Definition of New Units .....	58
a.	OMB Determined that Replacements/Repowerings Are Not New Units and Deleted EPA’s Contrary Statements and Rationale. ....	58
4.	Changes Relating to Regulatory Options.....	60

a.	OMB Revised the Discussion of Options 2 and 3, and Added a New Option 4.....	60
5.	Changes to Other Provisions of the Rule.....	61
a.	OMB Asked for Comment on the Possibility of Weaker Compliance Timelines. ....	61
b.	OMB Removed Firm Monitoring Requirements and Replaced Them with Suggestions.....	61
c.	OMB Removed Extra Protection for Species of Concern. ....	62
d.	OMB Altered the Nuclear Safety Exception. ....	62
e.	OMB Created a New Exception for New Units at Existing Facilities with Costs “Wholly out of Proportion” to the Costs Considered by EPA.....	62
f.	OMB Would Allow Facilities to Prove that, at Their Site, Entrainment Mortality Is Less Than 100 Percent. ....	63
III.	THE PROPOSED RULE FALLS WELL SHORT OF THE CLEAN WATER ACT’S STATUTORY MANDATE, IS ARBITRARY, CAPRICIOUS, AN ABUSE OF DISCRETION, AND OTHERWISE NOT IN ACCORDANCE WITH LAW, IS SIGNIFICANTLY WEAKER THAN EPA’S PRIOR 316(b) RULES, AND WILL NOT PROTECT AQUATIC RESOURCES UNLESS IT IS SIGNIFICANTLY STRENGTHENED.....	64
A.	EPA’s Interpretation of Section 316(b) and its “Approach to BTA” Contradicts the Plain Meaning of the Act and Congress’s Clearly Expressed Intent. ....	64
1.	When Making BTA Determinations Under Section 316(b) and Setting Parameters for Permit Writers to Do So, EPA Does Not Have Authority to Eschew Congress’s Fundamental Intent for the CWA’s Technology-Based Regulatory Program.....	64
2.	EPA’s Interpretation of the Statutory Term “Available” Is Unlawful.....	66
3.	EPA’s Understanding of its Cost-Benefit Authority is Incorrect. ....	67
B.	EPA Should and Must Establish a National Categorical Entrainment Standard Based on Closed-Cycle Cooling.....	68
1.	Option 1’s Entrainment Provisions Represent a Complete Abdication of EPA’s Responsibility to Minimize Adverse Environmental Impact. ....	68

a.	EPA’s Failure to Set Uniform National Standards for Entrainment Violates the Plain Language of Section 316(b) and Congress’s Clearly-Expressed Intent.....	69
b.	EPA Is Unlawfully Requiring State Permit Writers to Set Entrainment Controls Based In Large Part on Water Quality Considerations Rather than Technological Considerations. ....	70
c.	EPA’s Decision to Require State Permit Writers to Set Entrainment Controls on a Case-by-Case Basis Is Arbitrary and Capricious and Will Perpetuate Bureaucratic Paralysis.....	71
(1)	States Cannot Complete Case-By-Case BTA Determinations.....	71
(2)	States Cannot Conduct, or Meaningfully Review, Site-Specific Cost-Benefit Analyses. ....	77
d.	The Open-Ended Case-By-Case Format EPA Proposed (Based on Substantial Last-Minute Changes by OMB) Is Very Poorly Designed. ....	82
2.	EPA Should Select Option 3’s Entrainment Standard for the Final Rule.....	84
a.	Establishing National Categorical Standards Based on Closed-Cycle Cooling for Virtually All Existing Facilities, as the Agency Did a Decade Ago for New Facilities, Would Minimize Adverse Environmental Impacts. ....	84
b.	The Rulemaking Record Demonstrates that Closed-Cycle Cooling is Available to the Existing Facilities Because Retrofits are Feasible and Inexpensive. ....	85
(1)	There Is Adequate Space for Closed-Cycle Cooling at Virtually Any Plant Site.....	85
(2)	Remaining Useful Life is Not Quantifiable, Certain, Binding or Relevant Unless a Plant Owner Has Committed to a Closure Date.....	86
c.	The Rulemaking Record Demonstrates that Requiring Antiquated Plants to Install the Same Cooling Technology as their Modern Counterparts Would Not Cause Any Significant Adverse Impacts on Energy Supplies, the Economy or the Environment. ....	87

(1)	Requiring Closed-Cycle Cooling Would Not Cause Electricity Shortages. ....	87
(2)	Requiring Closed-Cycle Cooling Would Not Increase Electricity Prices. ....	88
(3)	Requiring Closed-Cycle Cooling Would Create Jobs and Improve the Economy. ....	89
(4)	Requiring Closed-Cycle Cooling Would Not Cause Air Pollution or Any Other Significant Adverse Environmental Impacts. ....	89
(5)	Requiring Closed-Cycle Cooling Would Cause Some Facilities to Repower their Plants, Yielding Additional Environmental and Economic Benefits. ....	91
3.	Option 2’s Entrainment Standard Is Far Superior to Option 1 and Option 4 in All Respects. ....	93
4.	EPA Should Shorten the Entrainment Compliance Timelines. ....	93
5.	Any Variance EPA Includes as Part of a Categorical Entrainment Standard Must Clearly Delineate What Issues May Be Considered by the Director and How They Are to Be Considered. ....	94
C.	Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects. ....	96
1.	EPA Should Establish a National Categorical Impingement Standard Based on Closed-Cycle Cooling. ....	96
2.	EPA’s Rejection of the 0.5 Ft/S Velocity Limitation as the Primary National Standard Is Illegal. ....	97
a.	EPA Has Found in Each Previous Section 316(b) Rulemaking, and Again for this Rule, that a 0.5 Ft/S Velocity Limitation Would Protect Approximately 96 Percent of Fish from Impingement and that Many Existing Facilities Already Meet that Standard. ....	97
b.	EPA Lacks a Legitimate Legal or Evidentiary Basis for Rejecting the 0.5 Ft/S Velocity Limit. ....	99
3.	The 12 Percent/31 Percent Impingement Mortality Reduction Requirement Is Problematic In Numerous Respects. ....	99

a.	Impingement Mortality Monitoring Is Inherently Difficult, Controversial, and Uncertain. ....	100
b.	The 12 Percent/31 Percent Standard is Further Weakened by the Provision Allowing the Director to Exclude Certain Species from the Standard. ....	101
4.	EPA Should Select the 0.5 Ft/S Velocity Limit as the Impingement Standard for the Final Rule. ....	102
D.	All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as New Units at Existing Facilities. ....	104
1.	Although the Closed-Cycle Cooling Standard for New Units at Existing Facilities Should Be Retained, the Definitions of New Unit and Existing Facility Are Problematic. ....	104
2.	All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as “New Units at Existing Facilities.” ....	107
E.	Other Critical Provisions Should Be Revised. ....	108
1.	EPA Should Clarify the Meaning of the Term “Species of Concern,” and Restore Additional Protections for These Species. ....	108
2.	EPA Should Prevent Directors from Excluding Any Species from the Rule’s Scope. ....	109
3.	EPA and States Should Maintain an Assumption of 100 Percent Entrainment Mortality in All Site-Specific Proceedings. ....	109
4.	EPA Should Specify Minimum Monitoring Requirements. ....	110
5.	EPA Must Prohibit the Use of Freshwater for Once-Through Cooling in Arid Regions or Those at Risk of Drought. ....	110
a.	Use of Reclaimed Water is a Proven Technology for Power Plant Cooling. ....	111
b.	Reclaimed Water is Widely Available for Cooling at Existing Once-Through Facilities. ....	112
c.	EPA’s Stated Concerns About Reclaimed Water Availability Are Unsupported and Unwarranted. ....	113



d.	The Use of Reclaimed Water for Closed-Cycle Cooling Addresses Any Consumption Issues. ....	115
e.	At a Minimum, EPA should Emulate California’s Policy on the Use of Reclaimed Water for Cooling and Establish a Preference for Reclaimed Water.....	116
6.	EPA Should Not Exempt Cooling Water Withdrawals from the Rule Merely Because the Water Is Also Used for Desalination. ....	117
7.	EPA Should Require an Actual-Flow Calculation Baseline.....	118
8.	EPA Should Remove the Special Provision for Nuclear Facilities .....	120
9.	EPA Should Require Interim Measures to Reduce Cooling Water Flow Until Long Term Compliance Solutions Are in Place.....	121
10.	EPA Should Clarify that Only Offshore Seafood Processing Facilities, not Onshore Facilities, Are Exempt from the Rule.....	122
F.	EPA’s Cost-Benefit Analysis is Deeply Flawed and Illegal.....	122
1.	EPA’s Extensive Monetized Cost-Benefit Analysis Far Exceeds the Restrictions Imposed by Congress.....	122
2.	EPA Vastly Underestimated the Benefits of the Rulemaking Options Such that Any Reliance on the Cost-Benefit Analysis Would Be Arbitrary and Capricious. ....	123
a.	EPA Has Drastically Underestimated the Number of Fish Killed by Cooling Water Intake Structures.....	124
b.	EPA Cannot Accurately Monetize the Benefits of Saving Non-Market Fish, Other Aquatic Organisms, and Ecosystems. ....	125
3.	EPA Overestimated the Costs of Closed-Cycle Cooling.....	126
a.	EPA Has Significantly Over-Estimated the Costs of Retrofitting Existing Power Plants to Closed-Cycle Cooling. ....	127
b.	EPA Overestimated the Downtime (and Attendant Costs) Required for Closed-Cycle Cooling Retrofits at Nuclear Plants.....	129
4.	If EPA Relies on, or Authorizes Use of, a Cost-Benefit Analysis, that Analysis Must Be Significantly Improved.....	130

a.	EPA’s Approach to Cost-Benefit Analysis Should Be Reformed. ....	131
b.	EPA’s National Benefits Assessment Requires Certain Adjustments. ....	132
c.	EPA’s National Costs Assessment Requires Certain Adjustments. ....	132
d.	Any Site-Specific Benefits Assessment Should Adhere to Precise Regulatory Requirements Established by EPA.....	133
G.	EPA Cannot Issue a Final Rule Without First Consulting NMFS and FWS and Fully Complying with its Duties under Other Applicable Federal Environmental Laws.....	135
IV.	ADDITIONAL REVISIONS TO THE PHASE I RULE ARE WARRANTED IN LIGHT OF THE <i>RIVERKEEPER I</i> DECISION.....	137
V.	RESPONSES TO EPA’S SPECIFIC REQUESTS FOR COMMENT .....	139
A.	Responses to Numbered Requests. ....	139
B.	Responses to Additional Requests.....	156
	LIST OF APPENDICES.....	163
	LIST OF EXHIBITS.....	164

## I.

### BACKGROUND

#### A. Factual Background: Once-Through Cooling Causes Adverse Environmental Impacts of Staggering Proportions.

Power plants and other industrial facilities use cooling water intake structures to withdraw massive volumes of water from natural waterbodies for cooling. The overwhelming majority of that water is drawn by plants using “once-through” cooling systems, which, as their name suggests, do not recirculate cooling water after its use. Instead, they pump cold water through a condenser just once, return the now-heated water to the water body from which it was withdrawn, and continually draw more cold water for further cooling.

The profligate withdrawal of such large volumes of water causes – as EPA first explained a decade ago – “multiple types of undesirable and unacceptable adverse environmental impacts,” including but not limited to entrainment and impingement; reductions of threatened, endangered or other protected species; damage to critical aquatic organisms, including important elements of the food chain; diminishment of a population’s compensatory reserve; losses to populations including reductions of indigenous species populations, commercial fisheries stocks, and recreational fisheries; and stresses to overall communities and ecosystems as evidenced by reductions in diversity or other changes in system structure and function.<sup>7</sup>

In the *Riverkeeper I* case, the Second Circuit observed that “[t]he environmental impact of [cooling water intake] systems is staggering: A single power plant might impinge a million adult fish in just a three-week period, or entrain some 3 to 4 billion smaller fish and shellfish in a year, destabilizing wildlife populations in the surrounding ecosystem.”<sup>8</sup>

Not only have EPA and the courts previously recognized and documented the staggering adverse environmental impacts of once-through cooling systems, but other federal and state agencies, and biologists and other professionals in the private sector have as well. In the preambles to the Phase I, Phase II and Phase III rules, EPA included lengthy discussions of these impacts under the heading “Environmental Impact(s) Associated with Cooling Water Intake Structures.”<sup>9</sup> Astonishingly, in this rulemaking, the agency did not even bother to include (or,

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<sup>7</sup> 66 Fed. Reg. 65,256, 65,292 (Dec. 18, 2001) (Final Rule - National Pollution Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities); *see also* 69 Fed. Reg. at 41,586.

<sup>8</sup> *Riverkeeper v. EPA*, 358 F.3d 174, 181 (2d Cir. 2004) (hereinafter “*Riverkeeper I*”).

<sup>9</sup> 65 Fed. Reg. 49,060, 49,071-75 (col. 3) (Aug. 10, 2000) (National Pollution Discharge Elimination System—Regulations Addressing Cooling Water Intake Structures for New Facilities); 66 Fed. Reg. at 65,262 (col. 3); 67 Fed. Reg. 17,122, 17,136-40 (col. 1) (Apr. 9, 2002) (National Pollution Discharge Elimination System—Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities); 69 Fed. Reg. at 41,586-90 (col. 1); 69 Fed. Reg. 68,444, 68,461-66 (col. 2) (Nov. 24, 2004) (National Pollution Discharge Elimination System—Proposed Regulations To Establish Requirements for Cooling Water Intake Structures at Phase III Facilities); 71 Fed. Reg. 35,006, 35,012-14 (col. 3) (June 16, 2006) (National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Phase III Facilities). The rulemaking record for this rule includes “the data and information contained in the records supporting the Phase I, Phase II, and Phase III rulemakings.” 76 Fed. Reg. at 22,184 (col. 1).

perhaps, studiously avoided including) a similar discussion of adverse impacts in the preamble. Instead, this important discussion is buried in a supporting document (the EEBA), which the vast majority of even the interested public will not read. That failure is emblematic of EPA's current dereliction of its responsibility to protect the aquatic environment. While EPA's discussion of adverse environmental impacts has faded into the support documents, the impacts themselves continue unabated, and are discussed in these comments immediately below.

## 1. Massive Water Withdrawals

Virtually all of the adverse environmental impacts of cooling water intake structures are caused by the massive withdrawal of water into the plants through those structures. With an actual daily intake volume in excess of 200 billion gallons per day, or 75 trillion gallons per year, industrial cooling water systems are, by far, the largest source of water withdrawals in the United States.<sup>10</sup> Steam-electric power plants use the vast majority of this massive volume, accounting for 93 percent of the total saltwater use, 41 percent of total freshwater use, and 49 percent of all water use nationwide.<sup>11</sup> Power plants use more water than any other industry sector in the country, withdrawing more than all irrigation and public water supplies combined.<sup>12</sup> Manufacturing facilities (primarily in the pulp and paper, chemicals, primary metals, and petroleum refining sectors) also use appreciable volumes of water, but far less than power plants.

EPA estimated that 633 presently operating power plants have a design intake flow (DIF) greater than 2 million gallons per day (MGD).<sup>13</sup> Collectively, these power plants have the capacity to withdraw more than 370 billion gallons per day (BGD) – more than 135 trillion gallons per year – from our nation's waters for cooling.<sup>14</sup> A typical power plant using once-through cooling withdraws hundreds of millions to several billion gallons of water per day. EPA estimated that 112 power plants have DIFs greater than one BGD and another 145 have DIFs between 500 MGD and 1 BGD.<sup>15</sup> Approximately 21 percent of the plants withdraw from an ocean, estuary or tidal river; seven percent from the Great Lakes; and approximately 72 percent

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<sup>10</sup> EPA, Environmental and Economic Benefits Analysis of the Proposed Section 316(b) Existing Facilities Regulation (March 28, 2011) ("2011 EEBA"), at 1-3, Table 1-1 (note unweighted, increase by less than 10%); *see also* J.F. Kenny et al., *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Report, Circular 1344 (2009), at 38, (Exh. 2), *also available at* <http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf> (last visited July 2011).

<sup>11</sup> J.F. Kenny et al., *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Report, Circular 1344 (2009), at 38, (Exh. 2), *also available at* <http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf> (last visited July 2011).

<sup>12</sup> *Id.*

<sup>13</sup> EPA estimated from its 1999 and 2000 questionnaires that there were 671 power plants above the 2 MGD threshold and that 38 have ceased operation, leaving 638 facilities still operating. *See* EPA, Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (2011), (hereinafter "2011 TDD"), at 4-4, Exh. 4-1, Cooling Water Use in Surveyed Industries (estimating that 671 electric generating facilities withdraw more than 2 MGD); *see also* 76 Fed. Reg. at 22,190 ("According to the 2007 EIA database, 38 of the 671 facilities have ceased operation since the Survey"). It should also be noted that the reference to "Phase II" in the title of the 2011 TDD appears to be a vestige that should have been deleted, given that the existing (power plant and manufacturers) rule is no longer referred to as Phase II.

<sup>14</sup> 2011 TDD, at 4-4, Exh. 4-1.

<sup>15</sup> 2011 TDD, Exh. 4-3. Note that these numbers were based on EPA's 1999/2000 questionnaires; EPA more recently estimated that 38 of the 671 power plants have closed. *See* footnote 13, *supra*.

from a freshwater (non-Great) lake, river, stream or reservoir.<sup>16</sup> Although EPA's presentation of the data is very unclear it appears that approximately 75 percent of the cooling systems are once-through and about 25 percent are closed-cycle.<sup>17</sup> Adding manufacturing facilities, which have a collective capacity of 39 BGD, yields a grand total of 409 BGD or nearly 150 trillion gallons per year of cumulative design intake capacity by the approximately 1,200 industry facilities subject to the rule.<sup>18</sup>

## 2. Impingement and Entrainment

Because cooling water intake structures remove such extraordinarily large amounts of water from natural waterbodies, their withdrawals necessarily affect the full spectrum of organisms at all life stages in the aquatic ecosystem, killing billions of fish, destroying habitats and destabilizing aquatic populations.<sup>19</sup> The principal environmental damage is the mortality of aquatic organisms through entrainment and impingement.

Entrainment occurs when fish and shellfish, eggs, larvae, and other organisms too small to be screened out are drawn through a cooling water intake structure into a plant's cooling system. As small, fragile entrained organisms pass through the cooling system, they are subject to mechanical, thermal, and toxic stress: including physical impacts in the pumps and condenser tubing; pressure changes caused by diversion of the cooling water into the plant or by the hydraulic effects of the condensers; sheer stress; thermal shock in the condenser and discharge tunnel; and, chemical toxemia induced by antifouling agents such as chlorine. Few, if any, entrained organisms survive.<sup>20</sup>

Impingement occurs when larger fish and other aquatic organisms become trapped on screening devices or other barriers installed at the entrance of the intake structure. Impingement is caused by the force of water passing through the intake structure and can result in starvation and exhaustion (when organisms are trapped against an intake screen), asphyxiation (when organisms are forced against a intake barrier by velocity forces that prevent proper gill movement or when organisms are removed from the water for prolonged periods of time), descaling (when organisms are removed from an intake screen by a wash system), and other physical harms.<sup>21</sup> A substantial number of the aquatic organisms entrained and impinged are killed or subjected to significant harm.<sup>22</sup>

Cooling water withdrawals kill the full spectrum of organisms in the aquatic food chain: phytoplankton (tiny, free-floating photosynthetic organisms); zooplankton (small aquatic

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<sup>16</sup> 2011 TDD, Exh. 4-6.

<sup>17</sup> 2011 TDD, Exh. 4-8.

<sup>18</sup> 2011 TDD, Exh. 4-1.

<sup>19</sup> See *Riverkeeper v. EPA*, 358 F.3d 174, 181 (2d Cir. 2004) ("*Riverkeeper I*"); *Cronin v. Browner*, 90 F.Supp.2d 364, 366 (S.D.N.Y. 2000) ("[C]ooling water systems 'may interfere with the maintenance or establishment of optimum yields of sport or commercial fish and shellfish, decrease populations of endangered organisms, and seriously disrupt sensitive ecosystems.'").

<sup>20</sup> 66 Fed. Reg. at 65,263 (col. 1); see also 65 Fed. Reg. at 49,072.

<sup>21</sup> 66 Fed. Reg. at 65,263 (col. 1).

<sup>22</sup> *Id.* (col. 2-3).

organisms that consume phytoplankton); fish, shellfish, crustaceans, reptiles (such as sea turtles) and marine mammals (such as seals and sea lions) at all life stages, including eggs, larvae, juvenile, and adult; and many other forms of aquatic life, including threatened, endangered and other protected species.<sup>23</sup>

The death toll of wildlife from power plant intakes is staggeringly high. As EPA acknowledges, it is impossible to quantify with any precision the extent of the adverse environmental impacts caused by the withdrawal of more than 75 trillion gallons of water per year (actual flow) by power plant cooling water intake structures.<sup>24</sup> Nonetheless, by EPA's own highly conservative estimates, and looking only to fish and shellfish mortality, industrial cooling water withdrawals annually result in the death of at least 2.2 billion age one-equivalent<sup>25</sup> fish, crabs, and shrimp, and a minimum of 528 billion eggs and larvae that serve as the basis of the aquatic food chain.<sup>26</sup> The actual mortality figures are likely much higher. As Drs. Peter Henderson and Richard Seaby of PISCES Conservation, Ltd. point out in their attached report, there are many issues with the quality of the data EPA used to make these estimates. For example, many of the data sets used in the calculations are old and many of the studies do not report all species caught, which causes some species to be underrepresented in the national calculations. Thus, EPA's estimate of the fish killed by power plants is likely an underestimate – potentially a significant underestimate – of the actual mortality numbers.<sup>27</sup> A table in the 2011 EEBA states that 1,055,936,410,000 (that is, more than a *trillion*) organisms are killed by in-scope facilities every year, which is double the estimate of 528 billion individuals given in the preamble.<sup>28</sup> Although, according to EPA, that discrepancy resulted from a programming error in the algorithm used to compile Appendix C of the EEBA,<sup>29</sup> the

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<sup>23</sup> 66 Fed. Reg. at 65,262-263; 69 Fed. Reg. at 41,586; 66 Fed. Reg. at 65,262-263; California Environmental Protection Agency, State Water Resources Control Board, *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Final Substitute Environmental Document* (May 4, 2010), hereinafter (“Calif. OTC Policy SED”) (Exh. 3), also available at [http://www.waterboards.ca.gov/board\\_info/minutes/2010/may/050410\\_5\\_staffpresentation.pdf](http://www.waterboards.ca.gov/board_info/minutes/2010/may/050410_5_staffpresentation.pdf) (last visited May 16, 2011).

<sup>24</sup> 67 Fed. Reg. at 17,139 (col. 3) (“Studies like those described ... may provide only a partial picture of the severity of environmental impact associated with cooling water intake structures. ...[T]he methods for evaluating adverse environmental impact used in the 1970s and 1980s, when most section 316(b) evaluations were performed, were often inconsistent and incomplete...”).

<sup>25</sup> According to EPA, “[t]he Equivalent Adult Model (EAM) is a method for converting organisms of different ages (life stages) into an equivalent number of individuals in any single age. For its 316(b) analyses, EPA standardized all I&E mortality losses into equivalent numbers of 1-year-old fish, a value termed age-1 equivalents (A1Es).” 2001 EEBA at 3-2 (internal citation omitted). This adult or age-1 “equivalent” method, however, is ecologically bankrupt, misleading, and illegal, and therefore should not be used, as a measure of the impacts caused by cooling water intake structures or the benefits of installing protective technologies because large number of eggs and larvae are not “equivalent” to smaller numbers of adult fish. In addition to becoming juveniles and then adults in later life stages, eggs and larvae also play a highly significant role in the aquatic ecosystem, which the EAM and A1E metrics ignore.

<sup>26</sup> 76 Fed. Reg. at 22,239 (col. 1).

<sup>27</sup> See *Biological comments on the US EPA's 2011 proposed rule for cooling water intake structures at existing facilities*, Henderson, P.A. and Seaby, R. M. H., PISCES Conservation, Ltd., hereinafter (“PISCES Report”) (attached as Appendix B).

<sup>28</sup> 2011 EEBA, Table C-16, p. C-27.

<sup>29</sup> Communication between Tom Born and Reed Super, June 14, 2011.

actual fish and shellfish losses at all life stages may well be closer to that one trillion figure. In many cases, the toll on fisheries by power plants rivals or exceeds that of the fishing industry.

As just several examples of the devastating aquatic mortality at hundreds of power plants across the country:

- The Salem Nuclear Generating Station in New Jersey withdraws over 3 billion gallons per day from Delaware Bay and kills an estimated 375,000 white perch, 281,746 herrings (alewife & blueback), 305,000 spot, 61,100 Atlantic croaker, 3,239 striped bass, 842,000,000 bay anchovy and 1,120,000 weakfish annually – four times as many bay anchovy and weakfish each year than are commercially caught in the Delaware Estuary.<sup>30</sup>
- The Northport power plant on the north shore of Long Island, New York, withdraws up to 939 million gallons per day from Long Island Sound and entrains an estimated 8,430,808,238 fish eggs and larvae of all species each year.<sup>31</sup>
- The Brunswick nuclear plant on the Cape Fear estuarine system in North Carolina, has entrained as much as 3-4 billion individual fish and shellfish at early life stages annually. Studies there have predicted an associated 15-35 percent reduction in populations, which may be altered beyond recovery;<sup>32</sup>
- On Florida’s Gulf Coast, the Crystal River power plant seriously reduces forage species and recreational and commercial landings (e.g., 23 tons per year);<sup>33</sup>
- On Lake Michigan, the D.C. Cook nuclear plant killed one million fish during a three-week study period.<sup>34</sup>
- Huge numbers of fish are also entrained at the Indian Point power plant, situated in a narrow section of the Hudson River estuary just south of Peekskill. As reported by

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<sup>30</sup> Versar, *Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station* at § VI-4 (Revised Final Report) (1989) (Exh. 4) (reported on an “equivalent adult” basis). 30 million pounds of bay anchovy and weakfish are lost each year due to entrainment and impingement at Salem compared to 6.8 million pounds of yearly commercial landings between 1975-1980.

<sup>31</sup> New York State Department of Environmental Conservation, *Best Technology Available (BTA) for Cooling Water Intake Structures*, DEC Policy Issuing Authority, Draft, March 4, 2010, Appendix A: BTA Policy Technical Document, Table 1: Estimated Entrainment and Impingement at Major New York Facilities Using Once-Through Cooling Water, p. 2 of 20 (hereinafter “DEC Draft BTA Policy”) (Exh. 5); *see also* Network for New Energy Choices, *Reeling in New York’s Power Plants: The Case for Fish-Friendlier Power* (June 2010) (Exh. 6)

<sup>32</sup> 67 Fed. Reg. at 17,138.

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

the New York State Department of Environmental Conservation, 1.2 to 1.3 billion fish eggs and larvae are entrained at Indian Point each year.<sup>35</sup>

- Cumulatively, the five power plants on the Hudson River (Indian Point, Bowline, Roseton, Lovett<sup>36</sup> and Danskammer) have caused year-class reductions estimated to be as much as 79 percent, depending on fish species.<sup>37</sup> The generators' 2000 analysis of three of these plants completed in predicted year-class reductions of up to 20 percent for striped bass, 25 percent for bay anchovy, and 43 percent for Atlantic tomcod, even without assuming 100 percent entrainment mortality.<sup>38</sup> New York State has concluded that these losses could seriously deplete any reserve or compensatory capacity needed to survive unfavorable environmental conditions.<sup>39</sup> Indeed, data shows that in the Hudson River, 10 of 13 key species are in decline.<sup>40</sup>
- The Brayton Point facility in Somerset, Massachusetts withdraws 1.3 billion gallons per day from Mt. Hope Bay and has apparently caused an 87 percent reduction in finfish abundance since a 50 percent increase in its cooling water withdrawal in 1985.<sup>41</sup>
- At the San Onofre Nuclear Generating Station on the Southern California coast, in a normal (non-El Niño) year, 121 tons of midwater fish are entrained, causing a 34-70 percent decline in Pacific Ocean fish populations within 3 kilometers.<sup>42</sup>
- A 2005-6 study commissioned by the owner of the Bayshore power plant on Lake

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<sup>35</sup> New York State Notice of Intention to Participate and Petition to Intervene, *In re: License Renewal Application Submitted by Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.*, U.S. Nuclear Regulatory Commission Docket Nos. 50-247-LR and 50-286-LR, ASLBP No. 07-858-03-LR-BD01, DPR-26, DPR-64 (Nov. 30, 2007), p. 286 (Exh. 7), *also available at* [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/noiindianpoint.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noiindianpoint.pdf) (last visited June 2011).

<sup>36</sup> The Lovett plant has since closed.

<sup>37</sup> 67 Fed. Reg. at 17,138, citing John Boreman and Phillip Goodyear, *Estimates of Entrainment Mortality for Striped Bass and Other Fish Species Inhabiting the Hudson River Estuary*, American Fisheries Society Monograph 4:152-160, 1988 (Exh. 8).

<sup>38</sup> *Id.*, citing Consolidated Edison Company of New York, Draft environmental impact statement for the state pollutant discharge elimination system permits for Bowline Point, Indian Point 2 & 3, and Roseton steam electric generating stations (2000).

<sup>39</sup> 67 Fed. Reg. at 17,138, citing New York Department of Environmental Conservation, Internal memorandum provided to the USEPA on NYDEC's position on SPDES permit renewals for Roseton, Bowline Point 1 & 2, and Indian Point 2 & 3 generating stations (2000).

<sup>40</sup> A report commissioned by Riverkeeper and released on May 15, 2008, *The Status of Fish Populations and the Ecology of the Hudson*, produced by Pisces Conservation Ltd., reveals that many Hudson River fish are in serious long-term decline. Of the thirteen key species studied, ten have declined in abundance since the 1980s (shad, tomcod, bay anchovy, alewife, blueback herring, rainbow smelt, hogchoker, white catfish, weakfish and white perch) (Exh. 9) *also available at* [http://www.riverkeeper.org/document.php/758/THE\\_STATUS\\_OF\\_F.pdf](http://www.riverkeeper.org/document.php/758/THE_STATUS_OF_F.pdf).

<sup>41</sup> 67 Fed. Reg. at 17,138, citing Gibson, Mark R., R.I. Div. Fish and Wildlife, *Comparison of Trends in the Finfish Assemblage of Mt. Hope Bay and Narragansett Bay in Relation to Operations at the New England Power Brayton Point Station* (1996) (Exh. 10). Brayton is retrofitting cooling towers to address this damage.

<sup>42</sup> 67 Fed. Reg. at 17,139 (col. 1), citing S. Swarbrick and R.F. Ambrose (1988).



Erie in Ohio estimated that more than 60 million adult fish and more than 2.5 billion fish eggs and larvae were killed in a given year.<sup>43</sup> A later study of the Bayshore plant by the University of Toledo put the number of fish eggs and larvae killed at more than 12 billion per year.<sup>44</sup>

- New York's Huntley Generating station, located along the Niagara River, which connects Lake Ontario to Lake Erie near the world-famous Niagara Falls, is estimated to entrain over 105 million fish eggs and larvae per year, with annual impingement of well over 96 million adult and juvenile fish – the largest impingement toll of any power plant in the state.<sup>45</sup>
- On the shores of Lake Michigan in Wisconsin, the Oak Creek power plant was estimated by its operator to impinge well over 2 million fish weighing 57-plus tons in a single year on its intake screens. In addition, between April and October of 2002, it entrained over 6 million larvae and over 9 million fish eggs.<sup>46</sup>

### 3. Taking of Endangered and Threatened Species

Since power plant cooling water intake structures generally suck in a cross-section of all species present in the waterbody, any plant located near the habitat or range of a rare or special status species is likely to be impinging and/or entraining individuals of that species. EPA explained in the preamble that cooling water intake structures may harm threatened or endangered species in several ways: populations of protected species may suffer direct harm as a result of impingement or entrainment mortality; they may suffer indirect harm if the withdrawals alter food webs; and intake structures may alter habitat critical to their long-term survival.<sup>47</sup>

EPA identifies 88 threatened or endangered species at risk from cooling water intakes (which is more than a third of the threatened or endangered species EPA assessed) and more than 130,000 baseline losses of threatened and endangered species annually.<sup>48</sup> Yet EPA acknowledges even these numbers are likely to be underreported.<sup>49</sup> Significantly,

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<sup>43</sup> Kinetrics, *Bay Shore Power Plant Cooling Water Intake Structure Information and I&E Sampling Data* (January 2008) (Exh. 11), also available at [http://www.epa.state.oh.us/portals/35/permits/bayshore\\_IE\\_data\\_collection.pdf](http://www.epa.state.oh.us/portals/35/permits/bayshore_IE_data_collection.pdf) (last visited May 2011).

<sup>44</sup> Christine Mayer, University of Toledo, *Effects of Bayshore Power Plant on Ecosystem Function in Maumee Bay, Western Lake Erie, Annual Progress Report to NOAA: October 2010-February 2011* (Exh. 12), also available at [http://www.utoledo.edu/as/lec/research/be/docs/maumee\\_bay\\_mayer\\_et\\_al\\_annual\\_r.pdf](http://www.utoledo.edu/as/lec/research/be/docs/maumee_bay_mayer_et_al_annual_r.pdf) (last visited July 2011).

<sup>45</sup> DEC Draft BTA Policy, Appendix A: BTA Policy Technical Document, Table 1: Estimated Entrainment and Impingement at Major New York Facilities Using Once-Through Cooling Water, p. 2 of 20 (Exh. 5).

<sup>46</sup> Public Service Commission, Wisconsin Department of Natural Resources, *Final EIS for the Elm Road Power Plant*, Chapter 8 (Exh. 13); see also Sierra Club, *Giant Fish Blenders: How Power Plants Kill Fish & Damage Our Waterways (And What Can Be Done To Stop Them)*, July 2011 (Exh 14).

<sup>47</sup> 76 Fed. Reg. at 22,244 (col. 2-3).

<sup>48</sup> 2011 EEBA at 5-3 and 5-8.

<sup>49</sup> 2011 EEBA at 5-8. Because threatened and endangered species are, by definition, rare, they will appear in samples in much lower frequency than common species and since sampling is limited, may be missed entirely; further, there is a strong disincentive for plant operators to report the taking of threatened and endangered species, which may be prohibited by federal and/or state law.

“[impingement and entrainment] mortality may either lengthen population recovery time, or hasten the demise of these species.”<sup>50</sup>

As just several examples,

- The Pittsburg and Contra Costa Plants in the San Francisco Bay Delta in northern California can impinge and entrain more than 300,000 endangered and threatened species per year, including Delta smelt, Sacramento splittail, Chinook salmon, steelhead trout.<sup>51</sup>
- From 1976 to 1994, approximately 3,200 threatened or endangered sea turtles entered enclosed cooling water intake canals at the St. Lucie Nuclear Generating Plant in Florida.<sup>52</sup> In the first 13 years of that period, 122 (7.5%) of the 1,631 loggerheads, 18 (6.7%) of the 269 green turtles, and four Kemp’s ridleys entrapped in the canal were found dead.<sup>53</sup>
- From 1992–2004, a total of 32 sea turtles – loggerhead, green and Kemp’s ridley – were found captured from the intake trash bars at the Oyster Creek Generating Station.<sup>54</sup>

#### 4. Fish Population Declines

As EPA has recognized, “studies estimating the impact of impingement and entrainment on populations of key commercial or recreational fish have predicted *substantial declines in population size*. This has led to concerns that some populations may be *altered beyond recovery*.”<sup>55</sup> Moreover, even where a fish population has not yet experienced a documented decline, the loss of large numbers of individuals deplete the species’ ability to survive other unfavorable environmental conditions, whether man-made or natural, such as drought and climate change.<sup>56</sup> EPA has also noted the concerns of its sister agencies in this regard:

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<sup>50</sup> 2011 EEBA at 2-12.

<sup>51</sup> *Id.* (numbers of fish expressed as age 1 equivalents).

<sup>52</sup> 66 Fed. Reg. at 65,263 (col. 3), citing, Florida Power and Light Company, *Assessment of the impacts at the St. Lucie Nuclear Generating Plant on sea turtle species found in the inshore waters of Florida* (August 1995) [DCN 10-5516] (Exh. 15).

<sup>53</sup> Committee on Sea Turtle Conservation, National Research Council (U.S.), *Decline of the sea turtles: causes and prevention*, at 112, National Academies Press (1990) [DCN 10-4845]; *see also* Florida Power & Light Co., *Assessment of the Impacts of the St. Lucie Nuclear Generating Plant on Sea Turtle Species Found in the Inshore Waters of Florida*, at 5 (August 1995) [DCN 10-5516] (Exh. 15) (The St. Lucie plant has impinged five species of endangered sea turtles—loggerhead, green, Kemp’s ridley, leatherback and hawksbill).

<sup>54</sup> Amergen Energy Company, LLC, *Assessment of the Impacts of the Oyster Creek Generating Station on Kemp’s Ridley, Loggerhead, and Atlantic Green Sea Turtles* at 6-32, Table 6-2 “Mortality of Sea Turtles Captured From Intake Trash Bars at the Oyster Creek Generating Station 1969-2004 (Live/Dead)” (Dec. 2004) (Exh. 16).

<sup>55</sup> 66 Fed. Reg. at 65,264 (col. 1) (emphasis added).

<sup>56</sup> 69 Fed. Reg. at 41,588 (col. 1).

... NMFS [the National Marine Fisheries Service] documented in several fishery management plans that cooling water intake structures are one of the threats that may adversely affect fish stocks and their habitats.<sup>57</sup>

... NOAA documents in a number of their fishery management plans that cooling water intake structures, particularly once-through cooling water systems that withdraw large volumes of water, cause adverse environmental impacts due to significant impingement of juveniles and entrainment of eggs and larvae.”<sup>58</sup>

## 5. Depressed Commercial and Recreational Fishing Yields

Because impingement and entrainment cause fish populations to decline, there are fewer fish available to be caught by commercial and recreational fisherman, thereby depressing their harvests. Although estimating the extent of these depressed fishery yields is highly imprecise, and depends on, among other things, rudimentary assumptions about the relationship between fish stock and harvest,<sup>59</sup> EPA estimated annual commercial and recreational fishing losses due to impingement and entrainment losses as follows:

Region	Commercial Fishing Losses (pounds)	Recreational Fishing Losses (number of harvestable adult fish)
California	1,379,000	1,022,339
North Atlantic	430,000	761,183
Mid-Atlantic	10,672,000	9,081,061
South Atlantic	99,000	133,897
Gulf of Mexico	5,559,000	2,851,347
Great Lakes	346,000	349,648
Source: 2011 EEBA, Chs. 6, 7		

For the reasons discussed above, these are likely significant underestimates.

## 6. Aquatic Community and Ecosystem Impacts

Impingement and entrainment mortality “has immediate and direct effects on the population size and age distribution of affected species, and may cascade through food webs.”<sup>60</sup> In particular, EPA has recognized that “the loss of large numbers of aquatic organisms” may affect not only “stocks of various species” and their compensatory reserve, but also “the overall

<sup>57</sup> 66 Fed. Reg. at 65,295 (col. 1) (citing DCN# 2– 024M, 2–024N, and 2–024O).

<sup>58</sup> 66 Fed. Reg. at 65,297 (col. 3).

<sup>59</sup> For example, EPA assumed a linear relationship between stock and harvest, meaning, for example, that a 10 percent decrease in a fish population would reduce the harvest by 10 percent.

<sup>60</sup> 2011 EEBA at 2-9.

health of ecosystems.”<sup>61</sup> In addition to altered food webs, in the 2011 EEBA, EPA discusses several other related aquatic community and ecosystem impacts, including “altered community structure and patchy distribution of species,” “reduced taxa and genetic diversity,” and “nutrient cycling effects.”<sup>62</sup>

Significantly, in a 2004 Federal Register publication, EPA approvingly cited an analysis of such ecosystem effects prepared by the New York State Department of Environmental Conservation (NYSDEC) in connection with the permitting of three Hudson River power plants. NYSDEC found that entrainment not only reduces adult populations of the species whose eggs and larvae are entrained and depletes the species’ ability to survive unfavorable environmental conditions, but, perhaps most significantly, diminishes the forage base, which disrupts the food chain, transferring energy from higher to lower trophic<sup>63</sup> levels and compromising the health of the entire aquatic community.<sup>64</sup> In particular, as NYSDEC and EPA explained, using a simplified example, if an individual bay anchovy is killed via entrainment and disintegrated upon passage through an intake structure it is no longer available as food to striped bass and other top predators, and is instead consumed only by lower trophic level organisms, such as detritivores (organisms that feed on dead organic material), thus transferring energy from the top of the ecosystem to the bottom and affecting the integrity and proper functioning of the system. Likewise, the entrained bay anchovy would no longer be available to consume phytoplankton, which upsets the distribution of nutrients in the ecosystem.<sup>65</sup>

Furthermore, while often overlooked, intake structures destroy countless small organisms (some of which are microscopic) that are ecologically important. These include benthic organisms (i.e., “bottom dwellers” such as mussels, anemones, crabs and shrimp) and planktonic organisms (i.e., free-floating microscopic plants and animals), which “are an important source of food for other aquatic organisms and an essential component of the food chain in aquatic ecosystems.”<sup>66</sup>

## **7. Reduced Ecological Resilience**

As EPA has recognized, the effect of long-term or chronic impingement and entrainment mortality may lead to a decrease in ecosystem resistance and resilience – that is, the ability of ecosystems to resist and recover from disturbances such as invasive species and unusual weather events like hurricanes or severe flooding. Consequently, EPA found that mortality caused by cooling water intake structures is “likely to reduce the ability of ecosystems to withstand and recover from adverse environmental impacts, whether those impacts are due to anthropogenic effects or natural variability.”<sup>67</sup>

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<sup>61</sup> 66 Fed. Reg. at 65,292 (col. 2).

<sup>62</sup> 2011 EEBA, pp. 2-16 to 2-17.

<sup>63</sup> The term “trophic” refers to the feeding habits or food relationship of different organisms in a food chain.

<sup>64</sup> 69 Fed Reg. at 41,587-88, citing NYS DEC, 2003, Final Environmental Impact Statement: Concerning the Applications to Renew NY SPDES Permits for the Roseton 1 & 2, Bowline 1 & 2 and Indian Point 2 & 3 Steam Electric Generating Stations.

<sup>65</sup> *Id.*

<sup>66</sup> 66 Fed. Reg. at 65,263 (col. 1 at fn 2).

<sup>67</sup> 2011 EEBA, p. 2-17, citing C. Folke, S. Carpenter, et al., “Regime Shifts, Resilience, and Biodiversity in

## 8. Thermal Discharges

The discharge of heated water from cooling systems has also been shown to harm fish and wildlife and has long been recognized to have effects upon the structure and function of ecosystems.<sup>68</sup> The operational differences between once-through cooling systems and closed-cycle cooling systems will significantly reduce the thermal load of the discharge to surface water. Unlike once-through cooling systems, where the entire thermal load is delivered to the surface water body, in a closed-cycle cooling system most of the heat is transferred to the air resulting in evaporation.<sup>69</sup> Thus, irrespective of how the flows are configured, there will be a substantial reduction in the thermal load of the effluent from a closed-cycle system compared to a once-through system.

In the EEBA, EPA notes that:

Numerous studies have shown that thermal discharges may substantially alter the structure of the aquatic community by modifying photosynthetic, metabolic, and growth rates, and reducing levels of DO [dissolved oxygen]. Thermal pollution may also alter the location and timing of fish behavior including spawning, aggregation, and migration, and may result in thermal shock-induced mortality for some species. Thus, thermal pollution is likely to alter the ecological services provided by ecosystems surrounding facilities returning heated cooling water into nearby waterbodies.<sup>70</sup>

The EEBA also explains that facility-specific factors control the degree to which thermal pollution will affect an aquatic ecosystem. These factors include the volume of the waterbody source, other heat loads, the rate of water exchange, the presence of nearby areas whose climate remains habitable for rare or endangered species when that of the surrounding area has been changed, and the extent that nearby fish species congregate.<sup>71</sup> As expected, adverse temperature effects may also be more prominent in ecosystems that are already subject to other environmental stressors such as high biochemical oxygen demand (BOD) levels, sediment contamination, or pathogens.<sup>72</sup> Additionally, there are indirect effects on fish and other

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Ecosystem Management,” 35(1) *Annual Review of Ecology, Evolution, & Systematics* 557 (2004) [DCN 10-4770] (Exh. 17) and L.H. Gunderson, “Ecological Resilience – In Theory and Application.” 31 *Annual Review of Ecology, Evolution, & Systematics* 425 (2000) [DCN 10-4785].

<sup>68</sup> *Cronin*, 90 F. Supp. at 366, citing James R. May & Maya K. van Rossum, “The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act,” 20 *Vt. L. Rev.* 373, 382 (1995) (Exh. 18).

<sup>69</sup> B. Dziegielewski and T. Bik, Southern Illinois University Carbondale, *Water Use Benchmarks for Thermoelectric Power Generation in the United States* (prepared for United States Geological Survey) (2006) (Exh. 19).

<sup>70</sup> 2011 EEBA at 2-12, citing Bulthuis 1987; Chuang et al. 2009; Martinez-Arroyo et al. 2000; Poornima et al. 2005; Leffler 1982.

<sup>71</sup> 2011 EEBA at 2-12-2-13.

<sup>72</sup> 2011 EEBA at 2-12.

vertebrate populations caused by thermal discharge, which include increased pathogen growth and infection rates.<sup>73</sup>

Indeed, there is a great deal of scientific literature addressing the harm to aquatic ecosystems caused by thermal pollution.<sup>74</sup> As noted by two research professors at the University of Maryland Center for Environmental Science, “temperature has long been recognized as a major environmental factor at the molecular, cellular, tissue, organism and ecosystem levels of biological hierarchy.”<sup>75</sup>

Increased demand for electricity in the 1960s and 1970s led to the expansion of steam-electric power plants. That boom accelerated researchers’ and environmental managers’ interest in temperature effects. Researchers became even more concerned when it became apparent that the steam-electric power plant sector proposed to “heat virtually 100 percent of large non-tidal riverine flows during summer low-flow conditions.”<sup>76</sup>

Elevated temperature induces behavioral changes that have been documented in important managed species such as bluefish, fluke, winter flounder, and tautogs.<sup>77</sup> Some of these behavioral changes include:

- Avoidance of parts or all of a waterbody by certain species during summer and early fall;<sup>78</sup>
- Attraction to parts or all of a waterbody during winter by species that should have migrated out of the area due to cold temperatures.<sup>79</sup>
- Large-scale mortality (due to thermal shock from a rapid drop in temperature) resulting from the failure to migrate followed by a planned or emergency shutdown.<sup>80</sup>

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<sup>73</sup> 2011 EEBA at 2-12.

<sup>74</sup> See Kennedy & Mihursky, *The Effects of Temperature on Invertebrates and Fish: A Selected Bibliography*, University of Maryland Center for Environmental Science (Exh. 20), available at <http://www.mdsg.umd.edu/issues/chesapeake/habitat/fishtemp/>.

<sup>75</sup> *Id.*

<sup>76</sup> *Id.*

<sup>77</sup> O. Donovan, D. Doyle, C. O’Neill and E. Kearns, “Thermal Plume Impact on Fish Distributions in Barnegat Bay,” 10(3) *Bull. Amer. Lit. Soc.* 14 (1977) (Exh. 21).

<sup>78</sup> M.J. Kennish, “State of the Estuary and Watershed: An Overview,” *SI 32 Journal of Coastal Research* 243 (2001) (Exh. 22).

<sup>79</sup> M.J. Kennish, M.B. Roche and T.R. Tatham, “Anthropogenic effects on aquatic organisms,” in M.J. Kennish and R.A. Lutz (eds.), *Ecology of Barnegat Bay, New Jersey*, at 318-338 Springer-Verlag (1984) (Exh. 23), available at <http://yosemite.epa.gov/water/owrcatalog.nsf/7322259e90d060c885256f0a0055db68/3c2b3d081f4714fd85256b06007233ee!OpenDocument>.

<sup>80</sup> Oyster Creek Nuclear Generating Station Fish Kill Monitoring Report, NRC ML#003684420 (January 2000) (Exh. 24); Oyster Creek 2001 Annual Environmental Operating Report, NRC ML#020660222 (February 2002) (Exh. 25); A. Cradic, New Jersey Department of Environmental Protection, *Oyster Creek Generating Station fined for water violations and fish kills: DEP seeks compensation for Natural Resources Damages* (December 12, 2002) (Exh. 26), also available at [http://www.state.nj.us/dep/newsrel/releases/02\\_0131.htm](http://www.state.nj.us/dep/newsrel/releases/02_0131.htm).

- Metabolic rate of organisms increases with increased temperatures resulting in decreased growth and survival,<sup>81</sup> especially during summer months when ambient water temperatures are at their peak.
- Tropical/subtropical invasive species are able to thrive in the surrounding warm water plume.<sup>82</sup>
- Calefaction or thermal loading directly interferes with physiological processes of biota, such as enzyme activity, feeding, reproduction, respiration, and photosynthesis. Less conspicuous, indirect effects, which are difficult to quantify, include greater vulnerability to disease, to changing gaseous solubilities, and to chemical toxicants associated with thermal enrichment.<sup>83</sup>

## 9. Chemical Discharges

As EPA notes in the EEBA:

One of the environmental impacts associated with power plant operations is the release of chemicals in the discharge of once-through cooling waters. These chemicals include metals from internal corrosion of pipes, valves and pumps (e.g., chromium, copper, iron, nickel, and zinc), additives (anti-fouling, anticorrosion, and anti-scaling agents) and their byproducts, and materials from boiler blowdown and cleaning cycles.<sup>84</sup>

These anti-fouling and cleaning chemicals can pose a risk to aquatic organisms downstream of the CWIS discharge, potentially causing organisms to develop acute and residual effects.<sup>85</sup> As the EEBA explains, “[a] typical biofouling procedure is continuous low-level chlorination at chronic toxicity levels with an occasional high (“shock”) dose,” while the “use of oxidants (chlorine, bromide) can give rise to residuals and/or disinfection byproducts (DBPs) such as trihalomethanes, haloacetic acid, bromoform, and others.”<sup>86</sup> Although the effects of some discharge chemicals are not well documented, in most cases, these effects, along with thermal and mechanical effects, are believed to be an additional component of the cumulative stress of entrainment on local aquatic ecosystems: “[C]oncentrations of these chemicals may be additive to low-level chronic adverse effect with other anthropogenic stressors identified above.”<sup>87</sup>

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<sup>81</sup> T. L. Beiting, W. A. Bennett, R. and W. McCauley, (2000) *Temperature Tolerances of North American Freshwater Fishes Exposed to Dynamic Changes in Temperature*. *Environmental Biology of Fishes*, 58(3): 237 – 275 [DCN 10-4716].

<sup>82</sup> M.J. Kennish (2001) *State of the Estuary and Watershed: An Overview*. *Journal of Coastal Research*, SI 32: 243-273 (Exh. 22).

<sup>83</sup> *Id.*

<sup>84</sup> 2011 EEBA at 2-13.

<sup>85</sup> 2011 EEBA at 2-14, citing Kelso and Milburn 1979.

<sup>86</sup> 2011 EEBA at 2-14, citing Taylor 2006.

<sup>87</sup> 2011 EEBA at 2-14.

## 10. Cumulative Impacts

Cooling water intake structures also cause cumulative impacts, understood to refer to impacts caused by multiple power intake structures on the same waterway as well as the impacts of the intake structures combined with fishing and other pressures. EPA has delineated these cumulative impacts in this rulemaking (in the EEBA) and previously in the preamble to EPA's prior Section 316(b) rules:<sup>88</sup>

In addition to impingement and entrainment losses associated with the operation of the cooling water intake structure, EPA is concerned about the cumulative overall degradation of the aquatic environment as a consequence of (1) multiple intake structures operating in the same watershed or in the same or nearby reaches and (2) intakes located within or adjacent to an impaired waterbody. Historically, impacts related to cooling water intake structures have been evaluated on a facility-by-facility basis.<sup>89</sup>

Cumulative effects of CWISs are likely to occur if multiple facilities are located in close proximity such that they impinge or entrain aquatic organisms within the same source waterbody, watershed system, or along a migratory pathway of a specific species (e.g., striped bass in the Hudson River). The cumulative impacts of CWISs may be exacerbated by the presence of other anthropogenic stressors.<sup>90</sup>

There is concern ... about the effects of multiple intakes on fishery stocks. ... EPA analyses suggest that over 99 percent of the existing facilities with cooling water withdrawal that EPA surveyed in its Section 316(b) survey of existing facilities are located within 2 miles of waters that are identified as impaired and listed by a State or Tribe as needing development of a total maximum daily load (TMDL) to restore the waterbody to its designated use. EPA notes that the top four leading causes of waterbody impairment (siltation, nutrients, bacteria, and metals) affect the aquatic life uses of a waterbody. The Agency believes that cooling water intakes potentially contribute additional stress to waters already showing aquatic life impairment from other sources such as industrial discharges and urban stormwater.<sup>91</sup>

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<sup>88</sup> Tellingly, however, the only references to "cumulative impacts" in the preamble to the Proposed Rule are three mentions of the cumulative *financial* burdens on power companies from EPA's air, water, and hazardous waste rules. After years of cumulative impacts from intake structures taking their toll on waterways, EPA is now apparently more concerned about the cumulative effect of regulation on industry's bottom line than the effect on aquatic resources.

<sup>89</sup> 66 Fed. Reg. at 65,263 (col. 2).

<sup>90</sup> 2011 EEBA at 2-17 (internal citation omitted).

<sup>91</sup> 66 Fed. Reg. at 65,263 (col. 2).



## 11. Habitat Loss

As EPA also recognizes, “[m]ost 316(b) facilities have been built on shoreline locations where power-generation buildings, roadways, CWISs [cooling water intake structures], canals, impoundments, and other water storage or conveyance structures have often been constructed at the cost of natural habitat, including terrestrial, aquatic, and wetlands.”<sup>92</sup> Moreover, the loss of fish habitat due to construction of a power plant and its intake structure combined with the direct losses of fish from operation of the intake exert even greater pressures on aquatic species:

Habitat loss in adjacent shoreline areas exacerbates the effect of CWIS losses, since many fish species affected by I&E [impingement and entrainment] mortality (e.g., bay anchovy, winter flounder) rely on coastal wetlands as nursery areas.<sup>93</sup>

## 12. Altered Flow Patterns in Source and Receiving Waters

Another adverse impact of cooling water intake structures recognized by EPA is that their massive withdrawals and discharges significantly alter patterns of flow within receiving waters both in the immediate area of the intake and discharge pipes, and in mainstream waterbodies, particularly in inland riverine settings.<sup>94</sup> In some ecosystems intake structures may cycle a substantial proportion of the water body through the power plant’s cooling system. EPA noted that “of the 521 facilities that are located on freshwater streams or rivers, 31 percent (164) of these facilities have average intake greater than 5 percent of the mean annual flow of the source waters.”<sup>95</sup> Even if the volume of water in the river stays relatively constant, “the flow characteristics of the waterbody, including turbulence and water velocity, may be significantly altered. This is particularly true in locations with multiple CWISs located close to each other.”<sup>96</sup> Significantly, as EPA found:

Altered flow velocities and turbulence may lead to several changes in the physical environment, including sediment deposition (Hoyal et al. 1995), sediment transport (Bennett and Best 1995), and turbidity (Sumer et al. 1996), each of which play a role in the physical structuring of ecosystems. Biologically, flow velocity is a dominant controlling factor in aquatic ecosystems. Flow has been shown to alter feeding rates, settlement and recruitment rates (Abelson and Denny 1997), bioturbation activity (Biles et al. 2003), growth rates (Eckman and Duggins 1993), and population dynamics (Sanford et al. 1994). In addition to flow rates, turbulence plays an important role in the ecology of small organisms, including fish eggs and larvae, phytoplankton, and zooplankton. In many cases, the turbulence of a waterbody directly affects the behavior of aquatic organisms, including fish, with respect to swimming speed (Lupandin 2005), location preference with a waterbody (Liao 2007), predator-prey interactions (Caparroy et

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<sup>92</sup> 2011 EEBA, pp. 2-2 to 2-3.

<sup>93</sup> 2011 EEBA, p. 2-3.

<sup>94</sup> 2011 EEBA, p. 2-15.

<sup>95</sup> *Id.*

<sup>96</sup> *Id.*

al. 1998; MacKenzie and Kiorboe 2000), recruitment rates (MacKenzie 2000; Mullineaux and Garland 1993), and the metabolic costs of locomotion (Enders et al. 2003). The sum of these effects may result in changes to the food web or the location of used habitat, and thereby substantially alter the aquatic environment.<sup>97</sup>

These problems will likely be exacerbated by climate change.<sup>98</sup>

### **13. Water Availability and Related Energy Impacts**

The enormous amount of water required for power plant water withdrawals threatens not only electrical power generation, but the general sustainability of water use in the U.S. In 2005, cooling water withdrawals accounted for nearly 41 percent of all freshwater withdrawals and 49 percent of all water withdrawals (fresh and saline) in the United States.<sup>99</sup> With hundreds of U.S. power plants still relying on once-through cooling, power plants are the largest water users in the country. The use of once-through cooling also represents an enormous opportunity cost to other water users. If cooling water is needed for downstream power plants, then upstream users must forego their use of this water to accommodate the needs of the power plants. This is particularly a problem in places where power plants are located near thirsty cities and other users.

EPA's Proposed Rule makes mention of the supposed reliability threats the power sector may face due to modernization to closed-cycle cooling.<sup>100</sup> However, nowhere does EPA discuss the threats to power generation and water supplies if facilities continue to utilize once-through cooling. These threats must be considered and incorporated into any BTA determination.

#### **a. Impacts on Upstream Beneficial Uses of Water**

The massive amounts of water withdrawn by power plants' once-through cooling systems affect water resource planning and land use policy in several fundamental ways. As an extremely telling example, consider the 1,021 MW coal-fired Gorgas Steam Plant in north central Alabama, which uses a once-through cooling system to withdraw up to 978 million gallons of cooling water per day from the Black Warrior River. Like many power companies, Alabama Power has resisted upgrading the cooling system to a once-through system, even though that would reduce the intake flow by approximately 95 percent. The adverse impacts of Gorgas's massive withdrawals are, however, not limited to entrainment, impingement, thermal discharges, and their consequential effects (which are felt not only at the intake and downstream, but also upstream). That is because Alabama Power also operates a hydroelectric dam (known as the Lewis Smith development as part of the Warrior River Hydroelectric Project) above the Gorgas Plant and, since 1974, the company has operated the dam so as to ensure that Gorgas' massive water requirements are met. The steam plants' extremely large cooling water demands

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<sup>97</sup> *Id.*

<sup>98</sup> *Id.*

<sup>99</sup> J.F. Kenny et al., Estimated Use of Water in the United States in 2005, U.S. Geological Survey Report, Circular 1344 (2009), at 38, (Exh. 2), *also available at* <http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf> (last visited July 2011).

<sup>100</sup> *See, e.g.*, 76 Fed. Reg. at 22,229.

affect Alabama Power's decisions both as to when to release water from the dam and how much water to release.

Because of the purported "need" to ensure massive flows to the downstream power plant, Alabama Power has opposed an alternative operational plan, proposed by residents, which would provide higher and more stable reservoir elevations in Smith Lake and thereby improve habitat for fish and wildlife (including a federally-listed species of mussel) and recreation in and on the lake.<sup>101</sup> If, however, plants like Gorgas were required to retrofit to closed-cycle cooling, the upstream dam could be operated in a more environmentally and socially appropriate manner.

This sort of competition for water will only worsen as droughts intensify and temperatures increase due to climate change. Often, the result will be that other beneficial uses of water upstream, including not only habitat and recreation but also drinking water and agriculture, will be curtailed in order to supply the power plant.

As the Atlanta Journal and Constitution reported in 2007, industry's contention that once-through cooling systems do not "consume" water fails to acknowledge the competition with upstream uses for those flows:

Utility water use has escaped scrutiny, in part, because false assumptions have guided public policy in water planning. Utilities have argued for years that their use doesn't matter because they return virtually all the water they use.

But use does matter when drought shrinks the water supply, and consumption from other sources puts pressure on reservoirs and rivers.

A Southern Co. coal-fired plant in Florida or its Farley nuclear plant in Alabama may put at least half of the water used back into the Chattahoochee River. But that water isn't going back to Lake Lanier.

Power plants also require minimum river flows to keep operating. Low flows on the Coosa River forced Georgia Power to cut back energy output at one plant this summer.<sup>102</sup>

Another example of power plants' massive water needs driving water resource and land use policies concerns flood-plain development. In a draft policy proposal, the White House Council on Environmental Quality (CEQ) recommended that development and other unwise use of floodplains and flood-prone areas be avoided in order to serve a variety of goals including to "[p]reserve and restore the hydrologic and natural resources functions" of those areas.<sup>103</sup> In

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<sup>101</sup> See Federal Energy Regulatory Commission, *Final Environmental Assessment for Hydropower License, Warrior River Hydroelectric Project* at 15-16, 40, 136, P-2165-022 (March 2009) (Exh. 27).

<sup>102</sup> Ken Foskett, Margaret Newkirk, Stacy Shelton, "Georgia's Water Crisis: The Power of Water," *Atlanta Journal Constitution* (November 18, 2007) (Exh. 28).

<sup>103</sup> See Council on Environmental Quality, *Proposed National Objectives, Principles and Standards for Water and Related Resources Implementation Studies* at 6 (Dec. 3, 2009) (Exh. 29), also available at <http://www.whitehouse.gov/administration/eop/ceq/initiatives/PandG/>. See also 74 Fed. Reg. 65,102 (Dec. 9, 2009)

response, the Edison Electric Institute (EEI), sought to perpetuate the status quo and urged CEQ to factor the “availability of cooling water” into its water resource decisions, arguing that “cooling water intake structures are necessarily built in flood plains” and that such development should not be considered “inappropriate or . . . discouraged.”<sup>104</sup> Of course, EEI has it backwards: EPA should discourage the continued use of fragile, precious waterfront land by power plants, rather than accept or encourage it. The demonstrated ability of facilities in the Southwest to locate away from waterbodies and out of flood plains proves that power plants are not water-dependent.

