Comments of Public Service Company of New Hampshire

on

EPA's Draft National Pollutant Discharge Elimination System

Permit No. NH 0001465

for

Merrimack Station

Public Service
of New Hampshire

A Northeast Utilities Company

Submitted to the U.S. Environmental Protection Agency

February 28, 2012

Executive Summary

EPA's draft National Pollutant Discharge Elimination System ("NPDES") permit for Public Service Company of New Hampshire's ("PSNH") Merrimack Station cannot be issued as proposed. EPA's determinations are unsupported and unfounded. EPA was arbitrary and capricious in establishing proposed permit limits and requirements for Merrimack Station. Furthermore, the draft permit fails to comply with applicable laws and regulations. Any final NPDES permit for Merrimack Station must address the issues raised in these comments. Specifically:

- EPA's rejection of PSNH's request for a continuation of the § 316(a) variance under which Merrimack Station has operated for over 20 years is unsupported and contrary to law. In fact, PSNH has demonstrated that continuation of its variance will ensure the protection and propagation of the balanced, indigenous fish population of the Hooksett Pool.

- EPA inexplicably bases its rejection of PSNH's § 316(a) variance on a comparison of the Hooksett Pool today with the Hooksett Pool as it looked in the 1960s. EPA fails to recognize that the Merrimack River, including its Hooksett Pool, was one of the most polluted rivers in the country in the 1960s.

- EPA also ignores the fact that the Hooksett Pool is currently a balanced, indigenous fish population, confirming PSNH's demonstration that a continuation of its current § 316(a) variance is warranted.

- The record is clear that PSNH's Merrimack Station has not caused appreciable harm to the Hooksett Pool and that PSNH is entitled to continuation of its § 316(a) variance.

- EPA erroneously determined that design and flow volumes of Merrimack Station's cooling water intake structures ("CWIS") must be modified to a level commensurate with closed-cycle cooling ("CCC") from at least April 1 through August 31 in order to satisfy the best technology available ("BTA") standard established in § 316(b) of the CWA.

- EPA determined that CCC was practicable and necessary at Merrimack Station despite significant, unanswered questions about whether the technology can, in fact, be installed at the plant following installation of the new wet flue gas desulphurization ("FGD") scrubber system.

- With estimated total costs to install CCC at Merrimack Station in excess of $110 million, EPA has not and cannot demonstrate that the technology can be implemented at an economically practicable cost (*i.e.*, without placing an impracticable or unbearable economic burden upon PSNH and/or its customers). Moreover, EPA's affordability analyses are fundamentally flawed.

- EPA made a self-serving conclusion that Merrimack Station's CWISs currently cause adverse environmental impacts ("AEI") to the Merrimack River. In fact, CCC is an unnecessary technology for Merrimack Station because only a *de minimis* level of fish and ichthyoplankton are impinged or entrained in an average year. Indeed, analysis from the Electric Power Research Institute ("EPRI") of data from approximately thirty (30) percent of the total number of existing facilities regulated by § 316(b) provides that Merrimack Station's annual rates of impingement and entrainment comprise less than one-tenth of one percent of the total losses from all of those facilities combined.

- The costs to install CCC at Merrimack Station are wholly disproportionate and significantly greater than any environmental benefits expected from its use. The disparate costs compared to relative benefits of the technology also violate Executive Order 13563, which requires all federal agencies to make a "reasoned determination" that a technology's benefits justify its costs.

- The cost-benefit ratio for installation of CCC at Merrimack Station is 974 to 1. This means that for every dollar of environmental benefit generated by the installation of CCC at Merrimack Station, PSNH and/or its customers would have to pay $974 in costs. For perspective, in its 2004 final rule for Phase II facilities regulated by § 316(b) of the CWA, EPA expressly rejected CCC technologies as BTA because of "generally high costs" and, instead, adopted regulations with a cost-benefit ratio of approximately 4.5 to 1. EPA's 2011 proposed rule for particular new and existing facilities regulated by § 316(b) similarly rejects CCC and has proposed regulations with estimated costs less than 22.2 times the expected benefits.

- Secondary environmental factors also support the conclusion that EPA's BTA determination requiring installation of CCC technologies was erroneous. Specifically, EPA failed to adequately consider the impacts that mandating CCC installation at Merrimack Station could have on regional reliability and the remaining useful life of the plant. Moreover, limited land availability, substantial water consumption due to evaporation, increased air emissions, and power generation losses due to CCC installation at Merrimack Station were either disregarded, inadequately considered, or erroneously dismissed by EPA as immaterial.

- EPA properly rejected cylindrical wedgewire ("CWW") screens as BTA for Merrimack Station, but for the wrong reasons. CWW screens are an available technology at Merrimack Station. In addition, CWW screens are effective in reducing impingement and entrainment to a level substantially similar to CCC. However, such reductions are unnecessary for Merrimack Station in light of its currently *de minimis* levels of annual impingement and entrainment. Moreover, costs necessary to implement CWW screens at Merrimack Station fail EPA's wholly disproportionate and significantly greater standards, as well as the requirements of Executive Order 13563, when compared to the expected environmental benefits. Thus, CWW screens are not BTA for Merrimack Station.

- A proper analysis pursuant to § 316(b) results in a conclusion that rescheduling maintenance outages for Units 1 and 2 at Merrimack Station, installation of a new fish return system, and continuous operation of existing traveling screens from April through December, collectively constitute BTA. This combination of system upgrades and operational changes satisfies every aspect of the BTA standard for minimizing AEI to the Merrimack River. Specifically, each technology is available, is effective (alone and in combination) to further reduce Merrimack Station's already *de minimis* levels of impingement and entrainment, and requires costs to install or implement that are reasonably proportional to the relative benefits.

- Alternatively, EPA should refrain from issuing an NPDES permit to Merrimack Station using only its best professional judgment ("BPJ"). A national rule governing new and existing cooling water intake structure facilities, including Merrimack Station, must be finalized on or before July 27, 2012. It makes little sense to issue a BPJ based permit now, given the almost fifteen years EPA has administratively continued Merrimack Station's existing permit. Any reader of the draft permit has to question why EPA would issue the permit now, invoking its BPJ, within months of issuance of a national rule.

- EPA has no basis for its determination that a biological treatment process is the best available technology economically achievable ("BAT") and therefore required to meet effluent limitations for discharges from Merrimack Station's FGD scrubber wastestream.

- EPA unlawfully predetermined the conclusion of its case-by-case BAT analysis for the FGD scrubber wastestream, by relying on an EPA guidance memorandum that attempts to circumvent the CWA by setting national standards without going through proper notice and comment.

- Biological treatment is not, in fact, BAT for the FGD scrubber wastestream because its effectiveness is not proven. EPA relies on data that, when properly analyzed, does not support its conclusions. Specifically, EPA relies on data from other plants where biological treatment is used, but ignores very important differences between those plants and Merrimack Station. Most important, EPA failed to consider the fact that the plants with biological treatment that formed the basis of EPA's conclusion could not meet the very limitations included in the draft permit.

- The pre-determined nature of EPA's BAT analysis for the FGD scrubber wastestream is evidenced by the fact that biological treatment does not meet the BAT factors. EPA failed to adequately consider costs associated with installing and maintaining a biological treatment system. Indeed, UWAG determined that because PSNH's physical/chemical treatment system already removes an overwhelming majority of pollutants per year, the incremental cost-per-pound of additional pollutants removed by biological treatment at Merrimack Station would be an astounding $8523 per pound. EPA failed to consider issues with the engineering processes associated with biological treatment systems, namely, physical space limitations, filter maintenance, interplay between the physical/chemical system already in place and a biological treatment system, and temperature considerations. EPA also failed to consider operational constraints created by the FGD scrubber.

- Merrimack Station's current physical/chemical system, chosen in accordance with best industry practices and regulatory representations, satisfies the BAT factors, and any effluent limitations for the FGD scrubber wastestream should be based on this technology.

- EPA should reject any further consideration of vapor compression or zero liquid discharge as BAT for the FGD scrubber wastestream, as it does not meet the BAT factors.

- Not only are EPA's proposed effluent limits based on an inappropriate technology, the limits themselves were derived from faulty data and are therefore technologically unachievable.

- EPA's decision to create case-by-case effluent limits for the FGD scrubber wastestream was unlawful because national effluent limitation guidelines ("NELGs") for low volume waste sources (which EPA has stated includes FGD scrubber wastestreams) already exist in EPA's regulations and specific NELGs are expected in the immediate future.

- EPA failed to take into account important costs and consequences associated with the permit's proposed limits and requirements, namely availability and operating capabilities of Merrimack Station and impacts on electric grid reliability. EPA also failed to consider the impacts of the proposed permit in light of the cumulative, detrimental effects of EPA's recent regulatory attack on the electric utility industry.

- EPA must consider these comments and amend the proposed permit accordingly. Failure to do so will result in a permit with no support in the record or basis in law.

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Supporting Documents

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35. Quantification of the Physical Habitat within Garvins, Hooksett and Amoskeag Pools of the Merrimack River (Normandeau 2011d)

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Comments of Public Service Company of New Hampshire

on

EPA's Draft National Pollutant Discharge Elimination System Permit

No. NH 0001465 for Merrimack Station

I. Introduction

Public Service Company of New Hampshire ("PSNH") submits these comments on the U.S. Environmental Protection Agency's ("EPA") draft National Pollutant Discharge Elimination System ("NPDES") permit for PSNH's Merrimack Station, Permit No. NH 0001465 ("draft permit").[1] Many of the limits and requirements in the draft permit lack factual support in the record or basis in law. Specifically, EPA's rejection of PSNH's request for continuation of its variance from Clean Water Act ("CWA") technology based and water quality based standards under § 316(a) is arbitrary and capricious. Similarly, EPA's determination that closed-cycle cooling ("CCC") is required during the months of April to August under § 316(b) is also arbitrary and capricious. EPA's "best available technology" ("BAT") determination and its proposed effluent on metals in the flue gas desulphurization ("FGD") system wastestream are likewise arbitrary, capricious and unlawful and must be reconsidered.

Finally, and critically, EPA failed to consider the important public policy ramifications of the stringent limits and requirements imposed by its draft permit. For example, EPA failed to consider that its proposed permit could jeopardize the continued operation of the units in question, or the impact that closure of Merrimack Station would have on the local community and electric system reliability in the area. EPA's final NPDES permit for Merrimack Station

[1] PSNH supports and adopts the comments and reports submitted by Normandeau Associates, Inc. ("Normandeau"), Utility Water Act Group ("UWAG"), National Economic Research Associates, Inc. ("NERA"), Electric Power Research Institute ("EPRI"), ASA Analysis & Communications, Inc. ("ASA"), Applied Science Associates, Inc., Enercon Services, Inc. ("Enercon"), and Duke Energy, on EPA's draft permit for Merrimack Station and incorporates those by reference.

must take into consideration the issues raised in these comments and contain reasonable limits and requirements established through a lawful and proper process based upon substantive facts.

II. General Background

A. Public Service Company of New Hampshire

PSNH is a public utility and a wholly-owned subsidiary of Northeast Utilities ("NU").[2] PSNH is headquartered in Manchester, New Hampshire, and is the largest power company in the State of New Hampshire, with more than 498,000 retail distribution customers served throughout the state in a 5,630-square-mile area that encompasses more than 211 New Hampshire communities. PSNH generates approximately 1,200 megawatts ("MW") of electricity from three fossil-fueled power plants, nine hydroelectric power plants, and a biomass facility. PSNH's generation fleet also includes five fossil-fueled "peaking units," each with nominal 20 MW nameplate ratings, that contribute to regional reliability and operate only in times of high demand.[3] Cumulatively, PSNH has invested more than $500 million in environmental initiatives at Merrimack Station since 1989, which has resulted in a significant reduction in discharges of pollutants. Merrimack Station currently meets all state and federal clean air requirements. PSNH has received numerous EPA awards for its environmental and public service initiatives.[4]

[2] NU is a publicly traded, energy company headquartered in Hartford, Connecticut, that owns several regulated subsidiaries offering electricity and natural gas service to customers in New England.

[3] Additionally, PSNH has contracts to purchase renewable power from various privately owned biomass and hydroelectric facilities, as well as New Hampshire's first commercial-scale wind farm in Lempster, New Hampshire.

[4] For instance, PSNH has received the following: EPA "Environmental Merit Award," 1996 (recognizing PNSH's demonstrated commitment and significant contributions to the environment); "New Hampshire Governor's Award for Pollution Prevention," 1996 (awarded for installing the SCR at Merrimack Station); U.S. EPA "Certificate of Appreciation," 1999 (recognizing Merrimack's NOx emissions reduction project); "Lung Champion Award," 2003 (awarded by the American Lung Association of New Hampshire); "Secretary of Defense Employer Support Freedom Award," 2002 (awarded by the U.S. Department of Defense); U.S. D.O.E. Grant For Mercury Reduction Research, 2007; "Breathe New Hampshire Award," 2008 (recognizing exceptional commitment and support of Breathe New Hampshire); and "Edison Electric Institute Common Goals Special Distinction-Environmental Partnerships Award," (recognizing efforts to collaborate with government agencies and environmental groups to develop an ozone reduction strategy).

B. PSNH's Merrimack Station

Merrimack Station, located in Bow, New Hampshire, is the largest of PSNH's three fossil-fueled power plants with a total electrical output of approximately 489 MW.[5] It produces approximately 3 million megawatt-hours of electricity on an annual basis, which is enough energy to supply hundreds of thousands of New Hampshire households. Merrimack Station consists of two primary steam-electrical generating units—Units 1 and 2—along with two smaller, jet-fuel-fired peaking combustion turbines. Unit 1 began operating in 1960 and has a rating of 110 MW; Unit 2 commenced operations in 1968 and has a rating of 336 MW. Merrimack Station withdraws water from and discharges to the Merrimack River.

C. Merrimack River

The Merrimack River is a 117-mile-long river that originates at the confluence of the Pemigewasset and Winnipesaukee Rivers in Franklin, New Hampshire, flows southward into Massachusetts, and then flows northeast until it empties into the Atlantic Ocean in Newburyport, Massachusetts. The total watershed of the river is approximately 4,700 square miles, covering much of southern New Hampshire and a portion of northeastern Massachusetts. The Merrimack River is classified as both a water of the United States, as well as a water of the State of New Hampshire.

Merrimack Station withdraws cooling water from, and discharges to, the Hooksett Pool portion of the Merrimack River, which is an approximately 5.8-mile long segment of the river

[5] EPA attempts to label the units at Merrimack Station as "baseload" units. This is a term of art, and it requires clarification. The term "baseload" refers essentially to the minimum continuous demand for electric power. When dispatched, the units at Merrimack Station generate power that helps serve this load. In this sense, the units at Merrimack Station provide base load. However, the term "baseload unit" is a separate concept. A "baseload unit" is one that operates virtually continuously at or near full power. This does not describe the units at Merrimack Station. These are units subject to economic dispatch and do not operate virtually continuously at full power output.

bordered to the north by the Garvins Falls Dam and to the south by the Hooksett Dam.[6] The Hooksett Pool has a total surface area of approximately 350 acres and a volume of 130 million cubic feet at full-pond level. The width of the Hooksett Pool varies between 500 to 700 feet and has typical depths ranging between six and ten feet under most flow conditions. The Soucook and Suncook Rivers, along with the Bow Bog Brook, are all tributaries to the Hooksett Pool. The Hooksett Pool is also the receiving water for the Town of Allenstown's wastewater treatment facility located near the mouth of the Suncook River. Much of the shoreline along the Hooksett Pool is undeveloped.

The New Hampshire Department of Environmental Services ("NHDES") designated the Hooksett Pool as a Class B water in accordance with New Hampshire water quality standards, which require all surface waters to provide for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters, when feasible. *See* N.H. Code Admin. R. Ann. Env-Wq 1703.01. New Hampshire Statute RSA 485-A:8(II) identifies the designated uses of Class B waters as "[o]f the second highest quality," and further provides that such waters "shall be considered as being acceptable for fishing, swimming and other recreational purposes and, after adequate treatment, for use as water supplies."

D. <u>Summary of Relevant Legal Issues and Standards of Review</u>

EPA's proposed NPDES permit for Merrimack Station is flawed and lacks factual support in the record and has no basis in law. As discussed more extensively below, EPA's draft permit is based on its erroneous application of and determinations under the CWA. Specifically, § 316(a) of the CWA requires EPA to ensure that any point source discharger's thermal component of its effluent has not caused, or will not cause, appreciable harm to the balanced,

[6] PSNH owns and operates both the Garvins Falls and the Hooksett dams subject to a license issued by the Federal Energy Regulatory Commission ("FERC").

indigenous population ("BIP") of the body of water into which the discharge is made. Section 316(b) similarly requires EPA to ensure that cooling water intake structures ("CWISs") are located, designed, and constructed in such a way as to minimize impingement and entrainment of biological organisms in the body of water from which cooling water is withdrawn. Additionally, CWA § 402 authorizes EPA to establish case-by-case technology based effluent limitations pursuant to its best professional judgment ("BPJ") only when national effluent limitation guidelines ("NELGs") have not been promulgated or are inapplicable.

In the draft permit, at each step, EPA failed to establish a rational or reasonable basis for its proposed permit requirements. EPA must consider these and other comments regarding the inadequacy of its draft permit and address these inadequacies in the final permit. EPA's final permit cannot stand if it is found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law." 5 U.S.C. § 706(2)(A). As is made clear by these comments, EPA's current draft permit contains limits and requirements that are based on EPA's arbitrary and capricious application of the law and are not supported by the record. EPA simply has not "fully [explained] its course of inquiry, its analysis, and its reasoning." *See Reynolds Metals Co. v. EPA*, 760 F.2d 549, 559 (4th Cir. 1985), (quoting *Tanner's Council of Am., Inc. v. Train*, 540 F.2d 1188, 1191 (4th Cir. 1976)).

III. Current NPDES Permit

EPA issued Merrimack Station's current NPDES permit on June 25, 1992. Importantly, this permit continued a variance for Merrimack Station's thermal discharges because PSNH adequately demonstrated that its thermal discharge was not resulting in appreciable harm to the BIP of the Hooksett Pool. To minimize impingement and entrainment, the 1992 permit established Merrimack Station's existing traveling screens and fish return system as the best technology available ("BTA"). The 1992 permit, for the most part, also set reasonable limits, including monitoring and reporting requirements for each of the then-existing outfalls at Merrimack Station. In 1997, PSNH timely submitted its application for renewal of the 1992 NPDES permit for Merrimack Station. EPA took more than 14 years to issue the draft permit. As such, the 1992 permit has been administratively continued and remains in effect today.

IV. PSNH's Comments on EPA's Draft NPDES Permit

PSNH strongly urges EPA to reconsider and revise its draft NPDES permit for Merrimack Station. As discussed more fully below, the draft permit contains permit limits and requirements that have no factual support in the record or basis in law. Simply put, EPA's proposed limits are arbitrary and capricious. Specifically, EPA's rejection of PSNH's request for a continuation of its § 316(a) variance is unsupported and should be reevaluated. PSNH has provided EPA with substantial information to establish that Merrimack Station's thermal discharge has not previously caused "appreciable harm" to the BIP, and is therefore entitled to a § 316(a) variance. EPA's rejection of PSNH's request runs counter to the studies compiled and submitted to EPA demonstrating the lack of appreciable harm.

Likewise EPA's determination that CCC must be installed at Merrimack Station pursuant to § 316(b) is equally erroneous and must be reconsidered. CCC is not an available technology under § 316(b), it is not necessary at Merrimack Station in light of the current *de minimis* levels of impingement and entrainment, nor is it acceptable under EPA's established "wholly disproportionate" or "significantly greater than" cost–benefit standard. Instead, PSNH has compiled and submitted ample studies demonstrating that operational changes, coupled with an upgraded fish return system, sufficiently reduce already relatively nominal incidences of impingement and entrainment at Merrimack Station, and therefore should be considered the BTA under CWA § 316(b). Alternatively, EPA should refrain from using its BPJ to determine BTA for Merrimack Station because of the impending NELG that must be issued by EPA on or before July 27, 2012.

The effluent limits and restrictions that EPA imposed upon the FGD wastestream at Merrimack Station must also be reevaluated. EPA improperly applied its BPJ by concluding that biological treatment is BAT for Merrimack Station. The resulting effluent limits are neither technologically nor economically achievable and are thus, unreasonable. EPA's decision to use its BPJ in the first place was also unjustified; instead, EPA should wait until specific and revised effluent guidelines are released that will regulate FGD wastestreams. Finally, a number of general permit provisions must be amended or eliminated prior to final issuance of the permit.

A. EPA's rejection of Merrimack Station's request for a continuation of its CWA § 316(a) thermal discharge variance is arbitrary, capricious, has no rational basis, and is inconsistent with law.

PSNH has made the requisite showing under CWA § 316(a) that it is entitled to a continuation of its variance from § 301 standards for its thermal discharges. Specifically, PSNH has demonstrated that no appreciable harm has resulted from thermal discharges from Merrimack Station and that a BIP exists in the Hooksett Pool. Thus, PSNH has demonstrated that the alternative limits it seeks will assure the protection and propagation of the BIP of the Hooksett Pool. EPA's rejection of PSNH's request is arbitrary, capricious and has no rational basis.

EPA's analysis was flawed from the outset – it was incorrectly based on a period of time when the Merrimack River was one of the most heavily polluted rivers in the country. EPA's conclusion that every change that has occurred to the Hooksett Pool is attributable to Merrimack Station's thermal discharge, and that these changes indicate "appreciable harm" to the BIP is therefore fatally flawed. In fact, many of the changes to the Hooksett Pool have occurred due to *improved* water quality. In order to accurately assess what impacts are attributable to Merrimack Station's thermal discharge, EPA instead should have looked at the fish community in the adjacent Garvins Pool (which is only approximately 2½ miles upstream from Merrimack Station).[7] Using a more appropriate baseline, it is clear that no appreciable harm has resulted from Merrimack Station's thermal discharges. EPA must reconsider and grant PSNH's request for a § 316(a) variance before a final permit is issued.

Merrimack Station's Thermal Discharges. In order to cool and condense steam produced in the facility's power production process, Merrimack Station utilizes two once-through CWISs withdrawing a total design intake flow of 287 million gallons per day ("MGD") of water from the Hooksett Pool-portion of the Merrimack River.[8] Each CWIS has two openings that provide cooling water to circulation pumps. These openings are protected by vertical bar racks with 3.5-inch spacing on center. The through-screen velocities for Units 1 and 2 are 1.5 and 1.82 feet per second, respectively.

To minimize impingement and entrainment by and through operation of its CWISs, PSNH currently utilizes two 3/8-inch square traveling mesh screens at each unit that are rotated at least twice each day and are often rotated more frequently when there is significant debris in the Merrimack River. These include shelves and sprays to clear debris and fish from the screens and return them to the Merrimack River. Each traveling screen has a single-pressure spray header with pressure ranging from 80 to 100 pounds per square inch. Fish and debris removed from traveling screens by the spray wash are directed into a trough that conveys the fish and debris, along with the wash water, to a pipe that empties into the Merrimack River. During portions of the winter, warmed water is recirculated back to the intakes and discharged through

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[7] Attached to these comments is an aerial photograph showing the proximity of the Garvins Pool to the Hooksett Pool.

[8] Unit 1 has a maximum design intake flow of 85 MGD, while Unit 2 has a maximum design intake flow of 202 MGD. The actual flow is approximately 10-15 percent less.

spray nozzles approximately 8 feet from the trash racks in order to prevent the formation of ice on the intake screens**.**

Water passing through PSNH's CWISs is returned to a large canal where it cools prior to being discharged back into the Merrimack River. PSNH installed and operates 224 power spray modules in the canal in order to cool the water discharged to it. PSNH's existing NPDES permit for Merrimack Station allows it to discharge a maximum of 275.4 MGD of non-contact cooling water into the Merrimack River, not to exceed a monthly average of 265.3 MGD. PSNH's current permit limits are based on EPA's previous determination that a § 316(a) variance was warranted. As discussed more fully below, PSNH has more than adequately demonstrated that continuation of its § 316(a) variance is warranted. No appreciable harm has resulted from past thermal discharges from Merrimack Station. PSNH has clearly demonstrated this and EPA has not adequately refuted it.

<u>Overview of Regulation of Thermal Discharges Under CWA §§ 301 and 316(a)</u>. Under CWA § 301, because Merrimack Station is a discharger of heat, it must satisfy both technology based standards and water quality standards, or obtain a variance from these standards under CWA § 316(a). With respect to technology based standards, CWA § 301 requires that these standards reflect the "best available technology economically achievable . . . which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." Additionally, CWA § 301(b) places more stringent requirements on a discharger if needed to meet state water quality standards. However, "a basic technological approach to water quality control [cannot] be applied in the same manner to the discharge of heat as to other pollutants." *See, e.g., Appalachian Power Co. v. Train*, 545 F. 2d 1351, 1356 (4th Cir. 1976). Thus, § 316(a) of the CWA authorizes EPA to grant variances for thermal discharges from "any

point source otherwise subject to the provisions of section [301] . . . of [the CWA]." 33 U.S.C. § 1326(a). Merrimack Station has in the past demonstrated that a § 316(a) variance from the technology based and water quality standards was appropriate; therefore, its current permit contains thermal discharge requirements based on a § 316(a) variance.

CWA § 316(a) allows EPA to grant a variance from the § 301 standards described above whenever:

> the owner or operator . . . can demonstrate . . . that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is made . . . .

EPA may instead impose alternative effluent limitations on thermal discharges "that will assure the protection and propagation of a [BIP] of shellfish, fish, and wildlife in and on that body of water." BIP is not defined by statute or regulations; however, "balanced, indigenous community" (which the regulations state is synonymous with BIP) is defined as "a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications." 40 C.F.R. § 125.71(c).

The Environmental Appeals Board ("EAB") has summarized the § 316(a) variance determination process as follows:

> [R]eading CWA sections 301 and 316(a) together, the statute and regulations in effect establish a three- (and sometimes four-) step framework for obtaining a variance: (1) the Agency must

> determine what the applicable technology and WQS-based limitations should be for a given permit; (2) the applicant must demonstrate that these otherwise applicable effluent limitations are more stringent than necessary to assure the protection and propagation of the BIP; (3) the applicant must demonstrate that its proposed variance will assure the protection and propagation of the BIP; and (4) in those cases where the applicant meets step 2 but not step 3, the Agency may impose a variance it concludes does assure the protection and propagation of the BIP.

In re: Dominion Energy Brayton Point, L.L.C. (Formerly USGen New England, Inc.), Brayton Point Station, 12 E.A.D. 490, 500 (EAB 2006) ("*Brayton Point I*").

EPA has promulgated regulations describing the factors, criteria, and standards for the establishment of effluent standards issued under a § 316(a) variance. *See* 40 C.F.R. §§ 125.70-73. These regulations restate the requirements of § 316(a) and require the applicant to demonstrate that an alternative effluent limitation will "assure the protection and propagation of a balanced, indigenous community . . . ." 40 C.F.R. § 125.73(a). For existing sources, this demonstration is based on the "absence of prior appreciable harm." 40 C.F.R. § 125.73(c)(1).

Existing sources can show that there has been no appreciable harm in one of two ways: either by demonstrating that "no appreciable harm has resulted from the normal component of the discharge taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to [the BIP]," *i.e.*, a retrospective demonstration,[9] or by demonstrating that "despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modification thereof) will nevertheless assure the protection

[9] In such a retrospective analysis, the existing discharger must demonstrate that it has appropriately evaluated the typical indicators of long-term thermal effects and determined that there is no indication of "appreciable" thermal impacts on the BIP attributable to the discharge in question. *See Brayton Point I,* 12 E.A.D. at 553") (when looking at trends, § 316(a) determination only assigns to station those effects actually caused by station). Because ecosystems are dynamic and "changes occur continually due to natural processes and stresses," the focus of a retrospective § 316(a) demonstration's long-term assessment of fish must be on those changes that are reasonably, but definitively, attributable to a particular thermal discharge, not simply on changes alone. *In re Pub. Serv. Co. of Ind., Inc. (Wabash River Generating Station, Cayuga Generating Station),* 1 E.A.D. 590, 601 (EAB 1979) ("*Wabash*").

and propagation of [the BIP], *i.e.,* a prospective demonstration. *See Brayton Point I*, 12 E.A.D. at 553 (citing 40 C.F.R. §125.73(c)(1)(i)-(ii)). PSNH has demonstrated that no appreciable harm has resulted from its prior thermal discharges through a retrospective analysis.

"Appreciable harm" is not defined in EPA's regulations. However, EPA has attempted to give some meaning to the term in case law and guidance documents. In a 1974 guidance document for § 316(a), EPA, EPA describes "appreciable harm" as damage to the BIP resulting in "a substantial increase" of nuisance or heat tolerant species, a "substantial decrease" in formerly indigenous species, a "substantial" reduction of trophic structure, "reduction of the successful completion of life cycles of indigenous species," an "unaesthetic appearance, odor or taste of the waters," and "elimination of an established or potential economic or recreational use of the waters." Importantly, EPA explains that "[i]t is not intended that every change in flora and fauna should be considered appreciable harm."[10] *See* Draft § 316(a) Technical Guidance – Thermal Discharges at 23 (Sept. 30, 1974).

Importantly, not all levels of impacts to a fish community rise to "appreciable harm." In fact, EPA's own guidance plainly states that some level of impact is acceptable. *See, e.g.*, Draft Interagency § 316(a) Technical Guidance Manual & Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements at 23 ("Draft EPA § 316(a) Guidance")

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[10] Additionally, in *Brayton Point I* 12 E.A.D. at 563 n.118, the EAB included a footnote stating that "[w]e note that the word 'measurable' is a synonym for 'appreciable.' (citing The Doubleday Roget's Thesaurus in Dictionary Form 31 (Sidney I. Landau & Ronald J. Bogus, eds., 1977)). In response to comments on a § 316(a) variance request, EPA provided that a thermal discharge must cause a significant delay in the recovery of a BIP of fish, shellfish, and wildlife to qualify as appreciable harm. *See* "CWA § 316(a) Variance-Based Thermal Discharge Limits" at III-8. Moreover, in response to comments regarding Brayton Point's final NPDES permit, EPA provided that "even significant adverse effects on a few species do not necessarily require a finding of appreciable harm to the BIP that would preclude a § 316(a) variance," EPA agreed "to the extent that the commenter is saying that even significant adverse effects on a few species might not create a 100 percent inviolate requirement that no § 316(a) variance could be issued." *See* "CWA § 316(a) Variance-Based Thermal Discharge Limits" at III-35; *Brayton Point I*, 12 E.A.D. at 575 (providing that a permitting authority should select a temperature that "represent[s] an acceptable level of impact but [does] not represent a zero impact temperature") (citation omitted); *In re Dominion Energy Brayton Point, LLC*, 13 E.A.D. 407 (EAB 2007) (providing that an applicant is not required to show "no effects" to prove no prior appreciable harm).

(reductions in macroinvertebrate community diversity and standing crop "*may* be cause of the denial of a 316(a) waiver" but applicant can still otherwise show no prior appreciable harm). Both the EAB and EPA Region 1 have confirmed this interpretation. *See, e.g., Wabash*, 1 E.A.D. at 600 (some level of harm to individual species is acceptable where community as whole remains relatively stable); *Brayton Point I,* 12 E.A.D. at 574 n.138, 139 (upholding EPA Region 1's analysis, which accommodates adverse effects but not to the extent that they would interfere with protection and propagation of BIP). In sum, an existing discharger is entitled to a § 316(a) variance if, as noted above, it shows that it has evaluated the typical indicators of long-term thermal effects (*e.g.*, abundance, diversity, community composition) in an appropriate manner, and determined that there is no reasonable indication of thermal impacts attributable to the discharge in question.

PSNH has demonstrated that no appreciable harm has resulted from thermal discharges from Merrimack Station. Furthermore, PSNH has demonstrated that continuation of its § 316(a) variance at Merrimack Station will continue to assure the protection and propagation of the BIP; therefore, EPA should renew the variance.

1. EPA was arbitrary and capricious in choosing the population that existed in the 1960s as the BIP.

EPA's determination that Merrimack Station's thermal discharge has caused appreciable harm to the BIP of the Hooksett Pool was flawed from the outset. EPA incorrectly considers "the resident biotic community identified during sampling conducted from 1967 to 1969 to best represent the [BIP] . . . ." Clean Water Act NPDES Permitting Determination for the Thermal Discharge and Cooling Water Intake Structures at Merrimack Station in Bow, New Hampshire, NPDES Permit No. 0001465 at 118 ("Determination"). EPA then goes on to compare the current fish community of the Hooksett Pool with that of the 1960s timeframe and concludes that the current habitat is "no longer able to support the fish community that existed in the 1960s, or early 1970s." *Id.* However, EPA has failed to demonstrate how the fish community in the Hooksett Pool in the 1960s constituted a BIP. Rather, that community was dominated by pollution-tolerant species and, therefore, not a BIP. Protection of **that** community would require the resumption of massive discharges of raw sewage and other pollutants – a result EPA cannot intend.

a. <u>Merrimack River was heavily polluted in the 1960s</u>

EPA's reasons for choosing the 1967-69 time period – earliest data available, volume of heated cooling water discharged tripled in 1968 after Unit 2 came online – ignore the fact that the water quality of the Hooksett Pool during that time period was severely impaired due to uncontrolled releases of raw sewage and other phosphates. In fact,

> [h]istoric observations of this contamination give a picture of a river contaminated beyond our current comprehension: sewage so dense that a single drop contains "dangerous" levels of bacteria; coliform bacterial counts exceeding 1 million per 100 ml for several cities; toxic metals and wastes including phenol and cyanide found in the river; suspended solids covering the river bottom and decomposing, causing gas to bubble up "as if the river were cooking"; and a predominant smell of rotten egg from hydrogen sulfide, which can ruin painting on boats and houses (Wolf 1965).

Normandeau Assoc., Inc., "Historic Water Quality and Selected Biological Conditions of the Upper Merrimack River, New Hampshire" 3 (2012) ("Normandeau 2011b"); *see also* U.S. Department of the Interior, Report on Pollution of the Merrimack River and Certain Tributaries (Aug. 1966).

As explained in Normandeau 2011b, the Merrimack River, during the 1960s, was polluted by waste from "wood and paper processing mills and textile mills," as well as by untreated sewage from towns situated along the river. Normandeau Associates, Inc. Comments on EPA's Draft Permit for Merrimack Station, Feb. 2012, at 14 ("Normandeau Comments"). "As late as the mid-1960s more than 120 million gallons per day of untreated or minimally treated wastewater were discharged into the Merrimack River." Normandeau 2011b at 3 (citing USGS 2003).

The effect of this contamination on the aquatic biota of the river is well-documented. *See* Normandeau Comments at 15 (discussing U.S. Department of Interior study measuring nutrient levels, total and fecal coliform, dissolved oxygen and biological oxygen demand levels that indicate harm to the biotic community from the pollution levels of the river). Notably, this contamination, and its resulting nutrient loading to the river, caused a reduction of oxygen available to the biota.

> USDI (1966) notes the sources of pollution to the river were mainly sewage and industrial waste that contain a variety of "obnoxious components," including oxygen "demanding" materials which limit fish and aquatic life by removing [dissolved oxygen] from the water. Other "greasy substances" in the water form surface scums, settleable solids and sludge deposits, and other suspended materials can make the water turbid, limiting light penetration.

Id. at 15.

Clearly, the fish community of the Hooksett Pool in the 1967-1969 timeframe was so impaired by pollution that any **improvement** in water quality would affect the fish community. However, EPA ignores improvements in water quality that occurred in the Hooksett Pool as a result of the CWA. *See Id.* at 13-17. EPA instead attributes all changes in abundance levels of some fish species to thermal discharges from Merrimack Station. *See, e.g.,* Determination at 59 (alleging that Station's thermal discharge caused yellow perch population decline); *Id.* at 60 (alleging that Station's thermal discharge caused pumpkinseed population decline); *Id.* at 72-74 (alleging "dominance of heat-tolerant species in Hooksett Pool [is] indicative of appreciable harm to the balanced, indigenous community").

In fact, as discussed more fully below, the fish community of the Hooksett Pool in the 1960s timeframe does not meet the required characteristics of a BIP. Thus, it is clearly inappropriate to use a 1967 based fish community that existed in sewage and phosphate polluted waters to assess whether there has been appreciable harm to the Hooksett Pool. EPA's conclusions regarding the effects of Merrimack Station's thermal discharge are therefore flawed.

b. A BIP may not include species whose presence or abundance is attributable to pollutants

As explained above, EPA regulations mandate that a BIP "will not include species whose presence or abundance is attributable to the introduction of pollutants that will be eliminated by compliance by all sources with section 301(b)(2)." 40 C.F.R. § 125.71(c). A review of the fish community of the Hooksett Pool in the 1967-1969 timeframe clearly demonstrates that 37 percent of the total fish catch from the Hooksett Pool during that time were of pollution-tolerant species.

> A review of species-specific tolerance to environmental perturbation (Barbour et al. 1999) for the fish species observed in Hooksett Pool during 1967-1968 reveals that the Hooksett Pool fish community during those years consisted only of fish species listed as tolerant or intermediate in tolerance to pollution (Table 2-3)…Of the sixteen fish species collected during 1967-1968, five are considered tolerant to pollution, including brown bullhead, white sucker, golden shiner, yellow bullhead, and American eel (Table 2-2; Barbour et al. 1999). Those five tolerant species accounted for 37% of the total fish catch from Hooksett Pool collected during 1967-1968. In addition, the 1967-1968 Hooksett Pool fish community was composed solely of species considered to be members of the generalist, insectivore and piscivore trophic guilds.

See Normandeau Comments at 20.

In addition, there were no pollution-**intolerant** species present during that timeframe.

> The lack of any fish species considered to be intolerant to pollution, and the lack of any fish species representing the filter feeder or herbivore trophic guilds, in the 1967-1969 Hooksett Pool fish community reflects the high degree to which Hooksett water quality was impaired by pollutants other than heat in the late 1960s.

Id.

It follows then that the fish community in the Hooksett Pool in the 1960s timeframe was attributable to the heavy pollution, was dominated by pollution tolerant species, and was therefore, not a BIP.

2. The aquatic community currently in the Hooksett Pool is a BIP.

Data from PSNH's 40-year biological monitoring program in the Merrimack River in the vicinity of Merrimack Station confirm that the current aquatic community in the Hooksett Pool meets all the characteristics of a BIP. Namely, the Hooksett Pool is characterized by (1) diversity at all trophic levels, (2) the capacity to sustain itself through cyclic seasonal changes, (3) the presence of necessary food chain species, and (4) non-domination by pollution-tolerant species. 40 C.F.R. §125.71(c). Thus, it is reasonable to conclude that where the aquatic community in a body of water receiving a thermal discharge meets these four characteristics of a BIP, that community has not suffered "appreciable harm" from the thermal discharge.

a. <u>The Hooksett Pool is characterized by diversity</u>

The evidence demonstrates that the BIP in the Hooksett Pool is characterized by diversity at all trophic levels. Detailed phytoplankton, zooplankton and meroplankton studies in the late 1970s detected no adverse impacts attributable to Merrimack Station's thermal discharge. Normandeau Assoc., Inc., "Merrimack River Monitoring Program Summary Report" (March 1979) ("Normandeau 1979b"). The submerged aquatic vegetation species that was the dominant "habitat former" species during the 1970s was still dominant as of 2003 (Normandeau 2011b).

Diversity in the number of macroinvertebrate species has actually increased in the Hooksett Pool with the observed increase primarily occurring in pollution-sensitive species that have benefited from the post-CWA enactment improvements in Merrimack River water quality – this is a far cry from the appreciable harm that EPA somehow reads in the available data. Normandeau Assoc. Inc., "Comparison of Benthic Macroinvertabrate Data Collected from the Merrimack River near Merrimack Station During 1972, 1973, and 2011" (Jan. 2012) ("Normandeau 2012a") Most significantly, data collected over a 40-year period of comparable electrofish sampling efforts in the Hooksett Pool clearly demonstrate that the diversity in the Hooksett Pool fish community has dramatically increased since 1972, from a total of 12 fish species in 1972 to a total of 19 fish species in 2011. As significant, a comparison of the 2010 and 2011 fish communities in the Hooksett Pool and the Garvins Pool – the most appropriate "upstream-downstream reference condition" by which to assess the current fish community in the Hooksett Pool[11] – shows that taxa richness between the two pools is similar: a total of 20 fish species in the Hooksett Pool in both 2010 and 2011 as compared to a total of 18 fish species in the Garvins Pool in 2010 and 16 in 2011.

Normandeau, on behalf of PSNH and under the direction of the Technical Advisory Committee ("TAC") (the group of fish and ecosystem experts from various federal and state agencies established under the current Permit to advise EPA and NHDES),[12] performed thermal and biological monitoring, including electrofish sampling, in the Hooksett Pool from 1972 through 1978 to characterize the river biota for the purpose of detecting potential long-term

[11] *See Biological Criteria, National Program Guidance for Surface Waters*, EPA Office of Water Standards and Regulations, EPA-440/5-90-004 (April 1990), at 27-28 (explaining concept of "upstream-downstream" approach to site-specific reference conditions).

[12] The TAC was established under Part I.15 of the current Permit and comprised of representatives from EPA, NHDES, the U.S. Fish and Wildlife Service ("USFWS") and the New Hampshire Fish and Game Department ("NHFGD").

trends relating to the Station's operations (Normandeau 1973, 1974, 1975, 1976, 1977, 1979).[13] It repeated the same thermal and biological monitoring and sampling program during 1995 (Normandeau 1996) and again during 2004, 2005, 2010 and 2011 to obtain additional annual observations of the abundance of fish populations – including the Representative Important Species ("RIS") of fish selected and approved by the TAC – in the Hooksett Pool (Normandeau 2007a, 2011a).

Typically, under § 316(a), variance applicants identify RIS – species "which are representative, in terms of their biological needs, of a balanced, indigenous community of shellfish, fish and wildlife in the body of water into which a discharge of heat is made," 40 C.F.R. §125.71(b) – for analysis. Here, the TAC unanimously selected and approved seven fish species from the Hooksett Pool fish community as RIS for Merrimack Station: (1) alewife (*Alosa pseudoharengus*), (2) American shad (*Alosa sapidissima*), (3) Atlantic salmon (*Salmo salar*), (4) smallmouth bass (*Micropterus dolomieu*), (5) largemouth bass (*Micropterus salmoides*), (6) pumpkinseed (*Lepomis gibbosus*), and (7) yellow perch (*Perca flavescens*). At the TAC's suggestion, PSNH subsequently added two additional fish species – fallfish (*Semotilus corporalis*), and white sucker (*Catostomus commersoni*) – to the list of RIS it evaluated in support of its request to renew the variance.

Population trend analysis of fish abundance in the Hooksett Pool was used to examine the fisheries data collected in electrofish sampling efforts conducted during August and September of the years with standardized sampling (1972, 1973, 1974, 1976, 1995, 2004, 2005, 2010 and 2011) (hereafter the "1972-2011 time period"), to assess the potential effects of Merrimack Station's thermal discharge on the resident and migratory species found in, or passing through,

[13] The full title of the Normandeau reports covering the span of 1969-2012 are provided on pages 46-49 of these comments.

the Hooksett Pool (Normandeau 2007a, 2011a).[14] This evaluation of the presence of long-term population trends of selected fish species in the Hooksett Pool was based on a time series of annual mean "catch per unit effort" ("CPUE") from electrofish sampling.[15] CPUE is commonly used by fisheries scientists as an index of population density or stock size, (EPA Large River Bioassessment Guide) and was used here as a relative index of the occurrence and population size (*i.e.*, abundance) of each selected fish species in the Hooksett Pool.[16] In addition, Normandeau analyzed this same data set to compare the structure of the Hooksett Pool fish community over the 1972-2011 time period using three established community indices: (1) taxa richness, (2) the Shannon Diversity Index, and (3) the Bray-Curtis Percent Similarity Index.[17] The application of each of these indices illustrates not only the diversity of the fish community in the Hooksett Pool as of 2011, but also the marked increase in diversity between 1972 and 2011,

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[14] Selection of electrofish data for inclusion in the population trends analysis for the period 1972-2005 is described in § 3.0 of the report titled "Merrimack Station Fisheries Survey Analysis of 1967 through 2005 Catch and Habitat Data" (Normandeau 2007a). As described in that report, electrofishing data collected by Normandeau during 1972, 1973, 1974, 1976, 1995, 2004 and 2005 were collected using consistent and well-documented procedures, even though the sampling effort varied among months in some of these years due to environmental conditions that influenced effective sampling (typically storm events that caused high flows and high water conditions). Examination of the electrofishing data among those years identified August and September as the only months with consistent sampling design and effort applied to the same sampling stations, thus providing the maximum number of months and years of historic data for population trend analysis (Normandeau 2007a). The 2010 and 2011 electrofish sampling in the Hooksett Pool was designed to collect fisheries data using the same consistent and documented procedures as in the years included in the original trends analysis (Normandeau 2011a).

[15] EPA itself has identified electrofishing as the "the most comprehensive and effective single method for collecting fishes from streams and rivers." Joseph E. Flotemersch et al., EPA Office of Research & Development, Concepts and Approaches for the Bioassessment of Non-wadeable Streams and Rivers, EPA/600/R-06/127 at 7-5("EPA Large River Bioassessment Guidance") (citations omitted). Passive gears such as trap nets can be more effective for specific species, guilds or size classes of fish but, as a result, may only effectively sample a segment of the fish community in a specific survey area. *See id.* Thus, the American Fisheries Society advises that the use of trap nets is more appropriate for standing waters such as lakes and ponds. *See* Scott A. Bonar et al., Standard Methods for Sampling North American Freshwater Fishes, (American Fisheries Society, August 2009).

[16] The use of the CPUE as a relative index of the abundance of each selected fish species was a reasonable assumption because the same electrofishing sampling gear was used to sample representative fixed stations during the period of August and September of all of the years with comparable sampling design, methodology and effort ((1972, 1973, 1974, 1976, 1995, 2004, 2005, 2010.

[17] Changes in community trends were also evaluated through two other indices, percent generalist feeders and percent tolerant individuals. The result of these evaluations are discussed below in Section IV.A.2.d.

and thus supports a finding that Merrimack Station's thermal discharge has not caused appreciable harm to the Hooksett Pool BIP.

Taxa richness is a tabulation of the number of different species present in a community within a given area at a given time. It is used in combination with other indices of community structure to evaluate for potential shifts in the species composition over time within a given fish community. Here, taxa richness was calculated as the number of distinct species present within the Hooksett Pool in a given standardized sample year during the 1972-2011 time period. The number of taxa observed was lowest in 1972 and 1976 – 12 species in each year – and highest in 2010 and 2011 – 19 species in each year. Moreover, over the course of the 1972-2011 time period, taxa richness increased from 12 species sampled during 1972, to 19 sampled in both 2010 and 2011 (with expected variability from sample year to sample year), clearly supporting a finding that Merrimack Station's thermal discharge has not caused appreciable harm to the BIP in the Hooksett Pool.

Using the standardized electrofish sampling data collected in 2010 and 2011, taxa richness was calculated as the number of distinct species present within the Garvins, Hooksett and Amoskeag Pools in each year (Normandeau 2011a). The Hooksett Pool had the highest taxa richness in both 2010 and 2011—with 19 species in each year – followed closely by the Garvins Pool, which had taxa richness of 18 species in 2010 and 16 species in 2011. The Amoskeag Pool had the lowest taxa richness each year, with 13 species in 2010 and 15 species in 2011.

More particularly, during 2010:

- American eel, Eastern silvery minnow and margined madtom were present in the Hooksett Pool but not detected in the Garvins Pool or the Amoskeag Pool.
- Juvenile alewife were present in the Hooksett and Amoskeag Pools but not detected in the Garvins Pool.

- Brown bullhead and golden shiner were present in the Garvins and Amoskeag Pools but not detected in the Hooksett Pool.

- Yellow bullhead, tessellated darter, spottail shiner, fallfish and common shiner were present in the Garvins and Hooksett Pools but not detected in the Amoskeag Pool.

Similarly, during 2011:

- Yellow bullhead, margined madtom, eastern blacknose dace and American shad were present in the Hooksett Pool but not detected in the Amoskeag Pool or the Garvins Pool.

- American eel were present in the Hooksett and Amoskeag Pools but not detected in the Garvins Pool.

- Golden shiner, common shiner and tessellated darter were present in the Garvins and Hooksett Pools were not detected in the Amoskeag Pool.

- Brown trout and brown bullhead were detected in the Garvins and Amoskeag Pools but not detected in Hooksett Pool.

Taken together, these data prove that the taxa richness of the Hooksett Pool fish community is comparable to the taxa richness of the thermally uninfluenced Garvins Pool fish community. This similarity between the fish communities in the two pools strongly supports a finding that Merrimack Station's thermal discharge has not reduced the species diversity of the Hooksett Pool fish community. This in turn confirms that the Station's discharge has not caused appreciable harm to the Hooksett Pool BIP.

The Shannon Diversity Index combines information on the number of species in an assemblage (richness) and each species' relative abundance or "evenness" (*i.e.*, the number of individuals from each species in the same area) to measure overall diversity in a given community. Here, the index was calculated for the fish assemblies present within the Hooksett Pool during August and September in each of the years with standardized sampling during the 1972-2011 time period. Fish community diversity in the Hooksett Pool was lowest during the 1995 sampling and highest during 2011. Moreover, all of the per-year diversity index values from the sampling years in the 2000s were higher than the values from the sampling years in the 1970s, indicating that the diversity of the fish community in the Hooksett Pool – and therefore the biological health of that community – has generally increased, not decreased, over the past forty years. This too supports a finding that Merrimack Station's thermal discharge has not caused appreciable harm to the BIP in the Hooksett Pool.

The Bray-Curtis Percent Similarity Index was used to quantitatively compare the fish communities within the Hooksett Pool among the years with standardized sampling during the 1972-2011 time period (Normandeau 2011a). Unlike taxa richness or rank abundance, this index calculates percent similarity among the fish taxa common in two sets of survey data – for example, the percent similarity between the fish taxa observed in the Hooksett Pool in 1972 as compared to the fish taxa observed in the Hooksett Pool in 2011. As a result, this assessment method can be particularly useful in demonstrating no prior appreciable harm.

