Table of Contents – Chapter III

1.0 The 2014 Final § 316(b) Rule Requires EPA To Revisit Its BTA Determination In The Draft Permit

Comment III.1(i)	AR-1548, PSNH, pp. 110-111
See also AR-1215, PSNH, p. 169	

In 2011, EPA utilized its BPJ authority to render a determination that a limitation of the intake flow volume of both CWISs at Merrimack Station to a level consistent with operating in CCC mode annually from April 1 through August 31, is BTA pursuant to § 316(b). PSNH and other interested stakeholders disputed this determination as arbitrary and capricious in their February 2012 comments to the Draft Permit. These comments were validated by EPA's promulgation of the 2014 final § 316(b) rule, in which the agency specifically rejected CCC as BTA for the industry.[483]

EPA correctly acknowledges in its Statement that its BPJ-based BTA determination in the Draft Permit is now null and void due to the new final § 316(b) rule. The agency is required to generate a new BTA determination in accordance with the requirements of this new rulemaking. A reasonable application of this rule would lead to a conclusion that the operation and technologies of the existing CWISs constitute BTA because the rates of impingement and entrainment at the facility are *de minimis* and because EPA implicitly acknowledged in its final § 316(b) rule that facilities with a three-year average AIF below 125 MGD are not required to address entrainment, absent extenuating circumstances (which do not exist at Merrimack Station).

Set out below is a detailed discussion of the final § 316(b) rule, including a well-reasoned application of its requirements to Merrimack Station—dictating that existing CWISs constitute BTA. PSNH also sets out a discussion of the 2017 evaluation of wedgewire screen technologies by Enercon and Normandeau, as well as an analysis of whether this CWIS technology is feasible and cost-effective for the facility. PSNH concludes its § 316(b) discussions by revisiting and updating it 2012 comments to the Draft Permit regarding why CCC is not and cannot be BTA for the CWISs at Merrimack Station.

483 *See, e.g.,* 79 Fed. Reg. at 48,340.

EPA Response

PSNH first comments that EPA's nationally applicable 2014 Final Regulations for Existing Cooling Water Intake Structures (Final Rule) validate PSNH's earlier comments opposing EPA's site-specific determination in the 2011 Draft Permit that closed-cycle cooling is the BTA for Merrimack Station. According to PSNH, the Final Rule "specifically rejected CCC as BTA for the industry."

To the extent the comment suggests that the Final Rule prohibits the selection of closed-cycle cooling as the BTA at a particular facility, EPA disagrees. To be clear, EPA found in the Final Rule that closed-cycle cooling reduces entrainment and impingement mortality to the greatest extent and is the most effective performing technology. 79 Fed. Reg. 48,300 at 48,340 (Aug. 15,

2014); *see also id.* at 48,342 ("Closed-cycle cooling is indisputably the most effective technology at reducing entrainment."). In the Final Rule, EPA specifically adopted closed-cycle cooling as the BTA for entrainment (and impingement) for new units at existing facilities. *Id.* at 48,337; 40 CFR § 125.94(e)(1). Furthermore, EPA established closed-cycle cooling as an alternative for satisfying the BTA standard for impingement mortality at existing facilities. *See* 40 CFR § 125.94(c)(1). For entrainment at existing facilities, EPA adopted a regulatory framework under which the permitting authority establishes BTA entrainment requirements "on a site-specific basis following prescribed procedures and applying specified factors for decisionmaking . . ." 79 Fed. Reg. at 48,342.[1] And, the Final Rule explicitly recognizes that EPA may determine that closed-cycle cooling is the site-specific BTA standard for entrainment at a particular facility. *See* 40 CFR § 125.94(d). Thus, EPA clarifies that the Final Rule does not prohibit EPA from selecting closed-cycle cooling as an entrainment BTA at a particular facility, but rather requires that its selection as the best technology available be determined via a site-specific inquiry. *See* 40 CFR § 125.98(f); *Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49, 66 (2d. Cir. 2018) (noting that, under the Final Rule, a permitting authority may determine that closed-cycle cooling is the BTA at a particular facility).

PSNH also comments that the Final Rule, promulgated after EPA issued the Draft Permit, nullifies EPA's BPJ-based permit determination and that, consequently, EPA must "generate a new BTA determination" in accordance with the requirements of the Final Rule. In particular, EPA disagrees that its 2017 Statement of Substantial New Questions for Public Comment ("the 2017 Statement") "acknowledges…that its BPJ-based BTA determination in the Draft Permit is now null and void." The 2017 Statement specifically requested comment regarding "the import of the 2014 CWA § 316(b) Regulations" and "what cooling water intake structure requirements should be included in the Final Permit in light of the 2014 CWA § 316(b) Regulations" but did not "acknowledge" that the BPJ-based BTA determination in the Draft Permit was "null and void." Rather, EPA recognized that the Final Rule grants a permitting agency the discretion to decide whether to consider each of the factors specified in 40 CFR § 125.98(f)(2) and (3), when rendering a BTA determination in an ongoing permit proceeding such as this one. 2017 Statement at 16-17. As EPA noted, the regulation provides that "[t]he Director's BTA determination may be based on some or all of the factors in paragraphs (f)(2) and (3) of this section and the BTA standards for impingement mortality at § 125.95(c)." *Id.* EPA further noted that it had "effectively considered all of the § 125.98(f)(2) and (3) factors, as well as the technologies specified in 40 CFR § 125.94(c)" in its proposed BTA determination in the 2011 Draft Permit. *Id.* Having said that, EPA agrees that the Final Rule is effective and that the final BTA determination for Merrimack Station should be consistent with the new regulations. *See id*. To this end, EPA has considered the factors at 40 CFR § 125.98(f)(2) and (3) in rendering its determination for the Final Permit and has determined that the site-specific determination complies with the Final Rule. *See* Response to Comment 5.3.

Finally, PSNH comments that EPA should determine that the current operation and technologies of the existing CWISs constitute BTA because "the rates of impingement and entrainment at the

[1] The Final Rule makes no specific mention of Merrimack Station and, therefore, does not specifically identify any particular technology as the BTA for the facility.

facility are *de minimis* and because EPA implicitly acknowledged in its final § 316(b) rule that facilities with a three-year average actual intake flow (AIF) below 125 MGD are not required to address entrainment, absent extenuating circumstances (which do not exist at Merrimack Station).” In the Responses to Comments below, EPA evaluates the existing technologies at Merrimack Station’s CWISs pursuant to the framework established in the Final Rule and whether the rates of entrainment and impingement at Merrimack Station are *de minimis*. *See* Response to Comments III.3, III.3.4, III.3.6. EPA also disagrees with PSNH’s statement that the Final Rule implicitly acknowledges that a facility with an AIF less than 125 million gallons per day (MGD) is not required to address entrainment. As discussed in detail in Response to Comment III.3.5, the BTA standard for entrainment applies to all facilities subject to the Final Rule (i.e., with design flows greater than 2 MGD and which use at least 25% of water withdrawn from its CWISs exclusively for cooling).