## **b. Threats to Power Generation and Grid Reliability**

Furthermore, in many cases and increasingly frequently, power plants relying on once-through cooling will be unable to operate due to the lack of sufficient volumes of water or because the water may not be sufficiently cool. The threats posed to reliable power generation by water availability and temperature issues are real and well known.<sup>105</sup> According to DOE, “[w]ater shortages, potentially the greatest challenge to face all sectors of the United States in the 21<sup>st</sup> century, will be an especially difficult issue for thermoelectric generators due to the large amount of cooling water required for power generation.”<sup>106</sup> Even industry recognizes these threats to reliability at once-through facilities due to water shortages.<sup>107</sup> For facilities using once-through cooling, “[i]f cooling water sources fall below the established minimum water level, or if the maximum thermal threshold for the discharge of cooling water cannot be met, a facility is required to power down or go offline.”<sup>108</sup>

In 2003, an EPRI study presented county-level thermoelectric power generation constraints in the year 2025 based on projected water availability and electricity demands. As

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(Council on Environmental Quality: Draft Principles and Standards Sections of the “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies”; Initiation of Revision and Request for Comments).

<sup>104</sup> Letter from C. Richard Bozek, EEI’s Director of Environmental Policy to Mr. Terrance L. Breyman, Deputy Associate Director for Natural Resources, CEQ at 5, 3 (April 5, 2010) (Exh. 30).

<sup>105</sup> See Lisa Song, “Heat Waves Putting Pressure on Nuclear Power’s Outmoded Cooling Technologies,” *SolveClimate News* (May 4, 2011) (Exh. 31), also available at <http://www.reuters.com/article/2011/05/04/idUS163919996420110504>. See also National Research Council, *Adapting to the Impacts of Climate Change* at 73 (2010) (Exh. 32), also available at [https://download.nap.edu/catalog.php?record\\_id=12783](https://download.nap.edu/catalog.php?record_id=12783).

<sup>106</sup> National Energy Technology Laboratory (“NETL”), *Estimating Freshwater Needs to Meet Future Thermoelectric Generation Requirements: 2010 Update* at 9 (Sept. 30, 2010) [hereinafter “NETL 2010”] (Exh. 33).

<sup>107</sup> Brent Barker, “Running Dry at the Power Plant,” *EPRI Journal* at 29-30 (Summer 2007) (“It is critical to recognize . . . that although the once-through plant consumes only a small fraction of the water it withdraws, it needs the withdrawal to operate. Hence, under drought conditions, a generating plant may have to be shut down or severely curtailed in operation because of its inability to withdraw a sufficient amount of water to meet its thermal discharge permit.”) (Exh. 34).

<sup>108</sup> Nicole T. Carter, Congressional Research Service, *Energy’s Water Demand: Trends, Vulnerabilities, and Management* at 6 (January 5, 2011)[hereinafter “CRS 2011”] (Exh. 35), also available at <http://www.fas.org/sgp/crs/misc/R41507.pdf>.

shown in Appendix E, the report projected that thermoelectric cooling water withdrawals would be constrained in hundreds of U.S. counties by the year 2025.<sup>109</sup>

Some of the underlying assumptions in the study may be outdated because the study has not been updated to reflect recent changes in power demand predictions<sup>110</sup> and climate change impacts to water availability.<sup>111</sup> Nonetheless, the study highlights the critical relationship between water and energy and the possible threats to energy generation under the assumed withdrawal scenarios.

More recently, the Union of Concerned Scientists compiled a sampling of reliability problems that have already occurred at once-through facilities because of water-related constraints, including:<sup>112</sup>

- In 2006, high intake water temperatures during a heat wave forced four nuclear plants in the Midwest to reduce their electrical output when it was needed most. One plant in Prairie Island, MN, was forced to reduce output by 50%.
- Only by relying on water from irrigation supplies did the 1,650 mw coal-fired Laramie River Station in Wheatland, WY, avert impacts to power production in 2008.
- In the summer of 2010, the Browns Ferry nuclear plant in Athens, AL, significantly reduced output for five weeks because of high discharge water temperature. This same facility had to reduce output for similar reasons in 2007.<sup>113</sup>

As the UCS report and others highlight, threats to energy generation because of source water concerns arise not only in the arid areas of the western U.S., but also in an “increasing number of water bodies in the East.”<sup>114</sup> The threats to energy reliability will only get worse with increases in energy use<sup>115</sup> and climate change,<sup>116</sup> and competition from other water users – such

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<sup>109</sup> Sujoy B. Roy, Karen V. Summers & Robert A. Goldstein, “Water Sustainability in the United States and Cooling Water Requirements for Power Generation,” 126 *Water Resources Update* 94 (Nov. 2003) (Exh. 36), also available at <http://opensiuc.lib.siu.edu/jcwre/vol127/iss1/12/>.

<sup>110</sup> Interview with Sujoy Roy (Apr. 6, 2011).

<sup>111</sup> CRS 2011 at 7.

<sup>112</sup> Union of Concerned Scientists, *The Energy-Water Collision: Power and Water at Risk* (June 2011) (internal citations omitted) (Exh. 37), also available at [http://www.ucsusa.org/assets/documents/clean\\_energy/ew3/power-and-water-at-risk-with-endnotes.pdf](http://www.ucsusa.org/assets/documents/clean_energy/ew3/power-and-water-at-risk-with-endnotes.pdf).

<sup>113</sup> CRS 2011 at 6.

<sup>114</sup> *Id.* (citing U.S. Department of Agriculture Forest Service, 2000 *RPA Assessment of Forest and Range Lands*, FS-687, at 14 (Feb. 2001) (Exh. 38)).

<sup>115</sup> NETL 2010 at 1 (citing Energy Information Administration, *Annual Energy Outlook 2010 with Projections to 2035* (Exh. 39) also available at <http://www.eia.doe.gov/oiaf/aeo/index.html>).

<sup>116</sup> CRS 2011 at 8; See also Mitch Weiss, Associated Press, *Southern Drought May Force Nuclear Plants to Shut Down* (Jan. 24, 2008) (“The water was low on the Tennessee River and had become warmer than usual under the hot sun. By the time it had been pumped through the Browns Ferry plant, it had become hotter still – too hot to release back into the river, according to the TVA. So the utility shut down a reactor.”) (Exh. 40).

as domestic and agricultural – will only get more intense,<sup>117, 118</sup> as the Associated Press has reported:

An Associated Press analysis of the nation’s 104 nuclear reactors found that 24 are in areas experiencing the most severe levels of drought. All but two are built on the shores of lakes and rivers and rely on submerged intake pipes to draw billions of gallons of water for use in cooling and condensing steam after it has turned the plants’ turbines.

Because of the yearlong dry spell gripping the region, the water levels on those lakes and rivers are getting close to the minimums set by the Nuclear Regulatory Commission. Over the next several months, the water could drop below the intake pipes altogether. Or the shallow water could become too hot under the sun to use as coolant.

“If water levels get to a certain point, we’ll have to power it down or go off line,” said Robert Yanity, a spokesman for South Carolina Electric & Gas Co., which operates the Summer nuclear plant outside Columbia, S.C.

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During Europe’s brutal 2006 heat wave, French, Spanish and German utilities were forced to shut down some of their nuclear plants and reduce power at others because of low water levels – some for as much as a week.<sup>119</sup>

In addition to these vulnerabilities due to inadequate water supply or increased water temperature, power plants using once-through cooling are also vulnerable due to the sheer volume of aquatic life being withdrawn from the source water:

- In September 1984, a flotilla of jellyfish blocked the intake at the St. Lucie nuclear plant in Florida, forcing both of its nuclear reactors to shut down for several days due to lack of cooling water.<sup>120</sup>
- In July 2011, five generators were shut down due to jellyfish in Japan, Israel and Scotland.<sup>121</sup>

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<sup>117</sup> NETL 2010 at 9.

<sup>118</sup> “According to a GAO 2003 report, national water availability has not been comprehensively assessed in 25 years, thus water availability on a national level is ultimately unknown. However, as the report goes on to say, current trends indicate that demands on the nation’s supplies are growing while the nation’s capacity to store surface-water is increasingly more limited and ground-water is being depleted.” NETL 2010 at 9 (internal citations omitted).

<sup>119</sup> Mitch Weiss, Associated Press, *Southern Drought May Force Nuclear Plants to Shut Down* (Jan. 24, 2008) (Exh. 40).

<sup>120</sup> Union of Concerned Scientists, *Got Water?* at 5 (Dec. 4, 2007) (Exh. 41), also available at [http://www.ucsusa.org/nuclear\\_power/nuclear\\_power\\_technology/got-water-nuclear-power.html](http://www.ucsusa.org/nuclear_power/nuclear_power_technology/got-water-nuclear-power.html).

- In March 2011, the McGuire nuclear plant was forced to shut down both reactors because of “macro-fouling” – where fish from Lake Norman clogged the plant’s water system.<sup>122</sup>

Meanwhile, EPA seems well aware of these types of risks and of the benefits closed-cycle cooling can provide. Indeed, EPA visited a number of sites that already have retrofitted to closed-cycle cooling for a variety of reasons:<sup>123</sup>

- McDonough (GA), Yates (GA), Canadys (SC) and Wateree (SC) converted all generating units to closed-cycle cooling.<sup>124</sup>
- Nearman Creek (KS) converted its generating units to reduce the need for cooling water at times of the year (summer) when the source water level is low.<sup>125</sup> [During EPA’s site visit, facility representatives noted that its closed-cycle recirculating cooling system is easy to operate and actually leads to slightly *better* performance by the generating units, as the return water from the tower is cooler than river water.]<sup>126</sup>
- Linden (NJ) constructed several new combined cycle units to replace retiring fossil units and uses grey water from a nearby treatment plant for its makeup water.<sup>127</sup>

EPA notes that, “[w]hile the reasoning for some retrofits may not explicitly include consideration of 316(b), flow reduction is clearly an issue in the forefront of permitting and operational decisions at many facilities. Even in cases where 316(b) was not a consideration, the benefits to aquatic communities are realized nonetheless.”<sup>128</sup>

### c. Water Supply Sustainability Risks in a Changing Climate

This sort of competition for water will only worsen as droughts intensify and temperatures increase due to climate change. Climate change will have a significant impact on the sustainability of water supplies in the coming decades, by increasing the risk that water supplies will not be able to keep pace with withdrawals in many areas of the United States. A

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<sup>121</sup> Peter Hanlon, *Jellyfish to Power Plants: You Suck*, <http://www.ecocentricblog.org/2011/07/26/jellyfish-to-power-plants-you-suck/> (July 26, 2011) (Exh. 42).

<sup>122</sup> U.S. Nuclear Regulatory Commission, McGuire Nuclear Station Licensee Event Report 369/2011-01, Revision 1 (Apr. 1, 2011) (Exh. 43), available at <http://pbadupws.nrc.gov/docs/ML1110/ML111020305.pdf>.

<sup>123</sup> 2011 TDD at 2-14.

<sup>124</sup> See Site Visit Report for McDonough-Atkinson Power Plant, February 11, 2009 [DCN 10-6536], Site Description Report for Yates Power Plant, February 11, 2009 [DCN 10-6538]; Site Visit Report for Canadys Station, February 10, 2009 [DCN10-6535] and Site Visit Report for Wateree Station, February 10, 2009 [DCN 10-6534], respectively.

<sup>125</sup> 2011 TDD at 2-14.

<sup>126</sup> Site Visit Report of Nearman Creek Power Station, March 3, 2009, at 4 [DCN 10-6524].

<sup>127</sup> See Site Visit Report for Linden Generating Station, May 26, 2010 [DCN 10-6557].

<sup>128</sup> 2011 TDD at 2-14.

2010 study conducted by Tetra Tech for the Natural Resources Defense Council (NRDC) found that in many parts of the nation, water withdrawals already outpace renewable water supply. The Tetra Tech report also found that “[t]he impacts of climate change will greatly increase the number of areas where renewable water supply will be lower than withdrawal, therefore increasing the number of areas vulnerable to future water shortages.”<sup>129</sup>

The Tetra Tech study projected that water withdrawals in 2050 will greatly outpace available precipitation in many U.S. counties, as is shown in Appendix F. After considering a number of sustainability factors such as population and economic growth, the Tetra Tech study further concluded that more than 1,100 U.S. counties in the lower 48 states will have higher risk of water shortages by 2050 as a result of climate change, as shown in Appendix G.

As EPA notes, the Proposed Rule has the potential to address over half of the water withdrawals in the entire nation.<sup>130</sup> Unfortunately, as is highlighted herein, the proposed rule does little if anything to curtail these significant water withdrawals.

#### **14. Industrial Use of Valuable, Scenic Waterfront Land**

It is no coincidence that power plants are located along the country’s mightiest rivers and on highly valued and scenic locations adjoining our most treasured oceans, lakes and estuaries: plants using once-through cooling need cooling water in volumes that can only be found at the edge of a major waterbody. Closed-cycle cooling, however, lowers intake volumes to levels which can be met by alternative water sources as such municipal water supplies, ground water, or treated sewage effluent discharges. By using such alternative water sources, power plants can be located away from waters of the U.S. Closed-cycle cooling thus decouples industrial cooling water needs from the need to site plants on sensitive, scenic and valuable waterfront property. Such facilities can locate in brownfields or industrial parks, avoiding incompatibility of land uses. This significant increase in siting flexibility, particularly for replaced, rebuilt or repowered facilities, is yet another advantage of moving away from once-through cooling and towards closed-cycle cooling.

#### **B. Statutory Background: Congress Enacted Section 316(b) as Part of the 1972 Clean Water Act Amendments to Standardize Permitting and Minimize Once-Through Cooling’s Massive Water Withdrawals and Fish Kills.**

When Congress enacted Section 316(b) as part of the sweeping 1972 amendments to the Clean Water Act, it was well aware of the enormity of once-through cooling water withdrawals, fish kills and thermal discharges, as well as the superiority of closed-cycle cooling. The provision was intended to standardize permitting and require the Best Technology Available – which was then and still is closed-cycle cooling – to minimize the water withdrawals and fish kills.

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<sup>129</sup> Sujoy Roy et al., Tetra Tech, *Evaluating Sustainability of Projected Water Demands Under Future Climate Change Scenarios* (2010) (Exh. 44), also available at [http://rd.tetrattech.com/climatechange/projects/nrdc\\_climate.asp](http://rd.tetrattech.com/climatechange/projects/nrdc_climate.asp).

<sup>130</sup> 76 Fed. Reg. at 22,189.



## 1. In 1972 Congress Was Well Aware of the Enormous Damage Caused by Once-Through Cooling.

Although once-through cooling systems have been in use for more than a century, and the size of U.S. power plants dramatically increased after World War II, it was not until the late 1960s that federal policymakers turned their attention to the environmental damage caused by intake structures. In 1967, Senator Warren Magnuson warned that “by 1980 thermal power plants throughout the nation will require an amount of cooling water greatly in excess of the average flow of the mighty Mississippi at St. Louis.”<sup>131</sup> Congress first considered the impacts of power plants’ massive water usage during extensive hearings on the effects of waste heat discharged from industrial facilities.<sup>132</sup> The White House was similarly concerned, and in 1968 President Lyndon Johnson’s staff issued a report explaining that “the large volumes of water withdrawn in once-through cooling processes [can have] as much or more effect on aquatic life than the waste discharges on which control measures are required.”<sup>133</sup>

In the early 1970s, a number of well-publicized massive fish kills occurred at U.S. power plants, such as the Brayton Point Power Station in Mt. Hope Bay, Massachusetts, which killed an astonishing 164.5 million menhaden and river herring in just one day, July 2, 1971,<sup>134</sup> the P.H. Robinson plant in Galveston Bay, Texas, which impinged more than 7 million fish in 12 months in 1969 and 1970, the Indian Point No. 1 nuclear facility on New York’s Hudson River, which killed 1.3 million fish over a 10 week period,<sup>135</sup> and the Millstone nuclear plant in Niantic Bay, Connecticut, where more than 2 million dead menhaden clogged the intake screens in the late summer of 1971.<sup>136</sup>

Public concern over these and other incidents prompted Congress to add Section 316(b) to the Clean Water Act amendments of 1972.<sup>137</sup> Significantly, during debate over the Clean

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<sup>131</sup> 113 Cong. Rec. 30129 (1967) (Exh. 45).

<sup>132</sup> *Thermal Pollution, Hearings before the Subcomm. on Air and Water of the Senate Comm. on Public Works*, 90th Cong., pts 1-4 (1968); *id.* at 1 (statement of Sen. Muskie) (“[b]y the end of the next decade, approximately one-sixth of the total fresh-water runoff in the United States will be required for cooling and condensing purposes.”) (Exh. 46); *id.* at 98-102, 104, 112-13, 137-38, 143 (testimony on intake impact on aquatic organisms); *Environmental Effects of Producing Electric Power, Hearings before the Joint Committee on Atomic Energy*, 91st Cong., pt. 1, 341-345, 375-76 (1969) (intake impact).

<sup>133</sup> Office of Science and Technology of the Executive Office of the President, *Considerations Affecting Steam Power Plant Site Selection*, 46 (1968) (Exh. 47).

<sup>134</sup> U.S. EPA, Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact, 1976 at p. 9, table I-3 (Exh. 48). EPA reported that the fish were “mangled.” *Id.*

<sup>135</sup> Clark and Brownell, *Electric Power Plants in the Coastal Zone: Environmental Issues*, American Littoral Society Special Publication at V-8, tbl. V-B (1973) (Exh. 49); *see also New York Times Abstracts*, May 24, 1972, p. 94, col. 1 (“alleged ‘massive’ killing of fish at [Con Ed’s] No. 2 nuclear-power plant at Indian Point on the Hudson River”) and *New York Times Abstracts*, March 1, 1972, p. 77, col. 3 (“more than 100,000 fish have been killed in last wk [at Indian Point]”) (Exh. 50).

<sup>136</sup> Clark and Brownell, *Electric Power Plants in the Coastal Zone: Environmental Issues*, American Littoral Society Special Publication (1973), p. V-8, tbl. V-B (Exh. 49); *see also New York Times Abstracts*, August 16, 1972, p. 41, col. 1 (“massive fish kill in Apr at Millstone Point nuclear power complex”) (Exh. 51).

<sup>137</sup> Although Section 316(b) has been occasionally described as “something of an afterthought,” (*Riverkeeper I*, 358 F.3d at 187 n.12) because of the minimal discussion of that provision in the *published* legislative history of the

Water Act, Senator James Buckley of New York cited with approval two newspaper articles reporting a decision of the Atomic Energy Commission (AEC) to require Consolidated Edison to install closed-cycle cooling at Indian Point.<sup>138</sup> The articles noted that the plants withdrew massive amounts of water from the Hudson River, entraining thousands of organisms per minute, and that the AEC had ordered Consolidated Edison to stop removing such large volumes of water from the River and to install closed-cycle cooling in order to abate these massive fish kills.<sup>139</sup> Troubled by the extraordinary mortality at Indian Point, Senator Buckley sought to ensure that regulatory agencies could require closed-cycle cooling at power plants. In response, Senator Edmund Muskie of Maine, the chief architect of the Act, assured Senator Buckley that EPA would have that authority.<sup>140</sup>

## **2. The 1972 CWA Amendments Fundamentally Restructured U.S. Water Pollution Regulation by Replacing Ineffectual Site-Specific Assessments of Water Quality with National Technology-Based Standards.**

The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”<sup>141</sup> In furtherance of this goal, in 1972, Congress fundamentally reformed the Act in what has been described as a “sea change” in this country’s water pollution control strategy.<sup>142</sup> Prior law had failed because, among other things, it “focused on the tolerable effects rather than the preventable causes of water pollution.”<sup>143</sup> Indeed, Congress passed the Federal Water Pollution Control Act Amendments of 1972 (now known as the Clean Water Act) because it recognized that “the Federal water pollution control program ...ha[d] been inadequate in every vital aspect ...”<sup>144</sup>

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Clean Water Act, that is plainly incorrect. More voluminous *unpublished* materials documenting the committee negotiations on the precise wording of what was eventually codified into the three subsection of Section 316 show that, during extensive six-month negotiations, the committee discussed and debated intake structure regulations at length. These materials are all available in the National Archives and located in a series of “Cartons” labeled “Accession No. 46-75-003, Senate Public Works Committee, Subcommittee on Environmental Pollution, Federal Water Pollution Legislation Files.” Within each box there are “Folders” with topic labels and often smaller individual “Files” with topic labels. In particular, there are five highly relevant committee files: (1) a File labeled “316,” containing drafts of Section 316, in a Folder labeled “Conference Committee Language” contained in Carton No. 2; (2) a file containing correspondence on “Phase I and Phase II,” in that same Folder and Carton; (3) files labeled “9/13” and “9/14,” containing notes on the individual sessions of the House and Senate conferees held on September 13<sup>th</sup> and 14<sup>th</sup>, 1972, in a Folder labeled “Conference Committee Conference Sessions,” in Carton No. 2; (4) a File labeled “General,” containing internal committee memoranda to Senate Muskie and to the Senate Conferees in a file labeled “General” in Carton No. 2; and (5) a File labeled “Thermal” in Carton No. 1. Those files are submitted herewith as Exhibit 52 (Exh. 52).

<sup>138</sup> 1 *Legislative History of the Water Pollution Control Act Amendments of 1972, 196-97* (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973) (Exh. 53).

<sup>139</sup> *Id.*

<sup>140</sup> *Id.*; see also *In the Matter of: Carolina Power & Light Company (Brunswick Steam Electric Plant)*, USEPA, Decision of the General Counsel, EPA GCO 41 at 178 (June 1, 1976) (noting that Congress was “well aware” of the impacts of intake structures when it enacted the CWA) (Exh. 54).

<sup>141</sup> CWA § 101(a), 33 U.S.C. § 1251(a). The Act defines “pollution” to include “the man-made or man-induced alteration of the ... biological ... integrity of water.” CWA § 502(19), 33 U.S.C. § 1362(19).

<sup>142</sup> *Riverkeeper I*, 358 F.3d at 184.

<sup>143</sup> *EPA v. California*, 426 U.S. 200, 202-03 (1976).

<sup>144</sup> *Milwaukee v. Illinois*, 451 U.S. 304, 310 (1981), quoting S. Rep. No. 92-414, 7 (1971), 2 *Legislative History of*

The 1972 “Amendments were viewed by Congress as a ‘total restructuring’ and ‘complete rewriting’ of the existing water pollution legislation.”<sup>145</sup> The single most important regulatory reform achieved by the 1972 Act was the seemingly paradoxical notion that the nation’s ambitious water quality goals could best be achieved if they were no longer tied to compliance with water quality standards. Congress concluded that past efforts to maintain such a regulatory link had failed because the science of water ecology was too complex to measure the “tolerable effects” with the precision necessary to have water quality standards serve as the primary touchstone for determining the appropriate level of control.<sup>146</sup>

Congress deliberately established the NPDES program to relieve permitting agencies of the need to conduct costly, lengthy, and indeterminate ecological studies to issue permits. Congress’s focus on uniform technology standards in the 1972 amendments was an explicit repudiation of unsuccessful predecessor statutes that relied on “water quality standards” as the primary method of pollution control. Prior to 1972, sources were regulated “based on their effect on the surrounding water” and discharges were limited only if they caused water quality to drop below an acceptable level.<sup>147</sup> But that approach created a “virtually unbridgeable causal gap” because “proving that a particular polluter had caused the water quality to dip below the standards was all but impossible to satisfy.”<sup>148</sup> Thus, “Congress realized not only that its [pre-1972] water pollution efforts ... had failed, but also that reliance on receiving water capacity as a crucial test for pollution levels had contributed greatly to that failure.”<sup>149</sup>

To reverse the anarchy and ineffectiveness of case-by-case regulation, Congress required EPA to set standards for categories of polluters:

In presenting the Conference Report to the Senate, Senator Muskie, perhaps the Act’s primary author, emphasized the importance of uniformity in setting § 301 limitations....[which] required that EPA focus on classes or categories of sources in formulating effluent limitations....

“The Conferees intend that the factors [for permitting standards]... be considered only within classes or categories of point sources and that such factors not be considered at the time of the application of an effluent limitation to an individual point source within such a category or class.” 118 Cong. Rec. 33697 (1972), Leg.

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the Water Pollution Control Act Amendments of 1972, 1452 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973).

<sup>145</sup> *Id.*, 451 U.S. at 317, quoting House Debate on H.R. 11896, 1 Leg. Hist. 350-51, 359-60 (remarks of Reps. Blatnik and Jones). 1 *Legislative History of the Water Pollution Control Act Amendments of 1972* 350 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973) (Exh. 55).

<sup>146</sup> *EPA v. California State Water Resources Control Board*, 426 U.S. 200, 202-03 (1976).

<sup>147</sup> *Riverkeeper I* at 189, citing *CPC Int’l v. Train*, 515 F.2d 1032, 1034-35 (8th Cir. 1975).

<sup>148</sup> *Id.* at 189-90, quoting *CPC*, 515 F.2d at 1035 and *Bethlehem Steel Corp. v. EPA*, 538 F.2d 513, 515 (2d Cir. 1976).

<sup>149</sup> *Weyerhaeuser*, 590 F.2d at 1042.

Hist. 172.<sup>150</sup>

The Senate Public Works Committee explained the Act's requirement for standardized effluent limits and this "shift to end-of-pipe standards":<sup>151</sup>

The Committee adopted this substantial change ...because of the great difficulty associated with establishing reliable and enforceable precise effluent limitations on the basis of a given stream quality. Water quality standards, in addition to their deficiencies in relying on the assimilative capacity of receiving waters, often cannot be translated into effluent limitations – defensible in court tests, because of the imprecision of models for water quality and the effects of effluents in most waters.....

With effluent limits, the Administrator can require the best control technology; he need not search for a precise link between pollution and water quality.<sup>152</sup>

"Government regulators were therefore freed from the 'need [to] search for a precise link between pollution and water quality in enforcing pollution controls."<sup>153</sup> Moreover, the new approach to regulation also:

implemented changing views as to the relative rights of the public and of industrial polluters. Hitherto, the right of the polluter was pre-eminent, unless the damage caused by pollution could be proven. Henceforth, the right of the public to a clean environment would be pre-eminent, unless pollution treatment was impractical or unachievable. ... This new view of relative rights was based in part on the hard-nosed assessment of our scientific ignorance: "we know so little about the ultimate consequences of injection of new matter into water that (the Act requires) a presumption of pollution. . . ."<sup>154</sup>

Under the 1972 Act:

a discharger's performance is ... measured against strict technology-based effluent limitations [setting forth] specified levels of treatment to which it *must conform* ... This new approach reflected developing views on practicality and rights. Congress concluded that water pollution seriously harmed the environment, and that although the cost of control would be heavy, the nation would benefit from controlling that pollution. Yet *scientific uncertainties made it difficult to assess the benefits to particular bodies of receiving water.*<sup>155</sup>

<sup>150</sup> *E. I. du Pont. v. Train*, 430 U.S. 112, 130 (1977).

<sup>151</sup> *Id.* at 163.

<sup>152</sup> S. Rep. No. 414, 92d Cong., 1st Sess. 8 (1971) (Exh. 56).

<sup>153</sup> *Friends of the Earth, Inc. v. Gaston Copper Recycling Corp.*, 204 F.3d 149, 151 (4th Cir. 2000), citing legislative history (internal citations omitted).

<sup>154</sup> *Weyerhaeuser v. Costle*, 590 F.2d 1011, 1043 (D.C. Cir. 1978), citing legislative history (internal citations omitted).

<sup>155</sup> *Weyerhaeuser*, 590 F.2d at 1042 (emphasis added).

A significant objective of Congress was to standardize permitting and to have EPA set a federal floor for environmental protection in order to avoid a “race to the bottom” by state regulators, which commonly occurred before 1972, when States competed to attract industries by relaxing control requirements:

[B]y eliminating the issue of the capacity of particular bodies of receiving water, Congress made nationwide uniformity in effluent regulation possible. Congress considered uniformity vital to free the states from the temptation of relaxing local limitations in order to woo or keep industrial facilities. In addition, national uniformity made pollution clean-up possible without engaging in the divisive task of favoring some regions of the country over others.<sup>156</sup>

In particular, the 1972 Act fundamentally restructured the law to rely in the first instance on the imposition of a series of categorically-determined technology-based standards to be promulgated by EPA that did not themselves depend on site-specific showings of impact of particular activities on water quality. These technology-based standards are designed to achieve the maximum reduction in activities that degraded water quality, by focusing on the extent to which certain technology was, depending on the type of source or pollutant, “practicable,” “achievable,” “available” or “demonstrated.”<sup>157</sup>

Water quality standards were retained in the 1972 Act only as a supplementary mechanism that – except in the case of thermal pollution under section 316(a), which is a “notable exception” – can only be used to set limitations stricter, but not more lenient, than technology-based limitations.<sup>158</sup> In 1977, Congress also observed that its “one experiment in the Act with allowing consideration of receiving water capacity,” section 316(a), “had led to a regulatory breakdown. ‘Heat has thus become an unregulated pollutant, clearly not the intent of the Congress. . . . That limited exemption has been turned into a gaping loophole.’”<sup>159</sup>

Congress intended the CWA’s technology-based standards to become more stringent over time. For permits issued before EPA had promulgated national standards, NPDES permit writers used their “best professional judgment” (BPJ) on a case-by-case basis.<sup>160</sup> Next, by 1977, discharges from existing facilities were to be brought in line with the “best practicable control technology currently achievable” (BPT).<sup>161</sup> In the next phase, by 1989, most facilities

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<sup>156</sup> *Weyerhaeuser*, 590 F.2d at 1042; *see also Natural Resources Defense Council, Inc. (“NRDC”) v. Train*, 510 F.2d 692, 709-10 (D.C. Cir. 1974) (explaining that Congress intended uniform federal requirements to “safeguard against industrial pressures by establishing a uniform ‘minimal level of control imposed on all sources within a category or class’”).

<sup>157</sup> See CWA sections 301(b), 304(b), 306; 33 U.S.C. §§ 1311(b), 1314(b), 1316.

<sup>158</sup> See CWA section 301(b)(1)(C), 33 U.S.C. § 1311(b)(1)(C); *EPA v. California*, 426 U.S. at 205 n. 12; *Riverkeeper*, 358 F.3d at 184 n. 10, 190; *Weyerhaeuser*, 590 F.2d at 1043.

<sup>159</sup> *Id.* at 1044, citing legislative history.

<sup>160</sup> 33 U.S.C. § 1342(a)(1)(B). Even in BPJ cases, the conditions are to reflect best practices in the industry rather than local conditions. *See Natural Resources Defense Council (“NRDC”) v. EPA*, 863 F.2d 1420, 1425 (9th Cir. 1988).

<sup>161</sup> BPT represents the “average of the best existing performance by plants . . . within each industrial category. This average is not based upon a broad range of plants within an industrial category or subcategory, but is based upon

nationwide would be required to step up the level of pollution control to standards based on the “best available technology economically achievable” (BAT).<sup>162</sup>

Finally, for new facilities, Congress created the strictest standard in the Act, “new source performance standards,” which require the application of “best available demonstrated control technology” (BADT).<sup>163</sup> These standards are similar to the technology-based limitations established for existing sources, except that no cost-based variances are allowed during permitting.<sup>164</sup> Indeed, with the passage of time and the tightening of the standards, cost considerations were to be relegated to a more peripheral role in the selection of best technology.<sup>165</sup> Courts have consistently held that a central statutory objective of technology standards is to “predicate[] pollution control on the application of control technology *on the plants themselves*”<sup>166</sup> to reduce pollution’s impacts “at their source.”<sup>167</sup>

Consequently, the Clean Water Act’s technology-based limitations were designed to force the iterative development of more protective technologies, and to ratchet down discharges and other impairments to water quality until they could be eliminated.<sup>168</sup> Congress and numerous federal courts have emphasized this “technology-forcing” character of the Act’s categorical standards within the context of the section 301 BAT requirement. Indeed, the most critical aspect of BAT is that it compels polluting industries to meet ever more stringent limitations on the path towards complete elimination of water pollution.<sup>169</sup> BAT must be “at a minimum, established with reference to the best performer in any industrial category.”<sup>170</sup> “The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible. In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.”<sup>171</sup>

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performance levels achieved by exemplary plants.” *EPA v. National Crushed Stone Assoc.*, 449 U.S. 64, 76 n.15 (1980).

<sup>162</sup> 33 U.S.C. § 1311(b)(2). BAT uses “the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.” *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985).

<sup>163</sup> CWA § 306; 33 U.S.C. § 1316.

<sup>164</sup> *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 137 (1977).

<sup>165</sup> *NRDC v. EPA*, 822 F.2d 104, 110 (D.C. Cir. 1987); *see also Riverkeeper I*, 358 F.3d at 185 (EPA “should give decreasing weight to expense as facilities have time to plan ahead to meet tougher restrictions.”).

<sup>166</sup> *Hooker Chems. & Plastics Corp. v. Train*, 537 F.2d 620, 623 (2d Cir. 1976) (emphasis added).

<sup>167</sup> *Bethlehem*, 538 F.2d at 515.

<sup>168</sup> The use of national, uniform standards also promotes the Congressional interest in “horizontal equity,” *i.e.*, that similar facilities be treated similarly under the CWA insofar as possible. *NRDC v. EPA*, 859 F.2d 156, 200 (D.C. Cir. 1988) (“[O]ne congressional purpose in this respect was clear: ... to maximize horizontal equity.”); *American Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1044 (3d Cir. 1975) (“[T]he intent is that effluent limitations applicable to individual point sources be as uniform as possible.”).

<sup>169</sup> *NRDC v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987).

<sup>170</sup> Conf. Rep. on S. 2770 (October 4, 1972), 1 *Legislative History of the Federal Water Pollution Control Act of 1972* 170 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973) (Exh. 57).

<sup>171</sup> *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985), citing legislative history 1 *Legislative History of the Federal Water Pollution Control Act of 1972*, 798 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973) (Exh. 58).

“[I]t is clear that Congress did not intend by that phrase [i.e., BAT] to limit the technology to that which is widely in use. ... ‘It will be sufficient, for the purpose of setting the level of control under available technology, that there be one operating facility which demonstrates that the level can be achieved or that there is sufficient information and data from a relevant pilot plant.’”<sup>172</sup> BAT must “utilize the latest technology to reach ‘the greatest attainable level ... which could be achieved.’”<sup>173</sup> As explained by the U.S. Court of Appeals for the District of Columbia Circuit:

[T]he [Clean Water Act’s] regulatory scheme is structured around a series of increasingly stringent technology-based standards ... [T]he most salient characteristic of this statutory scheme, articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing.... The essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies. *This policy is expressed as a statutory mandate, not simply as a goal.*<sup>174</sup>

Moreover, as the Supreme Court has recognized, the potential for economic consequences does not obviate the mandate for technology based standards:

Prior to the passage of the Act, Congress had before it a report ... [that] estimated that there would be 200 to 300 plant closings caused by the first set of pollution limitations. Comments in the Senate debate were explicit: ‘There is no doubt that we will suffer some disruptions in our economy because of these efforts; many marginal plants may be forced to close.’<sup>175</sup>

Much more recently, the Second Circuit recognized that technology standards are economically achievable even if they could result in the closure of certain facilities.<sup>176</sup> Referring to an 11 percent industry-wide risk of closure, the Court stated that “the EPA – and courts – have treated more substantial risks of closure as nonetheless supporting a finding of economic achievability.”<sup>177</sup> In *Chemical Manufacturers*, for example, the Fifth Circuit upheld a BAT standard where 14 percent of facilities would be forced to close.<sup>178</sup>

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<sup>172</sup> *American Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1058 (3d Cir. 1975), quoting legislative history.

<sup>173</sup> *NRDC v. EPA*, 863 F.2d 1420, 1431 (9th Cir. 1988). See also *Texas Oil & Gas Ass’n v. United States EPA*, 161 F.3d 923, 928 (5th Cir. 1998) (BAT limitations to be based on the performance of “the single best-performing plant.”) *American Iron & Steel*, 526 F.2d at 1061; *National Ass’n of Metal Finishers v. EPA*, 719 F.2d 624, 657, n. 51 (3d Cir. 1983); *FMC Corp. v. Train*, 539 F.2d 973, 983 (4th Cir. 1976); *American Frozen Food Inst. v. EPA*, 539 F.2d 107, 117 (D.C. Cir. 1976).

<sup>174</sup> *NRDC v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987) (emphasis added).

<sup>175</sup> *EPA v. National Crushed Stone*, 449 U.S. 64, 80 (1980).

<sup>176</sup> *Waterkeeper*, 399 F.3d at 518.

<sup>177</sup> *Id.*

<sup>178</sup> *Chem. Mfrs.*, 870 F.2d at 202.

**3. As Part of the CWA’s Technology-Based Regime, Section 316(b) Requires EPA to Adopt Uniform, National, Categorical, Technology-Based and Technology-Forcing BTA Standards for Cooling Water Intake Structures.**

CWA Section 316(b) represents the convergence of two important Congressional objectives: to minimize the massive water withdrawals and fish kills caused by once-through cooling at power plants, and to do so through the imposition of national, categorical, technology-based standards that can be made stricter, but not weaker, as a result of site-specific water quality assessments. As noted above, Section 316(b) was enacted as part of the sweeping 1972 amendments to the Clean Water Act. The plain language of this provision and an examination of the relevant statutory structure compels the conclusion that EPA is required to adopt uniform, national, categorical, technology-based and technology-forcing BTA standards for cooling water intake structures.

**a. Section 316(b) Requires EPA to Establish National Standards.**

With its use of a clear command – “shall” – Section 316(b) affords the Administrator of EPA no discretion to decline to establish standards for the intake of cooling water.<sup>179</sup> Indeed, EPA recognizes that Section 316(b) “requires EPA to establish standards for cooling water intake structures that reflect the ‘best technology available for minimizing adverse environmental impact.’”<sup>180</sup> Significantly, the term “standard” is used in the CWA only to refer to *national* standards, such as the “standards of performance” EPA issues as national categorical regulations for new facilities,<sup>181</sup> the “pretreatment standards” EPA issues as national categorical regulations for industrial facilities discharging toxic pollutants to sewer systems,<sup>182</sup> and the “standards of performance” EPA issues as national categorical regulations for marine sanitation devices.<sup>183</sup> Significantly, in the seminal 1977 case of *E. I. du Pont de Nemours v. Train* the Supreme Court relied, in part, on the fact that “§ 316(b) refers to ‘[any] standard established pursuant to section 301’” in holding that Congress intended EPA to promulgate effluent limitations for existing sources by regulation (and not case-by-case) under section 301.<sup>184</sup> As the Second Circuit confirmed in its review of EPA’s Phase II cooling water intake rule, Section 316(b) constitutes a “statutory directive to set national standards.”<sup>185</sup>

**b. The National Standards Section 316(b) Requires Are a Form of Limitation Required by Sections 301 and 306.**

Significantly, Congress has in Section 316(b) also directed EPA to utilize a *particular* Clean Water Act standard for implementing the BTA mandate: a “standard established pursuant

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<sup>179</sup> “‘Shall’ ... is the language of command.” *Escoe v. Zerbst*, 295 U.S. 490, 493 (1935).

<sup>180</sup> 76 Fed. Reg. at 22,196 (col. 2) (emphasis added).

<sup>181</sup> CWA § 306; 33 U.S.C. § 1316.

<sup>182</sup> CWA § 307(b); 33 U.S.C. § 1317(b). As the Courts have noted, these standards are to be uniform within an industrial category. See *Chemical Mfrs.*, 870 F.2d at 244, 253.

<sup>183</sup> CWA § 312(b); 33 U.S.C. § 1322(b).

<sup>184</sup> *E. I. du Pont de Nemours v. Train*, 430 U.S. 112, 133 n.24 (1977) (emphasis added).

<sup>185</sup> *Riverkeeper II*, 475 F.3d at 126.



to [CWA sections 301 or 306] and applicable to a point source.”<sup>186</sup> Any argument that EPA may choose to regulate on an individual, plant-by-plant basis thus is foreclosed not simply by Congress’s use of the term “standard” in Section 316(b), but also by that section’s requirement that intake structures be regulated *as part of* the categorical “standards established pursuant to” sections 301 and 306.<sup>187</sup>

Further, the legislative history provides that “[s]ection 316 must be read with other sections in the bill including section 301 effluent limitations . . . and section 306, new sources.”<sup>188</sup> Looking to the cross-referenced sections 301 and 306, and consistent with the Supreme Court’s conclusion in *du Pont* that the reference to “standards” in Section 316(b) means national categorical regulations, the courts have found that Section 316(b) requires EPA to establish BTA requirements as part of the standards required by sections 301 and 306 and subject to the deadlines set forth in those sections. For example, before remanding EPA’s first BTA regulations in 1977, the Fourth Circuit concluded that:

[t]he regulations issued under § 316(b) are...closely related to the effluent limitations and new source performance standards of §§ 301 and 306... It bears emphasis that § 316(b)...*requires § 301 and § 306 standards to deal with cooling water intake structures...*[The] regulations [are] issued at least in part under the same statutory sections, some of which limit intake structures, others, effluent discharges.<sup>189</sup>

Significantly, that court noted the fundamental differences in the statutory scheme for effluent limitations and Section 316(b) standards, as compared to water quality standards.<sup>190</sup> In that opinion, the Fourth Circuit also took note of “the aim of Congress to achieve nationally uniform standards.”<sup>191</sup>

Likewise, in rejecting a challenge to EPA’s authority to regulate cooling water structures in NPDES permits, the Seventh Circuit held that the requirements of Section 316(b) “are to be implemented through standards established pursuant to §§ 301 and 306.”<sup>192</sup> In entering the consent decree requiring EPA’s three-phase BTA rulemaking, the Southern District of New York held that “a Section 316(b) limitation should be considered a form of limitation under sections 301 and 306” and “the time limits in section 301 and 306 govern EPA’s duty to take action under Section 316(b).”<sup>193</sup> And in reviewing EPA’s Phase I Rule, the Second Circuit observed that Section 316(b)’s text:

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<sup>186</sup> CWA § 316(b).

<sup>187</sup> Also telling is the fact that BTA requirements must be issued for the same facilities, *i.e.*, “point sources” to which categorical discharge limitations apply.

<sup>188</sup> *Riverkeeper I*, 358 F.3d at 186, quoting statement of Rep. Clark.

<sup>189</sup> *Virginia Electric and Power Company v. Costle* (“*VEPCO*”), 566 F.2d 446, 450 (4th Cir. 1977); see also *Cronin v. Browner*, 898 F.Supp. 1052, 1059 (S.D.N.Y. 1995).

<sup>190</sup> *VEPCO*, 566 F.2d at 450, n.17 citing *Bethlehem*, 538 F.2d 513, and noting that unlike water quality standards, Section 316(b) regulators are “closely tied to § 301 or § 306.” *Id.*

<sup>191</sup> *Id.* at 450, citing *American Frozen Food Inst. v. EPA*, 539 F.2d 107, 118 (D.C. Cir. 1976).

<sup>192</sup> *United States Steel Corp. v. Train*, 556 F.2d 822, 850 (7th Cir. 1977).

<sup>193</sup> *Cronin*, 898 F.Supp. at 1059.

makes clear that administrative regulations under this section are promulgated “pursuant to” both sections 301 and 306 as well as Section 316(b). When the EPA “established” new source performance discharge “standard[s]” “pursuant to section ... 306,” it ought *then* to have regulated new intake structures, because, by virtue of Section 316(b), section 306’s standards “shall require that ... cooling water intake structures reflect the best technology available.”<sup>194</sup>

Accordingly, EPA not only should have promulgated requirements for cooling water intake structures at the same time as it promulgated discharge requirements for the point sources using the intakes, in accordance with the specific deadlines set forth in sections 301 and 306,<sup>195</sup> — i.e., by 1989, at the latest — but EPA was also required to promulgate those requirements as a form of section 301 and 306 limitations as part of the same standards.

**c. The National Standards Section 316(b) Requires Must Be Uniform and Categorical.**

The fact that Section 316(b) standards are a form of limitation under CWA sections 301 and 306 also reveals an essential feature about them: like the Act’s other technology-based standards, Section 316(b) standards are to be implemented on a nationwide, uniform basis whenever it is feasible to do so.<sup>196</sup> The industrial point source standards promulgated under sections 301 and 306 are “categorical” in nature. That is, each standard applies to a particular industrial category and, except in those limited circumstances where an individualized waiver or variance may be available, applies uniformly to all facilities in the United States in that category.<sup>197</sup> Since the requirements for cooling water intakes are required to be issued as part of these categorical standards, and are to be applicable to the same facilities to which categorical discharge limitations apply, it is therefore inescapable that these requirements are also to be categorical.

The integration of Section 316(b)’s “best technology available” (BTA) requirement to minimize adverse environmental impacts with the effluent limitations under sections 301 and 306 indicates Congress’s intent for national technology-based standards to control entrainment and impingement.

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<sup>194</sup> *Riverkeeper I*, 358 F.3d at 185-86 (emphasis in original).

<sup>195</sup> For existing sources those deadlines were July 1, 1977 (33 U.S.C. § 1311(b)(1)(A)) and March 31, 1989 (33 U.S.C. § 1311(b)(2)(C) – (F)). For new sources, EPA was required to publish a list of at least 27 specified industry categories by January 17, 1973 (33 U.S.C. § 1316(b)(1)(A)), and to promulgate standards for each category within one year thereafter (33 U.S.C. § 1316(b)(1)(B)).

<sup>196</sup> This does not mean, of course, that the substance of the Section 316(b) regulations is to be based on the substantive factors applicable to the section 306 standards or any of the various section 301 standards. The substance of the Section 316(b) standards is to be determined with reference to the language of Section 316(b) itself.

<sup>197</sup> See 33 U.S.C. § 1311(b)(2)(A) (directing EPA to promulgate “effluent limitations for *categories and classes* of [existing] point sources”); 33 U.S.C. § 1316(b)(1)(B) (specifying that “after a *category* of sources is included in a list” as required by this section, EPA “shall propose and publish regulations establishing Federal standards of performance for new sources *within such category*”) (emphases added). See generally *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 126-29 (1977).

Clearly, had it chosen to do so, Congress *could* have drafted Section 316(b) as solely a substantive requirement to be determined case-by-case by individual permit writers. For instance, Congress could simply have required that cooling water intake structures meet BTA, with no reference to “standards” or to sections 301 and 306. Or Congress could have written Section 316(b) to refer instead to CWA section 402,<sup>198</sup> since permit conditions are established pursuant to *that* section, not section 301 or 306. The fact that Congress added these additional mandates reflects a clear intent that the BTA requirements be issued as categorical standards.<sup>199</sup>

**C. Regulatory Background: For Forty Years, Regulation on a Case-by-Case Site-Specific Basis Has Caused Bureaucratic Paralysis, Litigation Quagmires, and the Perpetuation of the Unacceptable Status Quo, Contrary to Congress’s Intent.**

Since 1972, in the absence of national regulations, cooling water intake structures have been relegated on an *ad hoc*, case-by-case, site-specific basis by individual permit writers, typically State agencies, exercising their “best professional judgment.”<sup>200</sup> Permit proceedings have typically extended over many years – in some cases, more than a decade – despite the CWA’s requirements that NPDES permits be limited to five years duration<sup>201</sup> and that BAT regulations be reviewed and, if appropriate, revised every five years.<sup>202</sup> Permit renewals are backlogged in virtually every state and hundreds of facilities operate on long-expired permits. When BTA decisions have been made, these site-specific proceedings have resulted in uneven and conflicting rulings, the widespread use of inferior technology, little change in the status quo, and enormous, unnecessary aquatic mortality, all of which run contrary to the goals of the Clean Water Act and the direct mandate of Section 316(b).

Industry, which has a critical strategic advantage in these complex proceedings because of its superior resources, has taken advantage of biological and economic complexity and used litigation and delay tactics to avoid technology upgrades. In particular, industry will inundate regulators with an overabundance of information, which is highly time-consuming to evaluate, if it can be evaluated at all. As just one example of which EPA is aware, in New Jersey, one plant’s permit renewal application comprised 36 volumes, supported by 137 volumes of technical and reference materials, which took the state agency seven years to review and finally act upon.<sup>203</sup>

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<sup>198</sup> 33 U.S.C. § 1342.

<sup>199</sup> Of course, there will be some circumstances in which uniform regulation is simply impracticable for a particular aspect of certain facilities’ operation. There may be technical or administrative impediments to uniform regulation, a lack of available data, or site-specific conditions preventing any one set of technologies from being deemed the “best available.” Under *those* circumstances, plant-by-plant permitting may be appropriate; otherwise, there would be no regulation at all. See generally *NRDC v. Train*, 510 F.2d 692, 710 (D.C. Cir. 1974); *NRDC v. Costle*, 568 F.2d 1369, 1379-80 (D.C. Cir. 1977). But the fact that EPA’s attempts to establish nationwide uniform standards may be thwarted on occasion by practical considerations does not give the agency *carte blanche* to refuse to set such standards for an entire category whenever it prefers another approach. It certainly does not allow EPA to countermand the congressional preference for uniform standards based on the agency’s own policy judgments.

<sup>200</sup> See CWA § 402(a)(1)(B), 33 U.S.C. § 1342(a)(1)(B) (prior to national regulations, permits are case-by-case); *NRDC v. EPA*, 863 F.2d 1420, 1424 (9th Cir. 1988).

<sup>201</sup> CWA § 402(b)(1)(B), 33 U.S.C. § 1342(b)(1)(B).

<sup>202</sup> CWA § 301(d), 33 U.S.C. § 1311(d)

<sup>203</sup> 67 Fed. Reg. at 17,153 (col.1).

Industry then uses the enormous volumes of technical information in purported justification of a laundry list of baseless excuses and unsupported arguments, such as the following:

1. Industry incorrectly contends that adverse environmental impact (AEI) must be established at each facility before Section 316(b) applies or BTA requirements can be imposed.<sup>204</sup>
2. Industry further incorrectly contends that permitting agencies must define AEI at some threshold level of ecological damage for each individual facility's permit application.<sup>205</sup>
3. Industry often contends, contrary to the obvious facts, that a particular power plant is not causing AEI despite entraining and impinging large numbers of organisms.<sup>206</sup>
4. Industry often incorrectly contends that AEI must be or should be measured at the population level.<sup>207</sup>
5. Industry incorrectly argues that the methods used by fisheries scientists to evaluate the impacts of proposed harvesting regimes should be used to evaluate the harms of impingement and entrainment.<sup>208</sup>
6. Industry often incorrectly contends that populations will not be affected by intake structures, despite the loss of large numbers of early life stages of fish, based on the misapplication of the ecologically baseless concept of "surplus production."<sup>209</sup>

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<sup>204</sup> In New York, facility operators contest the existence of an adverse environmental impact as the first step in the state's BTA case analysis process. *See In the Matter of Athens Generating Company, LP*, Interim Decision of the Commissioner of the N.Y. State Dep't of Env'tl. Conservation at 4, (June 2, 2000), available at <http://www.dec.ny.gov/hearings/10976.html> ("Pursuant to CWA §316(b), a four step analysis determines whether 'best technology available' is being utilized by any particular facility" and the first step is determining "whether the facility's cooling water intake structure may result in adverse environmental impact.").

<sup>205</sup> *See, e.g.*, July 11, 2000, letter from Utility Water Action Group Cooling Systems Committee Chair David Bailey to OMB Office of Information and Regulatory Affairs Deputy Administrator Don Arbuckle, at 2, attached to July 11, 2000 letter from Kristy A.N. Bulleit to EPA Office of Science and Technology Director Geoffrey Grubbs. *See also* Comments of the Utility Water Action Group on EPA's Proposed Section § 316(b) Rule for New Facilities and ICR No. 1973.01, November 9, 2000 ("UWAG Phase I Comment") at 53-72.

<sup>206</sup> *See, e.g., In the Matter of Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC*, Interim Decision of the Assistant Commissioner of the N.Y. State Dep't of Env'tl. Conservation at 16 (Aug. 13, 2008), available at [http://www.dec.ny.gov/docs/legal\\_protection\\_pdf/indianpointid.pdf](http://www.dec.ny.gov/docs/legal_protection_pdf/indianpointid.pdf) (Exh. 59) ("Entergy maintains that staff may not presume adverse impacts exist, but rather must 'affirmatively establish' the existence of such impacts.").

<sup>207</sup> In pre-filed testimony, dated July 22, 2011, filed with the New York State DEC in regard to the NPDES permit for the Indian Point power plant, Entergy Nuclear argued that the plant's adverse environmental impact, and the efficacy of Entergy's proposed cylindrical wedgewire screens, should be considered at the population level and applied age-one equivalent conversions to represent the adverse impacts of Indian Point on all life stages of fish as part of a single metric; *see also* UWAG Phase I Comment at 58-68.

<sup>208</sup> UWAG Phase I Comment at 66.

<sup>209</sup> For example, FirstEnergy has claimed that the massive fish kills at its Bayshore power plant in Ohio are not significant to the fish population as a whole. *See* Letter from Michael Jirousek, FirstEnergy Generation Corp. to Naajy S. Abdullah, Ohio EPA re FirstEnergy's Comments on Renewal of NPDES Permit for Bay Shore Plant (May 26, 2010) (arguing that overall fish populations are not affected even though, "at face value" the fish kill data from

7. Industry incorrectly argues that only certain fish and shellfish species matter.<sup>210</sup>
8. Industry often has the temerity to argue, incorrectly, that massive fish kills and thermal discharges have a beneficial impact, for example because some of the dead fish are nuisance species or some species prefer warmer water.<sup>211</sup>
9. Industry makes the irrelevant argument that some of the fish they entrained or impinged were dead before they were trapped by the intake structure.<sup>212</sup>
10. Industry incorrectly argues that the percentage of fish being impinged and entrained is small when compared to overall stock size or what industry sometimes refers to as the “exploitable population.”<sup>213</sup>
11. Industry incorrectly argues or suggests that other causes, for example, fishing or natural conditions, have a more significant impact on fish than intake structures.<sup>214</sup>
12. Industry incorrectly argues that documented fish or shellfish population declines in the vicinity of the plant are unrelated to the operation of their intake structures.<sup>215</sup>
13. Industry incorrectly argues that large numbers of fish survive impingement and/or entrainment unharmed.<sup>216</sup>
14. Industry contends, contrary to legal precedent, that it should get credit for restoration or

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Bayshore suggest “that the number of organisms impacted in the cooling water intake is large.” (Exh. 60); *See also* discussion of “surplus production” arguments in John Boreman, “Surplus Production, Compensation, and Impact Assessments of Power Plants,” 3 *Envtl. Sci. & Pol’y* 8445 (2000) [DCN 2-018A] (Exh. 61) and Super and Gordon, “Minimizing Adverse Environmental Impact: How Murky the Waters,” *The Scientific World* 229 (2002) (Exh. 62).

<sup>210</sup> FirstEnergy has used this argument to attempt to publicly diminish the significance of its massive fish kills at the Bayshore power plant. *See, e.g.*, Letter from Michael Jirousek, FirstEnergy Generation Corp. to Naajy S. Abdullah, Ohio EPA (May 26, 2010) (killing massive numbers of emerald shiners, sheephead and gizzard shad is less important because there are large populations of these species in Lake Erie) (Exh. 60).

<sup>211</sup> This argument has been made by Midwest Generation with regard to the Crawford and Fisk plants in the Chicago waterway system in Illinois. Similarly, Dayton Power & Light has argued that once-through cooling at its Stuart plant in Ohio is beneficial to the environment because it supports fishing opportunities during the winter. *See* Letter from JoAnne Rau, Director, Environmental Safety and Management, Dayton Power and Light Company to Sean Ramach, US EPA Region 5 (Apr. 28, 2011) (providing DP&L’s comments on EPA’s rejection of the draft NPDES permit renewal for the J.M. Stuart Electric Generating Station) (Exh. 63). Recently, EPA proposed to object to Ohio EPA’s renewal of Stuart’s NPDES permit because Ohio EPA does not require compliance with thermal water quality standards and Dayton Power & Light has not provided support for a thermal variance. *See id.*

<sup>212</sup> FirstEnergy has emphasized such deaths in an attempt to diminish the significance of the massive fish kills at its Bayshore power plant.

<sup>213</sup> *See, e.g., In the Matter of Millstone Power Station*, Before the Connecticut Department of Environmental Protection, Office of Adjudications, Application No. 199701876, Applicant’s Post Hearing Submittal (May 8, 2009) (Exh. 64).

<sup>214</sup> *Id.* FirstEnergy has also tried to distract the public from the massive fish kills at its Bayshore power plant by pointing to other sources of stress on the aquatic ecosystem in the surrounding area.

<sup>215</sup> *See, e.g., In the Matter of Millstone Power Station*, Before the Connecticut Department of Environmental Protection, Office of Adjudications, Application No. 199701876, Applicant’s Post Hearing Submittal (May 8, 2009) (Exh. 64).

<sup>216</sup> *See, In the Matter of Dynegy Northeast Generation, Inc., on behalf of Dynegy Danskammer LLC (Danskammer Generating Station)*, DEC No.: 3-3346-00011/00002, SPDES No.: NY-0006262, Decision of the Deputy Commissioner of the N.Y. State Dep’t of Env’tl. Conservation at 17 – 18 (May 24, 2006) (Exh. 65) (Dynegy sought to have entrainment mortality figures for Danskammer adjusted for claimed entrainment survival).

mitigation measures.<sup>217</sup>

15. Industry often incorrectly argues that the operational baseline for comparing the performance of technologies should be calculated based on the wholly artificial concept that the plant operates at full capacity 24 hours a day, seven days a week, 365 days a year, and should receive “credit” for the difference between fictional baseline and its normal operation, even in instances where the gap between the fictional baseline and actual operation is 90 percent or more.<sup>218</sup>
16. Industry incorrectly argues that the burden of proof is on state regulators or intervenors to prove that certain technologies are BTA, when, in fact, permittees must prove that they are entitled to a NPDES permit to discharge and to withdraw cooling water from waters of the U.S.<sup>219</sup>
17. Industry often incorrectly argues that their excessive thermal discharges should be ignored because of “mixing zones.”<sup>220</sup>
18. Industry invariably argues that they are entitled to a variance under Clean Water Act Section 316(a) from technology-based standards for thermal discharges.<sup>221</sup>
19. Industry incorrectly argues that states cannot or should not require closed-cycle cooling

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<sup>217</sup> See, e.g., *Voices of the Wetlands v. State Water Resources Control Board*, No. S160211, 2011 WL 3558007 (Cal. Supreme Ct. August 15, 2011) at \* 7 (state approved \$7 million Elkhorn Slough habitat restoration plan as mitigation for entrainment and impingement; parties disputed restoration was a “substitute” for BTA and whether the BTA determination rested on the restoration plan as the basis for its BTA finding). For many years, restoration measures have been the centerpiece of Section 316(b) compliance for PSEG’s Salem nuclear plant in New Jersey, despite dubious claims that restoration is not linked to the BTA determination.

<sup>218</sup> Mirant Bowline LLC has sought a full-flow baseline for its Bowline Point Generating Station in recent permit proceedings, despite the fact that, in 2010, the plant generated energy equal to less than 5% of its capacity. See *In the Matter of the Application of Mirant Bowline LLC (Mirant) For a State Pollution Discharge Elimination System Permit Renewal for the Bowline Point Generating Station (Units 1 and 2)*, DEC # 3-3922-00003/00003, SPDES # NY-0008010, Post-Issues Conference Brief by the Staff of the New York State Department of Environmental Conservation at 12 (June 29, 2006) (accepting the applicant’s argument that the Mirant Bowline plant should be entitled to a full-flow baseline) (Exh. 66); see also, *In the Matter of Dynegy Northeast Generation, Inc., on behalf of Dynegy Danskammer LLC (Danskammer Generating Station)*, DEC No.: 3-3346-00011/00002, SPDES No.: NY-0006262, Decision of the Deputy Commissioner of the N.Y. State Dep’t of Env’tl. Conservation at 1 (May 24, 2006) (Exh. 65) (“[T]he baseline should be calculated using full-flow”). But see New York Independent System Operator, *Gold Book; 2010 Load & Capacity Data* at 42 (April 2010), available at: [http://www.nyiso.com/public/webdocs/services/planning/planning\\_data\\_reference\\_documents/2010\\_GoldBook\\_Public\\_Final\\_033110.pdf](http://www.nyiso.com/public/webdocs/services/planning/planning_data_reference_documents/2010_GoldBook_Public_Final_033110.pdf) (Mirant Bowline’s two generating units generated less than 150 GWh of energy in 2010, despite having a combined nameplate capacity of over 1 GW).

<sup>219</sup> Dynegy has sought to reverse the burden of proof with respect to its Danskammer plant, while Entergy has sought to do the same in permit proceedings related to the Indian Point facility.

<sup>220</sup> In the commenters’ experience, every power company attempts to make this argument, often by defining the mixing zone in a way that encompasses the entire thermal plume and failing to take an adequate look at the thermal discharges’ impacts on aquatic life. See, e.g., Letter from Mark Sanza, Assistant Counsel, NY DEC to the Hon. Maria E. Villa and the Hon. Daniel P. O’Connell, Administrative Law Judges, NY DEC (May 16, 2011) (Exh. 67) (NYS DEC stating letter stating that the Indian Point plant may use a “mixing zone” and that mixing zone will provide reasonable assurances of compliance with the water quality standards – without analyzing impacts on the record of permitting proceeding); Letter from Elise N. Zoli, Attorney for Entergy, to the Hon. Maria E. Villa, Administrative Law Judge, NY DEC (May 17, 2011) (Exh. 68) (power plant operator points to temperature measures in the thermal plume, rather than analyzing impacts to fish, in support of modified mixing zone).