A community analysis was conducted by comparing the results of standardized electrofish sampling in the Garvins, Hooksett and Amoskeag[18] pools among the years with standardized sampling during the 1972-2011 time period (Normandeau 2011a). Five major groups were identified consisting of sample collections primarily from the 1970s (Groups IA and IB), the 2000s (Group IIA), 1995 (Group IIB1) and the 2000s (Group IIB2). As would be expected from these groupings, there were significant differences among each of the decades (1970s, 1995, 2000s), indicating a high degree of temporal variability. However, if Merrimack Station's thermal discharge had adversely impacted the abundance and distribution of fish in the Hooksett Pool over the 1972-2011 time period, there should have been a consistent increase in the abundance of warmwater fish and an accompanying decrease in the abundance of coolwater

[18] The Amoskeag Pool is immediately adjacent to the Hooksett Pool, approximately 2½ miles downstream from Merrimack Station.

fish in the Hooksett Pool fish community over the 1970-2011 time period. Instead, the data indicate no such consistent increases and decreases. The groups from the 1970s (Groups IA and IB) were most similar to each other and least similar to the group from 1995 (Group IIB1) and the 2000s (Groups IIA and IIB2) (Table 3-10).

An increase in the abundance of bluegill, a warmwater fish, contributed most to the differences among the 1970s groups and the 1995 group. However, abundance of bluegill decreased between 1995 and the 2000s, and this decrease made the major contribution to the differences between Group IIB1 (1995) and Groups IIA and IIB2 (2000s). The increase in the abundance of bluegill between the 1970s and 1995 was accompanied by a decrease in the abundance of pumpkinseed. The 1970s were distinguished from the 2000s by a general increase in the abundance of spottail shiner, largemouth bass and bluegill, all warmwater fish. However, a decrease in the abundance of pumpkinseed, another warmwater fish, also distinguished the 1970s from the 2000s. Among coolwater fish, an increase in the abundance of fallfish and a decrease in the abundance of yellow perch contributed to the differences between these decades. In sum, a combination of increases and decreases in the abundances of both warmwater and coolwater contributed to the differences in the Hooksett Pool fish community between the 1970s and 1995, and the 1970s and the 2000s.

The Shannon Diversity Index was also calculated for the fish communities present within the Garvins, Hooksett and Amoskeag Pools using the standardized electrofish sampling data collected in 2010 and 2011. Analysis of these data shows that fish community diversity was greater in the Hooksett Pool during both 2010 and 2011 than in either the Garvins or the Amoskeag Pools. This runs completely counter to what any reasonable person would expect to see if, in fact, Merrimack Station's thermal discharge had caused appreciable harm to the BIP in the Hooksett Pool.

A community analysis was conducted by comparing the results of electrofish sampling in the Garvins, Hooksett and Amoskeag Pools in August and September of 2010 and 2011. This analysis showed that significant differences existed among the fish communities of each of the three pools, and that there was a clear trend of decreasing similarity among pools moving downriver from the Garvins Pool to the Hooksett Pool to the Amoskeag Pool. However, the differences are not related to the thermal discharge from Merrimack Station.

Five major groups were identified by Bray-Curtis numerical classification. Of these five groups, three – Groups IIA, IIB1 and IIB2 – were the most similar, with dissimilarities ranging from 50.52 percent to 55.92 percent. These groups consisted of a combination of samples from the Garvins and the Hooksett Pools. Group IIA contained 19 samples from the Garvins Pool and seven from the Hooksett Pool. Group IIB1 contained 22 samples from the Hooksett Pool, and Group IIB2 contained 19 samples from the Hooksett Pool. Importantly, the samples from the Garvins Pool did not form a unique group, but were instead clustered with samples from the Hooksett Pool to form Group IIA, indicating that the fish community in the Garvins Pool, which is not subject to Merrimack Station's thermal discharge, is not distinct from the fish community in the Hooksett Pool. If the Station's thermal discharge had adversely affected the fish community in the Hooksett Pool, the differences between these groups would be characterized by an increase in the abundance of warmwater species or a decrease in the abundance of coolwater species in the Hooksett Pool. However, the two Hooksett Pool groups (Groups IIB1 and IIB2) were distinguished from the majority of the Garvins Pool group (Group IIA) by generally lower abundances of fish including both warmwater and coolwater species (Table 2-

19). This finding supports the current existence of a BIP in the Hooksett Pool and the lack of appreciable harm from Merrimack Station's thermal discharge.

Diversity in the number of macroinvertebrate species has increased in the Hooksett Pool since the 1960s, with the observed increase primarily occurring in pollution-sensitive species that have benefited from the post-CWA enactment improvements in Merrimack River water quality (Normandeau 2012a). Macroinvertebrate communities are useful indicators of anthropomorphic perturbation due to their limited mobility. They are unable to avoid adverse environmental conditions and are often eliminated from areas where stresses exceed tolerance levels. In response to stressed conditions, the macroinvertebrate community often shifts towards high numbers of a few tolerant taxa.

Data from the 1966 United States Department of the Interior report "Report on Pollution of the Merrimack River and Certain Tributaries, Part II- Stream Studies- Physical, Chemical and Bacteriological" clearly indicates that pollution in the Merrimack River during the 1960s was adversely affecting the river's macroinvertebrate community (USDI 1966). Less than 15 miles of the Merrimack River, from a total of 115 miles studied, contained benthic organisms.

Water velocity and substrate conditions were found to determine the distribution, standing crop and species composition of the benthic macroinvertebrate community (including shellfish) observed in exhaustive annual studies performed from 1975 through 1978 in the Hooksett Pool both upstream and downstream of Merrimack Station (Normandeau 1979a). Lentic taxa inhabited the slow-flowing or ponded areas of the study area near Hooksett Dam with fine sediments and organic debris in the substrate, while lotic taxa inhabited rapid-flowing and turbulent areas of moderate currents with a cobble or boulder substrate found primarily in the Garvins Falls Dam tailwaters at the upstream end of the Hooksett Pool and in the Hooksett

Dam tailwaters at the downstream end. No endangered or threatened species of shellfish or benthic macroinvertebrates were found. The preference for lentic or lotic habitats overrides any influence of Merrimack Station's thermal discharge, because the standing crop and structure of benthic macroinvertebrate communities sampled by Ponar grabs and by artificial multiplates were similar within the same habitat types found both upstream and downstream from the cooling canal discharge (Normandeau 1979a). The relatively high thermal tolerance of organisms found in the benthic macroinvertebrate community and the surface-orientation of the thermal plume were two factors ameliorating any discharge effects, including those on drifting invertebrates sampled by artificial multiplate samplers (Normandeau 1979a).

Kick net and Ponar macroinvertebrate sampling was conducted within the Garvins Pool and at Monitoring Station N-10 in the Hooksett Pool during late 2011 to validate the use of N-10 as a control site for the assessment of potential impacts to the macroinvertebrate community due to Merrimack Station's thermal discharge. Due to the limited mobility of benthic organisms in the Hooksett Pool and the presence of ambient water temperatures at Station N-10, its use as such a control site is appropriate. Among the metrics examined for kick net data, no consistent pattern was detected to suggest that a significant difference in the macroinvertebrate communities within the Garvins Pool and the Hooksett Pool at Station N-10 exists. In contrast, data collected by Ponar revealed increased richness and diversity within the Garvins Pool relative to the Hooksett Pool Station N-10. However, kick net sampling provides the best representation of macroinvertebrate species available as a food source to fish residing within shallow water littoral habitats. EPA Large River Bioassessment Guidance. Even though the wadeable shore zone only accounts for a small proportion of the entire river channel, it may be the most productive and diverse zone for benthic macroinvertebrates (Wetzel 2001).

Macroinvertebrate sampling was conducted during October 2011 using the same sampling techniques and sampling locations as was performed during 1972. When compared to samples collected during 1972, kick net data collected in 2011 at Monitoring Stations N-10, S-0, S-4 and S-17 showed an increase in EPT richness of 150-300 percent. Taxa richness increased from 7-10 in 1972 to 21-23 in 2011. The 2011 EPT/chironomid abundance ratio was higher than that recorded during the 1970s, as would be expected from samples collected in a river with improved water quality and habitat tolerable for more pollution sensitive species (Normandeau 2012a). Benthic samples, collected by Ponar grab during 1972, 1973 and 2011 at Monitoring Stations N-10, S-0, S-4 and S-17, also show indications of improved riverine conditions over time, although these are not as dramatic as the shoreline samples, likely due to the sand substrate that is typically inhabited by tolerant organisms even in pristine conditions (Normandeau 2012a). A direct comparison of kick net and Ponar sampling data collected in the Garvins Pool and the Hooksett Pool downstream of Merrimack Station was not conducted due to concerns over the effect of varied seasonal timing of the sampling. Degraded habitat conditions that might be caused by continued exposure to Merrimack Station's thermal discharge should result in a consistent pattern of reduced diversity and increased abundance of pollution-tolerant species for the Hooksett Pool macroinvertebrate population located downstream of Merrimack Station over time (1970s to present). That hypothesis is not supported by the data collected during 2011.

b. <u>The current population sustains itself through cyclic seasonal changes</u>

In addition to being characterized by diversity, the aquatic community in the Hooksett Pool can sustain itself through cyclic seasonal changes. The Draft EPA 316(a) Guidance identifies five species-level metrics that may be used to assess whether a thermal discharge has caused appreciable harm to a fish community in the water body receiving the discharge. *See*

Draft EPA 316(a) Guidance at 31. Here, comparison of fisheries biocharacteristics data collected over a four-year period (2008-2011) in the Hooksett Pool and the thermally uninfluenced Garvins Pool (as well as in the Amoskeag Pool) provides a basis for assessing four of these metrics with respect to the fish community in the Hooksett Pool, including age and growth.[19] *See id.* ("Trends in age and growth normally expected in the species should be discussed."). The intensive age and growth analyses conducted by Normandeau to compare multiple species of fish resident in the Hooksett and the Garvins Pools during the 2008-2011 time period provide meaningful support for the ability of the BIP in the Hooksett Pool to sustain itself through cyclic seasonal changes (Normandeau 2009a, 2011a).

A comparison of the mean length at age for resident fish in the Garvins and the Hooksett Pools cannot be used to accurately determine any impact on fish populations because of the higher density of relevant fish populations in the Hooksett Pool. The underlying hypothesis is that where aquatic habitat has been adversely impacted by a thermal discharge, sampling data tend to show lower mean length at age for a resident fish species compared to the same species in a thermally uninfluenced area, due to a reduction in growth rates associated with thermal stress. However, the inverse relationship between density and growth (*i.e.*, the larger the fish population in a given water body, the slower the growth of individual fish in that population, due to competition for resources) has been well-studied and documented in other systems for both white sucker and yellow perch. Here, the observation of reduced mean length at age for two coolwater fish species (white sucker and yellow perch) in the Hooksett Pool might suggest that growth (as estimated by mean length at age) may be reduced for some age classes in the Hooksett Pool as compared to the same age classes of the same species in the Garvins Pool. However, the

[19] Normandeau's assessment of three of the four other metrics – "condition factors" (*e.g.*, length and weight, disease and parasitism, and reproduction – are discussed in section IV.A.4.b. below).

abundance (density) of both white sucker and yellow perch was greater in the Hooksett Pool than in the Garvins Pool during the sampling period; hence, the causes for such lower mean length at age for the coolwater fish species in question cannot be attributed to Merrimack Station's thermal discharge.

In addition, where aquatic habitat has been adversely impacted by a thermal discharge, sampling data tend to show a greater total mortality for a fish species resident in that habitat compared to the same species in a thermally uninfluenced area, due to increased stress associated with thermal impacts. Specifically, mortality rates were calculated for seven fish species (four warmwater and three coolwater) with adequate sample sizes and common to both the Garvins and the Hooksett Pools. No significant differences in total mortality were detected for two of the three coolwater fish species (white sucker and yellow perch) as well as three of the four warmwater fish species (bluegill, largemouth bass and pumpkinseed). Overall, the mortality levels observed in the Hooksett Pool are lower than or equal to those observed in the Garvins Pool for five of the seven species examined, including yellow perch and pumpkinseed, two fish species that have decreased in abundance in Hooksett Pool between 1972 and 2011. This finding supports the current existence of a BIP in the Hooksett Pool.

c. **<u>The Hooksett Pool Contains the Necessary Food Chain Species</u>**

Additionally, the aquatic community in the Hooksett Pool contains the necessary food chain species. Support for the continued presence of necessary food chain species is provided through an examination of recent fisheries and macroinvertebrate data within the Hooksett Pool. Benthic macroinvertebrate data collected from littoral areas of the Hooksett Pool, where numerous young of year and juvenile fish reside and forage, showed that total abundance, taxonomic richness, EPT richness, and the abundance of EPT taxa to chironomid taxa were all much higher in 2011 compared to 1972. In addition, a review of recent fisheries sampling indicates that forage species such as spottail shiner, common shiner and golden shiner are important components of the Hooksett Pool fish community as they were during the 1970s (Normandeau 2011a). Abundance of these forage species are comparable to levels observed during sampling conducted during the same years in the Garvins Pool to be used for comparative purposes in the assessment of potential impacts from Merrimack Station's thermal discharge.

The lower Hooksett Pool is a segment of the Merrimack River that is considered a low potential impact area for phytoplankton, because it is in a portion of the Merrimack River continuum where the annual carbon cycle is typically dominated by heterotrophic activities in a detrital food chain. *See* Draft EPA 316(a) Guidance at 18-19; Hynes 1970. Annual studies of the community composition and standing crop of phytoplankton and periphyton from 1975 through 1978 in the portion of the Hooksett Pool upstream and downstream of Merrimack Station showed no endangered or threatened species were found, no shift towards nuisance species observed in either the upstream or downstream portions of the Hooksett Pool, and no long-term reductions or increases in autotrophic production of the periphyton or phytoplankton components of the algal community that could be attributed to Merrimack Station's thermal discharge (Normandeau 1979a).

Continuation of autotrophic production at low levels insures maintenance of the detrital food chain in the Hooksett Pool. Occasional short-term reductions in abundance of primary producers were observed in the thermally influenced portion of the lower Hooksett Pool during low flow periods in the autumn of some years (Normandeau 1979a). However, these transient episodes of low productivity resolved quickly due to the short generation time (up to two cell divisions per day) of the diatoms which were dominate in the algal community and replenished rapidly during the fall season. All of these findings support the current existence of a BIP in the Hooksett Pool.

d. The Hooksett Pool is not Dominated by Pollution Tolerant Species

Finally, the aquatic community in the Hooksett Pool is not dominated by pollution-tolerant species. Aquatic habitat that has been adversely impacted by a thermal discharge characteristically contains a higher percentage of both generalist feeders (which can capitalize on a variety of different food sources and often increase dramatically with habitat degradation) and pollution-tolerant individuals. However, neither of these findings was observed in the Hooksett Pool for fish collected during the standardized electrofish sampling efforts that PSNH conducted between 1972 and 2011. This finding supports the current existence of a BIP in the Hooksett Pool.

It is well-established that the percentages of generalist feeders and pollution-tolerant individuals in a fish community increases as the physical and chemical habitat deteriorates. Barbour *et al.*, EPA Office of Water, Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Microinvertabrates, and Fish, EPA 841-B-99-002 (2nd ed. 1999). However, abundance of generalist feeders in the Hooksett Pool was highest during 1976 (75.7 percent) and lowest during 2010 (22.3 percent). (This decrease in percent generalist feeders from the 1970s to present can be attributed to the decrease in abundance of pumpkinseed, a generalist feeder that represented more than 50 percent of the Hooksett Pool fish community during the early 1970s.) Moreover, the percentage of pollution-tolerant species peaked during 1995 (42.0 percent), and the percentage of pollution-tolerant species in the Hooksett Pool during two of the four most recent sampling years (2004 11.5 percent) and 2010 (13.8 percent)) were comparable to the range of percentages observed during the 1970s (*e.g.*, 1972 (7.5 percent), 1976

(13.3 percent) and 1978 (7.8 percent)). The increased abundance of bluegill in the Hooksett Pool during 1995 is the principal factor in the elevated percentage of pollution-tolerant species observed during that year.

A higher percentage of generalist feeders were observed in the Hooksett Pool than was observed in the Garvins Pool during both 2010 and 2011. However, these differences were the result of increased relative abundance of both coolwater and warmwater species in the Hooksett Pool. Specifically, there was greater relative abundance in the Hooksett Pool of bluegill, a warmwater species, during 2010 and fallfish, a coolwater species, during 2011. In addition to generalist feeders, fish species in the filter feeder, piscivore, herbivore, and insectivore trophic guilds were also recorded in the Hooksett Pool.

Similar to percentage generalist feeders, a higher percentage of tolerant species was observed in the Hooksett Pool than was observed in the Garvins Pool during both 2010 and 2011. This difference can primarily be attributed to greater relative abundance in the Hooksett Pool of bluegill, a warmwater species, during 2010 and white sucker, a coolwater species, during both years. If Merrimack Station's thermal discharge had adversely impacted the BIP in the Hooksett Pool by increasing the percentage of generalist feeders or pollution-tolerant individuals, it would not be coolwater species that would have significantly contributed to these increases, as documented.

EPA has erroneously rejected PSNH's request for renewal of Merrimack Station's § 316(a) variance because it has incorrectly selected the compromised fish community that survived in the toxic pollutant-impaired Hooksett Pool of the 1960s as the BIP. If EPA had taken into consideration and appropriately evaluated *all* of the fisheries, macroinvertebrate and other aquatic sampling data from the 1972-2011 time period, it necessarily would have concluded that the current fish community in the Hooksett Pool is the proper BIP for the purpose of considering PSNH's variance renewal request. The current fish community in the Hooksett Pool is a BIP because it is a community characterized by (1) diversity at all trophic levels; (2) the capacity to sustain itself through cyclic seasonal changes; (3) the presence of necessary food chain species; and (4) non-domination by pollution-tolerant species. *See* 40 C.F.R. § 125.71(c).

3. EPA should have considered the adjacent Garvins Pool as the point of reference for its appreciable harm determination.

As demonstrated in § IV.A.2 above, the current fish community in the Hooksett Pool **is** a BIP. A comparison to assess appreciable harm is therefore unnecessary. However, instead of analyzing the current fish community in the Hooksett Pool with respect to the characteristics of a BIP, EPA decided to compare the current fish community with that of the Hooksett Pool in the 1960s. This was improper – comparing the current fish population with that of the 1960/1970 timeframe ignores the "corresponding changes to the river's indigenous aquatic populations" resulting from improved water quality of the river. *See id.* If EPA wanted to confirm the lack of appreciable harm evidenced by the existence of a BIP in the Hooksett Pool, it should have instead used the fish community in the Garvins Pool as a point of reference. Such a comparison also confirms that no appreciable harm has resulted from thermal discharges at Merrimack Station.

The EAB has recognized the flexibility with which EPA can and should consider the BIP. In *Wabash*, the EAB stated that the definition of BIP "is in the nature of a guideline: it describes important factors to be weighed and considered, but it does not spell out an all-inclusive checklist of criteria that lends itself to rote application." As PSNH's consultants have concluded, the Garvins Pool is a much more appropriate BIP upon which EPA should have based its analysis.

a. The Garvins Pool shares similar characteristics with the Hooksett Pool

The Garvins Pool is located immediately upstream of the Hooksett Pool approximately 2 ½ miles north of Merrimack Station (with PSNH's FERC-licensed Garvins Falls Hydroelectric facility forming the border between the two pools) and shares similar characteristics: "Physical habitat types within both the Garvins and Hooksett impoundments were surveyed during 2010 (Normandeau 2011d). "Sand/silt/clay was the abundant substrate type within both pools, followed by boulder and woody debris." Normandeau Comments at 84. Like the Hooksett Pool, the Garvins Pool has experienced improved water quality and associated environmental changes. The one key difference between the Hooksett Pool and the Garvins Pool is that the Garvins Pool has not been subject to Merrimack Station's thermal discharge. Thus, the current fish community in the Garvins Pool

> Provides a more appropriate point of comparison that may allow the identification of trends in Hooksett Pool that are potentially due to Merrimack Station's thermal discharge . . . [T]he biocharacteristics data collected during this 2008-2011 sampling confirms that when compared to the fish community in Garvins Pool, the fish community in Hooksett Pool in general, and individual species in Hooksett Pool in particular, is diverse, healthy and productive.

Id. at 21-22.

b. This approach of using a reference, or control, water body from which to determine impacts from the thermal discharge is widely accepted.

The EAB and EPA have both acknowledged instances in which it is appropriate to "use a nearby water body unaffected by the existing thermal discharge as a reference area." *See* Letter from EPA Region 4 to North Carolina Department of Environment and Natural Resources (Nov. 16, 2010). For Duke's Cliffside Station, EPA concludes that "[e]xamination of an appropriate reference area may be applicable in this case," relying on the EAB"s decision in *Brayton Point*

I, 12 E.A.D. 490 (2006). In *Brayton Point I*, EPA relied on a "hypothetical community" of fish, *i.e.,* a fish community that may have existed before the plant began operation. There, the issue was whether EPA should have instead used a nearby fish community as a reference point, rather than the hypothetical community it chose. Unlike the Garvins Pool, however, the nearby fish community considered in *Brayton Point I* was found by EPA to have been impacted by the plant's thermal discharge. Here, the Garvins Pool (being upstream and separated by a dam from the Hooksett Pool) clearly has not been affected by Merrimack Station's thermal discharge; therefore, use of it as a reference area is supported and appropriate.

EPA recognizes the need for using a reference or control water body in other contexts as well. For instance, when determining Total Maximum Daily Loads ("TMDLs"). In its "Protocol for Developing Sediment TMDLs," EPA states, "Where local experience has been gained in applying sediment indicators, it is often possible to identify target conditions through analysis of historical conditions or reference stream conditions in relatively high quality parts of the watershed." *See US EPA Office of Water, Protocol for Developing Sediment TMDLs EPA 841-B-99-004 (1st ed. 1999), available at* www.epa.gov/owow/tmdl/sediment/pdf/sediment.pdf. EPA should have looked to the Garvins Pool to assess whether the thermal discharge from Merrimack Station had caused appreciable harm to the BIP of the Hooksett Pool.

4. Operation of Merrimack Station has not resulted in appreciable harm.

PSNH has established that the fish community in the Hooksett Pool is a BIP and that there has been "no appreciable harm" to this population from Merrimack Station's thermal discharges; therefore, it is entitled to renewal of its § 316(a) variance. The absence of appreciable harm is evident from the fact that the Hooksett Pool is currently characterized by a balanced, indigenous population and confirmed by a comparison of the Hooksett Pool with the Garvins Pool.

The most significant flaw in EPA's § 316(a) analysis – other than its disregard of the impaired water quality in the Merrimack River during the 1960s and improved river water quality since the 1960s – is the EPA's inaccurate, inadequately supported finding that Merrimack Station's thermal discharge has caused appreciable harm to the BIP in the Hooksett Pool. EPA's finding of appreciable harm is clearly incorrect because properly interpreted, the data show that over time, there have not been (1) appreciable decreases in all coolwater fish species in Hooksett Pool, (2) appreciable increases in warmwater species in the Hooksett Pool, (3) appreciable decreases in the diversity of species in the Hooksett Pool (as discussed in detail below, the Shannon Diversity Index value shows that the current fish population in Hooksett Pool is more diverse now than it was forty years ago), or (4) appreciable increases in the abundance of generalist feeders or pollution-tolerant species in the Hooksett Pool. In fact, when compared to the Garvins Pool, the biocharacteristics of the fish population in the Hooksett Pool in general, and of the individual species in the Hooksett Pool in particular, indicate no appreciable harm to the BIP.

PSNH has conducted over 40 years of biological monitoring, reporting and analysis of Merrimack Station's potential impacts on the Merrimack River and its fisheries, at the direction and under the oversight of, among others, EPA, NHDES, FERC, the U.S. Fish and Wildlife Service, the New Hampshire Department of Fish and Game, and the Merrimack Station TAC. PSNH's variance renewal request is properly based on this comprehensive dataset and PSNH's scientifically sound, thorough analysis of these data. Specifically, in support of Merrimack Station's request, PSNH's team of nationally recognized scientists, with extensive experience in Merrimack River ecosystems, fish, and hydrothermal dynamics, conducted a retrospective analysis of the comprehensive aquatic and fisheries information collected during Merrimack Station monitoring program.

EPA, on the other hand, has failed to meet its burden to "convincingly negate[] by outside evidence" PSNH's satisfaction of applicable law. Draft EPA 316(a) Guidance at 17. Instead, contrary to Region 1's own previously stated practice,[20] EPA has primarily fallen back on unsupported speculation and libelous accusations of data manipulation and dishonesty by PSNH and its consultants.

Here, the evidence presented by PSNH provides a technically sound foundation for EPA to have concluded that no appreciable harm will result from the continuation of the variance from Merrimack Station's thermal discharge. Consistent with EPA's own guidance, *see* Draft EPA 316(a) Guidance at 46-62, PSNH has systematically collected, evaluated and reported upon substantial amounts of data, spanning more than a 40-year period, relating to the ecology and hydrology of the Hooksett Pool and the impoundments immediately above and below the Hooksett Pool (respectively, the Garvins Pool and the Amoskeag Pool). PSNH has, among other things, completed state-of-the-art statistical trend analyses covering this period, and performed an assessment of benthic macroinvertebrates. Specifically, PSNH has provided EPA with more than 40 years of comprehensive studies[21] of the Merrimack River ecosystem, including:

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[20] *See, e.g., Clean Water Act NPDES Permitting Decisions for Thermal Discharge and Cooling Water Intake from Kendall Station in Cambridge, MA, 316(a) and (b) Determination Document, at 122-23 (U.S. EPA Region 1 June 8, 2004) ("Mirant Kendall Determination"),* at 34-35 (question under § 316(a) is what informed scientific judgment would be without speculation about evidence not in record).

[21] These reports have been submitted to EPA over many years during the course of the NPDES permitting process. In reviewing the administrative record compiled by EPA, it was discovered that certain Normandeau reports were not included. Thus, PSNH has attached to its comments each and every Normandeau report referenced herein to avoid any doubt that all reports have been received by EPA. However, the fact that certain Normandeau reports are not included in EPA's current administrative record raises questions regarding whether EPA did, in fact, review all of Normandeau's information regarding the BIP in the Hooksett Pool. It is possible that EPA has considered additional documents not included in its administrative record due to confidentiality or other concerns. However, as a precautionary measure, each of Normandeau's reports is attached to these comments and PSNH respectfully requests that EPA review any such reports not previously considered prior to issuing the final permit.

- The Effects of Thermal Releases on the Ecology of the Merrimack River (Normandeau 1969) (AR #181);

- The Effects of Thermal Releases on the Ecology of the Merrimack River - Supplemental Report No. 1 (Normandeau 1970);

- Merrimack River Monitoring Program: A Report for the Study Period 1971 (Normandeau 1972);

- Merrimack River Monitoring Program: A Report for the Study Period 1972 (Normandeau 1973a);

- Merrimack River: Temperature and Dissolved Oxygen Studies 1972 (Normandeau 1973b);

- Merrimack River Monitoring Program: A Report for the Study Period 1973 (Normandeau 1974);

- Merrimack River Monitoring Program 1974 (Normandeau 1975a);

- Merrimack River Ecological Studies: Impacts Noted to Date; Current Status and Future Goals of Anadromous Fish Restoration Efforts; and Possible Interactions Between Merrimack Station and Anadromous Fishes (Normandeau 1975b);

- Merrimack River Monitoring Program 1975 (Normandeau 1976a) (AR #182);

- Merrimack River Anadromous Fisheries Investigations: Annual Report for 1975 (Normandeau 1976b);

- Further Assessment of the Effectiveness of an Oil Containment Boom in Confining the Merrimack Generating Station Discharge to the West Bank of the River (Normandeau 1976c);

- Merrimack River Monitoring Program 1976 (Normandeau 1977a) (AR #183);

- Final Report: Merrimack River Anadromous Fisheries Investigations 1975-1976 (Normandeau 1977b);

- Merrimack River Thermal Dilution Study 1978 (Normandeau 1978);

- Merrimack River Monitoring Program 1978 (Normandeau 1979a) (AR #198);

- Merrimack River Monitoring Program: Summary Report (Normandeau 1979b) (AR #364);

- Merrimack River Anadromous Fisheries Investigations: 1978 (Normandeau 1979c);

- Phase I Preliminary Report – Information Available Related to Effects of Thermal Discharge at Merrimack Station on Anadromous and Indigenous Fish of the Merrimack River (Stetson-Harza 1993);

- Merrimack Station: Thermal Discharge Modeling Study (Normandeau 1996) (AR #184);

- Merrimack Station (Bow) Fisheries Study (Normandeau 1997) (AR #201);

- Merrimack Station Thermal Discharge Effects on Downstream Salmon Smolt Migration (Normandeau 2006a) (AR #7);

- Merrimack Station Fisheries Survey Analysis of 1967 through 2005 Catch and Habitat Data (Normandeau 2007a) (AR #11);

- Entrainment and Impingement Studies Performed at Merrimack Generating Station from June 2005 through June 2007 (Normandeau 2007b) (AR #2);

- A Probabilistic Thermal Model of the Merrimack River Downstream of Merrimack Station (Normandeau 2007c) (AR #10);

- Biocharacteristics of Yellow Perch and White Sucker Populations in Hooksett Pool of the Merrimack River (Normandeau 2009a) (AR #12);

- Biological Performance of Intake Screen Alternatives to Reduce Annual Impingement Mortality and Entrainment at Merrimack Station (Normandeau 2009b); and

- Modeling the Thermal Plume in the Merrimack River from the Merrimack Station Discharge (ASA 2010).

In addition, the following reports related to the fish community, macroinvertebrate community and water quality of the Hooksett Pool, as it relates to Merrimack Station, are being submitted:

- Merrimack Station Fisheries Survey Analysis of the 1972-2011 Catch Data (Normandeau 2011a);

- Historic Water Quality and Selected Biological Conditions of the Upper Merrimack River, New Hampshire (Normandeau 2011b);

- Changes in the Composition of the Fish Aggregation in Black Rock Pool in the Vicinity of Cromby Generating Station from 1970 to 2007 (Normandeau 2011c);

- Quantification of the Physical Habitat within Garvins, Hooksett and Amoskeag Pools of the Merrimack River (Normandeau 2011d); and
- Comparison of Benthic Macroinvertebrate Data Collected from the Merrimack River near Merrimack Station (Normandeau 2012a).

The majority of these reports focus on the Merrimack River fish community, in accordance with the well-established biological assessment approach of using fish assemblages as indicators of overall ecological condition. EPA's own technical framework document for the development and implementation of large river bioassessment programs describes the many advantages of using fish assemblages as a direct measure of biological condition relative to biological integrity, noting that fish are relatively long-lived, mobile, feed at every trophic level (*e.g.*, herbivores, omnivores, and predators), and can be relatively easy to identify to species. *See* EPA Large River Bioassessment Guidance at 7-1.

Collectively, these studies and data provide a comprehensive and scientific history of the River and biota in the vicinity of Merrimack Station over a span of more than 40 years, and offer an appropriate foundation for PSNH's retrospective analysis. Based on these studies and data, PSNH's retrospective analysis conclusively demonstrates that Merrimack Station's thermal discharge has not caused prior appreciable harm to the fish community and its representative populations. In stark contrast, and as discussed in detail below, EPA's efforts to undermine PSNH's comprehensive retrospective analysis are overwhelmingly based on speculation alone. EPA's failure to rely on an adequate factual basis for its decision is clearly arbitrary and contrary to its legal requirements and responsibilities; such actions cannot and do not overcome the evidence presented by PSNH.

a. **<u>Merrimack Station's Thermal Discharge Has Not Caused Appreciable Harm To The Aquatic Community in The Hooksett Pool Under The Draft EPA § 316(a) Guidance's "Appreciable Harm" Criteria</u>.**

According to EPA's draft guidance for making § 316(a) demonstrations, an applicant seeking a § 316(a) variance may demonstrate that fish communities in the water body receiving its thermal discharge have not suffered appreciable harm from: (1) direct or indirect mortality from cold shocks, (2) direct or indirect mortality from excess heat, (3) reduced reproductive success or growth as a result of plant thermal discharges, (4) exclusion from unacceptably large areas, or (5) blockage of migration. Draft EPA 316(a) Guidance at 28-29.

The aquatic community in the Hooksett Pool has not experienced appreciable harm from direct or indirect mortality from cold shock. Merrimack Station has a 40-year record of thermal discharge without any documented fish kills due to winter shutdown and the associated cold water temperature shock. Thus, further investigation of direct or indirect mortality from cold shocks is not warranted. The aquatic community in the Hooksett Pool has also not experienced appreciable harm from direct or indirect mortality from excess heat, as demonstrated by the 1972-2011 Fisheries Data and Population Trend Analysis.

As discussed above, a fish population trend analysis was performed using the time series of abundance data (measured as catch per unit effort CPUE) collected through standardized electrofish sampling efforts conducted between 1972 and 2011. This analysis demonstrated that the RIS, as well as other resident fish species in the Hooksett Pool, have not suffered appreciable harm from direct or indirect mortality from excess heat or reduced reproductive success or reduced growth as a result of Merrimack Station's thermal discharge (Normandeau 2007a, 2011a).

Aquatic habitat that has been adversely impacted by a thermal discharge characteristically contains a higher abundance of fish species that are tolerant of warmer water, and a lower abundance of fish species that prefer cooler water. If Merrimack Station's thermal discharge had adversely impacted the abundance and distribution of fish in the Hooksett Pool, the abundance of resident coolwater species in the pool (as estimated by standardized electrofish sampling efforts conducted between 1972 and 2011) should have significantly decreased during the 1972-2011 time period. However, no such significant decrease in abundance was observed for three out of the five coolwater fish species resident in the Hooksett Pool. Specifically, there were no significant trends for fallfish and white sucker; the abundance of the remaining coolwater species, black crappie, increased in the Hooksett Pool over the 1972-2011 time period; and the abundance of chain pickerel and yellow perch decreased.

Similarly, if Merrimack Station's thermal discharge had adversely impacted the abundance and distribution of fish in the Hooksett Pool, the abundance of resident warmwater species in the pool (as estimated by the same standardized electrofish sampling efforts) should have significantly increased during the 1972-2011 time period. However, no such increase in abundance was observed for any of the warmwater fish species resident in the Hooksett Pool during this time period. Specifically, there were no significant trends for seven out of ten warmwater species (bluegill, golden shiner, largemouth bass, rock bass, smallmouth bass, spottail shiner and yellow bullhead), and abundance of the remaining three warmwater species (brown bullhead, pumpkinseed and redbreast sunfish) decreased, suggesting causes unrelated to Merrimack Station's thermal discharge.

In sum, there were no significant trends – either decreasing or increasing – over the 1972-2011 time period for four of the six resident RIS (fallfish, largemouth bass, smallmouth bass and white sucker) or five of the nine additional resident species (bluegill, golden shiner, rock bass, spottail shiner and yellow bullhead) in the Hooksett Pool. Moreover, of these nine species for which there were no significant trends, annual mean CPUE values were statistically similar to those observed in the adjacent the Garvins Pool for largemouth bass, fallfish and spottail shiner during 2010, bluegill during 2011, and golden shiner, rock bass and yellow bullhead during both years (2010 and 2011). During 2010, bluegill had a greater annual mean CPUE in the Hooksett Pool than was observed in the Garvins Pool. Similarly, during 2011, largemouth bass and fallfish had a greater annual mean CPUE in the Hooksett Pool than was observed in the Garvins Pool. While spottail shiner annual mean CPUE was greater in the Garvins Pool than was observed in the Hooksett Pool during 2011, annual mean CPUE was greater for both white sucker and smallmouth bass in the Hooksett Pool than was observed in the Garvins Pool for years 2010 and 2011. The lack of detection of a significant trend over time, and the similarity in CPUE between the Hooksett and the Garvins Pools together, support a finding that Merrimack Station's thermal discharge has not caused appreciable harm to these nine fish species.

Normandeau's analysis detected a statistically significant decreasing trend over the 1972-2011 time period for two of the six resident RIS (pumpkinseed and yellow perch) and three of the nine additional resident species (brown bullhead, chain pickerel and redbreast sunfish) in the Hooksett Pool. A decreasing trend in the mean annual CPUE was observed for two coolwater fish species (yellow perch and chain pickerel) and three warmwater fish species (pumpkinseed, redbreast sunfish, and brown bullhead). Annual mean CPUE values for brown bullhead and redbreast sunfish were the same or greater in the Hooksett Pool as compared to the Garvins Pool in 2010 and 2011. The similar catch rates for these two species during 2010 and 2011 in the Hooksett Pool and thermally uninfluenced the Garvins Pool suggest that the decline observed in abundance of brown bullhead and redbreast sunfish in the Hooksett Pool is unrelated to Merrimack Station.

Annual mean CPUE values for yellow perch, pumpkinseed and chain pickerel were lower in the Hooksett Pool as compared to the Garvins Pool in 2010 and 2011. The depressed catch rates in Hooksett Pool for these three species as compared to Garvins Pool in 2010 and 2011 suggest the presence of a limiting factor in Hooksett Pool that has decreased yellow perch, pumpkinseed and chain pickerel abundance. All three of these species show a strong affinity to water bodies with high amounts of submerged aquatic vegetation. Within the Hooksett Pool, the amount of submerged aquatic vegetation has decreased with improvements in system water quality since the early 1970s (Normandeau 2011b). Abundance of pumpkinseed is likely reduced due to competition with bluegill. In areas of poor water quality (such as the Hooksett Pool during the 1970s), it has been demonstrated that pumpkinseed have advantages over bluegill. In lakes where bluegill and pumpkinseed ranges overlap, it has been theorized that lakes containing only pumpkinseed are due to winterkill of bluegill unable to cope with the hypoxic (low DO) conditions (Osenburg et al. 1992, Fox 1994, Tomacek et al. 2007). Pumpkinseed are more capable of withstanding lower DO levels and fluctuating environmental conditions than bluegill (Fox 1994) allowing them to survive in conditions that effectively eliminate bluegill. It is likely that organic pollution in the Merrimack River prior to the enactment of the CWA in 1972 led to the low DO levels documented during the 1960s and early 1970s (Normandeau 2011b), conditions that would have been advantageous for a species such as pumpkinseed that are capable of tolerating these extremes. The Kendall tau b analysis detected a statistically significant increasing trend over the 1972-2011 time period for black crappie in the Hooksett Pool. There were no detectable differences between annual mean CPUE values for black crappie in the Hooksett Pool and the Garvins Pool during either 2010 or 2011. Similar catch rates for black crappie during 2010 and 2011 in the Hooksett Pool and thermally uninfluenced Garvins Pool suggests that the increase observed in abundance of this species is unrelated to Merrimack Station.

The 2010-2011 sampling data from the Garvins, Hooksett and Amoskeag Pools demonstrates that the aquatic community in the Hooksett Pool has not experienced appreciable harm from direct or indirect mortality from excess heat. As noted above, aquatic habitat that has been adversely impacted by a thermal discharge characteristically contains a higher abundance of fish species that are tolerant of warmer water, and a lower abundance of fish species that prefer cooler water. However, a comparison of the 2010 and 2011 fish communities in the Hooksett Pool and the Garvins Pool shows no clear pattern, and therefore no indication that Merrimack Station's thermal discharge has caused an increase in the abundance of warmwater species or a decrease in the abundance of coolwater species in the pool.

In comparing these data, Normandeau first hypothesized that if Merrimack Station's thermal discharge was adversely impacting the abundance and distribution of fish in the Hooksett Pool, there would a higher abundance of fish species that are tolerant of warmer water, and a lower abundance of fish species that prefer cooler water, in that pool. However:

- In 2010:
    - There were no significant differences in electrofish CPUE between the Garvins and the Hooksett Pools for 12 out of 22 fish species.
    - Among the resident species and RIS belonging to the warmwater guild (Fisheries Survey Analysis Table 3-5), the Hooksett Pool had higher CPUE for bluegill, redbreast sunfish, and smallmouth bass.
    - There were no significant differences in CPUE, or CPUE was higher in the Garvins Pool, for the following seven warmwater fish: brown bullhead, golden shiner, largemouth bass, pumpkinseed, rock bass, spottail shiner, and yellow bullhead.

- In 2011:
    - o There were no significant differences in CPUE between the Garvins and the Hooksett Pools for 13 out of 22 species.
    - o Among the resident species and RIS belonging to the warmwater guild, three species were more abundant in the Hooksett Pool: largemouth bass, redbreast sunfish, and smallmouth bass.
    - o However, there were no significant differences in CPUE, or CPUE was higher in the Garvins Pool, for seven warmwater fish: bluegill, brown bullhead, golden shiner, pumpkinseed, rock bass, spottail shiner, and yellow bullhead.

Normandeau also hypothesized that lower CPUE in the Hooksett Pool as compared to Garvins Pool for coolwater fish could indicate potential "appreciable harm" from higher water temperatures in the Hooksett Pool. However:

- In 2010:
    - o There were no significant differences in CPUE between the Garvins and the Hooksett Pools for black crappie or fallfish, both coolwater fish.
    - o In fact, CPUE for white sucker, a coolwater fish, was significantly higher in the putatively thermally enriched the Hooksett Pool.
    - o While two coolwater species, yellow perch and chain pickerel, had a lower CPUE in the Hooksett Pool, both of these species make use of habitats with submerged aquatic vegetation, which is more common in the Garvins Pool than the Hooksett Pool.
- In 2011:
    - o While, as in 2010, CPUE for yellow perch and chain pickerel was lower in the Hooksett Pool than in the Garvins Pool, CPUE was higher in the Hooksett Pool for fallfish and white sucker, both coolwater species.

In sum, the CPUE data for 2010 and 2011 for individual fish species did not exhibit a pattern supporting EPA's hypothesis that Merrimack Station operations have caused an increase in the abundance of warmwater species and a decrease in the abundance of coolwater water species in the Hooksett Pool. While some warmwater species were more abundant in the Hooksett Pool, there were no significant differences in abundance between the Garvins and the

Hooksett Pools for others, and some warmwater species were more abundant in the Garvins Pool than the Hooksett Pool. Among coolwater species, only the abundance of yellow perch and chain pickerel was consistently higher in the Garvins Pool, which contains more of the aquatic vegetated habitat preferred by both species. Similarly, although the percentage of generalist and pollution-tolerant fish species were higher in the Hooksett Pool during both 2010 and 2011, these differences are reasonably attributable to the increased relative abundance of both coolwater and warmwater species, not the presence of warmwater, generalist and/or pollution-tolerant species.

The Hooksett Pool is a low potential thermal impact area for the phytoplankton, zooplankton and meroplankton communities under the Draft EPA 316(a) Guidance. The phytoplankton community in the Hooksett Pool has not experienced appreciable harm from direct or indirect mortality due to excess heat. The lower Hooksett Pool is a segment of the Merrimack River that is considered a low potential impact area for phytoplankton, because it is in a portion of the Merrimack River continuum where the annual carbon cycle is typically dominated by heterotrophic activities in a detrital food chain. *See* Draft EPA 316(a) Guidance at 18-19; Hynes 1970. Annual studies of the community composition and standing crop of phytoplankton and periphyton from 1975 through 1978 in the portion of the Hooksett Pool upstream and downstream of Merrimack Station confirm the designation of the study area as a low potential impact area for the phytoplankton community (Normandeau 1979a). Over the four year study period (1975-1978), no endangered or threatened species were found, no shift towards nuisance species was observed in either the upstream or downstream portions of the Hooksett Pool, and there were no long-term reductions or increases in autotrophic production of the periphyton or phytoplankton components of the algal community that could be attributed to Merrimack Station's thermal discharge (Normandeau 1979a).

Moreover, continuation of autotrophic production at low levels insures maintenance of the detrital food chain in the Hooksett Pool. Occasional short-term reductions in abundance of primary producers were observed in the thermally influenced portion of the lower Hooksett Pool during low flow periods in the autumn of some years (Normandeau 1979a). However, these transient episodes of low productivity resolved quickly due to the short generation time (up to two cell divisions per day) of the diatoms which were dominate in the algal community and replenished rapidly during the fall season.

The zooplankton and meroplankton communities in the Hooksett Pool have not experienced appreciable harm from direct or indirect mortality from excess heat. The lower Hooksett Pool is a segment of the Merrimack River receiving Merrimack Station's thermal discharge that is considered low potential impact areas for net zooplankton and meroplankton, *see* Draft EPA 316(a) Guidance at 20-21, because no endangered or threatened species were found, and no reduction or adverse change was observed in exhaustive annual studies performed from 1975 through 1978 in the portion of the Hooksett Pool upstream and downstream of Merrimack Station (Normandeau 1979a). The results of the source water body studies were corroborated by a finding of minimal entrainment mortality of net zooplankton and meroplankton due to passage through the condenser cooling system and cooling canal of Merrimack Station (Normandeau 1979a), indicating that Merrimack Station's thermal discharge did not alter the standing crop, relative abundance, natural population fluctuations or free drift of these components of the BIP.

Habitat formers in the Hooksett Pool have not experienced appreciable harm from direct or indirect mortality from excess heat. Aquatic vascular plants (*i.e.*, macrophytes) are the primary habitat formers in the impounded freshwater riverine ecosystem found in the lower

Hooksett Pool. This segment of the Merrimack River receiving Merrimack Station's thermal discharge is considered a low potential impact area, *see* Draft EPA 316(a) Guidance at 22, for aquatic macrophytes because no endangered or threatened species were found. Also within-year comparison of similar habitats upstream and downstream from the cooling canal discharge revealed the heated effluent from Merrimack Station has generally had no adverse effect on the distribution and abundance of aquatic macrophytes (Normandeau 1979a).

A total of 14 species of aquatic vascular plants were observed during surveys conducted from 1970 to 1974. These plants were generally most abundant during August and September of each year (Normandeau 1979a). Merrimack River currents, substrate, water chemistry and depth are all factors influencing the distribution of macrophytes in impounded freshwater riverine ecosystems. Within-year variability among stations sampled from 1970 through 1974, in both the upstream ambient and thermally influenced portions of the study area, was lower in magnitude than inter-annual variation at each station, supporting classifying the study area as one of low potential impact for habitat formers (Normandeau 1979a).

Trends in the abundance of submerged aquatic vegetation can be linked to changes in nutrient loading associated with impaired water quality in the system prior to enactment of the CWA (Normandeau 2011b). Increases in system production due to algal growth have been linked to the addition of sewage to a receiving water. *See* Mackenthun 1965. Semi-quantitative submerged aquatic vegetation data were collected in the Hooksett Pool by Normandeau in 2002 and 2010. Looking at presence-absence only, a decline in overall extent of submerged aquatic vegetation in the Hooksett Pool is implied between the 1970s data and the 2002 and 2010 data. This apparent decrease in submerged aquatic vegetation is likely attributable to the reduction in nutrients in the Merrimack River. Such improvement has likely resulted in corresponding changes to the river's indigenous aquatic populations.

Similarly, the BIP has not experienced appreciable harm from blockage of migration. The Hooksett Pool is used by both resident and anadromous fish species. For the purposes of assessing the potential impact of Merrimack Station's thermal discharge on the BIP in the Hooksett Pool, the entire length of the Hooksett Pool should be considered a single water body, because fish residing in the pool are not limited in their ability to move about. The absence of any fish passage structure at the Hooksett Dam prevents adult anadromous species from accessing the Hooksett Pool unless directly stocked in or above the Hooksett Pool. While several species of anadromous fish are occasionally present in the Hooksett Pool due to stocking, the pool is not annually used as spawning or juvenile rearing habitat. With regard to anadromous species, the major role of the Hooksett Pool is to serve as a downstream passage route. Concerns related to the interaction of migrating anadromous fish species and Merrimack Station's thermal discharge have been examined. Telemetry studies using Atlantic salmon smolts (Normandeau 2006) and adult American shad (Normandeau 1979c) indicated that the thermal plume did not act as a barrier to migration.

More recently, a joint probability was developed using Hooksett Pool river flow and water temperature for each of four one-week biological periods of interest using a 21-year data set (ASA 2012). These biological periods were defined as early-spring (May 7-14), late-spring (June 1-7), summer (August 7-13) and fall (September 24-30). For each biological period, a single year representative of average (approximately 50th percentile of temperature-flow occurrence) and extreme (approximately 90th percentile of temperature-flow occurrence) conditions was selected for modeling (ASA 2011):

- The modeled differences of median water temperature relative to ambient conditions (ΔT) during the early-spring and late-spring biological periods at Monitoring Stations S-0 and S-4 evidence an adequate zone of passage for both resident and transient anadromous fish species moving between the portions of the Hooksett Pool upstream and downstream of Merrimack Station's cooling canal.

- The modeled differences of median water temperature relative to ambient conditions (ΔT) during the summer (August 7-13) biological period at Monitoring Stations S-0 and S-4 evidence a zone of passage within 6°C to 10°C of ambient for resident fish species moving between the portions of the Hooksett Pool upstream and downstream of the thermal discharge.

- The modeled differences of median water temperature relative to ambient conditions (ΔT) during the fall (September 24-30) biological period at Monitoring Stations S-0 and S-4 evidence an adequate zone of passage for resident fish species moving between the portions of the Hooksett Pool upstream and downstream of the thermal discharge. During the average year (approximately 50th percentile of temperature-flow occurrence), an adequate zone of passage is evident from the ambient or near ambient water temperatures throughout much of the river cross sections at S-0 and S-4. In an extreme year (approximately 90th percentile of temperature-flow occurrence), temperatures at S-0 and S-4 ranged from approximately 6°C to 10°C above the ambient water temperature.

In sum, evidence for the ability of fish species to move around and past the thermal plume associated with the Merrimack Station discharge is supported by radio-telemetry studies as well as thermal modeling data, both of which indicate that an adequate zone of passage exists for resident and migratory fish to maintain a BIP.

b. The Hooksett Pool BIP Has Not Experienced "Appreciable Harm" From Merrimack Station's Thermal Discharge Under the EPA § 316(a) Guidance's "Appreciable Harm" Criteria for RIS of Fish.