1.1 Legal Background

Comment III.1.1	**AR-1548, PSNH, pp. 111-118**
See also AR-1231, PSNH, pp. 29-34	

PSNH set out the complete CWA § 316(b) legal history in its February 28, 2012 comments to EPA’s original Draft Permit.[484] Included here is the only relevant legal background: an explanation of EPA’s 2014 § 316(b) final rule, which governs the regulation of all CWISs within the industry—including the CWISs at Merrimack Station. EPA published its CWA final § 316(b) rule for CWISs on August 15, 2014.[485] The final rule became effective October 14, 2014.[486] It applies to existing industrial facilities with the capability to withdraw greater than 2 MGD and utilize 25 percent or more of that water exclusively for cooling purposes.[487] The new regulations are codified under 40 C.F.R. Part 125, Subpart J, and 40 C.F.R. § 122.21, and establish categorical standards for determining and implementing BTA to minimize impingement and entrainment impacts of CWISs. The final § 316(b) rule modified and combined into a single rulemaking portions of its previous phased CWA § 316(b) rulemakings that had been litigated and remanded following judicial review.[488]

The primary requirements applicable to existing facilities in the final § 316(b) rule include the requirement that any facility with a DIF greater than 2 MGD install one of several approved technologies to reduce fish impingement mortality at its CWIS and the requirement that any existing facility with an AIF over 125 MGD conduct certain studies regarding entrainment of aquatic organisms in the facility’s CWIS that will allow the permitting authority to establish BTA standards for entrainment on a site-specific basis.[489] As an existing facility withdrawing less than 125 MGD AIF, Merrimack Station is subject only to the first of these two primary requirements.

EPA advanced seven “pre-approved” control technologies from which a facility may choose to satisfy the impingement mortality BTA standard.[490] The new regulations also allow facilities to select other technologies upon a demonstration to the permitting authority that the selected technology will perform adequately.[491] The seven delineated control technologies for impingement mortality include:

(1) operate a closed-cycle recirculating system;

(2) operate a CWIS with a designed maximum through-screen design intake velocity of 0.5 fps;

(3) operate a CWIS with actual maximum through-screen design intake velocity of 0.5 fps;

(4) operate an offshore velocity cap if installed before October 14, 2014;

(5) operate a modified traveling screen that incorporates certain protective measures as defined by 40 C.F.R. § 125.92(s);

(6) operate any other combination of technologies, management practices, and operational measures that the permit writer determines is BTA for impingement reduction; and

(7) achieve the specified impingement mortality performance standard.[492]

Options 1, 2, and 4 are essentially "pre-approved" technologies the implementation of which would not generally require a demonstration to or approval by the permitting authority. Option 3 requires at least daily monitoring of the actual velocity at the screen in perpetuity, and Option 7 requires biological monitoring in perpetuity at a minimum frequency of monthly to demonstrate compliance with the impingement mortality performance standard.[493] If a facility chooses Options 5 or 6 to comply with the rule, it must undertake an "impingement technology performance optimization study."[494] That study takes place after the installation of the chosen impingement technology and following the issuance of a new final NPDES permit (*i.e.*, "post-permit"). The study must include two years of at least monthly impingement mortality monitoring and set forth biological data measuring the reduction in impingement mortality achieved by operation of the chosen compliance option, including a demonstration that operation of the compliance option has been optimized to minimize impingement mortality.[495]

EPA has acknowledged there may be circumstances in which flexibility in the application of the final § 316(b) rule may be necessary.[496] For this reason, EPA has the discretion to determine that no additional controls are needed to meet the BTA impingement mortality standard if the rate of impingement at the facility is *de minimis*.[497] There is not an explicit standard or threshold for when the agency will deem a facility a candidate under the *de minimis* provision.[498] By way of illustration, the final rule provides that a facility might be a candidate for consideration "if [the] facility withdraws less than 50 [MGD] AIF, withdraws less than 5 percent of mean annual flow of the river on which it is located (if on a river or stream), and is not co-located with other facilities with CWISs such that it contributes to a larger share of mean annual flow[.]"[499] EPA explicitly clarifies that "the authority of the Director [to utilize the *de minimis* provision] is not limited to low flow facilities," despite the examples provided.[500] The agency acknowledges the definition of *de minimis* can and should vary on a site-specific basis.[501] Therefore, in order for a facility to avail itself of the *de minimis* provision, it must submit data to EPA indicating its *de minimis* impingement rate.[502]

For entrainment reduction, the final § 316(b) rule establishes regulations requiring the permitting authority to make a site-specific BTA determination—including a possible determination that no entrainment controls at a facility are necessary—after consideration of certain specified factors and based on all available entrainment data for a facility.[503] Specifically, 40 C.F.R. § 125.98(f) states that a permitting authority must consider the following factors in making such a site-specific determination:

> (i) Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species, and designated critical habitat (e.g., prey base);
>
> (ii) Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;
>
> (iii) Land availability inasmuch as it relates to the feasibility of entrainment technology;
>
> (iv) Remaining useful plant life; and
>
> (v) Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.[504]

In terms of social costs and relative benefits, the "significantly greater than" and "wholly disproportionate" cost-benefit standards at issue in the U.S. Supreme Court's *Entergy Corp. v. Riverkeeper Inc.*[505] opinion remain in effect following promulgation of the final § 316(b) rule. These standards provide a basis for EPA to "reject an otherwise available technology as a BTA standard for entrainment if the social costs are not justified by the social benefits."[506] A more complete discussion of the implication of the costs of a § 316(b) technology compared to its relative benefits is set out in Part III.D.3. below.

In addition to the five aforementioned mandatory factors, the permitting authority may also consider several other factors in reaching a site-specific BTA determination for entrainment, which include:

> (i) Entrainment impacts on the waterbody;
>
> (ii) Thermal discharge impacts;
>
> (iii) Credit for reductions in flow associated with the retirement of units occurring within the ten years preceding October 14, 2014;
>
> (iv) Impacts on the reliability of energy delivery within the immediate area;
>
> (v) Impacts on water consumption; and

> (vi) Availability of process water, gray water, waste water, reclaimed water, or other waters of appropriate quantity and quality for reuse as cooling water.[507]

The weight given to the mandatory factors may vary depending upon the circumstances of an individual facility.[508]

The permitting authority's consideration of the aforementioned factors in making a BTA determination is to be "based on a [facility's] submission of certain . . . required information" relating to entrainment impacts at a facility.[509] Specifically, to ensure that the permitting authority has access to the information necessary to make an informed BTA determination about a facility's site-specific entrainment controls, the final § 316(b) rule requires any existing facility with "major cooling water withdrawals"—greater than 125 MGD AIF—to collect the following types of entrainment-related information:[510]

> Entrainment Characterization Study: A study of at least two years of entrainment data, identifying and documenting "organisms collected to the lowest taxon possible of all life stages of fish and shellfish that are in the vicinity of the cooling water intake structure(s) and are susceptible to entrainment, including any organisms identified by [EPA], and any species protected under Federal, State, or Tribal law, including threatened and endangered [("T&E")] species with a habitat range that includes waters in the vicinity of the cooling water intake structure";
>
> Comprehensive Technical Feasibility and Cost Evaluation Study: A description of the technical feasibility and incremental costs of candidate entrainment control technologies. The study must include an evaluation of the technical feasibility of closed-cycle cooling ("CCC"), fine-mesh screens with a mesh size of 2 mm or smaller, reuse of water or alternate sources of cooling water, and any other entrainment reduction technologies identified by the applicant or requested by the permitting authority;
>
> Benefits Valuation Study: A detailed discussion of the magnitude of water quality benefits, both monetized and non-monetized, of the entrainment mortality reduction technologies evaluated in the Comprehensive Technical Feasibility and Cost Study, including discussion of recent mitigation efforts already completed and how these have affected fish abundance and ecosystem viability in the intake structure's area of influence as well as other benefits to the environment and the community; and
>
> Non-water Quality and Other Environmental Impacts Study: A detailed discussion of the changes in non-water quality factors attributed to technologies and/or operational measures

considered.[511]