<sup>221</sup> This argument is made by virtually every plant.

under Section 316(b) if closed-cycle cooling is not required under Section 316(a), even though those two subsections operate independently.<sup>222</sup>

20. Industry often incorrectly contends that compliance with BTA standards is too expensive for the company.<sup>223</sup>
21. Industry often incorrectly contends that compliance with BTA standards is too expensive for ratepayers.<sup>224</sup>
22. Industry often includes vague and absurdly excessive expenses in their estimates of compliance costs, such as overhead and indirect expenses.<sup>225</sup>
23. Industry incorrectly argues that it is entitled to special treatment because electricity is an “essential service.”<sup>226</sup>
24. Industry incorrectly argues that it provides significant societal benefits that entitle it to special treatment.<sup>227</sup>
25. Industry incorrectly argues that states lack the authority to require plants to curtail operations to meet BTA requirements or to shut down plants that are not complying with such requirements.<sup>228</sup>
26. Industry incorrectly argues that technology retrofits will cause long outages.<sup>229</sup>
27. Industry incorrectly argues that under Section 316(b) all issues have to be “balanced” against one another to arrive at a pareto optimal result.<sup>230</sup>

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<sup>222</sup> See, e.g., UWAG Phase I Comment at 16-20.

<sup>223</sup> Companies (facilities) that have argued that compliance is too expensive include FirstEnergy (Bayshore) and Dayton Power & Light (J.M. Stuart Generating Station). See Letter from Joseph M. Reidy, Attorney for Dayton Power & Light to John Sadzewicz, Ohio EPA (July 11, 1989) (comparing costs of cooling towers with other alternatives) (Exh. 69); see also Letter from William L. Patberg, Attorney for Dayton Power & Light to Paul Novak, Ohio EPA (Apr. 9, 2003) (arguing that cooling towers would cost a quarter of a billion dollars) (Exh. 70).

<sup>224</sup> Companies (facilities) that have argued that compliance is too expensive include: FirstEnergy (Bayshore) and Dayton Power & Light (Stuart).

<sup>225</sup> For example, in estimating the costs of retrofitting closed-cycle cooling at its E.F. Barrett plant in the South Shore Estuary on Long Island, New York, National Grid included a whopping \$30 million for what it vaguely described as “management,” “indirects,” “indeterminates,” and “contingencies.” Alden Research Laboratory and Burns Engineering Services, *An Engineering & Cost Assessment of Retrofitting Closed-Cycle Cooling Technologies and E.F. Barrett Power Station* (September 2007) (Exh. 71).

<sup>226</sup> Companies (facilities) claiming they should not be required to retrofit to closed-cycle cooling because they provide an “essential service” include FirstEnergy (Bayshore) and Dayton Power & Light (Stuart).

<sup>227</sup> Companies (facilities) claiming they they are entitled to special treatment because they provide social benefits and therefore should not be required to retrofit to closed-cycle cooling include FirstEnergy (Bayshore) and Dayton Power & Light (Stuart).

<sup>228</sup> Companies (facilities) claiming that the regulator cannot require them to curtail operations to meet BTA requirements include FirstEnergy (Bayshore) and Dayton Power & Light (Stuart).

<sup>229</sup> Companies (facilities) claiming that a retrofit would cause an overly long outage include: FirstEnergy (Bayshore); Dayton Power & Light (Stuart); and Entergy Nuclear (Indian Point).

<sup>230</sup> In the case of Indian Point, Entergy Nuclear has phrased this argument as a need to condition a 316(b) decision on other permitting issues such as adverse air impacts, unacceptable visual impacts, and SEQRA analysis

28. Industry incorrectly argues that cooling system retrofits raise nuclear safety concerns.<sup>231</sup>
29. Industry incorrectly argues there are insurmountable energy concerns from outages, energy penalties, or potential plant retirements.<sup>232</sup>
30. Industry incorrectly argues there are insurmountable concerns relating to fogging, steam plumes or mineral drift from closed-cycle cooling.<sup>233</sup>
31. Industry incorrectly argues that closed-cycle cooling is noisy.<sup>234</sup>
32. Industry incorrectly argues that closed-cycle cooling is unsightly.<sup>235</sup>
33. Industry often incorrectly argues that there is insufficient space for closed-cycle cooling on a given site.<sup>236</sup>
34. Industry often incorrectly contends that closed-cycle cooling at a given site would have to be built to certain oversized specification (based on an overly conservative “approach temperature”), thereby consuming more space and costing more than is reasonably necessary.<sup>237</sup>
35. Industry often vastly overstates the amount of time necessary to install closed-cycle cooling.<sup>238</sup>

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<sup>231</sup> Dominion Nuclear Connecticut has even vigorously opposed conducting biological monitoring near the intake structure at the Millstone Power Station on the dubious grounds that it would raise nuclear safety and security concerns.

<sup>232</sup> Companies (facilities) claiming insurmountable energy concerns include FirstEnergy (Bayshore) and Dayton Power & Light (Stuart). See, e.g., Ohio EPA, Response to comments document relating to FirstEnergy Bayshore plant, National Pollutant Discharge Elimination System (NPDES) permit (Oct. 2010) (Exh. 72) (FirstEnergy claims that it cannot shut down its own facility if a regulator requests it).

<sup>233</sup> See, e.g., UWAG’s Brief Challenging EPA’s § 316(b) Rule for New Facilities, *Riverkeeper, Inc. v. U.S. Environmental Protection Agency*, No. 02-4005(L) (2d Cir.), July 2, 2003, at 22 (contending that “[w]et cooling towers also make fog, which can affect visibility and an some sites can deposit salt on trees, shrubs, and farmers’ fields”).

<sup>234</sup> For example, ignoring the availability of ultra low noise fan options, National Grid has incorrectly contended that operation of closed-cycle cooling at its Glenwood power station in Hempstead Harbor in New York might violate a town noise ordinance.

<sup>235</sup> For example, Entergy Nuclear has submitted a visual assessment study concluding that the installation of cooling towers at Indian Point “would present a significant aesthetic impact.” Saratoga Associates, *Indian Point Energy Center Closed Cycle Cooling Conversion Feasibility Study Visual Assessment* at 1 (June 1, 2009), available at [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/indptvisual1.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/indptvisual1.pdf) (Exh. 73).

<sup>236</sup> See, e.g., *In the Matter of Dynegy Northeast Generation, Inc., on behalf of Dynegy Danskammer LLC (Danskammer Generating Station)*, DEC No.: 3-3346-00011/00002, SPDES No.: NY-0006262, Decision of the Deputy Commissioner of the N.Y. State Dep’t of Env’tl. Conservation at 1 (May 24, 2006) (Exh. 65) (“[T]he proposed closed-cycle cooling system retrofit configurations will not fit on the site.”).

<sup>237</sup> See the discussion of approach temperatures in the report of Powers Engineering, attached as Appendix D. This position has been taken, for example, by National Grid in their evaluation of closed-cycle cooling at the E.F. Barrett. See, e.g., *An Engineering & Cost Assessment of Retrofitting Closed-Cycle Cooling Technologies and E.F. Barrett Power Station*, Alden Research Laboratory and Burns Engineering Services, September 2007 (Exh. 71)

<sup>238</sup> See, e.g., Enercon Services, Inc., *Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a closed-Loop Condenser Cooling Water Configuration, prepared for Entergy Nuclear Indian Point2, LLC, and Entergy Nuclear Indian Point 3, LLC* at v, 43 (Feb. 12, 2010) (Exh. 74), available at [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/convclosloop.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/convclosloop.pdf). The over-estimate of the time necessary to install closed-cycle cooling is directly related to the tendency of many facilities to argue that technology retrofits



36. Industry often incorrectly contends that closed-cycle cooling does not pass a cost-benefit test.<sup>239</sup>
37. Industry often incorrectly argues that the benefits of closed-cycle cooling must exceed the costs before it can be required.<sup>240</sup>
38. Industry often incorrectly argues that only monetized benefits can be counted.<sup>241</sup>
39. Industry often incorrently argues that a host of so-called “social costs” should be considered as an integral part of the Section 316(b) determination.<sup>242</sup>
40. Industry often incorrectly argues that retrofits should not be required at plants that purportedly have too *little* useful life remaining.<sup>243</sup>
41. Industry often incorrectly argues that retrofits should not be required at plants that purportedly have too *much* useful life remaining (*i.e.*, plants that were recently repowered should be allowed to wait until the next repowering before retrofitting).<sup>244</sup>
42. Industry incorrectly argues that if a Section 316(b) determination was made a long time ago, it should not or cannot be revisited now.<sup>245</sup>

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will cause long outages.

<sup>239</sup> Companies (facilities) claiming that closed-cycle cooling cannot pass a cost-benefit test include FirstEnergy (Bayshore) and Dayton Power & Light (Stuart). *See, e.g.*, Letter from William L. Patberg, Attorney for Dayton Power & Light to Paul Novak, Ohio EPA (Apr. 9, 2003) (arguing that cooling towers would cost a quarter of a billion dollars but that “it is difficult to identify any environmental benefit at all” to their use) (Exh. 70).

<sup>240</sup> *Cf.* Brief of Petitioner Entergy Corp. in Support of Vacatur and Remand of Final Rule *Riverkeeper, Inc. v. United States Environmental Protection Agency*, No. 04-6692-ag(L) (2d Cir.), April 18, 2006, at 47 (arguing that Section 316(b) regulations – and, presumably, site-specific BTA determinations – “should not have net social costs”).

<sup>241</sup> *See, e.g.*, Final Brief of Petitioners PSEG Fossil LLC and PSEG Nuclear LLC in Support of Vacatur and Remand of Portions of Final Rule, *Riverkeeper, Inc. v. United States Environmental Protection Agency*, No. 04-6692-ag(L) (2d Cir.), April 17, 2006, at 26-31 (arguing that “EPA improperly required evaluation of ‘qualitative’ non-use benefits in site-specific cost-benefit analyses”).

<sup>242</sup> *See, e.g.*, *In the Matter of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations Inc.’s CWA § 401 Application for Water Quality Certification, DEC Application Numbers: 3-5522-00011/00030 (IP2) and 3-5522-00105/00031 (IP3)*, Town of Cortlandt Petition for Party Status in Joint Adjudicatory Hearing for Water Quality Certification (July 9, 2010) at 18 (Exh. 75); *In the Matter of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations Inc.’s Joint Application for Water Quality Certification, DEC Application Numbers: 3-5522-00011/00030 (IP2) and 3-5522-00105/00031 (IP3)*, Town of Cortlandt Memorandum of Law in Support of Cortlandt’s Petition for Party Status (Sept. 23, 2010) (Exh. 76) at 7-8, 14 (in support of power plant, town argued that for consideration of “non-monetary costs” including alleged aesthetic, noise and traffic impacts and alleged impacts to “social fabric and community character”).

<sup>243</sup> In the case of Indian Point, Entergy has framed this objection as a claim that closed cycle cooling could not be installed until near the end of its current Nuclear Regulatory Commission license period.

<sup>244</sup> *See, e.g.*, Dynegy Moss Landing, LLC, *State Water Resources Control Board Once-Through Cooling Water Policy Implementation Plan for the Moss Landing Power Plant* at 13-14 (Apr. 1, 2011) (Exh. 77) (arguing that changes to the cooling system are unwarranted in light of recent, large capital investments); *see also* e-mail from John Dennis, LADWP to Jonathan Bishop, California State Water Resources Control Board (Jul. 22, 2010) (Exh. 78) (arguing that LADWP should be allowed additional time for compliance with California’s once-through cooling water policy in light of recent investments totaling over \$600 million).

<sup>245</sup> In some cases, the claim that 316b decisions were made decades ago and cannot be disturbed now is supported

43. Industry often argues, contrary to the facts, that there is a cheaper alternative to closed-cycle cooling that is almost as protective.<sup>246</sup>
44. Industry often argues, contrary to the facts, there is an alternative to closed-cycle cooling that can be implemented more quickly and will therefore be more protective when time is factored in.<sup>247</sup>
45. Industry incorrectly argues that the receiving water into which the plant discharges is not entitled to Clean Water Act protection.<sup>248</sup>
46. Industry incorrectly argues that the receiving water into which the plant discharges is a commercial/industrial waterway such that water quality standards need not be as stringent as in other waterways.<sup>249</sup>

Given the inability of under-funded, under-staffed regulators at state agencies (or at EPA regional offices) – not to mention interested members of the public – to engage with and respond to the panoply of largely spurious issues raised at every opportunity and supported with opaque technical submittals, it is no wonder that power plants have successfully resisted upgrading their intake structures for decades. This applies to power plants regulated on a case-by-case basis by state agencies as well as those regulated directly by EPA.

For example, in the early 1970s the Atomic Energy Commission (AEC) determined that a

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by state regulators. Both Illinois and Michigan have adopted this unlawful interpretation of the Clean Water Act in multiple proceedings. *See, e.g., In the Matter of the Natural Resources Defense Council (NRDC), the Sierra Club, and the Great Lakes Environmental Law Center (GLELC) on the permit issued DTE Energy, Detroit Edison Company Harbor Beach Power Plant (DTE Energy)*, Respondent Michigan Dep't of Env'tl. Quality's Pre-Hearing Statement at 2-3 (Aug. 2, 2011) (a BTA permitting decision made in 1976 need not be revisited) (Exh. 79).

<sup>246</sup> For example, FirstEnergy claims that installing reverse louvers and fine mesh screens at its Bayshore plant would represent a move to the best technology available. At Indian Point, Entergy claims that cylindrical wedgewire screens are an acceptable alternative to closed cycle cooling (despite EPA's finding, in this proceeding, that wedgewire screens are not as effective as closed cycle cooling). And at the Danskammer Generating Station, Dynegy Generation has argued that variable speed pumps and sonic deterrents are effective, at least when viewed against the backdrop calculations of a full-flow baseline. *See In the Matter of Dynegy Northeast Generation, Inc., on behalf of Dynegy Danskammer LLC (Danskammer Generating Station)*, DEC No.: 3-3346-00011/00002, SPDES No.: NY-0006262, Decision of the Deputy Commissioner of the N.Y. State Dep't of Env'tl. Conservation at 3 (May 24, 2006) (Exh. 65).

<sup>247</sup> *See Enercon Services, Inc., Evaluation of Alternative Intake Technologies at Indian Point Units 2 & 3, prepared for Entergy Nuclear Indian Point2, LLC, and Entergy Nuclear Indian Point 3, LLC at v* (Feb. 12, 2010) (Exh. 80), available at: [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/alttechrep.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/alttechrep.pdf); *see also id. at* n.4 and Attachment 6 (arguing that cylindrical wedgewire screens should be preferred to closed-cycle cooling at Indian Point because they can be implemented more quickly).

<sup>248</sup> Dayton Power & Light, the owner of the Stuart plant in Ohio, claims that Three Mile Creek, into which the Stuart plant discharges, is a "discharge canal" and thus that water quality standards do not apply until the point at which the creek meets the Ohio River, several miles downstream of the discharge point. *See, e.g., Public Fact Sheet, Dayton Power & Light, "J.M. Stuart Station NPDES Permit Renewal, Sprigg Township, Ohio"* (Spring 2011) (Exh. 81); *see also* Letter from JoAnne Rau, Director, Environmental Safety and Management, Dayton Power and Light Company to Sean Ramach, US EPA Region 5 (Apr. 28, 2011) (providing DP&L's comments on EPA's rejection of the draft NPDES permit renewal for the J.M. Stuart Electric Generating Station) (Exh. 63).

<sup>249</sup> In Clean Water Act proceedings related to setting water quality standards, Midwest Generation has argued that Chicago's waters are less worthy of protection because they are used in commerce and by industry. *See Midwest Generation, Appropriate Thermal Water Quality Standards for the Chicago Sanitary and Ship Canal and Lower Des Plaines River* (Mar. 22, 2007) (Exhibit 82).

closed-cycle cooling system would be necessary at the Brunswick power plant in North Carolina to avoid significant environmental damage.<sup>250</sup> After years of battling, in 1980 EPA relented and settled for lesser controls.<sup>251</sup> With only these lesser controls in place, the plant currently kills three to four billion fish annually.<sup>252</sup>

Similarly, in the early 1970s, EPA ordered three Hudson River power plants to retrofit with closed-cycle cooling.<sup>253</sup> In the nearly 30 years since, the cooling water withdrawals at these plants have engendered endless lawsuits, negotiations, settlements and two environmental impact statements. Yet the plants still operate on long-expired permits, and the plants' once through cooling systems continue to kill fish at levels deemed "wholly unacceptable" by the state environmental agency.<sup>254</sup> The NPDES permit renewal for one of these plants, Indian Point, has been in adjudication since 2004 – only now scheduled for hearing dates to commence in the fall of 2011, and expected to take place over a year or more (with appeals likely).<sup>255</sup> Just as with the Brunswick plant, in the 1970s the AEC had determined that due to the potential for long-term impact, closed-cycle cooling was necessary for Indian Point – yet delay tactics, bureaucratic processing failures, and litigation have resulted in decades of operation of once-through cooling, allowing the plant to kill over a billion fish of all life stages each year.<sup>256</sup>

Notably, many of the plants whose negative environmental impacts spurred passage of the Clean Water Act 39 years ago are still operating today, their cooling water intake structures in much the same condition now as then. Incredibly enough, some of the oldest and most environmentally damaging plants in the country predate not just the 1972 Clean Water Act, but the Federal Water Pollution Control Act of 1948 as well.

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<sup>250</sup> *In the Matter of: Carolina Power & Light Company (Brunswick Steam Electric Plant)*, USEPA Environmental Appeals Board, 1978 EPA App. LEXIS 4 (February 20, 1978) at p. 2 (Exh. 83).

<sup>251</sup> James R. May & Maya K. van Rossum, *The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act*, 20 Vt. L. Rev. 373, 413 (1995). Internal EPA memoranda indicate that the decision not to require closed-cycle cooling was driven by agency resource and political concerns. *The Quick and the Dead*, 20 Vt. L. Rev. at 414, fn. 280 (Exh. 18).

<sup>252</sup> 66 Fed. Reg. at 65,264 (col. 1).

<sup>253</sup> *Consolidated Edison Co. of New York v. New York State Dept. of Environmental Conservation*, 726 F. Supp. 1404, 1407 (S.D.N.Y. 1989).

<sup>254</sup> 66 Fed. Reg. at 65,264 (cols. 1-2).

<sup>255</sup> *In the Matter of Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC For a State Pollution Discharge Elimination System Permit Renewal and Modification*, DEC No. 3-5522-00011/00004, SPDES No.: NY-0004472.

<sup>256</sup> See Letter from William R. Adriance, Chief Permit Administrator, New York State Department of Environmental Conservation, to Dara F. Gray, Entergy Nuclear Operations, (April 2, 2010) at 3 (available at [http://www.dec.ny.gov/docs/permits\\_ej\\_operations\\_pdf/ipdenial4210.pdf](http://www.dec.ny.gov/docs/permits_ej_operations_pdf/ipdenial4210.pdf)).

## II.

### SUMMARY OF THE PROPOSED RULE

#### A. The Proposed Rule

The Proposed Rule applies to “existing” point sources that have a “Design Intake Flow” (DIF) of over 2 Million Gallons per day (MGD) with the capacity to withdraw more than 2 MGD of water from waters of the U.S. and use at least 25 percent of the water they withdraw exclusively for cooling.<sup>257</sup> However, under the proposal, “water obtained from a public water system, reclaimed water from wastewater treatment facilities or desalination plants, treated effluent from a manufacturing facility, or cooling water that is used in a manufacturing process either before or after it is used for cooling as process water, is not considered cooling water.”<sup>258</sup>

Facilities below the thresholds are subject to permitting on a best professional judgment (BPJ) basis.<sup>259</sup> The three main components of the rule are the entrainment provisions, the impingement standards, and standards applicable to what EPA calls “new units at existing facilities.”<sup>260</sup> Under the Proposed Rule, a new unit at an existing facility must reduce entrainment mortality to a level commensurate with the performance of a closed-cycle cooling system. Existing units are far less strictly controlled.<sup>261</sup> Each of these components and other key provisions are summarized below.

#### 1. Entrainment Provisions for Existing Facilities (Existing Units)

The proposed rule does not set any specific criteria (numeric or otherwise) for the degree of entrainment reduction that is reflective of the Best Technology Available at any class or classes of existing units. Instead, permitting authorities are to determine BTA on a case-by-case basis.<sup>262</sup> Alternatively, existing facilities can choose to skip the case-by-case BTA analysis process and comply with the entrainment mortality standard that applies to new units at existing facilities.<sup>263</sup>

With respect to entrainment reduction, the only hard and fast “requirements” imposed on existing facilities are information provision requirements. These vary according to the size of

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<sup>257</sup> See proposed 40 C.F.R. § 125.91(a), 76 Fed. Reg. at 22,280 (col. 3). Although the rule specifies that an intake pipe is only regulated if at least 25% of its flow is cooling water, EPA leaves permit writers discretion to determine that an intake from which less than 25% of the flow is used for cooling should nonetheless be subject to permitting. See 76 Fed. Reg. at 22,193 (col. 2).

<sup>258</sup> Proposed 40 C.F.R. § 125.92, 76 Fed. Reg. at 22,281 (col. 2).

<sup>259</sup> See 76 Fed. Reg. at 22,174 (col. 3).

<sup>260</sup> In the proposed rule, EPA draws a critical distinction between what it terms “existing facilities” and “new units at existing facilities.” But since every site addressed by this rule is an existing facility, and since a facility can contain multiple electric generating units, some new and some not, it may be more accurate to restate EPA’s distinction in terms of existing and new *units*.

<sup>261</sup> See 76 Fed. Reg. at 22,196 (col. 1).

<sup>262</sup> See proposed 40 C.F.R. § 125.94(c), 76 Fed. Reg. at 22,283 (col. 2).

<sup>263</sup> See proposed 40 C.F.R. § 125.94(a)(2), 76 Fed. Reg. at 22,282 (col. 3).

the facility.<sup>264</sup> Applicants are not required to reduce the number of fish and other organisms entrained unless, after reviewing the information provided, the Director determines that efforts to reduce entrainment are warranted.

Facilities with an Actual Intake Flow (AIF) over 125 MGD, must conduct several entrainment-related studies and provide the results to the Director.<sup>265</sup> The Director's BPJ-based permitting review for such facilities relies on these studies.<sup>266</sup> The primary studies are:

- *Entrainment Characterization Study* – a large facility must collect data on entrainment mortality for all species and life stages that it has identified through a ‘source water baseline biological characterization study.’<sup>267</sup> But note that as the Proposed Rule is written, the Director may exclude any species from the baseline study or from entrainment monitoring.<sup>268</sup> Thus, the study may not in fact report on all of the fish entrained. The study must be peer reviewed, with reviewers selected in consultation with the Director (who may also appoint additional reviewers). If any significant comments from the peer review process are not accepted, the facility owner must explain why. “Peer reviewers must have appropriate qualifications in biology, engineering, hydrology, or other fields and their names and credentials must be included in the peer review report.”<sup>269</sup>
- *Comprehensive Technical Feasibility and Cost Evaluation Study* – “an engineering study of the technical feasibility and incremental costs of candidate entrainment mortality control technologies.”<sup>270</sup> This study must be peer reviewed under the same terms as the entrainment characterization study.
- *Benefits Valuation Study* – “an evaluation of the magnitude of water quality benefits, *both monetized and non-monetized*, of the candidate entrainment mortality reduction technologies and operational measures evaluated” in the technical feasibility study.<sup>271</sup> The study must include hard numbers for fish and shellfish mortality and must explain how these averted losses and other water quality benefits are assigned a monetary value.<sup>272</sup> The study must be peer reviewed under the same terms as the other studies, but although the rule requires a monetary valuation of benefits, it does not require that the peer reviewers have expertise in environmental economics.<sup>273</sup>

<sup>264</sup> See proposed 40 C.F.R. § 122.21(r)(1)(ii), 76 Fed. Reg. 22,275 (col. 3).

<sup>265</sup> See proposed 40 C.F.R. § 122.21(r)(1)(ii)(B), 76 Fed. Reg. at 22,276 (col. 1)..

<sup>266</sup> See proposed 40 C.F.R. § 125.94(a)(2), 76 Fed. Reg. at 22,282 (col. 3).

<sup>267</sup> See proposed 40 C.F.R. § 122.21(r)(9), 76 Fed. Reg. at 22,277 (col. 3) (requiring that the plan address “all species and life stages identified under the requirements of paragraph (r)(4) [the source water baseline biological characterization study]”).

<sup>268</sup> See 40 C.F.R. § 125.98(c)(6), 76 Fed. Reg. at 22,287 (col. 3) (discussed below).

<sup>269</sup> Proposed 40 C.F.R. § 122.21(r)(9)(ii), 76 Fed. Reg. at 22,278 (col. 1).

<sup>270</sup> Proposed 40 C.F.R. § 122.21(r)(10), 76 Fed. Reg. at 22,278 (col. 2).

<sup>271</sup> See proposed 40 C.F.R. § 122.21(r)(11), 76 Fed. Reg. at 22,279 (col. 1) (emphasis added).

<sup>272</sup> See proposed 40 C.F.R. § 122.21(r)(11)(i),(ii), 76 Fed. Reg. at 22,279 (col. 1).

<sup>273</sup> See proposed 40 C.F.R. § 122.21(r)(11)(v), 76 Fed. Reg. at 22,279 (col. 1).

- *Non-water Quality and Other Environmental Impacts Study* – a “discussion of the changes in non-water quality factors and other environmental impacts attributed to each technology and operational measure considered.”<sup>274</sup> As with the other entrainment-related studies, it also must be peer reviewed.<sup>275</sup>

Unlike larger plants, the owners and operators of existing facilities with an AIF less than 125 MGD need only provide a subset of the information that larger facilities must provide, i.e., baseline information to the Director about the cooling water intake system, the physical and biological characteristics of the waterbody, and their plans to reduce impingement mortality.<sup>276</sup>

After receiving the information listed above, the Director must determine “the maximum reduction in entrainment mortality warranted”<sup>277</sup> at a particular facility. In setting this so-called BTA standard at an individual facility, the Director must consider at least nine factors:

- (1) Numbers and types of organisms entrained;
- (2) Entrainment impacts on the waterbody;
- (3) Quantified and qualitative social benefits and costs, including ecological benefits and benefits to any threatened or endangered species;
- (4) Thermal discharge impacts;
- (5) Impacts on the reliability of energy delivery within the immediate area;
- (6) Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;
- (7) Land availability, inasmuch as it relates to the feasibility of entrainment technology;
- (8) Remaining useful plant life; and
- (9) Impacts on water consumption.

Based on these nine factors, the Director may reject an otherwise available technology “*if the social costs of compliance are not justified by the social benefits*, or if there are adverse impacts that cannot be mitigated that the Director deems to be unacceptable.”<sup>278</sup> The Director must provide a written explanation of the decision. In that explanation, the Director must explain why any measures that perform better than the chosen option were rejected.<sup>279</sup>

It is unclear when (if ever) the analysis process will result in an entrainment reduction determination by the Director or implementation of entrainment controls by the facilities. While the rule sets deadlines for the owners and operators of existing units to provide the various

<sup>274</sup> Proposed 40 C.F.R. § 122.21(r)(12), 76 Fed. Reg. at 22,279 (col. 1).

<sup>275</sup> See proposed 40 C.F.R. § 122.21(r)(12)(x), 76 Fed. Reg. at 22,279 (col. 2).

<sup>276</sup> See proposed 40 C.F.R. § 122.21(r)(2)(ii)(A),(B), 76 Fed. Reg. at 22,276 (col. 1) (all existing facilities must submit the basic information required in parts (r)(2)-r(8), but only the largest facilities must comply with the entrainment information requirements in parts (r)(9)-(r)(12)).

<sup>277</sup> Proposed 40 C.F.R. § 125.94(c), 76 Fed. Reg. at 22,283 (col. 2).

<sup>278</sup> Proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. at 22,288 (col. 1) (emphasis added).

<sup>279</sup> See proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. 22,288 (col. 1).

categories of information demanded to the Director,<sup>280</sup> it does not set an ultimate deadline for entrainment compliance.<sup>281</sup>

## 2. Entrainment Standards for “New Units at Existing Facilities.”

New units at existing facilities must meet entrainment standards based on the use of a closed-cycle cooling system.<sup>282</sup> The entrainment standard for *new units* at existing facilities parallels the two track standard for *new facilities* that EPA developed in the Phase I rule. Thus, the operator of a new unit can choose to reduce the new unit’s intake of cooling water to equal that of a closed-cycle cooling system under the same circumstances.<sup>283</sup> Alternatively, under the second compliance track, a higher intake flow is permissible but the facility operator must reduce entrainment mortality at the new unit to at least 90 percent of what would have been achieved had the new unit cut its AIF under the first track.<sup>284</sup> If a new unit opts to maintain a higher flow and plans to reduce mortality sufficiently to compensate, the Director must review the data the owner/operator submits to determine whether it will reduce impingement and entrainment mortality to 90 percent or greater of the reduction that could be achieved through closed-cycle cooling.<sup>285</sup> Finally, the Director also may exempt a new unit from compliance with either track and establish “alternative requirements” if the cost of compliance is “wholly out of proportion” to the costs considered by EPA during the rulemaking process.<sup>286</sup>

## 3. Impingement Standards for Existing Facilities (Existing Units) and “New Units at Existing Facilities.”

The impingement standard offers covered facilities a choice.<sup>287</sup> One option allows the facility operator to choose to ensure that “for all life stages of fish that are collected or retained in a 3/8 inch sieve and held for a period of 24 to 48 hours to assess latent mortality,” the mortality rate does not exceed 12 percent on an annual average basis, or 31 percent on a monthly basis.<sup>288</sup> This option is based on “the use of modified traveling screens with a fish handling and return system.”<sup>289</sup> EPA concluded that this 12 percent/31 percent level of mortality reduction is almost

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<sup>280</sup> See proposed 40 C.F.R. § 125.95(b), 76 Fed. Reg. at 22,284 (col. 1).

<sup>281</sup> See proposed 40 C.F.R. § 125.93(b) (requiring compliance “with the applicable BTA standards for entrainment mortality in § 125.94(c) as soon as possible”), 76 Fed. Reg. at 22,282 (col. 2).

<sup>282</sup> See proposed 40 C.F.R. §§ 125.93(c), 76 Fed. Reg. at 22,282 (col. 2); 125.94(a)(3), 76 Fed. Reg. at 22,282 (col. 3).

<sup>283</sup> See proposed 40 C.F.R. § 125.94(d)(1), 76 Fed. Reg. at 22,283 (col. 2). In quantitative terms, this means demonstrating “total flow reductions approximating 97.5% for freshwater withdrawals and 94.9% for saltwater withdrawals.” 76 Fed. Reg. at 22,253 (col. 3). See also proposed 40 C.F.R. § 125.92, 76 Fed. Reg. at 22,281 (col. 2) (defining a closed-cycle recirculating system with reference to these values).

<sup>284</sup> See proposed 40 C.F.R. § 125.94(d)(2), 76 Fed. Reg. at 22,283 (col. 3).

<sup>285</sup> See *id.*

<sup>286</sup> See proposed 40 C.F.R. § 125.94(d)(4), 76 Fed. Reg. at 22,283 (col. 3).

<sup>287</sup> See proposed 40 C.F.R. § 125.94(b), 76 Fed. Reg. at 22,282 (col. 3).

<sup>288</sup> See proposed 40 C.F.R. § 125.94(b)(1)(i), 76 Fed. Reg. at 22,282 (col. 3).

<sup>289</sup> See 76 Fed. Reg. at 22,197 (col. 2).

always achievable (i.e., 95 percent of the time)<sup>290</sup> through the use of modified traveling screens.<sup>291</sup>

Alternatively, the operator can choose to reduce the intake system's maximum velocity to 0.5 feet/second, which allows organisms to swim away from the intake.<sup>292</sup> EPA acknowledges this velocity reduction can reduce impingement (and thus impingement mortality) to below four percent, which is more effective than the 12 percent mortality level achievable by traveling screen systems option.<sup>293</sup> But EPA chose to identify two different levels of impingement reduction as the BTA level because "EPA's record shows modified traveling screens are available for all facilities, whereas reduced intake velocity may not be available at all locations."<sup>294</sup>

Under both alternatives, operators must also meet ancillary protective requirements. First, any facility that does employ travelling screens or equivalent active screens must incorporate certain protective measures that raise the odds that impinged fish can be safely returned to the source water.<sup>295</sup> Second, all facilities must ensure that there is a means of escape for fish that may get "entrapped" (for example in a forebay) to be returned to the waterbody.<sup>296</sup> Third, in the case of facilities withdrawing from oceans or tidal waters, their performance in reducing shellfish impingement mortality must be at least as good as would be achieved through properly deployed and maintained barrier nets.<sup>297</sup>

All covered facilities must meet the rule's impingement mortality standard on a schedule set by the Director.<sup>298</sup> In all cases, the standard must be met within 8 years of the rule taking

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<sup>290</sup> EPA used "performance corresponding to the 95th percentile of the beta distribution" as the statistical measure to determine the effectiveness of modified travelling screens. *See* 76 Fed. Reg. at 22,203 (col. 1).

<sup>291</sup> *See* 76 Fed. Reg. at 22,203 (col. 1).

<sup>292</sup> *See* proposed 40 C.F.R. § 125.94(b)(2), 76 Fed. Reg. at 22,283 (col. 1).

<sup>293</sup> *See* 76 Fed. Reg. at 22,204 (col. 3) ("the performance of 0.5 feet per second intake velocity is slightly better than the selected technology. . . a design through-screen velocity of 0.5 feet per second would be protective of 96% of motile organisms.").

<sup>294</sup> *See* 76 Fed. Reg. at 22,197 (col. 2).

<sup>295</sup> *See* proposed 40 C.F.R. § 125.94(b)(1)(iii)(B) (for those facilities choosing the 12/31 percent standard), 76 Fed. Reg. at 22,282 (col. 3); 40 C.F.R. § 125.94(b)(2)(v)(B) (for those facilities choosing the velocity limitation), 76 Fed. Reg. at 22,283 (col. 2).

<sup>296</sup> *See* proposed 40 C.F.R. § 125.94(b)(1)(iv)(B) (for those facilities choosing the 12/31 percent standard), 76 Fed. Reg. at 22,283 (col. 1); 40 C.F.R. § 125.94(b)(2)(vi) (for those facilities choosing the velocity limitation), 76 Fed. Reg. at 22,283 (col. 2). EPA has informed us that the term "through-flow" in these sections is a typographical error and should read "dual-flow." *See also* 76 Fed. Reg. at 22,251 (col. 2); 76 Fed. Reg. at 22,275 (col. 1) (discussing "entrapment" provision).

<sup>297</sup> *See* proposed 40 C.F.R. § 125.94(b)(1)(ii) (for those facilities choosing the 12/31 percent standard), 76 Fed. Reg. at 22,282 (col. 1); 40 C.F.R. § 125.94(b)(2)(iv) (for those facilities choosing the velocity limitation), 76 Fed. Reg. at 22,283 (col. 1).

<sup>298</sup> *See* proposed 40 C.F.R. § 125.93(a),(c), 76 Fed. Reg. at 22,282 (col. 2); *see also* proposed 40 C.F.R. § 125.94(a)(1), 76 Fed. Reg. at 22,282 (col. 3).



effect.<sup>299</sup> A facility’s owner or operator must submit an Impingement Mortality Reduction Plan to the Director that identifies the approach they will use to meet the BTA standards.<sup>300</sup>

#### 4. Other Provisions

##### a. Exclusion of Species/“Species of Concern”

On first reading, the language used to describe organisms protected by the rule appears comprehensive. For example, to be in compliance with the entrainment and impingement provisions means to achieve any applicable limitations “for all life stages of fish.”<sup>301</sup> Although the definition of “all life stages” allows the Director to exclude moribund and invasive species,<sup>302</sup> it still embraces virtually all fish and shellfish that are actually entrained or impinged.

However, the rule also repeatedly refers to studying and monitoring impingement and entrainment of “species of concern” without defining the term.<sup>303</sup> One possibility is that EPA intends the “species of concern” category to function as it does under the Phase I rule: offering stronger protection to endangered, threatened, or otherwise uniquely valuable species that the rule’s uniform standards would provide.<sup>304</sup> This elevated degree of protection is entirely consistent with the Clean Water Act’s goals and purposes.

But if read in concert with proposed Part 125.98(c)(6), the phrase could be interpreted to unlawfully permit the Director to exclude various species of fish from protection under the Clean Water Act and lower the standards for a particular facility below the BTA standards that EPA has identified. Part 125.98(c) addresses the Director’s responsibilities with respect to species of concern. Under sub-paragraph 6, “[t]he Director may determine invasive species, naturally moribund species, *and other specific species may be excluded from any monitoring, sampling, or study requirements* of 40 CFR 122.21 and § 125.94.”<sup>305</sup> Read broadly, this would allow the Director to summarily exempt species from the source water baseline biological characterization

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<sup>299</sup> See *id.*

<sup>300</sup> See proposed 40 C.F.R. § 122.21(r)(1)(6), 76 Fed. Reg. at 22,277 (col. 1) (describing the plan). See also proposed 40 C.F.R. § 125.95(b), 76 Fed. Reg. at 22,284 (col. 1) (setting dates for submittal of the plan that vary by facility size).

<sup>301</sup> Proposed 40 C.F.R. § 125.94(b)(1)(i), 76 Fed. Reg. at 22,282 (col. 3) (achieve impingement standards for all life stages of fish). See also 40 C.F.R. §§ 125.94(b)(1)(iii)(A), 76 Fed. Reg. at 22,282 (col. 2-3) (the owner of a facility must count as impinged “any fish” carried over in screen); 40 C.F.R. § 125.94(d)(2), 76 Fed. Reg. at 22,283 (col. 3) (a new unit at an existing facility complying with the track II entrainment standard must demonstrate reduced entrainment of “all stages of fish and shellfish.”).

<sup>302</sup> See proposed 40 C.F.R. § 125.92, 76 Fed. Reg. at 22,281 (col. 1).

<sup>303</sup> See *e.g.*, proposed 40 C.F.R. 125.97(a)(4), 76 Fed. Reg. at 22,287 (col. 1) (Entrainment monitoring reports must “describe . . . the species of concern, the counts and percentage mortality of organisms sampled, and other information specified in the permit.”). See also 76 Fed. Reg. at 22,204 (col. 3) (EPA is considering, as an additional impingement requirement, that facilities opting to reduce intake velocity also show that “species of concern are adequately protected.”).

<sup>304</sup> See 40 C.F.R. § 125.84(b)(4),(5) (requiring new facilities to take extra measures above and beyond implementation of closed-cycle cooling if necessary to protect “species of concern to the Director.”).

<sup>305</sup> Proposed 40 C.F.R. § 125.98(c)(6), 76 Fed. Reg. at 22,287 (col. 3).

study, from the impingement and entrainment reduction studies and plans, and from all monitoring efforts.

### **b. Monitoring Provisions**

Proposed section 125.96(a) would require impingement monitoring “over a 24-hour period and no less than once per month when the cooling water intake structure is in operation.”<sup>306</sup> Yet, “EPA assumes the facility would monitor no less than once per week during primary periods of impingement as determined by the Director, and no less than biweekly during all other times.”<sup>307</sup>

### **c. Nuclear Safety**

Proposed section 125.94(e), entitled “Nuclear facilities” provides that “[i]f the owner or operator of a nuclear facility demonstrates to the Director, upon the Director’s consultation with the Nuclear Regulatory Commission, that compliance with this subpart would result in a conflict with a safety requirement established by the Commission, the Director must make a site-specific determination of best technology available for minimizing adverse environmental impact that would not result in a conflict with the Commission’s safety requirement.”<sup>308</sup>

### **d. Exempted Offshore Facilities**

The proposed rule exempts three categories of existing offshore point sources with cooling water intakes: offshore liquefied natural gas (LNG) plants, offshore seafood processing vessels, and offshore oil and gas facilities.<sup>309</sup> The preamble explains that EPA has studied these offshore facilities but is not aware of any technologies beyond screens that avoid unacceptably altering the envelope or seaworthiness of vessels and platforms in these categories.<sup>310</sup> Instead, these facilities are subject to case-by-case BPJ-based permitting.<sup>311</sup>

## **5. Revisions to Phase I Rule**

The proposed rule also responds to the Second Circuit’s decision in *Riverkeeper I* by removing from the Phase I new facility rule the restoration-based compliance alternative and the associated monitoring and demonstration requirements because EPA lacks the authority to allow compliance with Section 316(b) through restoration measures.<sup>312</sup> The proposed rule also proposes certain relatively minor corrections to the Phase I rule.<sup>313</sup>

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<sup>306</sup> Proposed 40 C.F.R. § 125.96(a)(2), 76 Fed. Reg. at 22,286 (col. 2).

<sup>307</sup> 76 Fed. Reg. at 22,256 (col. 3)–22,257 (col. 1).

<sup>308</sup> Proposed 40 C.F.R. § 125.94(3), 76 Fed. Reg. at 22,284 (col. 1).

<sup>309</sup> See proposed 40 C.F.R. § 125.91(d), 76 Fed. Reg. at 22,281 (col. 1).

<sup>310</sup> See 76 Fed. Reg. at 22,195 (col. 3).

<sup>311</sup> See proposed 40 C.F.R. § 125.91(d), 76 Fed. Reg. at 22,281 (col. 1).

<sup>312</sup> 76 Fed. Reg. at 22,174 (col. 1); Fed. Reg. at 22,183 (col. 2). In *Riverkeeper I*, the Second Circuit held that EPA exceeded its authority by allowing new facilities to comply with section 316(b) through restoration measures, and remanded that aspect of the rule to EPA. 358 F.3d at 191.

<sup>313</sup> 76 Fed. Reg. at 22,183 (col. 3).

## B. EPA's Option Selection

Section 316(b) of the Clean Water Act requires EPA to establish standards for cooling water intake structures that reflect the “best technology available” to minimize adverse environmental impacts.<sup>314</sup> In determining the best technology available, EPA considered how well various technologies reduced entrainment and impingement. But EPA also evaluated these technologies against a number of other criteria.<sup>315</sup> EPA ultimately set what it considers a BTA standard based on technology that is capable of being implemented universally. In so doing, EPA rejected the possibility of subcategorizing facilities according to the feasibility of control technologies, and rejected the possibility of setting a standard based on a more effective model technology but allowing variances where the model technology is infeasible.

### 1. In Considering Technological Options, EPA Set a “Universal Availability” Requirement for BTA Candidate Technologies, then Rejected Closed-Cycle Systems and Velocity Limits Because EPA Found that They Are Not Universally Capable of Being Implemented.

EPA considered a number of flow-reducing technologies, including closed-cycle systems.<sup>316</sup> EPA also evaluated a number of exclusion technologies, including different screens and nets, fish collection systems that safely return excluded fish to a waterbody, and slowing the intake velocity sufficiently for fish to escape the zone of danger.<sup>317</sup> From this review, EPA selected three *best performing* technologies that merited further study: traveling screens, barrier nets, and wet closed-cycle cooling. EPA also determined that velocity reduction to 0.5 feet per second or less was a “candidate” best performing technology.<sup>318</sup>

Ultimately, however, EPA proposed a BTA performance standard based only on technologies that are capable of being implemented by every facility, even if better performing technologies are available and feasible at a subset of facilities.<sup>319</sup> For example, although EPA identified wet closed-cycle cooling “as a *candidate* best performing technology for both impingement mortality and entrainment mortality for new units at existing facilities,”<sup>320</sup> and although “EPA’s record shows numerous instances of existing facility retrofits to closed-cycle,”<sup>321</sup> the agency did not propose closed-cycle cooling as the Best Technology Available because EPA asserts they are not capable of being implemented everywhere.<sup>322</sup> Instead, because

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<sup>314</sup> 33 U.S.C. § 1326(b).

<sup>315</sup> See 76 Fed. Reg. at 22,197 (col. 1) (EPA considered criteria including: technical availability and economic impacts on facilities of different size, age, type, and location; cost effectiveness; social costs and benefits; effects on energy production, availability, and reliability; and potential adverse environmental effects).

<sup>316</sup> See 76 Fed. Reg. at 22,198 (col. 1) - 22,200 (col. 2).

<sup>317</sup> See 76 Fed. Reg. at 22,200 (col. 2) - 22,202 (col. 3).

<sup>318</sup> 76 Fed. Reg. at 22,202 (col. 3) - 22,203 (col. 1).

<sup>319</sup> See 76 Fed. Reg. at 22,203 (col. 3). See also 22,204 (col. 3).

<sup>320</sup> 76 Fed. Reg. at 22,203 (col. 3).

<sup>321</sup> 76 Fed. Reg. at 22,204 (col. 1).

<sup>322</sup> See 76 Fed. Reg. at 22,203 (col. 3).

EPA claims “closed-cycle cooling is not practically feasible in a number of circumstances,” and because these circumstances “are not isolated or insignificant,” the agency decided “that it should not establish closed-cycle cooling as the presumptive BTA entrainment control.”<sup>323</sup> Thus, after deciding that the BTA standard must be modeled on a technology capable of being implemented everywhere, EPA determined that closed-cycle cooling did not meet that standard and therefore could not be BTA.

Once it eliminated closed-cycle cooling and several other technologies from consideration, “EPA could identify no single technology that represented BTA [for entrainment] for all facilities” and opted for a case-by-case approach to regulating entrainment at existing units.<sup>324</sup> The agency concluded that closed-cycle technology could not be implemented everywhere for four reasons: local energy reliability; increased air pollution and the difficulty of obtaining air emissions permits for existing facilities in non-attainment areas; land availability; and remaining useful plant life.<sup>325</sup>

Uncertainty about the extent and likelihood of local reliability impacts caused by extended downtime was purportedly an important consideration for EPA.<sup>326</sup> In the preamble, EPA states that it considered establishing a uniform entrainment rule, while giving permitting authorities flexibility to establish extended compliance timelines for utilities to coordinate extended outages and account for reliability concerns. EPA states that it believes that this “would have been consistent with EPA’s assessment that, at the national level (rather than local level), closed-cycle cooling would not pose material energy reliability consequences.”<sup>327</sup> But EPA claims that it lacks adequate information to establish whether such a flexible approach would sufficiently address local reliability issues.<sup>328</sup>

Perceptions over increased air pollution also drove EPA’s finding that closed-cycle cooling cannot be installed everywhere.<sup>329</sup> EPA believes that for new units this is a lesser concern, because their system can be optimized for closed-cycle cooling from the design stage. EPA also states that increased emissions could raise a permitting concern, particularly in non-attainment areas where a plant will need to identify offsets for its increased emissions.<sup>330</sup>

And, although “EPA’s record indicated that the majority of facilities have adequate available land for placement of cooling towers . . . , as many as 25 percent of facilities may have one or more constraints on available space that would limit retrofit of cooling towers for the entire facility or would result in increased compliance costs.”<sup>331</sup> Finally, EPA believes that

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<sup>323</sup> 76 Fed. Reg. at 22,207 (col. 1).

<sup>324</sup> 76 Fed. Reg. at 22,197 (col. 2).

<sup>325</sup> See 76 Fed. Reg. at 22,207 (col. 1).

<sup>326</sup> See 76 Fed. Reg. at 22,208 (col. 3).

<sup>327</sup> 76 Fed. Reg. 22,208 (col. 3).

<sup>328</sup> *Id.*

<sup>329</sup> 76 Fed. Reg. at 22,208 (col. 2).

<sup>330</sup> See 76 Fed. Reg. at 22,209 (col. 1).

<sup>331</sup> 76 Fed. Reg. at 22,209 (col. 2-3).

“many facilities are nearing the end of their useful life” and the costs of a retrofit to such a plant may not justify the benefits.<sup>332</sup>

Thus, EPA opted for a lowest common denominator strategy – setting no uniform entrainment standard, and basing the impingement standard on traveling screens because they are capable of being installed everywhere. EPA considered but rejected the possibility of subcategorizing “the industry” (actually, several industries) into groups of facilities for which more effective flow reduction technologies are feasible.<sup>333</sup> And moreover, EPA did not establish a presumptive hierarchy of technologies that must be applied if available.

Similarly, regarding impingement, while EPA acknowledges that velocity reduction to 0.5 feet per second is available at many facilities and is more effective at reducing mortality than traveling screens,<sup>334</sup> it proposed an impingement standard that allows a facility to choose between reducing velocity and installing traveling screens. And although EPA found that wedgewire screens “would perform equally as well or better than seasonal deployment of barrier nets” to reduce the impingement of shellfish, EPA did not conduct a full analysis of wedgewire screens in the rulemaking, nor did it require their use where feasible while allowing less effective technologies elsewhere.<sup>335</sup>

## **2. The Four Regulatory Options EPA Considered**

Developing the proposed rule, EPA considered four regulatory options. The proposed rule is EPA’s “Option 1”: a numerical impingement standard based on the use of modified traveling screens or velocity reductions that applies to all units; flow reduction commensurate with closed-cycle cooling only for new units at existing facilities; and a case-by-case decision making approach to entrainment for all existing units.<sup>336</sup> The other end of the spectrum is EPA’s Option 3, which calls for the same impingement standards as Option 1 and requires flow reduction commensurate with closed-cycle cooling by all facilities.<sup>337</sup>

Option 2 is a hybrid of Options 1 and 3. Like those options, it would set a uniform numerical impingement and entrainment standard based on the use of modified traveling screens or velocity reductions for all units, but the closed-cycle-cooling -based entrainment standard would only be required of larger units – those with an actual intake flow of more than 125 MGD. For units with a smaller flow, Option 2 allows the same case-by-case decision making as Option 1.<sup>338</sup>

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<sup>332</sup> See 76 Fed. Reg. at 22,210 (col. 1).

<sup>333</sup> See 76 Fed. Reg. 22,204 (col. 1).

<sup>334</sup> See 76 Fed. Reg. at 22,204 (col. 3) (“the performance of 0.5 feet per second intake velocity is slightly better than the selected technology. . . a design through-screen velocity of 0.5 feet per second would be protective of 96% of motile organisms.”).

<sup>335</sup> See 76 Fed. Reg. at 22,203 (col. 3).

<sup>336</sup> See 76 Fed. Reg. at 22,204 (col. 1).

<sup>337</sup> See 76 Fed. Reg. at 22,206 (col. 2).

<sup>338</sup> See 76 Fed. Reg. at 22,206 (col. 1).

Finally, shortly before proposal, EPA considered a fourth possibility that is even less protective than Option 1. Option 4 would adopt a case-by-case approach to entrainment and apply the uniform impingement standard only to those facilities with a design intake flow greater than 50 MGD. Facilities with a lower intake capacity would be subject to case-by-case permitting for both impingement and entrainment.

### C. The Regulatory Impact Analysis

EPA considered the social costs of the proposed rule and the distribution of those costs across different parts of society (i.e. the “economic impact” of the rule).<sup>339</sup> EPA also considered the social benefits – first by listing the physical impacts of the rule in terms of reduced mortality and other benefits, then by trying to monetize these benefits.

EPA estimates the total social costs of the proposed rule (Option 1) are \$384 million.<sup>340</sup> If 100 percent of the rule’s costs for electricity providers were borne by the ratepayers, this would amount to an average cost of \$1.37 per year per household, or approximately 11.5 cents monthly.<sup>341</sup> By comparison, EPA estimates that the total social cost of the more environmentally protective Option 3 is \$4,631 million,<sup>342</sup> or \$1.47 monthly per household.<sup>343</sup> In the reverse, if 100 percent of the costs fell upon power companies “the majority of parent entities will incur annualized costs of less than one percent of revenues regardless of the option” that EPA selects.<sup>344</sup> Both of these 100-percent assumptions are highly conservative because, in reality, some (but not all) of the costs would be borne by power companies and some (but not all) would be borne by ratepayers.

EPA also estimated the rule’s impact on manufacturers by modeling a manufacturer’s after-tax cash flow, assuming, again highly conservatively, that the business had to absorb 100 percent of the rule’s costs.<sup>345</sup> EPA found that no facilities would close and, even under Option 3, only 3.4 percent of facilities would experience even “moderate” cash flow impacts.<sup>346</sup>

Finally, EPA estimated the administrative costs that states and territories will incur in implementing the rule at existing facilities. “EPA estimates that the total annualized cost for these activities will be \$5.31 million for Option 1, \$2.19 million for Option 2, \$1.28 million for Option 3, and \$4.06 million for Option 4.”<sup>347</sup> Thus, the highest administrative costs are imposed by the more site-specific, case-by-case options.

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<sup>339</sup> See 76 Fed. Reg. at 22,212 (col. 2)–22,237 (col. 1). EPA also conducted a variety of other analyses required by various acts of Congress, Executive Orders, and Agency initiatives.

<sup>340</sup> See 76 Fed. Reg. at 22,218 (col. 2) (in 2009 dollars, discounted at 3%).

<sup>341</sup> See 76 Fed. Reg. at 22,227 (col. 3).

<sup>342</sup> See 76 Fed. Reg. at 22,218 (col. 2).

<sup>343</sup> See 76 Fed. Reg. at 22,227 (col. 3) (\$17.60 annually).

<sup>344</sup> See 76 Fed. Reg. at 22,226 (col. 3).

<sup>345</sup> See 76 Fed. Reg. at 22,220 (col. 2).

<sup>346</sup> See 76 Fed. Reg. at 22,221 (col. 2).

<sup>347</sup> See 76 Fed. Reg. at 22,270 (col. 3).

In terms of the rule's physical benefits (at least those that can be measured in direct fish and shellfish losses). Option 3 – uniform impingement and entrainment standards based on closed-cycle cooling – would save 1,000 times more fish than the proposed rule. While Option 1 may save 422 million fish, uniform standards would save 407,922 million fish (as well as sea turtles and other endangered and threatened species).<sup>348</sup>

Although the fish-protection benefits of Option 3 are 1000 times greater than Option 1, the agency could not perform a comparable and complete monetary analysis of the options. EPA found that “quantifying and monetizing reductions in I&E mortality losses due to the regulatory options is extremely challenging.”<sup>349</sup> Since many benefit categories were not properly monetized, EPA concluded that the monetized values “likely underestimate total benefits, challenging the Agency’s ability to base BTA decision making on the relationship of quantified costs and benefits alone.”<sup>350</sup>

Still, EPA concluded that the sum of the proposed rule’s benefits under Option 1 justified its costs. The agency explained that cost-benefit analysis should not ignore non-monetizable benefits:

The assessment of benefits must take into account all benefits, including categories such as recreational, commercial and other use benefits, benefits associated with reduced thermal discharges, reduced losses to threatened and endangered species, altered food webs, nutrient cycling effects, and other nonuse benefits. Merely because there is no price tag on those benefits does not mean that they are not valuable.<sup>351</sup>

Thus, although EPA’s estimate of the rule’s monetized benefits (approximately \$18 million per year at a 3 percent discount rate and \$16 million per year at a 7 percent discount rate) is smaller than the agency’s estimate of its monetized costs (approximately \$384 million per year at a 3 percent discount rate and \$458 million per year at a 7 percent discount rate),<sup>352</sup> EPA concluded that Option 1 is cost-justified.<sup>353</sup> In the proposed rule and preamble, EPA does not, however, state whether the benefits of Options 2, 3, and 4 that it considered justify the costs.

#### **D. The Rulemaking Process: Changes Made at the Direction of OMB.**

Shortly before proposal, EPA submitted a draft of the Proposed Rule to the Office of Information and Regulatory Affairs (OIRA) within the Office of Management and Budget (OMB).<sup>354</sup> Pursuant to Executive Order 12,866, EPA has also released a redlined version of its

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<sup>348</sup> See 76 Fed. Reg. at 22,239-40 (Table VIII-2-Baseline I&E Mortality Losses and Reductions for All In-Scope Facilities by Regulatory Option). Expressed in age-one equivalents (A1Es), Option 2 still saves three times as many fish as Option 1 (1982 million vs. 615 million A1Es).

<sup>349</sup> 76 Fed. Reg. at 22,246 (col. 3)-22,247 (col. 1).

<sup>350</sup> 76 Fed. Reg. at 22,247 (col. 2).

<sup>351</sup> 76 Fed. Reg. at 22,211 (col. 3).

<sup>352</sup> 2011 EBA at 12-3, Table 12-2.

<sup>353</sup> 76 Fed. Reg. at 22,206 (col. 3).

<sup>354</sup> See *Documentation of Changes Made During Executive Order 12866 OMB Review – Cooling Water Intakes*

proposed rule, revealing any amendments made to reflect OMB's suggestions and recommendations.<sup>355</sup> The key changes made at the suggestion or recommendation of OMB are as follows.<sup>356</sup>

## 1. Changes Relating to EPA's National Cost-Benefit Analysis

EPA strongly doubted that a meaningful national cost-benefit analysis is possible, but OMB removed EPA's reservations and expressions of doubt. EPA explained that it did not rely on "a nation-wide comparison of costs and benefits" in proposing a rule because it felt that its efforts to calculate the benefits of the rule were unsatisfactory.<sup>357</sup> Among other problems:

EPA's calculation of reduced impingement and entrainment benefits of closed-cycle cooling does not account for 97 percent of the direct use A1E [age 1 equivalents<sup>358</sup>] of organisms entrained by cooling water intakes. Moreover, the monetized benefit values do not include the majority of the indirect use and nonuse value of the reductions in I&E mortality, and completely exclude categories such as the non commercial portion of impacts to threatened and

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2040-AE95 NPRM, Document ID: EPA-HQ-OW-2008-0667-1295 (Exh. 84); *see also Document Submitted to Initiate EO 12866 Review - Cooling Water Intakes 2040-AE95 NPRM FRN* [DCN 10-6625A], Document ID: EPA-HQ-OW-2008-0667-1295.1 (first attachment to Document 1295, EPA draft of the Proposed Rule sent to OMB) (Exh. 85).

<sup>355</sup> EPA-HQ-OW-2008-0667-1295 2 with markup showing [DCN 10-6625B], EPA-HQ-OW-2008-0667-1407 [DCN 10-6625B], (Redline-strikeout documenting changes made during EO 12866 review, hereinafter "Redlined Version of Proposed Rule") (Exh. 86).

<sup>356</sup> On May 19, 2011, Riverkeeper submitted a request to OMB under the Freedom of Information Act ("FOIA") asking that OIRA make available for inspection and copying (1) all documents exchanged between OIRA and EPA during the Proposed Rule's interagency review period, and (2) all documents received by OMB from any member of the public regarding the rulemaking. Given the exigencies of the public comment period on the Proposed Rule, which at that time was to close on July 19, 2011, Riverkeeper asked OMB to make all responsive documents available as soon as possible. On May 20, 2011, OMB acknowledged Riverkeeper's request but did not make any documents available. On June 28, 2011, Riverkeeper wrote to OMB again, repeating its document request and again emphasizing that time was of the essence in obtaining documents from OMB because the window to review and use those documents during the public comment would soon close. OMB did not respond to Riverkeeper's second letter. Riverkeeper wrote a third time on July 18, 2011, reiterating its earlier requests and cautioning that unless OMB responded promptly, it would seek a court order compelling OMB to provide all records responsive to Riverkeeper's May 19, 2011 FOIA request. OMB again failed to respond and is therefore in blatant violation of FOIA's mandatory twenty-day response deadline set forth in 5 U.S.C. § 552(a)(6)(A)(i). Consequently, Riverkeeper sued OMB in federal court on July 25, 2011, seeking a court order compelling disclosure of the requested documents. To date, OMB has not responded to the complaint. Accordingly, the commenters reserve all rights with respect to this matter, including the right to submit comments and related documents to EPA after the close of the comment period in light of the failure of the United States to timely comply with the mandatory disclosure requirements under FOIA.

<sup>357</sup> Redlined Version of Proposed Rule at 140-41.

<sup>358</sup> EPA states that "The Equivalent Adult Model (EAM) is a method for converting organisms of different ages (life stages) into an equivalent number of individuals in any single age. For its 316(b) analyses, EPA standardized all I&E mortality losses into equivalent numbers of 1-year-old fish, a value termed age-1 equivalents (A1Es). This conversion allows losses to be compared among species, years, facilities, and regions." 2001 EEBA at 3-2 (internal citation omitted).



endangered species, the thermal discharge impacts to water quality, and species composition.<sup>359</sup>

EPA thus concluded that, “[u]nder these circumstances, a complete national weighing of costs and benefits is not possible at this time.”<sup>360</sup>

However, OMB deleted EPA’s concerns and revised the preamble to read “. . . EPA has determined that the benefits of the proposed rule justify its costs. In addition, EPA has explained why consideration of costs and benefits is also appropriate in the site-specific permit setting when establishing entrainment controls.”<sup>361</sup> OMB also toned down the language that EPA used to describe the failings of the cost-benefit analysis exercise, removing phrases like “thus, the universe of even ecosystem benefits that [the analysis] can quantify is small.”<sup>362</sup>

## **2. Changes Relating to the Case-by-Case BTA Determination of Entrainment Standards**

### **a. EPA Sought to Require All Facilities to Use the “Best Performing Technology” So Long As its Costs Were Not Wholly Disproportionate to its Benefits.**

EPA strongly doubted the value and comprehensiveness of cost-benefit estimates where non-use, non-market values are so important. Therefore, the agency explained that a Director “may” take estimates of social costs and benefits into account when conducting a site-specific BTA analysis, but should keep in mind that these estimates are very uncertain and far from comprehensive.<sup>363</sup> In particular EPA stressed that:

it is important that the Director recognize that even at [sic] when dealing with only a single site assessment the quantified and monetized estimates of benefits are more uncertain and less comprehensive than the estimates of costs. Important benefit effect categories will very likely not be able to be quantified and monetized . . . . As a result, benefit estimates are likely to underestimate the value that would accrue to society . . . .”<sup>364</sup>

EPA’s strong doubts about the validity and meaning of a facility’s cost-benefit analysis led the agency to restrict its use, even on a site-specific basis:

The results of the social cost-benefit analysis should be interpreted in the following way: The Director may not reject an otherwise available technology as

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<sup>359</sup> Redlined Version of Proposed Rule at 141.

<sup>360</sup> Redlined Version of Proposed Rule at 141.