Fisheries biocharacteristics data for resident species were collected over a four-year period (2008-2011) from the Garvins, Hooksett and Amoskeag Pools of the Merrimack River (Normandeau 2011a). The Draft EPA 316(a) Guidance identifies five response metrics that may be used to assess whether a thermal discharge has caused appreciable harm to a resident fish community. Comparison of biocharacteristics data collected during 2008-2011 within the Hooksett Pool and the Garvins Pool, allows for assessment of four of those metrics: reproduction; disease and parasitism; age and growth; and condition factors (*e.g.,* length and weight).

The BIP has not experienced appreciable harm to reproduction at the species level. Assessment of the impacts to reproduction were limited to two coolwater fish species (yellow perch and white sucker) collected during spring of 2008 and 2009 (Normandeau 2011a). Due to the sampling design, which targeted the collection of spawning perch and sucker for assessment of fecundity, it is likely that the significant differences observed in the sex ratios within species and among pools were biased. Yellow perch in particular often form large spawning aggregations of one to several females with larger numbers of male individuals. As a result, collections made during that time of the year may not be ideal for assessing sex ratios.

Length-fecundity relations were significant for white suckers in both the Hooksett and the Garvins Pools, indicating that fecundity (*i.e.*, the number of eggs per female) increases with length in both locations. The estimated range of number of eggs per female white sucker as well as the range of observed body lengths overlapped for individuals collected within the Hooksett and the Garvins Pools in 2010 and 2011, suggesting that the BIP in the Hooksett Pool has not experienced appreciable harm from reduced reproductive success as a result of Merrimack Station's thermal discharge.

The BIP has not experienced appreciable harm from disease or parasitism at the species level. Resident fish species in aquatic habitat that has been adversely impacted by a thermal discharge characteristically manifest more frequent infestation of internal and external compared to the same species resident in a thermally uninfluenced area, indicating a reduction in the overall health and conditions of the fish Draft EPA 316(a) Guidance. The prevalence of external parasites was assessed for thirteen fish species (five coolwater species and eight warmwater species) common to both the Hooksett and Garvins Pools over the 2008-2011 time period (Normandeau 2011a). Of the five coolwater fish species, the prevalence of external parasites was greater for three species in the Hooksett Pool (black crappie, fallfish and white sucker) and a single species in Garvins Pool (chain pickerel). There was no significant difference in the prevalence of external parasites on yellow perch collected within the Hooksett and Garvins Pools. Prevalence of external parasites among warmwater fish species was greater for common shiner, rock bass and spottail shiner in the Hooksett Pool, and for bluegill, pumpkinseed and smallmouth bass in the Garvins Pool. There were no significant difference in the prevalence of external parasites on largemouth bass or redbreast sunfish collected within the Hooksett and Garvins Pools. The prevalence of internal parasites was assessed for two coolwater species collected during 2008-2009. Presence of internal parasites in white sucker did not differ between the Hooksett and thermally uninfluenced Garvins Pool whereas internal parasites were present in a greater percentage of yellow perch collected in the Garvins Pool.

In general, the prevalence of internal and external parasites associated with resident fish species common to both the Garvins and Hooksett Pools has been variable. There is no consistent evidence of warm or coolwater fish species residing in the Hooksett Pool being subjected to increased parasitism. Parasitism levels are less than or equal to those observed in the Garvins Pool for seven of the thirteen species examined for external parasites and both species examined for internal parasites. These observations are not consistent with EPA's hypothesis that Merrimack Station's thermal discharge has caused appreciable harm to the BIP in the Hooksett Pool.

The BIP has not experienced appreciable harm to age or growth at the species level. With regard to the length-weight relationship in fish, it is well-established that the magnitude of the slope in the regression equation reflects the condition (or robustness) of the fish, with a higher slope indicating a greater weight relative to a constant increase in length (Anderson and Neumann 1996). At the same time, since juvenile fish usually have a lower length-weight slope than older individuals, variation in the length-weight slope can also be the result of changes in the age composition of the samples. Where aquatic habitat has been adversely impacted by a thermal discharge, sampling data typically show a decreasing length-weight curve – signifying progressively lower weight for a given length – for a resident fish species over time or in comparison to the same species residing in thermally uninfluenced habitat. Such a decreasing curve indicates a reduction in quality of body condition due to the thermal impact. Here, the observations of similar or increased growth among coolwater species residing in the Hooksett Pool compared to the same species residing in the thermally uninfluenced Garvins Pool are not consistent with the hypothesis that Merrimack Station's thermal discharge has caused appreciable harm to the BIP in the Hooksett Pool.

Adequate length-weight data was available to compare within-year condition for four coolwater species in the Garvins and Hooksett Pools (Normandeau 2011a). Of the seven possible comparisons, there were no significant differences observed in weight growth relative to a constant increase in length in three cases (2011 chain pickerel, 2009 white sucker, 2009 yellow perch). In three instances (2011 fallfish, 2011 white sucker, 2008 yellow perch), the length-weight curves showed coolwater species in the Hooksett Pool grew significantly more rotund (or "fatter") with increasing length than in the Garvins Pool. Only yellow perch during 2011 grew significantly more rotund with increasing length in the Garvins Pool than was observed in the Hooksett Pool.

In addition, adequate length-weight data was available to compare within-year condition for six warmwater species in the Garvins and Hooksett Pools (Normandeau 2011a). In ten of the eleven comparisons, the length-weight curves showed warmwater species in the Hooksett Pool grew either equal to or significantly more rotund with increasing length than in the Garvins Pool. The observations of similar or increased growth of coolwater species residing in the Hooksett Pool relative to the thermally uninfluenced Garvins Pool are not consistent with the hypothesis that Merrimack Station's thermal discharge has caused appreciable harm to the BIP in the Hooksett Pool.

Similarly, where aquatic habitat has been adversely impacted by a thermal discharge, sampling data tend to show lower mean length at age for a resident fish species compared to the same species in a thermally uninfluenced area, due to a reduction in growth rates associated with thermal stress. Adequate age data for the comparison of mean length at age for individual cohorts between the Garvins and the Hooksett Pools was collected for two coolwater species during 2009 and four warmwater species during 2010 (Normandeau 2011a). Mean length at age was significantly greater in the Garvins Pool for two of the three cohorts of the coolwater white sucker (age-2 and age-3) and three of the four cohorts of the coolwater yellow perch (age-1, age-

2, and age-3) collected during 2009. The remaining two cohorts (white sucker, age-4; yellow perch, age-0) did not show a significant difference in mean length at age between the Garvins and the Hooksett Pools. Mean length at age for four of the six cohorts of warmwater species examined during 2010 did not differ between the Garvins and the Hooksett Pools. The remaining two cohorts (largemouth bass, age-0; pumpkinseed, age-1) exhibited a significantly higher mean length at age for individuals collected in the Hooksett Pool.

The observation of reduced mean length at age for these two coolwater fish species in the Hooksett Pool suggests that growth (as estimated by mean length at age) may be reduced in the Hooksett Pool for some age classes relative to that in the Garvins Pool. The inverse relationship between density and growth of fish has been well-studied and has been documented in other systems for both white sucker and yellow perch (Chen and Harvey 1995, Irwin et al. 2009). Here, abundance of white sucker was greater in the Hooksett Pool than the Garvins Pool, suggesting that the causes for such lower mean length at age are unrelated to the Station's thermal discharge.

In addition to mean length at age, total instantaneous mortality rates (Z) were compared for fish species common to the Garvins and Hooksett Pools (Normandeau 2011a). Z represents the sum of natural mortality (M) and fishing mortality (F). Where aquatic habitat has been adversely impacted by a thermal discharge, sampling data typically show a greater Z for a resident fish species compared to the same species in a thermally uninfluenced area, due to increased stress associated with thermal impacts. Mortality rates were calculated for seven fish species (four warmwater and three coolwater) with adequate sample sizes and common to both the Garvins and the Hooksett Pools. No significant differences in Z were detected for two of the three coolwater fish species (white sucker and yellow perch) as well as three of the four warmwater fish species (bluegill, largemouth bass and pumpkinseed).

Mortality estimates for both fallfish (a coolwater species) and smallmouth bass (a warmwater species) were significantly higher in the Hooksett Pool than in the Garvins Pool (Normandeau 2011a). However, elevated mortality estimates observed for smallmouth bass in the Hooksett Pool may be impacted by heavy recreational fishing pressure. Unfortunately, creel data from the Hooksett Pool bass fishery is not available to estimate the fishing mortality component of Z for smallmouth bass. Overall, the mortality levels observed in the Hooksett Pool are less than or equal to those observed in the Garvins Pool for five of the seven species examined, including yellow perch and pumpkinseed, two fish species that have decreased in abundance in the Hooksett Pool between 1972 and 2011.

In sum, EPA's finding of appreciable harm is clearly incorrect because properly interpreted, the data show that over time, there have not been (1) appreciable decreases in coolwater fish species in the Hooksett Pool, (2) appreciable increases in warmwater species in the Hooksett Pool, (3) appreciable decreases in the diversity of species in the Hooksett Pool (as discussed in detail below, the Shannon Diversity Index value shows that the current fish population in Hooksett Pool is more diverse now than it was forty years ago), or (4) appreciable increases in the abundance of generalist feeders or pollution-tolerant species in the Hooksett Pool (Normandeau 2011a). In fact, when compared to the Garvins Pool, the biocharacteristics of the fish population in the Hooksett Pool in general, and of the individual species in the Hooksett Pool in particular, indicate no appreciable harm to the BIP (Normandeau 2011a).

Observations on the 1972-2011 time series of abundance data for both coolwater and warmwater fish in Hooksett Pool do not show a consistent pattern of increase or decrease in abundance to support the hypothesis that Merrimack Station's thermal discharge has caused appreciable harm to the fish community in the pool (Normandeau 2011a). Moreover, comparison of the results of the standardized fish sampling conducted in the Hooksett Pool and the Garvins Pool in 2008-2011 shows that CPUE data collected for 24 fish species did not exhibit a clear pattern that would be consistent with the hypothesis that Merrimack Station's thermal discharge has caused an increase in the abundance of warmwater species or a decrease in the abundance of coolwater water species in the Hooksett Pool (Normandeau 2011a). Generally, where aquatic habitat has been adversely impacted by a thermal discharge, fish sampling data typically show a reduction in quality of body condition, lower mean length at age, higher total instantaneous mortality rate, decreased reproductive potential and more frequent infestation of parasites when compared to an appropriate BIP. Here, a review of biocharacteristics for thirteen fish species resident in both the Hooksett Pool and the Garvins Pool did not indicate a consistent pattern of impaired health and condition for either warmwater or coolwater individuals (Normandeau 2011a), which is supportive of a finding of "no prior appreciable harm" due to Merrimack Station operations.

5. EPA's consideration of an alternative approach to determining thermal discharge limits is unwarranted.

As discussed fully above, PSNH is entitled to a continuation of its § 316(a) variance. EPA has proposed for consideration its own, independent § 316(a) variance to include water quality based thermal limits. Determination at 217. EPA is considering including the following limits instead of the technology based limits:

(a) thermal discharges may not be "inimical to aquatic life";

(b) thermal discharges must provide, wherever attainable for the protection and propagation of fish, shellfish, and wildlife, and for recreation, in and on the receiving water;

(c) thermal discharges may not contribute to the failure of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to, and with only non-detrimental differences in community structure and function from, that of similar natural habitats in the region; and

(d) any stream temperature increase associated with thermal discharge must not appreciably interfere with fishing, swimming and other recreational purposes.

PSNH believes that these limits can be met with the current configuration of treating thermal discharges at Merrimack Station. To the extent EPA believes that reconfiguration of the current system would ensure achievement of these standards, PSNH is willing to discuss such changes with EPA.

B. EPA's § 316(b) BTA determination requiring installation and seasonal operation of CCC technologies at Merrimack Station is arbitrary and capricious.

EPA's proposed intake design and flow volume determination is flawed and unsupported. As a result, EPA improperly concluded that installation of CCC is the BTA for Merrimack Station's cooling water intake structures CWISs. EPA has failed to demonstrate how CCC is (1) necessary in light of the *de minimis* impingement and entrainment mortality rates currently experienced at Merrimack Station; (2) reasonable to further minimize Merrimack Station's impingement and/or entrainment mortality rates; (3) justifiable in light of EPA's established "wholly disproportionate" and/or "significantly greater" cost-benefit standard, and in light of Exec. Order 13563;[22] or (4) warranted in light of other adverse, non-water environmental and

[22] "Our regulatory system . . . must be based on the best available science. . . must promote predictability and reduce uncertainty. It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative." Exec. Order No. 13563, 76 Fed. Reg. 3821 (Jan. 16, 2011) ("Exec. Order 13563"). "[E]ach agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify);" *Id.*

Section 1(b) of Exec. Order 13563 requires the benefits of any "regulation" to justify its costs. PSNH recognizes that issuance of a draft permit may not be deemed equal to promulgating a regulation. However, § 1(a) energy effects. A proper analysis would conclude that, at most, operational changes and installation of a new fish return system are the appropriate BTA for Merrimack Station. EPA must reconsider its BTA determination and resulting proposed intake design and flow volume requirements before issuing a final permit. In the alternative, EPA should refrain from utilizing its BPJ to establish BTA for Merrimack Station in light of the impending national regulations EPA is required to issue by July 27, 2012, that will address the Station's CWISs.

Background of Merrimack Station's CWISs and CWA § 316(b). As explained in section IV.A. above, Merrimack Station utilizes two CWISs. Section 316(b) of the CWA requires the location, design, construction, and capacity of CWISs to reflect BTA in order to protect and minimize adverse environmental impacts to aquatic organisms. BTA should be established by EPA on a national scale; when national regulations do not exist, EPA may use its BPJ on a case-by-case basis. *See* 40 C.F.R. § 125.90(b).

Regulation of CWISs under § 316(b) originated in 1972. EPA published its first § 316(b) final rule in 1976; however, this rule was invalidated by the Fourth Circuit in 1977. *See* 41 Fed. Reg. 17387 (April 26, 1976); *Appalachian Power Co. v. Train*, 566 F.2d 451 (4th Cir. 1977). In place of the defunct rule, EPA published guidance for evaluating the adverse impact of CWISs and the general method for incorporating § 316(b) conditions into NPDES permits. *See* Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: § 316(b) (May 1, 1977) ("Draft EPA 316(b) Guidance"). The Draft EPA 316(b) Guidance outlined an approach for collecting information intended to support BPJ

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of Exec. Order 13653, by its express terms, applies more broadly to the United States' "regulatory system" as a whole, which includes regulations, as well as permits issued by agencies pursuant to such regulations. Nonetheless, by and through issuance of the draft permit in this matter, EPA has simply circumvented the rulemaking process and is attempting to push-through best professional judgment based BTA limits to ensure Merrimack Station is subject to the technology limits EPA hopes will be adopted in its final § 316(b) national rulemaking but knows are unlikely to make it through the rigors of the administrative process. As such, EPA has improperly engaged in a *de facto* rulemaking in this instance and the principles of the Exec. Order relating to "regulations" similarly apply.

determinations made by the permitting authority; however, it did not establish a national technology based BTA standard, as required by the CWA. In fact, EPA decided to forgo any further promulgation of § 316(b) regulations following issuance of this Draft EPA 316(b) Guidance and, instead, decided to rely on individual BPJ determinations.

Over fifteen years passed with no additional standards developed by EPA. Frustrated by this inaction, environmental groups initiated a citizen suit in 1995, demanding that EPA promulgate regulations to reduce impingement and entrainment caused by CWISs. The parties entered into a consent decree, with EPA agreeing to promulgate new § 316(b) regulations in accordance with a three-phase schedule. *See Cronin v. Browner*, 898 F. Supp. 1052, 1054 (S.D.N.Y. 1995). *See also Riverkeeper, Inc. v. Whitman*, 32 Envtl. L. Rep. 20382, 2001 WL 1505497, at *1 (S.D.N.Y. Nov. 27, 2001) (discussing the litigation that resulted in the consent order requiring EPA to promulgate three phases of CWIS regulations).

EPA promulgated Phase II of the regulatory phasing-schedule, which applied to CWISs located at existing power plants with a design capacity of greater than 50 million gallons per day, like those at Merrimack Station, in September 2004. *See* 69 Fed. Reg. 41576 (July 9, 2004) ("2004 Phase II regulations"). In the 2004 Phase II regulations, EPA called for an overall reduction in impingement of 80 to 95 percent, and an overall reduction in entrainment of organisms by 60 to 90 percent over a baseline value that reflected the level of impingement mortality and entrainment that would occur absent specific controls. *Id.* at 41590. Percentile ranges for impingement and entrainment reductions were included in the rule because it did not establish a single technology as BTA. Instead, EPA offered five compliance alternatives for a facility to select and implement to satisfy the BTA standard, such as using existing technologies, selecting additional fish protection technologies (such as screens with fish return systems), and using restoration measures. *See id.* at 41630.

EPA specifically declined to mandate CCC as BTA for existing facilities because of the "generally high costs" of converting existing facilities to that technology and because "other technologies approach the performance of this option."[23] *Id.* at 41601, 41605. The 2004 Phase II regulations did, however, specify that submerged cylindrical wedgewire ("CWW") screens were a pre-approved, "rule-specified design and construction technology" that complied with the rule's performance standards for CWISs located along freshwater rivers and streams. *Id.* at 41591; *see also id.* at 41602 (providing that "a facility can demonstrate that it meets specified conditions and that it has installed and properly operates and maintains a pre-approved technology" and "approving one technology at this time: submerged [CWW] screen technology to treat the total cooling water intake flow").

Several aspects of EPA's 2004 Phase II regulations were challenged in *Riverkeeper, Inc. v. EPA*, 475 F.3d 83 (2d Cir. 2007) ("*Riverkeeper II*"). Ultimately, the court rejected various provisions of the Phase II rule. In reaching its decision, the court relied on its earlier decision in *Riverkeeper, Inc. v. EPA*, 358 F.3d 174 (2d Cir. 2004) ("*Riverkeeper I*"), a challenge of EPA's 2001 § 316(b) Phase I rule for new facilities, which held that a provision allowing power plants to undertake restoration measures as an alternative to implementing BTA violated the intent of the CWA and was based on an impermissible construction of § 316(b). The *Riverkeeper II* court

[23] While CCC was expected to reduce impingement and entrainment mortality by up to 98 percent, the costs to make all regulated Phase II facilities closed-cycle compliant would have been approximately $3.5 billion per year—almost nine times the estimated annual cost ($389 million) of compliance with the performance standards chosen in the rule. *See* 69 Fed. Reg. at 41601, 41605, 41606, 41666.

Relatedly, the annual benefits expected from implementation of the rule were a meager $83 million, meaning the cost-benefit ratio was approximately 4.5 to 1. *Id.* at 41662. Conversely, the fact that the cost-benefit ratio is likely in excess of 30 to 1 for implementation of CCC at all existing CWIS facilities provides additional insight as to why EPA ultimately chose the compliance options included in the 2004 rule and rejected CCC as BTA.

ultimately remanded a significant portion of the regulations back to EPA for further development, including EPA's use of the "significantly greater" cost-benefit standard to assess the most effective CWIS technology to install at individual plants. On July 9, 2007, however, EPA formally suspended all but one section of the rulemaking, 40 C.F.R. § 125.90(b), which provides, in relevant part, that existing facilities not subject to any other subpart of 40 C.F.R. Part 125 must meet requirements under § 316(b) of the CWA determined by EPA on a case-by-case, BPJ basis. *See* 40 C.F.R. § 125.90(b).

Despite suspension of the 2004 rulemaking by EPA in 2007, EPA's use of the "significantly greater" standard in the 2004 rule and its established practice of considering costs and relative benefits in making § 316(b) BTA determinations was heard by the U.S. Supreme Court in *Entergy Corp. v. Riverkeeper Inc.*, 129 S. Ct. 1498, 1509-1510 (2009). In its decision, the U.S. Supreme Court definitively confirmed that § 316(b) allows permit writers to consider costs and benefits in determining BTA to minimize adverse environmental impacts. In doing so, the court provided that the term "minimize" within § 316(b) "admits of degree and is not necessarily used to refer exclusively to the 'greatest possible reduction.'"[24] *Id.* at 1510. The *Entergy* Court also referenced EPA's prior use of a "wholly disproportionate" cost-benefit standard and stated that although that standard may be somewhat different than the "significantly greater" standard utilized in the 2004 rule, "there is nothing in the statute that would indicate that

[24] Moreover, in speaking about the promulgation of regulations generally, both Justices Scalia and Breyer provided that some consideration of costs and benefits is a part of "rational" and "reasonable" decision making, or at least that imposing enormous costs with very small benefits would be "unreasonable" and "irrational." *Entergy*, 129 S. Ct. at 1510, 1513-15. Justice Scalia further provided that "whether it is 'reasonable' to bear a particular cost may well depend on the resulting benefits." *Id.* at 1510. A decision imposing "massive costs far in excess of any benefit," according to Justice Breyer, would conflict with a test of reasonableness. *Id.* at 1514. Allowing EPA to weigh costs and benefits "prevent[s] results that are absurd or unreasonable in light of extreme disparities between costs and benefits." *Id.* at 1515. According to Justice Breyer, an absolute prohibition on cost-benefit analysis would bring about "irrational" results, because "it would make no sense to require plants to 'spend billions to save one more fish or [plankter].'" *Id.* at 1513. This is "particularly so in an age of limited resources available to deal with grave environmental problems, where too much wasteful expenditure devoted to one problem may well mean considerably fewer resources available to deal effectively with other (perhaps more serious) problems." *Id.*

the former is a permissible interpretation while the latter is not." *Id.* at 1509. Thus, the Court concluded, use of either cost-benefit standard is acceptable for determining BTA for § 316(b) at existing facilities.[25] *Id.*

Lastly, on April 20, 2011, EPA published new proposed regulations entitled *National Pollution Discharge Elimination System-Cooling Water Intake Structures at Existing Facilities and Phase I Facilities*, RIN 2040, AE95, EPA-HQ-OW-2008-0667, FRL-9289-2 (April 11, 2011) ("EPA's Proposed § 316(b) Rule"), in which EPA set categorical standards applying § 316(b) to CWISs at existing power plants and manufacturers, and new units at existing facilities. *See* 76 Fed. Reg. 22174 (April 20, 2011). Like its prior rule, EPA's Proposed § 316(b) Rule focuses primarily on impingement and entrainment of organisms caused by operation of CWISs. It abandons the performance standards approach originally utilized in the remanded Phase II regulations first promulgated in 2004. Thus, there is no need to calculate a baseline against which reductions in impingement or entrainment are to be measured. Instead, for impingement, EPA proposes stringent fish mortality levels that must be met at all times and offers a facility operator two tracks for complying with the national standard.

To comply with the impingement standard, a facility can either: 1) operate modified traveling screens with collection buckets designed to minimize turbulence to aquatic life, screen panel materials with smooth woven mesh, a low pressure wash to remove fish prior to any high pressure spray for debris removal, 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; or 2) reduce the actual or maximum design intake velocity of the CWIS to less than 0.5 feet-per-second, measured as water passes through the screen mesh. Under EPA's

[25] Subsequent to the Supreme Court's *Entergy* decision, President Obama issued Exec. Order 13563 mandating the use of cost-benefits analyses. *See* Exec. Order 13563.

Proposed § 316(b) Rule, an operator utilizing the first option must monitor impingement mortality and demonstrate that the average, annual impingement mortality rate is less than 12 percent and the monthly average is less than 31 percent for the facility.

For entrainment, in the § 316(b) proposed rule, EPA has given permit writers the authority to set individual standards for each plant by evaluating technology options after consideration of site-specific factors. These site-specific factors include numbers and types of organisms entrained, entrainment impacts on the waterbody, cost, feasibility, performance of control technologies, impacts on the reliability of energy delivery, monetized and non-monetized benefits of control technologies, land availability, remaining useful plant life, and increased water consumption. Facilities with actual cooling water flows of more than 125 MGD will be required to perform an entrainment characterization study and technology reviews that will ultimately be used by state regulators to develop the site-specific limits for entrainment mortality.

The requirements of EPA's Proposed § 316(b) Rule have a costs-to-relative-benefits ratio of less than 22.2 to 1, according to EPA's Regulatory Agenda, Fall 2011, RIN 2040-AE95.[26] EPA has received and is currently reviewing numerous comments on the proposed regulations and must issue a final rule by July 27, 2012, pursuant to a settlement agreement.

1. EPA incorrectly applied the BTA factors.

EPA's case-by-case determination with regard to Merrimack Station is flawed because EPA incorrectly applied the relevant BTA factors. When making a BPJ based case-by-case § § 316(b) determination, EPA must consider the availability of a technology, the efficacy of a technology in reducing adverse environmental impact, the costs compared to the relative benefits

[26] Available at http://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201110&RIN=2040-AE95 (last visited Feb. 27, 2012). Notably, the cost-benefit ratio is labeled as "less than" 22.2 to 1 because all of the benefits have not been monetized, in EPA's opinion.

of installing a technology, as well as a number of potential secondary environmental effects including, but not limited to, effects on energy reliability, increased air emissions, land availability, remaining useful plant life, and water consumption. *See, e.g.*, 76 Fed. Reg. at 22196-97 (Apr. 20, 2011). EPA made self-serving, erroneous conclusions in its application of these factors to reach its pre-determined result that CCC is BTA and must be installed at Merrimack Station.

Additionally, PSNH disagrees with EPA's determination that the CWW screens are technologically infeasible. CWW screens are technologically feasible at Merrimack Station and are effective enough in reducing adverse environmental impact to comply with § 316(b)'s BTA standard. EPA's conclusions to the contrary are flawed and not supported by the numerous studies and literature submitted by PSNH to EPA throughout the years and contemporaneously with these comments. However, PSNH agrees with EPA's ultimate conclusion that CWW screens are not BTA for different reasons. Installation of the screens at Merrimack Station does not pass the "wholly disproportionate" and/or "significantly greater" cost-benefit standard for determining BTA pursuant to § 316(b). Thus, the installation of CWW screens at Merrimack Station is not justifiable.

A proper application of the BTA factors shows that operational changes, coupled with the installation of a new fish return system, are BTA for Merrimack Station. For all of these reasons, the § 316(b) requirements contained in the current draft permit, including the information and conclusions upon which they are based, are arbitrary and capricious and must be revised prior to final permit issuance for Merrimack Station.

a. <u>CCC is Not BTA for Merrimack Station</u>

EPA's § 316(b) BTA determination that CCC must be installed at Merrimack Station and operated from April 1 through August 31 of each year is arbitrary, capricious, and contrary to law. As explained in detail below, installation of CCC at Merrimack Station may not be technologically feasible; is not economically practicable; is not necessary, considering the current *de minimis* levels of impingement and entrainment occurring at Merrimack Station; nor is it reasonable to further minimize the current incidence of impingement and/or entrainment. Further, installation of CCC does not pass EPA's "wholly disproportionate" and/or "significantly greater" cost-benefit standard or the President's mandate set forth in Exec. Order 13563. Finally, installation of CCC should not be required due to the other adverse, non-water environmental and energy effects such technology would cause.

i. CCC is Not an Available Technology at Merrimack Station Because it May Not be Technologically Feasible and Cannot be Installed at an Economically Practicable Cost

For a technology to be considered "available," it must be both technologically feasible and economically practicable. Determination at 228-230. This interpretation is consistent with the legislative history for § 316(b), which provides that BTA should be interpreted to mean "best technology available commercially at an <u>economically practicable cost.</u>" *See* A Legislative History of the Water Pollution Control Act Amendments of 1972, 93rd Cong., 1st Sess., 264 (1973) (emphasis added) ("WPCA 1972 Legislative History"). EPA has, in turn, interpreted this legislative history to mean "that the application of [BTA] should not impose an impracticable and unbearable economic burden" upon the regulated entity. *See* 69 Fed. Reg. 41,575, 41,604 (July 9, 2004).

As explained fully in PSNH's 2007 Response to EPA's § 308 Request ("2007 § 308 Response") and Enercon Services, Inc.'s ("Enercon") 2012 Report ("2012 Enercon Report"), submitted contemporaneously with these comments, certain site-specific factors, such as the need for a new pumping station and condenser cleaning system, coupled with logistical issues with existing piping interfaces, limited land availability, site layout constraints, operating parameters, and water treatment and quality issues, all raise serious questions or doubts regarding whether retrofitting CCC at Merrimack Station is technologically feasible or economically practicable.[27]

Technological feasibility, *i.e.*, the ability to retrofit CCC technologies at Merrimack Station, is largely irrelevant, however, because EPA has not, and indeed cannot, demonstrate that CCC technologies can be installed at Merrimack Station at an economically practicable cost. With huge capital and other social projected costs to install CCC at Merrimack Station, coupled with substantial rate increases for PSNH's Energy Service customers,[28] all compared to minuscule expected environmental and other social benefits, there is no doubt that this technology cannot be considered economically practicable, and thus, BTA for the facility. *See* WPCA 1972 Legislative History. EPA's decision to the contrary is incorrect, arbitrary, and capricious and should be revised accordingly prior to issuing Merrimack Station's final NPDES permit.

[27] Additional studies are necessary before EPA can determine that CCC is BTA for § 316(b). Installation of CCC may be infeasible due to a number of non-environmental factors, (*i.e.* land availability, retrofitting, etc.). In fact, PSNH has not fully evaluated the feasibility of installing CCC technologies at Merrimack Station because the technology was expressly rejected in EPA's 2004 Phase II regulations and again in EPA's Proposed 316(b) Rule. *See* 69 Fed. Reg. 41576, 41605 (July 9, 2004); 76 Fed. Reg. 22174, 22207 (Apr. 20, 2011). EPA has not fully evaluated this feasibility either, which is arbitrary and capricious. Thus, if EPA continues to erroneously require installation of CCC technologies at Merrimack Station following review of these and other interested parties' comments, PSNH would need to perform a formal engineering study to determine whether a CCC retrofit is technologically feasible – an effort that would require more time than the comment period for the draft permit.

[28] As discussed below, only those customers of PSNH who purchase their Energy Service from PSNH will be required to pay for the costs of the permit mandates. All customers of PSNH have the ability to choose their supplier of energy from the competitive marketplace. Although PSNH provides a monopoly delivery service, generation-related costs are only borne by those customers who choose to purchase their actual electric energy from PSNH.

ii. CCC is Not Necessary at Merrimack Station Due to Only *De Minimis* Adverse Environmental Impact Caused by the Plant's Intake Structures

CCC is also not warranted to further reduce an already *de minimis* incidence rate of impingement and entrainment at Merrimack Station. The biological data from Merrimack Station's monitoring programs confirm that operation of the facility's CWISs has no adverse environmental impact ("AEI") to the aquatic ecosystems of the Merrimack River in the vicinity of the plant. Thus, installation of CCC is not necessary. Prior to discussing this data, PSNH refutes EPA's critiques of the sampling methods utilized by PSNH's consultant and dispels certain assumptions EPA made in analyzing the sampling data.

(a) EPA's Critique of PSNH's Sampling Methods and Assumptions Made in Analyzing PSNH's Sampling Data are Incorrect

On two occasions, EPA references the fact that PSNH's consultant, Normandeau, did not collect entrainment samples from October to April during its sampling program that formed the basis of the consultant's October 2007 report entitled "Entrainment and Impingement Studies Performed at Merrimack Generating Station from June 2005 Through June 2007" (Normandeau 2007b). *See* Determination at 247, 251. EPA attempts to assert that the average annual entrainment at Merrimack Station may be higher than Normandeau and/or EPA has estimated. However, EPA's assertion is unavailing. EPA had the opportunity to comment on Normandeau's sampling methods—including input on the months in which entrainment sampling would be conducted—prior to the commencement of the biological study. EPA provided no such comments at that time. In addition, ample scientific data exists on the life history of species present in the Hooksett Pool to support the conclusion that entrainment sampling was not necessary during these months because entrainable life stages of eggs and larvae ("ichthyoplankton") are not present in material quantities during that period. *See*

Normandeau Comments at 130. In fact, EPA admits as much in its determinations document, but still points to the lack of data from those months in an attempt to further inflate the estimated number of ichthyoplankton entrained at Merrimack Station in an average year. Determination at 251 (providing that "the decision not to sample during late fall through early spring was likely based on life history information for the species residing in the Hooksett Pool indicating that entrainable life stages are not likely to be present during that period"). EPA's critique is unwarranted as it has no basis in fact, and is arrived at in an arbitrary manner.

EPA identifies certain species of fish, including white suckers, yellow perch, and American shad, as "particularly prone to entrainment." *Id.* at 253, 314-15. EPA also asserts that "the Hooksett Pool has a limited capacity to recruit a new 'year class' to the larger fish community." *Id.* at 253. Both of these contentions are unsupported by any scientific evidence or reasoning. The Garvins Falls and the Hooksett Dam are licensed by FERC – EPA tasked with assuring adequate fisheries conditions – and, in fact, meet all fisheries conditions included in the FERC license. Again, PSNH must assume that EPA has inserted these unsupported particulars in a meager attempt to support its otherwise indefensible decision that installation of CCC is warranted at Merrimack Station.

More importantly, however, two of EPA's overarching assumptions that form the basis of its selection of CCC as BTA are self-serving, incorrect, and unsupported by any scientific literature. First, for entrainment, EPA assumes that ichthyoplankton are equally distributed throughout the river. EPA makes this assumption in order to postulate that the fraction or percentage of water withdrawn from the Hooksett Pool by Merrimack Station's CWISs directly corresponds to the percentage of ichthyoplankton that are lost from the waterbody as a whole. *Id.* at 245, 254. However, EPA cites to no literature to support its assumption that eggs and larvae are equally distributed throughout the Hooksett Pool. Indeed, Normandeau could not locate any scientific literature to support this proposition. *See* Normandeau Comments at 126. To the contrary, the literature Normandeau did obtain on this topic indicates that ichthyoplankton have a very patchy spatial and temporal distribution and are not evenly distributed throughout a given waterbody. *Id.*

EPA's equal distribution assumption is further disproved by the correlation analysis Normandeau included in its 2012 comments. *Id.* Specifically, Normandeau plotted the percentage of water withdrawal from the Hooksett Pool for each of the months during which entrainment data was collected in 2006 and 2007 against the total number of entrained organisms for each said month and, in fact, found a negative relationship between these two variables. *Id.* For instance, the months with the greatest percent withdrawal—August and September 2006—had the lowest entrainment because ichthyoplankton are not common in the Hooksett Pool during those months. *Id.* The highest entrainment occurred in June 2006 and June 2007 when Merrimack Station's riverflow withdrawn percentage was relatively low (June 2006), or average (June 2007), compared to other months. According to Normandeau, this data confirms that percentage of water withdrawal is not nearly as important as the density of ichthyoplankton in the Hooksett Pool for predicting entrainment at Merrimack Station. Thus, EPA wrongly assumes a direct, linear relationship between percentage of water withdrawn and percentage of a waterbody's ichthyoplankton entrained to support its conclusion that CCC must be installed at Merrimack Station pursuant to § 316(b).

Secondly, EPA further compounds its error of by asserting that percentage entrainment, therefore, varies directly with river flow. *See* Determination at 243. Again, EPA provides no support for this assertion. In fact, no evidence exists to support EPA's assertion that entrainment varies with river flow. Instead, as provided by Normandeau, entrainment primarily varies directly with the volume of water withdrawn at Merrimack Station and the density of ichthyoplankton in the river. Normandeau Comments at 126. As such, any and all conclusions rendered by EPA that rely upon these faulty assumptions are flawed and cannot form a credible basis upon which CCC may be required at Merrimack Station.

(b) *De Minimis* Levels of Entrainment and Impingement at Merrimack Station Cause No AEI to the Hooksett Pool

The current *de minimis* levels of entrainment and impingement at Merrimack Station do not constitute AEI. AEI is not defined by statute, regulation, or legislative history. However, the Draft EPA 316(b) Guidance defines AEI as follows:

> whenever there will be entrainment or impingement damage as a result of the operation of a specific cooling water intake structure. The critical question is the <u>magnitude</u> of any adverse impact. The magnitude of an adverse impact should be estimated both in terms of short term and long term impact with reference to the following factors:
>
> (1) Absolute damage (# of fish impinged or percentage of larvae entrained on a monthly or yearly basis);
>
> (2) Percentage damage (% of fish or larvae in existing populations which will be impinged or entrained, respectively);
>
> (3) Absolute and percentage damage to any endangered species;
>
> (4) Absolute and percentage damage to any critical aquatic organism;
>
> (5) Absolute and percentage damage to commercially valuable and/or sport fisheries yield; or
>
> (6) Whether the impact would endanger (jeopardize) the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (long term impact).

Draft EPA § 316(b) Guidance at 15 (emphasis added). In short, EPA has consistently construed AEI to only include impingement and/or entrainment of biological organisms beyond some *de minimis* level.

Courts and EPA agree that § 316(b)'s requirement to minimize AEI includes a reasonableness limitation. As the Supreme Court stated in *Entergy*, use of the term "minimize" within § 316(b) "admits of degree" and, therefore, does not require the "greatest possible reduction" in order to comply with the statutory standard. *Entergy*, 129 S. Ct. at 1506. Instead, what is required is a duty to achieve the greatest possible <u>reasonable</u> reduction in impingement and entrainment in order to comply with § 316(b). This standard necessarily includes cost considerations in determining what reductions can reasonably be achieved through technologies that are affordable and feasible for the industry. As the *Entergy* court aptly noted, the best technology option may be the one "that most *efficiently* produces a good, even if it produces a lesser quantity of that good than other available technologies." *Id.* at 1500.

Normandeau conducted comprehensive biological sampling at Merrimack Station between 2005 to 2007 and subsequently analyzed its data to determine the plant's current levels of impingement and entrainment. The complete analysis of this impingement and entrainment data is contained in Normandeau 2007b. In short, for impingement, Normandeau estimated that Merrimack Station actually impinged 6,736 fish between June 2005 and June 2006 and only 1,271 fish between July 2006 and June 2007—resulting in an estimated impingement of approximately 4,005 fish in an average year. *See* 2007 § 308 Response at 6. Normandeau took these estimated impingement numbers based on actual intake flow numbers to calculate the potential impingement estimations if the plant's CWISs operated at maximum design intake flow capacity throughout the year.[29] This analysis resulted in a forecast that estimated maximum impingement of 4,903 fish for both CWISs in an average year. *Id.* at 13.

For entrainment, Normandeau estimated that approximately 2.95 million ichthyoplankton were entrained at Merrimack Station in 2006 and approximately 2.5 million were actually entrained in 2007 based on actual intake flow numbers.[30] *See* Normandeau 2007b. This resulted in an estimated annual entrainment of 2,876,532 for an average year. 2007 § 308 Response at Attach 6, Table 2-1a. Again, Normandeau took these estimated, actual entrainment numbers and calculated the potential entrainment estimations if the plant's CWISs operated at maximum design intake flow capacity throughout the year. This analysis forecast that less than 3.5 million ichthyoplankton would be entrained in an average year. *See id.* at 12.

EPA disagreed with Normandeau's estimation of 3.5 million ichthyoplankton entrained in an average year and contended that the proper estimation should be 3.8 million. As support for this assertion, EPA pointed to sampling in May 2006 for Unit 1 that resulted in zero larvae being captured. Determination at 252. Specifically, EPA stated that "[t]he Unit 1 sampling result of zero larvae seems highly unlikely," especially when compared to the sampling from the same date at Unit 2 that led to a monthly estimate of 742,481 captured larvae for May 2006. *Id.* In the end, EPA rejected the zero value for the May 2006 sampling at Unit 1 and instead calculated entrainment in May for Merrimack Station using only the 742,481 estimate for Unit 2.

[29] Normandeau conducted this design intake flow analysis at EPA's request in order to better understand the maximum potential for entrainment and impingement at Merrimack Station were the plant to operate at full capacity for an entire year, which has never happened in the plant's 50+ year history.

[30] Approximately 1 percent of this entrainment estimation for 2007 included post-larval white sucker that were thought to have been entrained at Merrimack Station in June 2007. (Normandeau 2007b). EPA repeatedly mentions this purported fact throughout its determinations document in support of why CCC is warranted. *See* Determination at 116, 248, 268. However, as Normandeau explains in its 2012 comments, each of the two white sucker that formed the basis of this estimation were, in fact, post-yolk sac larvae and not post-larval or young-of-year. *See* Normandeau Comments at 129. As such, EPA's concerns are mistaken and should be omitted from its final decision on this NPDES permit.

It is patently improper for EPA to simply omit valid sampling data just because it does not seem consistent with other data collected.[31] EPA has no objectively valid reason, such as concrete evidence of improper collection methods or laboratory analyses, for its self-serving decision to delete the data. Indeed, in its 2012 comments, Normandeau clearly established that each of its May 2006 samples are valid. *See* Normandeau Comments at 130. In fact, Normandeau's data set, which is included in its latest report, revealed that all but one of the six samples collected at both Units 1 and 2 in May 2006 were between zero and two (with three of the six values being zero), meaning that ichthyoplankton densities are consistently low in May within the Hooksett Pool. The lone sizeable data point of 28 ichthyoplankton captured on the night of May 31, 2006, is the actual outlier that accounted for the sizeable entrainment estimate for that month. If anything, EPA should exclude this sampling point as an outlier. However, Normandeau provides in its 2012 comments that it did not have a valid methodological reason for excluding this value, which is why it was included. *Id.* at 114. EPA did not give the same fair treatment to the data. Not only did EPA fail to reject this lone, large sampling anomaly from May 2006 as inconsistent with the remaining data, it instead speciously took the polar opposite position and rejected the two zero sampling values obtained at Unit 1 by Normandeau in May 2006. *Id.* at 113-14. This cherry-picking of favorable data and deletion of other sampling values is the epitome of arbitrary and capricious behavior on the part of a federal agency.[32]

The natural mortality of early lifestages of fish, coupled with the exorbitant number of eggs fish produce each season, put Merrimack Station's raw numbers of impingement and

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[31] See § IV.C.4 below for another example of where EPA inappropriately rejected good data and used bad data in setting permit limitations.

[32] EPA also bluntly contended that Normandeau's calculated impingement survival rates were "questionable" without providing any objective reason to support its assertion. Determination at 261. This unsupported critique has no basis.

entrainment into perspective and support the ultimate conclusion that the current incidence of impingement and entrainment at Merrimack Station is, in fact, *de minimis*.[33] To illustrate this point, Normandeau took the raw numbers for the six species that comprise in excess of 90 percent of the total fish impinged and entrained in an average year at Merrimack Station and calculated the annual, expected adult equivalent losses due to the estimated impingement and entrainment based on actual intake flow. (Normandeau 2007b). For impingement, Normandeau concluded that only 517 adult fish would be lost in an average year due to actual intake flows at Merrimack Station in an average year. 2007 § 308 Response at 7. In addition, only 14,061 adult fish would be lost in an average year due to entrainment of ichthyoplankton at the plant based on actual intake flow.[34] *Id.* These adult equivalency numbers put biological losses from operation of Merrimack Station's CWISs into perspective and undeniably demonstrate that such operations result in *de minimis* AEI.

Although EPA acknowledges Normandeau's adult equivalency analysis in its determination document, EPA summarily dismisses the results as only one limited factor among many for determining AEI. Adult equivalency is but one factor. However, it is a very important factor that the scientific community has consistently recognized as an accepted standard method for estimating actual impacts to fish populations. Normandeau Comments at 129; *see also* 69 Fed. Reg. 41,575, 41,586 (July 9, 2004) (providing that "expressing impingement mortality and

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[33] In its 2012 comments, Normandeau provided the following insight on the natural mortality of fish:

> [A] single 10 inch female yellow perch can produce 109,000 eggs in a season. . . . If the natural mortality of fish eggs was [] not extremely high, yellow perch would crowd the waterways. For example, USEPA estimates that only 6.4 percent of the yellow perch eggs will survive to the yolk-sac larval stage, and for every 1,890 newly hatched yellow perch larvae, only one (0.05 percent) will survive to reproductive age (age 4).

Normandeau Comments at 141.

[34] Normandeau calculated adult equivalency losses based on design intake flows with Merrimack Station operating at 100 percent capacity all year, as well. This analysis resulted in an estimated, annual loss of 653 and 16,880 adult fish due to impingement and entrainment, respectively. 2007 § 308 Response at 8.

entrainment losses as [adult] equivalents is an accepted method for converting losses of all life stages into individuals of an equivalent age and provides a standard metric for comparing losses among species, years, and facilities.").

EPA further criticized the equivalency method for wrongfully omitting the value fish and ichthyoplankton have in providing a food source to many species within the ecosystem. Determination at 250-51, 254. In addition, EPA noted that an adult equivalency analysis "provides no understanding of the fractional loss those adults represent to populations in Hooksett Pool." *Id.* at 251. As an example, EPA takes the annual, estimated loss of 195 adult-equivalent yellow perch from Normandeau 2007b and compares it to electrofish sampling and trapnetting the consultant performed in 2004 and 2005, and again in 2008. *Id.* In each of the aforementioned sampling periods, 76 yellow perch were captured, with a portion of that total being juveniles, as opposed to adults. Based on this data, EPA makes the analytical leap that these "relatively low numbers of adult yellow perch caught over three years of sampling [makes] the loss of 195 adult-equivalents [of] greater significance." *Id.*

PSNH disputes each of these criticisms of Normandeau's adult equivalency analysis in turn. First, the equivalency method does not omit the value entrained ichthyoplankton and impinged fish may have in providing a food source to many species within the ecosystem. As Normandeau aptly provides in its 2012 comments, even if 100 percent mortality is assumed for impingement and entrainment,[35] these "dead and moribund organisms are discharged back to Hooksett [Pool] where they can be consumed by predators or recycled as nutrients."

[35] PSNH assumes 100 percent mortality for the sake of argument. In fact, PSNH agrees with the comments to this draft permit provided by the Electric Power Research Institute ("EPRI") that some entrainment survival is likely at Merrimack Station given, among other reasons, that the majority of species entrained are hardier species, and that 90 percent of entrainment at the plant consists of post-yolk-sac larvae that are also hardier than earlier larval stages. EPRI's February 2012 Comments on the Draft 316(b) Requirements in "Clean Water Act NPDES Permit Determinations for Thermal Discharge and Cooling Water Intake Structures at Merrimack Station in Bow, New Hampshire," at 2 ("2012 EPRI Comments").

Normandeau Comments at 129. Thus, the biomass of organisms impinged and entrained is not lost to the system. *Id.* Secondly, it is improper for EPA to take adult equivalency calculations for yellow perch and attempt to compare them to a limited sampling program that was not intended to be a complete census of the population of that species, all for the sake of providing the opportune supposition that Merrimack Station's CWISs impact on adult yellow perch may be significant. Normandeau flatly rejects EPA's use of its data in this way:

> A sampling program results in just that; a sample of the total population, not a complete census of the population. The catch of yellow perch in trap nets is at best <u>proportional</u> to the total population in Hooksett Pool and in no way represents a total census of the yellow perch population. Catch per Unit Effort (CPUE) is an indicator of population size, not the population size itself and cannot be compared to an equivalent adult estimate.

Id. at 129-30.[36]

EPA's determination document is devoid of any credible evidence that Merrimack Station's current incidence of impingement and entrainment is anything but *de minimis*. Indeed, EPA did not consider half of the factors contained in its Draft EPA 316(b) Guidance for

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[36] EPA also makes a related argument with respect to the relative abundance of white sucker and yellow perch. Specifically, EPA provides that the relative abundance of these two species decreased 2 percent between the 1960s and 2000s as support for its conclusion that the fish population remains in decline. Determination at 253. However, Normandeau yet again dispels of this argument by providing that "relative abundance tells us little about the absolute abundance of a given species. Relative abundance can decrease due to an increase the abundance of other species." Normandeau Comments at 131.

Normandeau also puts Merrimack Station's annual entrainment numbers into correct perspective:

> If entrainment substantially affected fish populations, it would be reasonable to expect that the abundance of fish with the greatest [adult equivalency] losses would be declining. White sucker had the largest [adult equivalency] estimate derived from all lifestages of 8,354 adults in 2006 and 11,774 adults in 2007. However, there was no significant trend in the abundance of white sucker between 1972 and 2011 which is not consistent with the hypothesis that entrainment losses have affected the white sucker population in Hooksett Pool. In comparison, an estimated 23 equivalent adult yellow perch were lost due to entrainment in 2007 and 238 in 2006. By any reasonable evaluation, these are *de minimis* losses and would be expected to have no impact on yellow perch populations in Hooksett Pool. However, yellow perch abundance decreased significantly between 1972 and 2011 in Hooksett Pool indicating that natural annual variation in the abundance of yellow perch is a greater influence on the yellow perch population than losses due to entrainment.

Id. at 142.

assessing the "critical question" of the magnitude of AEI experienced at the plant.[37] *See* Draft EPA § 316(b) Guidance at 15. For instance, EPA selectively left out that current operation of Merrimack Station's CWISs does not cause AEI to any endangered species, critical aquatic organisms, or any material damage to sport fisheries from the Hooksett Pool—facts that are corroborated by studies and reports produced by Normandeau. *See, e.g.*, 2007 § 308 Response at vi, 2. Instead, EPA focused only on the absolute number of fish impinged or entrained and made arbitrary and erroneous assumptions that ichthyoplankton are equally distributed throughout the waterbody. Then EPA wrongfully surmised that the fraction or percentage of water withdrawn from the Hooksett Pool by Merrimack Station's CWISs directly corresponds to the percentage of ichthyoplankton that are lost from the waterbody as a whole, in an arbitrary attempt to morph and inflate these absolute numbers into percentage assessments of AEI for particular species of fish within the waterbody. As explained above, these assumptions contain numerous faults and cannot form the requisite, reasonable evidence necessary to justify the installation of CCC at Merrimack Station. Instead, as PSNH's consultant provides in each of its studies and reports submitted to EPA—based on that company's unquestioned expertise and years of experience—the impingement and entrainment losses currently experienced at Merrimack Station are, in fact, *de minimis*. *See, e.g.*, Normandeau Comments at 143.

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[37] In addition, it is unclear, given the limited information PSNH has at this time, whether EPA utilized its Draft EPA 316(b) Guidance or any other guidance improperly as having the force of law. Guidance documents are not obligatory rules because they have not been subjected to the administrative notice and comment process. *See, e.g., Am. Paper Inst., Inc. v. EPA*, 882 F.2d 287, 288 (7th Cir. 1989) (holding that guidance documents "lack legally binding effect"); *Hobbs v. United States*, No. 90-1861, 1991 WL 230202, at *4-5 (4th Cir. Nov. 8, 1991) (concluding that the EPA's wetland delineation manuals are interpretive guidance documents without the force of law). Any use by EPA of the Draft EPA 316(b) Guidance or any other guidance as a rule with the force of law in establishing the limits of the draft permit is improper and PSNH reserves its right to contest any such unlawful action if and/or when sufficient facts are discovered. Improper use of guidance documents as administrative rules is discussed more fully in Section IV.C.5. below.