As EPA explained in the final § 316(b) rule, these entrainment study requirements are limited to facilities with actual water withdrawals exceeding 125 MGD because:

> [T]his threshold will capture 90 percent of the actual flows but will apply only to 30 percent of existing facilities. EPA concluded that this threshold struck the appropriate balance between the goal of capturing the greatest portion of intake flow while minimizing the study requirements for smaller facilities . . . . The selected threshold would significantly limit facility burden at more than two-thirds of the potentially in-scope facilities while focusing the Director on major cooling water withdrawals.[512]

Stated differently, facilities above the 125 AIF threshold comprise approximately 200 billion of the national total of 222 billion combined AIF gallons, which is why EPA determined in the final § 316(b) rule that it is these larger facilities (*i.e.*, > 125 MGD AIF) that have "the highest likelihood of causing adverse impacts" from entrainment.[513]

Facilities falling below this 125 AIF threshold supposedly are not universally exempt from the entrainment requirements of the final § 316(b) rule, according to EPA. Yet, the agency recognized in its proposed rule that a BTA determination for entrainment at facilities within the 2 MGD DIF to 125 MGD AIF range could very well be "no other technologies beyond impingement control . . . because no other technologies are feasible and/or their benefits do not justify their costs."[514] Nevertheless, EPA provided permitting authorities the right to "require reasonable information to make informed decisions at the smaller facilities" regarding what entrainment controls, if any, may be necessary to satisfy the BTA standard.[515]

Regarding implementation, 40 C.F.R. § 125.98(g) provides:

> In the case of permit proceedings begun prior to October 14, 2014 whenever the Director has determined that the information already submitted by the owner or operator of the facility is sufficient, the Director may proceed with a determination of BTA standards for impingement mortality and entrainment without requiring the owner or operator of the facility to submit the information required in 40 C.F.R. 122.21(r) . . . . In making the decision on whether to require additional information from the applicant, and what BTA requirements to include in the applicant's permit for impingement mortality and site-specific entrainment, the Director should consider whether any of the information at 40 C.F.R. 122.21(r) is necessary.[516]

EPA has determined it "has sufficient information in the record to determine the BTA requirements for the Merrimack Station permit" and does not need any of the additional permit

application information described in 40 C.F.R. § 122.21(r) to support its permit decision.[517]

[484] *See* AR-846 at 61-66.
[485] *See* 79 Fed. Reg. at 48,300.
[486] *Id.* at 48,358.
[487] *See* 40 C.F.R. § 125.91(a).
[488] *See, e.g.,* 79 Fed. Reg. at 48,328.
[489] *See* 40 C.F.R. § 125.94(a), (c); *id*. at § 122.21(r)(9)-(12).
[490] *See id*. at § 125.94(c).
[491] *See id*. at § 125.94(c)(6), (7).
[492] *See id.* at § 125.94(c)(1)-(7).
[493] *See id*. at § 125.94(c)(3), (7).
[494] *See id*. at § 122.21(r)(6)(i), (ii).
[495] *See id.*
[496] 79 Fed. Reg. at 48,309.
[497] 40 C.F.R. § 125.94(c)(11).
[498] *See* 79 Fed. Reg. at 48,309, 48,371.
[499] 79 Fed. Reg. at 48,309.
[500] *Id.* at 48,371.
[501] *See id.* at 48,371-72.
[502] *See id.*
[503] 40 C.F.R. § 125.94(d).
[504] *Id*. at § 125.98(f)(2)(i)-(v).
[505] 556 U.S. 208, 225 (2009).
[506] 40 C.F.R. § 125.98(f)(4).
[507] *Id*. § 125.98(f)(3)(i)-(vi).
[508] *Id*. § 125.98(f)(2).
[509] *See* 76 Fed. Reg. 22,174, 22,204 (Apr. 20, 2011) (codified at 40 C.F.R. pts. 122 and 125).
[510] *See* 79 Fed. Reg. at 48,309; 40 C.F.R. § 122.21(r)(9); *see also* EPA, Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule, Dock. ID EPA-HQ-OW-2008-0667-1282, at 7-7 (Mar. 28, 2011) (noting that "the permit writer would have access to all the information necessary for an informed decision about [a site-specific BTA determination] . . . to reduce entrainment mortality at facilities above 125 MGD AIF" because "the facility's permit application must include information to support such an evaluation"). Hereinafter, references to this document will be cited as "Proposed Rule TDD."
[511] *See* 40 C.F.R. § 122.21(r)(9)-(13). Discussion of the changes in non-water quality factors attributed to technologies and/or operational measures include but are not expressly limited to evaluating increases and decreases in energy consumption, thermal discharges, air pollutant emissions, water consumption, noise, safety, grid reliability, and facility reliability. *See id.* at § 122.21(r)(12).
[512] EPA Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule, Dock. ID EPA-HQ-OW-2008-0667-4138, at 3-8 (May 19, 2014). Hereinafter, references to this document will be cited as "Final Rule TDD."
[513] 79 Fed. Reg. at 48,309.
[514] 76 Fed. Reg. at 22,005.
[515] 79 Fed. Reg. at 48,309.
[516] 40 C.F.R. § 125.98(g).
[517] *See* AR-1534 at 16.

EPA Response

In its comment, PSNH states that its 2012 comments "set out the complete CWA § 316(b) legal history," but notes that "the only relevant legal background" is that pertaining to EPA's 2014

Final Rule.[2] The comment then presents PSNH's interpretation of the Final CWA § 316(b) regulations promulgated in 2014. For the most part, PSNH's comments here neither present an interpretation of how the regulations should be applied specifically to the Merrimack Station permit, nor request that EPA change the Draft Permit in any way. To the extent that PSNH's comments elsewhere echo one or more of the comments above and, based on the legal interpretations PSNH propounded here, suggest that certain permit conditions are inappropriate or request changes to permit conditions, EPA will respond to those later comments in appropriate detail.

Having said that, PSNH's comments make a number of statements regarding the Supreme Court's *Entergy* decision and the requirements of the Final Rule with which EPA does not agree and which warrant response. First, according to the comment, the "primary requirements" of the Final Rule are (1) compliance with one of the standards for the best technology available to minimize impingement mortality at 40 CFR § 125.94(c); and (2) that any existing facility with an AIF over 125 MGD must conduct and submit the results of certain studies regarding entrainment at 40 CFR § 122.21(r)(9) through (13) to help support the permitting agency's effort to develop BTA requirements for permit. Yet, the commenter's list is far from complete.

In EPA's view, the "primary requirements" for existing facilities in the Final Rule are set out in 40 CFR § 125.94(a), which states:

> On or after October 14, 2014, the owner or operator of an existing facility with a cumulative design intake flow (DIF) greater than 2 mgd is subject to the BTA (best technology available) standards for impingement mortality under paragraph (c) of this section, and entrainment under paragraph (d) of this section including any measures to protect Federally-listed threatened and endangered species and designated critical habitat established under paragraph (g) of this section.