<sup>361</sup> Redlined Version of Proposed Rule at 166; 76 Fed. Reg. at 22,211 (col. 3).

<sup>362</sup> Redlined Version of Proposed Rule at 141.

<sup>363</sup> Redlined Version of Proposed Rule at 343.

<sup>364</sup> Redlined Version of Proposed Rule at 343.

BTA for entrainment mortality requirements unless the social costs of compliance are wholly disproportionate to the social benefits.<sup>365</sup>

EPA called its approach to BTA the “wholly disproportionate” test.”<sup>366</sup> Under the “wholly disproportionate” test, a BTA analysis begins with consideration of the best performing and available technology to reduce entrainment or impingement. Only if the Director rejects the best performing technology because its costs were “wholly disproportionate” to the benefits it provided could the Director consider the next most effective technology. And “the test should be applied to the next most costly entrainment technology until the social cost of the proposed entrainment technology no longer violates the wholly disproportionate rule.”<sup>367</sup>

**b. OMB Directed EPA to Abandon its “Wholly Disproportionate” Test and Let States Reject Any Technology After an Open-Ended, Multi-Factor Evaluation if its Costs “Are Not Justified” by its Benefits.**

OMB rejected EPA’s “wholly disproportionate” test, thereby fundamentally rewriting the approach that state permit writers must follow in making BTA determinations. OMB also deleted EPA’s comment that it has used the wholly disproportionate test to interpret Section 316(b) since the 1970’s, and has issued a general counsel opinion supporting its use.<sup>368</sup> Thus, instead of requiring the Director to impose “the best controls whose cost is not wholly disproportionate to their associated benefits,”<sup>369</sup> the proposed rule allows a Director to reject any technology if the costs “are not justified” by the benefits.<sup>370</sup>

EPA’s initial draft emphasized performance and environmental protection: the rule text stated that closed-cycle cooling is the best performing technology and should be used unless infeasible or disproportionately costly. Additionally, EPA’s “wholly disproportionate rule” ensured that site-specific cost-benefit analyses – analyses that the agency’s staff cautioned would be uncertain and imprecise – were relegated to a secondary role of eliminating gross disparities between costs and benefits.

After OMB’s revisions, the Director need only require the maximum reductions “warranted” by an open-ended consideration of costs and benefits,<sup>371</sup> and can reject any technology if he determines that its costs “are not justified” by its benefits.<sup>372</sup> Thus, OMB proposes to allow Directors to engage in open-ended consideration of multiple factors so long as the end result is “justified” in the agency’s opinion. OMB has significantly altered the case-by-case analysis process, making it far more ambiguous, standardless and discretionary.

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<sup>365</sup> Redlined Version of Proposed Rule at 344.

<sup>366</sup> Redlined Version of Proposed Rule at 344.

<sup>367</sup> Redlined Version of Proposed Rule at 344.

<sup>368</sup> See Redlined Version of Proposed Rule at 168-69.

<sup>369</sup> Redlined Version of Proposed Rule at 169; see also p. 344, 450.

<sup>370</sup> Proposed 40 C.F.R. § 125.98(e), 72 Fed. Reg. at 22,288 (col. 1).

<sup>371</sup> Proposed 40 C.F.R. § 125.94(c), 76 Fed. Reg. at 22,283 (col. 2).

<sup>372</sup> Proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. at 22,288 (col. 1).

**c. EPA Determined that Closed-Cycle Cooling Is the “Best Performing Technology,” but OMB Deleted this Conclusion.**

EPA’s original preamble and rule text stated that “closed-cycle cooling is the best performing technology for reducing entrainment mortality, but it may or may not be the BTA for individual facilities in light of site-specific considerations.”<sup>373</sup> Under EPA’s original case-by-case analysis as outlined above, because closed-cycle cooling is the best performing technology, a Director would be required to determine whether it is available without considering cost (i.e. “otherwise available”) and, if so, the Director would require the use of closed-cycle cooling unless “the social costs of compliance are wholly disproportionate to the social benefits.”<sup>374</sup> Thus, EPA intended for closed-cycle cooling to be the default compliance technology nationwide.

However, OMB deleted EPA’s conclusion that closed-cycle cooling is the best performing technology,<sup>375</sup> and only left EPA’s statement that it had evaluated closed-cycle cooling as a “*candidate* best performing technology.”<sup>376</sup>

**d. OMB Also Deleted EPA’s Statement that Most Facilities Should Install Closed-Cycle Systems.**

Having set the “wholly disproportionate” test and selected closed-cycle cooling as the “best performing technology,” EPA believed that its case-by-case analysis procedure would lead to the same result as a national closed-cycle cooling standard with variances:

In theory, EPA believes that site-specific determination of BTA entrainment mortality controls will result in the same reductions – will “minimize adverse environmental impact” – as a one-size-fit-all requirement that included the variances that would be necessary to address the site-specific limitations on installation of closed-cycle.<sup>377</sup>

OMB, once again, deleted this statement. OMB also deleted EPA’s suggestion that many facilities would move to closed-cycle cooling:

In EPA’s view, entrainment mortality controls are appropriate in virtually all circumstances. The proposed decision not to establish uniform national entrainment controls was not a decision that no controls are required. The rejection of one-size-fits all does not mean that no-size-fits-all. Rather, the best way to determine entrainment controls is on a site-by-site basis. . . . Thus, EPA expects that, under the proposed approach, *there will be entrainment controls for*

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<sup>373</sup> Redlined Version of Proposed Rule at 428, proposed 40 C.F.R. § 125.94(c).

<sup>374</sup> Redlined Version of Proposed Rule at 344.

<sup>375</sup> Redlined Version of Proposed Rule at 428, proposed 40 C.F.R. § 125.94(c).

<sup>376</sup> 76 Fed. Reg. at 22,203 (col. 3) (emphasis added).

<sup>377</sup> Redlined Version of Proposed Rule at 138.

*most facilities and . . . Directors will require many facilities to install closed-cycle cooling to address entrainment.*<sup>378</sup>

**e. Although OMB Put Cost-Benefit Analysis at the Heart of the Decision Making Process, it Deleted EPA’s Guidance on How to Perform Cost-Benefit Analysis.**

After deleting EPA’s statements about the very significant uncertainties involved in the cost-benefit analysis process, OMB made a highly ambiguous form of cost-benefit analysis the linchpin of the rule. OMB would require monetized cost-benefit analyses wherever possible.<sup>379</sup> But, at the same time, OMB deleted and weakened EPA’s guidance statements about how cost-benefit analyses should be performed and reviewed.

For example, the rule calls for cost-benefit analyses that focus on the social costs of reducing impingement and entrainment, not the compliance costs to facilities. OMB deleted EPA’s explanation of the difference between social and facility costs of installation downtime and energy penalties, and how these costs should be calculated to avoid overestimating the social costs.<sup>380</sup>

OMB also removed EPA’s guidance on discount rates. EPA had called for facilities to use a “social discount rate . . . reflecting society’s rate of time preference as opposed to a facility’s cost of capital,” and suggested 3%, as per existing OMB guidance.<sup>381</sup> OMB replaced this instruction with a general reference to “an appropriate discount rate.”<sup>382</sup>

Finally, in the peer review process for the entrainment-related studies, EPA planned to require states to provide an explanation “for any reviewer comments not accepted.”<sup>383</sup> OMB changed this, only requiring explanation for “significant” comments that are not accepted.<sup>384</sup>

**3. Changes Relating to Definition of New Units**

**a. OMB Determined that Replacements/Repowerings Are Not New Units and Deleted EPA’s Contrary Statements and Rationale.**

EPA intended to treat replacements and repowerings as new units, but OMB excluded replacements and repowerings from the definition of new units.<sup>385</sup> Originally, EPA wrote that

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<sup>378</sup> Redlined Version of Proposed Rule at 159-160 (emphasis added).

<sup>379</sup> See Redlined Version of Proposed Rule at 310 (OMB suggests that the benefits valuation study should include monetization “to the extent appropriate.”).

<sup>380</sup> See Redlined Version of Proposed Rule at 338-339.

<sup>381</sup> See Redlined Version of Proposed Rule at 340.

<sup>382</sup> See Redlined Version of Proposed Rule at 340, 76 Fed. Reg. 22,261 (col. 2).

<sup>383</sup> Redlined Version of Proposed Rule at 401, 406, 408.

<sup>384</sup> See proposed 40 C.F.R. §§ 122.21(r)(9),(10),(12), 76 Fed. Reg. at 22,277-79.

<sup>385</sup> See Redlined Version of Proposed Rule at 92, 423 (revising 40 C.F.R. 125.92(r) and deleting 125.92(t), which defined repowering).

a replacement unit or repowered unit, as distinct from constructing an additional unit, would also be treated differently than existing units. Repowering, in contrast to simply constructing a new unit, is rebuilding and replacing the major components of an existing power plant. Repowering is done to improve efficiency, increase or optimize capacity, or minimize operating costs of the existing unit. For example, an electric generating facility may replace boilers, retrofit improved condenser designs, and utilize combined cycle or cogeneration in the repowered unit. The requirements for new units are modeled after the requirements for a new facility in the Phase I rule.

EPA has adopted this approach for the following reasons. Almost two-thirds of the coal fired units are at least 30 years of age, and more than 30 percent of coal units are at least 50 years of age. As these units are retired and replaced based on individual facility circumstances, facilities have the ideal opportunity to design and construct the new units without many of the additional expenses associated with retrofitting an existing unit to closed-cycle. Thus, for example, the timing of retirement and replacement is within the control of the facility and would be dictated strictly by the facility's internal requirements rather than linked to specific regulatory compliance deadlines. Further, the incremental downtime that may be associated with installing closed-cycle cooling may be avoided or minimized. In addition, the condensers can be configured for closed-cycle, reducing energy requirements, and high efficiency cooling towers can be designed as part of the unit replacement, allowing for installation of smaller cooling towers. These advantages may not always be available when retrofitting cooling towers at an existing unit. In consideration of the fact that these repowering, replacement, and additional unit construction decisions rest largely within the control of the individual facility, EPA decided that subjecting these operations to the same national BTA requirements as those applicable to new facilities is warranted.<sup>386</sup>

OMB also deleted EPA's extensive and reasoned explanation of why replacements and repowerings should be considered new units, and why a retrofit to closed-cycle cooling is available for all replacements and repowerings.<sup>387</sup> EPA's summary was trenchant:

In summary, EPA proposes that, because repowering, replacement, and additional unit installation decisions can be accomplished feasibly and with lower costs than retrofitting an entire existing facility, it is appropriate to require the same entrainment mortality controls at new units as are applicable to new facilities per the Phase I rule. New units are similar to new facilities, regardless of whether that unit is a green field construction, an additional unit, a replacement unit, or a repowered unit. Further, EPA considered that new units would be similar to new facilities in terms of the useful expected plant life and therefore found in general this would mean that closed-cycle cooling would reduce entrainment mortality for

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<sup>386</sup> Redlined Version of Proposed Rule at 92-93.

<sup>387</sup> See Redlined Version of Proposed Rule at 143-148.

a longer time than for existing facilities as a whole. Finally, since new units are more likely to be located in areas in attainment for national ambient air quality standards, EPA finds that air permit issues are also minimized for new units. Thus, EPA's analysis shows closed-cycle cooling would be available to such facilities for the reasons described above and are economically achievable (see Section VII).

In developing this proposed rule, EPA considered whether such requirements for new units would serve as a disincentive to replace older units and determined that this would not be the case given closed-cycle cooling's comparable cost relative to once through cooling and its small cost as a percentage of overall costs at the new unit. The capital costs of closed-cycle cooling are comparable to the capital costs of once through cooling with only a modest increase in O&M expenses of the cooling water system. Furthermore, the costs usually comprise less than 1 percent of the total costs of a new unit. Recent experience indicates that the Phase I requirements are not a disincentive for new facility construction, as demonstrated by numerous instances where recently constructed facilities are using closed-cycle; see 66 FR 28856; also see 66 FR 28865.

Further, EPA's analysis shows the generating units projected to close are most likely to do so because they are older, unreliable, less efficient, and therefore generally unprofitable. See Section VII for more information. In some instances, insufficient water exists to continue to operate a facility with once-through cooling, or thermal discharge limitations preclude operation of once-through cooling; these facilities have employed cooling towers, partial towers, and helper towers resulting in an increased reliability.<sup>388</sup>

#### **4. Changes Relating to Regulatory Options**

##### **a. OMB Revised the Discussion of Options 2 and 3, and Added a New Option 4.**

OMB added Option 4 to the rule.<sup>389</sup> OMB also rewrote EPA's analysis of Options 1, 2, and 3 to play up the benefits of Option 1 and delete any favorable comments about Options 2 and 3. Accordingly, OMB deleted EPA's statement that Option 3 is three times more effective than Option 1:

A comparison of the baseline and Option 1 adverse environmental impacts as expressed in age-1 equivalents shows that Option 1 reduces AEI by 31 percent. A similar comparison of the baseline to Option 3 shows that Option 3 reduces AEI by 92 percent."<sup>390</sup>

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<sup>388</sup> Redlined Version of Proposed Rule at 147-148.

<sup>389</sup> See Redlined Version of Proposed Rule at 125 (removing references to three options and replacing with references to four options), *see also* Redlined Version p. 148-50 (adding a two page description of Option 4 to the preamble).

<sup>390</sup> Redlined Version of Proposed Rule at 163.

And in discussing EPA's cost estimates for Option 2, EPA noted that its decision to allow Directors discretion to give facilities several extra years to come into compliance with the rule may actually reduce compliance costs. OMB deleted this observation as well.<sup>391</sup>

Most importantly, EPA concluded that none of the options it evaluated would have significant effects on national generating capacity. OMB highlighted the fact that Option 1 would have insignificant effects but deleted EPA's very similar conclusion about Options 2 and 3. With respect to Option 1, OMB summarized EPA's electricity market impact analysis by stating that "the early retirements among in-scope facilities under the proposed regulatory option have little impact at the level of national and regional electricity markets."<sup>392</sup> But with respect to Option 2, OMB deleted EPA's conclusion that although more generating units would close, "a large share of the estimated closures occur in generating units that have very low capacity utilization in the baseline" and only "3 percent of closure capacity occurs in generating units that otherwise appear to be reasonable economic contributors to electric power generation."<sup>393</sup>

Finally, OMB directed the addition of a summary of economic impacts which states: "EPA has considered the totality of these measures of economic impacts in concluding that there are no significant economic impacts associated with Option 1 (the preferred option) or Option 4, while there are considerably greater economic impacts associated with Options 2 and 3."<sup>394</sup>

## **5. Changes to Other Provisions of the Rule**

### **a. OMB Asked for Comment on the Possibility of Weaker Compliance Timelines.**

EPA set a firm eight year deadline for impingement compliance, even at facilities where the Director recognized that a plan to install closed-cycle cooling for entrainment compliance would extend beyond the eight year window. EPA recognized that keeping to a firm window might require some facilities to install impingement controls that become redundant when the closed-cycle cooling retrofit comes online, but EPA stated firmly that it "does not intend for the facility to do nothing to reduce [impingement] until the technologies for [entrainment] have been implemented."<sup>395</sup> OMB inserted a specific request for comments on this firm deadline.

### **b. OMB Removed Firm Monitoring Requirements and Replaced Them with Suggestions.**

In the draft sent to OMB, EPA set firm impingement monitoring requirements that included weekly monitoring during peak periods of impingement and bi-weekly monitoring at other times. OMB changed this, writing that monitoring frequencies would be specified on a

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<sup>391</sup> See Redlined Version of Proposed Rule at 134-35.

<sup>392</sup> Redlined Version of Proposed Rule at 240.

<sup>393</sup> Redlined Version of Proposed Rule at 242.

<sup>394</sup> Redlined Version of Proposed Rule at 253.

<sup>395</sup> Redlined Version of Proposed Rule at 291.

case-by-case basis by the Director, but that EPA “assumes” that the weekly/bi-weekly schedule would be common.<sup>396</sup> Similarly, EPA required facilities to stratify collections so that they cover the entire daily cycle (and tidal cycles where appropriate). Again, OMB changed this from a hard requirement to an assumption.<sup>397</sup> OMB then added a request for comment “on whether EPA should specific [sic] minimum sampling frequencies or leave this determination to the Director.”<sup>398</sup>

**c. OMB Removed Extra Protection for Species of Concern.**

EPA had originally required facility operators who reduce intake velocity to 0.5 feet/second or less to document that this measure adequately protected species of concern. OMB removed this requirement.<sup>399</sup>

**d. OMB Altered the Nuclear Safety Exception.**

EPA created an exception to the entrainment mortality requirements for nuclear facilities if compliance “would result in a conflict with a safety requirement established by the [Nuclear Regulatory] Commission.”<sup>400</sup> However, OMB deleted EPA’s clarifying statement that the exception was narrow and that “[t]echnical infeasibility, and not cost, is the only consideration in evaluation of a potential conflict with Commission safety requirements.”<sup>401</sup> OMB also broadened the exception such that it applies to the determination of BTA requirements generally, not just entrainment mortality.<sup>402</sup>

**e. OMB Created a New Exception for New Units at Existing Facilities with Costs “Wholly out of Proportion” to the Costs Considered by EPA.**

OMB added the “compliance costs wholly out of proportion” exemption to the rule’s entrainment requirements at § 125.94(d)(4).<sup>403</sup> EPA originally exempted only facilities that could show that installing closed-cycle cooling would result in significant adverse impacts on local air quality.<sup>404</sup>

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<sup>396</sup> See Redlined Version of Proposed Rule at 318, *see also* redlined version p. 442 (revisions to 40 C.F.R. §§ 125.96(b),(c)).

<sup>397</sup> Redlined Version of Proposed Rule at 320.

<sup>398</sup> Redlined Version of Proposed Rule at 322.

<sup>399</sup> See Redlined Version of Proposed Rule at 397.

<sup>400</sup> Redlined Version of Proposed Rule at 431, proposed 40 C.F.R. § 125.94(e), 72 Fed. Reg. at 22,284 (col. 1).

<sup>401</sup> Redlined Version of Proposed Rule at 431.

<sup>402</sup> *Id.*

<sup>403</sup> Redlined Version of Proposed Rule at 56.

<sup>404</sup> See Redlined Version of Proposed Rule at 430.



**f. OMB Would Allow Facilities to Prove that, at Their Site, Entrainment Mortality Is Less Than 100 Percent.**

OMB added a sentence to the preamble stating that the Proposed Rule allows facilities to demonstrate that entrainment mortality is less than 100 percent at their site.<sup>405</sup>

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OMB thus took a weak and illegal rule and made it much weaker, more arbitrary and capricious, and much further from being compliant with the law.

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<sup>405</sup> See Redlined Version of Proposed Rule at 62.

### III.

**THE PROPOSED RULE FALLS WELL SHORT OF THE  
CLEAN WATER ACT'S STATUTORY MANDATE, IS  
ARBITRARY, CAPRICIOUS, AN ABUSE OF DISCRETION,  
AND OTHERWISE NOT IN ACCORDANCE WITH LAW, IS  
SIGNIFICANTLY WEAKER THAN EPA'S PRIOR 316(b)  
RULES, AND WILL NOT PROTECT AQUATIC RESOURCES  
UNLESS IT IS SIGNIFICANTLY STRENGTHENED**

In introducing the Proposed Rule's BTA determination, EPA stated that it "has decided not to re-propose requirements similar to those of the final Phase II rule, but would adopt, for the reasons explained in [the] preamble, *a new framework*."<sup>406</sup> Unfortunately, that "new" framework, while it differs from the Phase II rule in certain respects, is not new at all; instead, it largely codifies existing practice and thereby perpetuates the highly unfortunate vacuum of federal leadership on this issue that has persisted for four decades since Congress first directed EPA to take action. For the reasons explained below, the Proposed Rule is both illegal and poor policy, worse in many ways than the Phase II framework (which was itself impermissibly weak, but at least purported to establish national categorical standards), and will continue the longstanding bureaucratic paralysis that has left impingement and entrainment as one of the last remaining unaddressed problems that the 1972 CWA was designed to correct.<sup>407</sup>

**A. EPA's Interpretation of Section 316(b) and its "Approach to BTA" Contradicts the Plain Meaning of the Act and Congress's Clearly Expressed Intent.**

Section IV.A. of the Preamble is entitled "EPA's Approach to BTA" and sets forth EPA's interpretation of Section 316(b) and the court decisions that interpreted and applied that provision.<sup>408</sup> EPA's interpretation is, however, deeply flawed and plainly contradicts the statute in several important respects; many of the Proposed Rule's fundamental flaws spring directly from the Agency's misunderstanding of its own authority.

**1. When Making BTA Determinations Under Section 316(b) and Setting Parameters for Permit Writers to Do So, EPA Does Not Have Authority to Eschew Congress's Fundamental Intent for the CWA's Technology-Based Regulatory Program.**

EPA takes the mistaken view that the integration of Section 316(b) with sections 301 and 306 is no more than an invitation from Congress to look to the factors considered in those other sections when establishing standards for Section 316(b), leaving the agency free to ignore any and all of the Congressional mandates on which the CWA's technology-based program rests.

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<sup>406</sup> 76 Fed. Reg. at 22,196 (col. 2) (emphasis added).

<sup>407</sup> EPA states that "[f]ollowing promulgation of the 2004 Phase II rule," the agency "became aware of certain elements of the 2004 rule that were particularly challenging or time-consuming to implement." 76 Fed. Reg. 22, 185 (col. 2). Unfortunately, the Proposed Rule does not improve upon the Phase II framework, but instead moves in the opposite direction, perpetuating the case-by-case approach, which will be impossible to implement.

<sup>408</sup> 76 Fed. Reg. at 22,196 (col. 2)-22,197 (col. 2).

For example, referring to the Second Circuit’s decisions in *Riverkeeper I* and *Riverkeeper II*, EPA states: “courts have held that, given Section 316(b)’s reference to sections 301 and 306 of the Act, EPA may look to the factors considered in those sections in establishing those standards for Section 316(b) standard setting.”<sup>409</sup> And referring to the *Entergy* decision, EPA states that “[t]he Supreme Court noted that, given the absence of any factors language in Section 316(b), EPA has more discretion in its standard setting under Section 316(b) than under the effluent guidelines provisions.”<sup>410</sup> In fact, while EPA may look to the factors set forth in sections 301 and 306 (and, by extension, section 304) in formulating the substantive content of BTA regulations, EPA is not free to disregard the fundamental regulatory principles inherent in the basic fabric which underlies all of the BAT, BPT, BCT, and BADT standards promulgated pursuant to those sections. Put slightly differently, while BTA requirements may impose a different substantive standard than the effluent limitations – indeed, *each* type of effluent limitation embodies a different substantive standard – BTA regulations must follow the same basic regulatory approach as Congress required for technology-based standards as a whole.<sup>411</sup>

This conclusion is made inescapably clear in the court decisions to which EPA refers, namely *Riverkeeper I* and *Riverkeeper II*, which, while finding that EPA need not follow certain directives that are particular to one or another of the effluent limitations (such as section 306’s prohibition against variances), nevertheless held that BTA standards must adhere to Congress’s intent for the entire technology-based program. For example, in *Riverkeeper I* the court began by explaining that “review [of] the entire statutory scheme ... [and] its development assists in interpreting the narrow statutory provision [i.e., Section 316(b)] before us.”<sup>412</sup> Similarly, in *Riverkeeper II*, the court began by noting that its “interpretation of Section 316(b) is informed by the two provisions it cross-references, CWA sections 301 and 306.”<sup>413</sup>

The Second Circuit in both of those cases went on to remand the restoration measures provisions in Phase I and Phase II rules, in part, because “Congress rejected a regulatory approach that relies on water quality standards, [such as] ... focusing on fish populations and consequential environmental harm,”<sup>414</sup> and restoration measures “are inconsistent with Congress’s intent that the ‘design’ of intake structures be regulated directly, based on the best technology available, and without resort in the first instance to water quality measurements”<sup>415</sup> because they “resemble the pre-1972 approach to water pollution, which regulated point sources based on their effect on the surrounding water and allowed sources to discharge pollutants provided the discharge did not cause water quality to dip below an acceptable level.”<sup>416</sup> In *Riverkeeper II* the court also relied on the CWA’s “technology-forcing principle” in its rejection

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<sup>409</sup> 76 Fed. Reg. at 22,196 (col. 3).

<sup>410</sup> 76 Fed. Reg. at 22,196 (col. 3).

<sup>411</sup> That regulatory approach is discussed above in Sections I.B.2 and I.B.3 of these comments.

<sup>412</sup> *Riverkeeper I*, 358 F.3d at 184. EPA itself has stated that “CWA § 316(b), like other provisions of the statute, should be construed with Congress’ ambitious overarching statutory purposes in mind.” EPA, *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA*, NPDES Permit No. MA 0003654, at 7-2 (July 22, 2002) (Exh. 87).

<sup>413</sup> *Riverkeeper II*, 475 F.3d at 91.

<sup>414</sup> *Riverkeeper I*, 358 F.3d 196.

<sup>415</sup> *Riverkeeper I*, 358 F.3d at 190; *see also Riverkeeper II*, 475 F.3d at 108-09.

<sup>416</sup> *Riverkeeper I*, 358 F.3d at 189, citing *CPC Int’l, Inc. v. Train*, 515 F.2d 1032, 1034-35 (8th Cir. 1975).

of the Phase II restoration measures provision.<sup>417</sup> And that decision also remanded one of EPA’s site-specific compliance options because, as the court explained, “Congress changed its approach in 1972, [and] ... [t]he Act now regulates discharges from point sources rather than water quality.”<sup>418</sup>

Nothing in the Supreme Court’s *Entergy* decision affected those holdings, as that court merely considered whether Congress had prohibited cost-benefit analysis for BTA, despite requiring it for BPT.<sup>419</sup> Thus, that decision, which explicitly left undisturbed all of the Second Circuit’s other holdings,<sup>420</sup> concerned the differences between the various technology-based standards rather than the regulatory approach common to all of them.

The fundamental precepts that apply to BTA requirements as well as all of the effluent limitations reflect the shift in regulatory approach embodied in the 1972 CWA amendments, including but not limited to (i) Congress’s direction to EPA to establish uniform, national, categorical, technology-based and technology-forcing regulations, (ii) Congress’s intent to avoid lengthy indeterminate studies in the context of permitting, (iii) the focus on readily applied, readily monitored and readily enforced “end-of-pipe” restrictions, and (iv) the assessment of consequential water quality effects only as a secondary task and only to make the requirements stricter than is dictated by technology considerations. As discussed herein, EPA has ignored all of those dictates in fashioning its current “approach to BTA” and “new framework.”

## **2. EPA’s Interpretation of the Statutory Term “Available” Is Unlawful.**

In one instance of this derogation of Congress’s intent and the plain language of the statute, EPA has applied an unlawful interpretation of the term “available” in Section 316(b). Specifically, EPA proposes to rule out several candidate “best performing technologies” because they cannot be implemented at every regulated facility in the United States. Thus, EPA rejected closed-cycle cooling as BTA and avoided setting a nationally uniform entrainment standard because it could not identify “a single technology that represented BTA for all facilities.”<sup>421</sup> Likewise, EPA rejected a velocity limit of 0.5 feet/second as the basis for a national impingement standard “because it is not available at all facilities.”<sup>422</sup>

However, it is impermissible for EPA to reject any technology “because it is not available at all facilities.”<sup>423</sup> The language, structure, and legislative history of the Clean Water Act indicate that Congress did not intend for EPA to consider whether a candidate technology is capable of being implemented universally when setting technology-based standards.

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<sup>417</sup> *Riverkeeper II*, 475 F.3d at 110.

<sup>418</sup> *Riverkeeper II*, 475 F.3d at 114-15.

<sup>419</sup> *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, 1510 (2009).

<sup>420</sup> *Id.* (“We of course express no view on the remaining bases for the Second Circuit’s remand which did not depend on the permissibility of cost-benefit analysis”).

<sup>421</sup> 76 Fed. Reg. at 22,197 (col. 2).

<sup>422</sup> 76 Fed. Reg. at 22,203 (col. 1).

<sup>423</sup> 76 Fed. Reg. at 22,203 (col. 1).

### 3. EPA's Understanding of its Cost-Benefit Authority is Incorrect.

As discussed above, the Clean Water Act also restricts (albeit does not deny entirely) the authority of EPA and delegated states to rely on cost-benefit considerations in establishing BTA standards under Section 316(b). Moreover, cost-benefit analysis is, at best, optional under Section 316(b). Indeed, EPA has not always employed cost-benefit analysis when regulating cooling water intake structures. The Phase I rule, the Phase III rule for oil rigs, and the “new units” provisions in the Proposed Rule each set Section 316(b) standards primarily based on technological and cost considerations, but not a strict cost-benefit approach, and none of them authorize permit writers to undertake cost-benefit analyses on a site-specific basis.<sup>424</sup> In *ConocoPhillips*, the Fifth Circuit upheld EPA's decision not to perform a cost-benefit analysis for the Phase III rule.<sup>425</sup> Because cost-benefit analysis is optional, and, in the circumstances presented here, frustrates, rather than promotes the intent of the statute, we urge EPA not to rely on cost-benefit considerations for this rule, and even more importantly, not to authorize permit writers to consider cost-benefit considerations on a site-specific basis.

Nevertheless, to the extent EPA chooses to engage in cost-benefit analysis for the final rule, as it did in developing the proposal, the agency's understanding of its authority in this regard is also mistaken. In explaining its approach to BTA, EPA states that:

because the Supreme Court has concluded that EPA may permissibly consider costs and benefits in its BTA determination and E.O. 13563 directs EPA only to propose regulations based on a reasoned determination that the benefits justify the costs, EPA has taken costs and benefits into account in this proposal. EPA has concluded that the benefits of the proposed option justify its costs.<sup>426</sup>

That blithe statement, however, completely ignores the limitations that the CWA imposes, as Justice Breyer explained in *Entergy* and EPA has previously recognized. In particular, the statute restricts EPA's investigation of, and reliance upon, cost-benefit analysis in choosing a regulatory option, establishing nationwide performance standards and procedures for them to be applied in permits. Justice Breyer explained that EPA is required to “describe environmental benefits in non-monetized terms,” “avoid lengthy formal cost-benefit proceedings and futile attempts at comprehensive monetization,” and “take account of Congress' technology-forcing objectives,” while merely using cost-benefit analysis to “prevent results that are absurd or unreasonable in light of extreme

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<sup>424</sup> See e.g., 66 Fed. Reg. at 65,312 (cols. 2-3) (In responding to comment on why the agency did not rely on cost-benefit considerations for the Phase I rule, EPA stated that “it is neither required nor prudent for EPA to develop empirical estimates of benefits where data limitations or other critical constraints preclude doing so in a credible and reliable manner”); *ConocoPhillips Co. v. EPA*, 612 F.3d 822, 829 (5th Cir. 2010) (“For new Phase III facilities, the EPA concluded that it was impossible to compare the costs incurred by individual facilities to the benefits of those facilities because those facilities have not yet been built. Instead, the EPA calculated the expected costs of compliance under the national uniform standards and determined whether those costs would result in a barrier to entry for new operations and whether those costs could be reasonably borne by the industry.”) (internal footnotes omitted); see also 71 Fed. Reg. at 35,025-29, 35,034; proposed 40 C.F.R. § 125.94(d); 76 Fed. Reg. at 22,283 (cols. 2-3).

<sup>425</sup> See *ConocoPhillips Co. v. EPA*, 612 F.3d at 842.

<sup>426</sup> 76 Fed. Reg. at 22,196 (col. 3).

disparities between costs and benefits.”<sup>427</sup> This can be done through EPA’s traditional wholly disproportionate test, so long as the analysis is a “limited” and “relatively subsidiary task” rather than a “primary” or “paramount” factor, in light of the “difficulty of quantifying all the benefits of minimizing the adverse impacts of cooling water intake structures” (to use the agency’s own words), and so long as permit writers do not conduct a second cost-benefit analysis of any kind – whether the wholly disproportionate test or otherwise – in implementing the standards that EPA establishes.

For a much fuller description of the numerous fatal flaws in EPA’s cost-benefit analysis please see Section III.F., below, and Appendix A.

**B. EPA Should and Must Establish a National Categorical Entrainment Standard Based on Closed-Cycle Cooling.**

EPA should completely jettison the case-by-case site-specific approach to setting entrainment standards and instead establish a national categorical entrainment standard based on closed-cycle cooling. EPA considered two such options: Option 3 which applies closed-cycle cooling to all facilities subject to the rule, and Option 2 which has a 125 MGD actual intake flow threshold. Because Option 3 is superior in all respects, and will protect aquatic resources with minimal difficulty, EPA should select that option for the final rule in place of the proposed option, Option 1.

**1. Option 1’s Entrainment Provisions Represent a Complete Abdication of EPA’s Responsibility to Minimize Adverse Environmental Impact.**

Despite the widespread availability of closed-cycle cooling, EPA plans to require states to set entrainment controls on a case-by-case basis. This violates a clear Congressional directive to adopt effective, national, and uniform standards. Further, it is arbitrary and capricious of EPA to claim that it will fulfill its statutory duty to minimize the adverse environmental impact of cooling water intakes by delegating BTA decisions to the states. Forty years of experience shows that states cannot make these permitting choices, and the states have told EPA as much. EPA’s Proposed Rule will therefore continue a woefully inadequate permitting process that has, for decades, allowed power plants to operate across the country pursuant to long-expired or impermissibly weak permits.

Not only does the Proposed Rule unlawfully and arbitrarily create a case-by-case standard-setting regime, the particular case-by-case regime that EPA has designed is particularly egregious in its legal infirmity. It leaves state permitting authorities unfettered discretion in setting standards, effectively allowing industry to self-regulate by proposing controls that overburdened state regulators lack the oversight capacity to meaningfully review.

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<sup>427</sup> *Entergy*, 129 S. Ct. at 1515; see also *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, Transcript of Oral Argument (Dec. 2, 2008) (Exh. 88).

**a. EPA’s Failure to Set Uniform National Standards for Entrainment Violates the Plain Language of Section 316(b) and Congress’s Clearly-Expressed Intent.**

As explained above, the Clean Water Act requires EPA to adopt uniform, national, categorical, technology-based and technology-forcing BTA standards for cooling water intake structures. Beyond the explicit directive to establish “standards” in the text of Section 316(b), the fact that Section 316(b) standards are promulgated under CWA sections 301 and 306 also indicates that, like the Act’s other technology-based standards, Section 316(b) standards must be implemented on a nationwide, uniform basis.

Further, national technology-based standards are consonant with several significant Congressional objectives that underpin the Clean Water Act: standardizing permitting procedures; limiting and revising the water-quality based approach to pollution control that rendered effective regulation impossible from 1948 to 1972; setting a federal floor for environmental protection in order to avoid a “race to the bottom” by state regulators; and promoting the Congressional interest in “horizontal equity,” *i.e.*, that similar facilities be treated similarly under the CWA insofar as possible. Congress made it abundantly clear that, to meet these objectives, EPA must set uniform, national, technology-based standards to minimize the adverse environmental impact of cooling water intake structures.

The record shows that EPA can and should establish a uniform national standard based on the use of closed-cycle cooling technology: EPA determined that closed-cycle cooling is a best performing technology<sup>428</sup> and that numerous existing facilities had retrofitted to closed-cycle.<sup>429</sup> EPA is concerned that “closed-cycle cooling is not practically feasible in a number of circumstances” that “are not isolated or insignificant.”<sup>430</sup> But it is unlawful for the agency to decide on this basis “that it should not establish closed-cycle cooling as the presumptive BTA entrainment control.”<sup>431</sup> As noted above, Congress gave EPA the ability to subcategorize the regulated industry and/or to offer variances precisely to address such concerns.<sup>432</sup> And properly crafted variance provisions have been upheld under Section 316(b) before.<sup>433</sup>

It is feasible to set uniform national standards because closed-cycle cooling and other technologies are available to the industry as a whole and EPA has the ability to issue variances in the rare case where it is technically infeasible. And, as outlined above, a case-by-case approach directly contradicts Congress’ general intent to end site-specific permitting under the Clean Water Act, and it contradicts Congress’ specific intent to require uniform standards under Section 316(b).

Setting a uniform standard with a variance is also consistent with Congress’s most

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<sup>428</sup> See 76 Fed. Reg. at 22,203 (col. 3).

<sup>429</sup> See 76 Fed. Reg. at 22,204 (col. 1).

<sup>430</sup> 76 Fed. Reg. at 22,207 (col. 1).

<sup>431</sup> *Id.*

<sup>432</sup> See 33 U.S.C. § 1311(n) (fundamentally different factors variance).

<sup>433</sup> See *Riverkeeper I*, 358 F.3d at 193-94.

fundamental objective in passing the Clean Water Act: “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”<sup>434</sup> A uniform standard provides a strong baseline of environmental protection and helps maintain water quality by placing the burden of proof for any downward variance upon the polluter.

If EPA is concerned about setting a categorical standard for the more than 1,200 facilities with cooling water intake structures affected by this rule, it must nevertheless undertake a thorough effort to craft national standards by looking at various thresholds and options for subcategorizing. EPA cannot aggregate all industries using intake structures and then default to a case-by-case regulatory approach, merely because it cannot find one technology that it believes all 1,200 facilities can install.

**b. EPA Is Unlawfully Requiring State Permit Writers to Set Entrainment Controls Based In Large Part on Water Quality Considerations Rather than Technological Considerations.**

Under EPA’s Proposed Rule, before a state may set entrainment controls at a particular site, the state permitting Director must consider the entrainment impacts on the waterbody, the ecological costs and benefits of the BTA candidate technologies (including to any threatened or endangered species), and the thermal discharge impacts of the candidate BTA technologies.<sup>435</sup> Additionally, to determine the environmental impacts of entrainment on the waterbody, the state permitting authority must also review “source water physical data” and “source water baseline biological characterization data.”<sup>436</sup> Only once the state has adequately evaluated these water-quality based concerns may it make a BTA determination. To the extent that this requires, or merely allows, states to analyze the consequential impact of its decision on the quality of the affected waters in the first instance, it is illegal because it is diametrically opposed to the approach to BTA envisioned by Congress and required under the Clean Water Act. As noted above, “Congress [intended] that the ‘design’ of intake structures be regulated directly, based on the best technology available, and without resort in the first instance to water quality measurements.”<sup>437</sup> It deliberately established the NPDES program to relieve permitting agencies of the need to conduct costly, lengthy, and indeterminate ecological studies to issue permits. Improving water quality is, of course, the goal of the Clean Water Act and its implementing regulations, but charactering on a site-specific basis the full extent of consequential damage caused to the waterbody by each intake structure’s fish kills is not a prerequisite to the imposition of technological controls.

The principled use of technology-based standards and rejection of the pre-existing water-quality based analyses applies equally in the Section 316(b) context as it does to effluent

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<sup>434</sup> 33 U.S.C. § 1251(a).

<sup>435</sup> See proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. at 22,288 (col. 1).

<sup>436</sup> See proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. at 22,288 (col. 1) (“The Director must establish case-by-case BTA standards for entrainment mortality for any facility subject to such requirements after reviewing the information submitted under 40 CFR 122.21(r)”); see also proposed 40 C.F.R. §§ 122.21(r)(2), (r)(4), 76 Fed. Reg. at 22,276 (col. 1-2) (requiring facilities to submit source water physical data and source water biological characterization data).

<sup>437</sup> *Riverkeeper I*, 358 F.3d at 190.



limitations. The Second Circuit explained in *Riverkeeper I* and again in *Riverkeeper II* that “Congress rejected a regulatory approach that relies on water quality standards, [such as] ... focusing on fish populations and consequential environmental harm.”<sup>438</sup> Congress retained water quality standards in the Clean Water Act only as a supplementary mechanism that can be used to set limitations stricter, but not more lenient, than technology-based limitations.<sup>439</sup> EPA is permitted to give consideration to the environmental benefits of its regulations at the national level.<sup>440</sup> But Congress forbade EPA from using site-specific water quality considerations as the basis for case-by-case standard setting or as the basis to weaken requirements that are based on technology considerations; yet that is precisely what EPA demands of state permitting authorities today.

The Clean Water Act directs EPA to set categorical standards on the basis of the best technology available to minimize adverse environmental impact without respect to water quality (except that water quality can be considered where necessary to make the requirements stricter). And as the next section points out, it is precisely EPA’s failure to set such categorical standards under Section 316(b) that, since the 1970’s, has paralyzed state decision making. For EPA to abdicate its responsibility to set national technology-based standards and instead order states to set water quality-based standards not only violates the law but marks a return to the pre-1972 regulatory approach that Congress sought to eliminate.

**c. EPA’s Decision to Require State Permit Writers to Set Entrainment Controls on a Case-by-Case Basis Is Arbitrary and Capricious and Will Perpetuate Bureaucratic Paralysis.**

EPA knows full well that the states will not meet the case-by-case decision making and cost-benefit analysis obligations that this Proposed Rule imposes. EPA thus abuses its discretion by claiming that this empty delegation of responsibility – which simply continues the current, failed site-specific permitting system – is adequate to meet the agency’s obligation to set BTA standards that minimize adverse environmental impact. EPA’s rule will not minimize adverse environmental impacts, and it will do little or nothing to change the status quo.

**(1) States Cannot Complete Case-By-Case BTA Determinations.**

EPA’s conclusions that (1) requiring state permitting authorities to set entrainment controls on a site-specific basis “represents the best technology available for minimizing the adverse environmental impacts associated with intake structures”<sup>441</sup> and that (2) “[s]ite specific proceedings are the appropriate forum for weighing all relevant considerations in establishing

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<sup>438</sup> *Riverkeeper I*, 358 F.3d at 196; see *Riverkeeper II*, 475 F.3d at 114 (“[I]n enacting the CWA, Congress rejected regulation by reference to water quality standards.”).

<sup>439</sup> *EPA v. California*, 426 U.S. at 205 n. 12; *Riverkeeper*, 358 F.3d at 185 n. 10, 190; *Weyerhaeuser*, 590 F.2d at 1043.

<sup>440</sup> *Entergy*, 129 S.Ct. at 1505-1506 (in setting uniform, national standards under Section 316(b), EPA may consider the benefits that derive from a “reduction in adverse environmental impacts” and the costs of achieving that reduction).

<sup>441</sup> 76 Fed. Reg. at 22,210 (col. 2).

BTA entrainment mortality controls<sup>442</sup> are arbitrary, capricious, and an abuse of the agency's discretion under the Clean Water Act. The Proposed Rule would require plant operators to submit, and permit writers to evaluate, at least the following studies:

- Source Water Physical Data;
- Cooling Water Intake Structure Data;
- Source Water Baseline Biological Characterization Data;
- Cooling Water System Data;
- Proposed Impingement Mortality Reduction Plan;
- Performance Studies;
- Operational Status;
- Entrainment Characterization Study;
- Comprehensive Technical Feasibility and Cost Evaluation Study;
- Benefits Valuation Study; and
- Non-Water Quality Impacts Assessment<sup>443</sup>

However, experience shows that state permitting authorities cannot meaningfully review studies of this sort and cannot make site specific BTA determinations at all, much less in the timely manner required under the Clean Water Act.

Since 1972, site-specific proceedings have resulted in uneven and conflicting rulings, the widespread use of inferior technology, as well as enormous, unnecessary aquatic mortality, all of which run contrary to the goals of the Clean Water Act and the direct mandate of Section 316(b). On December 13, 1976, EPA issued its first cooling water intake regulation to implement Section 316(b). Industry filed suit and, without reviewing its merits, the Fourth Circuit remanded the regulation because of procedural defects.<sup>444</sup> EPA subsequently withdrew the regulation, and for more than two decades failed to propose or adopt any new cooling water intake regulations.

In the absence of national regulations, cooling water intake standards have been relegated to *ad hoc* determinations by individual permit writers, typically state agencies, exercising "best professional judgment."<sup>445</sup> EPA's own assessment is that these case-by-case, site-specific Section 316(b) proceedings, which involve a complex assessment of the local marine ecosystem and fishery population dynamics to determine best technology available, impose a significant burden on permitting agencies:

The historical case-by-case approach requires significant resources on the part of the regulatory authorities that must implement Section 316(b) requirements. ...

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<sup>442</sup> 76 Fed. Reg. at 22,207 (col. 1).

<sup>443</sup> See e.g., proposed amended 40 C.F.R. 122.21(r); 76 Fed. Reg. 22,275 (col. 1)-22,279 (col. 2).

<sup>444</sup> *Appalachian Power Co. v. Train*, 566 F.2d 451, 459 (4th Cir. 1977).

<sup>445</sup> 66 Fed. Reg. at 65,262 (cols. 1-2). Where EPA has not yet promulgated national technology-based standards for a category of point sources, the permit writer must use, on a case-by-case basis, his or her best professional judgment to impose such conditions as he or she determines are necessary to carry out the provisions of the Clean Water Act. 33 U.S.C. § 1342(a)(1)(B); *NRDC v. EPA*, 863 F.2d 1420, 1424 (9th Cir. 1988).

[E]ach regulated facility must develop, submit, and refine [multi-year, multi-disciplinary] studies that characterize or estimate potential adverse environmental impact. ... [G]iven the iterative nature of the assessment process, industry as well as EPA regional and State regulatory authorities must expend significant resources assessing study plans and methods for characterizing the environmental impact occurring at each facility and evaluating those data to determine what constitutes BTA for each specific facility.<sup>446</sup>

EPA also acknowledges that “site-specific options increase the likelihood that each significant cooling water intake permitting issue would become a point of contention between the applicant and permit writer, which EPA’s experience indicates slows the permitting process, makes it more resource intensive, and makes it more costly.”<sup>447</sup> And EPA has been clear that site-specific consideration of biological and ecological conditions is one of the key drivers of this complexity, controversy, imprecision and substantial delay:

[B]ecause of the complexity of biological studies, it is very difficult to assess the cause and effect of cooling water intake structures on ecosystems or on important species within an ecosystem. An overwhelming majority of scientists have stated that biological studies can take multiple years because of the complex nature of biological systems. Moreover, unlike in the laboratory, where conditions are controlled, a multitude of confounding factors make biological studies very difficult to perform and make causation, in particular, difficult to determine.<sup>448</sup>

Biological complexity and the lack of categorical standards make industry’s superior resources a critical strategic advantage. Many states, including New York, New Jersey, Texas, Louisiana, Michigan, Wisconsin, Minnesota, and Kansas, have complained to EPA of the extreme burdens of making these decisions on a case-by-case, site-specific basis. For example, the New York State Department of Environmental Conservation has informed EPA of the “potentially endless, expensive studies that usually yield ambiguous or debatable results ... because it is impossible to identify, measure, and attribute the impact of each the [sic] many variables affecting populations on each of the impacted species.”<sup>449</sup> New York thus asked EPA to promulgate “clear performance-based requirements” that set “nationally-applicable minimum standards” so that “companies and regulators could put their staff and monetary resources into reducing impacts instead of into studies and rebuttals.”<sup>450</sup> Similarly, New Jersey has explained that:

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<sup>446</sup> 65 Fed. Reg. at 49,079 (col. 2). *See also* 66 Fed. Reg. at 65,262 (cols. 1-2) (EPA noting that site-specific determinations impose “significant resource demands on permitting agencies”) and 66 Fed. Reg. 28,853, 28,865 (cols. 2-3) (May 25, 2001) (in some States’ view, site-specific approach requires “burdensome expenditure of resources to develop section 316(b) requirements for each new facility.”).

<sup>447</sup> 69 Fed. Reg. at 41,607-608 (footnote and citations omitted).

<sup>448</sup> 66 Fed. Reg. at 65,285 (col. 2)

<sup>449</sup> Statements of NYS Dept. of Env. Cons., Division of Fish, Wildlife, and Marine Resources, provided to U.S. EPA, re Public Meeting to Discuss Adverse Environmental Impacts resulting from Cooling Water Intake Structures, p.1 [DCN 1-5025-PR] (June 29, 1998) (Exh. 89).

<sup>450</sup> Phase II Comment Letter from Peter Duncan, Deputy Commissioner of the Office of Natural Resources, NYS DEC, to EPA Proposed Rule Comment Clerk, re the NPDES Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, August 7, 2002, Comment 1.38, p. 2 (Exh. 90).

State agencies and permitting authorities could engage in a debate for years as to the population measure of a given fish species, let alone many fish species. The results of biological population studies and modeling can be very subjective because it is difficult to identify, measure, and attribute the impact of each of the many variables...affecting populations of each of the impacted species.<sup>451</sup>

More pointedly, Louisiana DEQ has stated: “In our opinion EPA vastly under estimated the resources necessary ... to implement the 316(b) requirements.... Throughout the proposed regulations, reference is made to site-specific determination of best technology available.... Where will the states and/or EPA get the resources to review all the submittals...?”<sup>452</sup> Michigan’s Department of Natural Resources has notified EPA that it has “experienced considerable inaction in the adoption of technology because of disagreement among power producers and agency biologists” regarding the minimization of cooling water intake structure impacts.<sup>453</sup> Likewise, the surface water permitting chief at the Michigan DEQ (which implements the NPDES program in that state) has complained of the:

considerable burden on the NPDES permitting program in Michigan if the 316(b) regulations ... require environmental effects studies at individual facilities. My experience indicates that studies of the effects of cooling water intake structures on the receiving water fisheries are extremely difficult to do and the results are difficult to interpret. The burden would be considerably reduced if the regulations require specific cooling water intake structure technology. Also, this approach would seem to me to be consistent with the intent of Section 316(b).<sup>454</sup>

As of July, 2011, several states had already taken the opportunity to reemphasize to EPA during the current comment period that a site-specific approach to BTA determinations imposes considerable and unrealistic administrative burdens on them. For example, the Texas Commission on Environmental Quality told EPA that it:

is not aware of any other situation in the NPDES permitting scheme with such excessive resource expectations on the permitting authority. . . . At a minimum, TCEQ has significant concerns related to the level of expertise necessary to

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<sup>451</sup> Phase II Comment Letter from Dennis Hart, Assistant Commissioner, Environmental Regulation, New Jersey Department of Environmental Protection, to EPA Proposed Rule Comment Clerk, re Cooling Water Intake Structures (New Facilities), November 9, 2000, DCN Comment 1.54, p. 4 (Exh. 91); see also Phase II Comment Letter from Bradley M. Campbell, Commissioner, New Jersey Department of Environmental Protection, to EPA Proposed Rule Comment Clerk, re Cooling Water Intake Structures (Existing Facilities), Aug. 8, 2002, Comment 2.002 (Exh. 92) (explaining that site-specific options are “likely to result in protracted dialogue between the permittee and the regulatory agency, undue and wasted effort, and delayed implementation of the required improvements.”).

<sup>452</sup> Phase II Comment Letter from Gary Aydele, Technical Advisor, Office of the Secretary, Louisiana Department of Environmental Quality, to EPA Proposed Rule Comment Clerk, re Cooling Water Intake Structure (Existing Facilities: Phase II) Proposed Rule, August 8, 2002, DCN Comment 2.1, p. 1 (Exh. 93).

<sup>453</sup> November 7, 2000 letter from Michigan Dept. of Natural Resources to EPA.

<sup>454</sup> Phase II Comment Letter from Bill McCracken, Chief of Permits Section, Surface Water Quality Division, Michigan Department of Environmental Quality, re 316(b) Burden, January 24, 2002 [DCN 4-0049] (Exh. 94).

review the required information in some of the studies and reports (such as noise, grid reliability, air emissions, social benefits). . . . TCEQ is also concerned that the inconsistency of reviews from state to state and region to region will allow for further inequities.<sup>455</sup>

Similarly, Kansas warns that “[r]educed state funding resources resulting from state budget restraints, expected reductions in EPA program funding, reduced program staffing because of funding restraints over the last several years, and increased workloads in the NPDES arena make simplification of the proposed 316(b) Rule provisions imperative.”<sup>456</sup>

According to the Minnesota Pollution Control Agency (MPCA), EPA’s rules force permitting agencies:

to play a critical role in the preparation of these application materials, in addition to the final review of the application materials and peer review comments during the permit development process. The MPCA believes that this proposed regulation requires expenditure of agency resources on permits falling under Section 316(b) .... This approach effectively requires state permitting authorities to undertake a level of effort, *on par with a rulemaking*, with each and every permit action that requires entrainment mortality reductions instead of specifying reductions within these proposed regulations.<sup>457</sup>

Instead of onerous case-by-case decision making, “the MPCA is in support of establishing nation-wide performance standards for minimizing adverse environmental impacts resulting from cooling water intake structures.”<sup>458</sup>

Similarly, Wisconsin stated that “[s]pecific performance standards ... make BTA decisions easier. . . . For example, if cooling towers are the ideal, why not set this as the EM [entrainment mortality] standard but allow for permittees to demonstrate why this will not work for a given situation?”<sup>459</sup>

The lesson learned in these states and around the country in the nearly four decades since Section 316(b) was enacted is that state permit writers lack the resources and expertise to permit intake structures in the absence of national categorical requirements, while applicants can use site-specific standard setting procedures to bring permitting to a grinding halt. The electricity industry has long and vigorously urged site-specific approaches and cost-benefit tests for Section

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<sup>455</sup> Phase II Comment Letter from Mark Vickery, P.G., Executive Director, Texas Commission on Environmental Quality to EPA, July 19, 2011, at p. 4 (EPA-HQ-OW-2008-0667-1970).

<sup>456</sup> Phase II Comment Letter from Donald R. Carlson, P.E., Chief, Industrial Programs Section, Bureau of Water, Kansas Department of Health and Environment to EPA, July 1, 2011, p. 6 (EPA-HQ-OW-2008-0667-1598).

<sup>457</sup> Letter from Jeff Udd, Acting Supervisor, Industrial Water Quality Permits Unit, Minnesota Pollution Control Agency to EPA, June 30, 2011, at p. 1-2 (EPA-HQ-OW-2008-0667-1631) (emphasis added).

<sup>458</sup> *Id.* at p. 1.

<sup>459</sup> Letter from Susan R. Sylvester, Acting Director, Bureau of Watershed Management, Wisconsin Department of Natural Resources to EPA, July 13, 2011, p. 4-5 (EPA-HQ-OW-2008-0667-2063).

316(b) permitting.<sup>460</sup> Power plant owners have perfected the technique of inundating regulators with site-specific information and then contesting every aspect of the permitting process so as to avoid technological upgrades. (As just a few examples of the many power plants whose permitting proceedings have been confounded by the lack of national intake structure regulations and the resulting case-by-case approach, see Section I.C., above.)

Nationwide, there are more than 600 existing power plants subject to the Proposed Rule, and an enormous number of them are already significantly overdue for re-permitting. At coal-fired power plants alone, more than 87 million MWh of generation operates without an up-to-date permit, and nationwide, 255 existing power plants have expired permits. Many of these permits (at least 65) have been expired for more than an entire five-year permit cycle,<sup>461</sup> and at least seven plants that we are aware of are operating with permits that expired in 1995 or earlier.<sup>462</sup> States cannot even re-issue permits in a timely manner, therefore, it is clear that they are unable to complete the expensive and labor-intensive technology review required by the proposed rule.

This problem will only get worse as those state agencies are subject to ever-worsening budget cuts. In 2011 alone, state funding for environment and energy agencies in New York was cut by ten percent,<sup>463</sup> and state funding for the North Carolina Department of Environment and Natural Resources was cut by more than twelve percent.<sup>464</sup> In Arizona, the state funding for the Department of Environmental Quality has been cut in half in the last two years, dropping from \$19.7 million in 2009 to \$7 million for 2011, and the budget for the Arizona Department of Water Resources has been cut by almost two-thirds.<sup>465</sup>

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<sup>460</sup> See *Riverkeeper I*, 358 F.3d at 196 (utility industry arguing that “EPA should only have sought to regulate impingement and entrainment where they have deleterious effects on the overall fish and shellfish populations in the ecosystem, which can only be determined through a case-by-case, site-specific regulatory regime.”); 67 Fed. Reg. at 17,162 (describing two wholly site-specific regulatory frameworks proposed by a utility association and a power company).

<sup>461</sup> See NPDES Permit Expiration Date spreadsheet (listing 47 coal plants with cooling water intakes operating on permits that expired in 2005 or earlier and had not been renewed by 2011; 18 of these were more than 10 years overdue) (Exh. 95).

<sup>462</sup> See NPDES Permit Expiration Date spreadsheet (listing four coal plants – Indian River, Cayuga, Schiller, and Valley – with permits expired in 1995 or earlier). In addition, the Indian Point, Bowline and Roseton facilities on the Hudson River are operating under NPDES permits that were issued in 1987 and expired in 1992. See also Abt Associates, Inc., P2F Compliance Years, dated February 13, 2004 (“[2004] Compliance Years List”) (listing 57 plants with cooling water intakes operating on permits that expired in the 1990s or earlier and had not been renewed by 2003; 15 of these were more than 10 years overdue) [DCN 6-4036-N] (Exh. 96); See also Attachment to EPA Memorandum re Implementation of Section 316(b) in NPDES Permits, Feb. 27, 2003 (“2003 NPDES Permit List”) (listing 67 plants with cooling water intakes operating on permits that expired in the 1990s and had not been renewed by 2003; 13 of these were more than 10 years overdue) (Exh. 97).

<sup>463</sup> Mary Phillips-Sandy, “New York Budget: The 5 Most Painful Cuts,” *AOL NEWS* (Feb. 1, 2011) (Exh. 98) also available at <http://www.aolnews.com/2011/02/01/new-york-budget-the-5-most-painful-cuts/>.

<sup>464</sup> Gary Robertson and Martha Waggoner, “Final NC budget takes aim at environmental policy,” *Bloomberg Business Week* (June 3, 2011) (Exh. 99) also available at <http://www.businessweek.com/ap/financialnews/D9NKE8N80.htm>.

<sup>465</sup> Shaun McKinnon, *Arizona budget cuts hurting water and air agencies*, *THE ARIZONA REPUBLIC* (May 4, 2010) (Exh. 100) also available at <http://www.azcentral.com/arizonarepublic/news/articles/2010/05/04/20100504arizona-budget-cuts-hurting-water-and-agencies.html>.

The federal funding for state environmental agencies has also been cut. The EPA's budget for the 2011 fiscal year was cut by 16 percent, and EPA passed that loss on to the states by cutting the federal funding given to state environmental agencies. Experts predict that the EPA's budget will be cut again during the next appropriations cycle, which will likely result in more cuts to state funding.<sup>466</sup> As a result of these drastic cuts, state officials have millions of dollars less to implement and enforce environmental laws than they did a few years ago.<sup>467</sup> These cuts have left state environmental agencies seriously shorthanded, making it even unreasonable to believe that they can complete the resource intensive review required by this permitting process.

EPA recognizes that Section 316(b) requires it "to establish standards for cooling water intake structures that reflect the 'best technology available for minimizing adverse environmental impact.'"<sup>468</sup> EPA also knows that state permitting authorities almost never complete site-specific determinations in a timely manner, and in many cases do not complete them at all. The simple reality is that most state permit writing agencies do not have sufficient financial or technical resources to meaningfully address cooling water impacts in the absence of national categorical requirements. Experience over the last four decades has shown that a case-by-case approach simply will not work. Instead, it is guaranteed to mire the NPDES permitting process in an endless cycle of paperwork and litigation that will leave waterbodies across the country unprotected. Any cooling water rule EPA promulgates cannot be effective unless it is simple and straightforward to implement, and does not require case-by-case determination of BTA requirements for each facility. Accordingly, the agency's conclusion that entrainment controls determined by state permitting authorities on a site-specific basis "represent[] the best technology available for minimizing the adverse environmental impacts associated with intake structures"<sup>469</sup> is irrational and illegal.

## (2) States Cannot Conduct, or Meaningfully Review, Site-Specific Cost-Benefit Analyses.

Similarly, and more particularly, it is arbitrary, capricious, and an abuse of discretion for EPA to require states to perform the task that it knows, above all, they cannot possibly accomplish: evaluating the consequential, monetized and social benefits of entrainment controls on a site-specific basis.<sup>470</sup> Under the Proposed Rule, state permitting authorities must not only oversee the development of hundreds of case-by-case, cost-benefit analyses, they also must

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<sup>466</sup> *Id.*

<sup>467</sup> Juliet Eilperin, *EPA budget cuts put states in bind*, THE WASHINGTON POST (June 20, 2011) (Exh. 101) also available at [http://www.washingtonpost.com/national/environment/epa-budget-cuts-put-states-in-bind/2011/06/08/AGbVpYdH\\_story.html](http://www.washingtonpost.com/national/environment/epa-budget-cuts-put-states-in-bind/2011/06/08/AGbVpYdH_story.html).

<sup>468</sup> 76 Fed. Reg. at 22,196 (col. 2)

<sup>469</sup> 76 Fed. Reg. at 22,210 (col. 2).

<sup>470</sup> See 76 Fed. Reg. at 22,204 (col. 2) ("the facility would provide detailed information on the other factors relevant to the Director's site-specific BTA determination. These would include . . . both the monetized and non-monetized benefits of such controls."); see also 76 Fed. Reg. at 22,210 (col. 3) ("[T]he facility's permit application must include the following information: . . . a detailed discussion of the magnitude of water quality benefits, both monetized and non-monetized, of the candidate entrainment mortality reduction technologies evaluated.").

conduct a meaningful review of each applicant's studies that includes both quantitative and qualitative assessments of environmental benefits and, more problematic still, estimates of the monetized value of these benefits.<sup>471</sup> That task simply cannot be done by state permitting agencies – not under the relatively flush times of years past, and most certainly not in today's leaner times as state agency resources are stretched ever thinner – and EPA knows it. The rule's site-specific cost-benefit analysis requirements will thus only impede the permitting process, reduce environmental protection, and lead to ineffective and wildly inconsistent permitting decisions – exactly the opposite of what Congress expected when it ordered EPA to set standards under Section 316(b) and what Administrator Jackson promised in asserting the rule would provide “regulatory certainty.”