Lastly, a current EPRI study on the economic benefits of retrofitting existing once-through cooling facilities with CCC[38] puts Merrimack Station's *de minimis* impingement and entrainment mortality numbers into even greater perspective. 2012 EPRI Comments at 7-9. Specifically, in developing its economic benefits information to provide EPA with technical data to inform EPA's 2011 proposed § 316(b) rulemaking, EPRI gathered impingement and entrainment data from a substantial portion of the existing Phase II facilities throughout the country. *Id*. at 7. EPRI's database contains information from 166 facilities (or 39 percent of the existing Phase II population) for impingement and 90 facilities (or 21 percent of the existing Phase II population) for entrainment. *Id.* Based on EPRI's study, Merrimack Station's average annual impingement ranked 136 out of 166 facilities, meaning the incidence of impingement at the facility was in the bottom 18 percent of all facilities in the database. *Id*. Importantly, the total annual impingement from the 30 facilities ranked at the bottom of EPRI's database accounted for only 0.02 percent (two ten thousandths) of the impingement for all 166 facilities. *Id.* Merrimack Station's annual entrainment estimate ranked 75 out of 90 facilities, meaning it is in the bottom 17 percent of all facilities in the database. *Id*. Again, the entrainment losses from the 16 facilities ranked at the bottom of EPRI's database made up only 0.04 percent (four ten thousandths) of the entrainment losses from all 90 facilities that provided entrainment data. *Id.*

EPRI's study not only substantiates Normandeau's ultimate conclusions, it is also consistent with the breadth of evidence and data included in the administrative record that collectively demonstrates that current operations at Merrimack Station unquestionably result in a *de minimis* AEI to the Hooksett Pool. As such, current operations are consistent with the duty established in the Supreme Court's *Entergy* opinion that requires PSNH to <u>reasonably</u> minimize

[38] EPRI's economic benefits study is described in more detail in its comments to this Draft Permit. *See* 2012 EPRI Comments at 7-9.

AEI. *Entergy*, 129 S. Ct. at 1506. PSNH has fulfilled that duty with its *de minimis* levels of impingement and entrainment. EPA's conclusions to the contrary are baseless.

Thus, in light of the already *de minimis* AEI to the ecosystem at Merrimack Station, the additional, expected reductions in impingement and entrainment provided by the installation of CCC are entirely insignificant. As explained in detail below, any expected additional environmental benefits provided through installation of CCC technologies patently fail EPA's established "wholly disproportionate" and/or "significantly greater" standards when compared to the costs required to construct and operate said technology.

iii. The Costs to Install CCC at Merrimack Station are Wholly Disproportionate and/or Significantly Greater than Any Expected Environmental Benefits

As discussed below, a detailed cost-benefit study prepared at the request of PSNH concludes that the cost-benefit ratio for CCC at Merrimack Station would be 974 to 1, providing clear evidence that requiring installation of that technology as BTA is unwarranted, arbitrary, and capricious. Stated plainly, this cost-benefit ratio means that for every dollar of social benefit generated by the installation of CCC at Merrimack Station, PSNH's Energy Service customers would have to pay $974 in costs. This unquestionably fails EPA's established "wholly disproportionate" and/or "significantly greater" cost-benefit standard, as well as the President's recently issued Exec. Order 13563. As such, EPA's conclusion that CCC is BTA for Merrimack Station fails to comply with governing law and is therefore arbitrary and capricious.

The limited legislative history of § 316(b) makes clear that a cost-benefit analysis should be undertaken in considering BTA for CWISs. Specifically, that legislative history provides that BTA should be interpreted to mean "best technology available commercially <u>at an economically practicable cost</u>." *See* WPCA 1972 Legislative History (emphasis added). Moreover, a recent Exec. Order from President Barack Obama provides that all regulatory initiatives undertaken by federal agencies—not just EPA—***must*** take into account costs and corresponding benefits. *See* Exec. Order 13563. Specifically, that Exec. Order provides, in relevant part:

> Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. . . . It must take into account benefits and costs, both quantitative and qualitative. . . .
>
> [T]o the extent permitted by law, ***each agency must***, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor its regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

Id. (emphasis added). EPA has expressly recognized in its Proposed § 316(b) Rule that it must comply with Exec. Order 13563. 76 Fed. Reg. at 22,212.[39]

Since at least 1977, EPA has compared costs and benefits in making BTA determinations pursuant to § 316(b). *See In re Pub. Serv. Co. of New Hampshire (Seabrook Station Units 1 and 2)*, 1977 WL 22370 (EPA), at *7, 1 E.A.D. 332 (June 10, 1977) ("*Seabrook*"), aff'd after remand, *Seacoast Anti-Pollution League v. Costle*, 597 F.2d 306 (1st Cir. 1979); *see also* 69 Fed.

[39] As stated in footnote 22 above, Exec. Order 13563 applies to both regulations and permits issued pursuant to such regulations. EPA's draft permit falls under either definition in this instance. Specifically, the manner in which EPA issued this BPJ based draft permit improperly circumvented the rulemaking process by attempting to attach more onerous BTA limits to Merrimack Station that EPA knows it could not achieve if it were to wait until after final promulgation of the national § 316(b) rule. In essence, EPA's action amounts to a *de facto* regulation.

Reg. 41,575, 41,604 (July 9, 2004) (providing that EPA has "long recognized that there should be some reasonable relationship between the cost of [CWIS] control technology and the environmental benefits associated with its use") (emphasis added). In *Seabrook*, the EAB noted that "consideration ought to be given to costs in determining the degree of minimization" required under § 316(b) and supported this assertion by providing that if costs and relative benefits were not to be considered in such technological analyses, cooling towers would be required "at every plant that could afford to install them, regardless of whether or not any significant degree of entrainment or [impingement] was anticipated." *Id.* This is not the case. Thus, the Board concluded that it is not "reasonable to interpret Section 316(b) as requiring technology whose cost is wholly disproportionate to the environmental benefit gained." *Id.*

Similarly, in a July 29, 1977 opinion, EPA's General Counsel provided that the minimization of AEI required under § 316(b) "must be tempered by economic considerations." *See In re Central Hudson Gas and Elec. Corp. (Central Hudson)*, Op. EPA Gen. Counsel 63 (July 29, 1977), 1977 WL 28250, at *8 (E.P.A.G.C.) (citing the *Seabrook* Board's "wholly disproportionate" standard with approval) (emphasis added). The General Counsel concluded his discussion by stating that "EPA ultimately must demonstrate that the present value of the cumulative annual cost of modifications to [CWISs] is not wholly out of proportion to the magnitude of the estimated environmental gains." *Id.* at *7; *see also In re Pub. Serv. Co. of New Hampshire (Seabrook Station)*, 1 E.A.D. 455 (August 4, 1978) (refusing to require the permittee to move its intake structure further offshore beyond the presently proposed site because to do so would be "wholly disproportionate to any environmental benefit"), aff'd, *Seacoast*, 597 F.2d at 311.

In 1991, EPA Region 4 generated a document entitled "Some Specific Comments on CWA § 316(b) Issues," in which it stated that:

> [t]here are no published EPA guidelines relating to what constitutes wholly disproportionate; however, a factor of 10 or more may be a reasonable factor to be used. That is, expenditures of perhaps 10 times the annual environmental damage might be a reasonable basis for evaluation.

"Some Specific Comments on CWA § 316(b) Issues," included in EPA Response to Comments on Brayton Point NPDES Draft Permit.[40] This document plainly establishes a recommended ratio of around 10 to 1 as the threshold for determining whether costs are wholly disproportionate to benefits.[41] *See also* 69 Fed. Reg. at 41662, 41666 (rejecting CCC with a cost-benefit ratio of 42 to 1 as BTA in EPA's 2004 rule for Phase II existing facilities and instead adopting compliance alternatives with a ratio of approximately 4.5 to 1).

EPA embraced this "wholly disproportionate" standard in conducting cost-benefit analyses—and consistently rejecting CCC as too costly and unjustified in light of the potential environmental benefits—under § 316(b) until it issued a proposed rule for CWISs at Phase II existing facilities in 2002. *See* 67 Fed Reg. 17121 (April 9, 2002). Specifically, in that rule proposal, EPA developed a "significantly greater" standard for measuring costs versus relative benefits and provided the following justification for doing so:

> [T]he new facility rule required costs to be "wholly disproportionate" to the costs EPA considered when establishing the requirement at issue rather than "significantly greater" as

[40] Available at http://www.epa.gov/region1/braytonpoint/pdfs/finalpermit/ResponsesToComments.pdf.

[41] This ratio is consistent with the Department of Interior's determination of the point at which restoration costs would be considered "grossly disproportionate" and therefore not recoverable as natural resource damages. *See* 61 Fed. Reg. 20,560, 20,602 (May 7, 1996). However, numerous courts have found more proportional cost-benefit ratios necessary to satisfy analogous standards in other contexts. *See, e.g., State of Ohio v. U.S. Department of the Interior*, 880 F.2d 432, 444 (D.C. Cir. 1989), *reh. denied en banc*, 897 F.2d 1151 (1989), (providing, in dictum, that "grossly disproportionate" could mean damages three times the amount of use value); *General Railway Signal Co. v. Washington Metropolitan Area Transit Authority*, 875 F.2d 320, 326 (D.C. Cir. 1989), *cert. denied*, 494 U.S. 1056 (1990) (concluding that a cost-benefit ratio of 2.3-to-1 or less is reasonable).

> proposed today. EPA's record for the Phase I rule shows that those facilities could technically achieve and economically afford the requirements of the Phase I rule. New facilities have greater flexibility than existing facilities in selecting the location of their intakes and technologies for minimizing adverse environmental impact so as to avoid potentially high costs. Therefore, EPA believes it appropriate to push new facilities to a more stringent economic standard. Additionally, looking at the question in terms of its national effects on the economy, EPA notes that in contrast to the Phase I rule, this rule would affect facilities responsible for a significant portion (about 55 percent) of existing electric generating capacity, whereas the new facility rule only affects a small portion of electric generating capacity projected to be available in the future (about 5 percent). <u>EPA believes it is appropriate to set a lower cost threshold in this rule to avoid economically impracticable impacts on energy prices, production costs, and energy production that could occur if large numbers of Phase II existing facilities incurred costs that are more than significantly greater than but not wholly disproportionate to the costs in EPA's record</u>.

67 Fed Reg. at 17145-46 (emphasis added). In short, EPA chose the "significantly greater" standard (instead of the "wholly disproportionate" test) to signal its understanding that existing facilities have less flexibility in selecting locations and technologies, that the rule will affect a much larger portion of the generating capacity, and that a less extreme standard will avoid "economically impracticable impacts on energy prices." *See* 68 Fed. Reg. 13,521 (Mar. 19, 2003).

EPA's use of the "significantly greater" standard in the proposed rule and its established practice of considering costs and relative benefits in making § 316(b) BTA determinations was challenged and eventually heard by the U.S. Supreme Court. Specifically, in *Entergy Corp. v. Riverkeeper Inc.*, 129 S. Ct. 1498, 1510 (2009), the U.S. Supreme Court definitively confirmed that § 316(b) allows the permit writer to consider costs and benefits in determining BTA to minimize adverse environmental impacts. Although the Supreme Court ultimately left it to EPA's discretion to decide how to take into account costs and benefits in § 316(b) actions, it made clear that such considerations are acceptable. Specifically, the Supreme Court provided that:

> "best technology" may . . . describe the technology that most efficiently produces some good. In common parlance one could certainly use the phrase "best technology" to refer to that which produces a good at the lowest per-unit cost, even if it produces a lesser quantity of that good than other available technologies.

Id. at 1506. As additional support, the Supreme Court provided that the term "minimize," as used in § 316(b), "admits of degree and is not necessarily used to refer exclusively to the 'greatest possible reduction.'" *Id.* The Supreme Court also recognized EPA's prior use of the term "wholly disproportionate" compared to its use of "significantly greater" in the rule at issue, and stated that although the standards may be somewhat different, "there is nothing in the statute that would indicate that the former is a permissible interpretation while the latter is not." *Id.* at 1509. Thus, the Supreme Court concluded, use of either the "significantly greater" or more rigorous "wholly disproportionate" tests are both acceptable for considering the costs and relative benefits for § 316(b) BTA determinations at existing facilities. *Id.*; *see also Voices of the Wetlands v. State Water Resources Control Board*, 257 P.3d 81, 104-06 (Cal. 2011) (upholding a permit writer's use of the wholly disproportionate cost-benefit analysis instead of the 2004 Phase II regulation's "significantly greater" test in assessing § 316(b) BTA determinations and providing that *Entergy* makes clear that the wholly disproportionate test is more stringent than the significantly greater test employed in EPA's 2004 § 316(b) rule).

Lastly, EPA's Proposed § 316(b) Rule also explicitly incorporates a cost-benefit test for determining BTA for entrainment. Specifically, that proposed rule provides, in relevant part:

> Because [Executive Order] 13563 directs agencies to propose and adopt rules only upon a reasoned determination that the <u>benefits justify the costs, EPA is proposing to apply this same standard in BTA entrainment determinations. This approach is consistent with the framework EPA has traditionally followed and would allow for</u>

> a full assessment in permit decisions of both qualitative and quantitative benefits and costs. As designed, EPA's proposed requirement for the establishment of site-specific BTA entrainment requirements strikes an appropriate balance between environmental improvements and costs, allowing the permitting authority to consider all of the relevant factors on a site-specific basis and determine BTA on the basis of those factors.
>
> . . .
>
> EPA expects that the Director's decision about BTA controls will also reflect consideration of the costs and benefits (monetized and non-monetized) of the various control technologies considered for the facilities.

76 Fed. Reg. 22174, 22212 (Apr. 20, 2011) (emphasis added).

EPA does not contest that the relative costs and benefits of available technologies should be taken into consideration in determining BTA at Merrimack Station pursuant to § 316(b). In fact, it is required. Whether such considerations are coined as a "cost-benefit analysis" or by another name, there is no cognizable defense for EPA failing to consider the relationship between the hardships imposed upon society (and to a substantial extent, the regulated entity) and the expected societal gains that will result from installation of a § 316(b) technology, especially considering the scarcity of resources and the current economic climate. Such analyses simply make common sense, pursuant to the imperative of basic rationality to ensure that actions do more good than harm. As explained below, there is no question that the costs compared to the relative benefits of installing CCC at Merrimack Station unconditionally fail the "wholly disproportionate" and "significantly greater" cost-benefit standards, as well as the principles articulated in Exec. Order 13563. EPA's conclusions to the contrary are unsupported by the facts, and therefore arbitrary and capricious.

In its February 2012 report entitled "Preliminary Economic Analysis of Cooling Water Intake Alternatives at Merrimack Station" (hereafter "2012 NERA Report"), PSNH's consultant, NERA Economic Consulting ("NERA"), determined that the cost-benefit ratio for the installation of CCC (or equivalent) at Merrimack Station is **974 to 1**. 2012 NERA Report at 36. Stated plainly, this means that for every dollar of benefit generated by the installation of CCC, PSNH's Energy Service customers would have to pay $974 in costs. *Id.* When compared to the installation and effectiveness of CWW screens at Merrimack Station—a technology that also is not BTA for the plant because its cost-benefit ratio is still 98 to 1, as explained below in Section IV.B.1.a.iii.—according to NERA the ratio of the incremental costs to the incremental benefits of CCC relative to CWW screens is an astounding **4,317 to 1**. *Id.* This means that for every $1 of additional benefit provided by CCC compared to CWW screens at Merrimack Station, society would have to pay more than $4,300.[42] *Id.* NERA's results provide indisputable evidence that the installation of CCC at Merrimack Station are unconscionable based on the "wholly disproportionate" and/or "significantly greater" cost-benefit standard EPA has repeatedly utilized to make § 316(b) BTA determinations. EPA's conclusion to the contrary is not borne out by the facts and appears to be an arbitrary decision made to reach a desired end.

EPA wrongly excluded all technology options other than CCC as either infeasible and/or with uncertain performance concerns. EPA considered the costs and benefits of only five technology options as potentially BTA for Merrimack Station—all of which involved one or both CWISs operating in CCC mode for at least some portion of a calendar year. For each technology option, EPA estimated the costs associated with construction, operating and maintenance, and energy that would be incurred by PSNH. EPA did not monetize expected benefits for each technology, however—calling such an undertaking "difficult, time-consuming,

[42] Interestingly, EPA utilized this incremental analysis to conclude that year-round CCC operations were not necessary at Merrimack Station, pursuant to § 316(b)'s BTA standard. 2012 NERA Report at E-3. Yet, EPA either inadvertently or consciously omitted considerations of any such incremental analysis in labeling seasonal CCC operations as BTA instead of a more reasonable technological alternative with a relatively proportional or realistic level of benefits compared to costs to install the technology.

controversial and expensive," and separately "a nearly insurmountable task," despite the 14 years it took EPA to act on the permit renewal application. Determination at 325-326.

In essence, EPA engaged in nothing more than an affordability determination for PSNH. *See, e.g., id.* at 325, 331 (determining that the costs of CCC "were *affordable* to the company;" providing that "PSNH could *afford* to retrofit both Units 1 and 2 with [CCC] and operate in [CCC] mode year round;" determining that all five of EPA's proposed CCC compliance options "would be *affordable* to the company") (emphases added). EPA ignored its prior precedent regarding the appropriate ratio of benefits compared to relative costs for determining whether CCC technology constitutes BTA at Merrimack Station and made the bald-faced assertion that the costs of installing the technology are "significant but economically achievable for PSNH," "affordable and reasonable." *Id.* at ix-x. This conclusion directly contradicts the bulk of the facts.[43]

More importantly, however, EPA's ostensible conclusion is directly contradicted by the detailed social cost and benefit estimates in NERA's 2012 Report. As mentioned above, NERA conducted a detailed cost-benefit analysis for EPA's proposed CCC technology and also developed cost-benefit results for other available and effective CWIS technologies—CWW screen technologies, Gunderboom Marine Life Exclusion System ("Gunderboom") technologies, Ristroph screens, and Multi-Disc screens—pursuant to the above-referenced February 2012 Enercon Report, PSNH's 2007 and 2009 § 308 Responses, and EPA's determination document

[43] EPA's conclusory statement is incorrect, because the NHPUC has ordered PSNH to perform "an economic analysis of retirement for any unit in which the alternative is the investment of significant sums to meet new emissions standards and/or enhance or maintain plant performance." *Re Public Service Co. of New Hampshire*, 94 NH PUC 103 (2009). Thus, the NHPUC, as economic regulator for PSNH will be the final arbiter of what is or is not "affordable." For further discussion see § IV.D. below.

providing that these technologies are or may be feasible technological alternatives at Merrimack Station.[44]

In developing its cost-benefit analysis for implementation of CCC at Merrimack Station, NERA updates and expands the cost and benefits data relied upon by EPA when EPA reached its draft permit conclusion that the costs of CCC are not "wholly disproportionate" and/or "significantly greater" than the benefits provided. Specifically, for costs, NERA incorporated the contingency multipliers Enercon developed to update estimates of the likely costs to install CCC at Merrimack. EPA relied upon 2007 cost data originally provided by Enercon. To expand and improve upon EPA's biological benefits information, NERA developed preliminary, conservative <u>monetary</u> estimates for the material biological benefits provided by each of the possible technological options utilizing information and principles contained in EPA's December 17, 2010 Guidelines for Preparing Economic Analyses ("2010 EPA Economic Guidelines") and the site-specific § 316(b) BTA analyses for entrainment included in EPA's Proposed § 316(b) Rule for regulation of new and existing CWISs. 2012 NERA Report at 6-7.

There are numerous shortcomings in EPA's cost-benefit analyses in determining that CCC is necessary for Merrimack Station's CWISs. EPA evaluated the one-time and recurring costs for the installation of CCC with improved intake screen technologies and fish return system at Merrimack Station and presented both a total net present value and an annualized cost estimate

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[44] NERA's cost-benefit analysis for the implementation of CWWs at Merrimack is discussed in § IV.B.1.a.iii., below. The cost-benefit analysis for installation of the Gunderboom technology is not discussed in PSNH's comments, however, because the relative costs and benefits of implementing that technology at Merrimack Station are inferior in comparison to the CWW screens. *See* 2012 NERA Report at 35. With much higher costs and virtually the same environmental benefits compared to CWW screens, Gunderbooms have an estimated cost-benefit ratio of 211 to 1. *Id.* at 36. Moreover, the ratio of incremental costs to incremental benefits between Gunderboom and CWW screens technologies at Merrimack Station is almost 7,900 to 1. *Id.* Thus, implementation of Gunderboom technology at Merrimack Station would not be a sensible technological option relative to CWW screens, based upon the results in NERA's 2012 Report, although the Gunderboom technology is "available" to Merrimack Station and as effective as CWW screens in minimizing AEI. *Id.*

over the course of 21 years for the project. EPA included values for private costs and social costs.[45] Its conclusions for the aforementioned totals are as follows:

Available Technologies	Private Cost		Social Cost	
	Total After-Tax Cash Flow Cost, Present Value at 5.3% (using nominal (i.e., not inflation adjusted) dollars, millions)	Annual Equivalent Cost at 5. 3% over 21 Years (using nominal (i.e., not inflation adjusted) dollars, millions)	Total Cost, Net Present Value at 7.0% of Capital & O&M Cost (millions) (using inflation adjusted 2010 dollars, millions)	Annual Equivalent Cost at 7.0% Over 21 Years (millions) (using inflation adjusted 2010 dollars, millions)
5. Units 1,2 (CCC) Seasonal[4] Type 2	$79.2	$6.4	$111.3	$10.3

Determination at 330. As stated above, EPA did not attempt to quantitatively assess the expected monetary environmental benefits resulting from EPA's decision in the draft permit that PSNH must install CCC at Merrimack Station—calling any such attempt to do so a "nearly insurmountable task" that is "unlikely to have a material effect on the ultimate decision." *Id.* at 325, 327. However, development of such benefits in monetary terms is the only way to make a true, "apples to apples" comparison between the costs and benefits associated with a considered project. Indeed, EPA's 2010 Economic Guidelines note that a monetized benefits analysis is a linchpin of a complete economic analysis. *See* 2010 EPA Economic Guidelines at 1-5. In place of a monetary, quantitative assessment, EPA merely: 1) compared the expected, quantitative, annual impingement and entrainment reductions resulting from PSNH's installation of CCC to the total and annualized social costs, respectively, of installing the technology Determination at 333, 339; and 2) spoke in vague, self-serving generalities about additional, expected environmental benefits to aquatic organisms and the biological makeup of the Hooksett Pool, as well as recreational fishing and general existence or bequest benefits for the public at large, that would result if PSNH were forced to install CCC at Merrimack Station. *See* Determination at

[45] As noted below, EPA's analyses are flawed, as EPA did not restrict the costs solely to those customers of PSNH that choose to purchase their energy from PSNH.

325-26; 335-38. EPA's non-monetary quantitative comparisons of expected, annual impingement and entrainment reductions to the total and annualized social costs if CCC is required at Merrimack Station are as follows:

Available Technologies	Combined Flow (gpm)	Percent Reduction in Flow and Entrainment	Estimated Annual # Eggs & Larvae Saved Over Entrainment Baseline (3,806,764)[1]	Estimated Annual Impinge-ment[1]	Total # of Fish Saved Over Impingement Baseline (4,903)[2]	Estimated Percent Reduction[3]		Social Cost (millions)	
						Impinge -ment	Impinge-ment Mortality	Total Cost, Net Present Value at 7.0% of Capital & O&M Cost	Annual Equivalent Cost at 7.0% Over 21 Years
5. Units I, II (CCC) Seasonal[7] Type 2	9,890	95 (5 months)	3,616,426	1,728	4,125-4,315	65%	55%-66%[8]	$111.3	$10.3
	200,150	0 (7 months)							

Option	Eggs & Larvae Saved Over Entrainment Baseline (Millions)	Fish Saved Over Impingement Baseline (Thousands)	Annualized Social Cost ($M)	Option Description
5	3.62	4.22	$10.3	Unit 1 (CCC)/ TYPE 2 Unit 2 (CCC)/ TYPE 2

Id. at 333, 339.

EPA makes no attempt to further analyze or discuss the aforementioned, purported "benefits" of installing CCC at Merrimack Station or provide any reasons to justify the imposition of over $110 million in estimated total social costs that would be incurred by PSNH and, in turn, PSNH's Energy Service customers. Instead, in its entrainment cost-benefit discussion, EPA provides a generic statement that allowing "Merrimack . . . to continue, unchecked, . . . would be inconsistent with the objectives of the [CWA,] New Hampshire water quality standards and . . . the public interest." Determination at 336. Certainly such an unsupported, conclusory statement should not, and indeed cannot, substantiate forcing PSNH and its Energy Service customers to expend and/or absorb over $110 million to install a technology that is undeniably unnecessary according to the very data relied upon by EPA and the conclusions made by PSNH's consultants.

EPA's cost-benefit analysis for CCC is clearly inadequate. Although NERA does not question the methodologies EPA employed to estimate private and social costs and certain qualitative biological benefits for the installation of CCC at Merrimack Station, NERA supplements EPA's cost-benefit assessment in two crucial respects. First, as explained in detail in the 2012 Enercon Report and incorporated by NERA in its analysis, EPA used outdated contingency multipliers to determine the likely costs of construction of CCC technology and a new fish return system[46] at Merrimack Station based on 2007 data previously submitted to EPA by Enercon. 2012 NERA Report at 12-13. These data include a contingency factor of 25 percent to predict present day costs of construction. 2012 Enercon Report at 22.

In fact, the large-scale construction and installation of the wet FGD scrubber system at Merrimack Station has reduced the amount of available free space at the plant and made the plant site more congested. This will result in the need for a new conceptual design, as well as significant amounts of new piping, and greater construction difficulty if CCC must, in fact, be installed. *Id.* at 21-22 Moreover, it is well established within the power industry that project costs significantly increase not only with the passage of time, but also between the conceptual and detailed design stages of a project and, again, between the design and implementation

[46] PSNH does not contest that certain upgrades to the existing fish return system at Merrimack Station are warranted. The estimated costs to install such upgrades are reasonable (*i.e.* approximately $300,000), however, in comparison to the $110+ million in expected costs to install CCC at Merrimack, if ultimately required by EPA. Moreover, an improved fish return system will undoubtedly be installed at Merrimack regardless of whether another CWIS technology is ultimately required. As such, the costs associated with the construction of the new fish return system have been included for each of the technological options considered in NERA's cost-benefit analysis but do not make a material difference in the net cost-benefit ratio because the costs of the return system are nominal compared to the contemplated CWIS technology options. *See* 2012 Enercon Report at 13-14.

stages.[47] Indeed, the 2012 Enercon Report describes a handful of projects undertaken or considered by other utilities that either saw cost estimates exponentially increase through the design and implementation phases, or were downsized or scrapped altogether due to drastically increased cost estimations as the projects progressed through their various phases. *Id.* Enercon also references several studies that corroborate this ever-increasing cost estimation phenomenon with the passage of time. *Id.* at 22. One such study provided that average, completed project costs exceed projections by a factor of 1.55. *Id.* As such, Enercon concludes that at least an additional 30 percent contingency multiplier needs to be added to Enercon's 2007 cost estimates to reasonably predict final project costs at Merrimack Station. *Id.* NERA used the updated Enercon estimate and added a 55 percent contingency factor to the 2007 cost estimates for installation of CCC at Merrimack Station. The updated initial capital cost for CCC at Merrimack Station is estimated to be approximately $84.9 million in 2010 dollars.[48] 2012 NERA Report at 12-13. In contrast, EPA's estimate for the initial capital cost for CCC is $65.4 million.

Secondly, NERA developed estimates of the monetary social benefits expected from the installation of CCC at Merrimack Station using the methodology contained in EPA's 2010 Economic Guidelines and information contained in EPA's economic benefits analyses for entrainment contained in EPA's Proposed § 316(b) Rule. NERA considered all of the

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[47] For a discussion of this issue relating specifically to Merrimack Station, *see* "New Hampshire Clean Air Project Due Diligence on Completed Portion – Prepared for New Hampshire Public Utilities Commission," Jacobs Consultancy, June 2011, pp. 3, 21-32 (available at: http://puc.nh.gov/Regulatory/CASEFILE/2008/08-103/LETTERS,%MEMOS/08-103%2020-01-20%20STAFF%20LTR%20JACOBS%20CONSULTANCY%20REVIEW%20AND%20REPORTS.PDF).

[48] Note that NERA focused only on compliance costs (*i.e.* mainly capital and operating costs) and did not attempt to monetize the expected social costs resulting from the installation of CCC at Merrimack. 2012 NERA Report at 11-12. NERA did, however, separately provide a qualitative assessment of these expected social costs, along with additional, possible social benefits referenced in EPA's 2010 Economic Guidelines and EPA Proposed 316(b) Rule, but ultimately determined that the qualitative values of these additional social costs and benefits are negligible and, if anything, reinforce the general conclusion that the costs vastly outweigh the benefits of CCC at Merrimack because the added social costs outweigh any slight qualitative benefits warranting consideration. *See id.* at 35-40.

recommended categories of possible ecological benefits referenced in EPA's 2010 Economic Guidelines, including market, non-market, indirect and non-use benefits, and followed the Guidelines' suggested approach of identifying and assessing carefully key benefits categories, as opposed to attempting to monetize every possible benefit category. *See id.* at 19-33, Appx. B. Like EPA, NERA determined that CCC at Merrimack Station would not yield any material market benefits because few, if any, fish within the Hooksett Pool are caught by commercial anglers. *Id.* at 21-22. Fish are caught by recreational anglers, however, and EPA has developed estimates that can be used to develop the dollar values of additional recreational fishing gains. Interestingly, these recreational values are consistently higher than the corresponding commercial values for all species in EPA's Proposed § 316(b) Rule. *See id.* (citing EPA's Proposed § 316(b) Rule and providing an example of the increased recreational values for yellow perch).

NERA also included the indirect benefits that might accrue to the Hooksett Pool if CCC is installed, as well. Particularly, because of interdependencies within an ecosystem, species without any direct commercial or recreational value can nonetheless serve as food sources to such commercial or recreational species and increase their survival and weight gain. *Id.* at 22. Thus, NERA used results from a production-foregone model that provided information on the potential biological gains in terms of adult equivalents of species valued by recreational fisherman. *Id.* at 25, 27. NERA also evaluated the potential for significant non-use benefits through the installation of CCC and concluded that any non-use benefits would not likely be important or material. In reaching this conclusion, NERA relied upon criteria that have been developed in economic literature for assessing the likely significance of non-use values. *See id.* at 22-23, Appx. B. Specifically, the literature indicates that a resource could have important non-use benefits if it were unique and if its loss would be irreversible or subject to a long recovery period. *Id.* In Appendix B of its report, NERA evaluated the potential biological gains at Merrimack Station to assess the "uniqueness" of these gains and concluded that the biological gains would not be considered unique. *Id.* at Appx. B. Thus, non-use benefits do not warrant the substantial difficulty and cost that would be involved to develop reliable estimates of potential non-use benefits, according to NERA. *Id.*

NERA used the basic information on the values that recreational fishermen place on additional harvest to develop estimates of the monetary recreational benefits for CCC and the other alternatives. The estimation included several conservative assumptions (*i.e.* assumptions that likely overstate monetary value). The conclusion of the NERA study is that CCC would lead to a present value over the period from 2012 to 2035 of approximately $102,000 in 2010 dollars in monetary societal benefits.[49] *Id.* at 30, 32-34. With social costs of CCC estimated at approximately $98,955,000 in 2010 dollars, the monetary benefits are meager in relation to the estimated cost total and result in a net cost estimate of approximately $98,854,000 in 2010 dollars. *Id.* at 35. As noted at the outset of this section, the cost-benefit ratio for the installation of CCC at Merrimack Station is therefore 974 to 1, meaning that for every dollar of benefit generated by the installation of CCC, society would have to pay $974 in costs. *Id.* at 36. This ratio drastically fails EPA's established "wholly disproportionate" and/or "significantly greater" cost-benefit standard, as well the tenets and purpose of Exec. Order 13563.[50] As such, EPA's

[49] A production foregone analysis conducted by ASA Analysis & Communication, Inc. was utilized by NERA to help ascertain its calculations. *See* ASA Analysis & Communication, Inc., Estimates of the Equivalent Loss of Entrainment and Impingement at the Merrimack Generating Station (February 2012).

[50] In its 2012 comments to this draft permit, EPRI discusses data it has gathered from 28 facilities in which a site-specific capital cost and economic benefit estimate to retrofit CCC was completed. *See* 2012 EPRI Comments at 8. Each of the 28 facilities had estimated annualized costs that exceeded the annual benefit. *Id.* Considering the annualized costs compared only to the annual expected benefits for entrainment—the aspect of AEI purportedly requiring CCC at Merrimack Station—EPRI found ratios to range from as little as 51 to 1 to as large as 357,416 to 1. *Id.* Merrimack Station's cost-benefit ratio for entrainment was 5,302 to 1, according to EPRI, and ranked eighth

decision to impose CCC at Merrimack Station is arbitrary, capricious and contrary to law. EPA should abandon its unsupported view that costs are justified simply because consumers can pay them—a view that ultimately may not be shared by PSNH's economic regulator, the New Hampshire Public Utilities Commission, and potentially lead to a retirement of this generating facility.

iv. CCC is Not the Best Technology Available for Merrimack Station According to Other Material Factors Considered in Making this Determination Pursuant to § 316(b)

EPA must consider a technology's expected secondary environmental effects in determining BTA pursuant to § 316(b) for a given plant. *See, e.g.*, 76 Fed. Reg. 22174, 22196-97 (Apr. 20, 2011). EPA acknowledges this in its BTA determination. Determination at 238, 303. Similarly, EPA's Proposed § 316(b) Rule provides that such factors should be considered in establishing BTA for entrainment. *See* 76 Fed. Reg. 22174, 22208-10, 22287-88 (Apr. 20, 2011). These secondary environmental effects include, but are not limited to, effects on energy reliability, limited land availability, remaining useful plant life, and increased water consumption.[51] EPA discussed these secondary effects in its § 316(a) BAT determination.

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among the 28 facilities for having the most disparate ratio. *Id.* The median ratio was 2,096 to 1. *Id.* Thus, Merrimack Station's ratio was twice the median value.

[51] Discussion of EPA's inadequate consideration of the effects installation of CCC would have on energy reliability at Merrimack Station and how the plant's remaining useful life was not fully evaluated by EPA are set out in Section IV.D. below. Although reliability impacts and remaining useful plant life considerations are discussed in Section IV.D. in relation to costs EPA should have considered in requiring CCC at Merrimack Station, the BTA standard for § 316(b) also requires that these factors be analyzed separately, as secondary environmental effects that influence what technology is BTA pursuant to § 316(b). PSNH hereby incorporates the reliability and remaining useful plant life discussions set out in Section IV.D. as if fully set out under this subsection and declares that EPA's failure to adequately consider these secondary environmental factors was arbitrary and capricious.

Additional secondary environmental factors EPA is required to consider in its BTA determination for § 316(b) include, but are not limited to, any resulting increased air emissions, icing/fogging concerns, power generation losses, any drift and vapor plume issues, any noise and aesthetic impacts, potential health effects, and impacts due to outages for construction of any required technologies. EPA failed to adequately consider and/or improperly dismissed as immaterial, each of the aforementioned factors. For instance, expected power generation losses due to the operation of circulating water booster pumps and cooling tower fans necessary to run CCC would result in almost 7 MW lost per hour, with a corresponding annual cost of approximately $4,225,800. *See* 2007 §

Determination at 156-167. Presumably its same conclusions apply to its § 316(b) BTA determination, although they were not discussed separately or incorporated by reference. *See* Determination at 319) (stating only that "the secondary environmental effects of the [technology] options were considered". Regardless, EPA incorrectly concluded that "none of these potential environmental impacts should prevent this option from being selected as the BAT for reducing the facility's thermal discharge to the Merrimack River." *Id.* at 156. This conclusion is clearly arbitrary and capricious and not supported by the uncontroverted facts and studies available to EPA. Each of these material secondary environmental effects is discussed below.

(a) Limited Land Availability at the Plant Makes Installation of CCC Complex if not Impossible

In its 2007 Response to EPA's § 308 Request, PSNH provided a general description for a proposed location for CCC at Merrimack Station and appurtenant structures. 2007 § 308 Response at 38-39. Since that time, however, PSNH has installed a FGD scrubber system that has taken up a lot of previously available land and created "accessibility" issues for interfacing any additional technologies to the main part of the plant. Thus, at the current time, it is unclear whether Merrimack Station has the necessary space to physically install CCC at the plant.

EPA has not engaged in an extensive analysis on this topic. Instead, EPA simply refers to the aforementioned information included in PSNH's 2007 response to its § 308 Request as adequate proof that CCC can be installed at the plant. Enercon's 2012 Report updates the information contained in PSNH's 2007 § 308 Response and raises a number of potential logistical issues that may inhibit CCC installation due to the FGD system, such as the need for a

308 Response at 45. Decreased condenser efficiency with CCC at Merrimack Station would result in another 3 MW lost per hour, with a corresponding annual cost of approximately $1,879,500. *Id.* at 44. Lastly, the additional outage time needed to implement CCC at both units would be approximately 135,000 MW-hours, with a corresponding cost of approximately $9,000,000. *Id.* at 46. These monetary numbers and generation losses are hardly immaterial and warrant additional consideration by EPA prior to requiring CCC at Merrimack Station.

new pumping station and condenser cleaning system, existing piping interfaces, site layout constraints (*i.e.* limited available space), operating parameters, and water treatment and quality issues.[52] 2012 Enercon Report at 42.

In truth, additional studies must be conducted before EPA can definitively state that CCC can actually be installed at Merrimack Station. PSNH has not fully evaluated the feasibility of installing CCC technologies at Merrimack Station because the technology has been expressly rejected by EPA on a national scale on repeated occasions. *See* 69 Fed. Reg. 41576, 41605 (July 9, 2004); 76 Fed. Reg. 22174, 22207 (Apr. 20, 2011). Any studies undertaken would need to be completed prior to the issuance of EPA's final permit for Merrimack Station in order to determine whether CCC is, in fact, capable of being retrofitted at the plant. More importantly, however, EPA's failure to adequately address and consider this secondary factor prior to issuing the draft permit is arbitrary and capricious and must be properly evaluated prior to issuance of the final permit.

(b) Expected Increased Evaporation Due to Cooling Towers at Merrimack Station Will Remove a Material Amount of Water from the Hooksett Pool Each Day

An estimated 4.79 million gallons of water per day will be lost due to evaporation from the Hooksett Pool if CCC is installed at Merrimack Station, according to PSNH's consultants. *See* 2012 Enercon Report at 17. Stated differently, CCC installed at Merrimack Station would consume approximately 3,325 gallons of water per minute and approximately 2,640 Olympic-sized swimming pools per year. *See id.*. EPA attempts to explain away this substantial, daily water loss by arguing that it must be similar to the evaporation rate currently experienced with

[52] PSNH would ultimately have to consider running the necessary piping along the shoreline, within a narrow strip of land buttressed by railroad tracks that contains highly erodible sands and is within a shoreline protection zone. Obtaining the necessary construction and/or operational permits may be impossible.

Merrimack Station's open-cycle system. Determination at 163. EPA provides no concrete support for its assertion, however, other than to say that the station's current "thermal discharge probably increases evaporation rates from the Hooksett Pool itself." *Id.* Such conjecture is patently lacking in substance and again shows EPA's haphazard analysis of the facts.

In fact, the power spray modules installed in Merrimack Station's discharge canal spray discharge into the air to cool the water through the process of convection—not evaporation. Moreover, the spray modules are operated under certain seasonal thermal conditions. Enercon acknowledges that "[t]here is an incremental increase in the amount of evaporation that occurs within the Hooksett Pool as a result of elevated water temperatures." *See* 2012 Enercon Report at 17. However, this evaporation is properly attributable to naturally occurring heat transfer due to higher ambient water temperatures within the waterbody. *Id.* Enercon concludes its critique of EPA's self-serving dismissal of this water consumption issue by stating that:

> [w]hile the exact amount of additional evaporation loss that occurs is difficult to determine, it is known that more water loss occurs in a closed-cycle system using cooling towers than one using cooling pond, and that closed-cycle systems typically evaporate 2 to 3 times more water than open-cycle systems. This negates the possibility that the evaporation occurring in the river due to increased temperatures exceeds that of cooling towers.

Id.. EPA's cursory review and dismissal of this material water consumption issue was arbitrary and capricious.

b. <u>EPA Rejected CWW Screens for the wrong reasons</u>

EPA rejected CWW screens as BTA for Merrimack Station's CWISs, pursuant to § 316(b); however, EPA did so for the wrong reasons. Contrary to EPA's conclusions, CWW screens <u>are</u> an "available" technology at Merrimack Station that would reduce impingement and entrainment effectively enough to comply with the plant's obligation to reasonably minimize AEI. *See Entergy*, 129 S. Ct. at 1506. Nevertheless, the cost to install this technology at

Merrimack Station unconditionally fails EPA's "wholly disproportionate" and/or "significantly greater" standard, as well as the tenets of Exec. Order 13563, when compared to the minimal additional benefits CWW screens would provide. As such, PSNH agrees with EPA's ultimate conclusion that CWW screens are not BTA for Merrimack Station. However, PSNH's comments below correct EPA's erroneous analysis of the BTA factors in reaching this conclusion.

i. CWW Screens are an "Available" Technology at Merrimack Station

CWW screens are an "available" technological option for Merrimack Station's CWISs. CWW screens can be operated between April and July in conjunction with an upgraded fish return system operating from August to November, when fouling of CWW screens are a potential concern due to traditionally low river flow. Importantly, PSNH acknowledges that its determination as to whether the CWW screen technology option is, indeed, "available" has changed—specifically, in its responses to EPA's 2007 and 2009 § 308 Requests. EPA correctly notes this in its determinations document. However, this change is explained by the numerous reports and data PSNH has submitted to EPA since responding to EPA's initial 2007 § 308 request. Since 2007, PSNH and its consultants have expended significant additional resources to determine the feasibility of installing CWW screens at the plant. This additional research has resulted in a reasoned and well-supported conclusion that the combination of technologies set out above is a real and concrete option for Merrimack Station. EPA's determination to the contrary is erroneous.

As support for its flawed conclusion, EPA cites to the need for ambient current velocity necessary to properly operate CWW screens and the fact that the Hooksett Pool purportedly does not have the requisite currents at "critical times," in EPA's opinion. Determination at 275-76.

EPA also questions whether sufficient water depths exist within the Hooksett Pool in order to install and operate the CWW screens properly and whether 1.5 mm screen slots will sufficiently reduce entrainment or would cause mortality due to larvae contact with the screens. *Id.* at 278-80. Lastly, EPA questions whether the number of CWW screens PSNH would need to install to ensure adequate cooling water withdrawal volumes could interfere with the waterbody's beneficial use. *Id.* at 276-78.

Currents within the Hooksett Pool portion of the Merrimack River are more than adequate during those "critical times" in which PSNH would operate the CWW screens. Normandeau's 2006 and 2007 biological data indicates that the greatest entrainment potential at Merrimack Station typically occurs between late May and late June. (Normandeau 2007b). As such, PSNH would operate CWW screens at Merrimack Station from April through July. Data from 1984 through 2005 on the Merrimack River reveals that flows in May and June are not typically low. In fact, flows during the month of May are second highest out of all the months, when the data for all of the years is averaged. 2012 Enercon Report at 10. Flows within the Merrimack River are not typically categorized as low until the months of August through November. However, Normandeau's reports provide that entrainment potential in these months is very low. Thus, PSNH would not operate the CWW screens during those months. Instead, an improved fish return system would be in operation to return impinged organisms from the traveling screens back to the river.

In addition, although CWW screens are designed to operate with a recommended sweeping velocity of 1 foot-per-second, this is only a design goal to assist in removing debris from the screens.[53] *See id.* In fact, CWW screens are currently being utilized at plants and facilities with little to no sweeping velocities. Enercon's 2012 Report provides specific examples of such facilities and the more favorable conditions that exist at Merrimack Station when compared to said facilities:

> Oak Creek and Campbell Unit 3 are located along the shores of Lake Michigan. While the water in Lake Michigan is by no means stagnant, there is not a prevailing current in the lake as there is in the Merrimack River. Johnson Screens has installed CWW screens in over 80 locations characterized as a lake or reservoir that have little to no sweeping flow. Examples of such installations include Granbury Water Treatment Plant in Granbury, TX, Freestone Energy Center in Streetman, TX, Bradbury Dam in Santa Barbara, CA, and in Beal Lake in Mohave Valley, AZ. With regard to sweeping flows, the Merrimack River is an environment that is more conducive to favorable CWW screen performance than any of the aforementioned examples. Therefore, not only should the Merrimack River be an acceptable location for installing CWW screens from a flow standpoint, it is potentially a more ideal environment than many other locations that have operated successfully.

Id. at 9. To combat any potential current problems that may exist while the CWW screens are in operation, airburst system compressor motors ("ABS") would be installed and run 24-hours per day from April to July and once per week for four hours from August through March. Enercon describes the usage and effectiveness the ABS technology as follows:

> ABS . . . is designed specifically for CWW screen installations in which there is no sweeping velocity at all. Johnson Screens has installed CWW screens of this type in 80 different locations characterized as a lake or reservoir. In these instances, there is little to no sweeping flow whatsoever, and the ABS has operated effectively in removing debris. Direct correspondence with Johnson Screens has indicated that fouling and debris removal is not an issue for screens installed in stationary water that use an ABS, as long as the screen is installed in open water and not in a small, contained area where the debris has nowhere to go.

[53] Moreover, certain CWW screens are designed to achieve an intake velocity of 0.5 feet-per-second. Indeed, such an intake velocity may well be required if the impingement compliance options contained in EPA's Proposed 316(b) rule remain unchanged in the final rule. *See* 76 Fed. Reg. 22174 , 22277 (Apr. 20, 2011).

Id. at 10.[54] For each of these reasons, EPA's concerns about adequate ambient currents are in error and cannot form the basis upon which CWW screens are rendered unavailable for Merrimack Station.

EPA's questions regarding adequate water depths for the installation of CWW screens are directly refuted by both Enercon and Normandeau, as well. PSNH included 24-inch diameter CWW screens for the feasibility design analysis in its response to EPA's 2009 § 308 Request. *See, e.g.,* 2009 § 308 Response at 9. Johnson Screens, the leading manufacturer of this technology, has stated that such 24-inch screens can be designed to operate in as little as 4 feet of water.[55] *See* 2012 Enercon Report at 11-12 (citing conversations with, and literature from, Johnson Screens as support).

In its response to EPA's 2009 § 308 Request, PSNH included a preliminary layout of CWW screens that showed the technology being installed from approximately 65 to 95 feet offshore in front of the existing Unit 1 and 2 CWIS screen houses. 2009 § 308 Response at 9. Enercon provides that the mean low water level in the vicinity of the CWW screens is 4 to 6 ft, with an average depth of 6 to 10 ft. *See* 2012 Enercon Report at 12. Moreover, in its 2012 comments, Normandeau references a May 2009 bathymetric survey that was conducted along the front of the CWISs at Merrimack Station indicating that depths in the vicinity of the intakes were about 13 feet at that time. *See* Normandeau Comments at 134 Normandeau includes a figure of this raw data in its 2012 comments and provides also that it is the most detailed information regarding water depths available. Normandeau concludes its analysis by stating that "water

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[54] Video footage of the effectiveness of CWW screens tested at Alden Research Laboratory, referenced and included in EPRI's 2012 comments to this draft permit, provides even more evidence that fears of impingement due to allegedly inadequate sweeping velocity at "critical times" are unwarranted. 2012 EPRI Comments at 3-4.

[55] Four feet of water depth is necessary to install 24-inch CWW screens because at least one half diameter of clearance (*i.e.* 12 inches for a 24-inch screen) must be provided above and below the outer edge of the screen, according to Johnson Screens, the leading manufacturer of this technology. *See* 2012 Enercon Report at 11.

depth . . . is not an adequate reason to reject wedgewire screens as an option for BTA at Merrimack Station." *Id.*

EPA's concerns that CWW screens with slot sizes of 1.5 mm may be insufficient to adequately reduce entrainment are misplaced and contrary to EPA's statements in its 2004 Phase II regulations. Specifically, in that rule, EPA identified the "addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline with mesh width of 1.75 mm" as the most appropriate technology for Merrimack Station. *See* 69 Fed. Reg. 41575, 41646 (July 9, 2004). According to Enercon, since that time, "the amount of information available concerning CWW screens and the confidence in the technological feasibility has [only] increased." 2012 Enercon Report at 7. Moreover, with the small number of eggs compared to larvae estimated to being entrained at Merrimack Station, it is unclear why smaller screen mesh sizes would be necessary. Regardless, Enercon provides that PSNH could allay any fears of larger mesh screen slot sizes as follows:

> the through-slot velocity can be lowered below the typical 0.5 fps value. Since the biological effectiveness of the CWW screens is predominantly determined by the ratio of sweeping velocity to through-slot velocity, the through-slot velocity can be lowered to increase the effectiveness of the screen. According to Normandeau, laboratory studies have indicated that larvae exposed to CWW screens in a flume of flowing water were less likely to be entrained if the sweeping flow equaled or exceeded the through-slot flow. A small fish larva (*e.g.*, 5-15 mm long) may be able to swim faster than the through-slot velocity of a CWW screen, but only for a short distance. After many repeated escape attempts, a larva may eventually become exhausted and become entrained. If there is sufficient sweeping flow past the screen, however, the sweeping flow can transport the larva beyond the screen's influence after a few escape attempts. It generally appears that the best chance of larval avoidance occurs when sweeping velocity exceeds through-slot velocity. In the Hooksett Pool of the Merrimack River, . . . fastest river currents typically occur during the spring, which is also the season of greatest larval abundance, a coincidence favorable for larval avoidance of CWW screens. The summer is

> often a time of reduced river flow, but by that time most larvae have grown large enough that they are no longer small enough to be entrained through narrow-slot CWW screens. The larger larvae or juveniles present in the summer also have greatly increased swimming ability, enabling them to easily avoid contact with CWW screens with a low through-slot velocity, even in weak sweeping flows.