The primary requirements established by the Final Rule are the BTA standards for impingement mortality *and* entrainment. The permit application requirements simply help provide permitting agencies with information to support the determination of requirements meeting the BTA standards set out in 40 CFR §§ 125.94(c) and (d). The application requirements for all facilities are set forth at 40 CFR § 122.21(r)(3) through (8), while additional requirements for facilities with actual intake flows (AIF) greater than 125 MGD are detailed at 40 CFR §§ 122.21(r)(9) through (13). According to PSNH, the additional information required from "any existing facility with 'major cooling water withdrawals'—greater than 125 MGD AIF" is mandated to ensure that the permitting authority "has access to the information necessary to make an informed BTA determination about a facility's site-specific entrainment controls." PSNH further suggests that the implication of EPA's not requiring this information for facilities with intake flows less than

[2] To the extent that PSNH's 2012 comments address past legal requirements that are no longer in effect, do not apply to the Final Permit, and, according to PSNH, are no longer relevant, EPA does not need to reply to such comments here because they are immaterial for the current permit proceeding. If EPA does not respond to some or all of such comments, it should not be read to indicate EPA's agreement with PSNH's characterization of those past requirements.

125 MGD is that such facilities need not install any entrainment controls. In its comment above, as well as in Comment III.3.5, PSNH suggests that EPA did not intend under the Final Rule for entrainment requirements to be established for facilities with an AIF less than 125 MGD. For example, PSNH states that "[f]acilities falling below this 125 AIF threshold *supposedly* are not universally exempt from the entrainment requirements" (emphasis added), and further states that "the agency recognized in its proposed rule that a BTA determination for entrainment at facilities within the 2 MGD DIF to 125 MGD AIF range could very well be 'no other technologies beyond impingement control…'" (citations and footnotes omitted).[3]

Yet, PSNH's comments appear to misunderstand or misconstrue the Rule. While only facilities with an AIF greater than 125 MGD must submit the additional entrainment related studies, a site-specific determination of the BTA for entrainment must be made for *all* facilities subject to the Final Rule. *See* 40 CFR §§ 125.91(a)(2), 125.94(d), 125.98(f). The text quoted above from 40 CFR § 125.95(a) expressly states that facilities withdrawing 2 MGD or more must satisfy the Rule's BTA standards for entrainment control. Nothing in the Final Rule exempts facilities with an AIF above 2 MGD but below 125 MGD from needing entrainment controls, and there is no regulatory presumption in the Final Rule that facilities withdrawing less than 125 MGD are not causing adverse impacts. *See, e.g.*, 79 Fed. Reg. at 48,355 ("since any facility *at any flow* may have an adverse environmental impact" (emphasis added)). In support of its argument that adverse impacts from entrainment are limited to facilities greater than 125 MGD AIF, PSNH cites to a passage from EPA's Technical Development Document (TDD) for the Final Rule which states that "this threshold [of 125 MGD] will capture 90 percent of the actual flows but will apply only to 30 percent of existing facilities." Yet, this passage goes on to explain that:

> [c]ontrary to a number of public comments, however, EPA is not implying or concluding that the 125 mgd threshold is an indicator that facilities withdrawing less than 125 mgd are (1) not causing any adverse impacts or (2) automatically qualify as meeting BTA. In other words, the threshold, while justified on a technical basis, does not result in exemptions from the rule. Instead, EPA is making a policy decision as to which facilities must provide a certain level and type of information.

TDD at 3-8. *See also* 79 Fed. Reg. at 48,309 (including the same statement). Thus, EPA made it abundantly clear in the preamble to the Final Rule, in the TDD, and in the regulations themselves, that 125 MGD AIF is a threshold for determining which facilities must provide certain types of additional studies. It does not determine whether site-specific entrainment controls are needed at a particular facility and it does not limit the permitting agency's ability to establish such entrainment controls in a NPDES permit. Indeed, contrary to other of its comments, PSNH recognizes this when it quotes from the preamble to the Final Rule in its comment, stating that "EPA provided permitting authorities the right to 'require reasonable information to make informed decisions at the smaller facilities' regarding what entrainment controls, if any, may be

[3] EPA notes that the preamble does not use the phrase "very well" while noting that facilities may not be required to install additional technology for entrainment control in all cases. EPA also notes that even facilities withdrawing more than 125 MGD might not, in a particular case, be required to install additional technology for entrainment control. *See* 40 C.F.R. § 125.98(f)(4).

necessary to satisfy the BTA standard" (footnote omitted). Thus, the regulations authorize EPA to require additional information, beyond the otherwise specified types of information, to support BTA findings for facilities withdrawing more than 2 MGD of water. *See* 40 CFR §§ 122.21(r)(1)(ii)(C), 125.98(i). EPA responds in more detail to PSNH's interpretation of the site-specific entrainment requirements and the administrative threshold of 125 MGD in Response to Comment III.3.5.

PSNH characterizes the BTA standards for impingement in the Final Rule as "seven 'pre-approved' control technologies from which a facility may choose to satisfy the BTA standard." As PSNH recognizes in its description of the alternative technologies, EPA only characterizes as "pre-approved" the three technologies that require no further demonstration or monitoring: closed cycle cooling, a *design* through-screen velocity no greater than 0.5 fps, and an existing offshore velocity cap. 40 CFR § 125.94(c)(1), (2), (4). Complying with the BTA for impingement mortality either through an *actual* through-screen velocity of 0.5 fps or by meeting the impingement mortality performance standard require ongoing monitoring. *Id.* § 125.94(c)(3), (7). In other words, while a permittee may elect to comply with the BTA for impingement mortality using either of these alternatives, the permittee must perform ongoing monitoring to demonstrate compliance with the standard. In addition, both the modified traveling screens and system of technologies options require submission of an impingement technology performance optimization study for the permitting authority to review before either technology may be determined to be the best technology available for impingement mortality. *Id.* § 125.94(c)(5), (6); *see also, e.g.*, 79 Fed. Reg. 48,321. In other words, the permittee may choose the alternatives at § 125.94(c)(5) or (6) to comply with the impingement mortality BTA standard, but the permitting authority must approve the technology and include permit conditions that ensure it is operated consistent with the optimization study.

In the above comment, PSNH neither argues that EPA's consideration of costs and benefits for the site-specific determination at Merrimack Station was incorrect nor explains how its comments on costs and benefits would impact the decision at issue in this permit proceeding. In any event, EPA agrees with PSNH that in *Entergy Corp. v. Riverkeeper, Inc*. 556 U.S. 208 (2009), the Supreme Court held that the CWA gives EPA the discretion to rely on cost-benefit analysis in establishing § 316(b) permitting requirements. The majority opinion allowed that in considering costs and benefits, the "wholly disproportionate" standard and the "significantly greater than" standard, or some other test, would all be within EPA's discretion under the statute. The Court did not conclude that EPA's consideration of costs and benefits under §316(b) *must* use a particular standard. EPA responds in more detail to PSNH's comments on consideration of the costs and benefits of available technologies in Response to Comments III.5.2.1, III.5.2.2, and III.5.2.3, below.

PSNH's comment also cites to, and quotes from, the regulations that detail the various factors, some mandatory and others discretionary, that permitting authorities are to consider when rendering site-specific BTA determinations for controlling entrainment. *See* 40 CFR § 125.98(f)(2) and (3). As the comment also notes, permitting agencies have discretion to determine the weight to assign to the various factors in their BTA determinations. In addition,

PSNH's comment notes the terms of 40 CFR § 125.98(g), which authorizes permitting agencies to forego requiring additional information submissions for "ongoing permit proceedings."

Lastly, EPA notes that the Final Rule was recently upheld by the U.S. Court of Appeals for the Second Circuit as a reasonable interpretation of the Clean Water Act. *See Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018).