It is clear that states cannot conduct cost-benefit analysis under section 316(b) because, even with the resources of the federal government at its disposal, EPA itself could not do it. EPA was incapable of making meaningful cost-benefit determinations for fundamental reasons: considerable uncertainty in quantifying the physical benefits of the rule, and beyond that, an inability to assign meaningful and accurate monetary values to those benefits. Tellingly, in the draft of this rule that EPA originally sent to OMB, EPA candidly admitted that it did not rely on the results of a cost-benefit analysis in setting standards because “a national *weighing of costs and benefits is not possible* at this time.”<sup>472</sup> It is irrational to think that what EPA cannot complete once, the states can do hundreds of times.

The first problem that EPA encountered lay in quantifying the benefits of the rule within acceptable bounds of uncertainty. There are some categories of benefits that EPA admits it was entirely unable to quantify, although the agency acknowledges that they exist and are important. For example, “[w]hile EPA can identify and hypothesize regarding the direction and relative importance of impacts of CWISs on the totality of the aquatic ecosystem . . . , EPA is currently unable to connect these effects with quantifiable environmental benefits. Thus, it is highly likely that the total environmental and monetary impacts of CWISs are significantly underestimated. . . .”<sup>473</sup>

EPA also believes that its calculations underestimate the environmental impacts of intake structures in other ways. For example, EPA confirmed that at least 15 threatened and endangered species are currently killed by cooling water intake structures.<sup>474</sup> But EPA states that 15 species “may be an underestimate” because it has documented cases of intakes killing non-endangered organisms from the same genus as a threatened and endangered species, and the range of the endangered species is sufficiently similar to that of the other member of its genus that it includes the zone of danger near a reporting facility's intake structure.<sup>475</sup> In all, EPA

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<sup>471</sup> See 76 Fed. Reg. at 22,205 (col. 3) (the state permitting authority's “written explanation would provide a review of the social costs . . . of the various technologies; a review of the potential reductions in entrainment and entrainment mortality; and a review and analysis of monetized and non-monetized benefits.”).

<sup>472</sup> Redlined Version of Proposed Rule, p. 166 (emphasis added).

<sup>473</sup> 2011 EEBA, p. 2-22.

<sup>474</sup> 76 Fed. Reg. at 22,244 (col. 1).

<sup>475</sup> 76 Fed. Reg. at 22,244 (col. 3).



identified 88 threatened and endangered species whose ranges overlap with cooling water intakes affected by this Rule.<sup>476</sup>

After grappling with the physical uncertainties, EPA was then faced with the even more difficult task of assigning meaningful and accurate dollar figures to the estimated 98 percent of the rule's benefits that have no established market value benefits to wildlife, ecosystem stability, and endangered species. Here, EPA admits a near-complete failure:

EPA's analysis does not fully quantify or monetize certain potentially important categories of benefits, such as existence values for threatened and endangered species, secondary and tertiary ecosystem impacts, benthic community impacts, shellfish impacts and the impacts arising from reductions in thermal discharges that would be associated with closed-cycle. Changes in fish assemblages due to impingement, entrainment and thermal effects are also not fully valued.<sup>477</sup>

The problem is not a lack of effort or resources on EPA's part, but fundamental methodological and data gathering obstacles:

Consideration of benefits in particular is complicated by the absence of well-developed tools or data to fully express the ecological benefits in monetized terms. EPA has, however, used the best currently available science to monetize the benefits of the various options in four major categories: Recreational fishing, commercial fishing, nonuse benefits, and benefits to threatened and endangered species.<sup>478</sup>

Even a (comparably) well resourced federal agency applying "the best currently available science" was forced to conclude that its estimates of non-use benefits and benefits to threatened and endangered species "are incomplete."<sup>479</sup> And since it was unable to monetize many categories of benefits, EPA's ability to base BTA decision making on the relationship of quantified costs and benefits alone was, by the agency's own admission, "challenging."<sup>480</sup>

The fact that EPA encountered such difficulties is unsurprising. They stem, in part, from the fact that monetizing the estimated benefits of this rule requires EPA to make difficult, sensitive, value-laden, and highly subjective assumptions. This comment letter summarizes key points from a more extensive environmental economic report prepared by two of Stockholm Environment Institute's senior economists, Frank Ackerman and Elizabeth Stanton.<sup>481</sup> The full Stockholm Environment Institute (SEI) report is attached to these comments as Appendix A.

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<sup>476</sup> See 76 Fed. Reg. at 22,244 (col. 3).

<sup>477</sup> 76 Fed. Reg. at 22,207 (col. 2-3).

<sup>478</sup> 76 Fed. Reg. at 22,197 (col. 1).

<sup>479</sup> 76 Fed. Reg. at 22,197 (col. 1).

<sup>480</sup> See 76 Fed. Reg. at 22,247 (col. 2).

<sup>481</sup> Comments of Frank Ackerman, Ph.D., and Elizabeth A. Stanton, Ph.D., Stockholm Environmental Institute-U.S. Center, Aug. 18, 2011, hereinafter ("SEI Report"), attached as Appendix A.

That report suggests that it may be impossible to infer accurate and meaningful measures of the value society places upon aquatic ecosystems from human behavior in markets:

[e]thical statements about nature, environmental integrity, and obligations to protect ecosystems and biodiversity, which are at stake for many people, are only awkwardly translated into the language of monetized non-use values. The beliefs of many stakeholders may be distorted beyond recognition in this process (or ignored for lack of research meeting rigid specifications) – which is why cost-benefit analysis is poorly suited for this case.<sup>482</sup>

States that must oversee, review, and rely upon intensive cost-benefit analyses of the sort that EPA attempted will have no more success (and likely far less success) than EPA in their efforts to set clear entrainment standards. To conduct a fine-grained and monetized cost-benefit analysis of the kind that EPA attempted, the applicants (who are required to conduct the cost-benefit study in the first instance) will first need to accurately estimate the number of fish of different species and different life stages lost to cooling water intake structures. As the significant flaws in EPA’s quantitative data show,<sup>483</sup> this is itself a difficult task. States will then need to provide applicants with methods to standardize fish counts across different life stages. To value forage fish species in terms of their impact on commercially and recreationally valued species, states will need to adapt trophic transfer models to the particular water bodies in their jurisdiction (since trophic transfer rates range from 2% to 24%) or will have to require applicants to study trophic transfer rates in their particular waterbody.<sup>484</sup>

States will also need to carefully police the way that regulated facilities monetize their benefit estimates. Valuing commercial fishing benefits entails retaining economists, assessing regional fish market price data, and evaluating economic models of producer and consumer surplus, taking into account any price shifts due to increased supply. To value breeding stocks for the ecosystem as a whole, states will have to assess fish population dynamics.<sup>485</sup> To value recreational fishing, applicants will have to attempt something akin to EPA’s “Random Utility Model” (RUM). For ecosystem benefits, either the applicants or the States will need to conduct original stated preference studies or attempt a benefits transfer approach, which even EPA could not do. And the entire approach of treating non-use values as monetizable values rather than as ethical constraints is problematic for most people.

In short, EPA found it incredibly difficult to quantify the environmental benefits of this rule and can scarcely begin to estimate their monetary value. EPA admits that its efforts are awkward and its results are freighted with a great deal of uncertainty. Showing appropriate humility and honesty, EPA forthrightly admitted in its earlier draft (before OMB’s intervention) that it lacked confidence in its cost-benefit analysis and could not rely upon it in making a BTA

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<sup>482</sup> Stockholm Environment Institute report.

<sup>483</sup> See discussion of EPA’s undercounts in Section III.F.2.a.

<sup>484</sup> See Stockholm Environment Institute report.

<sup>485</sup> See 69 Fed. Reg. at 41,660 (Col. 1) (EPA acknowledging that its own analysis failed to account for the progeny of fish killed by impingement and entrainment and that “given the complexities of population dynamics, the significance of this omission is not clear.”).

determination. The problems that frustrated EPA will plague the states as well. EPA's inability to complete a cost-benefit analysis provides specific, recent empirical evidence that states cannot conduct cost-benefit analyses of the kind that EPA envisions.

None of this comes as news to EPA. The states themselves, and others, have repeatedly told the agency that their inability to implement Section 316(b) without national standards is most pronounced when it comes to cost-benefit analysis. The Atlantic States Marine Fisheries Commission told EPA that "state permitting agencies do not have the appropriate staff to properly evaluate ... comprehensive cost-benefit analyses."<sup>486</sup> In commenting on the Phase II rule, New York State wrote that site-specific cost-benefit analysis "could effectively negate the value of the entire Phase II rule ... [because] the task of placing an accurate dollar value on aquatic resource impacts is rife with ecological and economic challenges; there is no widely accepted methodology."<sup>487</sup> Likewise, California informed EPA of its "experience ... that it is difficult to obtain agreement on costs or benefits. The result is a long series of arguments involving dueling cost/benefit analyses."<sup>488</sup>

Site-specific and monetized cost-benefit analysis gives existing facilities a powerful tool to evade regulation by converting NPDES permitting into a lengthy, controversial and ultimately futile debate about fishing yields and fish prices, and how much environmental protection is worth to the public. Such delays are an enormous impediment to protecting the natural resources Congress intended to EPA to safeguard. As the D.C. Circuit explained in affirming EPA's refusal to consider receiving water quality in setting effluent limitations for the pulp and paper industry, "Congress clearly intended ... to avoid such problems of proof so that a set of regulations with enforceable impact is possible."<sup>489</sup>

Accordingly, EPA should not require state agencies to conduct site-specific cost-benefit analyses in the context of permitting. It is arbitrary, capricious, and an abuse of discretion for EPA to demand that state permit writers undertake a task that it knows they cannot complete.

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<sup>486</sup> Letter from John V. O'Shea, Executive Director, Atlantic States Marine Fisheries Commission to Proposed Rule Comment Clerk, EPA, re: Cooling Water Intake Structure (Existing Facilities: Phase II), Aug. 7, 2002, at 1, Comments 1.059 (Exh. 102).

<sup>487</sup> Phase II Comment Letter from Peter Duncan, Deputy Commissioner of the Office of Natural Resources, NYS DEC, to EPA Proposed Rule Comment Clerk, re the NPDES Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, August 7, 2002, Comment 1.38, p. 3-4 (Exh. 90).

<sup>488</sup> Letter from Celeste Cantu, Executive Director of the California State Water Resources Control Board, to EPA Proposed Rule Comment Clerk-W-00-32, re Comments on National Pollution Discharge Elimination System Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities (Proposed Rule), August 5, 2002, at 4 (Exh. 103); *see also* Letter from Denise Sheehan, Executive Deputy Commissioner, New York DEC to Water Docket, EPA, re New York State Department of Environmental Conservation comments regarding the Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities; Notice of Data Availability (NODA), dated March 19, 2003 (June 2, 2003) (Exh. 104); NY DEC, Further Comments to the U.S. Environmental Protection Agency on its "Issues for Discussion at the Public meeting on September 10 and 11, 1998, Regarding §316(b) Rulemaking" held in Alexandria, VA (Oct. 5, 1998) (Exh. 105).

<sup>489</sup> *Weyerhaeuser*, 590 F.2d at 1044.

**d. The Open-Ended Case-By-Case Format EPA Proposed (Based on Substantial Last-Minute Changes by OMB) Is Very Poorly Designed.**

As discussed, EPA's decision to require states to set standards for entrainment controls on a case-by-case basis violates the Clean Water Act and is arbitrary, unworkable, and an abuse of discretion. In addition, the particular type of case-by-case decisionmaking format that EPA has proposed here is deeply flawed for many reasons.

First, under the Proposed Rule, studies that are highly sensitive to esoteric, value-laden assumptions about discount rates, valuation methodologies, and other issues will be bought and paid for by the regulated entities – as will the “independent” reviews of these studies. It will be critical, but impossible, for states to meaningfully oversee and review the work of consultants and industry experts. Regulated entities will end up self-regulating because they pay for the studies underpinning the state's entrainment control decision, pay for the review of those studies, and the state permitting authorities lack the capacity to provide a meaningful review of industry's submittals.

Second, the Proposed Rule leaves permit writers with unfettered discretion to set standards and reject better performing technologies. The Proposed Rule can be read to allow a permitting authority to consider an unlimited set of factors and then to reject *any* technology based on *any* of those criteria. Although EPA has set forth nine criteria that must be considered, the Director can consider any other criteria as well. And although they must all be “considered,” there is no indication of which criteria are more important than others, and in any case, all of them can simply be overruled by an additional tenth criterion added by the state. This is an open-ended balancing test in which permit writers have unfettered discretion to reach and justify any decision at all on any grounds that they please. By leaving permit writers with unlimited discretion to make case-by-case decisions, EPA is not only failing to set a standard, but experience with unconstrained case-by-case decision making under Section 316(b) shows that it will invariably lead to inconsistent decisions from state to state, and this delegation of unfettered discretion is illegal because it conflicts “with the Act's goal of uniform standards within an industry.”<sup>490</sup>

Third, EPA (actually, OMB) has proposed that states should perform an unlawful form of cost-benefit analysis. After OMB's revisions, the Proposed Rule abandons EPA's “wholly disproportionate” standard for cost benefit analysis, and allows permit writers to reject *any* superior technology if its benefits “do not justify” its costs.<sup>491</sup> This is problematic because it could allow permit writers to engage in a more searching and rigorous form of cost benefit analysis than is authorized even under the Act's weakest technology-based standard, the BPT standard.<sup>492</sup> As discussed above in Section III.A.3, the Clean Water Act severely limits EPA's discretion with respect to the type of cost-benefit test that it may employ under Section 316(b) and prohibits the establishment of BTA requirements on the basis of certain types of cost-benefit

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<sup>490</sup> *NRDC v. U.S. EPA*, 863 F.2d 1420, 1432 (9th Cir.1988).

<sup>491</sup> See proposed 40 C.F.R. § 125.98(e), 76 Fed. Reg. at 22,288 (col. 1).

<sup>492</sup> See *Entergy*, 129 S.Ct. at 1508 (“Other arguments may be available to preclude such a rigorous form of cost-benefit analysis as that which was prescribed under the statute's former BPT standard . . .”).

analyses.<sup>493</sup> In particular, “the courts of appeal have consistently held that Congress intended Section 304(b) . . . to preclude the EPA from giving the cost of compliance primary importance.”<sup>494</sup>

The “limited” cost-benefit analysis performed in setting the BPT standards was simply a comparison of the degree of effluent reduction with the costs to the affected industry of attaining such reduction.<sup>495</sup> The analogy to this approach in the context of Section 316(b) would be a comparison of the degree of reduction in impingement and entrainment with the costs of attaining such reduction. For the Proposed Rule, however, EPA is authorizing states to perform a second analysis quite different from anything contemplated by Congress for BPT: a comparison of monetized social benefits, calculated based on an assessment of consequential water quality effects, with monetized social costs.

EPA’s use of the phrase “benefits justify the costs” may be lawful only as a reformulation of its long-standing “wholly disproportionate” test. But if, as appears to be the case, EPA (or OMB) is allowing the use of forms of cost-benefit analyses that elevate economic considerations to a degree of primary importance, then the new standard violates the Clean Water Act.

OMB removed from the Proposed Rule the few provisions that would have helped mitigate the problems noted here. EPA originally designed a case-by-case analysis format in which state permitting authorities would begin with a rebuttable presumption that the best-performing technology – closed-cycle cooling – was the best technology available. EPA also avoided making cost-benefit analysis a primary consideration, using it only to eliminate extreme results: it wrote that a state may not reject “an otherwise available technology . . . unless the social costs of compliance are wholly disproportionate to the social benefits.”<sup>496</sup> But OMB changed that to allow a state to reject an otherwise available technology “if the social costs of compliance are not justified by the social benefits...”<sup>497</sup>

As a result, the rule creates an evidentiary quagmire for regulators, antithetical to NPDES permitting, which allows applicants to avoid installing environmentally protective controls for years, or even decades. If promulgated as proposed, the case-by-case entrainment provisions will sanction precisely the kind of regulatory uncertainty that Congress intended NPDES

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<sup>493</sup> See EPA’s understanding of its cost-benefit authority, *supra* section III.A.3.

<sup>494</sup> *Chemical Mfrs. Ass’n v. EPA*, 870 F.2d 177, 204 (5th Cir. 1989). See also *American Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1051 (3d Cir. 1975) (“even with that 1977 [BPT] standard, the cost of compliance was not a factor to be given primary importance.”); *BASF Wyandotte Corp.*, 598 F.2d at 637, 656 (1st Cir. 1979) (In determining the BPT standard, “[c]ost, however, is not a paramount consideration. Congress self-consciously made the legislative determination that the health and safety gains that achievement of the Act’s aspirations would bring to future generations will in some cases outweigh the economic dislocation it causes to the present generation. The obligation the Act imposes on EPA is only to perform a limited cost-benefit balancing to make sure that costs are not ‘wholly out of proportion’ to the benefits achieved.”) (quotations and citations omitted).

<sup>495</sup> *Appalachian Power Co. v. EPA*, 671 F.2d 801, 809 n.3 (4th Cir. 1982) (“[T]he ‘benefits’ that are to be related to ‘costs’ under § 304(b)(1)(B) are simply the benefits *assumed to result* ... from any reduction in the level of effluents being discharged.”) (emphasis added).

<sup>496</sup> Redlined Version of Proposed Rule p. 344.

<sup>497</sup> *Id.*, see also 76 Fed. Reg. at 22,262 (col. 2).

technology standards to eliminate. Because of the myriad uncertainties involved in determining the effects on waterbodies – as state agencies have explained and EPA acknowledges – permit writers will have unfettered discretion to unlawfully reject better performing technologies based on an open-ended balancing of factors, and to elevate cost and water quality considerations above technological efficacy. They will undoubtedly face substantial pressure to reduce the requirements for protection, given the lack of standards and the resources industry brings to bear in these proceedings. This is squarely at odds with the national technology-based scheme intended by Congress.

## **2. EPA Should Select Option 3’s Entrainment Standard for the Final Rule.**

### **a. Establishing National Categorical Standards Based on Closed-Cycle Cooling for Virtually All Existing Facilities, as the Agency Did a Decade Ago for New Facilities, Would Minimize Adverse Environmental Impacts.**

In developing the Proposed Rule, “EPA concluded that closed-cycle cooling reduces impingement and entrainment mortality to the greatest extent.”<sup>498</sup> That conclusion should come as no surprise because for more than a decade, EPA as well as state agencies, Congress, and virtually everyone else to have seriously considered the issue has come to the same conclusion that closed-cycle cooling (wet or dry) is most effective at reducing fish kills because it reduces intake flow to such a great extent. In addition to reducing impingement and entrainment, closed-cycle cooling also reduces thermal pollution, protect endangered species and the biological integrity of ecosystems, increase fish populations and fishing yields, increase the reliability of power plants in areas prone to drought, reduce competition for scarce water resources in these areas, and free power plants from the need to be located on waterfront lands, among other things.

No other technology comes anywhere close to the effectiveness and environmental benefits of closed-cycle cooling and EPA has not concluded, or even suggested otherwise. By EPA’s own calculations (which are significant underestimates due to the age of the data and other factors), Option 3 would save more than 500 billion of individual aquatic organisms per year<sup>499</sup> and result in estimated increases to fishery yields from two to more than 100 times greater than those under Option 1, depending on the region.<sup>500</sup> In the 2001 Phase I Rule and in the requirements for new units at existing facilities proposed as a component of the Proposed Rule, EPA set or proposes to set a national categorical standard requiring those facilities to reduce their intake flow to a level commensurate with that which could be achieved with a closed-cycle recirculating cooling system.<sup>501</sup> Doing so here would minimize the adverse environmental impacts of cooling water intake structures at existing facilities, as Congress intended, and would not cause any collateral problems, contrary to industry’s hyperbolic claims.

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<sup>498</sup> 76 Fed. Reg. at 22,207 (col. 1).

<sup>499</sup> 76 Fed. Reg. at 22,239.

<sup>500</sup> 2011 EEBA at 3-6 to 3-15.

<sup>501</sup> 40 C.F.R. § 125.84(b)(i); proposed 40 C.F.R. § 125.94(d)(i); 76 Fed. Reg. at 22,283 (col. 2).

**b. The Rulemaking Record Demonstrates that Closed-Cycle Cooling is Available to the Existing Facilities Because Retrofits are Feasible and Inexpensive.**

As noted in the preamble, “EPA’s record shows numerous instances of existing facility retrofits to closed-cycle.”<sup>502</sup> For example, retrofits of closed-cycle cooling on existing plants were completed many years ago at a gas-fired plant on a west coast estuary (Unit 7 of the 751 MW gas-fired Pittsburg Power Plant in Contra Costa County, California); a nuclear plant on a Great Lake (812 MW Palisades Nuclear Plant in Michigan), and coal-fired plants on eastern seaboard rivers (490 MW coal-fired Canadys Steam Plant and 346 MW Jefferies Coal Plant in South Carolina).<sup>503</sup> More recently, retrofits were completed at the McDonough (520 MW coal) and Yates (1250 MW, coal) plants on the Chattahoochee River in Georgia and at the Wateree Station (772 MW, coal) on the Wateree River in South Carolina, and are well underway at the Brayton Point power station (1500 MW, coal/oil) in Somerset, Massachusetts.

As discussed above, “technology-forcing” standards like BTA must compel industry to meet ever more stringent limitations and therefore must be established with reference to the best performer in any industrial category – “not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.”<sup>504</sup> Thus, the fact that the technology is widely available to existing facilities makes it “available” as that term is used in Section 316(b).

Further, the costs of retrofitting to closed-cycle cooling are minimal from both a microeconomic and a macroeconomic perspective. At the company level, EPA estimated that, at the very most, 1.5 percent of existing power units would retire as a result of the compliance costs, and this is clearly an overestimate because EPA assumed for purposes of that analysis that companies would absorb all the costs, rather than passing any of them on to consumers. Looking at the economy as a whole, as the SEI Report explains, the costs are small by any reasonable measure because the annualized total cost of Option 3 at a 7 percent discount rate, the highest cost estimate in the analysis, is \$4.86 billion, or 0.033 percent (1/30 of one percent) of the \$14 trillion US GDP.

Moreover, the potential hurdles identified by EPA as potentially making closed-cycle cooling retrofits somewhat more difficult in some locations are not only legally irrelevant (for the reasons just described), but also dramatically overstate the extent of the potential problems.

**(1) There Is Adequate Space for Closed-Cycle Cooling at Virtually Any Plant Site.**

In the preamble, EPA found that “the majority of facilities have adequate available land for placement of cooling towers.”<sup>505</sup> Further, even where facilities have constraints in this

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<sup>502</sup> 76 Fed. Reg. at 22,204 (col. 1).

<sup>503</sup> 67 Fed. Reg. at 17,155 (col. 1) (Apr. 9, 2002); Phase II TDD, pp. 4-1 to 4-6.

<sup>504</sup> *Kennecott v. EPA*, 780 F.2d 445, 448 (4th Cir. 1985), citing legislative history *See A Legislative History of the Water Pollution Control Act Amendments of 1972*, 93d Cong., 1st Sess. (Comm. Print 1973), at 798.

<sup>505</sup> 76 Fed. Reg. at 22,209 (col. 2).

regard, “[b]ased on [EPA’s] site visits, EPA has found that several facilities have been able to engineer solutions when faced with limited available land.”<sup>506</sup> Allowing potential space-constraint considerations at some sites to justify a case-by-case approach for all facilities, as EPA has done in the Proposed Rule, is arbitrary and capricious. As explained in the attached engineering report prepared by Powers Engineering, EPA’s estimate that as many as 25 percent of facilities might have space constraints that would limit retrofit of closed-cycle cooling for the entire facility or increase compliance costs is vastly overblown because EPA’s assessment is based on the use of land-intensive in-line cooling cells, not the much more space efficient back-to-back cooling cell configuration.<sup>507</sup> A back-to-back cooling cell configuration requires about 17 percent of the space needed for two in-line towers for the same cooling capacity, assuming the spacing recommended for parallel banks of in-line towers.<sup>508</sup> Because cooling cells can be installed in a back-to-back configuration at virtually any site, EPA should not set a “limited acreage” exemption (such as the 160 acres per gigawatt threshold the agency is exploring) and should acknowledge that closed-cycle cooling is an available technology for the industry as a whole. Finally, even if there are arguable site constraints, the use of eminent domain for matters relating to power transmission and generation (as well as a variety of other public goods and services) is well-established and should not be ruled out in this context.<sup>509</sup>

**(2) Remaining Useful Life is Not Quantifiable, Certain, Binding or Relevant Unless a Plant Owner Has Committed to a Closure Date.**

EPA’s argument that it is impractical to ask plants with a very short remaining useful life to undertake a closed-cycle cooling retrofit is reasonable only to the extent that a plant owner makes a legally binding commitment to permanently retire the once-through cooled units within a 5-year period. If a plant operator cannot make a legally binding commitment to permanently retire the units within that timeframe, then the units should get no special consideration from the

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<sup>506</sup> 76 Fed. Reg. at 22,209 (cols. 2-3).

<sup>507</sup> See TDD at 8-23 (“The EPRI worksheet contains numerous assumptions and default values that can be modified using site-specific data. Specific relevant assumptions and default values are listed below . . . Tower configuration was in-line rather than back-to-back, meaning towers are oriented in single rows rather than rows of two towers side by side.”).

<sup>508</sup> See Powers Report.

<sup>509</sup> For example, in New York, the state’s general power of eminent domain has been previously used for, *inter alia*, Urban Renewal (*Jackson v. New York State Urban Dev. Corp.*, 503 N.Y.S.2d 298); public roadways and intersections (*Waldo’s, Inc. v. Village of Johnson City*, 544 N.Y.S.2d. 809); maintaining the public shoreline (*Pfohl v. Village of Sylvan Beach*, 809 N.Y.S.2d. 367); providing electrical power (*Bergen Swamp Preserve Socy. v. Village of Bergen*, 741 N.Y.S.2d. 363); constructing water tunnels (*City of New York [Third Water Tunnel, Shaft 30B]*, 795 N.Y.S.2d 229, *affd.* 814 N.Y.S.2d 592); controlling sewage (*Ranauro v. Town of Owasco*, 735 N.Y.S.2d 332); providing a site for a general hospital (*In Re Site for New General Hospital*, 112 N.Y.S.2d 101, *affd.* 305 N.Y. 835); expanding airports (*First Broadcasting Corp. v. City of Syracuse*, 435 N.Y.S.2d. 194); protecting the public from fire damage (*Engels v. Village of Potsdam*, 727 N.Y.S.2d 202); providing necessary public parking (*Salvation Army v. Central Islip Fire Dist.*, 646 N.Y.S.2d 558); developing blighted areas (*Murray v. LaGuardia*, 52 N.E.2d 884); expanding/creating public parks (*Woodfield Equities LLC v. Incorporated Vil. of Patchogue*, 813 N.Y.S.2d 184 (2006)); expanding municipal buildings (*Stankevich v. Town of Southold*, 815 NYS2d 225 (2006)); providing affordable housing to local residents (*Keegan v. City of Hudson*, 803 N.Y.S.2d 279); and building a sport stadium (*Murphy v. Erie County*, 28 N.Y.2d 80 (1971)).



EPA regarding remaining useful life. In the 1970s, and in every decade since then, power plant operators have made the argument that they have insufficient useful life remaining to impose significant capital costs, whether for closed-cycle cooling or other pollution control equipment. And for those forty years, the plants have continued to operate, killing fish and causing other forms of pollution with the same antiquated equipment.<sup>510</sup> If, however, a plant operator is willing to back up its claim of limited useful life by making the closure date binding, as the Oyster Creek nuclear plant in New Jersey recently did, and the closure date is reasonably close in time, then the remaining life becomes relevant and can be taken into consideration. Because so few plants have committed to a closure date, and experience shows that plants continue to operate well beyond the end of their expected useful life, remaining life is not an obstacle to the availability of closed-cycle cooling.

Ironically, some newer plant operators may even attempt to make the argument that consideration of “remaining useful life” excuses them from compliance with any sort of upgrade, as the operator has not yet been able to recoup original construction costs.<sup>511</sup> This is the argument made by the Los Angeles Department of Water and Power in its current attempt to avoid compliance.<sup>512</sup> Yet this cannot be what EPA intends by allowing “remaining useful life” considerations, otherwise it would always be both too early and too late to require plants to modernize their cooling systems, and Section 316(b) would be drained of all its meaning.

**c. The Rulemaking Record Demonstrates that Requiring Antiquated Plants to Install the Same Cooling Technology as their Modern Counterparts Would Not Cause Any Significant Adverse Impacts on Energy Supplies, the Economy or the Environment.**

**(1) Requiring Closed-Cycle Cooling Would Not Cause Electricity Shortages.**

There will be no adverse reliability impact to the electric sector from adoption of Option 3. EPA’s electric system modeling analyses demonstrate that Option 3 would cause very few, if any, plant retirements and any consequential retirements will not adversely affect system reliability. According to EPA’s estimates, the additional retirements (whether full or partial) caused by Option 3 would total only 17 gigawatts, which represents less than 1.5 percent of total capacity in 2028.<sup>513</sup> Moreover, even this estimate drastically overstates the extent of actual retirements for a number of reasons.

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<sup>510</sup> See, e.g., Press Release “Nuclear Regulatory Commission, Department of Energy and Nuclear Energy Institute Sponsor February Workshop on Extended Operation for Nuclear Power Plants,” December 22, 2010 (Exh. 106).

<sup>511</sup> See, e.g., Dynegy Moss Landing, LLC, “State Water Resources Control Board Once-Through Cooling Water Policy Implementation Plan for the Moss Landing Power Plant” at 13-14 (April 1, 2011) (Exh. 107) (arguing that changes to the cooling system are unwarranted in light of recent, large capital investments).

<sup>512</sup> See e-mail from John Dennis, LADWP to Jonathan Bishop, California State Water Resources Control Board (Jul. 22, 2010) (Exh. 108) (arguing that LADWP should be allowed additional time for compliance with California’s once-through cooling water policy in light of recent investments totaling over \$600 million).

<sup>513</sup> See EPA, Economic and Benefits Analysis for Proposed 316(b) Existing Facilities Rule (2011), (hereinafter “2011 EBA”) at Table 6-3.

First, EPA assumed for purposes of this analysis that none of the costs of the regulation would be passed on to consumers, an obviously incorrect and highly conservative assumption.<sup>514</sup> In fact, because plants will attempt to pass on as much of the costs as they can, and because in regulated states this happens relatively automatically, there will be far fewer retirements than EPA estimated.<sup>515</sup>

In addition, several other reasons why there will no adverse reliability impacts are discussed in a report prepared by Schlissel Technical Consulting, Inc. The full report is attached to this comment letter as Appendix C. As the attached report explains in more detail, EPA used out-of-date demand forecasts. Under current forecasts, demand is lower than EPA estimated and there is less need for the 1.5 percent of capacity that EPA (over)estimated might retire.<sup>516</sup>

Even if a few existing generating units were to retire as a result of Option 3, system operators and utilities will have long lead times to construct any needed replacement capacity for any retirements that might occur. Moreover, new energy efficiency, demand side measures and renewable resources can meet future electricity demands while maintaining electric system reliability.<sup>517</sup> Additionally, the Schlissel report also notes that EPA's analysis shows that all NERC regions will comfortably exceed their required reserves in off-peak periods even with outages related to retrofits.<sup>518</sup>

## **(2) Requiring Closed-Cycle Cooling Would Not Increase Electricity Prices.**

EPA estimated that under Option 3, the average annual cost per residential household in 2015 would be less than \$1.47 per month (\$17.60 per year).<sup>519</sup> And even this very modest sum is, by EPA's own admission, an overestimate of the actual costs because EPA assumed "full pass-through of all compliance costs to electricity consumers,"<sup>520</sup> which is certain not to be the case in deregulated states where costs are not automatically passed on. As EPA admitted, "at least some facilities and firms are likely to absorb some of these costs, thereby reducing the impact of today's proposed rule on electricity consumers."<sup>521</sup> The extent to which power companies will absorb closed-cycle cooling costs (with negligible effects on their bottom line) is illustrated in a report by the economist Robert McCullough, entitled the *Economics of Closed-*

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<sup>514</sup> 76 Fed. Reg. at 22,223 (col. 2) ("For these two analyses, the Agency assumed that none of the compliance costs will be passed on to consumers through electricity rate increases and will instead be absorbed by complying facilities and their parent entities.").

<sup>515</sup> As discussed below, when estimating effects on electricity prices, EPA made the opposite (but equally unrealistic and conservative assumption), that 100 percent of the costs would be passed on to consumers.

<sup>516</sup> Schlissel report.

<sup>517</sup> See M.J. Bradley & Analysis Group, *Ensuring a Clean, Modern Electric Generating Fleet while Maintaining Electric System Reliability* (2010), at 3-5 (Exh. 109); Bipartisan Policy Center, *Environmental Regulation and Electric System Reliability*, at 39 (2011) (Exh. 110); J. McCarthy and C. Copeland, Congressional Research Service, *EPA's Regulation of Coal-Fired Power: Is a "Train Wreck" Coming?* (July 11, 2011) (Exh. 111).

<sup>518</sup> Schlissel report, citing 2011 EBA, Table 5-8.

<sup>519</sup> 76 Fed. Reg. at 22,228 (Exhibit VII – 10).

<sup>520</sup> 76 Fed. Reg. at 22,228 (Exhibit VII – 10, footnote "a").

<sup>521</sup> 76 Fed. Reg. at 22,228 (col. 1).

*Cycle Cooling in New York.* That report shows that the change in electricity prices as a result of requiring closed-cycle cooling for all existing plants in New York state would be minimal (less than 1 percent) because for the vast majority of the time, the market clearing price of electricity in New York (the price that all plants are paid for electricity regardless of their costs or the price they bid) is set by plants with closed-cycle cooling.<sup>522</sup> Thus, New Yorkers are *already* paying for closed-cycle cooling, and existing plants that still use once-through cooling are pocketing the difference. The same is likely true to a certain extent in other deregulated states. Accordingly, any increase in electricity prices would be negligible and barely noticed by consumers.

**(3) Requiring Closed-Cycle Cooling Would Create Jobs and Improve the Economy.**

A review of EPA's economic impact analysis by economists Professor Frank Ackerman and Dr. Elizabeth Stanton shows that a closed-cycle cooling standard would increase GDP and create jobs. EPA found, unambiguously, that stronger environmental protection leads to a greater GDP boost and a larger immediate spike in job creation. While Option 1 would *reduce* economic output by \$194 million, Option 3 would increase GDP by over \$4.2 billion.<sup>523</sup>

EPA wrongly concluded, however, that the initial job creation impact of Option 3 is outweighed, over time, by jobs losses caused by rising electricity prices. As Prof. Ackerman and Dr. Stanton's report explains, EPA's analysis is based on two significantly flawed assumptions. First, EPA wrongly assumes that all compliance costs will translate into higher electricity prices because electric generators will be able to pass on 100 percent of the rule's costs to customers. In fact, a better assumption is that, in deregulated states, only about half of compliance costs are likely to be passed on to consumers. In deregulated energy markets, infra-marginal producers will absorb rising costs as reductions in producer surplus. Second, EPA arbitrarily assumes that cost recovery occurs at a constant annual rate from 2013 through 2056. But traditional utility rate regulation would impose a phase-in period for cost recovery so that compliance costs are recovered as they are incurred, not before. This pushes the cost recovery back in time compared to EPA's estimate, thereby reducing its net present effect. After only partially correcting for these flaws, Ackerman and Stanton find that Option 3 would create over 2,000 new jobs.<sup>524</sup>

**(4) Requiring Closed-Cycle Cooling Would Not Cause Air Pollution or Any Other Significant Adverse Environmental Impacts.**

In the preamble to the proposed rule, EPA states that requiring closed-cycle cooling retrofits will impose energy penalties that result in increased air emissions of various pollutants to produce the same amount of power.<sup>525</sup> EPA argues that increased air pollution may render closed-cycle cooling infeasible on a local basis in some places because it will have adverse

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<sup>522</sup> R. McCullough, *Economics of Closed-Cycle Cooling in New York* at 20 (June 3, 2010) (Exh. 112).

<sup>523</sup> See Stockholm Environment Institute Report.

<sup>524</sup> See Stockholm Environment Institute Report.

<sup>525</sup> See 76 Fed. Reg. at 22,208-09.

health effects and “it may be difficult or impossible to obtain air permits for cooling towers at existing facilities located in nonattainment areas or attainment areas with maintenance plans.”<sup>526</sup>

In fact, as the Powers Report explains, overall air emissions from U.S. power plants will not increase as a result of closed-cycle cooling retrofits. EPA admits that its estimates of future air pollution are overstated because they ignore the effects of new regulations that, by EPA’s count, will reduce power plant sulfur dioxide emissions by 71%, nitrogen oxide emissions by 52%, and mercury emissions by 29%. Additionally, over the past few decades, electricity production in the United States has consistently shifted from coal plants to much cleaner natural gas-fired plants for economic reasons.<sup>527</sup> In reality, air emissions from U.S. power plants may decrease slightly less dramatically as a result of closed-cycle cooling retrofits, but they will not increase.

Further, EPA should assume that any additional power needed to compensate for energy penalties at older, coal-fired power plants will come from natural gas-fired sources whose primary function is to provide load following and peaking power. In comparison to these older coal plants, air emissions from modern natural gas-fired plants are exceptionally low. Additional power will also likely come from uprates at existing nuclear power plants and from the rising number of renewable energy sources in the United States. Generally, all of these sources have lower emissions than older existing facilities.

Air emissions also may decrease because some existing facilities will choose to repower to more efficient combined cycle natural gas as a consequence of this rule. In the Final Substitute Environmental Document for the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (“Calif. OTC Policy SED”), the State of California determined that, in the most realistic scenarios, some existing facilities would respond to a closed-cycle cooling mandate by repowering.<sup>528</sup> The assumption is likely realistic at the national level too. (The California analysis is further explained below in Section III.E.5.c. of these comments.)

To avoid upgrading their plants, industry frequently claims that closed-cycle cooling itself has significant adverse environmental impacts, including air emissions and visual, aesthetic, and noise-related concerns, as well as fogging and salt drift from cooling cells, which, in their view, should prevent closed-cycle cooling from being considered the Best Technology Available. That transparently false claim was rejected by EPA a decade ago in the context of the Phase I rule for new facilities. There industry raised all the same charges about these impacts, and EPA considered and rejected them (as did the reviewing court). In *Riverkeeper I*, the Second Circuit explained:

[The electric power industry argues that] by focusing on impingement and entrainment, the EPA ignored other adverse environmental impacts and failed to consider whether its regulations will yield a net environmental benefit. ... As for other environmental impacts,

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<sup>526</sup> 76 Fed. Reg. at 22,208 (col. 3).

<sup>527</sup> See Powers Report.

<sup>528</sup> See Calif. OTC Policy SED, at 119 (Exh. 3).

[industry] does not attempt to demonstrate what the EPA overlooked, except through vague and speculative references to “local air quality, water resources, [and] energy markets” (which, as noted[,] ... EPA did consider) and the suggestion that closed-cycle cooling may require increased land use and have undesirable “aesthetic” impacts. The EPA considered [and rejected] all of the factors that [industry] now raises.... *See, e.g.*, Public Comment & Response Nos. 062.026 at 1077, 056.012 at 927, 068.100 at 2137-41, 014.019 at 1098-1102.<sup>529</sup>

Thus, the debate – if there ever was a debate – about the environmental superiority of closed-cycle cooling was settled long ago.

**(5) Requiring Closed-Cycle Cooling Would Cause Some Facilities to Repower their Plants, Yielding Additional Environmental and Economic Benefits.**

Experience has shown that when power companies operating older, inefficient and, therefore, marginal plants are directed to upgrade their cooling systems, they will often choose to repower rather than retrofit or shut down. Repowering a heavily-polluting plant into a state-of-the-art modern facility that can produce electricity cleanly, efficiently and at lower cost is a win-win for the environment and the economy.

For example, as California developed a statewide policy for phasing out once-through cooling in recent years, “four of the original 21 coastal power plants have re-powered or are proceeding with re-powering projects that eliminate the use of once-through cooling water, either in whole or in part – Humboldt Bay, Long Beach, El Segundo, and Encina. A fifth closed-cycle cooled plant, Gateway, is being developed adjacent to the existing Contra Costa Plant.”<sup>530</sup> These projects will produce more power using advanced control technology to reduce air emissions and virtually eliminate water withdrawals. Other examples exist, as well.

In New York, the state environmental agency generally seeks to require new power plants to use dry cooling and existing or repowered power plants to use wet closed-cycle cooling. As a result, when an independent power company purchased the Albany Steam Station on the Hudson River from a traditional utility in the early 2000s as a result of de-regulation, the company chose to repower the old plant and add closed-cycle cooling as part of the repowering, thereby reducing both its fish kills and air pollution emissions by more than 95 percent and increasing its capacity from 400 MW to 750 MW. As New York State DEC explained:

Where impacts are large, the optimal approach from our standpoint is to repower an existing facility into a state-of-the-art power plant. The facility can thus be redesigned into an efficient new station (e.g. using combined cycle technology) that will reduce fuel use, greatly increase thermal efficiency and minimize

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<sup>529</sup> *Riverkeeper I*, 358 F.3d at 196-97 (internal citations omitted).

<sup>530</sup> *See* Calif. OTC Policy SED, at 122. *See also* El Segundo Homepage website, Modernizing El Segundo’s Power Generating Station (Exh. 113) *also available at* <http://www.elsegundorepowering.com/> and Sejal Choksi, “Alternatives to Once-Through Cooled Power Plants,” *San Francisco Bay Crossings* (July 2009) (Exh. 114), *also available at* <http://www.baycrossings.com/dispnews.asp?id=2192>.

impacts to air and water. ... The old 400 MW Albany Steam Generating Station, a once-through cooled plant was successfully repowered into the Bethlehem Energy Center (BEC), a 750 MW highly efficient, combined cycle station. Through use of the combined cycle process and mechanical draft cooling towers, cooling water was reduced from approximately 500 MGD to less than 10 MGD. The new BEC began commercial operation in mid 2005. Almost twice as much electricity is now being produced at far lower impacts to the aquatic resource.<sup>531</sup>

Similarly, the Bergen power station, originally constructed in 1959 as a coal-fired plant at the confluence of the Hackensack River and Overpeck Creek in Ridgefield, New Jersey, once withdrew more than half a billion gallons of river water per day through its once-through cooling system, but was repowered and converted from coal to gas in 1993. It has completely eliminated those withdrawals by retrofitting with closed-cycle cooling and running a pipeline under the river to a sewage treatment plant from which it now draws treated effluent for cooling.

Because repowering would play a highly significant role in the market response to a closed-cycle cooling mandate, the net effect of Option 3 would very likely be a decrease in air pollution emissions, virtually across the board. This result is confirmed by an analysis conducted by the State of California in conjunction with the development of its statewide BTA policy. In a section entitled “Effects on Electric Reliability,” the Final Substitute Environmental Document for the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling explained that, while “predicting the future operation of any *one* plant is conjecture at best,” when looking at the industry as a whole “certain trends are evident,” in particular that, faced with a requirement to install closed-cycle cooling, plant owners may “retrofit their OTC [once-through-cooled] plants with an alternative form of cooling, [b] repower their plants by essentially building a new plant using alternative cooling and then decommissioning the old one, or [c] shut the plant down, either permanently and convert to another use, or temporarily while waiting for more favorable economics for repowering or retrofitting.”<sup>532</sup> The environmental assessment continued:

The *most realistic scenarios* examined, in which some OTC plants would be retired while others repower or convert their cooling systems, *showed potential for significant benefits to the environment because the overall power sector would be more efficient and produce fewer emissions*, and because marine ecosystem impacts caused by use of OTC technology would be greatly reduced.<sup>533</sup>

Analyzing one of these “most realistic scenarios,” termed “Scenario 3,” in which all fossil fuel units are repowered to combined-cycle systems with dry cooling (as several plants in California already have) and the nuclear units are retrofitted to wet cooling, with replacement generation provided by new combined-cycle units, California estimated that fuel usage by power plants and resulting emissions of SO<sub>2</sub>, NO<sub>2</sub>, CO<sub>2</sub>, CO, TOG, and ROG would all *decrease, by 3*

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<sup>531</sup> New York State Department of Environmental Conservation, Aquatic Habitat Protection website, at 4 (Exh. 115), also available at <http://www.dec.ny.gov/animals/32847.html> (last visited, Aug. 2011).

<sup>532</sup> Calif. OTC Policy SED, p. 118 (emphasis added).

<sup>533</sup> Calif. OTC Policy SED, at 119 (emphasis added).

percent to 26 percent over current levels.<sup>534</sup> Those results are shown in the following table, which appears on page 110 of the Calif. OTC Policy SED:

**Scenario 3:** All fossil fuel units are repowered to combined-cycle systems with dry cooling. Nuclear units are retrofitted to wet cooling, with replacement generation provided by new combined-cycle units (Table 25).

**Table 25. Estimated Stack Emission: Scenario 3**

	Fuel Usage (MMBTU)	SO <sub>2</sub> (tons)	NO <sub>2</sub> (tons)	CO <sub>2</sub> (tons)	CO (tons)	TOG (tons)	ROG (tons)	PM10 (tons)
Baseline	151,648,525	53	557	9,070,258	3,116	413	116	262
Repowered Fossil <sup>[a]</sup>	118,351,861	43	402	7,030,961	2,104	280	104	267
Retrofitted Nuclear	12,760,349 <sup>[b]</sup>	5	63	757,965	321	28	9	20
<b>Net Change</b>	<b>-14%</b>	<b>-9%</b>	<b>-17%</b>	<b>-14%</b>	<b>-22%</b>	<b>-26%</b>	<b>-3%</b>	<b>10%</b>

Notes:

a. Based on average emission factors for new, dry-cooled combined-cycle units.

b. Fuel usage for retrofitted nuclear facilities refers to the additional fuel that would have to be consumed by a combined-cycle fossil unit to replace the generating shortfall from the nuclear facilities.

Accordingly, requiring closed-cycle cooling would cause some facilities to repower their plants, yielding additional environmental and economic benefits, particularly reductions in air pollution emissions.

**3. Option 2’s Entrainment Standard Is Far Superior to Option 1 and Option 4 in All Respects.**

While Option 3 saves more fish and other aquatic organisms than Option 2 (the option which requires closed-cycle cooling for all facilities with an actual intake flow greater than 125 MGD), the costs of Option 3 and therefore the overall burden on industry is not much greater than that of Option 2. Further, the administrative burden on states is least for Option 3 because it does not require extensive consideration of technological, biological and economics studies as do Options 1 and 4 (to a tremendous degree) and Option 2 (to a somewhat lesser degree). Option 2, however, is far superior to Options 1 and 4, and would provide some, but not all, of the benefits of Option 3 and avoid some, but not all, of the fatal flaws of Options 1 and 4.

**4. EPA Should Shorten the Entrainment Compliance Timelines.**

EPA’s extended implementation schedule for closed-cycle cooling retrofits is unnecessarily long. EPA’s proposed schedule for information submittal is entirely too long and should be cut in half. As EPA noted in the Proposed Rule, facilities with a DIF greater than 50 MGD were previously subject to the withdrawn Phase II rule and therefore should have already compiled much of the proposed application data which can be used to meet many of the information submittal requirements.<sup>535</sup> Furthermore, the start-to-finish application process for

<sup>534</sup> Calif. OTC Policy SED at 110.

<sup>535</sup> See 76 Fed. Reg. at 22,254 (col. 2).

closed-cycle cooling conversions should be no more than 24 months. Competition of closed-cycle cooling retrofits should be required no later than 36 months after approval of the application at fossil plants, and no more than 48 months after approval at nuclear plants (nuclear plants may need additional time to synchronize the retrofit outage with a refueling outage).<sup>536</sup> The attached engineering report concludes that if EPA applies the suggested downtime estimates of 1 and 2 months for fossil and nuclear plants respectively, there is no technical justification for EPA's proposed extended implementation schedule for closed-cycle cooling retrofits.<sup>537</sup>

This schedule is consistent with what EPA required for the Brayton Point plant, where the final compliance order required the company to complete construction of closed-cycle cooling within 29 months of getting all permits and to fully meet the closed-cycle-cooling-based permit limits seven months after that, for a total of 36 months from permitting to final compliance.<sup>538</sup>

**5. Any Variance EPA Includes as Part of a Categorical Entrainment Standard Must Clearly Delineate What Issues May Be Considered by the Director and How They Are to Be Considered.**

Although OMB deleted it, in the version of the Proposed Rule EPA sent to OMB shortly before proposal, EPA stated:

The Agency could have developed a proposed rule based on closed-cycle cooling as BTA that provides exceptions to take into account each of these four factors [i.e., energy reliability, air emissions, land availability, and remaining useful plant life] individually. In other words, EPA could have developed an option that would require closed-cycle cooling, but the rule would also necessarily provide numerous alternatives and exceptions to specifically address each of the identified factors.<sup>539</sup>

As discussed above, EPA should promulgate a rulemaking option that requires closed-cycle cooling (e.g., Option 3), and to the extent that such option includes a variance, EPA should carefully tailor that variance and set rules for the Director to follow in applying that variance.<sup>540</sup> In particular:

- The burden of proof must be placed squarely on the permit applicant to demonstrate entitlement to any variance.

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<sup>536</sup> See Powers Report.

<sup>537</sup> See Powers Report.

<sup>538</sup> U.S. EPA, Region I – New England, *In the Matter of Dominion Energy Brayton Point, LLC, Brayton Point Power Station, Somerset, Massachusetts, NPDES Permit No. MA0003654, Docket No. 08-007, Findings and Order for Compliance* at 6 (Exh. 116).

<sup>539</sup> Version of Proposed Rule Sent to OMB, p. 139 of 383 (Exh. 85).

<sup>540</sup> It should be noted that EPA's Fundamentally Different Factors (FDF) variance is designed to operate in both directions. That is, the FDF variance allows national standards to be made "either more or less stringent" on application by "[a]ny interested person." 40 C.F.R. § 125.30(b) (emphasis added).



- There should be no cost-benefit variance or any other site-specific cost-benefit analysis.
- Any calculation baseline must use an “actual flow” not a “full flow” operational baseline.
- Directors should be directed to find that there is adverse environmental impact (AEI) whenever there is impingement or entrainment and, further, AEI is not to be measured at the fish population level, or with adult-equivalent calculations such as age-1 equivalency.
- Fishery management models may not be used to assess the effects of impingement and entrainment.
- Density dependent models and the ecologically baseless concept of “surplus production” may not be considered in permitting proceedings.
- All species must be considered.
- Species of special concern, *e.g.*, not only threatened and endangered species, but also those awaiting listing and other sensitive, keystone or otherwise important species are entitled to enhanced protection.
- Arguments that some of entrained or impinged fish were dead before they were trapped by the intake structure may not be considered due to the difficulty in proving this.
- The degraded quality of source or receiving waterways may not be considered in permitting proceedings.
- Other aspects of source or receiving water quality may be considered only to make technology-based standard stricter, not to relax them.
- No waters of the U.S. are exempt from Clean Water Act protection or are deserving of lesser protection than others.
- Waterways that have been dammed by plant owners for use as cooling water reservoirs remain waters of the U.S.
- The impact on aquatic organisms from other sources may not be considered as a reason not to regulate intake structures or as a reason to regulate them less stringently.
- Entrainment survival claims may not be considered.
- As the courts have clearly held, restoration or mitigation measures may not be considered under Section 316(b).
- Section 316(b) requirements must be considered independently of any Section 316(a) variance application.
- The compliance costs or social costs to be considered may include only capital expenditures, operation and maintenance, and energy penalty, not speculative, indirect add-on costs.

- Arguments by permit applicants related to air quality issues must be evaluated by the Director in the context of the fact that, as EPA noted, most impacts from closed-cycle cooling itself are so localized as to occur wholly on the property of the plant itself;<sup>541</sup> and the final air permitting analysis should be evaluated with the expectation that it would be the last step in the permitting process (due to ongoing changes in the classification of areas in "non-attainment" status and the regulatory procedure for air permits which allows only for a one-year duration before a new air permit must be sought).
- Arguments that the power industry is entitled to special treatment may not be considered.
- Projections of a plant's remaining useful life should not be considered unless a plant operator makes a binding and enforceable commitment to close a plant within a 5-year time frame.
- Arguments that retrofits should not be required at a plant that was recently built or refurbished may not be considered.
- Arguments that an older Section 316(b) determination should not be revisited now cannot be considered.
- The implementation time for BTA measures cannot be considered as a reason for requiring a less protective technology over a more protective one; instead, less protective technologies that can be implemented more rapidly should be considered as interim measures to reduce impacts while more protective technologies are being installed.

**C. Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects.**

**1. EPA Should Establish a National Categorical Impingement Standard Based on Closed-Cycle Cooling.**

In the Proposed Rule "EPA concluded that closed-cycle cooling reduces impingement and entrainment mortality to the greatest extent."<sup>542</sup> As discussed above, EPA should set a national standard based on closed-cycle cooling for entrainment and establish a similar standard as the first component of the rule's impingement standards, as well.<sup>543</sup> Moreover, as explained below, while EPA did propose national standards for impingement, those standards are also insufficient because EPA did not primarily base them on velocity reduction.

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<sup>541</sup> 76 Fed. Reg. at 22,209 (cols. 1-2).

<sup>542</sup> 76 Fed. Reg. at 22,207 (col. 1).

<sup>543</sup> It should be noted, however, that even though "virtually all facilities with wet cooling towers have a maximum intake velocity of 0.5 feet per second" (76 Fed. Reg. at 22,258 (col. 2)), a closed-cycle cooling standard is not alone sufficient for impingement. *Id.*

**2. EPA’s Rejection of the 0.5 Ft/S Velocity Limitation as the Primary National Standard Is Illegal.**

**a. EPA Has Found in Each Previous Section 316(b) Rulemaking, and Again for this Rule, that a 0.5 Ft/S Velocity Limitation Would Protect Approximately 96 Percent of Fish from Impingement and that Many Existing Facilities Already Meet that Standard.**

As EPA has explained, “impingement is generally correlated to three factors: intake flow, intake velocity, and fish swim speed” and “[t]he latter two factors are closely related, as the ability of fish to evade impingement depends on the swimming ability of the individual fish and the intake velocity against which it is attempting to escape.”<sup>544</sup> Based on this analysis, “EPA has consistently recognized that regulating the intake velocity at cooling water intake structures (CWIS) is an effective way to minimize impingement impacts.”<sup>545</sup>

Accordingly, in the Phase I rule, EPA set a national categorical standard requiring all new facilities to have a maximum design intake velocity of 0.5 feet per second (ft/s or fps).<sup>546</sup> EPA established 0.5 ft/s as the appropriate minimum velocity requirement based on technical and scientific literature, state and federal studies, and an analysis of data from studies on fish swim speeds suggested that a 0.5 ft/s velocity would protect 96 percent of the tested fish.<sup>547</sup> EPA documented that 73 percent of manufacturing facilities and 62 percent of power plants constructed in the prior 15 years met the 0.5 ft/s through-screen velocity requirement.<sup>548</sup>

In addition, the record shows that in 2000, the Electric Power Research Institute (EPRI) submitted a report in which it “agreed that intake velocity was an appropriate regulatory criterion, and ... that a limit of 0.5 fps was a useful threshold for screening out significant impingement events at CWISs.”<sup>549</sup> Nevertheless, in *Riverkeeper I*, the power industry (UWAG) challenged the velocity requirement, arguing that there was insufficient support in the record for a through-screen velocity limit of 0.5 ft/s.<sup>550</sup> The Second Circuit rejected that challenge, finding that “EPA’s choice of velocity limit was reasonable.”<sup>551</sup>

“The Phase II rule used the same data, analyses and conclusions presented in Phase I to support a compliance alternative where an intake at a facility with a design through-screen velocity of 0.5 fps meets the impingement requirements.”<sup>552</sup> Similarly, the proposed Phase III rule utilized the same regulatory framework as the Phase II rule, including the 0.5 fps intake

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<sup>544</sup> Memo to Paul Shriner, EPA from Kelly Meadows, Tetra Tech, Subject: Analysis of swim speed data (hereinafter “Swim Speed Data Memo”) December 8, 2008, at 1 (DCN 10-6705A) (EPA-HQ-OW-2008-0667-0660) (Exh. 117); see also, 69 Fed. Reg. at 41,612 (col. 2); see also Pisces Report.

<sup>545</sup> Swim Speed Data Memo at 1.

<sup>546</sup> See 40 C.F.R. § 125.84(b)(2) and (c)(1).

<sup>547</sup> 66 Fed. Reg. at 65,274 (cols. 2-3).

<sup>548</sup> 66 Fed. Reg. at 28,864 (col. 3.); see also Swim Speed Data Memo at 3, citing DCN 2-030.

<sup>549</sup> Swim Speed Data Memo at 3.

<sup>550</sup> *Riverkeeper I*, 358 F.3d at 198.

<sup>551</sup> *Id.*, 358 F.3d at 199.

<sup>552</sup> Swim Speed Data Memo at 3.

velocity threshold.<sup>553</sup> “In the final Phase III rule, EPA opted not to regulate land-based facilities, but continued to impose the intake velocity requirements on certain offshore facilities.”<sup>554</sup> Industry did not specifically challenge the 0.5 ft/s standard in *Riverkeeper II* or in its challenge to the Phase III rule, *ConocoPhillips, et al. v. EPA*.

For the current rulemaking, EPA briefly re-examined the basis for the 0.5 ft/s threshold to ensure that it was still valid and conducted additional screening analyses. Based on that updated examination, EPA’s technical consultant concluded:

In reviewing the swim speed data in the record, the previous conclusions continue to be supported by the data. ... 0.5 ft/sec through-screen velocity would be protective of 96% of species. ... Given the potential for screen clogging and debris loading (which would reduce the open area of the screen and increase the through-screen velocity even further), the 0.5 fps threshold also provides for an appropriate safety margin for aquatic organisms. ... Analyses were conducted to determine if the velocity threshold should vary by waterbody type. The swim speed data from the EPRI report was plotted by fish assemblage, a categorization of fish species by waterbody type (e.g., Pacific Ocean, rivers in the Eastern U.S., etc.). ... These plots did not show any clear differentiation of swimming ability between fish in the various waterbodies nor did any waterbody type appear to be any more vulnerable than another; it is therefore reasonable to conclude that the 0.5 fps national intake velocity limit is appropriate for all waterbody types.<sup>555</sup>

EPA thus concluded that “a design through-screen velocity of 0.5 feet per second would be protective of 96% of motile organisms” and would therefore be “better than the selected technology,” *i.e.*, modified travelling screens.<sup>556</sup>

In addition, EPA’s updated analysis also showed, once again, that “many intakes already meet this standard, thereby reducing the burden of meeting the requirement.”<sup>557</sup> Specifically, “[a]ccording to data from EPA’s 2000 industry questionnaire, approximately 18% of intake structures meet the 0.5 fps threshold. Another 21% are less than 1.0 fps.”<sup>558</sup> Moreover, “many intake technologies installed today (e.g., cylindrical wedgewire screens) are specifically designed to meet the 0.5 fps threshold.”<sup>559</sup>

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<sup>553</sup> *Id.*

<sup>554</sup> *Id.*, citing 125.134(b)(2).

<sup>555</sup> *Id.* at 4.

<sup>556</sup> See 76 Fed. Reg. at 22,204 (col. 3). As discussed in the Pisces report attached as Appendix B, while the 0.5 ft/s velocity limit is more protective than modified travelling screens, it may not be as protective as EPA believes because not all fish with swim speeds faster than the velocity of the intake structure can and will actually avoid the intake. Thus, a 0.5 ft/s velocity limit should be one primary component of the impingement standards, but it is not itself sufficient.

<sup>557</sup> Swim Speed Data Memo at 4.

<sup>558</sup> Swim Speed Data Memo at 4, citing DCN 4-4023C “Preliminary Data Analyses Using Responses from the Detailed Industry Questionnaire: Phase II Cooling Water Intake Structures (Draft).”

<sup>559</sup> Swim Speed Data Memo at 4.

**b. EPA Lacks a Legitimate Legal or Evidentiary Basis for Rejecting the 0.5 Ft/S Velocity Limit.**

Having found that a 0.5 ft/s velocity limit is an appropriate and highly protective standard, EPA did not, however, require existing facilities to meet it. Instead, the Proposed Rule gives facilities the option of choosing to meet the 12-percent-annual/31-percent-monthly impingement mortality reduction standard, which is a less protective standard and is inferior in many ways, as discussed below. EPA states that it did so because “EPA’s record shows modified traveling screens are available for all facilities, whereas reduced intake velocity may not be available at all locations.”<sup>560</sup> That is illegal for at least two reasons. First, as discussed above, EPA applied an unauthorized interpretation of the statutory term “available” and an improper approach to BTA. Second, analysis or evidence in the record to support a conclusion that reduced intake velocity is not capable of being implemented at all locations appears to be lacking. To the contrary, the record evidence shows not only that 18 percent of intake structures presently meet the 0.5 ft/s velocity limit but also that many existing facilities can meet it.<sup>561</sup> As the Second Circuit stated in upholding that limit in *Riverkeeper I*: “The fact that a minority of facilities do not presently meet this requirement, of course, says nothing about whether the required technology is the ‘best’ or ‘available.’”<sup>562</sup>

**3. The 12 Percent/31 Percent Impingement Mortality Reduction Requirement Is Problematic In Numerous Respects.**

As noted above, the 0.5 ft/s velocity limit is more effective than the technology on which the 12/31 percent standard is based, assuming that both restrictions operate as they are intended. Additionally, because those two standards work in very different ways, the 12/31 percent limit is also inferior in other ways. A velocity limit allows fish to swim away from the intake and avoid impingement altogether. The 12/31 percent limit allows an unlimited number of fish to be impinged, and instead requires that enough impinged fish be returned to the waterbody such that no more than 88 percent (the reciprocal of 12 percent) die over the course of a year and no more than 69 percent (the reciprocal of 31 percent) die in any given month.