Id. at 11.[56]

EPA's fear of larvae mortality due to contact with the CWW screens is equally misplaced. Specifically, EPA critiques PSNH's reference to a study supporting the conclusion that larvae of a certain length can actively avoid being entrained because the study focuses on a species not found within the Hooksett Pool. However, EPRI references a 2011 American Fishes Society § 316(b) paper in its comments that determined actual testing on larvae avoidance was significantly greater than predicted based on slot size alone. *See* 2012 EPRI Comments at 4. Moreover, EPRI Technical Report 1019027 included white sucker as a test species in studies on the performance of fine mesh modified traveling screens and found impingement mortality rates in excess of 80 percent in white sucker larvae that had begun to develop musculature. *See id.* Similar results were found for bluegill and bass, as well, according to EPRI. *Id.* The stress caused by impingement on fine mesh screens at much higher velocities than would occur with

[56] Enercon provides specific examples of installations of CWW screens with through slot velocity of 0.5 fps an even 0.25 fps:

> The aforementioned Eddystone, Campbell Unit 3, and Oak Creek have all installed CWW screen arrays with a 0.5 fps through slot velocity. It is possible that CWW screens could be installed at Merrimack Station that would have a lower through slot velocity. This would increase the ratio of sweeping flow to through-slot velocity, thereby increasing screen effectiveness. There have been successful installations of CWW screens with through-slot velocities of 0.25 fps. Such installations include Willamette River Water Treatment Plant in Oregon and Bethlehem Energy Center in New York. Both installations utilized an ABS system.

Id.

CWW screens at Merrimack Station suggests that mortality due to incidental contact with the screens is a nonfactor.[57] *Id.*

Installation of the CWW screens will not result in any interference with the river's beneficial use. As Enercon provides in its 2012 Report:

> [T]he Merrimack River is not considered a navigable waterway. The Garvin's Falls Dam is approximately 2.5 miles upstream of the Station, and the Hooksett Dam is approximately 2 miles downstream of the Station. Neither of these dams utilizes locks, hence preventing navigation along the Merrimack River in this region. Installation of CWW screens would result in a minimal reduction in available recreational space in front of the Station, but would not significantly impact the navigability of the Merrimack River.

2012 Enercon Report at 8.[58] Thus, for all of the reasons set out above and for reasons included in the numerous studies and reports PSNH and its consultants have submitted to EPA, CWW screens are a feasible technology for installation at Merrimack Station. EPA was incorrect to conclude otherwise.

ii. CWW Screens are an Effective but Unnecessary Technology for Merrimack Station to Further Minimize the Already *De Minimis* AEI

Enercon estimated that the use of CWW screens with a 1.5 mm slot width during the months of April through July, coupled with operation of an upgraded fish return system from August to November, would reduce annual impingement and entrainment by up to 84 and 79 percent, respectively. *See, e.g.,* 2012 Enercon Report at iv. Use of such screens with up to a 9.0

[57] EPA's assertion that certain larvae may actually be attracted to the CWW screens because they may create a low-current refuge is not sound. Determination at 279-80. Any larvae large enough to swim and reside in any low-current areas created by the CWW screens would be too large to be entrained by the screens and should be able to easily avoid accidental impingement on the screens.

[58] In its 2009 Response to EPA's § 308 Request, PSNH noted that the main water traffic on the Merrimack River is for recreational purposes (*i.e.*, skiing, boating, and fishing). 2009 § 308 Response at 17-18.

mm slot width at Merrimack Station would yield up to a 73 percent reduction in entrainment and the same percentage reduction for impingement. *Id.*

In its determinations document, EPA does not counter Enercon's estimates with its own. Instead, EPA relies solely on its theories and opinions of why CWW screens are not technologically feasible at Merrimack Station. However, as stated above and in the reports and comments submitted by Enercon and Normandeau, installation and operation of CWW screens at the plant is a real, concrete option. Thus, as the percentages cited above indicate, CWW screens are a technological option that provides a substantially equivalent reduction in impingement and entrainment compared to CCC at a fraction of the cost to install CCC technologies—especially in light of the total, nominal numbers of fish and ichthyoplankton currently impinged and entrained at Merrimack Station. Indeed, EPA's 2004 Phase II regulations specifically pre-approved the CWW screen technology with 1.75 mm screen slot width as a "rule-specified design and construction technology" that fulfilled the rule's percentage-reduction performance standards for CWISs located along freshwater rivers and streams. 2004 Phase II regulations at 41591; *see also id.* at 41602 (providing that "a facility can demonstrate that it meets specified conditions and that it has installed and properly operates and maintains a pre-approved technology" and "approving one technology at this time: submerged CWW screen technology to treat the total cooling water intake flow").

CWW screens therefore could be an effective technology at the plant. However, they are an unnecessary technological option. For each of the reasons discussed in Section IV.B.1.a.ii., above, installation of CWW screens at Merrimack Station is unwarranted due to the *de minimis* rates of impingement and entrainment currently experienced at the plant. Normandeau's comprehensive studies and reports indubitably support this conclusion. Merrimack Station's current CWIS operations roughly impinge and entrain only 14,500 adult equivalent fish in an average year. *See* 2007 § 308 Response at 4, 7. In Normandeau's expert scientific opinion, these trivial losses due to impingement and entrainment are undeniably *de minimis* and result in negligible AEI to the Hooksett Pool. *See, e.g.*, Normandeau Comments at 143.

Normandeau's conclusions are corroborated by EPRI, as well. Merrimack Station ranked in the bottom 18 and 17 percent of all facilities in the Institute's database for average annual impingement and entrainment, respectively. Notably, Merrimack Station, along with the 15 other facilities with the lowest annual rates of entrainment (the purported AEI that EPA is utilizing to require CCC installation at the plant), comprise only <u>0.04 percent</u> of the total entrainment losses from all 90 facilities that provided entrainment data to EPRI. 2012 EPRI Comments at 7. This puts Merrimack Station's impingement and entrainment into perspective on a national scale and demonstrates the infinitesimal impact (if any at all) it is having on the ecosystem.

In the end, the faulty assumptions, analytical leaps, conjecture and self-serving conclusions contained in EPA's determinations document do nothing to refute Normandeau's reasoned and documented expert opinions and conclusions. PSNH has unquestionably fulfilled its duty to reasonably minimize AEI to the Hooksett Pool. *See Entergy*, 129 S. Ct. at 1506. As such, the additional, expected reductions in impingement and entrainment provided by the installation of CWW screens are not necessary. Moreover, as explained in detail below, any such incremental environmental benefits woefully fail EPA's "wholly disproportionate" and/or "significantly greater" standards, as well as the requirements of Exec. Order 13563, when compared to the costs required to construct and operate said technology at Merrimack Station.

iii. The Costs to Install CWW Screens at Merrimack Station are Wholly Disproportionate and/or Significantly Greater than Any Expected Environmental Benefits

Although CWW screens are an available and effective technology to reduce impingement and entrainment, PSNH agrees with EPA's ultimate conclusion that CWW screens are not BTA for Merrimack Station; however, for a different reason. The costs to install the CWW screen technology are wholly disproportionate to the minimal added environmental and social benefits. Based on the conclusions in Enercon's 2009 and 2012 reports that CWW screens are, in fact, technologically available for Merrimack Station, NERA analyzed the costs and relative benefits associated with the installation of that technology.[59] Utilizing the same methodologies described at length in Section IV.B.1.a.iii. of PSNH's comments, NERA determined that the ultimate total social costs to install CWW screens at Merrimack Station would be $7,901,000 in 2010 Dollars, with total benefits amounting to only $81,000. 2012 NERA Report at 35. These results indicate a cost-benefit ratio of about 98 to 1, meaning PSNH's Energy Service customers would have to pay $98 for every one dollar of added social benefit. *Id.* This too fails the principles set out in Exec. Order 13563, as well as EPA's "wholly disproportionate" and/or "significantly greater" cost-benefit standard repeatedly utilized to make § 316(b) BTA determinations.

Lastly, it is important to observe that should EPA erroneously reject PSNH's proposed operational changes and fish return upgrades to its CWISs, set out in Section IV.B.1.c. below, and steadfastly require PSNH to install some costly technology despite limited additional benefits, CWW screens are the more logical and reasonable technological requirement compared to CCC given the large differences in cost-benefit ratios between CWW screens and CCC

[59] Recall, EPA limited its cost-benefit analysis to only five technological options for Merrimack Station, all of which included one or both CWISs operating in CCC mode for at least some portion of a calendar year. EPA incorrectly ruled out CWW screens as technologically infeasible in its determinations document prior to considering the cost and relative benefits of the CWIS technology for Merrimack Station. Determination at 275-80.

implementation. As stated in Section IV.B.1.a.iii., above, the cost-benefit ratio for the installation of CCC at Merrimack Station is 974 to 1, compared to the 98 to 1 ratio for CWW screens. *Id.* at 36. What is more, the ratio of incremental costs to incremental benefits of CCC relative to CWW screens is more than 4300 to 1. *Id.* This means that for every $1 of additional benefit provided by CCC compared to CWW screens at Merrimack Station, society would have to pay in excess of $4,300. This is outrageous. It would be unconscionable for EPA to force such an expensive technology in light of its much smaller benefits. Thus, if forced to choose between the two technologies, CWW screens are the more appropriate and reasonable option under the circumstances. However, PSNH maintains that the company's proposed operational changes and fish return upgrades at Merrimack Station should be approved by EPA in lieu of both of these costly technologies.

iv. Secondary Environmental Factors Do Not Materially Alter the Conclusion that CWW Screens are an Available and Effective Technology for Reducing Impingement and Entrainment

The considerable, potential secondary environmental effects discussed with respect to CCC in Section IV.B.1.a.iv., above, are largely irrelevant for the installation of CWW Screens at Merrimack Station. Specifically, because CWW screens are a passive technological option, their installation will have no material adverse effect on energy reliability, air emissions, or water consumption. Moreover, installation of CWW screens at Merrimack Station will in no way be impacted by land availability limitations.

Power generation would be minimally impacted with this technology. Specifically, airburst system compressor motors would need to continuously run from April to July and run once per week for four hours from August to March. 2012 Enercon Report at 6. Additionally, existing coarse mesh traveling screens and upgraded fish return systems would need to be powered continuously from August through November and intermittently from August through November. *Id.* In total, the parasitic power losses from operation of these components would amount to approximately 202 megawatt hours per year. *Id.* This impact is 0.34 percent of the estimated parasitic power generation losses expected if CCC were to be installed at Merrimack Station—not to mention the additional, annual 26,000 MW-hours that would be lost due to condenser inefficiencies with CCC. *Id.*

In the end, the wholly disproportionate and/or significantly greater costs compared to expected benefits in installing CWW screens at Merrimack Station clearly illustrate that this technology cannot properly be labeled BTA. Instead, for the reasons explained below, proposed operational changes, coupled with fish return upgrades, are BTA for Merrimack Station and should be included as such in EPA's final permit.

c. Proposed Operational Changes and Installation of a New Fish Return System at Merrimack Station Constitute BTA and Satisfy the Requirements of § 316(b)

As demonstrated above, EPA's BTA determination for Merrimack Station was based on a misapplication of the relevant factors, and/or failure to adequately consider said factors, and is therefore arbitrary and capricious. A proper BTA analysis demonstrates that 1) rescheduling maintenance outages for Units 1 and 2 at Merrimack Station; 2) installation of a new fish return system; and 3) continuous operation of existing traveling screens from April through December, collectively, constitute BTA for § 316(b).[60]

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[60] Current operational measures and existing circumstances at Merrimack Station already cause significant flow reductions through the CWISs that result in a substantial decrease in overall impingement and entrainment. Specifically, as explained in the 2007 § 308 Response:

> Existing operational flow reductions at Merrimack Station occurring due to maintenance outages, Unit 2 single pump operation, and de-icing recirculation flow result in a combined annual flow reduction from a full flow baseline of 6.3 percent at Unit 1 and 9.0% at Unit 2. However, by far the greatest overall existing flow reductions for the Unit 1 and Unit 2 CWIS comes from the loss of intake pumping efficiency due to head loss from design full pond elevation as Hooksett Pool water levels change daily due to hydropower operation of the Garvins Falls (upstream) and

i. Changes in Operations of Existing Traveling Screens and Upgrades to the Fish Return System

Although PSNH does not concede that the current intermittent operation of the existing traveling screens and fish return system at Merrimack Station fail to reflect BTA pursuant to § 316(b), it does recognize that certain improvements and/or operational changes are available to make the system more effective and further reduce impingement mortality. EPA agreed that an upgraded fish return system is necessary at Merrimack Station.

Existing Unit 1 and Unit 2 traveling screens currently operate intermittently, unless debris levels are high. With intermittent operations, the surface area of the screens can become obstructed, increasing both the velocity of the water passing through the screens and the differential head loss. As the head losses and velocities increase, more fish cannot likely escape the screen area and can become impinged. Continuous operation of these screens would reduce impingement and improve the mortality of any fish that are impinged by returning them to the river more quickly. Continuous operation is not necessary, however, during periods of low impingement. Normandeau's data indicates that impingement levels are typically low in January through March, when the Merrimack River is usually frozen. *See* 2007 § 308 Response at 88. Running the traveling screens continuously from April through December was estimated in 2007 to increase annual maintenance costs by approximately $60,000 and would require an initial capital cost of approximately $15,000 to $20,000 to install an additional screen wash spray pump

> Hooksett (downstream) hydroelectric stations. Head loss alone accounts for a 22.9% intake flow reduction for Unit 1 and a 14.5% intake flow reduction for Unit 2. When the actual operational flow reductions during the June 2005 through June 2007 entrainment and impingement studies are weighted by the monthly abundance of impingement and entrainment and compared to the design flows, an overall annual reduction of adult equivalent losses of 17% for entrainment and 22% for impingement is attributable to the Station's existing operational flow reductions.

2007 § 308 Response at 96 (internal references omitted) at each unit so that both traveling screens at each unit may be run continuously. *See* 2007 § 308 Response at 65.

To upgrade its current fish return system, PSNH would install a low pressure spray wash[61] and a trough, with removable cover, designed to maintain a water velocity of 3 to 5 feet-per-second, with a minimum water depth of 4 to 6 feet. The trough would limit sharp turns and discharge slightly below the low water level.[62] In 2007, PSNH estimated the total capital cost of upgrading the fish return system to be approximately $300,000. *Id.* at 66. PSNH acknowledges that impingement survival with Merrimack Station's current system is minimal. Thus, assuming 100 percent mortality with the existing system, an improved fish return system—coupled with the changes in operations to the plant's current traveling screens—is estimated to reduce mortality rates of impingement at Merrimack Station by 46 percent at Unit 1 and 54 percent at Unit 2. *See id.* at 66-67. In terms of adult equivalent losses, the mortality rates would be reduced by 46 percent at Unit 1 and 50 percent at Unit 2.[63] *Id.*

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[61] Relatedly, EPA points out that currently one traveling screen and one pump at Unit 2 are shut down for approximately 8.4 days each year due to frazil ice, which results in 100 percent of the traveling screen spray wash flow being directed at the traveling screens in operation and increases the pressure of that spray wash flow. Determination at 269-70. This is an incorrect statement. The screen spraywash pressure remains constant regardless of how many pumps are in operation. Additionally it should be noted that operating only one intake pump during these 8.4 days not only reduces the overall intake flow, it also results in a roughly proportional reduction in the maximum through screen design velocity—providing a decrease in risk of impingement mortality.

[62] Although PSNH would limit sharp turns in the trough, studies indicate that sharp turns do not impact mortality rates. 2012 EPRI Comments at 5.

[63] PSNH has also considered replacing its existing traveling screens with coarse mesh Ristroph screens or Geiger MultiDisc screens ("MD screens"), although PSNH believes installation of said screens is unnecessary due to the current *de minimis* levels of impingement and entrainment. *See* 2007 § 308 Response at 68-74. Use of Ristroph screens, in combination with the upgraded fish return system, would reduce impingement mortality from baseline by approximately 50 percent at Unit 1 and 53 percent at Unit 2, with adult equivalency loss reductions of 60 percent and 50 percent at each unit, respectively. *Id.* at 68-69. The present value of the estimated cost of installing the Ristroph screens and the upgraded fish return system is approximately $1,576,000, although these costs could be higher due to "various uncertainties associated with the costs of installation and operations of the" screens. *See* 2012 NERA Report at E-3, 18. These percentage reductions in impingement appear substantial. However, because impingement mortality at PSNH is already trifling, the cost-benefit ratio of installing this technology at Merrimack Station is 138 to 1, meaning that for every $1 of social benefit PSNH's customers would pay $138. *Id.* at 36. This too fails EPA's "wholly disproportionate" and "significantly greater" standard, as well as the requirements of Exec. Order 13563.

ii. Rescheduled Maintenance Outages at Units 1 and 2

Rescheduling the annual planned maintenance outage of Unit 2 to occur from mid-May to mid-June would reduce annual impingement by approximately 41 percent and entrainment by approximately 40 percent. *Id.* at 91-93. Rescheduling of Unit 1's biennial planned maintenance outage to October can reduce annual impingement by approximately five percent. *Id.* at 93. Collectively, rescheduling of these outages would reduce annual impingement by approximately 46 percent[64] and entrainment by approximately 40 percent. *Id.*

EPA erroneously rejected this proposed rescheduling of outages as BTA.[65] In doing so, EPA did not contend that this operational change was unavailable or that its costs were wholly disproportionate or significantly greater than its expected benefits. Indeed, EPA plainly stated that flow reductions are one of the most effective strategies for yielding the greatest annual reduction in impingement and entrainment. *See* Determination at 297. As support for its dismissal of this § 316(b) compliance option, EPA stated only that it is not BTA for Merrimack Station because the outage periods do not encompass the entire period during which fish eggs and larvae are present in the Hooksett Pool, nor does the option adequately address impingement that occurs year-round at the facility. *Id.*

Installation of MD screens at Merrimack Station, along with upgrades to the fish return system, would reduce impingement mortality by approximately 69 percent at Unit 1 and 80 percent at Unit 2, with adult equivalency loss percentages of 67 percent and 60 percent, respectively. *See* 2007 § 308 Response at 71-74. Installation of this technology is estimated to cost approximately $2,624,000 in present value, although these costs could actually be higher than estimated, as well, due to various uncertainties. *See* 2012 NERA Report at E-3, 18. The estimated costs and relative benefits result in a ratio of 186 to 1, meaning installation of MD screens at Merrimack Station is also not justified in light of EPA's "wholly disproportionate" and "significantly greater" standard, as well as the requirements of Exec. Order 13563. *Id.* at 36.

[64] The reduction in impingement expected from moving the scheduled outage of Unit 1 to October is five percent. Because this outage is biennial, impingement reduction at Merrimack would alternate each year between 41 and 46 percent.

[65] EPA actually provided that "scheduling the annual Unit 2 maintenance outage from mid-May to mid-June could be a *component of* the BTA under CWA § 316(b)." *See* Determination at 297. However, the rescheduling option was ultimately rejected in lieu of requiring installation of CCC at the facility.

EPA's rejection of rescheduled maintenance outages for Units 1 and 2 at Merrimack Station is arbitrary and capricious inasmuch as it ignores the fact that the purpose of § 316(b) is to only minimize—not eliminate completely—impingement and entrainment due to operation of CWISs. Merrimack Station currently impinges and entrains a *de minimis* number of fish and ichthyoplankton, as confirmed by Normandeau's reports and data. In Normandeau's expert scientific opinion, the average annual losses currently experienced at Merrimack Station due to impingement and entrainment are undeniably *de minimis* and result in little to no AEI to the Hooksett Pool. *See, e.g.*, Normandeau Comments at 143. EPRI agrees, and its data confirms that Merrimack Station's annual rates of impingement and entrainment comprise less than one-tenth of one percent of the combined total losses experienced at the numerous facilities from whom EPRI has received data. 2012 EPRI Comments at 7. This shows the minuscule impact, if any, Merrimack Station's CWISs currently cause to the environment.

EPA's rejection of the rescheduling of annual planned maintenance outages because they do not address year-round impingement and do not encompass the entire period during which fish eggs and larvae are present in the Hooksett Pool is equally unavailing. The Unit 2 outage would occur from mid-May to mid-June, when average impingement and entrainment levels are at their respective peaks. *See* 2007 § 308 Response at 92. Moreover, EPA cannot consider each technological option in a vacuum. PSNH's proposed upgrades to Merrimack Station's fish return system and continuous operation of the plant's existing traveling screens from April through December will fill the impingement gap EPA has noted.[66] The combination of these

[66] Moreover, in its 2007 Responses to EPA's § 308 Request, PSNH included other proposed operational changes, including installation of variable speed pumps, that could be used in conjunction with the technologies listed in this subpart. *See* 2007 § 308 Response at 87-93. EPA summarily dismissed each of these options—individually—without looking at their potential, collective effectiveness if used in combination. EPA's failure to consider a combination of upgrades and operational changes to achieve substantially equivalent minimization of AEI compared to CCC is arbitrary and capricious. Such an analysis is warranted, indeed required, prior to final issuance of the permit.

technological improvements provides sufficient additional reductions to Merrimack Station's already *de minimis* levels of impingement and entrainment and is all that is necessary for PSNH to satisfy its regulatory burden. *See* 33 U.S.C. 1326(b). Indeed, these proposed changes are the only options that satisfy every aspect of the BTA standard for minimizing AEI to the Hooksett Pool: 1) each of the proposed changes is clearly available; 2) each—individually and in combination—is effective enough in reducing AEI, especially in light of the *de minimis* levels of impingement and entrainment currently experienced at the plant; and 3) the costs to install or implement each change is reasonably proportionate to the relative benefits the change would provide in further minimizing AEI. *Entergy*, 129 S. Ct. at 1506. EPA's BTA conclusions to the contrary are baseless and must be revisited prior to issuance of the final permit.

2. EPA's case-by-case determination of BTA is arbitrary and capricious in light of the impending issuance of EPA's final phase II regulations on July 27, 2012.

BPJ based case-by-case § 316(b) determinations are only proper when national regulations have not been set. Because EPA is required to take final action on regulations for new and existing CWIS facilities, including Merrimack Station, on or before July 27, 2012, EPA's case-by-case determination for Merrimack Station is improper. Because EPA has waited over 14 years, issuance of the draft permit at this time using its BPJ is clearly an attempt to impose limits on Merrimack Station that may not be required by other facilities in the industry. *See* 76 Fed. Reg. 22174, 22183 (April 20, 2011). EPA acknowledges this impending deadline in its determinations document, yet summarily dismisses it without explanation other than to say that "the Agency cannot be certain exactly when final regulations may be issued and go into effect." Determination at 221. Despite EPA's cursory ambivalence about the forthcoming final rule, it is clear that CWISs such as the ones at Merrimack Station will be regulated on a national level within five months from the date upon which these comments are submitted, and, thus, EPA's ability to establish BPJ based BTA technology standards will cease to exist. EPA's decision to ignore this fact and proceed with a case-by-case analysis for Merrimack Station's CWISs—after 14-plus years of inaction on PSNH's permit renewal application—is arbitrary, capricious, contrary to law, and frankly, makes no legitimate sense.

At the urging of EPA itself, the Ninth Circuit recognized the absurdity of proceeding with establishing BPJ case-specific effluent limits when NELGs are almost complete. *See Nat. Res. Defense Council, Inc. v. EPA*, 863 F.2d 1420 (9th Cir. 1988) ("*NRDC*"). In this case, it was EPA that defended its decision to abstain from using its BPJ authority to set effluent limits until after national effluent discharge limitations were promulgated because the BPJ decision was "intertwined with the development of" the national rulemaking. *Id.* at 1427. Specifically, in *NRDC*, EPA had not issued final effluent guidelines for the offshore oil industry. *Id.* at 1424. EPA restrained from deciding that reinjection of produced water was BAT for the permit because national standards would soon be promulgated to set a nationwide, uniform requirement on this issue and EPA did not want to conflict with the forthcoming national effluent limits. *Id.* at 1427.

The court agreed with EPA's decision and provided the following apt statement:

> The recent "anti-backsliding" amendment to the Act is designed to prevent "backsliding" from limitations in BPJ permits to less stringent limitations which may be established under the forthcoming national effluent limitation guidelines. . . . If the EPA were to require as BAT the retrofitting of all drilling sources for reinjection of produced water in the Gulf of Mexico, and, the *eventual* national standards were less stringent in any respect, there would be an <u>inconsistency between BAT for Gulf drilling and BAT for the rest of the nation's off-shore drilling. This inconsistency would lack any apparent scientific or equitable basis.</u> If, on the other hand, the eventual national standards embody more stringent standards that this permit requires, this permit can be reopened and its standards made more stringent. Given the large commitment of resources that would be necessary to begin retrofitting, <u>the values of certainty and uniformity inherent in the congressional scheme [of the CWA] take on added significance.</u>

> There is a justification for some delay in this situation in order to ensure that the produced water limitation in the Gulf conforms with the national standard.

Id. (emphasis added) (internal citation and quotation marks omitted); *see also* 49 Fed. Reg. 37,998, 38,020 (Sept. 26, 1984) (in addressing concerns about EPA's proposed anti-backsliding standard and the expectation that more permits issued based on a permit writer's BPJ would be challenged as a result, EPA provided its policy would be that "if promulgation of a [national effluent limitation] guideline is expected, [it] will generally defer permit issuance rather than issue a BPJ permit"). In short, as the Ninth Circuit and EPA have previously recognized, "[g]iven the large commitment of resources that would be necessary to begin retrofitting" Merrimack Station to comply with the draft permit, it makes little sense that EPA would seek to formulate and impose BPJ based BTA standards for Merrimack Station when a national standard is imminent.[67]

Guidelines and/or technology standards should be applied equally to all permittees and not penalize or create a competitive disadvantage for regulated entities that received a case-by-case permit before a national rule has been promulgated. Proceeding now with BPJ based BTA limits and requiring installation of CCC technologies at Merrimack Station could forever deprive PSNH the opportunity to pursue the options afforded by the new national regulations due to anti-backsliding rules that prevent EPA from changing, renewing, or reissuing an NPDES permit with technology limits that are less strict than the limits in the previous permit. *See* 33 U.S.C. § 1342(o). It is therefore not only proper, rather mandatory, for EPA to wait until the national regulations are implemented, and then apply those national standards to Merrimack Station's CWISs. Otherwise, the BPJ based permit could lead to the absurd result of forcing PSNH to go

[67] Notably, this argument applies to FGD wastewater effluent guidelines, as well. EPA is in the process of collecting data from the industry and is expected to adopt them in less than two years.

through timely, costly, and unnecessary efforts to comply with the BPJ based BTA limits that, within five months, will potentially never be applied to any other source. Likewise, if EPA were to somehow issue Merrimack Station a final permit before the national standards have been finalized, that permit may quickly need to be altered if the promulgated national rule is more stringent than EPA's BPJ determination. To sum it up, after taking more than 14 years to issue the draft permit, acting at this juncture would amount to a gross abuse of discretion, especially considering that EPA's margin for error in causing one of the aforementioned results by issuing the draft permit in its current form is minuscule.

Apparently, EPA is attempting to circumvent the rulemaking process and push through BPJ based BTA limits to avoid having to live with its own rule. Specifically, and perhaps most offensive to the administrative process, EPA appears to be expediting the establishment of BTA limits for Merrimack Station to ensure the plant is subject to the technology limits EPA hopes will be adopted in the final national rulemaking but knows are unlikely to make it through the rigors of the administrative process. Such a result-oriented ends-justifies-the-means process is just wrong.

EPA must comply with formal notice and comment procedures when it revises effluent limitations at the national level. This involves a notice of proposed rulemaking in the Federal Register, an extensive public comment period, and a final rule—all of which must be published, all of which are subject to public scrutiny, and all of which prevent EPA from creating law through back-door channels to establish limits on the regulated community that are contrary to the CWA or otherwise not in accordance with the law.

On the other hand, though NPDES permits like Merrimack Station's current draft permit are subject to notice and comment, the national exposure of the technology standards included therein are much less invasive because the limits only immediately impact one single plant. Moreover, since there is less attention paid to the limits in these permits at the national scene, scrutiny is similarly less extensive than it otherwise would be when nationwide standards are promulgated. PSNH can only assume that after waiting over 14 years to act on PSNH's permit renewal application, EPA is taking advantage of a last-ditch, backdoor opportunity to impose rigorous CWIS technology standards at Merrimack Station through the use of BPJ before national technology standards are issued by EPA. And, if the final § 316(b) rule is *not* similar to the BTA standards EPA was able to impose upon Merrimack Station's CWISs, EPA can at least ensure that Merrimack Station will be subject to these potentially much more stringent requirements which cannot be modified because of anti-backsliding rules.

Such piecemeal BPJ determinations made by EPA also ignore the large-scale reliability issues intentionally and/or inadvertently created by not considering the probable adverse impacts to the power production industry in the region. This is discussed more fully in § IV.D. below.

C. EPA's BAT determination and its proposed effluent limits on metals in the FGD system wastestream are arbitrary, capricious, and erroneous.

EPA's BAT determination and its proposed effluent limits on metals in the FGD system wastestream have no legal basis or justification. Merrimack Station's physical/chemical system is BAT. EPA should amend the limits in the draft permit and set limits that are based on the physical/chemical treatment system as discharged to Merrimack Station's treatment pond. EPA's proposed FGD wastestream permit limits are based on its unsupported determination that a biological treatment process is BAT. As a threshold matter, EPA's attempt to determine BAT on a case-by-case basis using its BPJ is unsupported and unlawful. EPA may not set case-by-case limitations where by regulation it has already set NELGs, as it has for steam electric power generating point sources, including FGD wastewater streams. *See NRDC v. EPA*, 822, F.2d 104, 111 (D.C. Cir. 1987). Regardless, EPA improperly applied the standards for determining case-by-case BAT; thus, its conclusion that a biological treatment process is BAT is unreasonable and without basis. Rather, biological treatment is not available, proven, or effective. EPA's proposed limits for discharges from the FGD wastewater stream are therefore arbitrary and capricious and should be revised prior to issuance of the final permit.

<u>Background of FGD Installation and Permitting.</u> In September 2011, PSNH began operating a wet FGD scrubber system at Merrimack Station, as required by the "Scrubber Law," enacted by the New Hampshire Legislature in June of 2006. *See* 2006 N.H. Laws Chapter 5, "An Act Relative to the Reduction of Mercury Emissions," ("RSA 125-O:11"), *et seq.*[68] The New Hampshire Legislature, supported by NHDES, determined that a wet FGD system is the best known commercially available technology for mercury reduction of air emissions. However, by design, operation of an FGD system results in FGD wastewater and an FGD wastestream. PSNH determined that a physical/chemical treatment with a "polishing" step was the best available technology for the plant to effectively treat the wastewater discharge from the scrubber. PSNH, with engineering and design support from Siemens Water Technologies and URS, began to install the physical/chemical system along with a state-of-the-art polishing system primarily for the enhanced removal of mercury and arsenic.

PSNH approached EPA in early 2009 to discuss authorization to discharge the FGD wastestream into the Merrimack River. EPA directed PSNH to NHDES for a water quality study to determine water-quality limits, if necessary. EPA implied that it would adopt whatever water

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[68] The Scrubber law required PSNH to install a wet FGD intended to control emissions of mercury, sulfur dioxide, and other pollutants from Units 1 and 2. Specifically, the Scrubber law requires PSNH to reduce mercury emissions by at least 80 percent by July 1, 2013, at the latest. However, the law provides numerous incentives to PSNH if its FGD system is operational prior to 2013. PSNH filed its application with NHDES to install and operate an FGD scrubber in June 2007. With the scrubber operational, Merrimack Station is now one of the cleanest coal-fired electric generating facilities in the country.

quality standards were eventually set by NHDES when determining BAT for Merrimack Station. This approach of state review and guidance prior to EPA review is typical in New Hampshire, even though New Hampshire has not been given primacy of the NPDES permitting program under the CWA. Following completion of the water quality study, NHDES ultimately concluded that, based on the net change of flows into and out of the treatment pond, certain elements had no net change to current limits and that for other constituents the Merrimack River had sufficient remaining assimilative capacity for most of the effluent from the FGD wastestream. NHDES was further satisfied that there was no "reasonable potential" that the treated FGD wastewater discharge would cause or contribute to a violation of state water quality standards at Outfall 003A. Ultimately, NHDES set reasonable water quality based limits on copper, aluminum and mercury, and imposed reporting and monitoring requirements for several other constituents in Outfall 003A.

Historically, EPA has accepted limits meeting state water quality standards as being BAT required by CWA § 301 because water quality effluent limits are almost always more stringent than technology based limits. Thus, once NHDES was assured that any discharge from the FGD wastestream would be well within satisfactory water quality parameters, PSNH and NHDES continued the discussion with EPA. In May 2010, PSNH submitted to EPA an addendum to its pending NPDES permit application seeking authorization to discharge its treated FGD effluent to the Merrimack River. Four months passed with no official action from EPA.

EPA did, however, make a § 308 informal information request to PSNH to obtain additional information regarding PSNH's plan for discharging the treated FGD wastestream to the Merrimack River. In October 2010, PSNH responded to EPA's § 308 information request and demonstrated how the physical/chemical treatment system, with the added Enhanced

Mercury and Arsenic Removal System ("EMARS") would satisfy any and all water quality based requirements for FGD wastewater treatment, why it represented BAT for Merrimack Station, and why other options were not BAT for Merrimack Station.

In November 2010, PSNH and NHDES jointly requested another meeting with EPA management in an attempt to obtain an NPDES permit modification or some other authorization/approval to allow for the proper discharge of FGD wastewater. At that time, construction of the scrubber was 75 percent complete and the physical/chemical system was 85 percent complete. At this meeting, attended by the Assistant Commissioner of NHDES, the head of the NHDES Air Resources Division, the head of the NHDES Water Division, and PSNH, various options were proposed by PSNH, such as discharging under the authority of Merrimack Station's existing permit, an administrative order, or an independent permit for the FGD wastewater effluent. Further, PSNH requested EPA to identify or develop other approval options which would allow the PSNH scrubber to come on-line in 2011 and improve the air and water quality in New Hampshire, as this scrubber project is arguably the single largest pollution control project ever developed in New Hampshire. Rather than cooperate in the effort to reach a constructive result, EPA stated in this meeting that when companies are faced with new and strict regulatory challenges, they usually find a new way to solve their own problems (which is what PSNH was left to do). EPA stated its intent to incorporate any requirements related to the FGD wastestream in Merrimack Station's draft NPDES permit renewal, which, at the time, had been pending for 13 years.

Due to EPA's decision not to modify the existing NPDES permit or provide any alternative option authorizing discharge of the FGD wastestream into the Merrimack River, PSNH was forced into the difficult decision to install additional treatment equipment, known as the secondary wastewater treatment system ("SWWTS"). The SWWTS includes vapor compression evaporation technology which is referred to as "zero liquid discharge" ("ZLD")[69] in the draft permit. *See, e.g.,* NHDES Draft Permit, Attach. E, at 20.

The SWWTS includes a brine concentrator, crystallizers, and filter presses that further treat the FGD wastewater treatment system following the physical/chemical system. The entire Scrubber wastewater is best viewed as a continuum, a process involving various stages of minimizing the discharge following the treatment of that discharge from the scrubber.

PSNH's decision to construct the SWWTS was based on a number of factors, the most significant of which was its obligation under New Hampshire law to have the scrubber "installed at Merrimack Station no later than July 1, 2013." NH RSA 125-O:11,I; 125-O:13,I. EPA told PSNH that it would not address the conditions related to any discharge from the operation of the Merrimack Station FGD until EPA issued PSNH's draft NPDES permit for the entire Merrimack Station. Having originally applied for the renewal of Merrimack Station's NPDES permit in 1997 and without any action or issuance by EPA over the intervening thirteen years, PSNH made the decision to consider additional technologies that would allow it to decrease the amount of waste generated by the Merrimack Station FGD, although not eliminate it completely. In late 2010, PSNH concluded that construction of the SWWTS was the best option it had that would both allow the Scrubber Project to come online and reduce the liquid discharge to a manageable amount that could be disposed of without an NPDES permit. PSNH knew, based on other EPA NPDES permits, that it was likely that EPA's draft permit for Merrimack Station would be

[69] At this time there are no coal-fired plants currently operating a technology system that completely eliminates all effluent discharges. In some contexts, ZLD is used to refer to avoidance of discharge to a receiving water body but does not necessarily refer to treatment via technology. For example, the Iatan system has been referred to as ZLD. There is, in fact, no discharge to a waterbody at Iatan. However, the technology itself does not eliminate the wastewater entirely. Instead, the would-be discharge is reduced to a manageable level and then mixed with flyash and landfilled.

controversial, require lengthy comment and review, and be subject to appeal; thus, the permit would not be issued in a final form for many years, potentially causing significant harm to PSNH and its customers. Furthermore, the decision to install the SWWTS was made to support the scrubber project schedule in an effort to place it in service in late 2011 in order to reduce emissions early, as encouraged by New Hampshire law, and to assist in reducing customer costs.

EPA's NPDES Draft Permit Limits Applicable to the FGD Wastestream. EPA's draft permit requires technology based effluent limits at Merrimack Station for the FGD wastestream (Outfall 003C). EPA's effluent limitations for FGD wastewater are based on an August 11, 2011, Ron Jordan memorandum to Sharon DeMeo of the EPA Region 1 Industrial Permits Branch that evaluated the "self-monitoring data" from the two Duke Plants "that incorporate physical-chemical treatment . . . followed by anoxic/anaerobic biological treatment of the FGD wastewater." Memorandum from Ron Jordan, EPA Engineering and Analysis Division, to Sharon DeMeo, Region 1 Industrial Permits Branch (Aug. 11, 2011) ("Jordan Guidance") (AR #53). However, EPA's use of the Jordan Guidance was arbitrary and capricious in that it wrongfully considered certain data, excluded certain data, and characterized certain data, all leading to indefensible and unachievable FGD wastewater limits for Merrimack Station.

Likewise, EPA unlawfully failed to use site-specific information from Merrimack Station in its application of its BPJ. Specifically, EPA did not properly consider the type of coal used, the specific characteristics of the wastestream (*i.e.*, nitrogen, bromides, chlorides, dissolved solids), the oxidation-reduction potential ("ORP") in the scrubber, costs, and other factors that are unique to Merrimack Station.

Eventually, EPA based its effluent limits on its erroneous determination that PSNH's current physical/chemical system and polishing step, combined with the EPA proposed additional step of biological treatment, represented BAT for Merrimack Station. Each of these limits, however, is unsupported and unlawful, and must be revised prior to issuance of the final permit.

Establishment of Effluent Limitations under CWA § 402. Under the CWA's NPDES program, each existing point source must install BAT that "will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." 33 U.S.C. § 1311(b)(2)(A)(i). For certain categories of point sources, CWA § 304(m)(1)(B)–(C) requires EPA to set NELGs based on EPA's determination of BAT for those sources. EPA has set such NELGs for steam electric power generating point sources. *See* 40 C.F.R Part 423.

Only when EPA has not promulgated NELGs is it authorized to use its BPJ to create case-by-case, technology based effluent limitations. 33 U.S.C. § 1342(a)(1)(B); CWA § 402(a)(1)(B). Because NELGs exist for steam electric power generating point sources and wastestreams discharged by those sources, EPA may not establish BPJ based limitations. This is especially true where, as here, EPA intends to amend its NELGs to include specific national effluent BAT standards for FGD wastestreams in the immediate future (currently FGD wastewater is regulated as a low volume wastestream).

When NELGs do not exist for an industry and its wastestreams, EPA may establish BAT using its BPJ. Using this approach, EPA must first identify "available" technologies by "survey[ing] the practicable or available pollution-control technology for an industry and assess[ing] its effectiveness." *Nat'l Wildlife Fed'n v. EPA*, 286 F.2d 554, 561 (D.C. Cir. 2002) (quoting *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 131 (1977)).[70] It is not

[70] Though this concept will not be discussed in great detail here, a technology may be "available" if it may be properly transferred from one industry to another. *Tanner's Council of Am.*, 540 F.2d at 1192. The transfer of technology is *only* permissible if it can be determined that the technology can be practicably applied. *Id.*; *CPC Int'l, Inc. v. Train*, 515 F.2d 1032, 1048 (8th Cir. 1975). A technology can be practicably applied if EPA can "(1) show

appropriate for EPA to deem a technology BAT if the technology has not been proven successful at pollution removal or has not been in place for a sufficient length of time to determine whether it is effective or not. *See, e.g., BP Exploration & Oil v.* EPA, 66 F.3d 784, 802 (6th Cir. 1996). Moreover, if EPA evaluates data and technology from only one plant, EPA must demonstrate the effectiveness of the technology. *Ass'n of Pacific Fisheries*, 615 F.2d at 816–19; *BP Exploration & Oil, Inc*. 66 F.3d at 802 (rejecting reinjection of drilling wastes as BAT in Alaska because even though an offshore oil platform used reinjection, "the technology is still experimental and is not yet available for application. . ."). [71]

Once it has identified available technologies, EPA considers a number of factors to determine BAT, including: the age of equipment and facilities involved; the process employed; the engineering aspects of the application of various types of control techniques; process changes; the cost of achieving such effluent reduction; and non-water quality environmental impacts (including energy requirements). 40 C.F.R. § 125.3(d)(3) (i) – (vi). Additionally, EPA takes into account: (1) "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and (2) [a]ny unique factors relating to the applicant." 40 C.F.R. §§ 125.3(c)(2)(i)–(ii); 125.3(d)(3); 33 U.S.C. § 1311(b)(2)(A).

EPA must consider each of the factors in 40 C.F.R. § 125.3(d)(3), and a failure to consider one factor deems EPA's effluent limits arbitrary and capricious. *See, e.g., Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 934–35 (5th Cir. 1998) (noting that a failure to consider the age

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that the transfer technology is available outside the industry; (2) determine that the technology is transferable to the industry; (3) make a reasonable prediction that the technology if used in the industry will be capable of removing the increment required by the effluent standards." *Id*.

[71] Even if it is not necessary for the model plant to demonstrate that every limit is achievable—a contention which PSNH does not concede—a plant upon whose technology that EPA relies on to establish the BAT should at least be able to achieve some of the limits for pollutants that are treated by that technology.

of the equipment and the facilities involved when determining the BAT would constitute an abuse of discretion); *Am. Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1048 (3d Cir. 1975) (remanding effluent limits because EPA did not consider the age of the facilities involved and the impact that age would have on the cost and feasibility of retrofitting older facilities). Not one factor is determinative; instead, EPA must balance all of the factors in determining BAT. Moreover, it would be incorrect to assert that BAT must be based on the "best single performer in the industry. To the contrary, the CWA's requirement that EPA choose the best technology does not mean that the chosen technology must be the best pollutant removal. Obviously, BAT . . . must be acceptable on the basis of numerous factors, only one of which is pollution control." *BP Oil & Exploration*, 66 F.3d at 796.

Most importantly, EPA's analysis of the BAT factors and its determination that all BAT limits are economically and technologically achievable must be reasonable. *BP Exploration*, 66 F.3d at 794. Further, EPA bears the burden of demonstrating a reasonable basis for its conclusion that the regulations are achievable, and a failure to do so renders the regulations arbitrary, capricious, and "not the result of reasoned decisionmaking." *Ass'n of Pac. Fisheries v. EPA*, 615 F.2d at 820; *Chem. Mfr's Ass'n v. EPA*, 885 F.2d 253, 265 (5th Cir. 1989); *Reynolds*, 760 F.2d at 559. When EPA sets effluent guidelines based on BAT, the effluent limits "cannot stand" if they are "based on a flawed, inaccurate, or misapplied study." *Texas Oil & Gas Ass'n*, 161 F.3d at 935. Likewise, if EPA fails to demonstrate the effectiveness of the chosen BAT, the effluent limitations must be remanded back to EPA for further consideration. *Ass'n of Pac. Fisheries*, 615 F.2d at 819; *Chem. Mfr's Ass'n*, 885 F.2d at 265.

One BAT factor is the consideration of cost to implement and maintain the proposed technology, or attain the proposed effluent limits. Indeed, the CWA specifically recognizes that the BAT must be *economically achievable*, 33 U.S.C. § 1311(b)(2)(A)(i), and requires the "cost of achieving such effluent reduction," 40 C.F.R. § 125.3(d)(3), be similarly evaluated. *See Texas Oil & Gas Ass'n* 161 F.3d at 934 (noting that cost refers to a consideration of the cost of the technology itself). Therefore, the cost determination is two-fold: cost must be considered in the six-factor BAT analysis, *and* the effluent limits must be economically achievable. *See Ass'n of Pacific Fisheries,* 615 F.2d at 819-20 (finding that EPA's failure to adequately consider the cost of land acquisition in the determination of whether a technology is an achievable technology is an example of unreasonable decision-making).

It makes sense that cost is such an important factor in the BAT analysis given the very name of this standard: the best available technology *economically* achievable. Thus, EPA is *permitted* to "balance factors such as cost against effluent reduction benefits." *BP Exploration*, 66 F.3d at 796. Courts have upheld EPA's decision to reject a technology based on high economic impacts that might otherwise have been the most effective pollution control technology. *See e.g. id.* (rejecting a technology as BAT, in part, because of the cost of the technology).

EPA argues that the BAT analysis and the establishment of effluent guidelines based on BAT do not *require* EPA to engage in a cost-benefit analysis. However, even if EPA's assertion is correct—which PSNH does not concede[72]—this does not mean that cost is not important in the BAT analysis and the establishment of effluent guidelines. EPA must implicitly consider the costs of the technology and the benefits received from the technology because of the duty to

[72] Importantly, neither does the Supreme Court or the President. Specifically, in *Entergy Corp. v. Riverkeeper, Inc.,* 556 U.S. 208 (2009), the Court responded to Petitioner's argument that a "cost –benefit analysis is precluded under the [BAT] test" by stating that "[i]t is not obvious to us that [this] proposition is correct, but we need not pursue that point, [since we assuredly agree with other points]." *Id.* at 221-22. Likewise, the requirements of the President's Exec. Order 13563, discussed earlier, mandate such a cost-benefit consideration on significant regulatory matters.

consider all of the factors in the BAT analysis. Additionally, the final BAT limits that are established must be economically achievable for the source. *Texas Oil & Gas Ass'n*, 161 F.3d at 934. In fact, the BPJ analysis requires a further step: the chosen technology must also be *appropriate* for point sources like the point source subject to the BPJ, based on all available information. 40 C.F.R. § 125.3(c)(2). "All available information" certainly includes the costs of implementing the proposed BAT at each similar facility. In short, it is not enough that the source "is a profitable company and should be able to afford to install [technology] if it is determined to be part of the BAT." NPDES Draft Permit, Attach. E, at 29. EPA cannot rely solely on the fact that a facility or the public can "afford" a treatment technology as a basis for determining whether it is cost-effective.[73]

Once EPA determines the BAT for a category of sources or on a case-by-case basis pursuant to its BPJ, EPA takes the technology standards established under the factors described above and applies that BAT to create actual effluent discharge limitations under § 304 of the CWA. It is through the creation of these effluent limitations that EPA imposes technology based treatment requirements into permits. *See* 40 C.F.R. § 125.3(c).[74]

As noted above, because EPA has established NELGs for Steam Electric Power generating sources, it was not authorized to determine BAT on a case-by-case basis, using its BPJ. EPA expects to complete a revision to these NELGs by late 2013. EPA wrongly decided that, until those revisions are finalized, it was authorized to use its BPJ to create case-by-case effluent limits. To "guide" this case-by-case BAT determination, EPA issued a memorandum

[73] If this were the case, EPA would be able to forego rigorous analyses of what technology is necessary for a particular site, and just rely on whether the owner of that facility is a Fortune 100, 500, or 1000 company ostensibly with deep pockets. *See Seabrook,* 1 E.A.D. at 332.

[74] EPA does not require the permittee to use this exact technology, and instead the permittee may use whatever technology it desires as long as the technology can achieve the effluent limits. *See, e.g., Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 561 (D.C. Cir. 2002). However, application of EPA's chosen technology is generally the only way to achieve the effluent limitations.

which "suggests" a BPJ analysis that is more akin to a requirement. Letter from Jim Hanlon, Director, Office of Wastewater Management, to Water Division Directors Regions 1-10 (June 7, 2010) (hereafter referred to as the Hanlon Memorandum). Due to its coercive nature, this, in and of itself, is an unlawful exercise of EPA's authority to set case-by-case limits primarily because it removes discretion from the case-specific analysis and directs writers as to what constitutes BAT for FGD wastestreams. Additionally, the Hanlon Memorandum contains a flawed interpretation of the CWA – namely the extra-statutory directive by EPA that all NPDES permits are required to include technology based limits for FGD wastestreams until EPA promulgates national BAT effluent limitations, and EPA's determination of BAT for these wastestreams.[75] EPA's case-by-case BAT determination for the FGD wastestream is based on its reliance on the flawed interpretation of the CWA in the Hanlon Memorandum.

Despite the fact that revised effluent guidelines are expected approximately one year from the date EPA will likely issue the NPDES permit for Merrimack Station, EPA nonetheless determined that it was necessary to ignore the existing NELGs and establish case-by-case BAT using its BPJ to set effluent guidelines. This was improper and contrary to the CWA. Finally, considering reliability issues associated with the national power grid, as well as other policy concerns, EPA's decision to use its BPJ to attempt to set macro-level energy and environmental policy at the micro level is unsupported.

Even assuming EPA was proper in establishing case-by-case technology based limits, EPA's BAT analysis and proposed effluent guidelines are unreasonable and without justification. Biological treatment is not BAT. Neither is a vapor compression or "zero-liquid discharge" system. Rather, a proper BAT analysis would conclude that the physical/chemical treatment

[75] As discussed in Section IV.C.5., if EPA intended to coerce the regional offices into compliance with this "guidance," it should have engaged in notice and comment rulemaking pursuant to APA § 553. Because it did not, the guidance is unlawful and must be set aside.

system already operating at Merrimack Station is BAT. Thus, EPA has erred in its analysis and conclusions. PSNH has demonstrated that the scrubber effluent resulting from the enhanced physical/chemical system, as analyzed and supported by NHDES, meets BAT standards.