2.0 EPA Is Obligated To Apply The Requirements of the 2014 Final CWA § 316(b) Rule

Comment III.2(i)	**AR-1548, PSNH, pp. 118-119**
See also AR-1215, PSNH, p. 169; AR-1231, PSNH, pp. 25-29, AR-841, UWAG, p. 61; AR-1222, UWAG, pp. 33-34	

In its Statement, EPA requests comments on a series of questions regarding whether, and to what extent, the agency should apply the standards of the 2014 final § 316(b) rule. PSNH responds in detail to each such question below. However, the Company's positions on these issues are simple: EPA should apply each and every standard of the 2014 final § 316(b) rule to the CWISs at Merrimack Station. The final rule was promulgated by the agency to establish a single, uniform set of standards to regulate every CWIS within the industry. It would therefore be patently unfair to not apply the rule and incongruent with the rule to cherry-pick limited provisions from it, causing Merrimack Station to be regulated differently than every other facility.

EPA Response

In response to the request for comment on whether and how to apply the Final Rule to the ongoing permit proceeding for Merrimack Station, PSNH comments that EPA should apply all of the standards of the Final Rule. EPA agrees that the determination for the BTA at Merrimack Station should consider the factors for site-specific entrainment controls as well as the BTA standards for impingement mortality established in the Final Rule. EPA also believes it effectively considered many of the factors specified in 40 CFR § 125.98(f)(2) and (3), as well as the impingement technologies specified in 40 CFR § 125.94(c) in rendering its proposed BTA determination in 2011. *See* AR-1534 at 16-17. *See also* Fact Sheet, Att. D "Clean Water Act NPDES Permitting Determinations for the Thermal Discharge and Cooling Water Intake Structures at Merrimack Station in Bow, New Hampshire" Chapters 10-12 (hereinafter, "2011 Draft Determinations Document") (AR-618). EPA also clearly stated that it expects to consider the § 125.98(2) and (3) factors, as well as the BTA standards for controlling impingement mortality specified in § 125.94(c) in rendering its BTA determination for the Final Permit. *See* AR-1534 at 17. PSNH provides additional details in later comments on how the Final Rule should be considered in the BTA determination for Merrimack Station. EPA responds to the detailed comments below. *See* Response to Comment III.5.3.

2.1 EPA No Longer Possesses the Authority to Determine BTA Utilizing BPJ Authority

Comment III.2.1	AR-1548, PSNH, pp. 119-120
See also AR-841, UWAG, pp. 61; AR-846, PSNH, pp. 118-119; AR-1131, Ohio Power, p. 2; AR-1215, PSNH, pp. 25-29, 169; AR-1222, UWAG, pp. 33-34; AR-1231, PSNH, pp. 25-29	

The regulations set out in the agency's 2014 final § 316(b) rule must govern the Final Permit for Merrimack Station. EPA does not enjoy any level of discretion on this issue. PSNH previously articulated this fact[518] and EPA correctly notes in its Statement that "these [2014 § 316(b)] regulations are now in effect and govern the Final Permit for Merrimack Station."[519] BPJ-based case-by-case § 316(b) determinations like those included in EPA's 2011 draft of the NPDES permit for Merrimack Station are only proper when national regulations have not been set. Courts, the EAB, and EPA have all established that the CWA does not allow for permit limits based on the agency's BPJ once uniform, technology-based standards for a source category are established.[520]

EPA's final § 316(b) rule was promulgated on August 15, 2014. Over three years have since elapsed and the NPDES permit for Merrimack Station has not yet been finalized. Attempting to single out Merrimack Station and apply a divergent set of standards to this singular facility would be arbitrary, capricious, and patently unfair. EPA appropriately acknowledges in its Statement that the agency has no choice but to apply these industry-uniform regulations to the Final Permit. PSNH agrees.

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[518] *See, e.g.,* AR-1231 at 25-34.

[519] AR-1534 at 14.

[520] *See e.g.*, *Natural Res. Def. Council, Inc. v. EPA,* 859 F.2d 156, 200 (D.C. Cir. 1988) (providing that CWA § 402(a)(1) "preclude[s] the establishment of BPJ permit limits once applicable effluent guidelines are in place"); *Natural Res. Def. Council, Inc. v. EPA*, 822 F.2d 104, 111 (D.C. Cir. 1987) (noting that a state or permit writer may set limitations utilizing its BPJ authority only when there is no national standard that has been promulgated for a point-source category); *Riverkeeper, Inc. v. EPA*, 358 F.3d 174, 203 (2d Cir. 2004) ("It is, of course, true that once the EPA promulgates applicable standards, regulation of those facilities subject to those standards on a [BPJ] basis must cease . . ."); *Citizens Coal Council v. EPA*, 447 F.3d 879, 891 n.11 (6th Cir. 2006) (noting that BPJ applies only when "EPA has not promulgated an applicable guideline"); *see also* Letter from Jim Hanlon, Director, Office of Wastewater Management, to Water Division Directors Regions 1-10, Attachment A, at 1 (June 7, 2010) (acknowledging that BPJ-based limits are only to be included in permits "until such time [as the ELGs are] promulgated") (attached hereto as Exhibit 16); *In re: Certainteed Corporation*, NPDES Appeal No. 15-01, 2015 WL 10091224, at *1 (EAB May 7, 2015) ("If EPA has developed industrial category-wide (or subcategory-wide) effluent limitations — referred to as 'effluent limitation guidelines' [] — such limits must be included in that facility's permit.") (citing 40 C.F.R. § 125.3(c)(1) & *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112 (1977)); H.R. Rep. No. 92-911, at 126 (1972), *reprinted in* A Legislative History of the Water Pollution Control Act Amendments of 1972 at 813 (1973) (providing that permits with BPJ limits may be issued only "prior to" the promulgation of nationally applicable effluent guidelines).

EPA Response

As stated in response to the previous comment, EPA agrees that the Final Rule establishes national standards for determining the BTA for impingement mortality and entrainment mortality at existing CWISs and that these standards apply to the BTA determination for Merrimack Station's Final Permit. As such, EPA has made its determination consistent with the standards established in the Final Rule. *See* Responses to Comments III.3.1, III.5.2, III.5.3. In the 2017 Statement, EPA expressed its view that the Final Rule would govern the BTA determination for Merrimack Station, while also noting the several pending challenges to the Final Rule in Federal court by a number of industry and environmental petitioners. 2017 Statement at 14-15. We note here that the Second Circuit has since denied those challenges and upheld the Final Rule. *See Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018).

2.2 EPA Should Consider All of the Regulatory Factors Set Out in the 2014 Final CWA § 316(b) Rule

Comment III.2.2	**AR-1548, PSNH, pp. 119-121**

The 2014 final § 316(b) rule purports to give permit writers discretion in "ongoing permitting proceedings" to apply less than all of the entrainment factors and BTA standards for impingement mortality.[521] Specifically, the regulation provides that "[t]he Director's BTA determination may be based on some or all of the factors in [40 C.F.R. § 125.98](f)(2) and (3) . . . and the BTA standards for impingement mortality at § 125.95(c)."[522] EPA acknowledges this regulation in its Statement but essentially disclaims that it has or will render its BTA determination for Merrimack Station based on less than all the factors and standards set out in the final § 316(b) rule:

> EPA's 2011 Draft Permit . . . analysis effectively considered all of the § 125.98(f)(2) and (3) factors, as well as the technologies specified in 40 C.F.R. § 125.94(c), in rendering its proposed BTA determination . . . EPA also expects to consider the § 125.98(f)(2) and (3) factors, as well as the BTA standards for controlling impingement mortality specified in § 125.94(c), in rendering its BTA determination for Merrimack Station's Final Permit.[523]

PSNH supports EPA's decision on this issue. Rules such as the final § 316(b) rule are promulgated to establish a uniform set of standards and equal playing-field for all facilities within an industry. It would therefore be counterproductive and prejudicial to regulate Merrimack Station by an incomplete set of factors or an altogether different set of criteria. The fact that more than three years (or more than half a standard permit cycle) have now passed since EPA promulgated the final § 316(b) rule further bolsters this conclusion, as the intent of 40 C.F.R. § 125.98(g) must be construed to apply to only those permit proceedings wherein the permit writer had almost concluded responding to comments and the final permit was days away from being finalized when the final § 316(b) rule became effective.