A standard based on reduced impingement is superior to one based on impingement mortality because the former avoids the difficulties and uncertainties of determining how many fish of which species have survived impingement. In addition, the former also avoids sub-lethal harm to impinged fish. For many reasons, it is far more practical, certain and effective to address an environmental problem before it happens (which, in this case, means preventing impingement through a velocity limit) rather than to let it happen and attempt to mitigate the consequences (which, in this case, means allowing unlimited impingement and trying to return the impinged fish to the waterbody alive). In this regard, the velocity limit is simple, effective, and relatively

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<sup>560</sup> See 76 Fed. Reg. at 22,197 (col. 2).

<sup>561</sup> TDD, Ch. 6.

<sup>562</sup> 358 F.3d at 199.

easy to measure compliance with, while the impingement mortality limit is not. Several related problems emerge here, as discussed below.

For a more extensive discussion of the problems with the Proposed Rule's 12/31 percent standard and the associated monitoring requirements, please see the report on biological issues prepared by PISCES Conservation, Ltd., and attached hereto as Appendix B.

**a. Impingement Mortality Monitoring Is Inherently Difficult, Controversial, and Uncertain.**

Facilities seeking to meet the 12/31 percent standard must develop and submit a "Proposed Impingement Mortality Reduction Plan." The plan must include a proposed biological sampling protocol for monitoring both impingement and impingement mortality and thereby demonstrating that the 12/31 percent standard is being met. Specifically, the plan must propose, at a minimum: (1) the duration and frequency of monitoring; (2) the monitoring location; (3) the organisms to be monitored; (4) the method in which naturally moribund organisms would be identified and taken into account; and (5) a latent mortality assessment procedure. This last item must involve a method for handling the organisms in a collection device "as little as possible," transferring them to a "holding area with conditions as close as practicable to the source water," and retaining them for 48 hours, at which time the number of dead organisms would be counted.<sup>563</sup> EPA envisions that the permitting authority would then review and approve the Impingement Mortality Reduction Plan, after making a determination that each of these issues has been properly addressed.

In practice, however, these issues are enormously complicated and controversial and will inevitably lead to disputes among the permitting authority, the permittee and others. As EPA acknowledges, "there are no standard methods for conducting impingement and entrainment studies and that there can be variability in designing a sampling plan between sites."<sup>564</sup> That variability, along with the complexity of the biological issues involved, will inevitably lead to disputes, delays and uncertainty. For example, because sampling is an expense that plant operators will want to minimize, they have every incentive to propose minimal sampling frequencies and to scale down the extent of monitoring in every other way. Unfortunately, permit writers will often oblige them so as to not burden industry or ratepayers. Moreover, while there is significant potential for disputes over the design of the sampling and the interpretation of the results, state agencies (as well as the general public) lack the resources to fully and properly evaluate the sampling plans being submitted.

In particular, disputes are highly likely to emerge with respect to the number of sampling events, the species to be monitored, how to properly account for periods when the plant is running at low capacity or when fish are relatively abundant or sparse in the waterbody and whether organisms died as a result of impingement or are naturally moribund (or plant operators may argue that organisms died as a result of the transferring and holding process). Especially controversial and fraught with difficulty is the latent mortality determination, whereby plant

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<sup>563</sup> 76 Fed. Reg. at 22,257 (col. 2).

<sup>564</sup> *Id.* at n.103.

operators must seek to retain the samples for 48 hours in a manner that will minimize mortality from the holding itself. Significantly, latent mortality may occur after more than 48 hours, and while EPA is not proposing a longer latency period because of the potential for greater mortality as a result of the holding, the fact remains that mortality which occurs 72 or 96 hours after the impingement event would not be measured at all under the Proposed Rule. Consequently, the sampling results are likely to be disputed, leaving substantial uncertainty as to whether impingement mortality has been actually reduced to the levels suggested by monitoring.<sup>565</sup>

In contrast, determining the maximum velocity of an intake structure is far more straightforward. While it is unlikely that 96 percent of fish will be protected at every intake structure meeting the velocity limit, the statistical analysis underpinning that figure has already been conducted by EPA, used in four rulemakings, and upheld by the courts, and thus there is no reason to revisit it on a plant-specific basis. For that reason, extensive biological monitoring with latency holding periods is not required to determine compliance with the velocity limit, no sampling protocols to be developed, assessed, debated, approved, and ultimately disputed, and no holding period for assessment of latent mortality.

**b. The 12 Percent/31 Percent Standard is Further Weakened by the Provision Allowing the Director to Exclude Certain Species from the Standard.**

While the Proposed Rule provides that compliance with the entrainment and impingement provisions means achieving any applicable limitations “for all life stages of fish,”<sup>566</sup> the Proposed Rule also contains a provision stating that “the Director may determine invasive species, naturally moribund species, *and other specific species* may be excluded from any monitoring, sampling or study requirements of 40 CFR 122.21 and § 125.94.”<sup>567</sup> This provision will invite plant operators and some regulators to seek to exclude certain species – in addition to species deemed to be “invasive”<sup>568</sup> or organisms that are determined to be naturally moribund – from the calculations in order to make a non-compliant facility appear to be compliant. For example, because certain fish species are more delicate than others and therefore less likely to survive impingement, by excluding those species from the monitoring requirements a facility that was not meeting the 12/31 percent limit would suddenly be deemed to be in compliance. Indeed, it is unclear whether the 12/31 percent standard can be met at every location using modified travelling screens unless the plant operator is able to convince the

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<sup>565</sup> Relatedly, because the 12/31 percent standard allows plants to impinge as many fish as they can it provides no incentive to reduce impingement, only impingement mortality. In fact, because the baseline is the number of fish impinged, the more fish that a plant impinges, the more it can kill. That may give permittees a perverse incentive to increase rather than decrease impingement. While plant operators would not likely seek to increase their impingement across the board, one can envision circumstances where increasing impingement of relatively robust fish species more likely to survive impingement (or sampling when those species are more likely to be present) becomes a strategy for increasing a plant’s average impingement survival results.

<sup>566</sup> Proposed 40 C.F.R. § 125.94(b)(1)(i), 76 Fed. Reg. at 22,282 (col. 3) (achieve impingement standards for all life stages of fish). *See also id.* §§ 125.94(b)(1)(iii)(A), 76 Fed. Reg. at 22,282 (col. 2-3) (the owner of a facility must count as impinged “any fish” carried over or removed from a screen).

<sup>567</sup> Proposed 40 C.F.R. § 125.98(c)(6) (emphasis added), 76 Fed. Reg. at 22,287 (col. 3).

<sup>568</sup> Allowing “invasive” species to be excluded is also problematic because there is no unanimity as to what species are considered invasive or whether all of those species are harmful.

director to exempt delicate species that would otherwise increase impingement mortality above the specified levels. In contrast, the 0.5 ft/s velocity limit will protect 96 percent of all fish. As discussed below, the director should not be allowed to exclude species from impingement monitoring or any other study, but the potential for such exclusion is further reason why the velocity limit is far more protective.

**4. EPA Should Select the 0.5 Ft/S Velocity Limit as the Impingement Standard for the Final Rule.**

In the Final Rule, EPA should abandon the 12-percent-annual/31-percent-monthly impingement mortality standard and instead set a national standard for impingement mortality at all existing in-scope facilities based on the 0.5 ft/s velocity limit. In addition, EPA should retain the additional fish-return, fish-entrapment, and shellfish barrier net requirements currently in the proposed rule. The maximum time frame for compliance should be shortened to three years or less. To the extent that some covered facilities might not be capable of meeting the velocity limit, a properly-crafted and properly-limited variance, consistent with that allowed under the Clean Water Act in these circumstances would be appropriate. Accordingly, 40 C.F.R. § 125.93 (a) should read:

**§ 125.93 Compliance.**

(a) The owner or operator of a facility subject to this subpart must comply with the applicable BTA standards for impingement mortality in § 125.94(b) as soon as possible based on the schedule of requirements set by the Director, but in no event later than [date 3 years after the effective date of the final rule].

And 40 C.F.R. § 125.94(b) should read:

**§ 125.94 As an owner or operator of an existing facility, what must I do to comply with this subpart?**

(b) *BTA Standards for Impingement Mortality.* By the dates specified in § 125.93(a), the owner or operator of an existing facility subject to this subpart must achieve the impingement mortality standards provided in paragraphs (b)(1) and (2) of this section:

(1) The owner or operator of an existing facility must demonstrate to the Director that its cooling water intake system has a maximum intake velocity of 0.5 feet per second.

(2) In addition, you must meet the following criteria:

(i) The maximum velocity must be demonstrated as either the maximum actual intake velocity or the maximum design intake velocity as water passes through the structural components of a screen measured perpendicular to the screen mesh;



(ii) The maximum velocity limit must be achieved under all conditions, including during minimum ambient source water surface elevations and during periods of maximum head loss across the screens or other devices during normal operation of the intake structure. If the intake does not have a screen, the maximum intake velocity perpendicular to the opening of the intake must not exceed 0.5 feet per second during minimum ambient source water surface elevations;

(iii) Each intake must be operated and maintained to keep any debris blocking the intake at no more than 15 percent of the opening of the intake. A demonstration that the actual intake velocity is less than 0.5 feet per second through velocity measurements will meet this requirement;

(iv) The owner or operator of a facility that withdraws water from the ocean or tidal waters must also reduce impingement mortality of shellfish at a minimum to a level comparable to that achieved by properly deployed and maintained barrier nets. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement;

(v) The owner or operator of a facility that employs traveling screens or equivalent active screens must incorporate protective measures including but not limited to: modified traveling screens with collection buckets designed to minimize turbulence to aquatic life, addition of a guard rail or barrier to prevent loss of fish from the collection bucket, replacement of screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray to remove debris on the ascending side of the screens, and a fish handling and return system with sufficient water flow to return the fish to the source water in a manner that does not promote predation or re-impingement of the fish; and

(vi) The owner or operator of the facility must ensure that there is a means for impingeable fish or shellfish to escape the cooling water intake system or be returned to the waterbody through a fish return system. Passive screens such as cylindrical wedgewire screens, and through-flow or carry-over free intake screens such as dual-flow screens and drum screens, will meet this requirement.

In addition, since fish with swim speeds faster than 0.5 ft/s may nevertheless be impinged, particularly at larger intake structures,<sup>569</sup> the rule should also require facilities to

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<sup>569</sup> See PISCES report, Appendix B. For example, even a fast-swimming fish may not be able to perceive that it is being impinged and in which direction safety lies until it is too late. *Id.*

conduct biological monitoring to verify that the 0.5 ft/s limitation is effective. Such monitoring would not involve an assessment of impingement mortality and would not require holding fish for a latency period, but would instead be used to verify whether fish species and life stages with faster swim speeds are being impinged in any appreciable numbers.

**D. All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as New Units at Existing Facilities.**

**1. Although the Closed-Cycle Cooling Standard for New Units at Existing Facilities Should Be Retained, the Definitions of New Unit and Existing Facility Are Problematic.**

In Phase I, EPA required *new facilities* to reduce intake flows to a level commensurate with the performance of closed-cycle cooling systems, but deferred regulation of all existing facilities – meaning all facilities that did not fit EPA’s strict definition of a “new facility”<sup>570</sup> – until the present rule.<sup>571</sup>

EPA promulgated a two-part definition of a new facility. The first part of the “new facility” test essentially restates EPA’s definition of a “new source” of water pollution that is subject to new source performance standards under Section 306 of the Act.<sup>572</sup> In particular, a facility is only considered new if:

- (i) It is constructed at a site at which no other source is located; or
- (ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
- (iii) Its processes are substantially independent of an existing source at the same site.<sup>573</sup>

Under the second part of EPA’s test, a new facility also has another essential characteristic: it either uses a new cooling water intake or an existing intake “whose design capacity is increased to accommodate the intake of additional cooling water.”<sup>574</sup>

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<sup>570</sup> An existing facility is any facility that is not a “new facility.” See proposed 40 C.F.R. § 125.92, 76 Fed. Reg. at 22,281 (col. 3) (“*existing facility* means any facility that commenced construction . . . on or before January 17, 2002; and any modification of, or any addition of a unit at such a facility that is not a new facility at § 125.83.”); see also *id.* at 22,193 (col. 2) (“EPA’s definition of an ‘existing facility’ in today’s proposed regulation is intended to ensure that all sources excluded from the definition of new facility in the Phase I rule are captured by the definition of existing facility in this proposed rule.”).

<sup>571</sup> See 66 Fed. Reg. at 65,256 (col. 3).

<sup>572</sup> See 40 C.F.R. §§ 122.2, 122.29.

<sup>573</sup> See 40 C.F.R. § 125.83. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source. *Id.*

<sup>574</sup> 40 C.F.R. § 125.83.

Thus, under EPA's Phase I rule, a facility is only "new" if it is both a "new source" and also uses a new or expanded intake.<sup>575</sup> In 2001, when it promulgated the Phase I rule, EPA reported that some commenters expressed a "well founded" concern with this two-part definition because "an existing facility could rebuild its whole facility behind the cooling water intake structure and not be subject to the requirements applicable to a new facility."<sup>576</sup> EPA admitted that, indeed, it was possible to "completely demolish an existing source, replace it with a smaller-capacity new source, and not be regulated under today's rule as a new facility."<sup>577</sup> However, EPA promised that to the extent any commenters "assert some inequity of treatment between new facilities and certain existing facilities, EPA will address this comment when it addresses what substantive requirements apply to existing facilities."<sup>578</sup>

In the current rule, EPA proposes to bring new units at existing facilities up to the level of control applied to new facilities.<sup>579</sup> In the preamble, EPA explains that a new unit at an existing facility should be treated like a new unit at a new facility for several reasons:

1. "As new units are built at existing facilities to provide additional capacity, facilities have the ideal opportunity to design and construct the new units without many of the additional expenses associated with retrofitting an existing unit to closed-cycle."
2. "The incremental downtime that can be associated with retrofitting to closed-cycle cooling is avoided altogether at a new unit."
3. "In addition, when new units are added, the condensers can be configured for closed-cycle, reducing energy requirements, and high efficiency cooling towers can be designed as part of the new unit, allowing for installation of smaller cooling towers. Thus, the capital costs for closed-cycle cooling at new units are lower than the capital costs for once-through cooling. These advantages may not always be available when retrofitting cooling towers at an existing unit."
4. "In consideration of the fact that additional unit construction decisions rest largely within the control of the individual facility, EPA decided that subjecting new units to the same national BTA requirements as those applicable to new facilities is warranted."<sup>580</sup>

In theory, all new units will now be required to approximate the performance of a closed-cycle cooling system – whether they are built at new or existing facilities. But in practice, many new units will not be subject to environmentally protective requirements because, in defining a "new unit," the proposed rule only counts additional units added to an existing facility to increase the facility's capacity. The definition of "new unit" excludes all other major changes at

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<sup>575</sup> 40 C.F.R. § 125.83, *see also* 66 Fed. Reg. at 65,259 (col. 1).

<sup>576</sup> 66 Fed. Reg. at 65,286 (col. 2).

<sup>577</sup> *Id.*

<sup>578</sup> 66 Fed. Reg. at 65,286 (col. 1).

<sup>579</sup> *See* 76 Fed. Reg. at 22,196 (col. 1-2) ("The requirements for new units are modeled after the requirements for a new facility in the Phase I rule.").

<sup>580</sup> 76 Fed. Reg. at 22,196 (col. 2).

an existing facility, including total replacements and repowerings, and even if the replacement unit adds capacity compared to the prior unit:

new unit refers to newly built units added to increase capacity at the facility and *does not include any rebuilt, repowered or replacement unit*, including any units where the generation capacity of the new unit is equal to or greater than the unit it replaces.”<sup>581</sup>

This is precisely the problem that commenters identified in 2001 and that EPA indicated it would address in this rule: under the proposed rule, a facility operator can completely demolish every part of a site behind the cooling water intake structure and rebuild an entirely new plant, yet potentially evade the protective standards imposed upon all other new units.

EPA’s decision to call only units added in order to increase a facility’s capacity “new units” and exclude other kinds of new units at existing facilities from comparable regulation is irrational, arbitrary, and capricious.<sup>582</sup> Replacements and repowerings are construction projects in which all of the significant equipment at an “existing facility” is removed and completely new equipment is installed. The electric generating unit that emerges from a replacement or repowering is, by any reasonable standard, a “new unit.” Thus, replacement and repowered sites are new units and should be subject to the same standards as “additional” units.

Neither the rule, nor the preamble, provide any justification for singling out “additional” units as “new units” and not treating replaced, repowered, or rebuilt facilities as new units. The reasons that EPA gave for strictly regulating additional units apply equally to total replacements and repowerings (as do the reasons EPA gave for strictly regulating new facilities back in 2001, in the Phase I rule). The rule irrationally distinguishes between two total replacements of a facility. If an owner replaces every inch of the site, it is a new facility. But if the owner completely demolishes and replaces everything at the existing facility except for the cooling water intake structure itself, it is an existing facility. Yet all the equipment necessary to meet a closed-cycle cooling standard (cells, different piping, etc.) is built behind the cooling water intake structure. Significantly, EPA’s technical experts agreed that the reasons for considering an additional unit to be a new unit apply equally to replacements and repowerings, but they were overruled by OMB. OMB has not justified its proposed change, and in any case the office does not have technical expertise thus its technical decision merits no deference. For EPA to accept OMB’s unjustifiable modification to the rule would be arbitrary and unreasonable; it is also inconsistent with Congress’s intent to control mortality at cooling water intakes.

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<sup>581</sup> Proposed 40 C.F.R. § 125.92, 76 Fed. Reg. at 22,282 (col. 1-2) (emphasis added).

<sup>582</sup> In *Riverkeeper II*, the Second Circuit found that EPA had illegally “expanded the scope of what may be classified as a ‘new unit’ while narrowing the Phase I definition of ‘stand-alone’ facility. Moreover, by including a potentially expansive definition of ‘new unit’ in the preamble to the Phase II Rule, the EPA has interpretively modified the definitions that appeared in the Phase I Rule without providing interested parties an opportunity for notice and comment.”<sup>582</sup> EPA has (at the direction of OMB) once again improperly used the definitions of “new” and “existing” to narrow the class of facilities required to meet a closed-cycle-cooling-based standard.

**2. All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as “New Units at Existing Facilities.”**

Fixing the new units provision is simple: EPA should restore the Section 125.92(r) definition of “new unit” contained in the version of the Proposed Rule it submitted to OMB shortly before the proposal, which read:

(r) *New unit* means any addition of an operating unit at an existing facility where the construction begins after [insert effective date of this rule], including but not limited to a new unit added to a new or existing facility for the same general industrial operation, but that does not otherwise meet the definition of a new facility at § 125.83. *New unit* includes any additional, rebuilt, repowered, or replaced unit where that unit is not subject to the requirements of Subpart I. For purposes of this definition, rebuilt refers to major modifications affecting operation of the cooling water intake structure such as replacement of the turbine, boiler, or condensers.<sup>583</sup>

In addition, EPA should restore the Section 125.94(d)(1) and (2) “BTA Standards for Entrainment Mortality for New Units at Existing Facilities” contained in the version of the Proposed Rule it submitted to OMB shortly before proposal, with an addition required by the *Riverkeeper I* decision (shown in italics). The necessity for that addition is further explained in Section V, below, in the context of the Phase I rule:

**(d) BTA Standards for Entrainment Mortality for New Units at Existing Facilities.** The owner or operator of a new unit at an existing facility must achieve the entrainment standards provided in either § 125.94(d)(1) or § 125.94(d)(2).

(1) The owner or operator of a facility must reduce actual intake flow (AIF) at a new unit, at a minimum, to a level commensurate with that which can be attained by the use of a closed-cycle recirculating system for the same level of cooling. The owner or operator of a facility with a cooling water intake structure that supplies cooling water exclusively for operation of a wet or dry cooling tower(s) and that meets the definition of closed-cycle recirculating system at 125.92(c) meets this entrainment mortality standard.

(2) The owner or operator of a facility must demonstrate to the Director that it has installed, and will operate and maintain, technologies for each intake at the new unit that reduce entrainment mortality of all stages of fish and shellfish that pass through a 3/8 inch sieve. The owner or operator of a facility must demonstrate entrainment mortality reductions equivalent to 90 percent or greater of the reduction that could be achieved through compliance with § 125.94(d)(1). *In seeking to comply with the requirement set forth in this subsection, a facility must aim for 100 percent, and if it falls short within 10 percent, that will be acceptable. It may not, however, aim for 90 percent and achieve only an 89 percent reduction in entrainment mortality.*

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<sup>583</sup> EPA Version of Proposed Rule submitted to OMB, at 360-61 of 383 (Exh. 85); *see also* Redlined Version of Proposed Rule, at 423 (Exh. 86).

## **E. Other Critical Provisions Should Be Revised.**

### **1. EPA Should Clarify the Meaning of the Term “Species of Concern” and Restore Additional Protections for These Species.**

The proposed rule repeatedly refers to “species of concern,”<sup>584</sup> but does not define the term. Presumably, EPA now assigns the same meaning to “species of concern” that it assigned in the earlier Phase II rule: “those species that might be in need of conservation actions, but are not currently listed as threatened or endangered under State or Federal law.”<sup>585</sup> This definition is consistent with EPA’s practice under the Phase I rule of offering stronger protection to “species of concern” than the rule’s uniform standards would otherwise provide.<sup>586</sup> To be clear, EPA should set forth this meaning of “species of concern” as a definition in the regulatory text.

EPA should also extend additional protection to species of concern. Originally, EPA proposed to require facility operators who reduce intake velocity to 0.5 feet/second or less to document that this measure adequately protected “species of concern” and left Directors with discretion to impose additional requirements if the velocity limit was inadequate to the task.<sup>587</sup> But OMB suggested that this requirement should be deleted, and EPA now seeks comment on the wisdom of such a provision.<sup>588</sup> EPA should restore the provision as originally drafted.

Protection for species of concern is important because hundreds of candidate threatened and endangered species are caught in a regulatory backlog that, in many cases, has extended for decades.<sup>589</sup> Although the intake velocity limit is protective of the majority of species, some species of concern may be adversely affected even by a slow-speed intake. If the best available science shows that a particular species requires support from stronger conservation measures to survive, including more stringent protection from impingement and entrainment, then the species should not be denied vital support because of administrative shortcomings. Recognizing and restoring additional protections for species of concern is a way for EPA to address a governance failure within the Department of Interior and fulfill its mandate to protect the health and biological diversity of the nation’s waters.

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<sup>584</sup> See e.g., proposed 40 C.F.R. 125.97(a)(4) (Entrainment monitoring reports must “describe . . . the species of concern, the counts and percentage mortality of organisms sampled, and other information specified in the permit.”). See also 76 Fed. Reg. at 22,204 (col. 3) (EPA is considering, as an additional impingement requirement, that facilities opting to reduce intake velocity also show that “species of concern are adequately protected.”).

<sup>585</sup> 69 Fed. Reg. at 41,587 (col. 1).

<sup>586</sup> See 40 C.F.R. § 125.84(b)(4),(5) (requiring new facilities to take extra measures above and beyond implementation of closed-cycle cooling if necessary to protect “species of concern to the Director.”).

<sup>587</sup> See Redlined Version of Proposed Rule at 397.

<sup>588</sup> *Id.*

<sup>589</sup> See, e.g., Columbia Basin Fish & Wildlife News Bulletin, “USFWS Announces Work Plan to Deal With Backlog of ESA Listing Determinations” (May 13, 2011) (Exh. 118).

## **2. EPA Should Prevent Directors from Excluding Any Species from the Rule's Scope.**

EPA should delete its proposed Sections 125.98(c)(6) – the provision that allows a Director unfettered discretion to exclude any species, without limits and without standards, “from any monitoring, sampling, or study requirements of 40 CFR 122.21 and § 125.94.”<sup>590</sup> Currently, Section 125.98(c)(6) provides an exception that could swallow the Clean Water Act. The proposed rule requires all existing units to reduce impingement mortality to 12 percent annually, and some units must also meet an entrainment standard based on the performance of closed-cycle cooling systems; others will use studies to propose entrainment standards. These standards are not met if a facility kills millions of fish that are simply not monitored or counted because they have been excluded by the Director. Under the Act, EPA and implementing state agencies are directed to minimize adverse environmental impacts – not ignore them.

## **3. EPA and States Should Maintain an Assumption of 100 Percent Entrainment Mortality in All Site-Specific Proceedings.**

EPA is considering “allow[ing] facilities to demonstrate, on a site specific basis, that entrainment mortality of one or more species of concern is not 100 percent.”<sup>591</sup> In general, neither EPA nor the states should be making entrainment decisions on a site-specific basis – EPA should set a national, uniform entrainment standard based on the performance of closed-cycle cooling systems. Such a standard would obviate virtually all biological monitoring requirements. But in any instance where entrainment monitoring is conducted, EPA should not allow permittees to attempt to demonstrate that entrainment mortality is less than 100 percent at their particular site. Assessing entrainment mortality on a site-specific and species-specific basis is administratively unworkable and will lead to significant delays in the permitting of cooling water intake structures for little gain.

An adequate demonstration of less than 100 percent entrainment mortality would require yet another study that states are not equipped to evaluate. Facilities would need to hold individuals after entrainment for days to ensure that apparent survivors do not succumb to latent mortality – for example, being so drastically weakened or injured that they die slowly or fail to develop properly into juvenile fish. There are, however, no objective criteria for entrainment mortality studies and this means that there inevitably would be disputes between permit applicants and regulators (and intervenors) about how long to hold samples to determine overall mortality, whether sampled individuals were dead before being entrained, and whether individuals who died after being entrained died because of the entrainment or for other reasons. The net effect will be to open a new set of biological controversies that delay effective permitting.

Further, there is little to be gained through the site-specific inquiry. As EPA noted, while *some* eggs of *some* species have been shown to survive entrainment under *some* conditions, there is no data to suggest that either the most common or the most endangered species are amongst

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<sup>590</sup> Proposed 40 C.F.R. § 125.98(c)(6), 76 Fed. Reg. at 22,287 (col. 3).

<sup>591</sup> 76 Fed. Reg. at 22,273 (col. 3).

these lucky few.<sup>592</sup> And it is the most common entrained and most endangered species that drive the entrainment standard – the endangered because their protection can drive more stringent standards, and the most commonly entrained because they often die in simply overwhelming numbers. As a consequence, tinkering with the mortality rate for another species will have only a vanishingly small effect on overall entrainment mortality. Like EPA’s proposal to engage in intensive site-specific cost-benefit analyses, this is yet another information gathering effort whose costs significantly outweigh its benefits. Accordingly, EPA should adhere to its presumption that any individual entrained is killed.

#### **4. EPA Should Specify Minimum Monitoring Requirements.**

EPA has requested comments on the monitoring requirements for impingement mortality. EPA should specify minimum monitoring requirements that meet the expectations it laid out in the preamble, rather than leaving monitoring terms to be determined by the Director. For example, EPA expects that regulated facilities will monitor impingement at least once weekly during primary periods of impingement, and that they will practice continuous monitoring in 6 to 8 hour shifts that cover an entire 24 hour cycle.<sup>593</sup> To ensure this expectation is met, EPA should codify the requirement in the final rule as a default practice. It is inefficient for each state to reinvent monitoring requirements (as EPA would have it) dozens of times – once for each facility. Moreover, as discussed above, since latent impingement mortality may occur up to 96 hours after an impingement event, if EPA retains the 12-percent impingement mortality standard, EPA should require facilities to retain impinged fish for 96 hours in order to determine the extent of latent mortality. EPA should specify uniform minimum monitoring requirements that meet the expectations it laid out in the preamble.

#### **5. EPA Must Prohibit the Use of Freshwater for Once-Through Cooling in Arid Regions or Those at Risk of Drought.**

EPA has requested comment on proposed regulatory provisions to encourage the use of recycled or reclaimed water as cooling water.<sup>594</sup> We support EPA’s general belief that the use of reclaimed water for cooling can be beneficial to water resources.<sup>595</sup> However, defining BTA in any meaningful way requires more than merely providing an exception from regulation for existing and new units that may choose to use reclaimed water.<sup>596</sup> Instead, BTA must be defined to *require* reclaimed water use. Every gallon of reclaimed water used is one less gallon withdrawn. The potential benefits of using reclaimed water for power plant cooling are immense and would result in additional environmental protection and water savings and improved reliability at both once-through and closed-cycle facilities that utilize freshwater intake.

EPA’s proposed approach fails to fully recognize either the availability of reclaimed water or the public and environmental benefits of using reclaimed water for cooling. Indeed,

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<sup>592</sup> 76 Fed. Reg. at 22,273 (col. 3).

<sup>593</sup> See 76 Fed. Reg. at 22,257 (col. 1).

<sup>594</sup> 76 Fed. Reg. at 22,274.

<sup>595</sup> See, e.g., *id.* at 22,199.

<sup>596</sup> See 40 CFR 125.91(c) & 125.93(d)(3).



EPA's weak case-by-case approach fails to explicitly require local consideration of this readily available option at all.<sup>597</sup> It is arbitrary, capricious and an abuse of discretion for EPA to fail to require the use of reclaimed water where it is available, particularly given that water availability threats are well known, and that widespread use and availability of reclaimed water can address both withdrawal and consumption impacts from power plant cooling.

**a. Use of Reclaimed Water is a Proven Technology for Power Plant Cooling.**

Reclaimed (or treated) wastewater is a viable alternative to the use of freshwater or saltwater for cooling, and it eliminates the intake issues associated with once-through cooling and the consumptive use issues associated with closed-cycle cooling.

The use of reclaimed water for power plant cooling dates back as early as 1967.<sup>598</sup> Today, as shown in Appendix H, approximately 67 U.S. power plants use reclaimed wastewater for cooling purposes.<sup>599</sup> The volume of treated wastewater used at these facilities ranges from 0.1 MGD to 55 MGD, with the average facility using between 0.5 MGD and 5 MGD.<sup>600</sup> The largest current user of reclaimed water is the Palo Verde Nuclear Plant in Wintersburg, Arizona, which uses 55 MGD of reclaimed water for closed-cycle cooling makeup water. The 3.3 GW facility obtains its water from two wastewater treatment plants in Phoenix and Tolleson.

The majority of power plants relying on reclaimed water for cooling are coal-powered, although several are geothermal and nuclear. The states with the largest numbers of facilities using reclaimed water are Florida, California, Texas, and Arizona.<sup>601</sup> And while the use of reclaimed water generally tends to occur most in areas where water shortages are more severe, power plants in many other states have taken advantage of the benefits of reclaimed water for power plant cooling.

For U.S. power plants currently using reclaimed water, the distance between the power plant and the treatment facility ranges from 0 miles (the treatment facility is onsite) to approximately 56 miles, with over 90% of the plants using reclaimed water from a facility within 25 miles. The average distance of all facilities from their reclaimed water source is approximately 7.5 miles.<sup>602</sup>

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<sup>597</sup> While 40 CFR 125.98(e) mentions "impacts on water consumption" as a mandatory factor for local consideration, it does not require the Director to examine availability of reclaimed or recycled water in making any entrainment control determination.

<sup>598</sup> J.A. Veil, Argonne National Laboratory, *Use of Reclaimed Water for Power Plant Cooling* at 9 (Aug. 2007) (Exh. 119) also available at <http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/reclaimed%20water.pdf>.

<sup>599</sup> *Id.* (with further analysis by Jenna Schroeder (e.g., some plants listed by Veil were proposed and never completed)). After research using the Energy Information Agency's 2009 EIA-860 data and cross-referencing with monthly EIA updates from 2010 and 2011, fourteen facilities were identified in addition to those listed by Veil.

<sup>600</sup> *Id.* One additional facility worth noting is the West County Energy Center, which is located in Palm Beach Florida and run by Florida Power and Light. It is reported on their website that as of early 2011, the facility will be using treated wastewater for all its cooling needs. However, repeated attempts to confirm this via phone and email were unreturned.

<sup>601</sup> *Id.*

<sup>602</sup> Jenna Schroeder, "Reclaimed Facilities Data" (attached hereto as Appendix H).

The level of treatment for the reclaimed water also varies by utility. All utilized reclaimed wastewater is treated to at least secondary treatment. Many power utilities enter into agreements with the wastewater treatment plant they are obtaining water from in order to have them conduct further (tertiary) treatment. Conversely, some facilities further treat the water onsite themselves. Under either scenario, effective measures, such as the addition of compounds to the reclaimed water, can be employed to prevent scaling, corrosion, and biofouling of the utility's infrastructure.<sup>603</sup>

**b. Reclaimed Water is Widely Available for Cooling at Existing Once-Through Facilities.**

Significant studies demonstrate widespread opportunities for treated wastewater to be used at power plants. A 2009 NETL study concluded that “[r]eclaimed water (treated municipal wastewater) is widely available in communities throughout the United States in sufficient volumes and is reliable enough to supply power plant cooling water.”<sup>604</sup> Similarly, a 2008 study by EPRI found that “[m]unicipal effluent due to its abundance and quality is a viable alternative source for cooling water supply.”<sup>605</sup>

Chief among the detailed studies on use and availability is Vidic (2009), a 445-page, multi-year report that painstakingly details the widespread availability and feasibility of using reclaimed water at both new and existing coal-burning power plants.<sup>606</sup> For existing plants in particular, Vidic showed that 75 percent of existing coal-burning power plants are within 25 miles of a wastewater treatment plant that could provide water for cooling. The Vidic report, conducted for the Department of Energy, further concluded that “finding alternative water resources to replace freshwater demand for cooling purposes is inevitable and urgent.” According to DOE, the results from the Vidic study indicate it is feasible to use secondary treated municipal wastewater as cooling system makeup water.<sup>607</sup>

*In addition to supporting the Vidic study, DOE's NETL is in the process of creating a GIS-based interface of non-traditional sources of water and coal-fired power plants.*<sup>608</sup>

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<sup>603</sup> Radisav D. Vidic & David A. Dzombak, University of Pittsburgh Department of Civil and Environmental Engineering, *Reuse of Treated Internal or External Wastewaters in the Cooling Systems of Coal-Based Thermoelectric Power Plants* at 5-27 (2009) (Exh. 120) also available at <http://www.netl.doe.gov/technologies/coalpower/ewr/water/pp-mgmt/pubs/06550/42722FSRFG063009.pdf>.

<sup>604</sup> National Energy Technology Laboratory, *Use of Non-Traditional Water for Power Plant Applications: An Overview of DOE/NETL R&D Efforts* at viii (2009) (Exh. 121) also available at <http://www.netl.doe.gov/technologies/coalpower/ewr/water/pdfs/Use%20of%20Nontraditional%20Water%20for%20Power%20Plant%20Applications.pdf>.

<sup>605</sup> Electric Power Research Institute, *Use of Alternative Water Sources for Power Plant Cooling* at 2-23 (2008) (Exh. 122).

<sup>606</sup> Radisav D. Vidic & David A. Dzombak, University of Pittsburgh Department of Civil and Environmental Engineering, *Reuse of Treated Internal or External Wastewaters in the Cooling Systems of Coal-Based Thermoelectric Power Plants* at 5-27 (2009) (Exh. 120).

<sup>607</sup> U.S. Department of Energy, Office of Fossil Energy, “Project Fact Sheet” (Exh. 123) also available at <http://fossil.energy.gov/fred/factsheet.jsp?doc=6251&projttitle=Use%20of%20Treated%20Municipal%20Wastewater%20as%20Power%20Plant%20Cooling%20System%20Makeup%20Water:%20Tertiary%20Treatment%20versus%20Expanded%20Chemical%20Regimen%20for%20Recirculating%20Water%20Quality%20Management>.

<sup>608</sup> U.S. Department of Energy, Office of Fossil Energy, *Internet-Based GIS Catalog of Non-Traditional Sources for Cooling Water for use at America's Coal-Fired Power Plants* (2009) (Exh. 124) also available at

Expected to be completed in the fall of 2011, the primary goal of the project is “to reduce/minimize high-quality freshwater withdrawal and consumption by creating an internet-based, GIS catalog of non-traditional sources of cooling water for coal-fired power plants.” As stated in the NETL Fact Sheet, “[b]y pairing non-traditional water sources to power-plant water needs, the research will allow power plants that are affected by water shortages to continue to operate at full capacity without adversely affecting local communities or the environment.”<sup>609</sup> Preliminary data available on the internet indicate that a significant number of existing, coal-fired power plants could benefit from the use of nearby non-traditional sources of cooling water.<sup>610</sup>

Carnegie Mellon and the University of Pittsburgh also continue to evaluate the most efficient way to treat reclaimed water for power plant cooling. The study is an economic and social analysis comparing tertiary treatment of reclaimed water to reclaimed water treated with an expanded chemical regimen. This study is currently underway.<sup>611</sup>

EPA should incorporate the findings from all of these studies into the proposed cooling water rule and require power plants to utilize available reclaimed water for the cooling water and environmental benefits it provides.

**c. EPA’s Stated Concerns About Reclaimed Water Availability are Unsupported and Unwarranted.**

In the 2011 TDD at page 6-18, EPA claims, “many facilities substantially outpace the volume of water available to them from alternate sources.” EPA relied on a single study in California in reaching this conclusion. However, EPA’s conclusion is both erroneous and misses the point.

First, EPA appears to ignore important studies on the availability of reclaimed water for cooling water, including NETL 2009, EPRI 2008, Vidic 2009 and the latest GIS information from All Consulting. Vidic reported approximately 27.5 billion gallons a day of wastewater flow available in eleven of the thirteen original NERC regions in the United States, from approximately 18,000 wastewater treatment facilities.<sup>612</sup> As is noted above, Vidic also found that approximately 50 percent of *existing* coal-fired power plants had sufficient reclaimed water available within a 10 mile radius, and 75 percent had sufficient reclaimed water available within

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[www.netl.doe.gov/publications/factsheets/project/Proj522.pdf](http://www.netl.doe.gov/publications/factsheets/project/Proj522.pdf).

<sup>609</sup> *Id.* at 2.

<sup>610</sup> See ALL Consulting, *GIS Catalog of Non-Traditional Sources of Cooling Water for Use at America’s Coal-Fired Power Plants* (Exh. 125) also available at [http://www.all-llc.com/projects/coal\\_water\\_alternatives/page.php?13](http://www.all-llc.com/projects/coal_water_alternatives/page.php?13) (last visited Aug. 17, 2011).

<sup>611</sup> National Energy Technology Laboratory, *Use of Treated Municipal Wastewater as Power Plant Cooling System Makeup Water: Tertiary Treatment Versus Expanded Chemical Regimen for Recirculating Water Quality Management* (Exh. 126) also available at <http://www.netl.doe.gov/technologies/coalpower/ewr/water/pp-mgmt/wastewater.html>.

<sup>612</sup> Radisav D. Vidic & David A. Dzombak, University of Pittsburgh Department of Civil and Environmental Engineering, *Reuse of Treated Internal or External Wastewaters in the Cooling Systems of Coal-Based Thermoelectric Power Plants* at 5-27, at 2-5 and 2-6 (2009) (Exh. 120).

a 25 mile radius.<sup>613</sup>

A 1995 report from the USGS estimated 41 BGD of treated wastewater from 16,400 facilities nationwide.<sup>614</sup> Of this 41 BGD, 2.4 percent (or 983 MGD) was reclaimed and used, which means the vast majority, approximately 97.6 percent or 40 BGD, was potentially available for use elsewhere, such as for power plant cooling. All of these studies demonstrate sufficient availability of reclaimed water for use as cooling water.

Second, EPA improperly characterizes the results of the California study. The California report cited by EPA evaluated 15 coastal power generation facilities that use once-through cooling to gauge the feasibility of converting these facilities to closed-cycle cooling. The report repeatedly states that it is the intent of the state to encourage alternate cooling methods whenever possible. Given this preference, the authors evaluated whether a sufficient volume of reclaimed water existed to meet the cooling needs at existing once-through facilities. This assessment was made assuming the facilities would maintain their *once-through* cooling configuration, not the closed-cycle needs of the upgrades they planned to undertake at these facilities. This is significant because, as the report states, the projected decrease in cooling water volume needed after the conversion would be between 93 percent and 98 percent, depending on the facility. For EPA to make a conclusion that using reclaimed water is not a feasible option because there is not sufficient volume available to replace *all* of the *original* once-through cooling needs is therefore incorrect and misguided. In fact, if one looks at the 15 facilities evaluated in the California report, the vast majority of plants could be serviced entirely by reclaimed water after their conversion to closed-cycle cooling, with the available volume often orders of magnitude greater than needed.<sup>615</sup>

Furthermore, even in areas where the once-through cooling water needs of facilities could not be met *entirely* by reclaimed sources, these reclaimed water sources oftentimes can provide a substantial portion, even a majority, of the cooling water needed under a once-through cooling configuration. For EPA to discount using reclaimed water as a cooling water source in these instances misses an important opportunity to conserve large volumes of water, as well as avoid the impacts procuring this water creates, such as impingement and entrainment of wildlife.

The use of reclaimed water should not be viewed as an all-or-nothing proposition, such that if there is not sufficient reclaimed water available for all cooling needs then reclaimed water cannot and should not be used at all. Even a 30 percent reduction in freshwater withdrawals for thermoelectric power generation using once-through cooling would result in withdrawal reductions of approximately 43 billion gallons a day,<sup>616</sup> nearly the same amount of reclaimed water available in the U.S., as reported by the USGS for 1995.<sup>617</sup>

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<sup>613</sup> *Id.* at 2-22 and 2-23.

<sup>614</sup> U.S. Geological Survey, *Estimated Water Use in the United States in 1995* at 58 (1998) (Exh. 127) *also available at* <http://water.usgs.gov/watuse/pdf1995/pdf/wastewater.pdf>. 1995 was the last year USGS kept track of this statistic.

<sup>615</sup> Jenna Schroeder, “CA Reuse Analysis.xlsx” (attached hereto as “Appendix I”).

<sup>616</sup> U.S. Geological Survey, *Estimated Use of Water in the United States in 2000* at 41 (2004) (Exh. 128) *also available at* <http://pubs.usgs.gov/circ/2004/circ1268/pdf/circular1268.pdf>.

<sup>617</sup> USGS (1998) at 58.

**d. The Use of Reclaimed Water for Closed-Cycle Cooling Addresses Any Consumption Issues.**

Numerous studies address the consumptive versus withdrawal considerations of various cooling practices. EPRI estimates that “once-through consumption levels, when including downstream evaporation, are less than, but of the same magnitude as, wet recirculating cooling system consumption levels.”<sup>618</sup>

The table below, taken from Mielke et al. (2010),<sup>619</sup> shows estimated once-through fossil plant water consumption levels of 300 gal/MWh versus closed-loop water consumption levels of 480 gal/MWh. For nuclear plants, the corresponding numbers are 400 gal/MWh and 720 gal/MWh.<sup>620</sup>

All units in gal/MWh	Steam condensing				Other use				Total				
	Withdrawal		Consumption		Withdrawal		Consumption		Withdrawal		Consumption		
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
<b>Steam turbine (coal, gas, biomass)</b>													
Once-through	20,000	50,000	300	300	30	30	0	30	20,030	50,030	300	330	
Closed-loop	300	600	300	480	30	30	0	30	330	630	300	510	
Dry	0	0	0	0	30	30	0	30	30	30	0	30	
<b>Steam turbine (nuclear)</b>													
Once-through	25,000	60,000	400	400	30	30	0	30	25,030	60,030	400	430	
Closed-loop	500	1,100	400	720	30	30	0	30	530	1,130	400	750	
Dry	0	0	0	0	30	30	0	30	30	30	0	30	
<b>Combined-cycle gas turbine</b>													
Once-through	7,500	20,000	100	100	30	30	0	30	7,530	20,030	100	130	
Closed-loop	230	230	180	180	30	30	0	30	260	260	180	210	
Dry	0	0	0	0	30	30	0	30	30	30	0	30	
<b>IGCC (coal)</b>													
Closed-loop	250	250	200	260	137	140	137	140	387	390	337	400	

Most importantly, however, no matter how one calculates consumptive use of closed-cycle cooling, the consumption is relatively minor relative to available reclaimed water.

Relying on the Mielke data, the amount of water *consumed* at once-through facilities is anywhere between 0.5 percent and 1.6 percent of the water withdrawn. Therefore, because the EPA reports that approximately 200 BGD of cooling water is withdrawn for once-through

<sup>618</sup> NETL 2010 at 21 (citing EPRI, *Water & Sustainability (Volume 3): U.S. Water Consumption for Power Production – The Next Half Century*, Topical Report No. 1006786 (Mar. 2002) [hereinafter “EPRI 2002”] (Exh. 129)). As EPA recognizes, most studies do not consider the consumptive impacts of once-through cooling *after* the cooling water leaves the power plant. 76 Fed. Reg. 22,199. Note: 40 CFR 125.98(e) does not expressly require consideration of the consumptive use of once-through cooling once the discharge leaves the facility, but it should.

<sup>619</sup> Erik Mielke, Laura Diaz Anadon, & Venkatesh Narayanamurti, “Water Consumption of Energy Resource Extraction, Processing, and Conversion: A review of the literature for estimates of water intensity of energy-resource extraction, processing to fuels, and conversion to electricity,” Energy Technology Innovation Policy Discussion Paper No. 2010-15, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University (Oct. 2010) (Exh. 130) *also available at* <http://belfercenter.ksg.harvard.edu/files/ETIP-DP-2010-15-final-4.pdf>.

<sup>620</sup> NETL notes that its original analysis (relied on by Mielke) did not account for downstream evaporative losses, which are not insignificant. NETL 2010 at 21. Interestingly, EPRI 2002 also reveals that shifting from coal and nuclear-based generation to natural gas generation would reduce water consumption *more than* the amount increased due to closed cycle cooling requirements. NETL 2002 at vii-viii.



facilities,<sup>621</sup> then between 1 and 3.2 BGD is generally consumed at once-through facilities. Switching from once-through to closed-cycle cooling could marginally increase the amount of water *consumed* from anywhere between 0 percent and 80 percent at any given facility. Thus, switching these facilities to closed-cycle cooling would increase consumption to 1 BGD on the low end (no change in consumption) and 5.8 BGD on the high end (assuming 80 percent increase in consumption). The amount of reclaimed water available more than meets these needs, assuming it is distributed where needed.

Similarly, in 2002, EPRI predicted that “if EPA requires cooling system retrofits at plants with once-through cooling[,] then national power plant freshwater consumption will rise [] about 10% above the base projection.”<sup>622</sup> This would result in increased consumption of less than 1 BGD across the 48 conterminous states.<sup>623</sup> Moreover, in 2010, NETL calculated a 26.6 percent increase in consumption from 2010 to 2035 with a phased approach to closed-cycle cooling retrofits. Under this scenario, NETL estimated an increase in consumption from 3.6 BGD to 4.6 BGD, or additional consumption of 1.0 BGD by 2035.<sup>624</sup> Again, the amount of reclaimed water available far exceeds these needs, assuming it is distributed where needed.

Finally, even under more extreme scenarios, reclaimed water could offset any increases in consumption due to modernization to closed-cycle cooling. For example, given that once-through generators use approximately 200 BGD of cooling water per year, if all of these facilities were to convert to closed-cycle wet cooling, the withdrawal rate would drop by about 95.6 percent on the low end to 99.4 percent on the high end.<sup>625</sup> Assuming *all of the remainder* is consumed, this would result in new consumption for closed-cycle cooling between approximately 2 to 8.8 BGD. Given the approximately 41 BGD of wastewater available in the U.S. reported by USGS in 1995, there is more than adequate daily reclaimed water flow in the United States to meet this demand, again assuming it is distributed where needed.

**e. At a Minimum, EPA should Emulate California’s Policy on the Use of Reclaimed Water for Cooling and Establish a Preference for Reclaimed Water.**

Since 1975, California has encouraged the use of reclaimed wastewater for power plant cooling and placed a priority on using wastewater for cooling purposes.<sup>626</sup> The use of freshwater for power plant cooling in California is only allowed “when it is demonstrated that the use of other water supply sources or other methods of cooling would be environmentally undesirable or

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<sup>621</sup> Personal Communication with Paul Shriner, EPA (June 8, 2011).

<sup>622</sup> EPRI 2002 at 6-2.

<sup>623</sup> See EPRI 2002 at Figure 6-5.

<sup>624</sup> NETL 2010 at 1-2.

<sup>625</sup> Erik Mielke, Laura Diaz Anadon, & Venkatesh Narayanamurti, “Water Consumption of Energy Resource Extraction, Processing, and Conversion: A review of the literature for estimates of water intensity of energy-resource extraction, processing to fuels, and conversion to electricity,” Energy Technology Innovation Policy Discussion Paper No. 2010-15, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University (Oct. 2010) (Exh. 130).

<sup>626</sup> California State Water Resources Control Board (SWRCB), Res. No. 75-058 at 4-5 (June 19, 1975) (Exh. 131) also available at [http://www.swrcb.ca.gov/board\\_decisions/adopted\\_orders/resolutions/1975/rs75\\_058.pdf](http://www.swrcb.ca.gov/board_decisions/adopted_orders/resolutions/1975/rs75_058.pdf).

economically unsound.”<sup>627</sup> The success of this policy has resulted in almost a dozen power plants in California using reclaimed water for closed-cycle cooling makeup water.<sup>628</sup>

Today, California Water Code § 13552.6 codifies the importance of using reclaimed water and declares the use of potable domestic water for closed-cycle cooling to be a waste or unreasonable use of water if safe and sufficient reclaimed water is available.

Unfortunately, EPA’s Proposed Rule takes a very different approach by essentially elevating the use of inland waters over reclaimed water and by placing the burden on state agencies to evaluate the cooling water impact on water consumption. Yet the longevity and success of California’s approach provides further evidence that the use of reclaimed water is the best technology available for minimizing environmental impact and consumption. Like California did more than three decades ago, EPA should at the very least establish a preference for the use of reclaimed water for power plant cooling in areas at risk of water scarcity.

## **6. EPA Should Not Exempt Cooling Water Withdrawals from the Rule Merely Because the Water Is Also Used for Desalination.**

While we understand EPA’s desire to encourage the reuse of cooling water for other processes, we have serious concerns about the blanket exemptions in Section 125.91(c) and Section 125.92. As drafted, these sections exempt water from the definition of “cooling water” if it is obtained from a desalination plant or is used in a manufacturing process either before or, more likely, after it is used for cooling purposes. This exemption promotes withdrawal – and associated aquatic mortality – and raises particular concerns with respect to the co-locating of desalination facilities with power plants.

EPA has acknowledged that: “[f]rom a biological perspective, the effect of intake structures on impingement and entrainment does not differ depending on whether an intake structure is associated with a power plant or a manufacturer.”<sup>629</sup> This conclusion is true for seawater desalination facilities that withdrawal large amounts of water and do not employ the best technology available for minimizing entrainment and impingement and propose to co-locate with a power plant in order to utilize their existing intake structure for the desalination process feed water. The exclusion of seawater used for cooling and desalination from the definition of “cooling water,” as contemplated by proposed Sections 125.91(c) and 125.92, would allow the power plant to characterize all of its intake as water that is not defined as “cooling water” because it is also used for desalination feed water – thereby effectively exempting the power plant from the Proposed Rule. Thus, if a power plant co-locates with a large enough ocean desalination facility to exempt it from the rule, the marine life mortality would go completely unregulated.

This exemption would thus allow both the first user and second user of the seawater to avoid impingement and entrainment controls, thus providing no protection for marine life.

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<sup>627</sup> *Id.* at 4.

<sup>628</sup> See J.A. Veil, Argonne National Laboratory, *Use of Reclaimed Water for Power Plant Cooling* at 9 (Aug. 2007) (Exh. 119).

<sup>629</sup> 76 Fed. Reg. at 22,192.

Significantly, new desalination plants in California have received NPDES permits under the presumption that they will cause no net impact to the marine environment by virtue of co-locating with power plants who are subject to Section 316(b) (on the theory that the power plant is already required to employ the best technology available to minimize adverse impacts under 316(b) and the desalination plant is withdraw no additional water beyond that used by the power plant).<sup>630</sup> Now, ironically, EPA’s proposed rule would exempt a once-through-cooled power plant from Section 316(b) compliance if it gives its discharge water to a desalination plant (on the theory that the water is not cooling water if it is ultimately used for drinking). Consequently, both the first user and second user (the power plant and the desalination facility) might claim that they cause no impact because the other user is the primary consumer, while their massive water withdrawal kills sea life through entrainment and impingement at exactly the same levels as before.

EPA has provided no reasonable explanation for this broad exemption. Regardless of whether a desalination plant also uses it, if water is used for cooling it remains “cooling water” and must be regulated under Section 316(b). To ensure the objective of Section 316(b) to minimize entrainment and impingement from cooling water intakes is achieved, the proposed language in the regulations must be re-written to eliminate any and all definitions or exemptions that would potentially allow power plants to be excluded from the regulations simply because a seawater desalination facility happened to co-locate with the power plant.

## **7. EPA Should Require an Actual-Flow Calculation Baseline.**

In the preamble to the Proposed Rule, EPA states that “[f]ollowing promulgation of the 2004 Phase II rule, ... EPA became aware of certain elements of the 2004 rule that were particularly challenging or time-consuming to implement.”<sup>631</sup> The very first of these “challenging” elements mentioned by EPA is the calculation baseline: “In practice, both permittees and regulatory agencies encountered difficulty with the calculation baseline. Specifically how a facility should determine what the baseline represented and how a particular facility’s site-specific configurations or operations compared to the calculation baseline.”<sup>632</sup>

A calculation baseline typically comes into play in either of two scenarios. First, where a performance standard is expressed in terms of a percentage reduction (as in the 2004 Phase II rule), the calculation baseline is the starting point from which the reductions are measured. Second, a calculation baseline is often used to compare two different technologies that protect fish in different ways. For example, regulatory agencies often employ a calculation baseline when comparing the performance of closed-cycle cooling to other flow reduction measures such as variable speed pumps or to screening technologies.

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<sup>630</sup> See, e.g., Cal. Reg’l Water Quality Control Bd., San Diego Region, Order No.R9-2009-0038 Amending Order No. R9-2006-0065 (NPDES No. CA0109223) Waste Discharge Requirements for the Poseidon Resources Corporation Carlsbad Desalination Project Discharge to the Pacific Ocean via the Encina Power Station Discharge Channel 1 (2009) (Exh. 132) *also available at* [http://www.waterboards.ca.gov/sandiego/board\\_decisions/adopted\\_orders/2009/R9\\_2009\\_0038\\_rev1.pdf](http://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2009/R9_2009_0038_rev1.pdf)

<sup>631</sup> 76 Fed. Reg. at 22,185 (col. 2).

<sup>632</sup> *Id.* at cols. 2-3.



In the commenters' experience, the most controversial aspect of the Phase II calculation baseline definition was its operational component. In relevant part, the Phase II rule provided as follows:

*Calculation baseline* means an estimate of impingement mortality and entrainment that would occur at your site assuming that: ... *baseline practices [and] procedures ... are those that your facility would maintain* in the absence of any ... operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment.<sup>633</sup>

Where a facility has not implemented any operational controls to save fish, the operational baseline should be straightforward – it would simply reflect the actual intake flow (AIF) and the timing (seasonality) of that actual flow. But in practice, some power companies and at least one state agency has stated that the operational component of the calculation baseline should be a “full-flow” baseline, i.e., a baseline that assumes, contrary to actual practice at any power plant, that the facility runs 24 hours a day, 7 days a week, 365 days a year.

Use of a fictional full-flow baseline can allow, for example, a plant that runs 60 percent of the time (as many baseload fossil plants do) to take credit for “saving” 40 percent of the fish, when it has made no actual reductions at all. More important, using a “full-flow” calculation baseline tends to overestimate the effects of alternatives to closed-cycle cooling such as variable speed pumps. To illustrate the point from a particular permit proceeding, when issuing a draft permit for the Port Jefferson power station in 2009, New York State DEC estimated that the plant would entrain 1.1 billion organisms per year if it operated 100 percent of the time. Thus, the full-flow calculation baseline for entrainment at Port Jefferson is 1.1 billion organisms. In fact, the station was at that time entraining only 1.02 billion organisms per year under its actual operating conditions. Thus, the actual flow baseline (or, more precisely, the actual fish-kill baseline) is 1.02 billion organisms, which is about a 7 percent difference from the baseline. To illustrate the significance of this difference, closed-cycle cooling would reduce entrainment by 95 percent or more from the *actual* 1.02 billion entrainment figure, reducing entrainment to approximately 50 million organisms per year. But if the full-flow baseline is used, then a suite of technologies and operational measures that reduce entrainment to 55 million organisms per year would be deemed to be 95 percent effective (and therefore identical in effectiveness to closed-cycle cooling) and a suite of technologies and operational measures that reduce entrainment to 160 million organisms per year would be deemed to be 85.5 percent effective (and therefore “equivalent” to closed-cycle cooling using a 10 percent margin of error that DEC imitated from EPA’s Phase I rule). The full-flow baseline distorts reality and provides less protection for aquatic resources because if an actual fish-kill baseline were used, then a 95 percent reduction would equate to 50 million organisms entrained regardless of which technologies were being used, and not 55 or 160 million organisms. In cases where the actual-flow baseline and full-flow baseline are further apart, such as with the Bowline Point Generating Station in New York, now operating below 10% of capacity,<sup>634</sup> the prejudice will be even greater. Clearly, EPA cannot intend that this gross distortion be permissible.

<sup>633</sup> 69 Fed. Reg. at 41,683 (col. 3)-41,684 (col. 1) (adopting 40 C.F.R. § 125.93) (emphasis added).

<sup>634</sup> See supra note 218, p. 36.

Recognizing the problematic nature of the calculation baseline, EPA states that it “has developed a new approach to the technology-based requirements proposed today that does not use a calculation baseline.”<sup>635</sup> What EPA presumably means is that, unlike the Phase II rule, the Proposed Rule does not include performance standards expressed in terms of a percentage reduction and does not include a definition of calculation baseline. But by proposing a site-specific, case-by-case approach to BTA determinations for entrainment, EPA is requiring regulators to compare the performance of different technologies. Because the Proposed Rule does not forbid use of a calculation baseline, many state agencies will no doubt employ one in comparing different candidate BTA technologies. Likewise, to the extent that facilities propose impingement reduction technologies that are “comparable” in performance to barrier nets for shellfish or that meet the “90 percent or greater” (i.e., Track II) standard for new units, regulators may employ calculation baselines to make those comparisons. The Proposed Rule thereby invites the use of calculation baselines but without defining the term or otherwise providing guidance on how they should be defined and applied. The result is therefore even worse than the Phase II rule in this regard because EPA is punting to the states, with less guidance and direction than before, the primary problem it had identified from its implementation experience under the 2004 Phase II rule.

Accordingly, EPA should either include a provision in the rule prohibiting states and EPA regional offices from using any calculation baseline in implementing the rule, or if EPA allows use of calculation baselines then EPA should make clear in the rule that a “full-flow” calculation baseline is impermissible, and that the operational component of a calculation baseline must reflect the plant’s actual operations (for example, taking the last 3 years of actual operation), modified only in the rare instance where there have been reductions in flow actually implemented to protect fish (and only to that extent). Most importantly, because power plants never operate 100 percent of the time, a full-flow baseline should never be allowed.

## **8. EPA Should Remove the Special Provision for Nuclear Facilities.**

EPA created an exception to the entrainment mortality requirements for nuclear facilities if compliance “would result in a conflict with a safety requirement established by the [Nuclear Regulatory] Commission [NRC].”<sup>636</sup> However, OMB broadened it to also cover impingement mortality requirements and deleted EPA’s clarifying statement that the exception was narrow and that “[t]echnical infeasibility, and not cost, is the only consideration in evaluation of a potential conflict with Commission safety requirements.”<sup>637</sup> If this provision is retained, EPA should revert to the version contained in the proposed rule sent to OMB. Better yet, EPA should remove the provision entirely because the exception is unnecessary and potentially confusing, given the design and operation of U.S. nuclear plants’ cooling water systems and existing NRC regulations.

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<sup>635</sup> 76 Fed. Reg. at 22,185 (col. 3).

<sup>636</sup> Proposed 40 C.F.R. § 125.94(e); 76 Fed. Reg. at 22,284 (col. 1).

<sup>637</sup> Redlined Version of Proposed Rule at 431.

Currently operating nuclear power plants that utilize once-through cooling have two completely separate and independent cooling systems; one system to cool the steam used to generate electricity, which is the subject of this rulemaking, and a second “service water” system which provides water to cool plant buildings and equipment, and emergency cooling water to cool the reactors, spent fuel pools and other critical plant systems in the event of an accident.<sup>638</sup> The first system is considered “non-safety related” by the Nuclear Regulatory Commission, and the second “service water” system is considered “safety-related.” The two systems are completely separate in that they rely on different pumps, piping and intakes to function. It is extremely unlikely that compliance with Section 316(b) could in any way implicate or create safety concerns related to the operation of the safety-related service water system, given this separation. Moreover, the NRC’s existing regulations adequately address proposed changes to a nuclear facility, rendering this additional process unnecessary.<sup>639</sup>

Furthermore, by creating a unique process for the Director to make a secondary BTA determination in response to a facility operator raising safety concerns with the NRC, the provision creates confusion as to when NRC review of BTA requirements would occur. Any review by the NRC of a BTA determination should be limited to ensuring that the implementation of BTA, as determined by EPA and implemented by the Director, would not reduce safety margins at an operating nuclear plant. Such review should occur after the BTA requirements have been specified, not before.

#### **9. EPA Should Require Interim Measures to Reduce Cooling Water Flow Until Long Term Compliance Solutions Are in Place.**

The proposed rule does not set a firm deadline for entrainment compliance and gives facilities up to eight years to comply with the rule’s impingement standard. In the interim, a number of technologies exist, which while not commensurate with the effectiveness of closed-cycle cooling, nevertheless offer reductions in adverse impacts, move a facility’s performance closer to BTA, and can be installed relatively quickly. Accordingly, we request that EPA include a definition of interim measures in the proposed rule and require that the interim measures be implemented as NPDES permit conditions until full compliance is achieved.

The interim measures can include technologies and operational changes that reduce the flow of cooling water, particularly at peak spawning times. For example, peaking facilities can install variable speed pumps that allow them to use less water when not operating at full capacity. All facilities can alter their standard procedures to implement aggressive shutdowns of pumps when offline, rather than leaving cooling water pumps running. And facilities can typically schedule regular maintenance outages for peak spawning periods. These kinds of operational measures should be within reach of most facilities and there is no reason why they should not be required immediately while long-term BTA requirements are being studied, developed, and implemented.