1. EPA's determination that a biological treatment process is BAT is arbitrary, capricious, and without rational basis.

EPA's determination that biological treatment combined with physical/chemical treatment is BAT for Merrimack Station is unsupported, unreasonable, and therefore arbitrary and capricious. EPA unlawfully relied on the flawed interpretation of the CWA in the Hanlon memorandum and established effluent limits on a case-by-case, BPJ based determination that biological treatment was BAT. However, biological treatment is not an "available," proven or effective technology and therefore it should not have been considered as a technology option for Merrimack Station. A proper analysis of the BAT factors makes clear that biological treatment is not BAT for Merrimack Station. Moreover, the effluent limitations that EPA established based on the use of biological treatment are neither technologically nor economically achievable at Merrimack Station. These limits must be revised prior to issuance of a final permit.

a. <u>EPA's basis for its BAT determination is flawed and unlawful</u>

EPA's BAT determination is improperly based on the 2010 Hanlon memorandum, in which EPA predetermines the conclusion of any "case-by-case" analysis. Congress equipped EPA with a process for setting effluent guidelines on a national scale – establishment of NELGs. Importantly, this process is subject to notice and comment. Here, EPA is unlawfully using a guidance document to establish a rule that otherwise would be subject to notice and comment. The Hanlon memorandum in effect requires EPA regional offices and state permit writers to use BPJ to set effluent limits, and, states that biological treatment in addition to physical/treatment represents BAT for FGD wastestreams instead of physical/chemical treatment alone. EPA has unlawfully removed the individual nature of case-by-case determinations.[76]

An agency may only promulgate legally binding substantive rules – *i.e.*, those "agency pronouncements that have the force and effect of law" – through notice and comment rulemaking prescribed in 5 U.S.C. § 553; *see also National Mining Ass'n v. Jackson*, No. 10-1220, 2011 WL 4600718 at *6 (D.D.C. Oct. 6, 2011). This is especially true in the context of the CWA: "[a]d hoc national policy determinations developed through internal agency memoranda standing alone without promulgating regulations or guidelines through public notice and/or an opportunity for a public hearing, are not proper procedures for EPA to enforce the FWPCA." *Ford Motor Co. v. EPA*, 567 F.2d 661, 671–72 (6th Cir. 1977) (citing *Assoc. Indus. of Ala. V. Train*, 9 ERC 1561, 1568–69 (N.D. Ala. Dec. 6, 1976)).

Because the Hanlon memorandum has a legally binding effect, it must be subject to notice and comment. In *American Mining Congress v. Mine Safety & Health Administration*, 995 F.2d 1106 (D.C. Cir. 1993), the D.C. Circuit set forth the following four factors to help determine whether a rule has a legally binding effect, and thus whether a rule must undergo notice and comment rulemaking:

> Accordingly, insofar as our cases can be reconciled at all, we think it almost exclusively on the basis of whether the purported interpretative rule has "legal effect," which in turn is best ascertained by asking (1) whether in the absence of the rule there would not be an adequate legislative basis for enforcement action or other agency action to confer benefits or ensure the performance of duties, (2) whether the agency has published the rule in the Code of Federal Regulations, (3) whether the agency has explicitly invoked its general legislative authority, (4) whether the rule effectively amends a prior legislative rule. If the answer to any of

[76] Indeed, EPA is required to set national guidelines, and Courts have recognized that individual determinations may not take the place of national effluent limitations. *See, e.g., E.I. Du Pont de Nemours*, 430 U.S. at 131–133.

> these questions is affirmative, we have a legislative, not an interpretative rule.

Id. at 1112. The D.C. District Court's most recent case on this issue indicates that courts are open to finding that an extra-statutory effort by EPA to set binding norms through guidance documents is simply impermissible and contradicts the requirements of the APA. *See National Mining Ass'n v. Jackson*, 2011 WL 4600718 (D.D.C. Oct. 6, 2011).

The transmittal letter accompanying the Hanlon memorandum makes clear EPA's intent with respect to the binding nature of the guidance:

> You [the permit writer] should work with authorized state programs to encourage them to utilize this guidance in their permit decision making process. In cases where State permitting authorities do not consider the attached guidance in developing permit conditions, you should consider using objection authorities in cases where permits do not address appropriate technology-based or water quality-based limits to address FGD . . . discharges.

Hanlon Memorandum, at 2. This clearly sets binding policy on EPA regional offices, the kind of binding policy that courts have previously struck down for failing to comply with notice and comment rulemaking. EPA's failure to subject this guidance document to the strictures of notice and comment rulemaking exceeded its authority under the APA and the CWA, and the contents of the guidance document are therefore void and may not be properly relied upon by EPA or any permit writer.

b. <u>Biological Treatment is Not an Available, Proven or Effective Technology and It Cannot be Considered BAT for Merrimack Station</u>

Biological treatment[77] is not an "available" technology; therefore, it should not have been considered by EPA in the first place. Although EPA has discretion when reviewing the

[77] Biological treatment of wastewater refers to various technologies that use microorganisms to target the removal of specific pollutants, including suspended growth activated sludge, sequential batch reactor activated sludge, and the use of specialized microbes in a fixed film or a suspended growth system. The draft permit indicates

technologies that it may consider when determining the BAT for a point source, once it chooses the available technologies, it must be prepared to justify its conclusions. *See e.g., Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 562 (D.C. Cir. 2002).

There is not sufficient data to support a conclusion that biological treatment is an available or effective technology in the steam electric power generating industry, or, more specifically, at Merrimack Station. This technology is new and has not been fully vetted, its effectiveness is unclear and contradictory, and evidence of its success is speculative at best, especially given the fact that each biological treatment system must be able to adapt to the conditions in its own plant in order to successfully remove any constituents. Changes in fuel type, FGD operations, temperatures, plant size, boiler type, testing capabilities, and other variables may all impact the operation of biological treatment. Because these variables vary greatly from plant to plant, this treatment option is anything but widely applicable.

Only a handful[78] of plants in the country—Duke Energy and Progress Energy plants—use biological treatment to treat FGD wastewater. However, the biological treatment processes at these plants have only been installed for a few years, meaning that a sufficient length of time has not yet passed to fully understand the successes and limitations associated with this technology.

EPA essentially required the addition of biological treatment at Merrimack Station based solely on the performance of two facilities in North Carolina: Duke's Allen and Belews Creek Stations. However, these plants vary greatly from Merrimack Station, in that they are

that EPA intends the addition of the biological treatment at Merrimack Station to reduce the selenium remaining in the FGD wastestream after the physical/chemical treatment.

[78] Biological treatment is currently operational at Roxborough Station (Progress Energy), Mayo Station (Progress Energy), Allen Station (Duke Energy), Belews Creek Station (Duke Energy), and Flint Station (Duke Energy-West Virginia).

discharging into waters identified as having higher concentrations of selenium than the Merrimack River. Additionally, the two Duke Energy plants have an FGD purge stream on the order of 400 to 600 gallons/minute, while Merrimack Station's FGD purge stream is 50 gallons/minute. Importantly, Merrimack Station's physical/chemical treatment facility has minimal capacity to process additional effluent from the bioreactors. Other obvious differences that EPA must consider are changes to the purge stream based upon coal types, boiler design and operation, scrubber operation, footprint of the plant, the sensitivity of the microorganisms (bugs) as they adapt to varying conditions and climate. Biological systems must also be periodically backwashed to remove the buildup of pollutants and EPA has not indicated how this wastestream is to be managed at Merrimack Station. Moreover, because of the limited time and scope of the implementation of this treatment system, other unknown operational issues associated with biological treatment render the success and effectiveness of this technology to treat FGD wastewater unknown at this time. Biological treatment therefore cannot be BAT for Merrimack Station.[79]

Perhaps most significant is the fact that biological treatment systems have not been in operation for a sufficient length of time to demonstrate whether this technology (combined with physical/chemical treatment) represents BAT for FGD wastewater discharge. Specifically, without a sufficient length of time to evaluate the system's success, it is difficult to know

[79] Other limitations of this treatment system include: "(1) [p]otential need for pretreatment to remove suspended solids; (2) [b]ackwash water required to periodically slough off excess microbial growth, prevent short-circuiting of flow, and for de-gassing; (3) [l]arge footprint required given the low hydraulic loading rate (*e.g.*, 2.4 gpm/ft^2 or 81-162 Lpm/m^2) requirements and high minimum hydraulic residence requirements (46 hours); (4) [p]resence of an excessive amount of nitrates will require proportional amount of carbon or energy source. This excess carbon source will also generate some additional biomass; (5) [e]xternal carbon source is required if soluble influent organic content or COD is insufficient; (6) [w]asted biomass residuals contain elemental selenium that may be hazardous depending upon the TCLP results; (7) [m]edia replacement may be required over the life of the system; (8) [b]iological residuals will need to be thickened and dewatered for landfill disposal."). *See* Final Report: Review of Available Technologies for Removal of Selenium in Water (June 2010) at VIII, 4-65–66) ("AR #132) (1-8 numbers added).

whether this technology can be sustained over the long-term, given "unknowns" associated with, among other concerns, (1) the suitability of the construction materials used in these systems over time; and (2) the nature and extent of maintenance and/or component replacement required during routine operation and during outages.

Additionally, there are significant limitations on the treatment parameters of the biological process. Some plants that have installed this system are now turning to other treatment technologies that accomplish better removal rates for a wider range of metals and pollutants. This too indicates that biological treatment has either not been in place long enough to determine whether it is effective at treating FGD wastewater, or that this treatment process is not the best option for this wastestream. In fact, two of the plants that opted to implement biological treatment are reverting back to other treatment options because of the narrow focus of the treatment ability of this system. Specifically, there is evidence that Roxborough Station and Mayo Station, both Progress Energy plants, are replacing their biological treatment systems[80] with alternative treatment technologies due to the need for additional dissolved solids removal.

Another issue with biological treatment is the saturation of the biological filter and the need to backflush the system's microbes. Activated carbon layers in various reactors are used where biological mass is grown. There are typically two stages of biological carbon filters which do require backwash on a periodic basis. The frequency with which this backwash process must occur is based on operational needs and the quantity and volume of backwash that Merrimack Station will be able to manage. However, EPA did not discuss the need for a backwash process in Merrimack Station's Draft NPDES permit. Presumably, then, the main component of the biological treatment process—the biological filter—might need to be constantly monitored to

[80] Both of these plants use the ABMet biological metals removal system created by GE. This is the same technology that EPA referenced in the Merrimack Station draft NPDES permit.

ensure that it does not become saturated. This will require operational changes and resource allocation.

Because of the uncertainties regarding the effectiveness of the biological filter without frequent maintenance, biological treatment process for selenium removal is not a proven technology. Choosing biological treatment at Merrimack Station is especially problematic given the fact that PSNH would be tied to these limits due to the anti-backsliding requirement of the CWA. If the forthcoming NELGs select a technology other than biological treatment, PSNH would have no way to amend the limits tied to the biological treatment system, requiring PSNH's customers to fund an unnecessary and ineffective technology.

Other issues with biological treatment that make it inappropriate for the industry as a whole include the sensitivity of the bugs in the biological reactors, and the inability of the bugs to adapt and acclimate to varying conditions. Further, see the discussion below regarding the many flaws of EPA's draft permit limits based on the effectiveness of biological treatment.

c. An Analysis of the BAT Factors Indicates that Biological Treatment is Not BAT for Merrimack Station

Not only is biological treatment not an "available" technology for purposes of determining BAT, an analysis of the factors to be considered in a BAT analysis make clear that biological treatment is not BAT for Merrimack Station. Specifically, consideration of 1) the cost of achieving reductions through the installation of a biological treatment system, 2) the engineering processes required for such installation, 3) operational restraints at Merrimack Station, and 4) the appropriateness of this technology for this point source category all weigh against selection of this technology.

i. The costs of biological treatment given the effectiveness of this control technology make clear that it is not BAT

The cost of installing and maintaining a biological treatment system over the long-term is cost-prohibitive and not economically achievable. All technology based limits set by EPA under the CWA must be economically achievable. Specifically, EPA must consider costs of the technology in setting technology based limits. *See* CWA § 304(b)(2)(B). Those costs must be reasonable.

PSNH projects that the addition of a biological system will cost approximately $23 million, not the $4.95 million estimated by EPA. EPA cost estimates for a biological system are grossly understated. Specifically, EPA Region 1 based its cost estimates on a 50 gallons/minute flow; however, because discharges could be as high as 70 gallons/minute, Merrimack Station's biological treatment must be designed to treat the higher level. As such, EPA's cost estimates are necessarily low.

In fact, because the microorganisms (bugs) in the biological treatment process have a mortality risk below 40ºF, coupled with New Hampshire's cold climate,[81] such a system needed for PSNH would require the construction of an approximate 4,900 square feet building to enclose the equipment needed. This equipment includes: tanks, pumps, piping, HVAC, electrical and control system, foundations, sumps, curbs, trenching for exterior interconnection piping for numerous systems, an electrical power supply line, etc. Costs also vastly underestimated include engineering for design, construction management, training, PSNH labor, overhead costs, and AFUDC, among others. Additionally O&M costs related from such an installation would range from $500,000 to $600,000 annually (not the $297,000 estimated by EPA). EPA is required to

[81] If the wastewater is continuously flowing through the biological treatment system, climate is less of a concern. However, potential upsets in flow are possible, such as when the units are not dispatched by ISO-NE, or there are equipment availability issues, or during outages of the scrubber.

consider cost, and to come to a reasonable conclusion with respect to proper BAT for a point source. Yet, EPA failed to consider the site-specific conditions at Merrimack Station.

EPA's stated purpose for requiring the biological treatment process is to remove additional selenium remaining in the FGD wastewater after it has already been treated by the physical/chemical system and the polishing step. During initial operation of the Merrimack Station Scrubber WWTS, PSNH detected discharge selenium concentrations on the order of 0.10 mg/l. Even more recent performance testing has seen the average concentration drop to 0.065 mg/l (or 65 µg/l). Based on Duke Energy's biological treatment, EPA has proposed permit limits of 10 and 19 µg/l, average and maximum.

EPA's consideration of costs associated with installation of biological treatment was incomplete and inaccurate. EPA does not appear to have taken into account the costs associated with the periodic backwashing of the biological treatment system, costs associated with the handling and disposal of the treated waste once it has been processed by the biological treatment system, and the necessity to enclose the entire biological treatment facility in a building with HVAC. Many of these issues are discussed in Section IV.C.1.c.ii. below, which evaluates the limitations of the engineering processes associated with biological treatment.

EPA stated, when explaining why the biological treatment (coupled with a physical/chemical system) was not cost prohibitive, that it was more cost-effective than physical/chemical treatment alone. In fact, EPA's entire cost analysis for biological treatment was contained in a table in a memorandum sent from Ron Jordan to Sharon DeMeo on September 13, 2011. Memorandum from Ronald Jordan to Sharon DeMeo (Sept. 13, 2011) ("AR #118"). In this email, Mr. Jordan presented "estimated costs and pollutant removals for three technology options for treatment of FGD wastewater." *Id*. EPA made little attempt to justify these costs other than to mention that the total amount of the FGD system was $430 million and that PSNH is a profitable company and "should be able to afford" the added EPA Determination at Attach. E, p. 29. Further, EPA mentions the costs of biological systems at other sites but fails to discuss any site-specific conditions that could impact those costs. EPA's ultimate conclusions regarding costs and pollutant removal reductions are:

Technology Option	Capital Cost (2010 $)	Annual O&M Cost (2010 $)	Annualized Cost (2010 $)	Pollutant Reductions (lbs/yr)
Chemical Precipitation	$4,869,000	$430,000	$889,000	16,900
Chem Precip + Biological	$9,823,000	$727,000	$1,654,000	639,000
Chem Precip/Softening + Evaporation	$27,949,000	$1,524,000	$4,162,000	830,000

AR #118.

EPA primarily relied on data it collected from the industry and vendors. Email from Ronald Jordan to Sharon DeMeo regarding Estimated costs & pollution reductions for treatment options at Merrimack Station, September 13, 2011. However, as described below, EPA has not included any of that data in the administrative record or released it pursuant to a Freedom of Information Act ("FOIA") request. After many requests from PSNH, EPA has failed to provide sufficient information to understand how EPA developed the number of pounds of pollutants removed by both the physical/chemical and biological treatment systems.[82]

UWAG attempted to recreate EPA's calculations of pounds removed and the costs of removing them, and found that it was impossible. *See* UWAG Comments on Proposed NPDES Permit for the Merrimack Station, (Feb. 28, 2012) at 45 ("UWAG Comments"). UWAG found that EPA's estimate of 16,900 lb/yr of pollutant removal by the physical/chemical treatment

[82] In a "Memorandum on Transparency and Open Government," issued January 22, 2009, the President required federal agencies to be transparent in all of its actions. Likewise, the Director of OMB, in a December 9, 2009 memorandum, directed federal agencies to implement the principles of transparency set forth in the President's memorandum. http://www.gpoaccess.gov/presdocs/2009/DCPD200900010.pdf Yet, EPA has refused to release the information that would allow the public the opportunity to see how it calculated the removal rates which were used as the basis for Merrimack Station's draft permit. Clearly, if the information exists, EPA's action violates the FOIA, the guarantees of the U.S. Constitution, and the Administrative Procedure Act. If the information does not exist, EPA acted arbitrarily in setting the Merrimack Station permit limits.

system is low and incorrect. UWAG estimated pollutant removals using EPA's data from Duke Energy's Allen and Belews Creek facilities, which have physical/chemical treatment systems similar to Merrimack Station, and using the average flow rate for Merrimack Station, but assuming continuous flow to be conservative. UWAG found that EPA's estimate for physical/chemical treatment is "grossly underestimated." *Id.* at 48. Apparently, EPA made this error by assuming Merrimack Station has a settling pond prior to its physical/chemical treatment system. It does not.

In addition, UWAG found that adding biological treatment at Merrimack Station will not remove 623,000 extra pounds per year of pollutants as claimed by EPA. Rather, it calculates that only 2,980 pounds per year will be removed based on data from the Belews Creek plant and 2,060 pounds per year based on data from the Allen plant. *Id.* at 48. Importantly, both plants have biological treatment following physical/chemical treatment. EPA erroneously predicts that a biological system at Merrimack Station would remove 209 times as much pollutant as the Belews Creek data indicates. *Id.* It will not.

EPA's cost-per-pound estimate for pollutants removed from biological treatment at Merrimack Station is only **$1.23 per pound**. Based on UWAG's estimated removal rates and EPRI's annualized costs, the cost-per-pound removed is actually **$503 per pound** based on data from Belews Creek and **$728 per pound** based on data from the Allen plant. *Id.* at 49-50. Because PSNH's data shows that its physical/chemical treatment system will remove all but 176 pounds of pollutant per year, the incremental cost-per-pound removed, if Merrimack Station were required to install biological treatment to meet the draft permit limits, would be **$8,523 per pound.** EPA has never required such arbitrary limits in an NPDES permit.

ii. The engineering processes associated with biological treatment make clear that it is not BAT

(a) Footprint concerns at Merrimack Station

Another issue with biological treatment at Merrimack Station relates to the engineering processes associated with applying this control technique. First, it is unclear whether Merrimack Station has the necessary space to physically install this treatment system and building. EPA failed to consider whether this treatment system was even feasible at the plant prior to its unreasonable and unsupported selection of biological treatment as BAT for Merrimack Station. EPA failed to review the site-specific conditions, or associated costs, of Merrimack Station which is very constrained and congested for siting the necessary infrastructure. This also translates into added costs to remove existing facilities to make room for such a building and to interconnect it to the station's physical/chemical wastewater treatment system.

There are significant space limitations to installing the necessary equipment and tanks at Merrimack Station. In addition to the four reactor vessels needed to conduct the actual biological treatment process, an additional two tanks for backwash and two tanks for wastewater would also be necessary. This creates a significant footprint concern for Merrimack Station, and also implicates significant cost concerns, as well. Consideration of all relevant factors related to this BAT factor would weigh against selection of biological treatment as BAT. EPA's selection is unreasonable, unsupported and should be rejected.

(b) Operational issues with the biological backwash for the treatment process

Consideration of the operational processes, maintenance activities, and engineering processes associated with a biological treatment should have included an analysis of the impacts of the high frequency, almost continuous, backwash of the bioreactor, which is necessary to remove biomass/waste. The impacts associated with the backwash render this technology even more cost-prohibitive and ineffective. EPA was under a duty to consider this and similar operational issues and, had it done so, it would have had even further reason to conclude that biological treatment is not BAT for Merrimack Station. EPA's failure to consider this aspect of biological treatment was unreasonable.

(c) Merrimack Station's physical/chemical system will be negatively impacted by the biological backwash

As explained above, Merrimack Station must manage the backwash wastestream once it has passed through biological treatment. The only feasible option for Merrimack Station, given operational and site constraints, is to recirculate the treated waste back through the physical/chemical system. This must be done at slow feed rates in order to prevent overloading the system so that it is able to capture the trace amounts of selenium.[83] However, Merrimack Station's physical/chemical system does not currently have added margin to accept this new flow through its normal operations, and it would be very difficult for the system to also be charged with treating the sludge from the biological treatment process. Therefore, adding the waste back from a biological system would bring the guaranteed removal rate of the physical/chemical system into question.

Merrimack Station's physical/chemical system is carefully designed and operated to provide the maximum reduction level of all constituents of concern. Unlike some FGD wastewater treatment systems, Merrimack Station's system is finely tuned to accept a high ORP which, for example, affects mercury speciation and capture. It is critical to the operation of the physical/chemical system to maintain the correct ORP level, which at Merrimack Station is

[83] The physical/chemical system is designed to be and operates at a flow rate of 50 gpm. The biological system would result in approximately 10 percent increase in the flow rate and would have significant adverse impacts on the effectiveness of the system.

elevated.[84] A biological reactor necessarily changes the anaerobic levels which, in turn, lower the ORP significantly. If this stream containing lower ORP is then reintroduced to the physical/chemical system, it could also significantly impact the effectiveness of the system. In fact, the addition of lower ORP is not consistent with the original design guidelines and could likely jeopardize the guarantees of the physical/chemical system itself. Moreover, the high ORP will significantly reduce the effectiveness of EPA's proposed biological reactor.[85] In applying its BPJ to the Merrimack Station, EPA failed to consider or even mention such important facts.

The recirculated effluent from the biological system would necessarily contain biological solids and waste. Merrimack Station's physical/chemical system is not designed to process biological waste or the expected volume of that waste. If Merrimack Station were required to recirculate the treated waste back through the physical/chemical system, the effluent would exceed the design solids loading. EPA failed to consider this and, as a result, biological reactors cannot be considered BAT at Merrimack Station for treating FGD wastewater.

Because Merrimack Station cannot dispose of the backwash via ponds, and because a recirculation methodology is not feasible, as discussed above, Merrimack Station would be forced to seek out other disposal options. EPA did not consider the cost of waste disposal into its cost-estimate analysis associated with biological treatment. More importantly, this suggests that though disposal of the waste may not be problematic at other stations, it would be very

[84] In addition to failing to consider the impact of different ORP levels, EPA failed to consider the normal variability of mercury concentrations. For example, in systems like the one installed at Merrimack Station (high ORP), dissolved mercury is also higher. As the ORP fluctuates due to changes in operation, types of coal, and other varying conditions, the level of treatment of the system likewise fluctuates. This is a science and is expected. However, EPA ignored this science and wrongfully excluded data from Duke Energy in the Jordan Guidance as "upsets" even though the data simply indicated these normal fluctuations. Duke Power concurs: "In deriving Merrimack limits from Allen and Belews Creek data, EPA excluded some data that reflected normal operation and yet used some other data that were flawed." *See* Comments of Duke, February 2012 at 3 ("Duke Comments").

[85] Biological treatment requires a healthy population of microbes to be effective. High ORP kills microbes and, thus, will significantly decrease the effectiveness of biological treatment, demanded by EPA.

problematic at Merrimack Station, and thus represents a significant limitation on the success and operational feasibility of a biological reactor. EPA should have considered these operational limits when determining BAT for Merrimack Station.

iii. EPA Failed to Consider the Operational Constraints Created by Merrimack Station's Scrubber in Determining the Biological System was BAT

The effluent coming out of the FGD scrubber at Merrimack Station is different from the effluent associated with most scrubber systems. Specifically, Merrimack Station's nitrate levels are elevated. Additionally, Merrimack Station's ammonia levels are surprisingly low—typically measuring less than 1 mg/l. Data indicates that these levels are atypical. Based on this information, the system must be converting ammonia into nitrates, which is similar to what happens in a biological treatment system.

This is problematic because power plants do not operate in a steady state condition and have many changing factors that must be taken into account during operation. For example, nitrate concentrations that are elevated to the level that Merrimack Station experiences cannot be effectively treated by the biosystem. *See* Placer Data Library, Detection Limits and Reporting Limits, http://www.placerdata.com/library/reportinglimits.php. (last visited April 28, 2011) (AR #17). Moreover, if the bugs in the biological treatment system become acclimated to living among elevated nitrate levels (around 60 to 100 mg/l or higher), they could very well be more sensitive to upsets in conditions. This is a real possibility if the high nitrate levels are not consistently maintained – a likely outcome given the fact that the Merrimack Scrubber is associated with two different sized units each burning different and variable coal blends, which can each change output levels frequently during the week, causing numerous transient conditions and resultant chemistry and process changes. Importantly, higher nitrates also requires more backwashing, adding to the overload of the physical/chemical system.

Therefore, the effluent from the FGD WWTS is *unique* to Merrimack Station. EPA's chemists and scientists should have considered this unique aspect of Merrimack Station's discharge when evaluating the operational constraints associated with installation of a biological treatment system.[86] Such a consideration would have weighed significantly against EPA selecting biological as BAT. Putting aside the fact that EPA improperly based its proposed limits for the FGD wastewater stream on a BPJ based, case-by-case BAT determination, EPA's conclusion that a biological treatment process is BAT is based on flawed data and is therefore unreasonable. Contrary to EPA's determination, BAT for the FGD wastestream is the physical/chemical treatment process already in place at Merrimack Station. The use of biological treatment is not supported by a proper consideration of the BAT factors; therefore, EPA's BAT determination was unreasonable, arbitrary and capricious. EPA did not (and cannot) support the data it used to calculate the effluent limits, and it cannot demonstrate that the effluent limits it established are technologically and economically achievable.

2. The physical/chemical treatment process is BAT for Merrimack Station.

EPA's rejection of Merrimack Station's determination that a physical/chemical system is BAT for the FGD WWTS is without support and represents a complete reversal of EPA's prior involvement with PSNH on the development of the physical/chemical system. Merrimack

[86] Further, EPA failed to consider analytical limitations associated with biological treatment and the related effluent limits associated with this treatment system. Specifically, Duke Energy has its own private laboratories which can achieve "extraordinarily low" method detection limits. Duke Comments at 12. This allows Duke to dedicate important, individualized attention to their specific wastestreams, and it also allows them to learn how to fully examine characteristics of the wastestream on an ongoing basis. Through this individualized and expert attention, Duke has learned that effluents behave differently and must be accounted for. Further, Duke is capable of running better dilution factors and other analytical processes with state-of-the-art equipment. This is a luxury that most utilities do not enjoy, including PSNH. Instead, PSNH, like most utilities, must rely on outside analytical laboratories to conduct this highly sensitive testing and PSNH therefore cannot easily study on a timely basis and learn from the characteristics in the effluent and how compounds in the wastestream may interfere with or impact results. Commercial laboratories employed by PSNH may be unable to achieve low dilution factors to actually measure down to the limits proposed in Merrimack Station's draft permit. The limitations to real-time laboratory access make this treatment process (and the accompanying effluent limits) technologically unachievable.

Station worked with NHDES well over a year to determine that a physical/chemical system was the best treatment option for Merrimack Station because this technology satisfied any and all water quality standards that DES developed *specifically for Merrimack Station*, and which also passed muster under NHDES's antidegradation review.

PSNH chose the physical/chemical system at Merrimack Station because it ensured that PSNH could meet water quality standards. EPA was aware of the efforts between NHDES and PSNH to set water quality limits at outfall 003A, and it never once suggested that the physical/chemical system and polishing step, or the water quality limits established by NHDES would be insufficient to meet EPA's technology standards. Though it had an opportunity to introduce these possibilities as likely regulatory requirements, EPA chose to "spring" technology based limits on PSNH that are much more stringent. The limits were based on a short-term use of this technology and at sites where the application does not align with specific circumstances at Merrimack Station.

As early as 2006, EPA knew of PSNH's need to install and operate an FGD treatment system as quickly as possible in order to comply with state law. EPA knew that PSNH had to treat and dispose of the FGD wastewater discharge.[87] For the reasons discussed more fully below, PSNH determined that the physical/chemical treatment system would satisfy the relevant requirements.

[87] Nevertheless, EPA refused to authorize or facilitate a solution for the discharge until it issued Merrimack Station's NPDES permit which, at that point, had been held hostage in the administrative permitting process for over 13 years. Because EPA refused to facilitate the process of bringing the scrubber system online, PSNH was forced to develop an alternative method for Merrimack Station to treat and dispose of the FGD discharge beyond the physical/chemical treatment system that was already nearing the end of construction. PSNH eventually chose the secondary FGD wastewater treatment system that is under construction at Merrimack Station today as its alternative option. However, Merrimack Station continues to desire to use the physical/chemical treatment process and discharge. Email from John King, EPA Region 1, to David Webster, EPA Region 1 (May 27, 2011) ("AR # 300").

In fact, in an email from April 2009, an EPA representative relayed to NHDES the following:

> Allan Palmer, PSNH Senior Engineer, also ask[sic] whether the thrust of the meeting will be discussing limits, treatment, or both. I request your input on the agenda of the meeting. My thoughts are that *as representatives of the regulatory agencies our emphasis is deriving effluent limits that are protective of the water quality standards of New Hampshire. I recommend the meeting, therefore, concentrate on the parameters contained in the scrubbers effluent and <u>what effluent limits PSNH can expect</u>.*

Email from John King, EPA Permit Writer, to Stergios Spanos, NHDES, April 8, 2009, 8:22 a.m. ("AR #437) (emphasis added).[88]

In other words, EPA's Region 1 representative John King indicated that he understood the purpose of the meeting to be to set effluent limits *that PSNH could expect.* PSNH reasonably understood this to include *all* effluent limits – both water quality and technology based. In light of this history with EPA and PSNH's own analysis, PSNH's determination to install a physical/chemical system was proper and is legally and factually supported. EPA's determination otherwise is arbitrary and capricious.

As a result of this meeting and others, NHDES and PSNH performed a water quality analysis to determine if water quality based limits were necessary at Outfall 003A to regulate this new wastestream.[89] EPA's claim that PSNH began construction of the FGD WWTS without consulting EPA is disingenuous—EPA was involved in the process of determining initial permit limits. All parties who contributed to this analysis did so with the understanding that the FGD

[88] A few minutes later, a DES engineer responded to that same email stating that DES would start looking at antidegradation requirements and impairment status based on the content of the discharge.

[89] Ultimately, DES proposed 003A limits for flow, aluminum, copper and mercury and monitoring only for arsenic, selenium and chloride. There was only one limit proposed at 003C: a limit for mercury due to analytical detection limitations

WWTS discharge at outfall 003C would be regulated by these water quality based limits should they prove to be necessary.

Based on EPA's permitting practices for the industry, PSNH understood that the FGD purge stream was to be managed as a low volume waste. Indeed, this has been EPA's practice in recent Region 1 NPDES permits.[90] At no point did EPA suggest that it would consider additional and more stringent limits than those required to achieve DES's water quality standards.

Both the physical/chemical and polishing systems installed by PSNH at Merrimack Station use unit processes that are standard in the water and wastewater treatment industry with a long history of successful operation. Operation and maintenance of these systems is accomplished by trained, experienced individuals. The process is suited for the reduction of suspended solids and dissolved solids, including metals, which are usually present in FGD wastewater. EPA itself has recognized the efficiency and success of this technology. 2009 Detailed Study Report, at 4–50 (noting that the "data show that chemical precipitation is an effective means for removing many metals from the FGD wastewater").

Additionally, the cost of the physical/chemical treatment system is reasonable. The capital costs for the physical/chemical system range from $19 to $21 million dollars. Operation and maintenance ("O&M") costs for the system are expected to be around $1.1 million. However, as discussed in Part IV.C.1.c.i above, EPA's calculations as to the costs and effectiveness of both the physical/chemical system and the addition of a biological system are

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[90] *See* NPDES Permit for Brayton Point. ("The facility will be installing selective catalytic reduction (SCR) systems on Units 1 and 3, and a . . . [FGD] system on unit 3. As a result of these technologies, the facility will generate new waste streams which will go to the wastewater treatment system, and ultimately discharge though 004. *These waste streams are considered low volume waste streams.*") (emphasis added).

completely unsupported, whereas the numbers presented by PSNH are the product of actual experience, engineering expertise, and site-specific knowledge.

Based on the BAT factors, the physical/chemical system is the appropriate technology for Merrimack Station. Most importantly, the physical/chemical system is an available, proven, effective, and operationally efficient technology. This treatment system is used by numerous power plants around the country, and has been relied upon by those using FGD systems for many years to treat FGD wastewater. PSNH reasonably concluded, given the water quality standards created by NHDES that the physical/chemical system would unquestionably meet any and all effluent limits that EPA eventually required in the permit.

3. The vapor compression or "zero liquid discharge" process is not BAT for Merrimack Station.

In addition to improperly determining that biological treatment is BAT, EPA was wrong to have not dismissed zero liquid discharge ("ZLD") as potentially part of the BAT for Merrimack Station. EPA stated that it "could potentially find [ZLD] to be part of the BAT for Merrimack Station for the Final NPDES permit." EPA Draft Permit at Attach E., p. 20–22. EPA seems unwilling to reject ZLD as BAT because EPA's own analysis indicates that there are a number of primary concerns with this technology associated with non-water quality environmental impacts and costs. However, a more thorough BAT analysis makes clear that a vapor compression process is not BAT, especially for Merrimack Station.

a. <u>PSNH Had No Choice but to Construct a Reduced Liquid System at Merrimack Station</u>

It is crucial to recognize that PSNH's decision to construct a reduced liquid secondary FGD wastewater treatment system ("SWWTS") at Merrimack Station was made because state law required PSNH to install a scrubber at the facility by a date certain, which necessarily meant that it needed some way to treat and dispose of the FGD wastestream. Because EPA refused to cooperate with NHDES and PSNH to facilitate construction and operation of the scrubber system, PSNH had to develop an alternative.[91] With its hands tied due to EPA inaction and with the scrubber construction and start-up schedule requiring treatment of scrubber wastewater in late 2011, PSNH realized that it had to find a solution which did not require EPA's approval. At that time, the only technology option to deal with the FGD wastewater from Merrimack Station, absent authority under an EPA-issued NPDES permit, was for PSNH to reduce or eliminate its FGD effluent volume significantly so that PSNH could then dispose of the effluent in a cost-effective manner. The need for a supplemental system to the physical/chemical treatment process was especially profound given the fact that PSNH's Energy Service customers would experience significant financial ramifications if the start-up of the scrubber was delayed and, most importantly, PSNH would be in violation of state law (RSA 125-O:11 *et seq.*) if it failed to timely bring the scrubber into service.[92] PSNH had no other choice but to install the SWWTS.

PSNH is currently transporting all of the treated FGD wastewater from Merrimack Station to area POTW facilities, where they discharge that effluent pursuant to properly issued NPDES permits. This added expense caused by EPA's refusal to cooperate with PSNH is increasing the costs to PSNH's Energy Service customers unnecessarily. EPA's action has produced an absurd result and is an example of bureaucracy at its worst.

b. <u>An analysis of the BAT Factors Makes Clear that ZLD is Not BAT for Merrimack Station</u>

A BAT analysis proves that ZLD is not BAT for Merrimack Station, and that the effluent limits that would be established pursuant to this system—zero—are technologically and

[91] By statute, the New Hampshire Legislature encouraged all regulatory agencies – federal, state, and local – to give due consideration to the general court's finding that installation and operation of scrubber technology at Merrimack Station is in the public interest. RSA 125-O:13,I. EPA completely disregarded this request by the State of New Hampshire.

[92] Apparently, potential delays in reducing air emissions were of little concern to EPA.

economically challenging over the long-term. PSNH will have the ability with the SWWTS to bring the liquid volume down to zero but will also be able to reduce the volume to various lower quantities that PSNH could dispose of economically. As such, ZLD is not "available" in the legal sense. Although there is one other known process installed for a FGD WWTS (Kansas City Power & Light's Iatan Station in Weston, Missouri) that is generally referred to as ZLD, it is not an equivalent system to the SWWTS that will be in operation at Merrimack Station and PSNH is not aware of any similar treatment operational in any other comparable facility in the United States. Merrimack Station's SWWTS operates on the tail end of the physical/chemical treatment process, and includes a brine concentrator and two crystallizers. The SWWTS system presents certain operational challenges for Merrimack Station's engineers because of its uniqueness and the unknowns associated with the equipment in the treatment process. Although the first stage of the process utilizing a brine concentrator is better understood and is effective in minimizing the WWTS discharge, the additional equipment ("the first effect" and "the second effect") provides PSNH with additional operational options but will need to be monitored carefully to determine impacts on other areas of the plant. Certainly the operational challenges increase as the various stages/equipment of the entire process beyond the brine concentrator are utilized, as do the costs potentially.

Although the Iatan Station has installed similar technology, there are numerous equipment and operational differences between these two plants (Iatan only has a brine concentrator but no crystallizers) that suggest that the ZLD process as installed at Iatan is not BAT, as legally defined, for Merrimack Station. The Iatan Station has a 140 acre landfill on site and is authorized to dispose of 2,000 tons of fly ash and gypsum per day. Therefore, Iatan is able to dispose of large quantities of the brine concentrate/fly ash solid waste mixture generated by the FGD wastewater thermal dewatering system. Merrimack Station does not have on-site landfill capability to dispose of the ash based solid wastes generated by the SWWTS process. This means that PSNH, if it had in place a system like Iatan, would have to continuously fill trucks with the reduced liquid and dewatered solid material by-product and transport it for disposal. This implicates several BAT factors, including the cost of achieving the reduction and the engineering aspects of the application of this control technique.

Finally, Iatan uses Powder River Basin coal, not Eastern Bituminous coal as its primary fuel source. This is significant, because Powder River Basin coal produces much more fly ash than Eastern Bituminous coal or similar coals. Because Iatan is the only facility employing this technology, the fact that a different fuel source is used makes it exceedingly difficult for EPA to use information from Iatan to assess the operational and maintenance differences of employing a similar system at Merrimack Station. Therefore it is wrong for EPA to assume that the system would represent BAT because the differences in coal source alone implicate significant issues with operation of the system. There is not sufficient evidence that this technology can effectively be transferred from site to site.

These differences demonstrate that EPA does not have complete data to demonstrate that this technology is readily available (under the BAT factors) or that its associated effluent limits are technologically or economically reasonably achievable (as defined by the BAT factors) for Merrimack Station over the long term. Without sufficient data from at least a single plant or model plant, EPA has not and could not present evidence to justify a conclusion that a ZLD process is BAT.[93]

[93] Critical to this conclusion is the fact that no other plant in the country operates the SWWTS in the same manner as PSNH.

In addition to the fact that Merrimack Station's SWWTS as installed is not an "available technology" as defined by EPA in its BAT factors, there are several generic engineering challenges associated with the ZLD process that prohibit it from being identified as BAT by EPA for the industry or Merrimack Station.

c. <u>ZLD is not a transferable technology</u>

EPA has not demonstrated that ZLD is a transferable technology, and if a technology is to be relied upon as BAT based solely on its use in another industry, it must be transferable. A technology is transferable if it may be practicably applied to another industry, which requires the permit writer to demonstrate the following three factors: "(1) show that the transfer technology is available outside the industry; (2) determine that the technology is transferable to the industry; (3) make a reasonable prediction that the technology if used in the industry will be capable of removing the increment required by the effluent standards." *Tanner's Council of Am.*, 540 F.2d at 1192.

As PSNH explained in its Oct. 8, 2010 Response to EPA's Informal Information Request, numerous power plants use or have used vapor-compression evaporator systems to treat cooling tower blowdown. These evaporator systems consist of brine concentrators in combination with forced-circulations crystallizers. However, FGD wastewater chemistry and cooling tower blowdown chemistry are very different, and the power industry's operational and other experience with evaporator systems is not transferable to the use of these systems to treat FGD wastewater. Supporting this reality is PSNH's understanding that there are currently no power plants in the United States that are operating a vapor compression evaporator system (*i.e.*, a brine concentrator and crystallizer) to treat FGD wastewater.

As demonstrated above, EPA should have foreclosed the possibility that ZLD is BAT, as legally defined, for Merrimack Station. First, the fact that EPA has insufficient data is enough in and of itself to determine that ZLD is not BAT. Additionally, the consideration of costs and long-term operational factors make it clear that ZLD is not currently BAT. Any other conclusion by EPA would be unreasonable, arbitrary and capricious.

4. The effluent limitations established by EPA are not technologically achievable at Merrimack Station because EPA relied on faulty data to set the limits.

Notwithstanding EPA's errors regarding what constitutes the BAT for Merrimack Station, the effluent limits that EPA imposed at Outfall 003C (the FGD wastestream) are not technologically or economically achievable and are therefore unreasonable. PSNH's employees, consultants, and others have thoroughly reviewed EPA's evaluation and analysis—primarily the analysis in the "Determination of Effluent Limits for Flue Gas Desulfurization (FGD) Wastewater at PSNH Merrimack Station" from Ron Jordan to Susan DeMeo—to understand how EPA determined that biological treatment was BAT, and how EPA determined effluent limits for the constituents in the FGD wastestream. "EPA has the heaviest of obligations to explain and expose every step of its reasoning" when establishing effluent limits. *Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 563 (D.C. Cir. 2002). EPA has fallen short of its duty to justify the effluent limits in Merrimack Station's Permit.

EPA's effluent limitations for several of the pollutants in Outfall 003C were based on erroneous conclusions and unsound analysis of data from two Duke Energy plants—Duke's Allen and Belews Creek Stations, and, as a result, these effluent limitations are arbitrary and capricious. On August 11, 2011, Ron Jordan submitted a memorandum to Sharon DeMeo of the EPA Region 1 Industrial Permits Branch that evaluated the "self-monitoring data" from the two Duke Plants "that incorporate physical-chemical treatment . . . followed by anoxic/anaerobic biological treatment of the FGD wastewater." Jordan Guidance. The report claimed to provide an overview of the statistical methods used to evaluate the treatment data and calculate effluent limits, describe the data used to calculate the effluent limits, explain why certain data was excluded, describe the statistical models and equations used, etc. *Id*. The analysis focused specifically on data from the two Duke Energy plants for six pollutants in the FGD wastestream: arsenic, chromium, copper, mercury, selenium and zinc.

However, Mr. Jordan and his staff at EPA improperly analyzed data due to the significant flaws in EPA's own methodology, discussed below. EPA did not meet its burden to explain its calculations and how it established the draft effluent limits. Moreover, it failed to show whether the analysis and creation of effluent limits for Merrimack Station based on the data from Duke's Allen and Belews Creek Stations are reasonable and technologically achievable. Instead, there is no justification or any logical reason for EPA's draft limits. In fact, EPA's analysis is patently incorrect, and its effluent limits are therefore unreasonable. The particular flaws in EPA's analysis include the following:

a. <u>EPA Inappropriately Rejected Good Data and Used Bad Data</u>

First, EPA inappropriately rejected earlier data associated with, among other things, problems caused by the absorber chemistry that led to higher effluent readings on days when those problems occurred. This was improper, as EPA ignored data that reflects the changes and operational impacts that are inherent in the biological system operating conditions. EPA, like any other regulatory or business entity, cannot take isolated snapshots of manipulated data and then attempt to convert this data into full-time permit limits based on ideal conditions across the industry as a whole and to Merrimack Station specifically.

Without any valid evidence, EPA claimed that Duke Energy's January 17, 2011 data were bad and that the high levels could have been caused by laboratory error or mishandling of the samples. Based on this conjecture, EPA wrongfully excluded the data. In fact, Duke Energy has indicated that there were no upset conditions. *See* Duke Comments, at 4-5. EPA should re-analyze the data in light of these errors. Second, EPA improperly excluded some data that recorded periods of high concentration of metals (specifically, mercury and selenium), at Duke's Belews Creek Station. However, this data was more likely the product of normal absorber chemistry.[94] *Id.* at 5-7. EPA appears to have evaluated data during a period of time where dissolved mercury and dissolved selenium increased, which is an indicator of high ORP in the absorber. There are many factors that can cause high ORP in the absorber, including, among others, scrubber chemistry changes. The high ORP is very difficult to control, and as it carries over into the FGD treatment system and more dissolved metals enter into the treatment system, it becomes more difficult to treat these metals.

This is not an "upset event," but is a reality associated with this treatment system and the absorber chemistry. Because this data is simply a product of the normal fluctuations of the system, it should have been included when evaluating Duke Energy's limits. *See* Duke Energy's Comments at 5. If anything, this data shows variability in the success and operation of the biological treatment system and that the variability is not constrained to occur only on an infrequent basis, since the unit output, fuel limestone, and other factors can all change on a frequent basis at any coal-fired unit. If there is uncertainty and high variability in the success of this system, then biological treatment is not BAT. EPA does not explain or justify its decision to eliminate this data—as it must—and its reasoning is therefore unreasonable, arbitrary, and capricious.

[94] EPA excluded some of Duke Energy's data for other unjustified reasons. For example, mercury results were discarded as extreme observations because Belews Creek began to burn a higher blend of Northern Appalachian coal during this time, but did not add oragnosulfide to its treatment system. EPA claimed that if organosulfide had been added, treatment levels would be lower and would have reduced the mercury limits, though EPA did not support this assertion. Duke Comments at 4-5; UWAG Comments at 6-8.

EPA relied on data that it knew had questionable quality control issues. Duke Energy notified EPA that certain low-level mercury results from its facilities were questionable and that it had made an error in reporting its results. However, EPA did not exclude or correct these errors before calculating the limits for Merrimack Station, resulting in draft permit limits that are inherently flawed and that are not technologically achievable.

b. <u>EPA Misapplied the Box-Plot Analysis when Testing For Outliers</u>

Next, EPA misapplied the box plot analysis when testing for outliers in the Allen and Belews Creek data, which similarly led to flawed analysis and calculations. EPA assumed that the resulting high-level metal readings were the product of upset conditions, which is likely incorrect in this instance. This incorrect conclusion led to EPA's decision to discard these data points, skewing the data and eventually producing artificially low concentration levels at Duke's Allen and Belews Creek. This mistake alone caused EPA to draft limits for Merrimack Station that cannot be achieved even with biological treatment.

c. <u>EPA Incorrectly Assumed a Random Sample Collection</u>

Also problematic was EPA's decision to assume a random sample collection/analysis from the two Duke Energy stations. In reality, the data from the two plants was not the product of random sampling, and instead was the product of a two-stage sampling method: the data was first collected on a weekly basis and was then later collected on a monthly basis. If EPA had properly used a variability factor for weekly sampling and then a variability factor for monthly sampling instead of the factor used for random sampling, it would have significantly increased the limits that EPA calculated. EPA's misapplication of the random sampling variability factor and its faulty conclusions led to faulty results. EPA must correct this error which would increase the daily maximum limit for mercury at Merrimack Station.

d. EPA Ignored the Negative Impacts That Low Levels/Trace Elements have on PSNH's Ability to Measure Limits in the Draft Permit

EPA failed to properly consider and analyze how the level of TDS, chloride, and bromide in Merrimack Station's wastewater would impact its ability to measure down to EPA's low proposed limits. Specifically, samples with higher TDS levels, such as at Merrimack Station, will likely have higher Method Detection Limits and Quantitation Limits; thereby making it practically impossible to measure down to EPA's proposed limits. However, there is no discussion in EPA's determination document addressing these site-specific issues. EPA must either provide an analysis of these issues or adjust the limits in Merrimack Station's final permit. Failure to do so is clearly arbitrary and capricious.

e. EPA Erred in Setting Limits that Cannot Be Met by the Facilities Which EPA Used in Creating the Limits

Adding further support to the fact that EPA set effluent limits that are not technologically achievable is the fact that EPA relied on data from only two power plants – Duke Energy's Belews Creek and Allen plants. However, the very plants upon which EPA obtained its data could not consistently meet the discharge limits EPA has proposed for Merrimack Station. Courts have recognized that if EPA establishes a BAT and sets effluent limits based on the performance of a particular plant, then that plant should be able to meet the limits promulgated by EPA. Otherwise, the technology chosen is not *technologically achievable* and therefore violates the statutory mandate that BAT and BAT based effluent limits must be technologically and economically achievable. 33 U.S.C. § 1311(b)(2)(A).

The available data from the two Duke Energy plants—the very plants that six of Merrimack Station's effluent limitations were based upon—indicates that the Duke facilities do not regularly meet EPA's proposed effluent limitations for Merrimack Station for some of the pollutants. In fact, Duke has documented a number of instances it exceeded limits contained in Merrimack Station's draft permit. For example, Duke Energy's Belews Creek exceeded Merrimack Station's proposed monthly average for selenium of 10 ppb for five months during which EPA conducted its analysis. *See* Duke Comments at 8 (reporting limits of: August 2008 – 15.88 ppb; September 2008 – 16.84 ppb; October 2008 – 11.58 ppb; July 2010 – 155.5 ppb; and December 2010 – 26.6 ppb). Belews Creek exceeded Merrimack Station's proposed daily maximum limits for selenium of 19 ppb for five months during which EPA conducted its analysis. *Id*. (reporting limits of: August 25, 2008 – 19.6 ppb; September 8, 2008 – 31.3 ppb; September 15, 2008 – 22.5 ppb; July 14, 2008 – 299 ppb; and December 8, 2010 0 26.7 ppb). Likewise, Belews Creek exceeded Merrimack Station's proposed monthly average for copper of 8 ppb in August 2010 (reporting 11.85 ppb). *Id*. at 9. Belews Creek also exceeded Merrimack's proposed daily maximum limit for mercury of 0.055 ppb on 8 days during which EPA conducted its analysis. *Id*. (reporting limits of: October 5, 2009 - .256 ppb; November 2, 2009 – .096 ppb; February 10, 2010 - .060; May 26, 2010 – 0.136 ppb; and October 7, 2010 - .442 ppb). The data from Duke Energy's Allen facility is equally disturbing. For example, Allen exceeded Merrimack Station's proposed daily maximum limit of 15 ppb for arsenic on four days during which EPA conducted its analysis. *Id*. at 10 (reporting limits of: March 3, 2010 – 22.5 ppb; May 10, 2010 – 63.1 ppb; May 25, 2010 – 63.9 ppb; and June 29, 2010 – 20.1 ppb). Allen similarly would have exceeded Merrimack's proposed monthly limits of 8 ppb for arsenic on four dates. *Id*. (reporting limits of: March 2010 – 14.75 ppb; May 2010 – 63.5 ppb; June 2010 – 17.6 ppb; and July 2010 – 12.1 ppb). Allen exceeded Merrimack Station's proposed daily maximum limit for copper of 16 ppb on August 19, 2010, reporting 22.5 ppb and its monthly average limit for copper of 8 ppb for August 2010, reporting 15.9 ppb. Finally, Allen exceeded Merrimack

Station's proposed monthly average of .022 ppb for mercury for December 2010, reporting .33 ppb. *Id*.