Application of all the final § 316(b) rule factors and standards in this permit renewal proceeding is also prudent because, in a practical sense, the BTA analysis was started anew by EPA's Statement. EPA has essentially reversed course on its BTA determination by renewing its consideration of wedgewire screen technologies as a feasible and effective option for Merrimack Station. In its 2011 Draft Permit, EPA utilized its BPJ authority to determine that PSNH must limit the intake flow volume of both CWISs at Merrimack Station to a level consistent with operating in a CCC mode from, at a minimum, April 1 through August 31 of each year. Despite PSNH identifying cylindrical wedgewire screens as a feasible technology in its submissions to EPA prior to the issuance of the 2011 Draft Permit, the agency rejected the technology and insisted on a CCC system as the BTA to control for entrainment and impingement mortality. EPA is now reconsidering its determination and examining wedgewire screens as the possible BTA for Merrimack Station. Such a shift—from rejecting a technology altogether to then considering its use—demonstrates the permitting agency is essentially starting over in its decision-making, and therefore, should apply all the regulatory factors set out in the 2014 final § 316(b) rule.

521 *See* 40 C.F.R. § 125.98(g).
522 *Id.*
523 AR-1534 at 16-17.

EPA Response:

As stated in response to the previous comment, EPA agrees that the Final Rule establishes national standards for determining the BTA for impingement mortality and entrainment mortality at existing CWISs and that these standards apply to the BTA determination for Merrimack Station's Final Permit. EPA does not agree with PSNH's narrow, unsupported interpretation that § 125.98(g) "must be construed to apply to only those permit proceedings" where, on October 14, 2014, the final permit was only "days away." While section 125.98(g) provides that it applies to "permit proceedings begun prior to October 14, 2014," it does not specify an outside time limit.

In any event, as the comment points out, EPA made clear in the 2017 Statement that it expected to consider the factors and standards of the Final Rule in rendering its BTA determination for the Final Permit. *See* AR-1534 at 17.[4] The 2017 Statement also clarifies that, in this case, the determination is consistent with the ongoing permitting provision of the Final Rule at 40 CFR § 125.98(g) in that EPA has determined that the record contains sufficient information to

[4] The comment also states that, by issuing the 2017 Statement, EPA "essentially reversed course" and is "starting over" in its BTA determination. To the extent the commenter is asserting that the 2017 Statement is an announcement of a wholesale reconsideration of the entirety of EPA's analysis in the 2011 proposed BTA determination, EPA disagrees. The 2017 Statement notes that new information related to the space requirements for, and effectiveness of, cylindrical wedgewire screens suggests that they may be available at Merrimack Station. *Id.* at 17-21. Furthermore, the 2017 Statement invites public comment on these issues, as well as on "how the costs of using wedgewire screens . . . compare to the costs and benefits of using closed-cycle cooling as part of the BTA" and on the effect of the Final Rule. *Id.* at 21. While the 2017 Statement notes that EPA is reconsidering wedgewire screens as the possible BTA for Merrimack Station, it does not announce an intention by EPA to abandon the entirety of the BTA analysis. Indeed, it would make little sense to do so where the new information and comments EPA has received to-date do not address or affect that analysis or the Final Rule does not alter the analysis.

determine the BTA requirements without further delaying permit issuance by waiting for the specific, additional information submissions established in the Final Rule at 40 CFR § 122.21(r). EPA maintains, as it set out in the 2017 Statement, that the appropriate factors under the Final Rule can be addressed without the additional § 122.21(r) submissions established under the Final Rule. *See* AR-1534 at 16. Moreover, EPA agrees that additional information that PSNH submitted with its comments on the 2017 Statement, including an additional entrainment technology evaluation (AR-1550), biological benefits evaluation (AR-1567), and economic analysis (AR-1565), is substantially similar to information required under 40 CFR § 122.21(r). *See* Comment 5.2. EPA has considered these additional submissions in its determination for the Merrimack Station Final Permit. *See* Responses to Comments III.4.2 and III.5.2.

2.3 EPA Must Consider Additional 40 CFR § 122.21(r) Studies Submitted Along with These Comments Before Rendering Its BTA Determination

Comment III.2.3	**AR-1548, PSNH, pp. 122-127**
See also AR-1231, PSNH, pp. 29-36	

Since the AIF of the CWISs at Merrimack Station is below the 125 MGD AIF compliance threshold established in the final § 316(b) rule and because entrainment at Merrimack Station is *de minimis*, technological installations to address entrainment at Merrimack Station are unwarranted.[524] Should EPA improperly reject this conclusion, the agency must consider the analyses submitted by PSNH contemporaneously with these comments to provide EPA at least the minimum amount of information the agency would need to make a reasoned and legally defensible BTA entrainment determination in accordance with the final § 316(b) rule.

The final § 316(b) rule requires that "BTA standards for entrainment . . . reflect the [permitting authority's] determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in § 125.98."[525] PSNH has not previously submitted to EPA a number of fundamental analyses the agency would need to adequately assess the factors set out in § 125.98 and make a rational BTA determination for entrainment at Merrimack Station. These analyses have not previously been completed because EPA has not requested them and because they are not mandated by the final § 316(b) rule for facilities with AIFs equivalent to those at Merrimack Station.[526] However, without these essential analyses, EPA cannot possibly render a reasonable and rational BTA determination for entrainment.

The final § 316(b) rule requires operators with CWISs to submit an array of information with their NPDES permit application.[527] Some application requirements apply to "all existing facilities" while others apply only to existing facilities that withdraw greater than 125 MGD AIF of water for cooling purposes.[528] To ensure a permitting authority has access to the information necessary to make an informed BTA determination about a facility's site-specific entrainment controls, the final § 316(b) rule requires any existing facility with "major cooling water withdrawals"—greater than 125 MGD AIF—to collect entrainment-related information, including an Entrainment Characterization Study, Comprehensive Technical Feasibility and Cost Evaluation Study, Benefits Valuation Study, and Non-water Quality and Other Environmental Impacts Study.[529]

As mentioned above, EPA has not asked PSNH to submit any of the aforementioned entrainment studies required by the final § 316(b) rule. Instead, it states it "has sufficient information in the record to determine the BTA requirements for the Merrimack Station permit."[530] This decision is arbitrary and capricious and not supported by the facts. While PSNH has over the years provided to EPA a number of comprehensive biological studies that likely satisfy the Entrainment Characterization Study requirement of the final § 316(b) rule,[531] as well as a host of reports and responses to CWA § 308 information requests that could constitute a satisfactory Comprehensive Technical Feasibility and Cost Evaluation Study,[532] a Benefits Study and Non-water Quality and Other Environmental Impacts Study addressing the specific requirements of the final § 316(b) rule have not previously been submitted by the Company.[533] EPA must consider these two additional types of reports given the agency explicitly stated it intends to apply each and every standard of the 2014 final § 316(b) rule to the CWISs at Merrimack Station.