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<sup>638</sup> For a description of the different cooling systems employed at nuclear power plants, see *Got Water? Issue Brief*, David Lochbaum, Union of Concerned Scientists, December 2007 (Exh. 41).

<sup>639</sup> See 10 C.F.R. § 50.59.

**10. EPA Should Clarify that Only Offshore Seafood Processing Facilities, Not Onshore Facilities, Are Exempt from the Rule.**

EPA intended to exempt seagoing vessels from the rule because of concerns about space limitations and retrofits that could compromise the seaworthiness of drilling rigs, liquefied natural gas terminals, and fishing boats. As the rule is drafted, however, it is unclear whether all seafood processing facilities are exempted, including land based facilities, or whether only vessels are exempted. The preamble discussion of seaworthiness and related concerns makes it clear that only vessels are exempted.<sup>640</sup> But proposed 40 C.F.R. § 125.91(d) reads “This subpart does not apply to seafood processing facilities, offshore liquefied natural gas terminals, and offshore oil and gas extraction facilities that are existing facilities as defined in § 125.92.” By not prefacing “seafood processing facilities” with the word “offshore,” some might read ambiguity where EPA intended none. Therefore, EPA should include the word “offshore” as a preface to “seafood processing facilities.”

**F. EPA’s Cost-Benefit Analysis is Deeply Flawed and Illegal.**

**1. EPA’s Extensive Monetized Cost-Benefit Analysis Far Exceeds the Restrictions Imposed by Congress.**

As discussed above, while Section 316(b) permits EPA to consider costs in relation to benefits in choosing a regulatory option and establishing nationwide performance standards for the Section 316(b) existing facilities rule, the statute restricts EPA’s investigation of, and reliance upon, such comparisons. Congress intended EPA to consider environmental benefits in non-monetized terms, avoid lengthy cost-benefit proceedings and futile attempts at comprehensive monetization, and take account of the Clean Water Act’s technology-forcing objectives. If used at all in developing intake structure requirements, cost-benefit analysis should be used only to prevent results that are absurd in light of extreme disparities between costs and benefits, for example through EPA’s traditional wholly disproportionate test. Most importantly, any cost-benefit comparison must be limited and subsidiary, not a primary or paramount factor. Congress intended to allow only a limited consideration of costs when it directed EPA to set technology-based standards. Cost-benefit comparisons must be limited in light of the difficulty of quantifying and monetizing all the benefits of minimizing the adverse impacts of cooling water intake structures, which consistently causes unreasonable regulatory delays and underestimates of benefits.

The cost-benefit analysis that EPA performed, however, went well beyond what Congress intended. Instead of leaving its consideration of the rule’s costs and benefits in non-monetized terms, EPA attempted to monetize them. And instead of avoiding lengthy cost-benefit proceedings, EPA expended considerable time and energy over the course of several years on this analysis, and now intends to require state permitting authorities to oversee hundreds of these lengthy, monetized cost-benefit reviews as well. EPA’s efforts to conduct a fine-grained and monetized cost-benefit analysis have spanned several years and included multiple rounds of data gathering, volumes of economic analysis, extensive literature reviews, and several economic

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<sup>640</sup> See, e.g., 76 Fed. Reg. at 22,193 (col. 2) (“EPA decided to propose requiring the Director, exercising BPI, to establish BTA impingement and entrainment mortality standards for . . . a seafood processing vessel . . .”).

modeling runs. EPA is embroiled in a far more intense comparison of costs and benefits than Congress intended even under the BPT standard – the Clean Water Act’s only technology-based standard that actually required some form of cost-benefit analysis.

But when it comes time to make a final decision, it seems that this fine-grained, time intensive, and costly approach to cost-benefit analysis provides relatively little useful information. By its own admission, the agency still cannot adequately monetize the benefits of this rule and cannot rely on the analysis it has performed to date in determining the best technology available. After years of analysis, during which existing plants have killed billions more fish, continued to degrade hundreds of aquatic ecosystems, and placed threatened and endangered species in jeopardy, EPA still has not come to a clear conclusion about the precise monetary benefits of saving one fish or one billion fish. Instead, the agency proposes to kick the problem down to the states, which is exactly what Congress did not want EPA to do.

## **2. EPA Vastly Underestimated the Benefits of the Rulemaking Options Such that Any Reliance on the Cost-Benefit Analysis Would Be Arbitrary and Capricious.**

Despite a considerable expenditure of time and effort, EPA was unable to value the benefits of this rule in monetary terms. EPA also made several errors in those parts of its analysis that it was able to complete. This section summarizes key points from a more extensive environmental economic report prepared by two of Stockholm Environment Institute’s senior economists, Frank Ackerman and Elizabeth Stanton. The full Stockholm Environment Institute (SEI) report is attached to these comments as Appendix A. As the attached report explains in more detail, the errors in EPA’s analysis are significant enough that for the agency to rely on this faulty cost-benefit analysis would be arbitrary, capricious, and an abuse of the agency’s discretion.

Calculating the value of the rule’s benefits in monetary terms is a two stage process: EPA must first quantify the rule’s physical impacts – the baseline number of fish and other organisms<sup>641</sup> that are now being killed by cooling water intake structures but will be saved by the rule. Then, EPA faces the challenge of attaching monetary values to those physical impacts. The agency has made significant errors at both stages.

Making only partial and conservative corrections for the errors in EPA’s benefits estimates, the SEI report attached to this comment letter concludes that the monetized benefits of regulation approach or exceed EPA’s cost estimates for every option that EPA explored. The corrected benefits estimates, coupled with revised cost estimates provided by Powers Engineering that address flaws in EPA’s estimate of compliance costs,<sup>642</sup> demonstrate that the benefits of a national entrainment standard based on the use of closed cycle cooling outweigh the costs.

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<sup>641</sup> Significantly, EPA does not even attempt to quantify the issues of phytoplankton and the small organisms (other than fish and shellfish) despite the fact that they are important components of the food chain.

<sup>642</sup> See Section III.F.3, below.

**a. EPA Has Drastically Underestimated the Number of Fish Killed by Cooling Water Intake Structures.**

EPA appears to have significantly underestimated the baseline number of fish killed by cooling water intake structures. Errors in this baseline calculation inevitably propagate through the rest of EPA's cost-benefit analysis, thereby casting serious doubts on the whole effort.

For example, EPA's estimate of the number of walleye entrained and impinged annually in the entire Great Lakes region is orders of magnitude less than the number of walleye reported to have been entrained in one year at a single facility. EPA estimates that all of the power plants and manufacturing facilities in the Great Lakes combined impinge and entrain less than 10,000 individual walleye: eggs, larvae, juveniles, and adults.<sup>643</sup> In 2005 and 2006, the operator of the Bay Shore Power Plant, located on the shore of Lake Erie in Ohio, hired the independent consulting firm Kinetrics to analyze and report impingement and entrainment sampling data from Bay Shore and provided this data of the Ohio Environmental Protection Agency.<sup>644</sup> By its own estimate, Bay Shore killed over 7,000,000 walleye larvae and 499,000 juveniles in a single year.<sup>645</sup> There is no way to square EPA's estimate of less than 10,000 individual walleye deaths in all of the Great Lakes with the plant's evidence-based conclusion that it killed 7.5 million.

Nor are EPA's walleye numbers the only dubious statistics in its Great Lakes analysis. EPA estimates that 221 million individual freshwater drums are impinged and entrained every year in all of the Great Lakes.<sup>646</sup> In 2005/06, Bay Shore estimated that it killed 940 million individual freshwater drums by itself.<sup>647</sup> Similarly, EPA estimated Great Lakes logperch deaths at 10.5 million annually.<sup>648</sup> Bay Shore reports killing over 30 million.<sup>649</sup> And EPA estimates white perch deaths at less than 10,000 for the entire Great Lakes, while Bay Shore reports killing nearly 490,000 individuals by itself.

EPA has thus grossly underestimated the number of fish killed by power plants and manufacturing facilities in the Great Lakes region. The agency should investigate, document and correct any similar gross errors in its estimates for that and other regions. These errors are

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<sup>643</sup> See EEBA Table C-12, p. C-16 (reporting number of "individuals" impinged and entrained); see also *id.* at 3-2 (explaining that EPA employs a model to convert organisms of any particular age into an equivalent number of "individuals" of any other age), 76 Fed. Reg. at 22,238 (col. 3) (defining age-one equivalent losses as "the number of individuals of different ages impinged and entrained by facility intakes, standardized to equivalent numbers of 1-year old fish").

<sup>644</sup> See Kinetrics, *Bay Shore Power Plant Cooling Water Intake Structure Information and I&E Sampling Data*, 16 (Table 5.4), 22 (Table 5.7) (Jan. 2008) (Exh. 11), also available at [http://www.epa.state.oh.us/portals/35/permits/bayshore\\_IE\\_data\\_collection.pdf](http://www.epa.state.oh.us/portals/35/permits/bayshore_IE_data_collection.pdf).

<sup>645</sup> *Id.* at 16 (Table 5.4), 22 (Table 5.7).

<sup>646</sup> See EEBA Table C-12, p. C-15.

<sup>647</sup> See Kinetrics, *Bay Shore Power Plant Cooling Water Intake Structure Information and I&E Sampling Data*, 16 (Table 5.4), 22 (Table 5.7) (Jan. 2008) (Exh. 11) also available at [http://www.epa.state.oh.us/portals/35/permits/bayshore\\_IE\\_data\\_collection.pdf](http://www.epa.state.oh.us/portals/35/permits/bayshore_IE_data_collection.pdf).

<sup>648</sup> See EEBA Table C-12, p. C-15.

<sup>649</sup> See Kinetrics, *Bay Shore Power Plant Cooling Water Intake Structure Information and I&E Sampling Data*, 16 (Table 5.4), 22 (Table 5.7) (Jan. 2008) (Exh. 11) also available at [http://www.epa.state.oh.us/portals/35/permits/bayshore\\_IE\\_data\\_collection.pdf](http://www.epa.state.oh.us/portals/35/permits/bayshore_IE_data_collection.pdf).

deeply problematic because the number of fish killed by cooling water intake structures is the fundamental basis of all of EPA's benefit calculations. EPA's underestimate of mortality – a thousand-fold undercounting of some species – undermines the validity of its entire cost-benefit analysis.

**b. EPA Cannot Accurately Monetize the Benefits of Saving Non-Market Fish, Other Aquatic Organisms, and Ecosystems.**

The problems with EPA's cost-benefit analysis do not end with its gross underestimates of the number of fish that would be saved by a more stringent rule. Even if the agency's physical estimates were corrected, EPA would still need to address significant errors and gaps in its efforts to put a dollar figure on the true value to society of fish, other aquatic organisms, and entire ecosystems that are not bought and sold in commercial markets. Several of the most significant problems with EPA's analysis identified in the SEI report are summarized below.

Even the most straightforward of the non-market calculations – estimating the direct use values of fish as objects of sport – has proved quite challenging. EPA seems to have severely underestimated recreational fishing benefits. The value that EPA concludes that the average angler derives from catching a walleye in the Great Lakes – approximately four dollars – is based on EPA's own meta-analysis. It does not appear to match other estimates in the economic literature, which are over twenty dollars per fish, nor does it accord with the perception of companies in the sportfishing industry.<sup>650</sup>

Beyond direct use values, the problems escalate dramatically. To begin with, EPA admits that entire and substantial categories of benefits, including many non-use values, are beyond its capacity to estimate.<sup>651</sup> EPA has not yet estimated the non-use value of any of the billions of aquatic organisms and thousands of ecosystems that are affected by cooling water intake structures outside of the North and Mid-Atlantic Regions. And EPA has failed to capture the indirect use benefits of fish and healthier aquatic ecosystems, such as scuba diving, or hunting and watching birds that eat fish. Currently, EPA places a zero value on these activities.<sup>652</sup>

Even in the North and Mid-Atlantic regions, where EPA was able to conduct a partial non-use value calculation, the agency made the problematic and unjustified assumption that people place no value whatsoever on the welfare of fish and ecosystems outside of their home region.<sup>653</sup> Thus, EPA assumes that Alaskans would place no value on saving endangered sea turtles in Florida, and that Floridians, in turn, do not care about the health of such iconic American rivers as the Hudson, Colorado, Columbia, Delaware, and Mississippi. In making this assumption, EPA is ignoring empirical evidence from leading environmental economists that people place substantial value on the health of ecosystems and animals even if they are hundreds

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<sup>650</sup> See SEI Report, attached as Appendix A; see also Gentner Consulting Group, Economic Damages of Impingement and Entrainment of Fish, Fish Eggs, and Fish Larvae at the Bay Shore Power Plant (Sept. 2009) at Table 8 (Exh. 133).

<sup>651</sup> See SEI Report.

<sup>652</sup> See *id.*

<sup>653</sup> See *id.*

or thousands of miles away.<sup>654</sup> John Loomis, a leading economist in the field who EPA relies on and cites for other purposes, concluded that “on average, measuring only the benefits at the state level would result in just 13 percent of the national total public good benefits.”<sup>655</sup>

EPA also failed to take into account the particular value that people attach to protecting threatened and endangered species. EPA notes that cooling water intakes have significant impacts on threatened and endangered species, but claims an inability to come up with any reasonable estimates for the value of these impacts. Yet model calculations that EPA included in the EEBA demonstrate that EPA is well aware of the research literature on methods for estimating the non-use value of threatened and endangered species.<sup>656</sup>

EPA’s model calculations, however, are problematic and would need to be refined before further use. EPA’s model calculations of the non-use value of threatened and endangered species – which are not included in the final cost-benefit analysis – depend crucially on the assumed percentage of the affected population that is lost under baseline conditions. This is doubly problematic. First, EPA used different assumed percentage losses for different species without providing any basis for its chosen percentages (all of which were very low). Second, EPA’s analysis simply will not be credible until the agency corrects the drastic quantitative impact assessment errors discussed above. For example, even if EPA could justify its assumption that requiring closed-cycle cooling would save only one percent of endangered sea turtles, one percent of a severely underestimated baseline number of turtles remains a severe underestimate.

Until and unless EPA corrects its estimates of fish kills and recreational fishing benefits, completes its planned willingness to pay study, accounts for the substantial value that people place on environmental preservation (even from a distance), and corrects the serious deficiencies in its approach to valuing threatened and endangered species, the agency will continue to dramatically undervalue the benefits of a uniform national standard based on closed-cycle cooling. The flaws in EPA’s present analysis, both in its quantification and monetization of the rule’s benefits, are sufficiently large that to rely upon it would be arbitrary, capricious and an abuse of discretion.

### **3. EPA Overestimated the Costs of Closed-Cycle Cooling.**

In the proposed rule, EPA significantly overestimates the costs of installing closed-cycle cooling at existing facilities. The greatest flaw in EPA’s approach to estimating the cost of retrofits was EPA’s irrational decision, in 2007, to abandon its own thoroughly documented cost estimation model and instead use unverified figures provided by the Electric Power Research Institute (EPRI), which is an arm of the electric power industry being regulated by the rule.

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<sup>654</sup> *See id.*

<sup>655</sup> *See id.* (quoting John B. Loomis, “Vertically Summing Public Good Demand Curves: An Empirical Comparison of Economic versus Political Jurisdictions,” 76(2) *Land Economics* 312, 319–20 (2000)).

<sup>656</sup> *See id.*



This section summarizes key points from a more extensive engineering and cost report prepared by Powers Engineering. The full report is attached to this comment letter as Appendix D. As the attached report explains in more detail:

**a. EPA Has Significantly Over-Estimated the Costs of Retrofitting Existing Power Plants to Closed-Cycle Cooling.**

EPA developed a model for estimating the costs of closed-cycle cooling retrofits. The inputs for EPA's model are thoroughly explained and corroborated with actual fossil and nuclear plant retrofit cost data. EPA concluded that its model generates accurate and conservative estimates for closed-cycle cooling retrofits at both conventional and nuclear power plants.<sup>657</sup>

But EPA abandoned its model in 2007, when the Electric Power Research Institute (EPRI), a power industry body, provided EPA with cost estimates based on the results of a self-administered industry survey. EPA stated that it would use EPRI's capital cost estimates and energy penalty estimates instead of its own model results because the two sets of estimated costs were similar.<sup>658</sup>

The estimates produced by EPRI and EPA are not similar at all: EPRI's capital cost estimates are between 50% and 100% higher than EPA's.<sup>659</sup> EPRI has also estimated energy penalties several times larger than EPA. And EPRI's cost estimates are also higher than those of SPX, the largest manufacturer of power plant cooling towers in the United States.<sup>660</sup>

EPA should not have used EPRI's estimates. EPRI cannot be considered a neutral party in assessing the cost or difficulty of closed-cycle cooling retrofits because EPRI member companies have consistently opposed such retrofits. And in contrast to EPA's well documented and well understood model, there is no record evidence to corroborate EPRI's extremely high cost estimates. Thus, EPA should have continued to use its own model.

There are only two areas in which EPA's model requires substantial changes: nuclear plant retrofit costs, and nuclear plant outage (downtime) estimates. With these notable exceptions aside, the cost estimation model that EPA used until 2007 is conservative and fairly accurate.

EPA's new cost estimates – based on EPRI's model – are not remotely similar to EPA's original estimates, nor are they realistic, for several reasons.

First, at conventional plants, EPA's final cost estimate is greatly inflated because EPA replaced its own well-grounded and conservative<sup>661</sup> cost estimate of \$27 million with EPRI's \$53

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<sup>657</sup> See Powers Engineering comments on EPA 316(b) March 28, 2011 TDD, William Powers, P.E., Powers Engineering, hereinafter ("Powers Report") (attached as Appendix D).

<sup>658</sup> See Technical Development Document at 8-15.

<sup>659</sup> See Powers Report (section II).

<sup>660</sup> See Powers Report.

<sup>661</sup> In this context conservative means that actual costs are likely to be lower.

million estimate. EPA is wrong to claim that these are “similar results.” EPA’s model generates two different estimates of the capital cost of a retrofit, depending on whether a plant uses conventional (fossil fuel burning) or nuclear technology. EPRI’s model generates three different capital cost estimates, and these differ not by the plant’s technology, but by whether site conditions make a retrofit “easy”, “average,” or “difficult.” The table below, drawn from EPA’s technical development document, displays the different estimates generated by EPA and EPRI.<sup>662</sup>

**Exhibit 12-3. Cost Comparison for a 350 MW Plant with Cooling Flow of 200,000 gpm (288 MGD)**

	Tower Type	Capital Costs - Tower and Piping	Condenser Upgrade <sup>1</sup>	O&M	Tower Electricity Usage (Pumps & Fans)	O&M Total <sup>2</sup>	Annualized Capital Not Including Condenser Upgrade <sup>3</sup>	Annualized Condenser Upgrade	Total Annualized Cost Not Including Condenser Upgrade	Annual Heat Rate Penalty <sup>4</sup>
EPA Phase II	Redwood Tower	\$27,000,000	\$5,200,000	Included in O&M Total	Included in O&M Total	\$2,900,000	\$2,200,000	\$400,000	\$5,100,000	?
	Redwood Tower - Nuclear	\$49,000,000	\$9,400,000	Included in O&M Total	Included in O&M Total	\$4,200,000	\$3,900,000	\$800,000	\$8,100,000	?
EPRI Costs	Easy	\$32,000,000	-	\$260,000	\$2,600,000	\$2,860,000	\$2,600,000	-	\$5,460,000	\$1,040,000
	Average	\$53,000,000	-	\$260,000	\$2,600,000	\$2,860,000	\$4,200,000	-	\$7,060,000	\$1,040,000
	Difficult	\$83,000,000	-	\$260,000	\$2,600,000	\$2,860,000	\$6,600,000	-	\$9,460,000	\$1,040,000

In this chart, EPA took the example of a cooling system with a flow rate of 200,000 gpm. EPA wrongly concluded that its cost estimates and EPRI’s estimates are similar because it compared its conventional plant capital cost estimate of \$27 million to EPRI’s lower bound “easy” estimate of \$32 million, and its nuclear plant capital cost estimate of \$49 million with EPRI’s “average” estimate of \$53 million.<sup>663</sup> But EPA did not use EPRI’s lower bound estimate to determine capital costs at conventional plants, it used EPRI’s higher value – \$53 million – as the basis for estimating costs at *all* power plants.<sup>664</sup>

At conventional plants, EPRI’s estimate of \$53 million is nearly double EPA’s \$27 million estimate. And EPA’s original estimate was already generous because it assumed a low approach temperature, deliberately over-estimated pump and fan sizes, used a cost estimate for surface condenser upgrades that is considerably higher than a manufacturer’s estimate, and did not take into account the 0.5 percent efficiency improvement that typically results from a condenser upgrade (which would considerably offset efficiency losses associated with installation of closed-cycle cooling).<sup>665</sup> By replacing a well documented and conservative cost estimate of \$27 million with an unsupported industry estimate of \$53 million, EPA has significantly overestimated retrofit costs at conventional plants.<sup>666</sup>

<sup>662</sup> See Powers Report.

<sup>663</sup> See Powers Report.

<sup>664</sup> See TDD 8-17.

<sup>665</sup> See Powers Report. (Sections II.B & II.C)

<sup>666</sup> Some adjustment to the EPA model cost would be necessary to account for the rise in costs between 1999 and 2009. However, the rise in costs is on the order of 37 percent between 1999 and 2009, not a factor of two. At best, EPRI’s cost estimates are 50% higher than EPA’s. See Powers Report (providing industry standard cost inflation references and performing calculation).

Second, at nuclear plants, EPA's estimates are erroneously inflated because of unspecified safety concerns. EPA's underlying model, developed in 2002, generates estimates of retrofit costs at nuclear power plants far lower than the \$49 million value that EPA provides in the present rulemaking. EPA stated that its 2002 model was both conservative and very accurate at nuclear plants. And EPA presented the data behind its cost model in extensive detail, including the costs of actual closed-cycle cooling retrofits, to support its position. But, as the attached Powers report explains, the agency then arbitrarily applied a cost multiplier to its estimates in order to account for unspecified and undocumented concerns about the added expense of safely retrofitting a nuclear power plant.<sup>667</sup>

Using these cost multipliers, EPA estimates that the same retrofit that costs \$27 million at a conventional power plant will cost \$22 million more at a nuclear plant. And it is on the basis of this inflated \$49 million estimate that EPA claims it is acceptable to adopt EPRI's even higher estimate of \$53 million. But there is no support in the current record for EPA's decision to double many retrofit costs at nuclear plants, just as there was no record evidence to support this practice when EPA began it in 2002. Indeed, as the attached report shows, the record contains evidence that partially contradicts EPA's stance: statements by nuclear plant operators and regulators indicating that construction in close proximity to an operating nuclear plant is a familiar practice (it takes place, for example, when new generating units are built alongside an existing one) and does not raise significant safety concerns.<sup>668</sup>

Third, EPA's estimates of the turbine efficiency penalty and closed-cycle cooling parasitic fan and pump loads for nuclear and fossil plants are unreasonably high. The attached report shows that these overestimates again result from EPA's adoption of EPRI's unsupported figures. EPRI's figures contradict both EPA's own model and record evidence from existing retrofits. EPRI's estimated turbine efficiency penalty is approximately five times the average efficiency penalty found in EPA's own cost model, and about ten times the average efficiency penalty observed at some sites that have been retrofitted to a closed-cycle system.<sup>669</sup> And compared to EPA's original model, the EPRI cost spreadsheet overestimates fan and pump energy requirements by 30%. Overall, as the attached report makes clear, EPA's closed-cycle cooling cost model provided reasonably accurate estimates of annual average turbine efficiency penalties, fan energy demand, and pump energy demand.<sup>670</sup> EPA should reinstate its retrofit closed-cycle cooling cost model's estimates of energy demand and efficiency penalties and not rely on the EPRI figures.

**b. EPA Overestimated the Downtime (and Attendant Costs) Required for Closed-Cycle Cooling Retrofits at Nuclear Plants.**

In 2002, EPA estimated that if facilities are given a period of several years to come into compliance, as they are under the Proposed Rule, then closed-cycle conversions at both fossil

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<sup>667</sup> See Powers Report.

<sup>668</sup> See Powers Report. (Section II.D)

<sup>669</sup> With respect to the turbine efficiency penalty, part of the overestimate arises from EPA's erroneous decision to model the long-run energy penalty on the peak energy penalties observed at the height of summer, rather than adopting the average energy penalty observed over time. See Powers Report. (Section III.A)

<sup>670</sup> See Powers Report.

and nuclear plants would require no more than two months of additional downtime beyond that which is ordinarily scheduled. EPA provided considerable support for this position on the record based on its experience at several power plants.<sup>671</sup>

EPA later increased its estimate from two months to seven months at nuclear plants. Nothing in the record developed by EPA between 2002 and 2011 can support this drastic revision. EPA's 350 percent increase in the outage time estimate was based on a single weak data point: a letter from a planner at the Palisades II nuclear plant, written in 2002, describing a retrofit at the plant that was conducted in the early 1970's.<sup>672</sup> Thirty years later, plant staff could not state definitively how long the retrofit had taken and could only infer an estimate of the plant's outage time from whatever records remained from the 1970s.<sup>673</sup>

As the attached Powers report explains, information from better-documented retrofits and other complicated construction projects at nuclear plants completed within the past ten years strongly supports EPA's original view that two months of additional downtime is a reasonable and conservative estimate (i.e., actual costs are likely to be lower). EPA pointed out in the April 2002 TDD that four surface condensers at an Arkansas nuclear plant were upgraded during two days of downtime. More complicated construction projects at nuclear power plants, such as plant replacements, have been completed in much less than seven months. For example, the 2008 replacement of four steam generators at the Diablo Canyon nuclear facility, Units 1 and 2, which involved cutting an opening in the nuclear reactor containment dome, required an outage of only ten weeks. The attached engineering report points out that:

it is not credible that the outage time for a highly invasive nuclear reactor steam generator replacement that occurs inside the nuclear containment dome averages 2 to 2-and-a-half months, and yet the hook-up of circulating water piping to an existing nuclear reactor surface condenser, an action the NRC predecessor agency stated would create no nuclear safety concerns, would require a 7-month outage.<sup>674</sup>

EPA should assume that, at most, a closed-cycle cooling hook-up requires no more than two months outage time.

#### **4. If EPA Relies on, or Authorizes Use of, a Cost-Benefit Analysis, that Analysis Must Be Significantly Improved.**

If EPA uses cost-benefit comparisons at all, the agency may use them only as Congress intended: as secondary "reality checks" intended only to avert extreme disparities between the costs and benefits of technologies that deliver the greatest reductions in entrainment, impingement, and thermal pollution. This kind of practical cost-benefit analysis would lead EPA to set a uniform national standard based on the performance of closed-cycle cooling systems.

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<sup>671</sup> See Powers Report.

<sup>672</sup> See Letter from John A. Gulvas, Consumers Energy to Timothy Connor/Ashley Allen, U.S. EPA dated Feb. 28, 2002 (EPA-HQ-2002-0049-2341).

<sup>673</sup> See *id.* at 7.

<sup>674</sup> Powers Report.

But even if EPA completes this rulemaking under the unlawful approach to cost-benefit analysis that it has applied to date, the result should be the same. The economic analysis performed by SEI that is attached to this comment shows that, after correcting significant errors in EPA's cost-benefit analysis, the benefits of a closed-cycle cooling standard actually exceed its costs.<sup>675</sup> Thus, the benefits of protecting fish and aquatic ecosystems clearly "justify" the costs of a uniform, national closed-cycle cooling standard.

**a. EPA's Approach to Cost-Benefit Analysis Should Be Reformed.**

Had EPA followed the cost-benefit approach that Congress envisioned, it would have proposed a uniform national entrainment standard based on the use of the best technology available: closed-cycle cooling. The Clean Water Act allows EPA to consider whether the costs of a closed-cycle cooling standard can be reasonably borne by an industry; they can. And EPA's data show that the costs of a closed-cycle cooling standard are not wholly disproportionate to its benefits.

But EPA decided to compare costs and benefits more extensively and probingly than Congress deemed appropriate in setting technology-based standards. Despite a determined and good faith effort, EPA produced a cost-benefit analysis that overlooks many benefit categories entirely and underestimates others, both physically and monetarily. This is not surprising. Through 40 years of failed environmental regulation, Congress learned that elaborate efforts to precisely assess environmental harms and benefits would be futile and, what is worse, would leave the agency unable to enact effective environmental regulations at all. That is why Congress prohibited EPA from making cost-benefit comparisons a primary consideration in setting the best technology available standard.

Further, there is a severe imbalance in any cost-benefit analysis when, as here, the costs of the proposed action can be valued commercially but the benefits cannot be monetized with any meaningful degree of accuracy. Faced with such uni-directional uncertainty, EPA should set a rule that errs on the side of environmental protection.

If EPA were to apply its longstanding "wholly disproportionate" test to the information that it has already analyzed, the agency could quickly set a uniform national standard based on the performance of closed-cycle cooling systems. The non-use values of the fish and other organisms saved by this rule are substantial. EPA's initial effort to monetize them through a habitat valuation analysis generated a value of several billion dollars.<sup>676</sup> Thus, EPA has firm grounds to conclude that the costs of this rule are reasonable and proportionate to its benefits and, indeed, that the rule's benefits exceed its costs. At the very least, however, there is no extreme disparity between the benefits and costs of a uniform national standard based on closed-cycle cooling.

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<sup>675</sup> See SEI Report.

<sup>676</sup> EEBA chapter 9; see also Stockholm Environment Institute report (discussing EPA's habitat valuation analysis).

**b. EPA’s National Benefits Assessment Requires Certain Adjustments.**

The most significant errors in EPA’s benefits analysis are described above in Section III.F.2 of these comments and in the report of the Stockholm Environmental Institute, attached as Appendix A. Briefly, EPA has underestimated the number of fish and other organisms affected by this rule and the recreational and non-use benefits that people derive from healthier aquatic ecosystems. The Stockholm Environment Institute has provided a general estimate of benefits that addresses many of the deficiencies in EPA’s analysis. Specifically, the Stockholm Environment Institute:

- applied EPA’s habitat area restoration method (discussed in the EEBA) for non-use values, but extrapolates the method’s results nationally;
- used a benefits transfer method to infer national threatened and endangered species benefits; and
- modified EPA’s estimated recreational benefits to account for the significant discrepancies between EPA’s estimates and others.

Together, these basic modifications result in benefits estimates that are greater than or approach EPA’s cost estimates for all of the options that EPA considered, including for a uniform national standard based on closed-cycle cooling. And, as noted above, EPA’s cost estimates are themselves inflated.<sup>677</sup> Correcting the errors in both the costs and the benefits estimates leads to the conclusion that the benefits of regulation are greater than the costs for every option that EPA considered. EPA should correct its national estimate to account for the deficiencies identified in the Stockholm Environment Institute’s report, which is attached as Appendix A.

**c. EPA’s National Costs Assessment Requires Certain Adjustments.**

As explained above (and more extensively in the attached report of Powers Engineering), there are multiple flaws in EPA’s estimate of the costs of closed-cycle cooling retrofits. Many of the problems with EPA’s figures stem from the agency’s decision to abandon its own well-grounded cost estimates and rely instead on significantly higher estimates provided by EPRI. To correct these errors, EPA should re-estimate the costs of retrofits at plants around the country using the following default values for unit costs, recommended by Powers Engineering.<sup>678</sup> These unit costs are based on EPA’s original estimates and some recent data from a leading cooling tower manufacturer:

Installed cost, wet tower (in-line or back-to-back), \$/gpm:	182 – 223
Installed cost, plume-abated tower (in-line or back-to-back), \$/gpm:	316 – 411
Average turbine efficiency penalty (fossil or nuclear), %:	0.30 – 0.40
Average fan parasitic energy penalty (fossil or nuclear), %:	0.40 – 0.60
Average pump parasitic energy penalty (fossil or nuclear), %:	0.40 – 0.60

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<sup>677</sup> See Section III.F.3, *supra*.

<sup>678</sup> The ranges provided represent the variation from 12° F to 8° F design approach temperatures at different power plants.

Total retrofit downtime, months:

fossil – 1, nuclear – 2

Based on these more realistic unit cost estimates, and assuming some variation in design approach temperatures and a mix of wet and plume-abated towers, Powers Engineering concludes that the annualized national pre-tax compliance costs for power plants under Option 2 and Option 3 would be \$3,029 million and \$3,104 million annually (compared to \$4,933 million and \$5,079 million in EPA's estimates, as shown in *EBA*, Table 3-8). Assuming no change in EPA's estimates of costs to manufacturers, this implies that the total cost of Option 2 is 62.8 percent of EPA's estimate and the total cost of Option 3 is 62.9 percent of EPA's estimate.

Moreover, both EPA's and Powers Engineering's calculations are very conservative (i.e., actual costs are likely to be lower) because they both use total current nationwide design intake flow (DIF) to calculate the capital cost of cooling tower retrofits under Options 2 and 3. Given the ongoing coal plant retirement trends unrelated to projected 316(b) compliance costs, the actual number of existing plants needing to be retrofit will likely be smaller. For example, a December 2010 compilation of various studies by The Brattle Group evaluating the amount of coal plant retirements found estimates ranging from 10 GW to 75 GW of coal capacity will be retired between now and 2020.<sup>679</sup> In fact, more than 27.5 GW of coal plant retirements have already been announced by utilities throughout the country.<sup>680</sup> EPA should factor these retirements into its cost analysis because plants that are to be retired in the near future will not need to be retrofitted with cooling towers and, therefore, will avoid a significant cost.

**d. Any Site-Specific Benefits Assessment Should Adhere to Precise Regulatory Requirements Established by EPA.**

As explained previously, requiring states to conduct site-specific cost-benefit assessments violates the Clean Water Act, offends the Congressional intent behind the Act, and is arbitrary, capricious, and an abuse of EPA's limited discretion to consider the costs and benefits of setting a uniform, *national* standard. State agencies should not be authorized to conduct any cost-benefit analysis in the process of issuing NPDES permits, because they simply cannot perform or meaningfully review such analysis in a manner that provides any useful information. However, to the extent that EPA persists in allowing states to undertake any cost-benefit assessment, the rule should require those analyses to adhere to precise requirements established by EPA. As the attached report of the Stockholm Environment Institute explains in greater detail, EPA should start by making four important changes to the site-specific cost-benefit analysis process envisioned in the Proposed Rule.

First, EPA should clarify how costs and benefits are to be compared. EPA's novel formulation in the Section 316(b) context that benefits should "justify" the costs of entrainment controls is unclear and some states may interpret it as a departure from the "wholly disproportionate" standard. A clear interpretive standard set by federal regulation would prevent states from making cost-benefit comparisons under disparate standards. It would also

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<sup>679</sup> The Brattle Group, Potential Coal Plant Retirements Under Emerging Environmental Regulations (December 8, 2010) (Exh. 134).

<sup>680</sup> See Electric Generating Units Planned Retirement Date Spreadsheet (developed from publicly available information), Aug. 15, 2011 (Exh. 135).

prevent states from relying on cost-benefit considerations in a manner that is inconsistent with the limits that Congress placed on the use of cost-benefit comparisons. Therefore, EPA should establish that the new “benefits justify the costs” standard is consistent with its existing Clean Water Act guidance: the costs of a protective measure are justified so long as they are not wholly disproportionate to the benefits conferred by that measure.

Second, EPA should ensure that government employees or contractors are the sole arbiters of the technical adequacy of all cost-benefit analyses. The integrity of the analytical process can only be assured if the State, not the applicant, selects the contractors and oversees the studies.

Third, applicants require additional guidance on how to conduct complex cost-benefit analyses. Therefore, EPA should restore guidance statements that OMB had deleted, including EPA’s explanation of the difference between the social costs and the private costs to facilities of installation downtime and energy penalties and how these costs should be calculated to avoid overestimating the social costs, as well as EPA’s guidance on discount rates, which called for facilities to use a “social discount rate . . . reflecting society’s rate of time preference as opposed to a facility’s cost of capital,” and suggested 3%, as per existing OMB guidance.<sup>681</sup>

Finally, EPA should provide standardized default values and valuation methodologies for costs of control technologies, and for all major benefits categories, suitable for use in local analyses. As the attached SEI report explains in more detail, EPA should require:

- *Estimates of national, not regional, non-use values* – economic studies have repeatedly shown that people place a high value on preserving and protecting ecosystems even if they do not live close to them. A complete benefits analysis must include the value that all Americans derive from protecting wildlife, not just the benefits to those people who live close to a particular waterbody.
- *A clear explanation of how the heightened value of protecting threatened and endangered species is included in the benefits analysis* – Americans place a particularly high value on protecting and preserving threatened and endangered species. This additional value must be reflected in the benefits analysis.
- *Quantified uncertainty estimates* – EPA should require that all cost-benefit studies include a quantitative measure of the uncertainty in the estimates of the number of fish and other organisms affected by a cooling water intake structure, and in the estimates of the economic costs and benefits of protecting these organisms. Regulators should understand the error range associated with the estimates they have received.
- *A buffer or margin of safety for threatened and endangered species* – The difference between killing 1 percent and 2 percent of all the individuals in an endangered population can be hugely significant – it may be the difference between life and extinction for that species. Where threatened or endangered species, or species of concern are involved, EPA should require that applicants do their utmost to quantify the uncertainties in their

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<sup>681</sup> See Redlined Version of Proposed Rule, p. 340.



benefits estimate, and then base their benefits calculations on the upper end of the error range.

- *Non-use value estimates no lower than those found by EPA* – Presently, EPA is conducting a national willingness to pay study to develop accurate and transferable estimates of the non-use benefits of wildlife. If applicants or regulators can document a substantial basis to deviate upwards from EPA’s estimates, this should be permitted. But contingent valuation of environmental goods is difficult and must be done with care and transparency because an applicant can significantly alter the results of a site-specific cost-benefit analysis by manipulating estimates of non-use values. As a safeguard against inaccurate estimation studies, EPA should not allow applicants to present non-use values for fish and aquatic ecosystems that are lower than those found in EPA’s forthcoming study.

**G. EPA Cannot Issue a Final Rule Without First Consulting NMFS and FWS and Fully Complying with its Duties under Other Applicable Federal Environmental Laws.**

Although EPA is promulgating this proposed rule under the Clean Water Act, the agency has a separate duty to comply with the Endangered Species Act. Under that Act, EPA has a mandatory duty “to use . . . all methods which are necessary to bring any endangered . . . or threatened species to the point at which the protections of the Act are no longer necessary.”<sup>682</sup> Also, EPA must consult with the Secretaries of the Departments of Interior and Commerce to insure that any action it authorizes, funds, or carries out “is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of [critical] habitat of such species.”<sup>683</sup>

To date, EPA has not consulted the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS), the designees of the Secretaries of the Interior and Commerce, to obtain their opinions on the biological and ecological impacts of this rule and the advisability of reasonable and prudent alternatives to EPA’s Proposed Rule. Reasonable and prudent alternatives to EPA’s proposed action exist, including the other regulatory options under consideration.

In promulgating this rule, EPA will be taking an action within the meaning of the Endangered Species Act.<sup>684</sup> Specifically, EPA is requiring states to make case-by-case entrainment control decisions and is declining to set a uniform, national, technology-based standard based on the performance of closed-cycle cooling systems. Thus, EPA is authorizing existing cooling water intake structures to continue to take endangered species, and to adversely modify habitat that is critical to multiple endangered species, on the vain hope that states may be

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<sup>682</sup> *Nat’l Wildlife Fed’n v. Hodel*, No. S-85-0837, 1985 U.S. Dist. Lexis 16490 at \*11 (Aug. 26, 1985) (E.D. Cal.) (citing 16 U.S.C §§ 1536(a)(1), 1532(3)).

<sup>683</sup> 16 U.S.C. § 1536(a)(2).

<sup>684</sup> See 40 C.F.R. § 402.02 (“Action means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to . . . the promulgation of regulations...”).

able to take effective action to regulate these intakes. Where an EPA action directly continues a situation in which endangered species are being taken, EPA must first consult the Secretary of Interior, Commerce, or Agriculture as appropriate.<sup>685</sup>

EPA has evidence that cooling water intake structures take endangered and threatened species of fish. And the Proposed Rule authorizes continued operation of existing cooling water intake structures in a manner that EPA claims will at best “minimize” over an extremely extended schedule – and, significantly, will not end – the killing of fish and other aquatic organisms, as well as the wholesale degradation of aquatic ecosystems by CWISs. Under these circumstances, EPA has a mandatory duty to consult with the NMFS and FWS prior to promulgating a final rule.

In addition, EPA’s has duties to protect and conserve wildlife, and to cooperate with other federal agencies in the protection and conservation of wildlife, under a number of federal laws including but not limited to: the National Environmental Protection Act,<sup>686</sup> the Endangered Species Act,<sup>687</sup> the Fish and Wildlife Coordination Act,<sup>688</sup> the Bald and Golden Eagle Protection Act,<sup>689</sup> the Migratory Bird Treaty Act,<sup>690</sup> the Migratory Bird Conservation Act,<sup>691</sup> the Marine Mammal Protection Act,<sup>692</sup> the Wilderness Act,<sup>693</sup> the Coastal Zone Management Act,<sup>694</sup> the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006,<sup>695</sup> and Federal Land Policy and Management Act,<sup>696</sup> and the National Forest Management Act.<sup>697</sup> EPA cannot promulgate a final regulation without first insuring that it has met its particular duties under these acts, and its general duty to protect and conserve wildlife – particularly endangered and threatened species.

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<sup>685</sup> See *Defenders of Wildlife v. EPA*, 882 F.2d 1294, 1300 (8th Cir. 1989).

<sup>686</sup> See 42 U.S.C. §§ 4321-70d.

<sup>687</sup> See 16 U.S.C. §§ 1531-44.

<sup>688</sup> See 16 U.S.C. §§ 661-67e.

<sup>689</sup> See 16 U.S.C. §§ 668a-668d.

<sup>690</sup> See 16 U.S.C. §§ 703-712.

<sup>691</sup> See 16 U.S.C. §§ 715-715s.

<sup>692</sup> See 16 U.S.C. §§ 1361-1421h.

<sup>693</sup> See 16 U.S.C. §§ 1132-1136.

<sup>694</sup> See 15 U.S.C. §§ 1451-65.

<sup>695</sup> See 16 U.S.C. §§ 1801-91d.

<sup>696</sup> See 43 U.S.C. §§ 1701-85.

<sup>697</sup> See 16 U.S.C. §§ 1600-87.

#### IV.

### ADDITIONAL REVISIONS TO THE PHASE I RULE ARE WARRANTED IN LIGHT OF THE *RIVERKEEPER I* DECISION

In addition to removing from the Phase I new facility rule the restoration-based compliance alternative and the associated monitoring and demonstration requirements (as EPA is currently proposing), another revision is also warranted in light of the *Riverkeeper I* decision.

In its Phase I rule, EPA required new facilities to limit intake volume to a level commensurate with closed-cycle cooling (Track I),<sup>698</sup> while also allowing those facilities to use technologies other than closed-cycle cooling so long as they could demonstrate that “the technologies employed will reduce the level of adverse environmental impact from [the] cooling water intake structures to a comparable level” to that which would be achieved by closed-cycle cooling (Track II).<sup>699</sup> EPA further defined “comparable level” to mean a reduction in impingement mortality and entrainment of all life stages of fish and shellfish to 90 percent or greater of the reduction that would be achieved by closed-cycle cooling.<sup>700</sup>

In the *Riverkeeper I* litigation, Riverkeeper and other environmental groups challenged EPA’s 90-percent threshold because it appeared to allow facilities to choose technologies that were designed to achieve only 90 percent of the reductions that EPA had selected as BTA. In defending the 90 percent threshold, EPA explained to the court that:

given the numerous factors that must be considered to determine the required level of reduction in impingement and entrainment for Track II [*i.e.*, the 90 percent option] and the *complexity inherent in assessing the level of performance of different control technologies*, EPA believes it is appropriate for a new facility following Track II to achieve reductions in impingement and entrainment that are 90 percent or greater of the levels achieved under Track I [*i.e.*, closed-cycle cooling].<sup>701</sup>

In ruling on the issue, the Second Circuit stated that “impingement and entrainment ... cannot always be measured directly and with mathematical precision, the use of any alternative technologies would require the EPA to make a judgment call as to whether those technologies yield results ‘equivalent’ to Track I’s.”<sup>702</sup> Thus, the court concluded as follows: “We think it was reasonable for the EPA to make clear ... how much ambiguity it is willing to tolerate in measuring compliance and what it considers a reasonable margin of error in comparing the performance of different technologies.”<sup>703</sup> However, the court then added a critical caveat:

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<sup>698</sup> 40 CFR § 125.84(b)(1).

<sup>699</sup> 40 CFR § 125.84(d)(1).

<sup>700</sup> 40 CFR § 125.86(c)(2)(i).

<sup>701</sup> *Riverkeeper I*, 358 F.3d at 187-88 (emphasis added), citing 66 Fed. Reg. at 65,279 .

<sup>702</sup> *Id.* at 188-89.

<sup>703</sup> *Id.* at 189.

Based on the EPA's representation that "90 percent" compliance is permitted because of measuring error, EPA Br. at 52, it would, of course, be inappropriate for the EPA to use 90 percent as a benchmark and allow an additional margin of error in measuring compliance with that benchmark. *A facility must aim for 100 percent, and if it falls short within 10 percent, that will be acceptable. It may not, however, aim for 90 percent and achieve only an 89 percent reduction in impingement and entrainment.*<sup>704</sup>

In other words, where an applicant proposes a suite of technologies and operational measures as equivalent to closed-cycle cooling, it must submit data showing that the reductions are expected to be 100 percent of the level that would be achieved by closed-cycle cooling. So long as such a demonstration is made in the permitting process, actual monitoring showing that performance was within the 10 percent margin of measuring error will be deemed to be in compliance.

In the Proposed Rule, EPA makes this same point in the context of the proposed 12 percent annual impingement mortality standard for existing facilities:

EPA recognizes that some variability in the annual average is inevitable, and thus the only way to consistently achieve the 12 percent annual standard is to *target a better level of performance as the long-term average performance.*<sup>705</sup>

The Phase I rule, however, does not make it clear that facilities must – as the Second Circuit held – “aim for 100 percent” of Track I, and thus applicants and permit writers may be under the mistaken impression that facilities can instead aim for 90 percent and fall short of that reduced target without violating the regulations. Accordingly, to respond to the *Riverkeeper I* decision, EPA should revise 40 CFR § 125.89(b)(1)(ii) to read as follows (additions shown in italics):

**§ 125.89 As the Director, what must I do to comply with the requirements of this subpart?**

(b)(1)(ii) For a facility that chooses Track II, you must review the information submitted with the Comprehensive Demonstration Study information required in § 125.86(c)(2), evaluate the suitability of the proposed design and construction technologies and operational measures to determine whether they will reduce both impingement mortality and entrainment of all life stages of fish and shellfish to 90 percent or greater of the reduction that could be achieved through Track I. *In seeking to comply with the requirement set forth in this subsection, a facility must aim for 100 percent, and if it falls short within 10 percent, that will be acceptable. It may not, however, aim for 90 percent and achieve only an 89 percent reduction in entrainment mortality.*

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<sup>704</sup> *Id.* n.16 (emphasis added).

<sup>705</sup> 76 Fed. Reg. at 22,203 (col. 2) (emphasis added).

## V.

### RESPONSES TO EPA'S SPECIFIC REQUESTS FOR COMMENT

#### A. Responses to Numbered Requests.

On pages 22,273-75 of the preamble, EPA provided a numbered list of 28 “Specific Solicitations of Comment and Data,” which summarized and pulled together in one place many of the requests for comment that were otherwise scattered throughout the preamble. We respond to those requests here.

1. **Definition of “Design Intake Flow.”** *EPA requests comment on whether the definition of DIF should be further revised to clarify that EPA intends for the design intake flow to reflect the maximum volume of water that a plant can physically withdraw from a source waterbody over a specific time period. This would mean that a facility that has permanently taken a pump out of service or has flow limited by piping or other physical limitations should be able to consider such constraints when reporting its DIF. See Section V.G.*<sup>706</sup>

#### **Response:**

So long as facilities are not receiving impingement and entrainment mortality reduction “credit” for fictional flow reductions (see discussion above regarding full flow baseline) DIF should reflect the maximum amount of water than can be withdrawn by the plant.

2. **National BTA Categorical Standards for Offshore Oil and Gas Extraction and Seafood Processing Facilities.** *EPA requests comment and data on the appropriateness of a single BTA categorical standards [sic] for offshore oil and gas extraction facilities and seafood processing facilities. Today’s rule would continue to require that the BTA for existing offshore oil and gas extraction facilities and seafood processing facilities be established by NPDES permit directors on a case-by-case basis using best professional judgment. See Section V.H*<sup>707</sup>

#### **Response:**

Like all other facilities, existing offshore facilities should be subject to categorical standards that minimize adverse environmental impact. EPA determined that a categorical standard requiring technologies more advanced than the screens presently in use on ocean going vessels would “result in unacceptable changes in the envelope of existing platforms, drilling rigs, mobile offshore drilling units (MODUs), seafood processing vessels (SPVs), and similar facilities as the technologies would project out from the hull, potentially decrease the seaworthiness, and potentially interfere with structural components of the hull.”<sup>708</sup> EPA should

<sup>706</sup> 76 Fed. Reg. at 22,273 (col. 2); *see also* 76 Fed. Reg. at 22,195 (col. 3).

<sup>707</sup> 76 Fed. Reg. at 22,273 (col. 2); *see also* 76 Fed. Reg. at 22,196 (col. 1).

<sup>708</sup> 76 Fed. Reg. at 22,195-96 (col. 3).

clarify whether, in reaching the conclusion that no better categorical standard is technically feasible, it considered (1) installation of variable speed pumps that would better match cooling water intake with process needs, and (2) operational changes, such as limiting or delaying activities that require cooling water intake while a vessel is in near-shore and other highly biologically productive waters.

Additionally, as discussed above in Section III.E.10 of these comments, EPA should clarify the text of proposed 40 C.F.R. § 125.91(d) to make it clear that only offshore seafood processing facilities – i.e., ocean going vessels – are exempt from the categorical standards proposed.

The following section of this comment letter is most relevant to this request for comment:

- III.E.10 - EPA Should Clarify that Only Offshore Seafood Processing Facilities, not Onshore Facilities, Are Exempt from the Rule.
3. **Cost-cost Alternative From Phase II Rule.** *EPA does not have technical data for all existing facilities. EPA concluded that the Phase II rule costs provided in Appendix A are not appropriate for use in a facility-level cost-cost test. See Section III. Moreover, under the national requirements EPA is proposing today, EPA concluded that a specific cost-cost variance is not necessary because the Director already has the discretion to consider such factors. EPA requests comment on these conclusions.*<sup>709</sup>

**Response:**

The cost data provided in Appendix A to the Phase II rule are highly speculative, unreliable, irrelevant to today's rulemaking, out-dated, problematic in numerous other respects and should not be considered in facility level cost-cost tests because, among other things, they reflect only EPA's estimate of the cost of installing screens at some facilities. As EPA recognizes that screens are less effective than closed-cycle cooling, the screens-only cost data is of limited utility. If EPA establishes a variance from a national standard based on closed-cycle cooling, and if that variance mechanism allows for consideration of costs (which is not required), then the appropriate comparison will be between a facility's cost of implementing closed-cycle cooling and EPA's estimate of the average cost of such conversions nationwide.

As noted above, and as explained further in the attached report of Powers Engineering, EPA's current estimates for the costs of closed-cycle cooling are significantly overestimated. Finally, the compliance costs to be considered in any cost-cost variance should include only capital expenditures, operation and maintenance, and energy penalty, not speculative, indirect add-on costs.

The following sections of this comment letter are most relevant to this request for comments:

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<sup>709</sup> 76 Fed. Reg. at 22,273 (col. 3).

- III.B - EPA Should Establish a National Categorical Entrainment Standard Based on Closed-Cycle Cooling;
- III.F.3 - EPA Overestimated the Costs of Closed-Cycle Cooling.

4. **Entrainment Survival.** *There are circumstances where certain species of eggs have been shown to survive entrainment under certain conditions, however EPA has not received any new data for either the most common species or the species of concern most frequently identified in available studies. For purposes of today's national rulemaking, entrainment is still presumed to lead to 100 percent mortality. See Section VI. Today's proposed rule would allow facilities to demonstrate, on a site specific basis, that entrainment mortality of one or more species of concern is not 100 percent. EPA requests comment on this approach.*<sup>710</sup>

**Response:**

As explained more fully above, in any instance where entrainment monitoring is conducted, EPA should not allow permittees to attempt to demonstrate that entrainment mortality is less than 100 percent at their particular site. Assessing entrainment mortality on a site-specific and species-specific basis is administratively unworkable and will lead to significant delays in the permitting of cooling water intake structures for little gain.

The following section of this comment letter is most relevant to this request for comments:

- III.E.3 - EPA and States Should Maintain an Assumption of 100 Percent Entrainment Mortality in All Site-Specific Proceedings.

5. **Alternative Impingement Mortality Compliance Requirements.** *EPA requests comment and data on a provision that would require facilities seeking to comply with the impingement mortality standard by meeting an intake velocity requirement either to demonstrate that the species of concern is adequately protected by the maximum intake velocity requirements, or else to employ fish friendly protective measures including a fish handling and return system. EPA is considering this provision because the Agency is concerned that some facilities that comply with the impingement mortality requirements by reducing intake velocity to 0.5 fps or less, may still impact species of concern. See Section VI.D.1.a.*<sup>711</sup>

**Response:**

As discussed above, EPA should require existing facilities to reduce their intake velocity to 0.5 ft/s and should additionally require those facilities with travelling screens to employ fish

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<sup>710</sup> 76 Fed. Reg. at 22,273 (col. 3).

<sup>711</sup> 76 Fed. Reg. at 22,273 (col. 3); *see also* 76 Fed. Reg. at 22,203 (col. 3).

friendly protective measures including a fish handling and return system because reducing intake velocity alone is not sufficient to protect fish.

The following section of this comment letter is most relevant to this request for comments:

- III.C - Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects.

In addition, with respect to the term “species of concern” please see:

- III.E.1 - EPA Should Clarify the Meaning of the Term “Species of Concern” and Restore Additional Protections for These Species;
- III.E.2 - EPA Should Prevent Directors from Excluding Any Species from the Rule’s Scope
- III.G - EPA Cannot Issue a Final Rule Without First Consulting NMFS and FWS and Fully Complying with its Duties under Other Applicable Federal Environmental Laws.

6. **Monthly and Annual Limits on Impingement Mortality.** *EPA requests comment on the need to tailor the impingement mortality requirements of today’s proposal to account for site-specific circumstances and/or technologies, including location of cooling water intakes that impinge relatively few fish or other approaches that achieve impingement mortality reductions equivalent to the proposed performance standards. For example, if EPA were to consider number of fish killed as an alternative, it might statistically model the data or select the minimum observed value. Studies and information supporting these alternatives would be most helpful. EPA also requests comment on the monthly and annual limits in the proposed rule and way in which they were calculated.*<sup>712</sup>

**Response:**

In general, EPA should not set (or ask Directors to set) impingement mortality limits on a site-specific basis. Nor should EPA’s national uniform standard for impingement mortality be set on a percentage basis, as the agency now proposes. Instead, EPA should set a nationally uniform technology standard that minimizes both impingement and entrainment based on the performance of closed-cycle cooling systems and a velocity limit of 0.5 ft/s. As discussed above, the percentage mortality approach that EPA has adopted at present is flawed, and the 12 percent annual and 31 percent monthly limits are based on very limited data. Moreover, EPA and states are not permitted to weaken technology-based standards on the basis that the source waters are already “degraded.”

The following sections of this comment letter are most relevant to EPA’s request for comments:

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<sup>712</sup> 76 Fed. Reg. at 22,273 (col. 3); *see also* 76 Fed. Reg. at 22,187 (col. 3), 22,203 (col. 1).



- III.C - Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects.

In particular:

- III.C.1 - EPA Should Establish A National Categorical Impingement Standard Based on Closed-Cycle Cooling.
  - III.C.3 - The 12 Percent/31 Percent Impingement Mortality Reduction Requirement Is Problematic In Numerous Respects.
- Appendix B - Comments of Dr. Peter Henderson and Richard Seaby, PISCES Conservation, Ltd.

**7. Flow Basis for Option.** *EPA requests comment on both the threshold and the flow basis for a variation of option 2 that would use 125 MGD Actual Intake Flow (AIF) rather than a 125 MGD Design Intake Flow (DIF) as the threshold. See Section VI.D.2.<sup>713</sup>*

**Response:**

EPA should maintain the use of a DIF threshold rather than an AIF threshold. A DIF threshold is simpler to establish and the administrative burden on states of vetting claims from applicants is already considerable; EPA should not increase that burden.

Also, demand for energy has declined somewhat during the current economic downturn. A facility may currently have a historically low AIF, but without an enforceable commitment to maintain the current rate of operations in the future, the facility may not stay below the AIF threshold for long as the economy recovers. Once the NPDES permit is issued it will not be revised, and with many states facing a NPDES permitting backlog that sees facilities operate on administratively continued permits for years – or, in some cases, decades – an erroneous determination that a facility falls below the threshold may go uncorrected for ten years or longer.

If EPA is concerned about the costs or feasibility of a national categorical standard for entrainment, it must undertake a thorough effort to craft a national standard by looking at various thresholds and options for subcategorizing the more than 1,200 facilities with cooling water intake structures affected by this rule. But those thresholds should be set on a clear and easily determined basis. DIF provides such a basis; AIF does not.

**8. Waterbody Type as a Basis for Different Standards.** *EPA's reanalysis of impingement and entrainment data does not support the premise that the difference in the density of organisms between marine and fresh waters justifies different standards. More specifically, the average density of organisms in fresh waters may be less than that found*

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<sup>713</sup> 76 Fed. Reg. at 22,274 (col. 1); *see also* 76 Fed. Reg. at 22,206 (col. 1).

*on average in marine waters, but the actual density of aquatic organisms in some specific fresh water systems exceeds that found in some marine waters. EPA also believes the different reproduction strategies of freshwater versus marine species make broad characterizations regarding the density less valid a rationale for establishing different standards for minimizing adverse environmental impact. EPA requests comment on its proposal not to differentiate requirements by water body type.*<sup>714</sup>

**Response:**

EPA has provided a firm environmental basis for not distinguishing between facilities situated on different waters of the United States: the variation in organism densities and reproduction strategies within marine and freshwater ecosystems is sufficiently high that no category of waterbodies can be singled out for different treatment. EPA should therefore maintain its intention to set uniform national impingement standards across all water bodies (though these should be improved, as noted above), and EPA should also set a uniform national entrainment standard (based on the use of closed-cycle cooling) across all water bodies.

There is also a legal requirement for uniform national standards across all waters of the United States. Congress intended “that the ‘design’ of intake structures be regulated directly, based on the best technology available, and without resort in the first instance to water quality measurements.”<sup>715</sup> Closed-cycle cooling and a velocity limit of 0.5 ft/s are the best technologies available to minimize adverse environmental impacts in all waters of the United States. Congress intended that the best technologies available be used, and that technology-based standards not be relaxed based on assessments of local water quality, which in this context means considerations of the density or reproductive strategies of the aquatic populations in a particular water body.

Establishing different standards for different water bodies based on their existing ability to support certain densities and populations would allow facilities to impact the remaining and badly stressed aquatic populations in water bodies that have already been severely harmed by prior use as industrial dumping grounds. This runs directly contrary to the Clean Water Act’s goals of *restoring* and *maintaining* aquatic ecosystems, and courts forbade this outcome in the earlier *Riverkeeper* litigation.<sup>716</sup>

The following section of this comment letter is most relevant this request for comment:

- I.B.2 – The 1972 CWA Amendments Fundamentally Restructured U.S. Water Pollution Regulation by Replacing Ineffectual Site-Specific Assessments of Water Quality with National Technology-Based Standards;
- 9. Capacity Utilization Rating as a Basis for Different Standards.** *Electric generating facilities may still continue to withdraw significant volumes of water when not generating*

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<sup>714</sup> 76 Fed. Reg. at 22,274 (col. 1).

<sup>715</sup> *Riverkeeper I*, 358 F.3d at 190; *see also Riverkeeper II*, 475 F.3d at 108-09.

<sup>716</sup> *See Riverkeeper II*, 475 F.3d at 108-09.

*electricity. Further, EPA found that load-following and peaking plants operate at or near 100 percent capacity (and therefore 100 percent design intake flow) when they are operating. Peaking facilities (those with a CUR of less than 15 percent, as defined in the 2004 Phase II rule) may withdraw relatively small volumes on an annual basis, but if they operate during biologically important periods such as spawning seasons or migrations, then they may have nearly the same adverse impact as a facility that operates year round. EPA requests comment on its decision not to exclude facilities with a low capacity utilization rate. Comments who believe that EPA should include a CUR threshold in the final rule should provide a suggested threshold and explain the basis for it.*<sup>717</sup>

**Response:**

EPA is correct to avoid setting any kind of capacity utilization rate threshold for the reasons that the agency has already articulated.

**10. Flow Commensurate With Closed-Cycle Cooling.** *EPA requests comment on whether the demonstration that a facility's flow reduction will be commensurate with closed-cycle cooling should be based on a defined metric, or determined by the permitting authority on a site-specific basis for each facility. EPA is proposing that a facility seeking to demonstrate flow reduction commensurate with closed-cycle cooling using flow reduction technologies and controls other than through closed-cycle cooling (e.g., through seasonal flow reductions, unit retirements, and other flow reductions) would have to demonstrate total flow reductions approximating 97.5% for freshwater withdrawals and 94.9% for saltwater withdrawals. See Section IX.D.*<sup>718</sup>

**Response:**

The 97.5 percent freshwater/94.9 percent saltwater flow reduction metrics that EPA has proposed for determining when a facility has reduced its intake flow commensurate with closed-cycle cooling are clear and workable, and supported by EPA's record. They should be maintained in the final rule. But in that final rule, these metrics should apply to all facilities, not merely to new units at existing facilities. As explained above, EPA is required to set a uniform national standard under this rule based on the performance of closed-cycle cooling systems. There is no need, or legal basis, for EPA to require permitting authorities to define "commensurate" anew at every facility.