In addition to these dates on which Duke facilities would have violated Merrimack Station's proposed limits, EPA conducted a four-day sampling at Belews Creek. Notably, Belews Creek would not have met any of Merrimack Station's proposed monthly average limits for mercury of selenium on any of the four days. *Id*. at 12.

PSNH listed each of these instances to prove a very important point. Had the two Duke facilities, which have the biological treatment installed that EPA considers BAT for Merrimack Station, been subject to the Merrimack draft permit limits, those facilities would have had over 450 violations during a four-year period.[95] The CWA allows EPA to seek damages of up to $37,500 per violation. This means that if Duke's Belews Creek and Allen Plants were operating under the limits proposed for Merrimack Station, Duke would be subject to over $16 million in potential fines from EPA (approximately 450 would-be violations x $37,500). It is absurd for EPA to claim BTA for technology that would subject its user to substantial violations and fines. Biological treatment cannot be BTA under any interpretation of the CWA. Clearly, EPA was arbitrary and capricious in determining otherwise.

Further, it is arbitrary for EPA to assume that the biological treatment that works best for one facility will work at others. EPA failed to provide any analysis as to why the technology at the two Duke plants will work at Merrimack Station, given the site-specific operating information. In fact, PSNH now has specific scrubber and physical/chemical treatment system

[95] EPA and the courts consider violations of monthly average limits to be a violation for each day of the month in which there was a discharge (*i.e.*, 30 or 31 violations per month). *Atlantic States Legal Foundation v. See Foods*, 897 F.2d 1128 (11th Cir. 1990); EPA "Interim Clean Water Act Settlement Penalty Policy," March 1, 1995, Attachment 1 (stating that the formula for determining NPDES permit violations is the maximum statutory penalty multiplied by the number of days in the month in which there was a discharge).

data which EPA could use to confirm that the biological treatment technology used at the Duke Energy facilities is not appropriate at Merrimack Station.

EPA's draft permit limits for arsenic, chromium, copper, mercury, selenium and zinc must be reevaluated because EPA inappropriately excluded data from Duke's Allen and Belews Creek plants, misapplied the box plot analysis, wrongly assumed random samples, and relied on incorrect removal rates. EPA's analysis is unreasonable and completely unjustified in or by its own analytical documents. EPA therefore did not satisfy its burden to explain its conclusions, which constitutes unreasonable agency action that must be overturned.

f. <u>EPA's Draft Permit Limits for Outfall 003C Are Arbitrary</u>

Many of the effluent limits discussed below (Arsenic, Chromium, Copper, Mercury, Selenium, and Zinc) were based on the faulty calculations, methodology and analysis in the Ron Jordan Aug. 11, 2011 memorandum. Additionally, EPA should postpone considering limits for TDS and chlorides. Similarly, the limits for cadmium, lead, and manganese should be deleted in the permit. EPA should also reconsider the mercury limit which it lowered to a level that is lower than all known rates at similar plants. PSNH also does not agree with the restrictive monitoring and reporting requirements, including the requirements for boron, iron, BOD, nitrogen and phosphorus, and the other constituents. Finally, as discussed in detail below, EPA is not authorized to establish water quality based limits at internal outfalls.

EPA did not sufficiently justify its conclusions for any of these effluent limits, and many of them are unreasonable and not technologically achievable, and therefore must be reconsidered before a final permit is issued.

i. Arsenic, Zinc, Copper and Chromium

EPA established Merrimack Station's effluent limit for arsenic, zinc, copper, and chromium on faulty methodology and analysis of the data from Duke Energy's Allen and Belews Creek stations. The flaws in this analysis are discussed above. These flaws led to the artificially low effluent limits for these constituents. EPA should remove the arsenic, zinc, copper and chromium limits after it reevaluates the data from the Duke Plants in light of the methodology based arguments raised above.

ii. Selenium

In addition to being based on the faulty methodology and analysis of the data from Duke Energy's Allen and Belews Creek stations discussed above, the selenium limit is incorrect and should be removed by EPA after it reevaluates the data from the Duke Plants.

iii. Mercury

EPA's Duke Energy based BAT numbers for mercury were 55 and 22 ppt for maximum and average limits, respectively, as reported in the Ron Jordan memorandum determining the effluent limits for Merrimack Station. Due in large part to the NHDES water quality study, PSNH invested in a cutting edge technology, the EMARS polishing step, with the goal of reducing mercury and arsenic levels beyond concentrations typically achieved with traditional physical/chemical treatment. As a result, PSNH provided projected final concentrations of 20 µg/l and 0.014 µg/l for arsenic and mercury, respectively, to NHDES for the system. However, those projections were just that – projections based on the information PSNH had at the time.

The mercury concentration of 14 ppt exceeded EPA's Duke based calculations. Instead of basing the draft permit limit for Merrimack Station on appropriately managed data from Duke Energy, using the available data, EPA revised Merrimack Station's limit down to PSNH's *projection* which was made prior to the physical/chemical system being installed. EPA should have used actual data. Moreover, it is clear that EPA is wrongfully cherry-picking limits, choosing to use some of the data from Duke Energy when it suits its purposes while excluding other data when it wants tighter limits.

iv. Cadmium, Lead, and Manganese

PSNH also challenges EPA's decision to set a permit limits for cadmium, lead and manganese. Specifically, EPA did not have data from the Duke Energy plants regarding cadmium, lead and manganese and had "insufficient information .. . to prescribe a [] limit[s] lower than [those] proposed by PSNH." Draft Permit, Attach. E, at 41. Rather, EPA based the permit limits on PSNH's projected values for those constituents, without any actual data or site-specific analysis. However, EPA chose to set permit limits even though there is no technology based standard or water quality concern. EPA should not set these limits. PSNH's projected values do not represent technologically or economically achievable effluent limits per se. There is no justification for these limits and monitoring requirements. EPA's cadmium, lead and manganese limits are therefore unreasonable, arbitrary and capricious.

v. TDS and Chlorides

EPA simply turned the projected discharge concentrations of the FGD scrubber purge for TDS and chlorides that PSNH projected and submitted to EPA into BPJ based BAT effluent limits, while simultaneously acknowledging that neither Merrimack Station's treatment system nor the addition of biological treatment would be effective at removing chlorides.

More specifically, the scrubber and the physical/chemical system are in the very early stages of use at Merrimack Station. Further, EPA did not have data to rely on from the Duke Energy plants, and instead simply adopted PSNH's preliminary prediction of the discharge concentration as BAT. It is not appropriate to set permit limits for chloride and TDS at this time. EPA's TDS and chloride limits are therefore unreasonable, arbitrary and capricious.

vi. Monitoring Requirements for B, Cd, Fe, Pb, Mn, BOD, Cl, N, P, TDS

EPA set monitoring requirements for Boron, Cadmium, Iron, Lead, Manganese, BOD, Chlorides, Nitrogen, Phosphorus, and TDS. These are all pollutants that were not evaluated at the two Duke Energy plants to help establish effluent limits for Merrimack Station. EPA required reporting, in part, so that the data from these pollutants would be available to assess whether limits should be established in the next permit reissuance.

However, the monitoring requirements are significant in terms of costs and manpower. These requirements result in the weekly collection and analysis of at least two hundred and sixty (52 x 5) 24-hour composite samples for each of these parameters over the life of the permit. There is absolutely no justification for these excessive monitoring requirements. Additionally, in the current permit PSNH collects a grab once a quarter for metals monitoring. The new permit requires 24-hour composite sampling every week. The magnitude of some of the permit limits will likely require the use of specialized "clean" sampling techniques and the shipment of samples to one of a handful of labs in the country that can achieve EPA's miniscule detection limits. This sampling requirement is excessive and unwarranted. Because EPA failed to consider the impact on PSNH and its customers, its inclusion of these costly and unwarranted monitoring requirements is clearly arbitrary.

In conclusion, the limits established by EPA are unreasonable, not technologically or economically achievable. EPA's overall decision that biological treatment is BAT for Merrimack Station is unreasonable, arbitrary and capricious. EPA's decision cannot stand, and it must reevaluate its BAT determination and permit limits for the FGD wastestream. The enhanced physical/chemical system in place at Merrimack Station is the appropriate technology to treat the FGD wastestream. PSNH should be allowed to discharge this effluent via Outfall 003C in accordance with the limits and monitoring as established by NHDES.

5. EPA's decision to establish BAT on a case-by-case basis is arbitrary and capricious.

Regardless of the egregious flaws in EPA's application of BPJ discussed above, EPA should not have applied BPJ at all. EPA is not authorized to use its BPJ to set case-by-case BAT limits when applicable national effluent guidelines already exist, as is the case here. Even if EPA were to incorrectly argue that there were no applicable effluent guidelines in effect, EPA is not justified in creating case-specific BAT limits when it will amend national effluent limits to specifically include FGD wastestreams within a year or so from the date of the issuance of Merrimack Station's NPDES permit. Finally, BPJ limits are not warranted where, as is the case here, electric power generation reliability issues and other national policy concerns instead warrant national standards.

a. <u>EPA's Decision to Use its BPJ was Arbitrary and Capricious Because National Effluent Guidelines Already Exist</u>

EPA has already set NELGs for steam electric power generating point sources and a broad range of pollutants from this point source category, including FGD wastestreams; therefore, EPA's decision to establish BAT on a case-by-case basis is without legal support. Where effluent guidelines are applicable to a particular point source and wastestream, EPA may not create alternative BPJ based, case-by-case limitations. *See NRDC v. EPA*, 822 F.2d 104, 111 (D.C. Cir. 1987) (noting that a state or permit writer may set BPJ based limits only when there is no national standard that has been promulgated for a point-source category); *Citizens Coal Council v. EPA*, 447 F.3d 879, 881 n.11 (noting that BPJ applies only when "EPA has not promulgated an applicable guideline"). BPJ based limits are designed to fill the gap when no standardized effluent limitations exist; it is therefore unnecessary to even consider BPJ based limits in this case because national effluent guidelines are in effect.

FGD wastewater from wet FGD systems is currently considered a "low volume waste" under the Steam Electric Power Generating Guidelines promulgated in 1982 and therefore is subject to NELGs. 40 CFR Part 423.11(b) (defining "low volume waste sources" to include "wastewaters from wet scrubber air pollution control systems."). EPA recently confirmed this in its 2009 Final Detail Study report on the Steam Electric Power Generating Point Source Category: "FGD wastewaters are currently regulated by the effluent guidelines as *low volume wastes* generated at steam electric plants [40 C.F.R. 423.11(b)]." Final Detailed Study Report, at 3-17(emphasis in original).[96] In fact, this is exactly how EPA Region 1 recently classified and regulated the FGD wastestream produced at the Brayton Point Power Station in Somerset, Massachusetts. In the Fact Sheet accompanying Brayton Point's Permit, EPA Region 1 stated:

> The facility will be installing selective catalytic reduction (SCR) systems on units 1 and 3, and a wet flue gas desulferization (FGD) system on unit 3. . . As a result of these technologies, the facility will generate new waste streams which will go to the wastewater treatment system, and ultimately discharge though 004. *These waste streams are considered low volume waste streams*.

EPA Fact Sheet, Draft NPDES Permit Brayton Point Station, at http://www.epa.gov/region1/braytonpoint/pdfs/Braytonfs.pdf. (emphasis added). EPA Region 1's contrary decision in Merrimack Station's draft permit is further evidence of the arbitrary and capricious actions of EPA.[97]

In its effluent limitations for the Steam Electric Power Generating Point Source Category, EPA established best practicable control technology (BPT) standards, and new source

[96] *Available at* http://water.epa.gov/scitech/wastetech/guide/upload/finalreport.pdf.

[97] If EPA decides to change its mind and alter this particular regulatory or enforcement scheme, it must justify its reasons for doing so. Brayton Point and Merrimack Station's permits represent two completely different decision-making processes and conclusions by EPA, but EPA did not justify its decision to dramatically change course. This exemplifies arbitrary action.

performance standards (NSPS) for certain pollutants in low volume waste streams.[98] 40 C.F.R. §§ 423.12, 423.15. NSPS are typically understood to be at least as stringent as BAT, and may be even more stringent. *See, e.g., Am. Iron and Steel Inst. v. EPA*, 526 F.2d 1027, 1058–59 (3d Cir. 1975); (rejecting a position that new source standards cannot be as stringent as best available technology economically achievable standards); *BP Exploration,* 66 F.3d at 790. Additionally, NSPS and BPT standards are typically the same, and therefore some of the pollutants in FGD wastestreams are already being regulated in a manner similar to how they would be regulated under BAT requirements.

EPA stated in the preamble to the proposed NELGs that it was reserving the right to separately regulate FGD wastewater for future rulemaking because there was insufficient data to establish BAT or NSPS for these discharges. 45 Fed. Reg. 68,328, 68,333 (Oct. 14, 1980) (proposed rule) ("[D]ischarges from flue gas desulfurization (FGD) systems are currently regulated as low volume waste discharges. EPA has determined that this discharge stream should be regulated separately . . . . The Agency does not have sufficient data on this stream at this time to propose revised BAT . . . .").

EPA did note, however, that "[i]n the interim, the BPT control for low volume wastes limiting TSS, pH, and oil and grease will still be applied to discharges from flue gas cleaning systems using wet scrubbing. Accordingly, the Agency reserves this stream for limitations to be developed in the future." *Id*. The only reasonable interpretation of this statement is that EPA intended the existing technology based effluent limits for low volume wastestreams to apply to FGD wastestreams until additional national standards were set.[99]

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[98] The BPT and NSPS standards for low volume waste streams apply to TSS and oil and grease. Of course, pH limits apply to all discharges, and no discharger may discharge PCBs.

[99] Importantly, the EPA Permit Writer's Manual says that the permit writer should determine whether a pollutant "was not considered by EPA when the agency developed the effluent guidelines" and whether the pollutant

Importantly, EPA *did not remove* FGD wastewater from the definition of low volume waste in the Final 1982 rule even though it indicated the intent to regulate FGD wastestreams separately from low volume waste streams in the future. In fact, EPA confirmed as recently as 2009 that FGD wastewater is regulated by the steam electric power generation effluent guidelines as a low volume waste, almost thirty years after expressing the intent to one day separately regulate FGD wastewater. Therefore, though EPA may establish a separate BAT for FGD wastewater in the impending 2013 rule, it has yet to do so, and FGD wastewater still remains a low volume waste and thus still falls within the "interim" regulatory period identified by EPA in the proposed 1982 effluent limitations.

Because NELGs already exist for the steam electric power point source category as a whole and for low volume wastestreams (including FGD wastestreams) from this point source—EPA should not make a BPJ based case-by-case BAT determination. During the interim period—and unless and until more specific effluent limitations are set—FGD wastewater remains regulated as low-volume wastewater and is subject to the technology based effluent limits applicable to low-volume wastewater from steam electric power generating point sources.

b. EPA's Decision to Use its BPJ was Arbitrary and Capricious Because Even if PSNH Accepted EPA's Inaccurate Position Regarding the 1982 National Effluent Guidelines, EPA is Proposing New Effluent Guidelines in the Immediate Future

Even if PSNH accepted EPA's inaccurate position that the 1982 NELGs do not apply to FGD wastestreams, EPA is proposing new effluent guidelines that will be applicable in the immediate future. EPA should have taken these impending regulations into account when

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is already controlled by the effluent guidelines before the permit writer uses BPJ to regulate the pollutant. Permit Writers' Manual at 5–46. This indicates that since low-volume waste was considered by EPA but that no BAT standard was set for this wastestream, that it would be inappropriate to use BPJ to regulate low volume wastes—including FGD wastestreams—at this time.

deciding to use its BPJ. When establishing case-specific BAT effluent limitations in a permit, EPA "*shall* consider . . . *any unique factors relating to the applicant.*" 40 C.F.R. § 125.3(c)(2) (emphasis added). Importantly, EPA itself states that it expects to "complete" the rulemaking and "promulgate revised effluent guidelines in late 2013." *See, e.g.* Hanlon Memorandum, at 1; EPA Draft Permit, Attach. E, at 3 (noting that final NELGs will be set by 2014). This means that the question of how FGD wastewater will be regulated for this point source will be conclusively decided within approximately one year from the date EPA issues the final permit for Merrimack Station.

Creating BPJ based limits in permits "was to be only an interim measure pending the promulgation of guidelines, limitations, and standards mandated elsewhere in the [CWA]." *NRDC v. EPA*, 437 F. Supp. 2d 1137, 1160 (C.D. Cal. 2006) (explaining that BPJ based permits may not be used in place of promulgating effluent guidelines). In fact, one court has recently recognized that it "know(s) of no legal authority stating that the practice of issuing permits based on 'best professional judgment' was to be ongoing." *Id*. at 1160–61 (citing *E.I. DuPont de Nemours & Co. v. Train*, 430 U.S. 112, 120 (1977)) (noting that though BPJ "authorizes the imposition of limitations in individual permits, the section itself does not mandate either the Administrator or the States to use permits as the method of prescribing effluent limitations."). Nevertheless, EPA is attempting to establish BAT for Merrimack Station based on its BPJ and a case-by-case determination, nearly 30 years after the effluent guidelines for the steam electric power generating point source category were promulgated, yet only one year from the date that these guidelines will be revised. This is not proper.

Creating effluent guidelines is a burdensome process; indeed EPA has been in the process of creating new effluent guidelines for many years. It is curious that EPA, knowing that it will release effluent limitations in the immediate future, would create BPJ based limits that will be derived from a consideration of the exact same standards[100] that EPA is currently evaluating—and has been evaluating—to set effluent guidelines for FGD waste streams.

It is also curious, then, that EPA was able to establish BAT limits so quickly based on its BPJ even though it has not passed specific national effluent limits—considering the same exact criteria that it considers when using its BPJ—for over 30 years. At best, this suggests that the BAT limits EPA established for Merrimack Station were not as carefully considered and evaluated as the future national effluent limits. At worst, this suggests hasty, haphazard decision-making by EPA that is not grounded in complete or accurate information. Either alternative is unacceptable, and either alternative represents unreasonable and arbitrary action that must not be tolerated in the administrative process.

Additionally, if these limits are actually implemented into Merrimack Station's permit, and if the final limits and BAT chosen for FGD wastestreams from steam electric power generating point sources are less stringent than the provisions in the permit, PSNH could not amend the Merrimack Station permit. Instead, anti-backsliding rules prevent EPA from changing, renewing, or reissuing an NPDES permit with technology limits that are less strict than the limits in the previous permit. 33 U.S.C. § 1342(o). This means that Merrimack Station and perhaps a few other plants will be operating under different standards than what may be required by the final rule, and there is nothing that could be done to reverse EPA's overreaching via the

[100] If EPA formulates BPJ limits, it must evaluate the same requirements and engage in the *same* analysis that it must engage in when it sets national effluent limitation guidelines. Specifically, 40 C.F.R. § 125.3(d) would *require* EPA to consider the following when setting BAT limits based on BPJ: "(i) [t]he appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and (2) [a]ny unique factors relating to the applicant," as well as the following factors: (1) the age of the equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various types of control techniques; (4) process changes; (5) the cost of achieving such effluent reduction; and (6) non-water quality environmental impact (including energy requirements). *See also* 33 U.S.C. § 1314(b)(2)(B). These are the exact same factors EPA considers when establishing NELGs. 40 C.F.R. § 125.3(c)(2).

eleventh-hour-use of BPJ. This runs contrary to Congress' intent that the CWA establish "uniform, technology based effluent limitations," *NRDC v. EPA*, 437 F. Supp. 2d at 1147.

EPA previously recognized the absurdity of this result when it decided to wait to use its BPJ to evaluate costs and determine whether reinjection of produced water was BAT for the offshore oil and gas industry. *NRDC, Inc. v. Sierra Club*, 863 F.2d 1420, 1427 (9th Cir. 1988). In short, just like EPA recognized when it was considering use of its BPJ to set limits for the offshore oil industry in *NRDC*, it makes little sense that EPA would seek to impose biological treatment and the limits associated with this technology for Merrimack Station when a national standard—that would almost certainly be applicable to Merrimack Station—is imminent. Further, choosing biological treatment as the BAT would lead to piecemeal regulation and uncertainty among facilities in New Hampshire and other states across the country. Though this may be appropriate in a case where EPA has set no standards and has no intention of setting standards, there is no need to impose BPJ based BAT and BAT effluent limits when such standards exist today, and when it is *known* that EPA *will* imminently set revised effluent standards. It is therefore proper to wait until the revised NELGs are implemented, and then apply such standards to Merrimack Station's FGD wastewater. Any other outcome would not only be illegal, but if implemented would lead to the absurd result of forcing PSNH to go through timely, costly, and unnecessary efforts to comply with the BPJ based BAT limits that will potentially never be applied to any other source.

Finally, EPA's efforts to circumvent the rulemaking process and push-through such opportunistic BPJ based BAT limits may have an even deeper motive. Specifically, and perhaps most offensive to the administrative process, EPA is seemingly attempting to push-through the Merrimack Station BAT limits to ensure that Merrimack Station is subject to the BAT limits that

EPA hopes will be adopted in the final NELGs, but knows are unlikely to make it through the rigors of the administrative process.

EPA must comply with formal notice and comment procedures when it revises effluent limitations at the national level. This involves a notice of proposed rulemaking in the Federal Register, an extensive public comment period, and a final rule—all of which must be published and subject to public scrutiny. EPA cannot resort to back-door lawmaking to establish limits on the regulated community that are contrary to the CWA or otherwise not in accordance with the law.

On the other hand, though NPDES permits like the one proposed for Merrimack Station are subject to notice and comment, the national exposure of the effluent is on a much smaller scale because the limits only impact a single plant. Moreover, since there is less attention paid to the limits in these permits at the national scene, scrutiny is similarly less extensive than it otherwise will be when nationwide standards are promulgated. EPA is seemingly taking advantage of a last-ditch, backdoor opportunity to ensure that it has its way by establishing effluent limits at Merrimack Station through the use of BPJ and interim guidance, both of which invoke far less input and criticism.

c. EPA's Decision to Use its BPJ was Arbitrary and Capricious Based on Concerns and Other Public Policy Considerations

There are other administrative policy concerns with EPA establishing BAT on a case-by-case basis using its BPJ when national effluent guidelines will likely be promulgated one year from the time EPA finalizes the permit for Merrimack Station. Specifically, this is, in effect, enabling EPA to set policy at the micro level at Merrimack Station so that it can the turn around and use Merrimack Station as an example when it is trying to force policy at the macro-level. Moreover, allowing BPJ limits to be implemented in Merrimack Station's permit enables EPA to make policy decisions about energy regulation and grid production that are largely unchecked. If EPA is going to engage in this behavior it should be forced to look at the industry as a whole which is exactly what it is doing with the imminent promulgation of the NELGs.

D. **EPA failed to consider important costs and consequences implicated by the limits and requirements in its draft permit.**

EPA failed to consider important public policy considerations implicated by the stringent limits and requirements imposed on PSNH through the draft permit. For example, EPA gave no consideration to whether the costs of compliance with the draft permit could cause the early retirement of the units in question, and the impact this would have on the local community or electric grid reliability issues.[101] In justifying its decision to ignore these important considerations, EPA made a number of unreasonable and unsupported assumptions. First, EPA assumed that the costs of installing CCC would not force PSNH to retire Merrimack Station because PSNH would recover those costs of compliance from its customers. Specifically, EPA stated:

> PSNH has stated that it has no retirement plans for Merrimack Station, and has not suggested that the station would be retired if faced with required expenditures for modification of its cooling systems. Indeed, PSHN has already been willing to spend larger amounts on air pollution controls at the station.[102]

[101] EPA had an obligation and failed to adequately consider costs associated with the limits and requirements proposed in the draft permit. Specifically, when determining BAT, EPA must consider "the cost of achieving such effluent reduction." *See* 40 C.F.R. § 125.3(d)(3)(v). Negative impacts on reliability are "costs associated" with EPA's action. Similarly, when determining BTA, EPA must consider cost and secondary environmental factors. Finally, Exec. Order 13563 requires consideration of cost when making regulations.

[102] EPA is referencing the wet FGD scrubber system recently installed by PSNH at Merrimack Station. EPA is well aware that installation of the scrubber was mandated by state law (RSA 125-O:11, *et seq.*), after the New Hampshire Legislature specifically found that its installation was in the public interest, and by statute provided for recovery of the costs of such installation. No such state statute exists for any requirements included in an EPA permit.

Determination at 163 (internal citations omitted).[103] Likewise, EPA concluded that:

> EPA currently expects that PSNH will recover the costs of cooling tower installation and operation through increased electricity rates, as authorized under the New Hampshire Public Utilities Commission's rate regulation framework. As such PSNH's electricity consumers, and not the company's shareholders, will "pay for" technology needed for Merrimack Station to comply with CWA requirements.

Id. at 154.

EPA's assumptions with respect to the recoverability of the costs of installing CCC technology are overly simplistic, uninformed and unjustified. Significantly, EPA failed to consider the unique context in which PSNH as a regulated utility operates in New Hampshire. The New Hampshire Public Utilities Commission ("NHPUC"), not PSNH, will decide whether or not the costs associated with installation and operation of CCC, biological treatment, or any other expenditure are recoverable from PSNH's customers. Importantly, the NHPUC recently ordered that PSNH must perform "an economic analysis of retirement for any unit in which the alternative is the investment of significant sums to meet new emissions standards and/or enhance or maintain plant performance." *In re Public Service Co. of New Hampshire*, 94 NH PUC 103 (2009). If EPA continues to insist on CCC and/or biological treatment, such directive would require PSNH to conduct an economic analysis of the retirement of units. The NHPUC would then determine whether the proposed expenditures would be reasonable and prudent, such to justify PSNH's pursuit of the investment. If the NHPUC were to determine that such costs were not reasonable or prudent, PSNH would be faced with the early retirement or sale of the units.

EPA also appears to have assumed that the installation of CCC technology would have no impact on how the units are operated, their operational reliability, or the reliability of the local or

[103] The reason PSNH never raised the issue of possible plant closure is that PSNH reasonably assumed that EPA would not require the installation of costly CCC technology where the plant has been operated without such technology, and without appreciable harm to the BIP, for over 40 years.

regional electric transmission systems. This must be the case as EPA offers no analysis or discussion of these important considerations in the draft permit or its determination document. As discussed below, this is a serious shortcoming in EPA's analysis as installation and operation of CCC technology would change how the units are operated which in turn would impact the reliability of the units and the grid.

EPA should have also considered the impact of its CCC mandate against the backdrop of other regulatory actions imposed on the electric utility industry generally, and coal-fired power plants, in particular. The CCC mandate is just one of many requirements being imposed by EPA, and it is the cumulative impact of these regulatory and permitting requirements which could hasten the early retirement of the units in question and lead to serious local and regional reliability issues.

Finally, EPA should have taken into account the fact that the electric utility industry in New Hampshire was restructured under NH RSA Chapter 374-F, "Electric Utility Restructuring". Under the restructured regulatory paradigm, PSNH has essentially two business segments – a delivery segment and an energy/generation segment. The delivery segment provides distribution of electricity to all customers within its franchised service territory. The energy/generation segment deals with the production and sale of the actual energy. But, the sale of electric energy in New Hampshire is subject to competition. PSNH's customers can, and do, choose their supplier of electricity (as opposed to the delivery services performed by PSNH) from a range of competitive choices. One of those choices is energy generated by PSNH from its assets, including Merrimack Station.

The costs of any environmental mandates ordered into effect by EPA at Merrimack Station would only be paid for by those customers who choose to buy their Energy Service from

PSNH. The affordability analyses relied upon by EPA failed to limit the potential costs of the draft permit mandates only to those customers that do purchase Energy Service from PSNH. The draft permit's assertion "that PSNH will pass the cost of cooling tower installation and operation through to electricity customers under conventional ratemaking practices" is just plain wrong.

The analyses relied upon by EPA to demonstrate the "affordability" of the draft permit mandates utilized revenues and sales data that are not limited to PSNH's energy generation function. Instead, the analyses utilized data found in Form 10-K filings made with the U.S. Securities and Exchange Commission which reflect total dollar revenues (delivery revenues and energy/generation revenues) and total kilowatt-hour amounts of energy delivered by PSNH. A proper analysis would be based solely upon PSNH's sales of generation in the competitive retail market.

A majority of PSNH's larger customers have chosen to migrate to competitive suppliers. As a result of such large customer migration, smaller customers, mostly residential, would ultimately pay larger shares of the costs of any EPA mandates. EPA's use of the wrong underlying data, and the failure to take into account the limited pool of consumers that would have to pay those costs, make EPA's analyses useless. To the extent that "affordability" is the standard to be applied – a standard PSNH disagrees with – the erroneous analyses cannot be relied upon by EPA.

1. EPA failed to consider impacts on the availability, operating capabilities, and dispatch profile of Merrimack Station.

EPA should have conducted a full and complete assessment of reliability impacts associated with its CCC mandate in order to protect and preserve the reliability of electricity supply. EPA has publicly acknowledged that it does not have sufficient expertise within EPA to evaluate and consider the adverse reliability impacts of its directives applicable to coal-fired generation facilities.[104] EPA's insufficient expertise is most pronounced in the areas of local and regional grids. EPA has acknowledged the "complexity of the electric system and the local nature of many reliability issues" and stated its intent to consult with "reliability experts, including but not limited to the Federal Energy Regulatory Commission ("FERC"), Regional Transmission Operators ("RTOs"), Independent System Operators ("ISOs"), and other planning authorities . . . the North American Electric Reliability Corporation ("NERC") and affiliate regional entities, such as state public service commissions ("PSCs") and public utility commissions ("PUCs")". Enforcement Responses Policy at 2. Yet, EPA did not consult with any reliability experts before issuing the draft permit here. Instead, EPA attempted to avoid such consultation by assuming (unjustifiably) that CCC would not cause the units to be shut down or otherwise alter their operation.

One of these reliability experts, NERC, is the United States' Electricity Reliability Organization, certified by the Federal Energy Regulatory Commission under Section 215 of the Federal Power Act, as added by the Energy Policy Act of 2005. NERC's mission is to improve and ensure the reliability of the bulk power system in North America. NERC achieves this mission in many ways, including conducting reliability assessments and overseeing and coordinating the work of dozens of planning authorities across the United States. NERC's reliability assessments are conducted to provide an independent review of the electric utility industry's plans to maintain reliability of the bulk power system and to identify trends to maintain reliability. NERC's role includes identification of emerging issues and potential

[104] *See* "The [EPA's] Enforcement Response Policy for Use of Clean Air Act Section 113(a) Administrative Orders in Relation to Reliability and the Mercury and Air Toxics Standards," from Cynthia Giles, Assistant Administrator of the Office of Enforcement and Compliance Assurance, to EPA Regions I-X Regional Administrators, Regional Counsel, Regional Enforcement Directors and Air Division Directors (EPA Headquarters and Regions I-X), Dec. 16, 2011, ("Enforcement Response Policy") available at: http://www.epa.gov/compliance/resources/policies/civil/erp/mate-erp.pdf.

concerns. One emerging issue is the individual and cumulative impacts of EPA's regulations targeting coal-fired generation facilities, which includes NPDES mandates for CCC. NERC has evaluated the reliability impacts of CCC mandates and projected plant retirements as a potential concern to reliability, both from an aggregate generation adequacy vantage point, and from the local, granular level. Specifically, NERC has identified substantial risks of a diminution of reliability adequacy associated with CCC mandates, especially when those are considered in the context of contemporaneous mandates applicable to coal-fired generation facilities. The issue is not academic. It is confirmed, documented and must be addressed.

In its 2011 Long-Term Reliability Assessment,[105] NERC has considered and addressed the regional generation adequacy impacts of regulations being proposed and implemented by EPA, including CCC mandates, on coal fired electric generating units. [106] NERC concluded that: "**the 316(b) rule will have the greatest impact** on the amount of capacity that may be economically vulnerable to retirement (approximately 25 to 39 GW) and consequently, the greatest impact on Planning Reserve Margin." 2011 Long-Term Reliability Assessment at 117. (emphasis added). With respect to New England, NERC's strict and moderate cases both show New England with projected reserve margins below acceptable criteria in the event CCC is required on a wide-spread basis.[107] *Id.* at 156, Table 43.

Given the serious generation adequacy issues raised for New England as a result of CCC mandates on coal-fired electric generation resources as set forth in NERC's 2011 Long-Term Reliability Assessment, EPA is on notice of material and documented reliability concerns. These

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[105] Available at http://www.nerc.com/files/2011%20LTRA_Final.pdf

[106] Available at http://www.nerc.com/files/EPA%20Section.pdf. Generation adequacy concerns are a function of installed and available capacity that may be delivered to meet load and reserve requirements.

[107] *E.g.*, NERC 2011 Long-Term Reliability Assessment, Table 43.

documented reliability concerns should have been considered and addressed in the draft permit, not simply (and unreasonably) assumed away.

In addition to these generation issues, EPA's CCC mandates will affect the stability of the local grid and the ability to maintain an adequate level of reliability. CCC mandates could result in withdrawal of electric generation (given that there is no certainty that a generation facility will be authorized to install the required controls and continue operations), or in changes in unit commitment, operational capability and dispatch profiles. In order to fully assess the "operational reliability impacts" of these outcomes, NERC has established (under the oversight of the Federal Energy Regulatory Commission under Section 215 of the Federal Power Act) a set of processes and protocols for the assessment of criteria to assure an adequate level of reliability and to protect consumers from interruption of firm service as a result of retirements or operational restrictions resulting from environmental mandates. This process is based on the NERC "Functional Model"[108] and utilizes the full range of expertise available to confirm adequate studies and assessments are prepared in advance of major changes in circumstances relative to individual generation stations. The details of how local and wide area reliability assessments are undertaken, peer reviewed, and confirmed by NERC is summarized in NERC's *Reliability Assessment Guidebook, Version 2.1* (May 2010).[109]

The Energy Policy Act of 2005 requires development of and adherence to mandatory reliability standards and preservation of an "adequate level of reliability of the bulk power

[108] See NERC Reliability Functional Model, Version 4 (August 2008), available at : http://www.nerc.com/files/FM_Version_4_Clean_2008Aug25.pdf. Under NERC's Reliability Functional Model (now in Version 5), Registered Entities include the following: Generation Owner, Generation Operator, Transmission Owner, Transmission Provider, Interchange Coordinator, Market Operator (Resource Integrator), Balancing Authority, Reliability Coordinator, Resource Planner, Transmission Planner, Planning Coordinator, Reliability Assurer, Distribution Provider, Load-Serving Entity. Reliability Standards developed by NERC and approved by the Commission utilize the functional model. *See, e.g., Mandatory Reliability Standards for Interconnection Reliability Operating Limits*, Order No. 748, 134 FERC ¶ 61,213 (2011).

[109] Available at: http://www.nerc.com/files/Reliability%20Assessment%20Guidebook%20v2.1.pdf

system."[110] An adequate level of reliability involves both "adequacy" which is the "ability of the electric system to supply the aggregate electric power and energy requirements of the electricity consumers at all times, taking into account scheduled and reasonably expected unscheduled outages of system components" and operating reliability, which is "the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system components." There are no short cuts,[111] and there are no generalized assumptions that could reasonably be adopted by EPA in relation to the draft permit that negates or otherwise avoids the need for such an assessment to fully inform a cost benefit and reliability analysis of the draft permit. EPA's simplistic analysis that "PSNH has stated that it has no retirement plans for Merrimack Station" and that it "expects that PSNH will recover the costs" of CCC is clearly an unacceptable shortcut.

2. EPA failed to consider impacts of the draft permit on electric grid reliability.

EPA also failed to consider and substantively address the consequences of the requirements of the draft permit on the local and regional electric system. EPA previously recognized that CCC mandates could cause reliability concerns. *See* Proposed § 316(b) rule. Yet, here, EPA failed to consider such reliability concerns. EPA should have done a bottom-up assessment of the substantive determinations underlying the draft permit because changes to the operational profile and capabilities of Merrimack Station as a result of retrofitting cooling towers

[110] 16 U.S.C. § 824o.

[111] NERC has established criteria for assessment of an adequate level of reliability, which required detailed study and application of sensitivity analysis to define the impacts of withdrawal of system elements (such as a single coal-fired electric generating unit) from service or impairment of historical operational ranges and dispatch patters from such units, which could affect power flows and local area stability, as well as generator-supplied ancillary services and primary frequency response. These criteria are summarized in NERC's definition of "Adequate Level of Reliability" adopted by its Operating Committee and Planning Committee, as required by FERC. NERC has developed a formal definition of and criteria indicative of an "Adequate Level of Reliability" in accordance with the Commission's requirements in North American Electric Reliability Corp., 118 FERC ¶ 61,030, P 16 (2007). A detailed description of NERC's definition is available at: http://www.nerc.com/docs/pc/Definition-of-ALR-approved-at-Dec-07-OC-PC-mtgs.pdf

for both units and operating in closed-cycle cooling mode 24/7, year around, could result in any of the following scenarios: 1) substantially diminished operational capabilities; 2) different dispatch patterns, affecting local and wide-area transmission system stability; 3) diminished ancillary service capabilities; 4) reduction of primary frequency response potential; or even 5) withdrawal of the facility from service. Each potential consequence presents material risks of a decrease in the capability to assure an adequate level of reliability. These must be evaluated and considered by EPA to justify its technology choices before it issues a final permit for Merrimack Station.

In addition to operational reliability and local grid stability problems, EPA's mandate requiring CCC systems on existing coal-fired electric generation units raises serious regional and interconnection wide generation adequacy issues. As discussed above, NERC has reported in its recent 2011 Long Term Reliability Assessment that mandates under § 316 (whether by rule or in individual NPDES renewals) requiring the installation of CCC systems will have a substantial negative effect on regional reserve margins (also known as "generation adequacy") in New England.[112] NERC's Vice President and Director of Reliability Assessment and Performance Analysis, for example, testified at a FERC Reliability Technical Conference on November 30, 2011, that "[i]ndividually, as modeled, the Section 316(b) Cooling Water Intake Structures Rule

[112] *See also* United States Department of Energy, Office of Electricity Delivery and Energy Reliability, "Electricity Reliability Impacts of a Mandatory Cooling Tower Rule for Existing Steam Generation Units" (October 2008) ("DOE 2008 Report"), at v ("Based on the best available data, this loss of generation capacity in combination with the early retirement of facilities that either cannot or choose not to retrofit may jeopardize the ability of California, New York, and New England to maintain reserve margins needed to meet contingencies during peak electricity demand periods."). *available* at http://www.netl.doe.gov/energy-analyses/pubs/Cooling_Tower_Report.pdf The adverse generation adequacy impacts of permitting authorities adopting a closed-cycle cooling requirement as a condition to NPDES renewal has become very well established. During the past year, EPA, the Department of Energy, and the Congressional Research Service have all taken steps to refine and improve the assumptions used in long-term reliability assessments by removing assumptions that such wide-spread cooling tower retrofits will be required. *See, e.g.,* Congressional Research Service, "EPA's Regulation of Coal-Fired Power: Is a 'Train Wreck' Coming?" at pp 22-24 (August 8, 2011). The draft permit with respect to Merrimack Station, however, undermines those efforts and confirms that strict case assumptions regarding the effect of § 316 will be severe with respect to generation adequacy.

would have the greatest potential impact on planning reserve margins."[113] With specific reference to CCC mandates, NERC's Director of Reliability Assessment and Performance Analysis has explained:

> Based on our assumptions, the primary driver for retirements, in terms of magnitude, is the implementation of the 316 rules, which showed margin reductions in certain areas could affect bulk power system reliability, unless additional resources are added.
>
> But reserve margins are not the complete landscape. The capacity planning process assumes normal operation and maintenance of generating plants. **Policy that changes normal operations must be understood to appreciate overall reliability effects**.[114]

EPA's Proposed § 316(b) Rule clearly raises electricity system reliability issues that must also be analyzed, and EPA cannot, through regulation of individual facilities on a case-by-case basis using its BPJ, circumvent consideration of these reliability issues. But EPA's Proposed § 316(b) Rule's general discussion of reliability considerations addresses only one dimension of electric system reliability, generation resource adequacy. The reality that EPA NPDES permitting actions may directly affect system reliability issues is also recognized, but EPA concludes incorrectly that tools to assess localized issues are not available and that the only local issues that would have to be addressed relate merely to timing for compliance.

EPA's Proposed § 316(b) Rule recognizes that the primary driver of reliability problems to be expected from NPDES permit actions will involve local reliability issues, which must be evaluated on a unit by unit basis by expert entities with sufficient technical capabilities and modeling expertise:

> Energy Reliability Should Be Considered on a Localized Basis. During EPA's site visits, several urban areas were identified where

[113] Panel III, Written Remarks, Mark Lauby, Vice President and Director of Reliability Assessment and Performance Analysis, North American Electric Reliability Corporation, FERC Reliability Technical Conference (November 30, 2011) at 6.

[114] FERC Technical Conference, Tr. at p. 172, lines 5-14 (emphasis added).

> the existing transmission system would not be able to transfer sufficient electricity during periods of extended downtime. This limitation to reliability occurs even when a surplus of electricity can be generated within the same NERC region. … *Currently available models are not able to predict localized impacts, and instead are limited to measures of reserve capacity in broader geographic regions*. This uncertainty about the extent and likelihood of local reliability impacts is an important consideration in the decision to propose requiring site specific development of section 316(b) entrainment requirements.
>
> One approach EPA could have adopted in today's proposed rule would have been to establish a uniform entrainment requirement and then to address these local reliability concerns by providing permitting authorizes the flexibility to establish extended compliance timelines (i.e. 10 to 15 years) []. This would have allowed facilities to develop more workable construction schedules with their permit writers and coordinate with NERC to schedule installation down times accounting for generation supply reliability needs. . . . EPA was concerned that such a flexible approach, however, would not resolve all local reliability concerns, because *currently available information is not adequate to establish either the extent or significance of possible electric reliability concerns.*

76 Fed. Reg. at 22208-09. This same analysis holds true when EPA regulates on a case-by-case basis, like it is doing here. In fact, there is even more concern in these instances due to the fact that each of EPA's "smaller actions" may go unnoticed until it is too late. As confirmed by recent large-scale cascading blackouts in the Southwest, seemingly "small" or "localized" issues can materially contributed to large-scale impacts.[115]

EPA's Proposed § 316(b) Rule, however, concludes mistakenly that "currently available models are not able to predict localized impacts, and instead are limited to measures of reserve capacity in broader geographic regions." Models exist and are available to predict localized impacts and are available and in active use by transmission providers and NERC-authorized planning authorities across the United States, including New England. If EPA is not aware of or

[115] Report on Outages and Curtailments During the Southwest Cold Weather Event of February 1-5, 2011, Prepared by the Staffs of [FERC] and [NERC], Causes and Recommendations (August 2011) (" . . . .the loss of local generation led to voltage concerns that necessitated localized load shedding . . . .").

does not otherwise address reliability issues and problems associated with evaluation of different control mandates under a site-specific NPDES permit, the failure is EPA's. The tools exist. EPA needs to consult the right experts and take the time required to get it right prior to issuing a permit with requirements that could jeopardize electric system reliability. EPA certainly had the time to do so during the 14-year period it took to act on this permit renewal application. It is EPA's responsibility to become informed and to explain why operational changes to the CWIS, coupled with an upgraded fish return system, do not present a reasonable balance between all the relevant criteria.

a. Local and Regional Electricity System Reliability Impacts of Requiring CCC at Merrimack Station Must Be Evaluated and Addressed.

Reliability needs on the power system are constantly evolving due to the continuously changing drivers of customer loads, available generation resources, and dispatch economics. Congress and FERC have recognized the complexities in ensuring reliability resulting in the establishment by FERC, as described above, of NERC as the United States' Electric Reliability Organization to provide the structure and authority to ensure reliability requirements are met. As EPA's Proposed § 316(b) Rule intimates, it is not possible to apply existing reliability tools to determine the impacts of a proposed EPA standard until that standard is actually articulated and its applicability to specific generating units made known. With the draft permit, the time is now and of the essence.

NERC has established and FERC has approved a comprehensive framework for ensuring reliability.[116] Moreover, because the draft permit is indicative of a common approach expected

[116] NERC through its functional entities has developed a comprehensive framework for Reliability based upon over 120 Reliability Standards comprising more than 1600 separate reliability requirements. To ensure that the wide range of inter-dependent reliability concerns are assessed through detailed engineering analysis and coordinated with the appropriate and responsible functional entities, NERC has established 18 reliability functions

to be applied to other NPDES renewals for existing coal-fired generation plants, the NERC processes and tools should be used to assess the cumulative impact of requiring closed-system cooling across New England and perhaps the United States. Diligent efforts to assess the local and regional reliability impacts of its application to Merrimack Station (as well as the national impacts of similar requirements on other coal-fired power plants) must commence immediately. Without these efforts, there is no record basis upon which the EPA can conclude that the requirements of the draft permit (and the EPA programs under which it has issued) will not undermine reliability of the nation's power supply—contrary to stated public policy.

Reliability assessments are highly inter-dependent and deliberately overlapping, generally building from very detailed engineering analysis performed typically by facility owners at the local level and feeding into less detailed, broader scoped analysis performed by grid operators or planners at a more regional level. The ranges of analyses are designed to complement each other and avoid potential gaps. Constraints identified through detailed local analysis such as voltage or stability concerns can result in wide-area reliability impacts such as voltage collapse or system separation, and, of course, wide-area delivery issues can result in local outages and curtailments as well.

The draft permit creates substantial uncertainty regarding the potential planning scenarios needed to model and evaluate withdrawal of Merrimack Station from service (due to state determinations on unit retirement) or changes in operation capabilities and dispatch profiles. This consideration will necessarily reflect changed availability and operational characteristics of other, similarly affected coal-fired generation stations, both with respect to Section 316[117] and

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with 18 classifications of corresponding Functional Entities who are held responsible for ensuring the Reliability Standards are met.

[117] A number of adverse operational effects of retrofitted closed-cycle cooling systems on coal-fired generators have been documented in a variety of studies. *See, e.g.,* California Energy Commission, Consultant

contemporaneously applicable environmental regulations. Even in normal times, the largest drivers of new reliability needs and significant transmission expansion are significant changes in generation resource profiles. When there are changes in the generation elements of the bulk electric system's "topography," many of the different NERC reliability functions, both in the planning horizon and in the operating horizon, are affected. This requires extensive local and regional analyses and coordination to fully assess impacts of topography changes and to identify solutions to those problems.

The comprehensive framework established by NERC matches expertise and accountabilities to reliability needs and provides the responsibilities for proactively coordinating between functions. As to the draft permit for Merrimack Station, the following is an illustrative list of the tools and studies that should be performed before any final action is taken by EPA:

- Power Flow Analysis: A reliability assessment performed by local Transmission Owners or regional Planning Authorities to determine transmission constraints in delivering energy from generation resources to customer loads. Power Flow Analysis involves detailed modeling of specific generators, transmission facilities, and customer loads to assess the ability of the system to maintain reliable operations under a wide range of potential contingencies (outages of key elements) consistent with the NERC Reliability Standards. Power Flow Analysis involves extensive screening at the local level to assess in detail thousands of scenarios and develop workable transmission upgrades, coupled with higher level screening at the regional level to assess the compatibility of and any interdependencies between the locally developed assessments.

- Stability and Voltage Security Analysis: Reliability assessments performed by local Transmission Owners or Planning Authorities to integrate new or retire existing generation facilities. These assessments require specific knowledge of generator locations and operating parameters and involve highly specialized modeling and analysis tools. While the analyses are detailed and require local expertise and knowledge, the reliability impacts are not necessarily local and can result in either local or wide-area blackouts.

Report, "Comparison of Alternative Cooling Technologies for California Power Plants, Economic, Environmental and Other Tradeoffs" (February, 2002) (noting issues regarding turbine back pressure and sub-optimization of systems due to retrofits of closed-cycle cooling).

- Operational Analyses: Reliability assessments performed by local Transmission Owners, Load Serving Entities, and Planning Authorities to assess the ability to reliably operate the generation fleet and restore service in response to catastrophic events. Operational Analyses include:

    - *System Restoration Plans (Blackstart*) — enable the power system to be restored after a major storm or blackout. These plans involve special generators and complex transmission arrangements to enable re-starting the power system without external sources of power. In addition to the engineering and construction considerations, extensive system testing and operator training is required by NERC to prepare for changes in System Restoration Plans. The draft permit theorizes that Blackstart would not become an issue because the permit writers assume Merrimack Station will continue to operate in a mode and configuration where it can continue to provide system restoration. This assumption is speculative.

    - *Gas Interdependency and Fuel Diversity Studies*— assess the impacts of interruptions in gas supplies or deliveries to overall power system operations. As coal capacity, which has significant onsite fuel storage, is displaced by gas capacity, which may have limited or no onsite fuel storage, the loss of key pipeline facilities will interrupt substantial amounts of generating capacity which can drive load shedding or wide-area blackouts in unprepared regions.

    - *Plant Operational Assessments*— consider changes in generator operational performance such as reduced operating flexibility (min/max output levels, ramping capability, etc.) or new operating contingencies (such as loss of multiple units). With respect to retrofitted closed-cycle cooling on existing coal-fired power plants, reduced operating flexibility has been documented and such impacts are anticipated for Merrimack.