A report prepared by NERA Economic Consulting ("NERA") has been submitted along with these comments that addresses many of the requirements of the Benefits Valuation Study.[534] A Benefits Valuation Study evaluates the magnitude of water quality benefits, both monetized and non-monetized, of the entrainment mortality reduction technologies evaluated in the Comprehensive Technical Feasibility and Cost Study. It includes discussion of recent mitigation efforts already completed and how these have affected fish abundance and ecosystem viability in the intake structure's area of influence as well as other benefits to the environment and the community. Benefits are quantified in physical or biological units and monetized using appropriate economic valuation methods. The study also identifies other benefits to the environment and nearby community, including improvements for mammals, birds, and other organisms and aquatic habitats.[535] NERA's robust study uses data from Normandeau's previous biological studies, benefits information Normandeau provided directly to NERA to support its analyses, and technological cost information provided by Enercon.[536]

Several aspects of a Non-water Quality and Other Environmental Impacts Study required by the final § 316(b) rule are addressed in the Enercon 2017 Comments, which have been submitted along with these comments.[537] The final § 316(b) rule specifies that a Non-water Quality Environmental and Other Impacts Study must discuss changes in environmental and other factors not water quality-related that are attributed to the candidate technologies or operational measures. Potential impacts that are to be evaluated include, but are not limited to, energy consumption, air pollution, noise, safety concerns, grid reliability, plant reliability, consumptive water use, impacts of construction, aesthetic impacts, environmental justice, archaeological and historical resources, and other permitting impacts. Evaluation of these concerns puts CWIS technological options being considered into proper perspective by quantifying the totality of environmental impacts expected if a technology is implemented at a facility. This ensures that a technology that is better from a CWA perspective is not worse overall for the environment.

As stated at the outset and discussed in detail below, PSNH maintains that additional technological controls at Merrimack Station to address entrainment are unwarranted.

Nevertheless, if EPA intends to require PSNH to incorporate entrainment controls at the facility, the agency's previous assertion that BTA for entrainment has been fully evaluated is arbitrary and capricious. Only after EPA considers the reports prepared by NERA and Enercon will the agency have some information that at least addresses the 40 C.F.R. 122.21(r)(9) through (r)(12) requirements so it can attempt to evaluate all of the mandatory BTA factors set out in 40 C.F.R. § 125.98(f).[538] Without them, EPA cannot and has not rendered a BTA determination that can withstand judicial scrutiny.

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[524] The significance of the 125 MGD AIF threshold, as well as the facts supporting a determination that entrainment at Merrimack Station is *de minimis* are discussed in Sections III.C.2. & 3., respectively, below.
[525] 40 C.F.R. § 125.94(d); *see also* 79 Fed. Reg. at 48,330 ("While site-specific permit requirements are not new, what is different about this approach from the current requirement for permits to include 316(b) conditions is that for the first time, EPA is establishing a detailed specific framework for determining BTA entrainment control requirements. Thus, the rule identifies what information must be submitted in the permit application, prescribes procedures that the Director must follow in decision making and factors that must be considered in determining what entrainment controls and associated requirements are BTA on a site-specific basis.").
[526] 40 C.F.R. §§ 122.21(r)(1)(ii)(C) and 125.98(i) provide EPA discretionary authority to compel PSNH to submit any additional information the agency determines is necessary for determining permit conditions and requirements. EPA has made no such requests of PSNH for this permit renewal proceeding.
[527] *See generally id*. at § 122.21(r).
[528] *See, e.g.*, *id*. § 122.21(r)(1)(ii)(A), (B).
[529] *See* 79 Fed. Reg. at 48,309; *id.* § 122.21(r)(9)-(12).
[530] AR-1534 at 16.
[531] *See, e.g.,* AR-1154.
[532] *See, e.g.,* AR-6. Notably, the discussions in many if not all such reports and responses previously submitted by PSNH and/or its consultants may be outdated and may not include all the cost-related details required by 40 C.F.R. § 122.21(r)(10)(iii).
[533] The Company has previously submitted analyses, reports, and/or comments that address these topics. These materials predate the 2014 final § 316(b) rule, however, and therefore were not prepared to satisfy all of the requirements of the new regulations.
[534] *See generally* NERA Economic Consulting, Economic Evaluation of Two Entrainment Reduction Technologies at Merrimack Station (Dec. 2017). This report is attached hereto as Exhibit 17. Hereinafter, references to this document will be cited as "NERA 2017 Report." This report also addresses the cost-related requirements of 40 C.F.R. § 122.21(r)(10)(iii). *See id.* Attached hereto as Exhibits 18 and 19, respectively, are a memorandum from Enercon Services, Inc. to NERA entitled Technical Memorandum to Document Technology Cost Inputs for Merrimack Station (Dec. 13, 2017) ("Enercon Technology Cost Inputs Memo") and Normandeau Associates, Inc., Biological Benefit Evaluation of Entrainment Reducing Technologies at Merrimack Station (Dec. 11, 2017). These two documents provide factual information utilized in NERA's analyses.
[535] *See* 40 C.F.R. § 122.21(r)(11).
[536] *See generally* NERA 2017 Report.
[537] *See generally* Enercon 2017 Comments.
[538] In fact, one could argue EPA needs more specific and/or detailed information regarding entrainment at Merrimack Station because the agency's maximum potential reduction in entrainment impacts is diminutive compared to the maximum potential at facilities with an average AIF of 125 MGD or more—where impacts due to entrainment may more rationally be assumed and corresponding, meaningful reductions in entrainment can therefore be expected. At facilities with an AIF below 125 MGD, like Merrimack Station, EPA is forced to make an arguably more difficult and precise determination regarding entrainment compliance when compared to larger-flow facilities already presumed to have a significant impact due to entrainment, meaning the agency has a very small margin for error in reaching a reasonable entrainment BTA determination.

EPA Response:

PSNH begins its comment asserting that technological installations to address entrainment are unwarranted for Merrimack Station because the AIF at Merrimack Station is below 125 MGD and because entrainment is, according to PSNH, *de minimis*. EPA disagrees on both counts and responds in more detail to PSNH's comments on these issues below. *See* Response to Comment III.3.5 and 3.6. As explained in these responses, the Final Rule neither exempts facilities with an AIF less than 125 MGD from the BTA standards for entrainment, nor does it establish an express exception for *de minimis* entrainment impacts (as it does for impingement). *See* Response to Comment III.3.6; *see also* 40 CFR §§ 125.91(a)(2), 125.94(d). In addition, EPA has explained that it does not regard Merrimack Station's entrainment of millions of fish eggs and larvae each year from the Merrimack River to be *de minimis*. *See* AR-618 at 252-254. *See also* Response to Comment 4.F. Instead, in EPA's view, this entrainment represents adverse environmental impact that needs to be addressed under CWA § 316(b). On the facts of this case, EPA has determined that technological upgrades are warranted at Merrimack Station to minimize the adverse environmental impacts from entrainment. *See* AR-618 at 314-315.

Next, PSNH comments that EPA must consider the analyses submitted by PSNH with its comments on the 2017 Statement. EPA agrees that, as the analyses at issue were submitted during the comment period for the 2017 Statement in support of comments provided by PSNH, it is appropriate for EPA to consider them in development of the Final Permit. To this end, EPA has considered them and responds to the additional information, including the economic analysis prepared by NERA and Enercon's assessment of non-water quality and other environmental impacts, in responses to PSNH's more detailed comments below. See Response to Comment 6 and associated sub-comments.