**11. Credits for Unit Closures.** *EPA requests comments on the proposed approach to allow credits for unit closures to be valid for 10 years from the date of the closure. In EPA's current thinking this approach reasonably allows facilities to get credit for flow reductions attributable to unit closures, but also requires such facilities to make future progress to ensure its operations reflect best available entrainment controls. See Section IX.D.*

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<sup>717</sup> 76 Fed. Reg. at 22,274 (col. 1).

<sup>718</sup> 76 Fed. Reg. at 22,274 (col. 2); *see also* 76 Fed. Reg. at 22,253 (col. 3).

**Response:**

EPA should not allow any “credit” whatsoever for flow reductions attributable to unit closures. Plant operators may choose to close a unit, but the remaining units must still use BTA to minimize the adverse environmental impacts of their cooling water intake structures.

**12. Land Constraints.** *EPA requests comment on the use of a ratio for determining the land constraint threshold for retrofit construction of cooling tower, as well as data for determining alternative thresholds. EPA has not identified any facilities with more than 160 acres/1000MWs that EPA believes would be unable to construct retrofit cooling towers. EPA is exploring the use of such a ratio to support determinations regarding adequate land area to construct retrofit cooling towers. See Section IX.D (footnote 1).*<sup>719</sup>

**Response:**

As explained in the attached engineering report prepared by Powers Engineering, EPA’s estimate that as many as 25 percent of facilities might have space constraints that would limit retrofit of cooling towers for the entire facility or increase compliance costs is vastly overblown because EPA’s assessment is based on the use of land-intensive in-line cooling towers, not the much more space efficient back-to-back cooling tower configuration. A back-to-back cooling tower configuration requires about 17 percent of the space needed for two in-line towers for the same cooling capacity, assuming the spacing recommended for parallel banks of in-line towers. Because cooling towers can be installed in a back-to-back configuration at virtually any site, EPA should not set a “limited acreage” exemption (such as the 160 acres per gigawatt threshold the agency is exploring) and should acknowledge that cooling towers are an available technology for the industry as a whole.

The following sections of this comment letter are most relevant this request for comment:

- III.B.2.b.1 – There Is Adequate Space for Cooling Towers at Virtually Any Plant Site;
- Appendix D – Comments of William Powers, P.E., Powers Engineering

**13. Proposed Implementation Schedule.** *EPA requests comment on its proposed schedule for implementing the proposed rule. The proposed schedule uses a phased approach for information submittal, requiring some facilities to submit application materials as soon as six months after rule promulgation. The longest timeframe for information submittal would not exceed seven years and six months. EPA solicits comment on the proposed schedule, and specifically seeks comment and data on the appropriate amount of time to collect data, conduct reviews, obtain comment, provide for public participation, and issue final permit conditions. See Section IX.E.*<sup>720</sup>

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<sup>719</sup> 76 Fed. Reg. at 22,274 (col. 2); see also 76 Fed. Reg. at 22,252 (col. 3).

<sup>720</sup> 76 Fed. Reg. at 22,274 (col. 2); see also 76 Fed. Reg. at 22,254 (col. 3).

**Response:**

EPA's proposed schedule for information submittal is entirely too long and should be cut in half. As EPA noted in the Proposed Rule, facilities with a DIF greater than 50 MGD were previously subject to the withdrawn Phase II rule and therefore should have already compiled much of the proposed application data which can be used to meet many of the information submittal requirements.<sup>721</sup> The maximum time frame for impingement compliance should be shortened to three years or less. Further, completion of cooling tower retrofits should be required no later than 36 months after approval of the application at fossil plants, and no more than 48 months after approval at nuclear plants (nuclear plants may need additional time to synchronize the retrofit outage with a refueling outage).<sup>722</sup>

The following sections of this comment letter are most relevant to EPA's request for comments:

- III.B.4 - EPA Should Shorten the Entrainment Compliance Timelines.
- III.C - Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects.

In particular:

- III.C.4 - EPA Should Select the 0.5-Foot-per-Second Velocity Limit as the Impingement Standard for the Final Rule.

**14. Methods for Evaluating Latent Mortality Effects Resulting From Impingement.**

*EPA requests comment on methods for evaluating latent mortality effects resulting from impingement. EPA requests comment on whether it should specifically establish 24 or 48 hours after initial impingement as the time at which to monitor impingement mortality. EPA's record demonstrates that a holding time of no more than 48 hours is optimal for evaluating the latent mortality associated with impingement while at the same time minimizing mortality associated with holding the organisms. See Section IX.F.1.<sup>723</sup>*

**Response:**

EPA should not measure latent mortality from impingement at all. Instead, EPA should eliminate the 12/31 percent impingement mortality standard as a compliance option and set a 0.5 ft/s velocity limit to control impingement as the national standard.

Measuring latent mortality is deeply problematic. As EPA acknowledges, "there are no standard methods for conducting impingement and entrainment studies and that there can be

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<sup>721</sup> See 76 Fed. Reg. at 22,254 (col. 2).

<sup>722</sup> See Powers Report.

<sup>723</sup> 76 Fed. Reg. at 22,274 (col. 3); see also 76 Fed. Reg. at 22,257 (col. 3).

variability in designing a sampling plan between sites.”<sup>724</sup> That variability, along with the complexity of the biological issues involved, will inevitably lead to disputes, delays and uncertainty. Also, latent mortality may occur after more than 48 hours. While EPA is not proposing a longer latency period because of the potential for greater mortality as a result of the holding, the fact remains that mortality which occurs 72 or 96 hours after the impingement event would not be measured at all under the Proposed Rule. As the attached biological report from PISCES Conservation explains, latent impingement mortality has been demonstrated to occur 96 hours after the impingement event. Thus, if latent mortality evaluations are conducted, they must include a holding time of at least 96 hours.

It is both more straightforward and more effective to reduce impingement altogether by lowering intake velocities, rather than allowing unlimited impingement but attempting to reduce the mortality rate. EPA has already concluded that “a design through-screen velocity of 0.5 feet per second would be protective of 96% of motile organisms” and is better than attempting to reduce impingement mortality through the use of technologies such as modified travelling screens.<sup>725</sup> The evidence shows not only that 18 percent of intake structures presently meet the 0.5 ft/s velocity limit but also that many existing facilities can meet it.<sup>726</sup>

The following sections of this comment letter are most relevant to this request for comment:

- III.C - Although the Establishment of National Categorical Standards for Impingement Is Necessary and Appropriate, the Proposed Standards Are Impermissibly Weak and Problematic in Numerous Respects.

In particular:

- III.C.2 – EPA’s Rejection of the 0.5 Ft/S Velocity Limitation as the Primary National Standard Is Illegal.
- III.C.3 - The 12 Percent/31 Percent Impingement Mortality Reduction Requirement Is Problematic In Numerous Respects.
- Appendix B - Comments of Dr. Peter Henderson and Richard Seaby, PISCES Conservation, Ltd.

**15. Counting Impinged Organisms With the “Hypothetical Net.”** *EPA requests comment on the “hypothetical net” approach to measuring impingement mortality. Facilities could apply a “hypothetical net” in that they could elect to only count organisms that would not have passed through a net with 3/8” mesh. For example, a facility that uses a finemesh screen or diverts the flow directly to a sampling bay would only need to count organisms that could be collected if the flow passed through a net,*

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<sup>724</sup> *Id.* at n.103.

<sup>725</sup> See 76 Fed. Reg. at 22,204 (col. 3).

<sup>726</sup> See TDD, Ch. 6.

*screen, or debris basket fitted with 3/8'' mesh spacing. See Section IX.F.1. EPA further solicits comment on alternative approaches that would not penalize facilities for employing fine mesh screens.*<sup>727</sup>

**Response:**

The response to this request is similar to the previous response: EPA should not measure impingement mortality at all. Instead, EPA should eliminate the 12/31 percent impingement mortality standard as a compliance option and set a 0.5 ft/s velocity limit to control impingement as the national standard. Furthermore, as the PISCES report explains, there is not a distinct cut-off for the size of animal that will pass through a 3/8'' inch mesh. It depends on many factors, such as body shape of a particular species (long thin forms can pass through the mesh when many times longer than 3/8''), the angle at which a fish approaches the mesh (head on, most fish are smaller than side on), the amount of debris already on the mesh, among other factors.

**16. Incentives for Reducing I&E by Reducing Water Withdrawals.** *EPA requests comment on incentives or alternative requirements for exceptionally energy efficient or water efficient facilities. See Section III. EPA also solicits comment on the regulatory provisions that encourage the use of recycled water as cooling water, including reclaimed water from wastewater treatment plants and process water from manufacturing facilities, EPA solicits comment on other incentives to encourage use of recycled water to supplement or replace marine, estuarine, or freshwater intakes.*<sup>728</sup>

**Response:**

In principle, the commenters support efforts to encourage the conservation, use and reuse of water and believe that EPA should incentivize the use of reclaimed water wherever possible. As discussed more thoroughly above, reclaimed water is widely available for use as cooling water and EPA has underestimated the availability of this resource. EPA should incentivize the use of reclaimed water by following the State of California in requiring that all facilities demonstrate that they have made use of all reasonably available reclaimed water for cooling before any withdrawal of water from a water of the United States is allowed.

However, we are concerned that EPA is not effectively encouraging reuse, and is instead providing a huge and unwarranted loophole from BTA requirements, when it exempts cooling water withdrawals where the water is also used for desalination. In particular, we have serious concerns about the blanket exemptions in Section 125.91(c) and Section 125.92. As drafted, these sections exempt water from the definition of "cooling water" if it is obtained from a desalination plant or is used in a manufacturing process either before or, more likely, after it is used for cooling purposes.

The problem arises because new desalination plants in California have received NPDES permits under the presumption that they will cause no net impact to the marine environment by

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<sup>727</sup> 76 Fed. Reg. at 22,274 (col. 3).

<sup>728</sup> 76 Fed. Reg. at 22,274 (col. 3).

virtue of co-locating with power plants that will be required to employ the best technology available to minimize adverse impacts under 316(b).<sup>729</sup> But EPA's proposed rule would exempt a once-through-cooled power plant from Section 316(b) compliance if it gives its discharge water to a desalination plant. Consequently, in California (and soon in other states), both the power plant and the desalination facility will be able to claim that they cause no impact because the other user is the primary consumer, while their massive water withdrawal kills sea life through entrainment and impingement at exactly the same levels as before. To ensure the objective of Section 316(b) to minimize entrainment and impingement from cooling water intakes is achieved, the proposed language in the regulations must be re-written to eliminate any and all definitions or exemptions that would potentially allow power plants to be excluded from the regulations simply because a seawater desalination facility happened to co-locate with the power plant.

The following sections of this comment letter are most relevant to this request for comment:

- I.A.13 - Water Availability and Related Energy Impact
- III.E.5 - EPA Must Prohibit the Use of Freshwater for Once-Through Cooling in Arid Regions or Those at Risk of Drought.
- III.E.6 - EPA Should Not Exempt Cooling Water Withdrawals from the Rule Merely Because the Water Is Also Used for Desalination.

**17. Options Which Provide Closed-Cycle Cooling as BTA.** *EPA solicits comment on regulatory options that establish closed-cycle cooling as BTA. EPA specifically requests comment on the regulatory options 2 and 3 included in today's proposal, which would establish closed-cycle cooling as BTA for EM at a DIF of 2 MGD and 125 MGD, respectively. See Section VI and VII. EPA further solicits comment and supporting data on alternative thresholds, including whether such alternative thresholds should be based on DIF or AIF. EPA also solicits comment and supporting data for alternative criteria that would establish closed-cycle cooling as BTA for some facilities.*<sup>730</sup>

**Response:**

EPA should establish an entrainment standard based on closed-cycle cooling as envisioned in the agency's Option 3. Option 3 would set a national categorical standard based on closed-cycle cooling and include a narrow safety-valve variance for those plants with factors fundamentally different than the majority of plants that can meet such a standard. Option 3 would minimize adverse environmental impacts with feasible and readily affordable technology.

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<sup>729</sup> See, e.g., Cal. Reg'l Water Quality Control Bd., San Diego Region, Order No.R9-2009-0038 Amending Order No. R9-2006-0065 (NPDES No. CA0109223) Waste Discharge Requirements for the Poseidon Resources Corporation Carlsbad Desalination Project Discharge to the Pacific Ocean via the Encina Power Station Discharge Channel (May 13, 2009) (Exh. 136) *also available at* [www.swrcb.ca.gov/rwqcb9/board\\_decisions/adopted\\_orders/2009/R9\\_2009\\_0038\\_rev1.pdf](http://www.swrcb.ca.gov/rwqcb9/board_decisions/adopted_orders/2009/R9_2009_0038_rev1.pdf).

<sup>730</sup> 76 Fed. Reg. at 22,275 (col. 1); see also 76 Fed. Reg. 22,205 (col. 1).



Contrary to industry's hyperbolic claims (many of which EPA uncritically accepted), Option 3 would not cause electric reliability problems, would not increase electricity prices, and would not cause any significant adverse environmental effects. Further, EPA's economic findings are unambiguous: the stronger the regulation, the greater the boost to the economy and job creation. At either discount rate EPA used in its analysis, Option 3 creates jobs and stimulates the economy to a greater degree than any of the other options. At a 7 percent discount rate, it produces 10,102 new jobs under EPA's analysis, but the actual benefits to the economy of Option 3 are likely much greater. Option 3 is therefore a job-creating rule that will improve the economy.

In its cost-benefit analysis, EPA was unable to quantify whole categories of benefits, and even where EPA was able to quantify benefits, it was unable to monetize the overwhelming majority of them. A complete cost-benefit analysis, if that were even possible using existing economic tools, would show that the benefits of Option 3 clearly exceed the costs and thus the benefits obviously justify the costs, and the costs are not wholly disproportionate to the benefits.

The following sections of this comment letter are most relevant to this request for comment:

- I.B.3 – As Part of the CWA's Technology-Based Regime, Section 316(b) Requires EPA to Adopt Uniform, National, Categorical, Technology-Based and Technology-Forcing BTA Standards for Cooling Water Intake Structures;
- I.C – Regulatory Background: For Forty Years, Regulation on a Case-by-Case Site-Specific Basis Has Caused Bureaucratic Paralysis and Perpetuated the Unacceptable Status Quo, Contrary to Congress's Intent;
- II.D – The Rulemaking Process: Changes Made at the Suggestion or Recommendations of OMB;
- III.A – EPA's Interpretation of Section 316(b) and its "Approach to BTA" Contradicts the Plain Meaning of the Act and Congress's Clearly Expressed Intent;
- III.B – EPA Should Establish a National Categorical Entrapment Standard Based on Closed-Cycle Cooling; and
- III.F – EPA's Cost-Benefit Analysis is Deeply Flawed and Illegal.

**18. Costs of Controls to Eliminate Entrapment.** *EPA assumes facilities with modified traveling screens including a fish handling and return system would meet the proposed requirements to eliminate entrapment of fish and shellfish. EPA believes those facilities with an offshore velocity cap leading to a forebay but without a fish return system would incur costs to meet the proposed requirements for entrapment. For facilities with closed-cycle cooling systems, EPA does not have data on the number of facilities that also have a fish handling and return system. Further, EPA does not have data on the number of facilities that have less than 0.5 feet per second intake velocity but have a cooling water*

*intake system that may cause entrapment. EPA solicits comment and data on the types and numbers of facilities with a cooling water intake system that may cause entrapment, and the costs to eliminate entrapment.*<sup>731</sup>

**Response:** No comment.

**19. Analysis of New Capacity.** *EPA requests comment on the number of new units and the amount of new capacity construction projected. See Section VII.*<sup>732</sup>

**Response:**

As discussed above, even the most expensive of EPA's options will cause so few power plant retirements that the number of new units and amount of new capacity is irrelevant. Any retirements would be replaced many times over under even the most modest new capacity projections.

**20. Monitoring Reports.** *EPA solicits comment on how frequently I&E mortality monitoring reports should be submitted. EPA further solicits comment on incorporating the monitoring reports into monthly DMRs, or whether less frequent reporting is appropriate. EPA also requests comment on whether minimum monitoring frequencies should be established in this rule or left to the discretion of the Director. See Section IX.*<sup>733</sup>

**Response:**

To the extent biological monitoring is conducted pursuant to the rule, EPA should specify minimum monitoring requirements that meet the expectations it laid out in the preamble, rather than leaving monitoring terms to be determined by the Director. It is inefficient for each state to reinvent monitoring requirements (as EPA would have it) dozens of times – once for each facility.

The following sections of this comment letter are most relevant to this request for comment:

- III.E.4 - EPA Should Specify Minimum Monitoring Requirements.
- Appendix B - Comments of Dr. Peter Henderson and Richard Seaby, PISCES Conservation, Ltd.

**21. Seasonal Operation of Cooling Towers.** *EPA solicits comment on an option that would require cooling towers on some or all facilities but recognize the site-specific nature of EM by allowing seasonal operation of cooling towers during peak entrainment season.*

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<sup>731</sup> 76 Fed. Reg. at 22,275 (col. 1); *see also* 76 Fed. Reg. at 22,251 (col. 2) and 76 Fed. Reg. at 22,204 (col. 3)

<sup>732</sup> 76 Fed. Reg. at 22,275 (col. 1).

<sup>733</sup> 76 Fed. Reg. at 22,275 (col. 1); *see also* 76 Fed. Reg. at 22,262 (col. 2).

*EPA also requests comment on including a similar provision for new units at existing facilities, which are required to achieve I&E reductions commensurate with closed-cycle cooling in the proposed rule.*<sup>734</sup>

**Response:**

Closed-cycle cooling should operated year-round because of the potential to entrain and impinge aquatic organisms well beyond “peak entrainment season.” To the extent that a facility operating closed-cycle cooling nevertheless entrains large numbers of organisms during peak entrainment season, additional fish protective measures should be required, such as seasonal outages.

**22. New Unit Provision.** *EPA solicits comment on the new unit provision. Specifically, EPA solicits comment on the clarity of the definition of new unit, and whether it should be expanded to include other units such as those that are repowered or rebuilt. EPA also solicits comment on whether the new unit provision should be deleted, therefore subjecting these units to the same site-specific entrainment BTA determination required of existing units.*<sup>735</sup>

**Response:**

EPA should revert to the new units definition and standards that it proposed to OMB with minor revisions noted above. The version of the proposed rule that EPA sent to OMB would have required all replacements, repowerings, and rebuilt power plants to meet standards based on closed-cycle cooling because those plants have the ability to include closed-cycle cooling systems as part of the initial design of the rebuilt, repowered or replacement plant. But OMB modified those provisions such that only “new units at existing facilities,” a very narrowly-defined class of entities, now have to meet the closed-cycle cooling standards.

Neither the rule, nor the preamble, provide any justification for not treating replaced, repowered, or rebuilt facilities as new units. The reasons that EPA gave for strictly regulating additional units apply equally to total replacements and repowerings<sup>736</sup> – this is evident from the version of the preamble that EPA sent to OMB. The current rule irrationally distinguishes between two total replacements of a facility. If an owner replaces every inch of the site, it is a new facility. But if the owner completely demolishes and replaces everything at the existing facility except for the cooling water intake structure itself, it is an existing facility. Yet all the equipment necessary to meet a closed-cycle cooling standard is built behind the cooling water intake structure.

EPA’s technical experts agreed that the reasons for considering an additional unit to be a new unit apply equally to replacements and repowerings, but they were overruled by OMB.

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<sup>734</sup> 76 Fed. Reg. at 22,275 (col. 2).

<sup>735</sup> 76 Fed. Reg. at 22,275 (col. 2).

<sup>736</sup> As do the reasons EPA gave for strictly regulating new facilities back in 2001, in the Phase I rule.

OMB has not justified its proposed change, and in any case the office does not have technical expertise. For EPA to accept OMB's unjustifiable modification to the rule is arbitrary and unreasonable; it is also inconsistent with Congress's intent to control mortality at cooling water intakes.

The following sections of this comment letter are most relevant to EPA's request for comments:

- II.D.3 - OMB Determined that Replacements/Repowerings Are Not New Units and Deleted EPA's Contrary Statements and Rationale.
- III.D - All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as New Units at Existing Facilities.

**23. Review Criteria to Guide Evaluation of Entrainment Feasibility Factors.** EPA solicits comment on the criteria specified in the regulation for guiding the evaluation of closed-cycle cooling as BTA for EM. EPA further solicits comment on additional criteria that EPA should address, and whether such criteria should be developed in the regulation or provided in guidance.<sup>737</sup>

**Response:**

State permitting directors should not be required to evaluate whether closed-cycle cooling is the best technology available to minimize entrainment on a site-specific basis because EPA's record evidence supports – and the Clean Water Act requires – establishing a national categorical standard based on the performance of closed-cycle cooling systems. Further, the evidence shows that states are incapable of making these determinations in a timely manner, if at all, and certainly not in the manner that EPA envisions in the proposed rule. But in cases where a facility seeks a variance from national standards, Directors will be required to determine whether a variance is warranted. As discussed above, EPA should carefully tailor any variance provision and set rules for the Director to follow in apply that variance.

The following section of this comment letter is most relevant to this request for comments:

- III.B.5 – Any Variance EPA Includes as Part of a Categorical Entrainment Standard Must Clearly Delineate What Issues May Be Considered by the Director and How They Are to Be Considered.

**24. Alternative Procedures for Visual or Remote Inspections.** *EPA requests comment on its proposal to permit the Director to establish alternative procedures for conducting visual or remote inspections during periods of inclement weather. EPA also requests comment on whether the rule should specify minimum frequencies for visual or remote*

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<sup>737</sup> 76 Fed. Reg. at 22,275 (col. 2).

*inspections, or leave this to the determination of the permitting authority. See Section IX.F.*<sup>738</sup>

**Response:**

EPA should maintain the requirement that cooling water intake structures be inspected at least weekly to ensure that any technologies installed to comply with § 125.94 are maintained and operated to ensure that they will continue to function as designed.

**25. Threshold for In-Scope Facilities.** EPA requests comment on the threshold of DIF greater than 2 MGD for identifying facilities in-scope of this rule.<sup>739</sup>

**Response:**

The 2 MGD DIF threshold is appropriate for defining the universe of facilities within the scope of the Clean Water Act. Facilities above this level have an impact on water bodies that is more than *de minimis* and the 2 MGD threshold matches the threshold set in the Phase I rule. If EPA is concerned about costs and impacts on small business of meeting a national standard that is also suitable for the nation's largest power plants, EPA must undertake a thorough effort to craft a national standard by looking at various thresholds and options for subcategorizing the more than 1,200 facilities with cooling water intake structures affected by this rule. But EPA should not and cannot set a higher threshold and leave all below-threshold facilities to have their BTA determination made on a BPJ basis.

**26. Application Requirements.** *EPA requests comment on the burden and practical utility of all of the proposed application requirements. EPA is particularly interested in the burden of application requirements to facilities with DIF < 50 MGD. EPA also requests comment on its proposal to limit application requirements for facilities that have already installed closed-cycle cooling, or opt to do so without a site-specific assessment of BTA, and whether there are additional requirements that could be relaxed for this group.*<sup>740</sup>

**Response:**

The application burdens imposed by the open-ended case-by-case process in the Proposed Rule can be dramatically lessened by selecting Option 3. This would avoid the need for 1,200 site-specific applications, with multiple studies included in each application. Such studies would only be required in the context of a variance from a uniform national closed-cycle cooling standard. To the extent that EPA leaves any significant aspect of cooling water intake regulation to site-specific determination, the studies that EPA is requiring as part of the proposed application requirements are necessary and unavoidable. EPA, the states, and the public lack reliable information as to specific power plants' technologies, operations and fish kills and the

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<sup>738</sup> 76 Fed. Reg. at 22,275 (col. 2); *see also* 76 Fed. Reg. 22,259 (col. 2).

<sup>739</sup> 76 Fed. Reg. at 22,275 (col. 2).

<sup>740</sup> 76 Fed. Reg. at 22,275 (col. 2); *see also* 76 Fed. Reg. at 22,249 (col. 2).

required studies should fill this data gap. Application requirements can be lessened for facilities with closed-cycle cooling or those that opt to install closed-cycle cooling.

**27. Comment from State and Local Officials.** EPA specifically requests comment on this proposed rule from State and local officials. See Section X.E.<sup>741</sup>

**Response:**

As discussed above, many states have previously commented to EPA that they lack the resources and expertise to make BTA determinations or conduct cost-benefit analyses on a site-specific, case-by-case basis in the absence national categorical standards.

The following sections of this comment letter are most relevant to this request for comments:

- I.C. Regulatory Background: For Forty Years, Regulation on a Case-by-Case Site-Specific Basis Has Caused Bureaucratic Paralysis, Litigation Quagmires, and the Perpetuation of the Unacceptable Status Quo, Contrary to Congress's Intent.
- III.B.1.c(1) – States Cannot Complete Case-By-Case BTA Determinations.
- III.B.1.c(2) – States Cannot Conduct, or Meaningfully Review, Site-Specific Cost-Benefit Analyses.

**28. Comment From Tribal Officials.** EPA specifically requests additional comment on this proposed action from Tribal officials. See Section X.F.

**Response:** No comment.

**B. Responses to Additional Requests.**

In addition, the preamble also contains other specific requests for comments that were not included in the list of 28 responded to above. We respond to these, which appear at various places in the preamble, here.

**From Preamble Section VI.C.**

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

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<sup>741</sup> 76 Fed. Reg. at 22,275 (col. 3).

*and additional costs should not be necessary. EPA has occasionally used annual limits in the effluent guidelines program (most recently for the pulp and paper industry category (40 CFR 430, promulgated in 1998) and has previously not included a variability factor for annual limits. Thus, EPA's proposed approach to calculating the annual standard for mortality impingement is consistent with past practice. **EPA requests comment** on its proposed approach for calculating and implementing the annual standard. This technology does not minimize adverse environmental impacts associated with entrainment, and does not specifically address impingement mortality of shellfish.*<sup>742</sup>

**Response:**

As noted above, EPA should not measure impingement mortality as a percentage of impingement at all. Instead, EPA should eliminate the 12/31 percent impingement mortality standard as a compliance option and set a 0.5 ft/s velocity limit to control impingement as the national standard. Please see the responses above to EPA's fourteenth and fifteenth requests for comments.

But it is conceivable that, in the context of a variance from a national impingement standard that requires facilities to meet a 0.5 ft/s velocity limit, measuring impingement mortality may be necessary. In that situation, EPA should not apply a variability factor for the reasons EPA presents in the preamble.

**From Preamble Section VI.D.1.b.**

**Entrainment Controls**

*The proposal would require consideration of site-specific entrainment controls for each facility above 2 MGD DIF. EPA considered proposing no further controls to address entrainment mortality, and to rely instead only on the BTA impingement mortality controls, which would achieve up to a 31 percent reduction in total AEI. EPA has not selected this option as the basis for national BTA because EPA believes that some facilities may be able to do more to control entrainment and that requiring a structured site-specific analysis of candidate BTA technologies for entrainment control will allow the Director to determine where it is appropriate to require such controls. However, one outcome of the site specific analysis may be that the Director would determine that no other technologies beyond impingement control meet the criteria for election as BTA, because no other technologies are feasible and/or their benefits do not justify their costs. **EPA requests comment** on the option of basing national BTA on impingement controls only and dropping the specific requirement for a structured site specific analysis of entrainment BTA options, as discussed below.*<sup>743</sup>

**Response:**

The evidence that EPA has gathered compels EPA to establish an entrainment standard based on closed-cycle cooling as envisioned in the agency's Option 3 because closed-cycle cooling is the best technology available. Anything less –particularly a decision to set no

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<sup>742</sup> 76 Fed. Reg. at 22,203 (col. 2-3).

<sup>743</sup> 76 Fed. Reg. at 22,205 (col. 1).

entrainment standard at all – is a wholesale abdication of EPA’s statutory duty. Congress specifically enacted Section 316(b) to address the massive fish kills caused by closed-cycle cooling. EPA has consistently found that the primary adverse environmental impacts of cooling water intake structures are impingement and entrainment. EPA has no authority to require BTA for minimizing impingement only and not entrainment.

The following sections of this comment letter are most relevant to this request for comment:

- I.A – Factual Background: Once-Through Cooling Causes Adverse Environmental Impacts of Staggering Proportions;
- I.B. – Congress Enacted Section 316(b) as Part of the 1972 Clean Water Act Amendments to Standardize Permitting and Minimize Once-Through Cooling’s Massive Water Withdrawals and Fish Kills;
- III.A – EPA’s Interpretation of Section 316(b) and its “Approach to BTA” Contradicts the Plain Meaning of the Act and Congress’s Clearly Expressed Intent;
- III.B – EPA Should Establish a National Categorical Entrainment Standard Based on Closed-Cycle Cooling; and
- III.F – EPA’s Cost-Benefit Analysis is Deeply Flawed and Illegal.

**From Preamble Section VI.E. Option Selection**

*EPA solicits comment on Option 4 and the impacts, including the cumulative impacts of today’s proposal on small entities generally.*<sup>744</sup>

**Response:**

Option 4 is the least protective and most legally inadequate of all the options that EPA considered and should be given no further consideration.

*EPA also requests comment on whether, if Option 4 were adopted for the final rule, it should include uniform national requirements for new units at existing facilities with DIF less than 50 MGD based on closed-cycle cooling.*<sup>745</sup>

**Response:**

Option 4 is the least protective and most legally inadequate of all the options that EPA considered and should be given no further consideration. New units (as properly defined) with a DIF of 2 MGD or above should be subject to uniform national requirements based on closed-cycle cooling.

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<sup>744</sup> 76 Fed. Reg. at 22,208 (col. 2).

<sup>745</sup> 76 Fed. Reg. at 22,208 (col. 2).



### **From Preamble Section VI.I. EPA's Costing of the Preferred Option**

*These hypothetical scenarios illustrate the site-specific costs if a significant number of facilities install and operate a closed-cycle cooling system. These scenarios assume facilities would install only closed-cycle cooling and operate it year-round. This may represent an upper-bound cost for those facilities. EPA also assumed that cooling towers will be installed at fossil fuel plants within 10 years. EPA is aware that there are other possible scenarios for projecting which facilities might be required to install closed-cycle cooling or other entrainment mortality technologies as a result of individual BTA determinations. Some of these would show lower or higher costs than those presented here. **EPA requests comment** on other scenarios that might better capture the range of costs that result from the structured analysis of entrainment mortality BTA required by today's proposed rule.<sup>746</sup>*

#### **Response:**

As explained above, and in more depth in the attached report of Powers Engineering, EPA overestimated the costs of closed-cycle cooling. The greatest flaw in EPA's approach to estimating the cost of retrofits was EPA's irrational decision, in 2007, to abandon its own thoroughly documented cost estimation model and instead use unverified figures provided by the Electric Power Research Institute (EPRI), which is an arm of the electric power industry being regulated by the rule. Consequently, EPA has overestimated the costs of closed-cycle cooling by approximately 60 percent.

The following sections of this comment letter are most relevant to this request for comment:

- III.F.3 - EPA Overestimated the Costs of Closed-Cycle Cooling.
- Appendix D – Comments of William Powers, P.E., Powers Engineering

### **From Preamble Section IX.B. When would affected facilities be required to comply?**

*...if a facility plans to retrofit to wet cooling towers to both reduce entrainment mortality and to use the resulting lower intake velocity to comply with requirements for impingement mortality, the Director may be able to allow for compliance with the IM requirements to extend to the same schedule as the entrainment mortality requirements. However, where the Director determines a facility would need longer than 8 years to comply with the EM requirements established by the Director, the proposed rule would not allow the compliance schedule for IM to extend beyond 8 years. EPA recognizes that this limitation may penalize facilities that might install cooling towers to meet both IM and EM requirements but are unable to complete installation within 8 years. **EPA requests comment** on this limitation.<sup>747</sup>*

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<sup>746</sup> 76 Fed. Reg. at 22,211 (col. 2).

<sup>747</sup> 76 Fed. Reg. at 22,248 (col. 2).

**Response:**

In the draft of this proposed rule that EPA originally sent to OMB, the agency explained the firm eight year deadline for impingement compliance by saying that it “does not intend for the facility to do nothing to reduce [impingement] until the technologies for [entrainment] have been implemented.” All facilities should be able to install closed-cycle cooling in less than eight years, and impingement controls should be required in three years or less. To the extent that a facility installs closed-cycle cooling to meet impingement and entrainment standards, and the retrofit is expected to take longer than usual, the facility should be required to install interim measures to reduce impingement.

**From Preamble Section IX.D. *What information must I submit in my permit application?***

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

*EPA recognizes that in some cases it may be efficient for permit applicants to combine several of the required studies into a single document and have them reviewed holistically by a single set of peer reviewers. Such an approach is not precluded by the proposed rule as long as the peer review panel has the background appropriate to conduct the combined review and the permitting authority approves. **EPA requests comment** on the peer review requirements and the level of specificity regarding peer review in the draft rule text.<sup>748</sup>*

**Response:**

The current study process is deeply flawed because consultants and peer reviewers will be hired and paid by the applicant. In many cases, they will become advocates for the applicant’s position rather than impartial adjudicators. This risk is multiplied because most applicants are repeat players: the parent company owns or operates multiple facilities and can provide pliant consultants and reviewers with a steady stream of work. Even if applicants pay for the cost of conducting studies and peer reviews, the integrity of the analytical process can only be assured if the State, not the applicant, selects the contractors and oversees the studies.

*Under 125.94(d)(2), EPA would allow facilities to implement technologies other than closed-cycle cooling systems that reduce entrainment mortality by at least 90 percent of what would have been obtained via flow reduction commensurate with closed-cycle cooling under 125.94(d)(1). This compliance provision mirrors the Track II provision of the Phase I rule, and is intended to provide opportunities for facilities to consider technologies such intake relocation or fine mesh screens, or operational measures such as the recycle and reuse of cooling water for other purposes... **EPA seeks comment** on this provision.<sup>749</sup>*

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<sup>748</sup> 76 Fed. Reg. at 22,253 (cols. 1-2).

<sup>749</sup> 76 Fed. Reg. at 22,254 (col. 2).

**Response:**

EPA should clarify that, in seeking to comply with the entrainment mortality requirement by demonstrating reductions in mortality that are commensurate with use of a closed-cycle system, a facility must aim for 100 percent, and if it falls short within 10 percent, that will be acceptable. It may not, however, aim for 90 percent and achieve only an 89 percent reduction in entrainment mortality.

The following sections of this comment letter are most relevant to this request for comment:

- III.D.2 – All Repowered, Replaced, or Rebuilt Facilities Must Be Subject to the Same Closed-Cycle-Cooling-Based Requirements as “New Units at Existing Facilities.”
- IV – Additional Revisions to the Phase I Rule Are Warranted in Light of the *Riverkeeper I* Decision.

**From Preamble Section IX.J. What is the Director’s role under today’s proposal?**

*(4) The Director would review and approve the site-specific impingement mortality plan including the duration and frequency of any monitoring beyond the minimum specified by the rule, the monitoring location, the organisms to be monitored, and the method in which naturally moribund organisms would be identified and taken into account. EPA solicits comment on whether the Director should review, but not approve, the identified plans.*<sup>750</sup>

**Response:**

EPA should not measure impingement mortality at all. Instead, EPA should eliminate the 12/31 percent impingement mortality standard as a compliance option and set a 0.5 ft/s velocity limit to control impingement as the national standard. Please see the responses above to EPA’s fourteenth and fifteenth requests for comments.

However, if a facility should face technical constraints that prevent it from complying with a 0.5 ft/s velocity limit and impingement mortality monitoring is required, monitoring plans should depend on approval by the Director. Facilities should not be able to design their own monitoring plans without oversight because sampling is an expense that plant operators will want to minimize, they have every incentive to propose minimal sampling frequencies and to scale down the extent of monitoring in every other way.

At the same time, however, the Director’s ability to approve monitoring studies, as set forth in proposed 40 CFR § 125.98(c)(6), should be revised to prevent state permit directors from excluding “other specific species,” which are neither invasive nor naturally moribund, from monitoring, sampling, and study requirements. Since BTA determinations and compliance with

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<sup>750</sup> 76 Fed. Reg. at 22,260 (col. 3).

BTA standards will be in large part determined through monitoring, sampling and studies, this “species of [no] concern” provision would allow states to simply ignore, rather than minimize, mortality to certain species.

The following sections of this comment letter are most relevant to this request for comment:

- III.E.2. – EPA Should Prevent Directors from Excluding Any Species from the Rule’s Scope.

*(6) The Director would review and approve the site-specific entrainment mortality sampling plan for new units at existing facilities (other than those employing closed-cycle cooling) including the duration and frequency of monitoring, the monitoring location, the organisms to be monitored, and the method in which latent mortality would be identified. EPA solicits comment on whether the Director should review, but not formally approve, the identified plans.<sup>751</sup>*

**Response:**

As with impingement monitoring, entrainment monitoring plans should also depend on approval by the Director. Facilities should not be able to design their own monitoring plans without oversight because sampling is an expense that plant operators will want to minimize, they have every incentive to propose minimal sampling frequencies and to scale down the extent of monitoring in every other way.

At the same time, however, the Director’s ability to approve monitoring studies, as set forth in proposed 40 CFR § 125.98(c)(6), should be revised to prevent state permit directors from excluding “other specific species,” which are neither invasive nor naturally moribund, from monitoring, sampling, and study requirements. Since BTA determinations and compliance with BTA standards will be in large part determined through monitoring, sampling and studies, this “species of [no] concern” provision would allow states to simply ignore, rather than minimize, mortality to certain species.

The following section of this comment letter is most relevant to this request for comment:

- III.E.2 – EPA Should Prevent Directors from Excluding Any Species from the Rule’s Scope.

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<sup>751</sup> 76 Fed. Reg. at 22,260 (col. 3) - 22,621 (col. 1).

## **LIST OF APPENDICES**

- Appendix A: Comments of Frank Ackerman, Ph.D., and Elizabeth A. Stanton, Ph.D., Stockholm Environment Institute-U.S. Center
- Appendix B: Comments of Dr. Peter Henderson and Richard Seaby, PISCES Conservation, Ltd.
- Appendix C: Comments of David Schlissel and Anna Sommer, Schlissel Technical Consulting
- Appendix D: Comments of William Powers, P.E., Powers Engineering
- Appendix E: Thermoelectric Cooling Constraint Index for 2025
- Appendix F: Projected total water withdrawal as percent of available precipitation in 2050
- Appendix G: Water Supply Sustainability Index in 2050 with available precipitation computed using projected climate change
- Appendix H: Reclaimed Facilities Data
- Appendix I: California Reuse Analysis

## LIST OF EXHIBITS

- Exhibit 1: Letter from Administrator Lisa P. Jackson to Congressman Fred Upton (December 16, 2010)
- Exhibit 2: J.F. Kenny et al., *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey Report, Circular 1344 (2009)
- Exhibit 3: State Water Resources Control Board, California Environmental Protection Agency, *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Final Substitute Environmental Document* (2010)
- Exhibit 4: Versar, *Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station*, Revised Final Report (1989)
- Exhibit 5: New York State Department of Environmental Conservation, *Best Technology Available (BTA) for Cooling Water Intake Structures, DEC Policy Issuing Authority*, Draft (March 4, 2010)
- Exhibit 6: Network for New Energy Choices, *Reeling in New York's Power Plants: The Case for Fish-Friendlier Power* (June 2010)
- Exhibit 7: New York State Notice of Intention to Participate and Petition to Intervene in the Nuclear Regulatory Commission relicensing proceeding, *In re: License Renewal Application Submitted by Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.*, U.S. Nuclear Regulatory Commission Docket Nos. 50-247-LR and 50-286-LR, ASLBP No. 07-858-03-LR-BD01, DPR-26, DPR-64 (Nov. 30, 2007)

- Exhibit 8: John Boreman and Phillip Goodyear, *Estimates of Entrainment Mortality for Striped Bass and Other Fish Species Inhabiting the Hudson River Estuary*, American Fisheries Society Monograph (1988)
- Exhibit 9: Riverkeeper, *The Status of Fish Populations and the Ecology of the Hudson*, produced by Pisces Conservation Ltd. (May 15, 2008)
- Exhibit 10: Gibson, Mark R., R.I. Div. Fish and Wildlife, *Comparison of Trends in the Finfish Assemblage of Mt. Hope Bay and Narragansett Bay in Relation to Operations at the New England Power Brayton Point Station* (1996)
- Exhibit 11: Kinetrics, *Bay Shore Power Plant Cooling Water Intake Structure Information and I&E Sampling Data* (Jan. 2008)
- Exhibit 12: Christine Mayer, University of Toledo, *Effects of Bayshore Power Plant on Ecosystem Function in Maumee Bay, Western Lake Erie, Annual Progress Report to NOAA: October 2010-February 2011*
- Exhibit 13: Public Service Commission, Wisconsin Department of Natural Resources, *Final EIS for the Elm Road Power Plant*, Chapter 8
- Exhibit 14: Sierra Club, *Giant Fish Blenders: How Power Plants Kill Fish & Damage Our Waterways (And What Can Be Done To Stop Them)* (July 2011)
- Exhibit 15: Florida Power & Light Co., *Assessment of the Impacts of the St. Lucie Nuclear Generating Plant on Sea Turtle Species Found in the Inshore Waters of Florida* (August 1995)
- Exhibit 16: Amergen Energy Company, LLC, *Assessment of the Impacts of the Oyster Creek Generating Station on Kemp's Ridley, Loggerhead, and Atlantic Green Sea Turtles* (Dec. 2004)

- Exhibit 17: C. Folke, S. Carpenter, et al., “Regime Shifts, Resilience, and Biodiversity in Ecosystem Management,” 35(1) *Annual Review of Ecology, Evolution, & Systematics* 557 (2004)
- Exhibit 18: James R. May & Maya K. van Rossum, “The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act,” 20 *Vt. L. Rev.* 373, 382 (1995)
- Exhibit 19: B. Dziegielewski and T. Bik, Southern Illinois University Carbondale, *Water Use Benchmarks for Thermoelectric Power Generation in the United States* (prepared for United States Geological Survey) (2006)
- Exhibit 20: Kennedy & Mihursky, *The Effects of Temperature on Invertebrates and Fish: A Selected Bibliography*, University of Maryland Center for Environmental Science
- Exhibit 21: O. Donovan, D. Doyle, C. O’Neill and E. Kearns, “Thermal Plume Impact on Fish Distributions in Barnegat Bay,” 10(3) *Bull. Amer. Lit. Soc.* 14 (1977)
- Exhibit 22: M.J. Kennish, “State of the Estuary and Watershed: An Overview,” SI 32 *Journal of Coastal Research* 243 (2001)
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- Exhibit 24: Oyster Creek Nuclear Generating Station Fish Kill Monitoring Report, NRC ML#003684420 (January 2000)



- Exhibit 25: Oyster Creek 2001 Annual Environmental Operating Report, NRC ML#020660222 (February 2002)
- Exhibit 26: A. Cradic, New Jersey Department of Environmental Protection, *Oyster Creek Generating Station fined for water violations and fish kills: DEP seeks compensation for Natural Resources Damages* (December 12, 2002)
- Exhibit 27: Federal Energy Regulatory Commission, *Final Environmental Assessment for Hydropower License, Warrior River Hydroelectric Project* at 15-16, 40, 136, P-2165-022 (March 2009)
- Exhibit 28: Ken Foskett, Margaret Newkirk, Stacy Shelton, "Georgia's Water Crisis: The Power of Water," *Atlanta Journal Constitution* (November 18, 2007)
- Exhibit 29: Council on Environmental Quality, *Proposed National Objectives, Principles and Standards for Water and Related Resources Implementation Studies* (Dec. 3, 2009)
- Exhibit 30: Letter from C. Richard Bozek, EEI's Director of Environmental Policy to Mr. Terrance L. Breyman, Deputy Associate Director for Natural Resources, CEQ at 5, 3 (April 5, 2010)
- Exhibit 31: Lisa Song, "Heat Waves Putting Pressure on Nuclear Power's Outmoded Cooling Technologies," *SolveClimate News* (May 4, 2011) (Exh. 31)
- Exhibit 32: National Research Council, *Adapting to the Impacts of Climate Change* (2010)
- Exhibit 33: National Energy Technology Laboratory ("NETL"), *Estimating Freshwater Needs to Meet Future Thermoelectric Generation Requirements: 2010 Update* (Sept. 30, 2010)

- Exhibit 34: Brent Barker, “Running Dry at the Power Plant,” *EPRI Journal* at 29-30 (Summer 2007)
- Exhibit 35: Nicole T. Carter, Congressional Research Service, *Energy’s Water Demand: Trends, Vulnerabilities, and Management* (Jan. 5, 2011)
- Exhibit 36: Sujoy B. Roy, Karen V. Summers & Robert A. Goldstein, “Water Sustainability in the United States and Cooling Water Requirements for Power Generation,” *126 Water Resources Update* 94 (Nov. 2003)
- Exhibit 37: Union of Concerned Scientists, *The Energy-Water Collision: Power and Water at Risk* (June 2011)
- Exhibit 38: U.S. Department of Agriculture Forest Service, *2000 RPA Assessment of Forest and Range Lands*, FS-687 (Feb. 2001)
- Exhibit 39: Energy Information Administration, *Annual Energy Outlook 2010 with Projections to 2035* (2010)
- Exhibit 40: Mitch Weiss, Associated Press, *Southern Drought May Force Nuclear Plants to Shut Down* (Jan. 24, 2008)
- Exhibit 41: Union of Concerned Scientists, *Got Water?* (Dec. 4, 2007)
- Exhibit 42: Peter Hanlon, *Jellyfish to Power Plants: You Suck*, <http://www.ecocentricblog.org/2011/07/26/jellyfish-to-power-plants-you-suck/> (July 26, 2011)
- Exhibit 43: U.S. Nuclear Regulatory Commission, *McGuire Nuclear Station Licensee Event Report 369/2011-01, Revision 1* (Apr. 1, 2011)

- Exhibit 44: Sujoy Roy et al., Tetra Tech, *Evaluating Sustainability of Projected Water Demands Under Future Climate Change Scenarios* (2010)
- Exhibit 45: 113 Congressional Record 30129 (1967)
- Exhibit 46: *Thermal Pollution, Hearings before the Subcommittee on Air and Water of the Senate Committee on Public Works, 90th Congress, Parts 1-4* (1968)
- Exhibit 47: Office of Science and Technology of the Executive Office of the President, *Considerations Affecting Steam Power Plant Site Selection*, 46 (1968)
- Exhibit 48: U.S. EPA, *Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact* (1976)
- Exhibit 49: Clark and Brownell, *Electric Power Plants in the Coastal Zone: Environmental Issues*, American Littoral Society Special Publication (1973)
- Exhibit 50: *New York Times Abstracts*, May 24, 1972, p. 94, col. 1; and March 1, 1972, p. 77, col. 3.
- Exhibit 51: *New York Times Abstracts*, August 16, 1972, p. 41, col. 1.
- Exhibit 52: Materials from the National Archives relating to Congressional Deliberations about Section 316 of the Clean Water Act.

- Exhibit 53: Pages 196-97 of *Legislative History of the Water Pollution Control Act Amendments of 1972* (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973)
- Exhibit 54: *In the Matter of: Carolina Power & Light Company (Brunswick Steam Electric Plant)*, Decision of the General Counsel, EPA GCO 41 (June 1, 1976)
- Exhibit 55: Pages 350-60 of *Legislative History of the Water Pollution Control Act Amendments of 1972* (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973)
- Exhibit 56: Senate Report No. 414, 92d Congress, 1st Session (1971)
- Exhibit 57: Conf. Rep. on S. 2770 (October 4, 1972), 1 *Legislative History of the Federal Water Pollution Control Act of 1972* 170 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973)
- Exhibit 58: Page 798 of *Legislative History of the Federal Water Pollution Control Act of 1972* (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-1 (1973)
- Exhibit 59: *In the Matter of Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC*, Interim Decision of the Assistant Commissioner of the N.Y. State Department of Environmental Conservation (Aug. 13, 2008)
- Exhibit 60: Letter from Michael Jirousek, FirstEnergy Generation Corp. to Naajy S. Abdullah, Ohio EPA re FirstEnergy's Comments on Renewal of NPDES Permit for Bay Shore Plant (May 26, 2010)

- Exhibit 61: John Boreman, "Surplus Production, Compensation, and Impact Assessments of Power Plants," 3 *Envtl. Sci. & Pol'y* 8445 (2000)
- Exhibit 62: Super and Gordon, "Minimizing Adverse Environmental Impact: How Murky the Waters," *The Scientific World* (2002)
- Exhibit 63: Letter from JoAnne Rau, Director, Environmental Safety and Management, Dayton Power and Light Company to Sean Ramach, US EPA Region 5 (Apr. 28, 2011)
- Exhibit 64: *In the Matter of Millstone Power Station*, Before the Connecticut Department of Environmental Protection, Office of Adjudications, Application No. 199701876, Applicant's Post Hearing Submittal (May 8, 2009)
- Exhibit 65: *In the Matter of Dynegy Northeast Generation, Inc., on behalf of Dynegy Danskammer LLC (Danskammer Generating Station)*, DEC No.: 3-3346-00011/00002, SPDES No.: NY-0006262, Decision of the Deputy Commissioner of the N.Y. State Department of Environmental Conservation (May 24, 2006)
- Exhibit 66: *In the Matter of the Application of Mirant Bowline LLC (Mirant) For a State Pollution Discharge Elimination System Permit Renewal for the Bowline Point Generating Station (Units 1 and 2)*, DEC # 3-3922-00003/00003, SPDES # NY-0008010, Post-Issues Conference Brief by the Staff of the New York State Department of Environmental Conservation, (June 29, 2006)
- Exhibit 67: Letter from Mark Sanza, Assistant Counsel, NY DEC to the Hon. Maria E. Villa and the Hon. Daniel P. O'Connell, Administrative Law Judges, NY DEC (May 16, 2011)

- Exhibit 68: Letter from Elise N. Zoli, Attorney for Entergy, to the Hon. Maria E. Villa, Administrative Law Judge, NY DEC (May 17, 2011)
- Exhibit 69: Letter from Joseph M. Reidy, Attorney for Dayton Power & Light to John Sadzewicz, Ohio EPA (July 11, 1989)
- Exhibit 70: Letter from William L. Patberg, Attorney for Dayton Power & Light to Paul Novak, Ohio EPA (Apr. 9, 2003)
- Exhibit 71: Alden Research Laboratory and Burns Engineering Services, *An Engineering & Cost Assessment of Retrofitting Closed-Cycle Cooling Technologies and E.F. Barrett Power Station* (September 2007)
- Exhibit 72: Ohio EPA, Response to comments document relating to FirstEnergy Bayshore plant, National Pollutant Discharge Elimination System (NPDES) permit (Oct. 2010)
- Exhibit 73: Saratoga Associates, *Indian Point Energy Center Closed Cycle Cooling Conversion Feasibility Study Visual Assessment* (June 1, 2009)
- Exhibit 74: Enercon Services, Inc., *Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration, prepared for Entergy Nuclear Indian Point 2, LLC, and Entergy Nuclear Indian Point 3, LLC* (Feb. 12, 2010)
- Exhibit 75: *In the Matter of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations Inc.'s CWA § 401 Application for Water Quality Certification, DEC Application Numbers: 3-5522-00011/00030 (IP2) and 3-5522-00105/00031 (IP3), Town of Cortlandt Petition for Party Status in Joint Adjudicatory Hearing for Water Quality Certification* (July 9, 2010)

- Exhibit 76: *In the Matter of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations Inc.’s Joint Application for Water Quality Certification, DEC Application Numbers: 3-5522-00011/00030 (IP2) and 3-5522-00105/00031 (IP3), Town of Cortlandt Memorandum of Law in Support of Cortlandt’s Petition for Party Status (Sept. 23, 2010)*
- Exhibit 77: *Dynegy Moss Landing, LLC, State Water Resources Control Board Once-Through Cooling Water Policy Implementation Plan for the Moss Landing Power Plant (Apr. 1, 2011)*
- Exhibit 78: E-mail from John Dennis, LADWP to Jonathan Bishop, California State Water Resources Control Board (Jul. 22, 2010)
- Exhibit 79: *In the Matter of the Natural Resources Defense Council (NRDC), the Sierra Club, and the Great Lakes Environmental Law Center (GLELC) on the permit issued DTE Energy, Detroit Edison Company Harbor Beach Power Plant (DTE Energy), Respondent Michigan Dep’t of Env’tl. Quality’s Pre-Hearing Statement (Aug. 2, 2011) (a BTA permitting decision made in 1976 need not be revisited)*
- Exhibit 80: *Enercon Services, Inc., Evaluation of Alternative Intake Technologies at Indian Point Units 2 & 3, prepared for Entergy Nuclear Indian Point2, LLC, and Entergy Nuclear Indian Point 3, LLC (Feb. 12, 2010)*
- Exhibit 81: Public Fact Sheet, Dayton Power & Light, “J.M. Stuart Station NPDES Permit Renewal, Sprigg Township, Ohio” (Spring 2011)
- Exhibit 82: *Midwest Generation, Appropriate Thermal Water Quality Standards for the Chicago Sanitary and Ship Canal and Lower Des Plaines River (Mar. 22, 2007)*

- Exhibit 83: *In the Matter of: Carolina Power & Light Company (Brunswick Steam Electric Plant)*, USEPA Environmental Appeals Board, 1978 EPA App. LEXIS 4 (February 20, 1978)
- Exhibit 84: *Documentation of Changes Made During Executive Order 12866 OMB Review – Cooling Water Intakes 2040-AE95 NPRM*, Document ID: EPA-HQ-OW-2008-0667-1295
- Exhibit 85: *Document Submitted to Initiate EO 12866 Review - Cooling Water Intakes 2040-AE95 NPRM FRN* [DCN 10-6625A], Document ID: EPA-HQ-OW-2008-0667-1295.1
- Exhibit 86: *EPA-HQ-OW-2008-0667-1295 2 with markup showing* [DCN 10-6625B], Document ID: EPA-HQ-OW-2008-0667-1407
- Exhibit 87: *EPA, Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA*, NPDES Permit No. MA 0003654 (July 22, 2002)
- Exhibit 88: *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, Transcript of Oral Argument (Dec. 2, 2008)
- Exhibit 89: Statements of NYS Dept. of Env. Cons., Division of Fish, Wildlife, and Marine Resources, provided to U.S. EPA, re Public Meeting to Discuss Adverse Environmental Impacts resulting from Cooling Water Intake Structures [DCN 1-5025-PR] (June 29, 1998)
- Exhibit 90: Phase II Comment Letter from Peter Duncan, Deputy Commissioner of the Office of Natural Resources, NYS DEC to EPA Proposed Rule Comment Clerk re the NPDES Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities (August 7, 2002)



- Exhibit 91: Phase II Comment Letter from Dennis Hart, Assistant Commissioner, Environmental Regulation, New Jersey Department of Environmental Protection to EPA Proposed Rule Comment Clerk re Cooling Water Intake Structures (New Facilities) (November 9, 2000)
- Exhibit 92: Phase II Comment Letter from Bradley M. Campbell, Commissioner, New Jersey Department of Environmental Protection to EPA Proposed Rule Comment Clerk re Cooling Water Intake Structures (Existing Facilities) (Aug. 8, 2002)
- Exhibit 93: Phase II Comment Letter from Gary Aydell, Technical Advisor, Office of the Secretary, Louisiana Department of Environmental Quality to EPA Proposed Rule Comment Clerk re Cooling Water Intake Structure (Existing Facilities: Phase II) Proposed Rule (August 8, 2002)
- Exhibit 94: Phase II Comment Letter from Bill McCracken, Chief of Permits Section, Surface Water Quality Division, Michigan Department of Environmental Quality, re 316(b) Burden [DCN 4-0049] (January 24, 2002)
- Exhibit 95: NPDES Permit Expiration Date spreadsheet
- Exhibit 96: Abt Associates, Inc., *P2F Compliance Years* (February 13, 2004)
- Exhibit 97: Attachment to EPA Memorandum re Implementation of Section 316(b) in NPDES Permits (Feb. 27, 2003)
- Exhibit 98: Mary Phillips-Sandy, "New York Budget: The 5 Most Painful Cuts," AOL NEWS (Feb. 1, 2011)
- Exhibit 99: Gary Robertson and Martha Waggoner, "Final NC budget takes aim at environmental policy", *Bloomberg Business Week* (June 3, 2011)

- Exhibit 100: Shaun McKinnon, *Arizona budget cuts hurting water and air agencies*, THE ARIZONA REPUBLIC (May 4, 2010)
- Exhibit 101: Juliet Eilperin, *EPA budget cuts put states in bind*, THE WASHINGTON POST (June 20, 2011)
- Exhibit 102: Letter from John V. O'Shea, Executive Director, Atlantic States Marine Fisheries Commission to Proposed Rule Comment Clerk, EPA, re Cooling Water Intake Structure (Existing Facilities: Phase II) (Aug. 7, 2002)
- Exhibit 103: Letter from Celeste Cantu, Executive Director of the California State Water Resources Control Board to EPA Proposed Rule Comment Clerk-W-00-32 re Comments on National Pollution Discharge Elimination System Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities (Proposed Rule) (August 5, 2002)
- Exhibit 104: Letter from Denise Sheehan, Executive Deputy Commissioner, New York DEC to Water Docket, EPA re New York State Department of Environmental Conservation comments regarding the Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities; Notice of Data Availability (NODA), dated March 19, 2003 (June 2, 2003)
- Exhibit 105: NY DEC, Further Comments to the U.S. Environmental Protection Agency on its "Issues for Discussion at the Public meeting on September 10 and 11, 1998, Regarding §316(b) Rulemaking" held in Alexandria, VA (Oct. 5, 1998)
- Exhibit 106: Nuclear Regulatory Commission, Press Release "Nuclear Regulatory Commission, Department of Energy and Nuclear Energy Institute Sponsor February Workshop on Extended Operation for Nuclear Power Plants," (December 22, 2010)

- Exhibit 107: Dynegy Moss Landing, LLC, *State Water Resources Control Board Once-Through Cooling Water Policy Implementation Plan for the Moss Landing Power Plant* (Apr. 1, 2011)
- Exhibit 108: E-mail from John Dennis, LADWP to Jonathan Bishop, California State Water Resources Control Board (Jul. 22, 2010)
- Exhibit 109: M.J. Bradley & Analysis Group, *Ensuring a Clean, Modern Electric Generating Fleet while Maintaining Electric System Reliability* (2010)
- Exhibit 110: Bipartisan Policy Center, *Environmental Regulation and Electric System Reliability* (2011)
- Exhibit 111: J. McCarthy and C. Copeland, Congressional Research Service, *EPA's Regulation of Coal-Fired Power: Is a "Train Wreck" Coming?* (July 11, 2011)
- Exhibit 112: R. McCullough, *Economics of Closed-Cycle Cooling in New York* (June 3, 2010)
- Exhibit 113: El Segundo Homepage website, Modernizing El Segundo's Power Generating Station
- Exhibit 114: Sejal Choksi "Alternatives to Once-Through Cooled Power Plants", *San Francisco Bay Crossings* (July 2009)
- Exhibit 115: New York State Department of Environmental Conservation, Aquatic Habitat Protection website (2011)
- Exhibit 116: U.S. EPA, Region I – New England, *In the Matter of Dominion Energy Brayton Point, LLC, Brayton Point Power Station, Somerset,*

*Massachusetts, NPDES Permit No. MA0003654, Docket No. 08-007, Findings and Order for Compliance (Exh. 116).*

- Exhibit 117: Memo to Paul Shriner, EPA from Kelly Meadows, Tetra Tech, Subject: Analysis of swim speed data (December 8, 2008)
- Exhibit 118: Columbia Basin Fish & Wildlife News Bulletin, “USFWS Announces Work Plan to Deal With Backlog of ESA Listing Determinations” (May 13, 2011)
- Exhibit 119: J.A. Veil, Argonne National Laboratory, *Use of Reclaimed Water for Power Plant Cooling* (Aug. 2007)
- Exhibit 120: Radisav D. Vidic & David A. Dzombak, University of Pittsburgh Department of Civil and Environmental Engineering, *Reuse of Treated Internal or External Wastewaters in the Cooling Systems of Coal-Based Thermoelectric Power Plants* (2009)
- Exhibit 121: National Energy Technology Laboratory, *Use of Non-Traditional Water for Power Plant Applications: An Overview of DOE/NETL R&D Efforts* (2009)
- Exhibit 122: Electric Power Research Institute, *Use of Alternative Water Sources for Power Plant Cooling* (2008)
- Exhibit 123: U.S. Department of Energy, Office of Fossil Energy, “*Project Fact Sheet*”
- Exhibit 124: U.S. Department of Energy, Office of Fossil Energy, “*Internet-Based GIS Catalog of Non-Traditional Sources for Cooling Water for use at America’s Coal-Fired Power Plants*” (2009)

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- Exhibit 133: Gentner Consulting Group, Economic Damages of Impingement and Entrainment of Fish, Fish Eggs, and Fish Larvae at the Bay Shore Power Plant (Sept. 2009)
- Exhibit 134: The Brattle Group, Potential Coal Plant Retirements Under Emerging Environmental Regulations (December 8, 2010)
- Exhibit 135: Electric Generating Units Planned Retirement Date Spreadsheet (developed from publicly available information), Aug. 15, 2011
- Exhibit 136: Cal. Reg'1 Water Quality Control Bd., San Diego Region, Order No.R9-2009-0038 Amending Order No. R9-2006-0065 (NPDES No. CA0109223) Waste Discharge Requirements for the Poseidon Resources Corporation Carlsbad Desalination Project Discharge to the Pacific Ocean via the Encina Power Station Discharge Channel (May 13, 2009)