    - *Ramping/Regulating and Must Run Analysis*— assess the ability of the available generation mix to respond to daily fluctuations in customer loads, unplanned outages, and weather patterns.

    - *Outage Coordination*— assesses generation and transmission maintenance and construction activities to ensure they can be scheduled and performed without jeopardizing electric system reliability. Areas with extensive construction activities may be constrained in the ability to concurrently schedule major projects.

b. The Draft Permit's Discussion of Reliability is Incomplete and Incorrect

EPA's consideration of potential impacts to reliability of its proposed requirement for Merrimack Station to install CCC is incomplete and incorrect. Although paragraph 7.4.3.1.5.2 of the Determination contains some discussion of reliability issues, it merely states that "PSNH has expressed concern" about reliability implications of established permit limits based on continuous operation of closed-cycle cooling at Merrimack Station. Then EPA states, without support, that it has "considered this issue carefully and sees no credible threat to electric system reliability." This statement is made without any factual support or analysis and is contrary to EPA's own admission in its Proposed § Rule that it is not aware of existing tools that would permit a sufficient examination of local or regional reliability issues caused by unit specific NPDES permit requirements, as quoted and discussed above. Further, it is obvious that EPA has not engaged the NERC process summarized above with regard to the draft permit.

Rather than substantively address the reliability issues raised by the draft permit's requirements, EPA has attempted to assume its way around the problem. For example, EPA states that "PSNH has stated that it has no retirement plans for Merrimack Station and has not suggested that the station would be retired if faced with the required expenditures for modification of its cooling systems." Determination at 163. From this proposition, EPA concludes that there would be no operational impacts (including as to blackstart) from compliance with the draft permit. With all due respect, EPA's reasoning and discussion of reliability issues in the Draft Permit is simplistic, speculative, circular, and fails to consider the very retirement analyses that would be required of PSNH by the N.H. Public Utilities Commission. *Re Public Service Co. of New Hampshire*; *Id.*

The draft permit goes on to discuss reliability issues solely in the context of the impact of lost capacity due to increased station service requirements to operate the mandated cooling systems, concluding that a loss of 22 MW of capacity due to parasitic loadings is not sufficient to create generation adequacy problems in the region. In dismissing reliability concerns regarding the loss of 22 MW of net dependable capacity from Merrimack Station during the summer peak season, the draft permit cites to an ISO New England, Inc., 2009-2018 Forecast Report of Capacity, Energy, Loads, and Transmission report. Determination at 164. This is an incomplete response to the issue, however, because reserve margin related studies provide only information about one aspect of reliability and is out of date. Other aspects can only be evaluated by also conducting reliability analyses and operational assessments, as required by NERC standards and discussed above. Further, the generation adequacy impacts of the draft permit must be assessed in a fashion that integrates the related impacts on other coal-fired generation resources in the region and also address the cumulative impact of concurrent regulations affecting all those resources.

c. <u>EPA Incorrectly Dismisses as Insignificant the Expected Lost Generation that Will Occur if CCC is Installed at Merrimack Station</u>

In its determinations document, EPA notes that PSNH estimated an approximately 10 MW reduction in the average, annual electricity output at Merrimack Station if forced to install CCC. Determination at 156-57, citing to PSNH's November 2007 CWA § 308 Response. Specifically, 2.98 MW of that expected loss would be caused by condenser efficiency losses due to the increased temperature of cooling water provided to it. The remaining 6.7 MW isn't lost, per se. Instead, it would be needed to power the total booster pumps and tower fans necessary to run CCC at the plant. EPA considered the increased air emissions expected to make up for this annual 10 MW loss and ultimately concluded that any such increase would be inconsequential. Determination at 159.

Although PSNH disagrees with EPA's conclusion on the increased air emissions issue, the company would be remiss if it did not point out that EPA seemingly ignored that the expected parasitic power generation losses resulting from implementation of CCC at Merrimack

Station would eliminate enough electricity from the grid to power over 7,900 households. *See* 2012 Enercon Report at 26. As Enercon aptly noted:

> If conversion to closed-cycle cooling became the standard for all power plants in the United States, the generating capacity of the Nation's fleet would be substantially impacted. Assuming all open-cycle power plants in the United States were required to be converted to closed-cycle cooling, it is estimated that approximately 166 million MW-hr per year of generating capacity would be lost. This represents enough electricity to power approximately 15.5 million average American households. Approximately 40 power generating stations the size of Merrimack Station would have to be built to make up the lost generating capacity.

Id. (citations omitted). Obviously, plausible outcomes, such as retirement of the entire plant, would substantially aggravate this issue. Removal of this substantial amount of electricity from the grid is a material, adverse secondary environmental impact that provides even further support to the proper conclusion that CCC is not BTA for Merrimack Station. Moreover, EPA's failure to discuss and/or seemingly consider the macro effects of its piecemeal, § 316(b) BPJ based permit issuances is arbitrary and capricious and, frankly, short-sighted.

3. EPA failed to consider the culmination of upcoming regulatory actions imposed on the electric utility industry.

EPA is currently developing myriad environmental rules and regulations focused on the electric utility industry that will impose unrealistic timeframes, jeopardize reliability of the electric system, result in significant increases in electricity prices, undermine economic recovery, and cause a loss of jobs across much of the United States.[118] The majority of these rules are

[118] These regulations include the Cross-State Air Pollution Rule (Transport Rule) targeting SO2 and NOx in the Eastern United States (replacement for the Clean Air Interstate Rule (CAIR)), Maximum Achievable Control Technology for Electric Generating Units (Utility MACT), Coal Combustion Residuals or Byproducts targeting coal ash and byproducts (CCRs), § 316(b) rules regarding plant-cooling water intake structures, the climate change Endangerment Finding and the resultant triggering of New Source Review on new and modified sources for greenhouse gases such as CO2, GHG performance standards for new, modified, and existing utility sources, and effluent guidelines for water discharges from electric generators.

expected to be promulgated over the next 12 to 18 months and require full compliance within three years of being finalized. This current slate of rules is unprecedented in scope, scale, and timing and will drastically impact all coal- and oil-fired generation. The expected result of these numerous rules is fittingly being referred to as "EPA's Train Wreck" because of the impacts it will have on the electric utility industry and, specifically, energy production and reliability within the country.[119] Notably, NERC has concluded that EPA's Proposed § 316(b) initiative for cooling water intake structures will have the greatest impact on the industry.[120]

The electric generating units impacted by these rules and regulations represent roughly 400 GWs of capacity, which is 40 percent of the currently available generating capacity in the United States and nearly 50 percent of total United States generation. These generators are not only vital to electricity supply adequacy in the United States, but provide substantial generator-supplied frequency control capability on the bulk power system, which is essential to maintain the stability of the grid. The aggregate impact of these rules and regulations will require unprecedented levels of generation and transmission construction activity by utilities over a short period of time and could force the industry to operate in an uncertain condition where reliability and system stability may not be assured.[121]

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[119] *See, e.g.*, American Legislative Exchange Council, EPA's Regulatory Train Wreck (Nov. 2011).

[120] *See* NERC 2011 Long-Term Reliability Assessment (Nov. 2011).

[121] In the electricity industry, interrelationships between generators, loads, power flows, transmission system conditions, and demand growth, both within a single utility's footprint and in relation to neighboring systems, must be evaluated and "studied" in advance so that the system can be planned and operated in order that the causes and effects between different dynamic elements can be understood. Failure to understand in advance these dynamic relationships and operations where the causes and effects between different characteristics are "unstudied" violates existing NERC reliability standards on modeling, data, and analysis (its MOD standards). This would be tantamount to operating an air traffic control system with gaps in the radar. *See, e.g.*, U.S.-Canada Power System Outage Task Force, Final Blackout Report (April 2004). NERC has identified the need for updating its MOD standards to include valid, generic, non-confidential, and public power flow and stability models to understand and support actions to address reliability impacts from decreased coal-fired generation and increased variable energy resources on the bulk electric system. *See e.g.*, NERC, Special Report, "Standard Models for Variable Generation" (May 18, 2010).

In fact, the cumulative effect of these impending rules and regulations will result in generating units subject to said rules either installing extensive retrofits within an unrealistic timeframe or shutting down entirely. For example, a report from the Edison Electric Institute ("EEI") estimates that over 150 GWs of coal units—half of the United States coal fleet—is at risk of being unavailable in 2015 due to insufficient time to install controls or construct replacement generation.[122] Nearly 80 GWs of coal units would be retired by 2015 and the remaining coal units would be subject to an unachievable retrofit program. These retirements and retrofits create the need for utilities to spend an anticipated $300 billion in the next five years, over two-thirds of which is for replacement generation. Retrofits would be so substantial, in fact, that, in many cases, they will cost more to build than the cost of the original generating unit and may take nearly as long. Indeed, to simply comply with the impending rules, incremental capital cost estimates are between $85 and $129 billion.[123] Given the vital grid stability functions of these generators, neither costly retrofitting nor retirement is an acceptable result.

The stringency of these regulations, their inflexibility, and their rigid compliance schedules also unquestionably put reliability at risk.[124] Among other things, these rules will, in effect, cause reserve margins to plummet and unnecessarily increase the likelihood and severity of blackouts. Equally important to the degradation of generation reserve margins, these rules will result in a loss of generation capacity and associated operational support that is mission

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[122] *See* Edison Electric Institute, Potential Impacts of Environmental Regulation on the United States Generation Fleet (Jan. 2011).

[123] *Id.*

[124] NERC concluded that implementation of four EPA rules could result in a loss of up to 19 percent of fossil-fuel-fired steam capacity in the United States by 2018, with the potential for "significantly deteriorating future … system reliability." NERC, 2010 Special Reliability Scenario Assessment: Resource Adequacy Impacts of Potential United States Environmental Regulations IV (Oct. 2010) ("2010 NERC Report").

critical to maintaining balance, resilience, and contingency response capability on the bulk power network. As stated above, EEI's Report projects that 70 to 80 GWs of coal-fired generation retirements are possible as a result of the combined cumulative impacts of EPA's regulations. Other independent reports estimate comparable impacts. For instance, NERC considered two scenarios, a moderate case and a strict case, for the combined impacts of the existing and upcoming rules impacting electric utilities.[125] The NERC report specifically considered the impact of EPA's current and expected rulemakings on certain aspects of generation supply adequacy (capability to meet peak load obligations in a given planning horizon). NERC is also carefully evaluating the problems resulting from changes in generation resources interconnected to the grid, including the adverse impacts of displacing coal-fired generation with other forms of generation that do not provide the same kinds or amounts of grid support functionality. The fact that NERC is evaluating the adverse impacts of changing generation mix, increased interconnection of variable energy resources (such as wind and solar), as well as studying the effects of displaced coal-fired generation on interconnection wide and local balancing and frequency response should be understood by EPA as a warning that the assumptions it incorporated in its reliability impact determinations are flawed.

Collectively, these new rules and regulations will impose a form of indirect taxation via increased electricity rates, as well. This severely tests the ability of the economy to absorb the cost of massive retrofitting and new capacity projects undertaken on an unprecedented and

[125] 2010 NERC Report. NERC's study considered the combined impacts of the expected Utility MACT, the proposed CCR, the proposed Transport Rule, and the expected § 316(b) rules under the CWA. NERC's strict case reflects a higher increase in costs with more stringent requirements for the proposed rules than its moderate case. In its report, NERC determined that the applicable regulations will threaten the basic reliability of the electric grid by resulting in the annual removal of more than 70 GW of electric capacity (or roughly 7 percent of total capacity in the United States). Some areas would likely dip below a 15 percent "reserve margin," which is necessary to protect against vulnerabilities from extreme weather, blackouts, and other events. These vulnerabilities to the electrical grid have the potential to cause severe economic upheaval and diminished productivity.

constrained schedule. Controlling or replacing coal-fired generation nationwide will further impede the economic recovery of the United States. Impacts would include increased electricity rates, lower discretionary spending, job losses, lost tax revenues, potential adverse public health impacts, and risks to national security.[126] These rules will also result in a sudden and dramatic increase in the demand for capital, equipment, and resources. The increasing demands will thereby strain the supply of equipment, materials and resources, placing inflationary pressure on compliance costs that will ultimately be borne by consumers through more expensive electricity prices. Indirect consequences of the deterioration in electric system reliability and less affordable electricity prices include the loss of energy-intensive manufacturing operations, the loss of manufacturing jobs, a decline in tax revenues, and the risk to national security if military bases and key manufacturing and production operations do not have a steady and reliable supply of electricity.

In fact, IHS Global Insight estimates that every $1 billion spent on upgrade and compliance costs will put 16,000 jobs at risk and reduce United States GDP by as much as $1.2 billion.[127] Shutting down coal-fired facilities alone can cost several hundred jobs per facility. The closure of coal-fired plants and large industrial facilities also puts local government finances at risk due to their dependence on tax revenue associated with these facilities. Local

[126] *See, e.g.*, NERA, Potential Impacts of EPA Air, Coal Combustion Residuals, and Cooling Water Regulations (Sept. 2011); IHS Global Insight, The Economic Impact of Proposed EPA Boiler/Process Heater MACT Rule on Industrial, Commercial, and Institutional Boiler and Process Heater Operators (Aug. 2010) ("2010 IHS Global Insight Report"). PSNH's concerns with EPA's lack of attention to detail in this regard are shared, not only by other utilities and electricity regulators, but also by state environmental regulators because of the adverse public health impacts of electricity supply disruptions. *See, e.g.*, Comments of Pennsylvania Department of Environmental Regulation, Federal Energy Regulatory Commission Docket No. AD12-1-000, filed February 28, 2012 (FERC accession 20120228-5077) ("Clearly, the EPA needs all the help it can get. And the citizens of the United States need EPA to get that help. As the Centers for Disease Control and Prevention has pointed out, grid reliability impacts have fundamental ramifications for the health and safety of communities. Put simply, blackouts are public health and welfare hazards. Loss of power can result in, among other things, polluted drinking water, spoiled vaccines, unhealthy food supplies exposure to dangerous and/or life threatening heat or cold, and other adverse results.").

[127] 2010 IHS Global Insight Report at 5.

governments will have only a short period of time to institute plans for revising their budgets, retraining the workforce, and determining the extent of the services they can continue to provide.

In short, the effect of requiring utilities to retrofit or retire so many units in such a short time period will trigger a series of impacts on affordability, ranging from rapid rate increases to reductions in jobs, making the overhaul of nearly 50 percent of the generation fleet in three years impracticable, if not impossible. The potential impacts of EPA's draft NPDES permit for Merrimack Station cannot be evaluated in isolation, but must be considered in combination with other existing and upcoming regulatory initiatives—including electric system reliability mandates—that affect electric utilities. EPA has failed to consider such implications in issuing this piecemeal, case-by-case, draft permit. Had it done so, EPA would have undoubtedly recognized the detrimental impacts its determinations—requiring the investment of exorbitant capital dollars in a short period of time—will have on reliability, electricity prices, the economy and job creation and/or retention across much of the United States. EPA's failure to consider such factors is arbitrary and capricious and these factors must be properly considered prior to final issuance of this NPDES permit.

E. EPA cannot issue a final permit for Merrimack Station until it adequately responds to PSNH's Freedom of Information Act request.

EPA should extend the comment period for the draft permit until it has fully and adequately responded to PSNH's FOIA request. On October 12, 2011, PSNH submitted a FOIA request to EPA, pursuant to 5 U.S.C. § 552, *et seq.*, asking for EPA's documentation of, and/or support for, certain standards and limitations in the draft permit including but not limited to any and all agency records relating to decisions made by EPA involving the treatment of Merrimack Station's FGD system wastestream (hereafter "FOIA Request"). On October 27, 2011, EPA extended the original 60-day public comment period until February 28, 2012, due, at least in part to "the number of complex issues embodied in the Draft Permit, which the Region referred to as "unusual, if not unprecedented." *See* Letter from David M. Webster, Manager, Industrial Permits Branch, to Linda T. Landis, Senior Counsel, Public Service of New Hampshire (Oct. 27, 2011).

PSNH appreciates EPA's extension of the comment period. However, that extension has been ineffective because EPA has still not submitted a complete response to PSNH's FOIA Request. PSNH has received a partial response from EPA.[128] However, said response contained very few informative records related to EPA's establishment of FGD wastewater treatment limits, no identification of records withheld, nor any reasons for the lack of such records. PSNH and EPA have discussed the deficiencies of EPA's response to the FOIA Request and, as early as November 23, 2011, PSNH formally requested that EPA produce an index identifying any responsive record being withheld, along with an explanation for its withholding. EPA is obligated to produce such documentation under FOIA and its own regulations—a fact that has been acknowledged by Mark Stein at Region 1. *See* 5 U.S.C. § 552(a)(6)(C); 40 C.F.R. § 2.104(g)-(h); *see also Winthrop v. FAA*, 328 Fed. Appx. 1, 1 n.3 (1st Cir. 2009) (providing that any agency claiming an exemption under FOIA "is required to furnish the requester a *Vaughn* index, arising from *Vaughn v. Rosen*, 484 F.2d 820 (D.C. Cir. 1973), which requires a correlation of the information that an agency decides to withhold with the particular FOIA exemption and EPA's justification for withholding the document); *See* Email from Mark Stein, EPA Region 1, to Rob Fowler, Balch & Bingham LLP (Nov. 23, 2011).

To date, EPA has not provided any additional documents to PSNH, nor has EPA provided whether any such records in fact exist by producing an index or explanation of any

[128] Indeed, EPA Region 1 has attempted to maintain an administrative record on its website of all documents it considered in drafting the permit. Available at http://www.epa.gov/region1/npdes/merrimackstation/adminrec.html. However, new documents were added to that online record as recently as two weeks ago.

documents it is supposedly withholding. Thus, either EPA has violated FOIA by improperly withholding records, or Region 1 has adopted limits and standards in the draft permit without any adequate basis or scientific support. Both possibilities constitute unlawful agency action. Moreover, EPA's failure to provide or identify records requested by PSNH flies in the face of the President's goal of increased transparency for federal agencies. Specifically, the President's January 2, 2009, "Memorandum on Transparency and Open Government" obligates federal agencies to be transparent in all of their actions. Likewise, the Director of OMB's December 9, 2009 memorandum[129] directs federal agencies to implement the principles of transparency set forth in the President's Memorandum. Yet, EPA has refused to release the information that would allow the public the opportunity to review how EPA established the requirements of the draft permit for Merrimack Station.

EPA's failure to properly respond to the FOIA Request has forced PSNH and its consultants to submit these comments without the benefit of all documents considered by EPA in creating the limits and requirements of the draft permit. This is improper and prejudicial to PSNH and other third parties interested in the requirements of the draft permit. More importantly, however, EPA's unacceptable action justifies an extension of the existing comment period until EPA provides a complete response to PSNH's FOIA Request.

(a) EPA's draft permit includes unreasonable limits and requirements that are arbitrary and capricious, and therefore must be reconsidered.

In addition to EPA's unreasonable, arbitrary, and capricious determinations with regard to CWA § 316(a), § 316(b), and FGD wastestream discharge, EPA also included many other unreasonable terms in the permit that must be reconsidered and revised before a final permit is

[129] Available at http://www.whitehouse.gov/open/documents/open-government-directive.

issued. EPA's demands, detailed below, are unattainable and inexplicable. These permit terms must be revised to provide Merrimack Station with a manageable permit that protects water quality to the maximum extent reasonable achievable.

2. Outfall 003 (Point Source Discharge to Merrimack River)

PSNH respectfully requests that the following revisions regarding Outfall 003 be made and incorporated into the Final Permit:

a. <u>Retention of the Temperature In-River Monitoring Program</u>

The draft permit requires Merrimack Station to retain its four-station (Stations S-0, N-10, S-4, and N-5) surface temperature monitoring program, despite the fact that the draft permit simultaneously requires closed-cycle-cooling. This makes no sense, because the closed-cycle-cooling is, according to EPA, supposed to reduce the thermal load by 99.6 percent. EPA's requirement that this load then be monitored by Merrimack Station's existing program is unreasonable, arbitrary and capricious, especially given the burdensome nature, both financially and operationally, associated with this program. If EPA intends to require closed-cycle-cooling, then the existing temperature in-river monitoring program is no longer necessary and should be removed from the permit.

b. <u>TRC Monitoring</u>

Per the NELGs, EPA assigned a daily maximum limit for Free Available Chlorine (FAC) in the cooling tower blowdown (003D) of 0.5 mg/l. Additionally, EPA commented that compliance will be maintained with the Total Residual Chlorine (TRC) water quality standard if the Outfall 003D TRC is maintained below 4.6 mg/l. EPA claims that compliance with a 0.5 mg/l FAC limit does not necessarily ensure compliance with a 4.6 mg/l TRC limit, so TRC monitoring is also established at Outfall 003 along with a water quality based limit of 0.43 mg/l.

This is absurd. Under the current permit (with TRC limits of 0.2 mg/l at Outfalls 001 and 002), PSNH has never detected TRC at the end of the canal in its 19 years of monitoring. EPA even admits in the Permit Fact Sheet[130] that "based on the analysis and factors discussed above, there is no reasonable potential for an in-stream excursion of chlorine above the water quality standards." There is no compelling reason for PSNH to sample the end of the canal on a weekly basis to ensure that TRC will be less than 0.43 mg/l. In fact, if there was some reason to believe that water quality was at risk—which it clearly is not—it would have at least made sense to impose the TRC monitoring at Outfall 003D alongside the FAC monitoring.

c. **<u>Daily pH Monitoring</u>**

The daily pH monitoring requirements are unreasonable and unduly burdensome. PSNH requests a reduction in frequency and, at a minimum, that EPA clarify that pH monitoring be limited to Monday thru Friday, excluding holidays, and only when qualified personnel are readily available.

d. **<u>WET Testing</u>**

EPA admits that the potential toxicity of the discharges from Outfall 003 is "relatively low." NHDES Draft Permit Fact Sheet, at 48 ("The potential toxicity of the facility's remaining discharges cannot be known at this point, although EPA believes it is relatively low . . ."). Given the low threat of toxicity in the discharge as well as the time and expense involved, PSNH requests that the frequency of WET testing be reduced from a quarterly requirement (four times a year) to an annual requirement. The permit condition allowing for a reduction in frequency can be reversed to allow for increased frequency in WET testing if toxicity is detected.

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[130] Available at http://www.epa.gov/region1/npdes/merrimackstation/pdfs/MerrimackStationFactSheet.pdf.

e. <u>Shift the Majority of All Effluent Monitoring to Outfall 003</u>

EPA has historically defended the use of internal monitoring locations based on the high dilution provided by the existing open cooling water flow. With closed-cycle cooling, however, the canal flow will drop dramatically thereby eliminating EPA's concern with dilution. PSNH therefore requests that EPA—if it intends to incorporate the CCC requirement in the final permit—justify its decision to not shift the majority of all effluent monitoring to Outfall 003.

3. Outfall 003A (Treatment Pond Weir)

Outfall 003A represents the discharge from Merrimack Station's Slag Settling/Wastewater Treatment Pond. As an initial matter and to avoid any confusion, PSNH first requests that the description of Outfall 003A include the discharge from the slag settling area (Waste Treatment Plant #3) as well as flows related to the FGD service water pump house, which may include, among other things, screen and filter backwash and quench pump test water.

As a result of the addition of the treated FGD purge stream and at the request of DES—who was arguably acting at the direction of EPA—PSNH and DES cooperatively conducted an antidegradation analysis to determine whether additional water quality based limits were necessary at Outfall 003A. Based upon guidance provided by EPA Region 1 (which included an explanation that there were no technology based limits available for FGD wastewater), PSNH understood that the FGD wastewater discharge would be regulated by these water quality based limits (along with the rest of the discharge into Outfall 003A) and that the FGD purge stream would be regulated as a low volume waste, such that there was little expectation that any other limitations would be applied to the FGD discharge itself. DES and PSNH discussed the fact that some monitoring might be better relocated to the actual FGD WWTS discharge due to analytical limitations related to potential permit limits far below usual and customary detection levels at

Outfall 003A. In other words, it was understood that the majority of effluent monitoring would continue to be applied at Outfall 003A and not the new Outfall 003C. In fact, EPA need only include the more stringent of the technology based limit or the water quality based limit, not both.

However, EPA imposed both technology based limits at Outfall 003C, as well as water-quality limits at Outfall 003A for the same constituents. This makes no sense and is contrary to EPA's prior position of applying only the more stringent limit. EPA cannot argue that the limits serve different purposes as the water quality based limits proposed at Outfall 003A are directly related to the addition of the FGD WWTS, *i.e.*, Outfall 003C. Instead, EPA should remove the less stringent limits, either the water quality based limits at Outfall 003A or the technology based limits at Outfall 003C.

a. EPA Should Remove the Water Quality Based limits at Outfall 003A in Light of the Technology Based limits Imposed at Outfall 003C

The metal limits in EPA's draft permit were derived from the water quality study conducted by DES, discussed above. EPA also set technology based limits for most of these same metals at Outfall 003C, which EPA says are more stringent than the water-quality based limits at Outfall 003A. With minor revisions, PSNH supports the monitoring program proposed by DES with water-quality based limits at Outfall 003A and no technology based limits at Outfall 003C. If EPA insists on assigning these technology based limits at 003A then, there is no need to then place water quality based limits on the same metals at Outfall 003A. EPA should therefore remove the water quality based limits at Outfall 003A, since this effort at repetitive regulation leads to unreasonable and unduly burdensome permit limits that cannot be achieved over the long-term.

Further, EPA may only require internal effluent limits "[w]hen permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible." 40 C.F.R. Part 122.45. This prohibition of internal limits was an issue in *American Iron and Steel Institute v. EPA*, 115 F.3d 979 (D.C. Cir. 1997) ("AISI"). In AISI, the court first recognized the strict limits of EPA:

> The [Clean Water] Act provides that when a permitting authority determines that "discharges of a pollutant from a point source would interfere with the attainment or maintenance of [applicable] water quality standards, effluent limitations (including alternative effluent control strategies) for such point source shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality." The statute is clear: The EPA may regulate the pollutant levels in a waste stream that is discharged directly into the navigable waters of the United States through a "point source'; it is not authorized to regulate the pollutant levels in a facilities internal waste stream.

Id. at 996 (internal citations omitted) (emphasis added). Then the AISI Court explained its rationale:

> We are apprised of nothing in the policy underlying the CWA that undercuts the plain meaning of the statutory text. To the contrary, by authorizing the EPA to impose effluent limitations only at the point source, the Congress clearly intended to allow the permittee to choose its own control strategy. By imposing water quality based standards upon internal facility waste streams, the EPA seeks to deprive the individual permittee of the ability to choose between a control system that meets the point-source WQBEL [Water Quality-Based Effluent Limitations] by means of point source controls and a control system that meets the point source WQBEL by means of internal waste stream purification. As we have just seen, however, the statute does not permit this sort of meddling inside the facility.

Id. (emphasis added). EPA's authority to require and set internal permit limits is very constrained.

EPA incorporated water quality based limits, which were originally calculated by NH DES, on the FGD WWTS discharge at Outfall 003A.[131] Because monitoring at Outfall 003 is not impractical or infeasible, EPA is not authorized to set internal monitoring for water quality based limits and its actions are clearly arbitrary and contrary to law.

b. If EPA does not Remove All of the Water-Quality Based Limits for the Metals at Outfall 003A, it Should Revise the Permit Limits As Follows:

i. The Water Quality Limits for Selenium and Arsenic Should be Removed

Based on its extensive water quality study, NHDES only recommended monitoring and reporting for selenium and arsenic. Specifically, for arsenic, DES noted that it was "concerned about (1) the arsenic water quality standard being outdated and subject to revision by EPA; (2) the proposed limit possibly being unnecessarily stringent; (3) the potential for the federal antibacksliding regulations to require such a limit to be retained in the permit; (4) the excessive cost of monitoring for arsenic using clean sampling and analytical procedures, not just for PSNH but possibly for other permittees; and (5) the technical feasibility of achieving the limit. NHDES has determined that it would be inappropriate to include a numeric permit limit for arsenic in NPDES permits at this time." *See* NHDES Antidegradation Analysis of Merrimack River in the Vicinity of Merrimack Station (Oct. 4, 2010) at 5-6 ("AR 209"). DES went on to note that PSNH should only monitor and report the concentrations of arsenic in outfalls 003A and 003C (and conduct fish tissue monitoring to develop a site specific bioaccumulation factor for arsenic for the middle Merrimack River).

[131] To the extent that EPA set additional water quality based limits on internal outfalls, the CWA does not permit "this sort of meddling inside the facility." EPA must amend the draft permit to correct its overreaching effort.

Regarding the selenium monitoring and reporting requirements, DES stated that it "proposed that monitoring for selenium be included in the draft permit and that a reopener clause be added to allow the permit to be modified to include the limit of 0.058 mg/l at outfall 003A if it is determined during the permit term that there is reasonable potential for the limit to be violated. Accordingly, the draft permit contains a reopener clause and a monitoring requirement for selenium." AR #209 at 7. DES therefore found that there was no reasonable potential that the water quality based limit would be violated.

Therefore, the very data that EPA relied on to require water-quality based limits is the very data that DES used to conclude that only monitoring and reporting—and not water quality based limits—were necessary for arsenic and selenium. EPA should remove these limits from the permit because they are unnecessary and EPA's overreaching is in error.

ii. There is no Reasonable Potential that Copper will Exceed the Proposed Permit Limits, So the Water-Quality Limits Should be Deleted

The copper water quality based limit must be revised and removed because there is no reasonable potential that the proposed copper permit limits will be exceeded. Specifically, Attachment F to the Draft Permit compiles six years of actual monitoring data, which reports average and maximum concentrations of copper of 0.010 and 0.05 mg/l, respectively. PSNH has provided a larger historical data set that substantiates the respective concentrations even further. This data therefore shows that there is clearly no reasonable potential to exceed the proposed permit limits of 0.027 and 0.083 mg/l. Therefore, the copper water-quality limit must be removed from the permit.

iii. The Monitoring Requirement for Mercury is Unduly Burdensome and Must Be Less Stringent in Order to Be Reasonably Achievable

NHDES set a mercury limit of .00072 μg/l at Outfall 003A but, because of analytical limitations, the reporting detection limit was set at 0.2 μg/l. DES also recommended that a mercury water-quality based limit of 0.13 mg/l be required at Outfall 003C, with the assumption that the same reporting detection limit of 0.2 μg/l would be established. PSNH supports the DES proposal for mercury regulation over the conditions that EPA required in the Draft Permit, including the requirements at both Outfall 003A and Outfall 003C as they relate to mercury. EPA's expectation to consistently and accurately monitor at such low concentration is unreasonable and the monitoring requirements are unduly burdensome.

iv. The Monitoring Limit for Aluminum is Unnecessary

On the Fact Sheet, EPA states that it does not consider aluminum "a pollution[sic] of concern for the FGD WWTS effluent discharge" and, therefore, has not set a technology based standard at Outfall 003C. Since aluminum is not a pollutant of concern in FGD effluent and since the water quality based limits at Outfall 003A were a result of the FGD addition, PSNH requests the limit for aluminum be removed.

v. EPA Cannot Justify Increasing the Monitoring and Reporting Requirements from Monthly and Quarterly Grab Samples to Weekly Composites

Moreover, EPA's requirement that monitoring and reporting requirements for the metals in Outfall 003A increase from monthly and quarterly grab samples to weekly composite sampling is also clearly unreasonable and must be revised. Attachment F to the Draft Permit compiles six years of actual monitoring data, and during that six years Merrimack Station had one—and only one—permit noncompliance at Outfall 003A. This compliance record hardly justifies increasing effluent monitoring from monthly and quarterly grab samples to weekly composites. This redundant and excessive monitoring is particularly burdensome given that EPA's extremely low limits will require that most samples be collected using clean techniques and then shipped across the country for analysis. These monitoring and reporting requirements are crippling and unachievable, and EPA cannot justify this unwarranted regulation.

vi. The Existing Monitoring Requirements for TSS, Oil and Grease Should be Retained

The data in Attachment F indicates that EPA's data for TSS shows that the maximum and average values for 72 readings conducted over a six year period were 19.2 and 5.6 mg/l, respectively, compared to permit limits of 100 and 30 mg/l, respectively. At a minimum, this data supports maintaining the existing monitoring program of monthly grab samples, with no justification to increase to weekly composite samples.

Further, visual monitoring has been an excellent surrogate for weekly analysis of oil and grease at several outfalls at Merrimack Station, including Outfall 003A.

vii. The Flow (MGD) Permit Limits at Outfall 003A are Unnecessary Given EPA's Decision to Impose Technology based Limits at Outfall 003C

If EPA intends to regulate the FGD effluent with technology based standards, PSNH requests that the flow limits be eliminated or, at a minimum, the average monthly flow be increased to 6.5 mgd. EPA recognized a similar oversight at Outfall 003C when they removed the permit limits in their correction letter, issued December 16, 2011.

viii. There is No Basis for the Requirement to Monitor Chloride

PSNH agrees with the NHDES statement that there "is no reasonable potential for the existing discharge to cause a violation of the chronic aquatic life criteria." AR #209 at 8. Therefore, there is no reason to require a 24-hour composite sample be collected and tested for chloride every week. EPA's concern about "future effluent quality" does not change the fact that there are no water quality concerns or technology standards. EPA Fact Sheet to NPDES Draft Permit, at 26. Therefore there is no basis to monitor chloride and the requirement limit must be deleted.

4. Outfall 003B (Metal Cleaning Waste)

Merrimack Station generates metal cleaning wastewater during the following activities: (1) cleaning the Unit 1 air heater, typically 4 or 5 times each year, producing, in the range of 200,000 to 400,000 gallons of wastewater each time; (2) cleaning Unit 1's air heater, boiler, precipitators, and stack once every 18 to 24 months, producing in the range of 400,000 to 600,000 gallons of wastewater; and (3) cleaning Unit 2's air heater, boiler, precipitators, and stack once a year, producing upwards of a million gallons of wastewater. Based on these numbers, PSNH's permit renewal application provided the average flow of metal cleaning wastewater for Unit 1 was 6850 gpd (500,000 gallons 5 times a year) and Unit 2 was 2900 gpd (1,058,500 gallons 1 time per year).

Prior to major maintenance outages, daily discharges of low volume wastewater ("LVW") are collected after treatment until two of the three basins are mostly filled. This LVW is then used as the supply to start the metal cleaning wash. Once the water is used to wash ash from equipment, it drains back to Basin 1 where it is chemically treated to enhance settling. The treated LVW is then pumped to Basin 3 where primary settling occurs before being transferred to Basin 2. From Basin 2, the wastewater is recycled back to be used as a continuing source for ongoing fireside wash. Limited volumes of treated wastewater are intermittently discharged during this process as necessary to maintain capacity in the treatment facility. Once the waterwash is finished, the wastewater is treated and the basins are sequentially discharged as the iron concentrations drop below 1.0 mg/l. This process is dependent upon the ability to blend the routine LVW with nonchemical metal cleaning wastes.

During all outages, the station floor drains are routinely exposed to fireside wastewater or some other nonchemical metal cleaning operation, *e.g.*, condenser and heat exchanger cleanings. Therefore, the floor drain system routinely transfers a combination of LVW and nonchemical metal cleaning wastes from Merrimack Station to the treatment facility during every significant outage. EPA's draft permit would prohibit the commingling of these two wastestreams and would prevent the discharge of LVW to the WWTF during the treatment of metal cleaning waste. As explained above, these actions are not physically possible at Merrimack Station since the WWTF was designed to centrally treat all wastewaters. EPA's draft permit would prevent the use of the washwater recycling system and increase both the consumption of potable or river water and the generation of significantly more wastewater.

EPA arbitrarily and substantially changed PSNH's requirements for discharges via Outfall 003B and should eliminate these requirements in the final permit for Merrimack Station. Specifically, EPA should only include "chemical cleaning waste discharges" in Outfall 003B. Likewise, fireside washes and/or more routine operations should be allowed to combine prior to monitoring and should continue to be managed through Outfall 003A. Since 1985, EPA has addressed metal cleaning waste at Merrimack Station in this manner.

EPA's rationale for prohibiting this requirement is based on 40 C.F.R. § 125.3(f), which prohibits dilution in lieu of treatment. PSNH recognizes that dilution is not an option. However, EPA's regulations do not forbid commingling of wastestreams. Specifically, EPA regulations state:

> In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property . . . attributable to each controlled waste source shall not exceed the specified limitations for that waste source.

40 C.F.R. 423.13(h). EPA's guidelines make this point even more clear:

> It is also recognized by EPA that, due to economies of scale, combining similar waste streams for treatment to remove the same pollutants is generally less costly than separate treatment of these waste streams. The employment of cost saving alternatives in meeting the effluent limitations should not be discouraged.

39 Fed. Reg. 36,186, 36,196 (Oct. 8, 1974). Other sections of EPA's regulations explain how EPA will address limits if wastestreams are combined for treatment. *See* 40 C.F.R. § 423.13(h). This clearly acknowledges that the regulations do not prohibit the commingling of wastestreams.

EPA's prohibition of LVW from mixing with metal cleaning water is unwarranted and not required by EPA regulations. EPA wrongly assumed that Merrimack Station was simply diluting metal cleaning water as a treatment technique. This is wrong. Merrimack Station mixes the wastestreams as part of its overall design and efficient operation of the facility. Further, because Merrimack Station's Outfall 003 is accessible and monitoring is practicable, this requirement is unwarranted. EPA's unsupported assumption that PSNH can engineer the solution or make scheduling adjustments to achieve EPA's unreasonable requirements is arbitrary, capricious, and has no factual basis. This is especially true in light of the fact that EPA's assumption would require PSNH to spend significant resources and attempt to increase its storage capacity by approximately 100 percent in an already tight footprint. Simply put, PSNH does not have the extra capacity or space to segregate the wastestreams and EPA's requirements on this issue are arbitrary. Making PSNH spend money for the sake of spending money is never right.

Also, Region 1 recently issued the Brayton Point facility a permit that authorizes the combined treated wastestream of metal cleaning wastes and LVW, clearly indicating its regulatory authority to do so. Apparently, EPA reasoned that the LVWs have similar characteristics as nonchemical metal cleaning wastestreams. In fact EPA is correct on this point. Both streams often have similar concentrations of the same metals and it is impractical, costly, and inefficient to manage the two streams separately. EPA should revise these requirements so that Outfall 003B only regulates the discharge of chemical metal cleaning wastes.

5. Outfall 003D (Cooling Tower Blowdown)

PSNH respectfully requests the following revisions to the permit limits at Outfall 003D, Cooling Tower Blowdown:

- PSNH requests the FAC monitoring be reduced to Monday through Friday, excluding holidays, and when qualified plant personnel are available.
- Based upon footnote 14, it appears that the discharge limit should be labeled as "Average Daily" instead of "Average Monthly."
- PSNH requests the chromium and zinc monitoring requirements be reduced to monthly grab samples. The current monitoring requirements are unduly burdensome and unreasonable.
- PSNH requests the characteristic description be expanded to reflect the language contained at 40 C.F.R. § 423.15(j)(3) which requires no detectable amounts of the 126 priority pollutants "contained in chemicals added for cooling tower maintenance."
- Given that EPA has reduced the allowable thermal discharge by 99.6-percent, it makes no sense to establish thermal limits and require continuous thermal monitoring at two locations with daily heat load calculations and monthly and annual reporting. PSNH therefore requests the entire thermal effluent section be removed.
- EPA should amend the draft permit to recognize that the 1.19 million gallons per day was a preliminary estimate of total flow and there is no real need to regulate the flow.

6. Outfall 004A (Unit 1 & Unit 2 Traveling Screen Washwater)

PSNH respectfully requests revisions to the permit limits at Outfall 004A, the Unit 1 and Unit 2 Traveling Screen Washwater. First, there is no reason to have a flow limit and PSNH requests that EPA remove this limit. Additionally, the inspections are unreasonable, unduly restrictive, and unachievable over the long-term. PSNH therefore requests that the inspections be reduced to Monday thru Friday, excluding holidays, when qualified personnel are available to conduct the inspections. PSNH further requests that EPA eliminate monitoring for oil and grease if inspections will be required on a daily basis.

7. Outfall 004B (Fire Main Pump Overflow & Ice Dam Removal Sprays)

PSNH respectfully requests revisions to the permit limits at Outfall 004B, the Fire Main Pump Overflow and Ice Dam Removal Sprays. First, there is no reason to have a flow limit and PSNH requests that EPA remove this limit. Additionally, the inspections are unreasonable, unduly restrictive, and unachievable over the long-term. PSNH therefore requests that the inspections be reduced to Monday thru Friday, excluding holidays, when qualified personnel are available to conduct the inspections. PSNH further requests that EPA eliminate monitoring for oil and grease if inspections will be required on a daily basis.

8. Outfall 004C (Unit 1 & Unit 2 CWIS Operational Sump Pumps)

PSNH respectfully requests revisions of the permit limits at Outfall 004C, the Unit 1 and Unit 2 CWIS Operational Sump Pumps. First, there is no reason to have a flow limit and PSNH requests that EPA remove this limit. Additionally, the inspections are unreasonable, unduly restrictive, and unachievable over the long-term. PSNH therefore requests that the inspections be reduced to Monday thru Friday, excluding holidays, when qualified personnel are available to conduct the inspections. PSNH further requests that EPA eliminate monitoring for oil and grease if inspections will be required on a daily basis. Finally, if EPA refuses to remove the sampling requirement for oil and grease, PSNH requests the frequency be reduced to 1/year which is consistent with the other outfalls and the language in subscript 18 (NHDES Draft Permit, at 22 n.18) which states that "[i]n addition to yearly testing, testing for Oil and Grease shall be immediately initiated if oil sheen is observed."

9. Outfall 004D (Unit 1 & Unit 2 Deicing Headers)

PSNH respectfully requests revisions of the permit limits at Outfall 004D, the Unit 1 and Unit 2 Deicing Headers. The deicing recirculation water is not a discharge to the river since it is immediately drawn back into the station; therefore, this outfall should be eliminated from the permit. If EPA ignores PSNH's request and refuses to remove the outfall from the permit, then there is no reason to have a flow limit and PSNH requests that this limit be removed. Additionally, the permit application reports that the estimated flow for the two units is 21 MGD, not 1.0 MGD as EPA has provided as the permit limit, and the flow cannot be estimated from a pump curve as the water is simply forced back from the condenser outlet. Moreover, if the outfall is not eliminated, then PSNH further requests that the oil and grease monitoring be removed if inspections are required on a daily basis, and that the inspections be reduced to Monday thru Friday, excluding holidays, when qualified personnel are available to conduct the inspections.

10. Outfall 005A (Unit 1 Cooling Water Intake Structure Maintenance Sump Pumps)

PSNH respectfully requests revisions to the permit limits at Outfall 005A, the Unit 1 Cooling Water Intake Structure Maintenance Sump Pumps. First, there is no reason to have a flow limit and PSNH requests that EPA remove this limit. Additionally, the inspections are unreasonable, unduly restrictive, and unachievable over the long-term. PSNH therefore requests that the inspections be reduced to Monday thru Friday, excluding holidays, when qualified personnel are available to conduct the inspections. PSNH further requests that EPA eliminate monitoring for oil and grease if inspections will be required on a daily basis.

11. Outfall 005B (U1 CWIS Maintenance Sump Pumps)

EPA independently authorized the discharge of Outfall 005A and 005B into the Merrimack River. However, these two outfalls are substantially identical and simply represent different locations where the pump hose may discharge. Therefore, Outfall 005B should be eliminated from the permit.

12. Outfall 005C (U2 CWIS Maintenance Sump Pumps)

PSNH respectfully requests revisions to the permit limits at Outfall 005C, the Unit 2 Cooling Water Intake Structure Maintenance Sump Pumps. First, there is no reason to have a flow limit and PSNH requests that EPA remove this limit. Additionally, the inspections are unreasonable, unduly restrictive, and unachievable over the long-term. PSNH therefore requests that the inspections be reduced to Monday thru Friday, excluding holidays, and as long as personnel are available to conduct the inspections. PSNH further requests that EPA eliminate monitoring for oil and grease if inspections will be required on a daily basis.

13. Outfall 005D (U2 CWIS Maintenance Sump Pumps)

EPA independently authorized the discharge of Outfall 005C and 005D into the Merrimack River. However, these two outfalls are substantially identical and simply represent different locations where the pump hose may discharge. Therefore, Outfall 005D should be eliminated from the permit.

14. Explanation of Superscripts, NHDES Draft Permit

PSNH also takes issue with several of the Superscripts accompanying the permit document. Specifically, PSNH requests the following:

- (5)d. PSNH requests that chromium be removed from the list of WET test parameters as it is not listed in Attachment A.

- (5)f. PSNH requests that WET testing be automatically suspended for the permit duration after four consecutive sampling periods, if no test shows a LC50 $<$ 100%.

- (8) PSNH requests the weekend discharge prohibition be eliminated since EPA has never collected a sample.

- (9) PSNH requests approval to substitute 8 grab samples over the discharge period as a suitable replacement for continuous pH monitoring.

- (11) If EPA refuses to eliminate BOD5 monitoring as requested earlier, PSNH requests a reduction to annual monitoring be granted automatically after six months of reporting. Moreover, PSNH requests BOD5 monitoring be automatically eliminated after the six month period.

- (14) If the limit is supposed to be the average of analyses made over a single period and if the sampling frequency is daily, then the limit should be labeled as an "Average Daily Limit."

- (17) PSNH requests that daily inspections are only required Monday thru Friday, excluding holidays, when qualified personnel are readily available.

- (20) PSNH requests this outfall and footnote be eliminated since there is no discharge to the river.

15. Unusual Impingement Events

The draft permit requires Merrimack Station's traveling screens to be rotated at least every eight hours and, if more than forty (40) fish have been impinged on the screens at any time, said screens must be rotated continuously. The permit also requires the operator to count and identify the species of each dead fish, as well as measure a certain percentage of the dead of each species. These requirements are not practical to incorporate into the day-to-day operations of a large plant and should be deleted from the permit.

Alternatively, and at the very least, PSNH requests that the permittee be required to observe, on the traveling screens, or estimates, based on temporarily limited observations, fifty (50) or more and not forty (40) or more impinged fish to reflect the number that has historically defined an extraordinary impingement event.

16. Daylight Savings Time Adjustment

PSNH respectfully requests that all flow limits in the Draft Permit be increased accordingly to account for the 25-hour operation for daylight savings time adjustment.

17. Compliance Schedule

PSNH requests that EPA revise the Draft Permit to recognize that PSNH need not immediately comply with the requirements to install a cooling tower and biological treatment system. Instead, an interim period is necessary to allow for construction of these facilities and integration of these facilities into the existing operation of Merrimack Station. A "compliance schedule" is authorized under CWA § 309, as recognized by EPA in its Draft Permit Fact Sheet. NHDES Draft Permit Fact Sheet, at 9 ("When appropriate, however, schedules by which a permittee will attain compliance with new permit limits may be developed and issued in an administrative compliance order under CWA § 309(a) or some other mechanism."). EPA should therefore recognize the high probability that PSNH will be issued an administrative compliance order such that immediate compliance will not be required and the existing facilities will be allowed to operate without interruption.

V. Conclusion

EPA's proposed NPDES permit for Merrimack Station must be revised. EPA simply does not have sufficient bases to support its proposed limits and requirements. PSNH is entitled to a continuation of its § 316(a) variance for its thermal discharges – a variance under which the Station has operated for over 20 years. EPA has not provided any rational basis for its rejection of PSNH's variance request. Instead, EPA has based its entire § 316(a) decision on an analysis of the Hooksett Pool at a time when it was most polluted. EPA must grant the continuation of Merrimack Station's current § 316(a) variance for its thermal discharges in the final NPDES permit.

CCC is not BTA for Merrimack Station's CWISs. EPA should not have established BTA for Merrimack Station on a case-by-case basis, in light of the impending national rule that must be finalized by EPA on or before July 27, 2012. Nevertheless, analysis of the BTA factors confirms that CCC is an "unavailable" technology at Merrimack Station; is unnecessary to reduce AEI given the *de minimis* incidence of impingement and entrainment currently occurring at the plant; would result in the expenditure of costs that are wholly disproportionate and/or significantly greater than any expected environmental benefits that would accrue from the technology; and, is unwarranted due to a number of secondary environmental factors that collectively result in other material adverse impacts to the plant. Instead, a combination of operational changes and upgrades to Merrimack Station's fish return system constitute BTA pursuant to § 316(b). Indeed, these measures collectively provide the only option for Merrimack Station's CWISs that satisfies each of the BTA factors. EPA must consider these comments, which clearly prove that CCC is not BTA, when setting technology limits in the final NPDES permit for Merrimack Station.

Biological treatment is not BAT for the FGD scrubber wastestream. Instead, the physical/chemical system currently operating at Merrimack Station is BAT. EPA improperly predetermined its BAT conclusion by relying on an EPA guidance memorandum that attempts to circumvent the CWA by setting national standards without going through proper notice and comment. Moreover, EPA's decision to create case-by-case effluent limits for the FGD scrubber wastestream was unlawful because national effluent limitation guidelines exist. Nevertheless, EPA's selection of biological treatment as BAT for Merrimack Station is indefensible. The effectiveness of the technology is simply not proven. EPA used data from only two plants that have installed biological reactors in an attempt to demonstrate that the technology is effective, yet ignores very important differences between those plants and Merrimack Station. Most important, EPA failed to consider that the plants upon which its BAT determination for Merrimack Station is based could not even meet the limitations included in the draft permit. EPA made self-serving determinations in analyzing BAT for the FGD scrubber wastestream, evidenced by its failure to take into account costs, engineering processes, operational constraints and other important considerations. EPA must set technology limits for the FGD scrubber wastestream based on the performance of the currently installed physical/chemical system in the final NPDES permit for Merrimack Station.

Finally, and importantly, EPA must take into account important costs and consequences associated with the permit's proposed limits and requirements. EPA seemingly ignored the potential serious impacts of its proposed permit on availability and operating capabilities of Merrimack Station and on electric grid reliability. Any final permit for Merrimack Station must take these important implications into consideration.

Based upon the comprehensive comments, voluminous scientific studies, detailed economic analyses, and site-specific technological evaluations submitted, PSNH respectfully urges EPA to reconsider what is reasonably necessary in order for Merrimack Station to comply with the CWA, and to amend the draft permit accordingly.