Although EPA agrees that consideration of the analyses submitted in support of PSNH's comments on the 2017 Statement (as well as the 2011 Draft Permit, to the extent they are still relevant) is appropriate, EPA does not agree that it could not render a reasonable and rational BTA determination for entrainment in accordance with the Final Rule without the reports required for larger facilities.

As PSNH points out, the actual intake flow (AIF) at Merrimack Station is below 125 MGD. For this facility, the Final Rule therefore would require only the information specified in 40 CFR § 122.21(r)(4) through (8): Source Water Physical Data, Source Water Biological Characterization Data, Cooling Water Intake System Data, as well as facility-specific information about the selected impingement compliance option and operational status of each CWIS. Under the Final Rule, an Entrainment Characterization Study, Comprehensive Technical and Feasibility and Cost Evaluation Study, Benefits Valuation Study, and Non-water Quality and Other Environmental Impact Study are not required for facilities, like Merrimack Station, with AIF less than 125 MGD, 40 CFR § 122.21(r)(9)-(12). Thus, the comment is controverted by the plain language and structure of the regulations. Indeed, PSNH acknowledges in the comment that the specified studies "are not mandated by the final § 316(b) rule for facilities with AIFs equivalent to those at Merrimack Station." As explained more below, *see* Response to Comment 3.5, EPA's policy decision to require the specified studies only from facilities with AIFs greater than 125 MGD was made in part to reduce the potential burden of the permit application process on

smaller facilities. PSNH points to nothing in the Rule to indicate that EPA intended that a permitting authority could not make a BTA determination in accordance with 40 CFR § 125.98(f)(2) and (3) without those studies. To the contrary, the fact that the Final Rule requires only larger facilities to submit these studies, *see* 40 CFR § 122.21(r)(1)(ii)(B), while still requiring a permitting authority to make an entrainment BTA determination under the framework of the Final Rule for any facility larger than 2 MGD, *see id.* §§ 125.91(a)(2), 125.94(d), 125.98(f), indicates that the Final Rule contemplates that a permitting authority may make BTA determinations for facilities with AIFs below 125 MGD without the specified studies.[5] Under the commenter's approach, facilities with AIFs above 125 MGD would have to submit the studies required by 40 CFR §§ 122.21(r)(9) – (12), but so would facilities with AIFs *below* 125 MGD. In EPA's view that would make no sense, because it contradicts the plain language of the regulations and would eviscerate the potential relief that EPA intended to provide to facilities with relatively lower AIFs. EPA declines the comment's suggestion to interpret the additional application requirements in the Final Rule for facilities with AIFs *greater than* 125 MGD as a requirement that facilities with AIFs *less than* 125 MGD must also submit these studies before a permitting authority may make an entrainment BTA determination.[6] And while the comment states that EPA "cannot possibly render a reasonable and rational BTA determination for entrainment" for this facility without information that the Final Rule does not otherwise require, it provides no explanation why, despite the rule, the reports are nonetheless necessary for a BTA determination for Merrimack Station in particular (*i.e.*, based on specific circumstances at this facility).

Irrespective of which permit application materials are required for this facility under the Final Rule, the final entrainment BTA for Merrimack Station is informed in part by the reports and analyses that PSNH provided, which are substantially similar to the full suite of information required by facilities with AIF greater than 125 MGD. In other words, EPA has considered the additional analyses referenced in the comment. In addition, PSNH recognizes that information it submitted prior to and since issuance of the 2011 Draft Permit is substantially similar to the information required for facilities with AIF greater than 125 MGD, including the comprehensive biological studies and evaluations of technical feasibility and cost.

3.0 Existing Technologies and Operations at Merrimack Station Constitute BTA

Comment III.3(i)	**AR-1548, PSNH, p. 126**

[5] Furthermore, the preamble to the Final Rule states: "To facilitate the determination of entrainment requirements for facilities below 125 mgd AIF, a [permitting authority] *may* require the owner or operator to submit some or all of the study requirements at § 122.21(r)(9) through (13) *or variations thereof*." 79 Fed. Reg. at 48,378 (emphasis added). Consistent with the intent expressed in the preamble, for the Merrimack permit, EPA has considered in its BTA determination information substantially similar to that required from facilities with larger AIFs.

[6] To the extent the comment asserts that the Final Rule should have required all facilities with an AIF lower than 125 MGD to submit the studies at § 122.21(r)(9) through (12), the time for challenging the Final Rule on this basis is long expired. CWA § 509(b)(1), 33 U.S.C. § 1369(b)(1). Moreover, the Final Rule was recently upheld by the U.S. Court of Appeals for the Second Circuit as a reasonable interpretation of the Act. *See Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018).

PSNH established in its February 2012 comments to EPA's 2011 Draft Permit that the existing technologies at Merrimack Station constitute BTA under a complete and reasoned BPJ analysis. Specifically, PSNH provided that "[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)."[539] The requirements of the 2014 final § 316(b) rule do not negate this conclusion. In fact, the 2014 final § 316(b) rule dictates that continued use and operation of existing CWIS technologies (*i.e.*, use of existing traveling screens and the current fish return system) is all that is required to satisfy the BTA standard.[540] This is so because: (1) the rate of impingement at Merrimack Station is *de minimis*, meaning no additional controls are needed to satisfy the BTA impingement mortality standard;[541] (2) the 3-year average AIF at Merrimack Station is below the 125 MGD compliance threshold EPA set out in the final § 316(b) rule for addressing entrainment mortality; and (3) entrainment is *de minimis* at Merrimack Station, even if EPA does not summarily conclude no entrainment controls are needed at Merrimack Station based on the 125 MGD AIF compliance threshold established in the final § 316(b) rule.

[539] AR-846 at 113.
[540] Although, PSNH may still consider upgrading its fish return system to address identified issues with the current system.
[541] *See* 40 C.F.R. § 125.94(c)(11).

EPA Response

The comment above echos comments that PSNH made on the 2011 Draft Permit regarding requirements to install technology to minimize impingement at Merrimack Station. PSNH indicates what it believes is the BTA for impingement mortality under the 2014 Final Rule. In this case, EPA developed one response to this comment as well as comments submitted on impingement BTA from 2012 (summarized below). Following that response, EPA addresses PSNH's detailed comments on whether impingement is *de minimis*, the comment related to the actual intake flow at Merrimack Station, and whether entrainment is *de minimis*.

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

Comment III.3.1	**AR-846, PSNH, pp. 113-118**
See also AR-872, Normandeau, pp. 133-4AR-1207, EPRI, pp. 5-6, AR-1128, NERA, pp. E-3, 11-18	

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 recognizes that certain improvements and/or operational changes are available to make the system more effective and further reduce impingement mortality. A proper BTA analysis demonstrates that 1) installation of a new fish return system; 2) continuous operation of existing traveling

screens from April through December; and 3) rescheduling maintenance outages for Units 1 and 2 at Merrimack Station, collectively, constitute BTA for § 316(b).[60]

To upgrade its current fish return system, PSNH proposed installing 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 acknowledged 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*.

Continuous operation of the existing traveling screens, except during periods of low impingement, would reduce impingement and improve the mortality of any fish that are impinged by returning them to the river more quickly. 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 at each unit so that both traveling screens at each unit may be run continuously. *See* 2007 § 308 Response at 65.

Finally, 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 in the 2011 Draft Permit.[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*.

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 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.

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 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)

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. 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.
[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.

EPA Response:

In this 2012 comment, made prior to EPA's promulgation of the 2014 Final Rule, PSNH stated somewhat confusingly and contradictorily that, while it did "not concede that current intermittent operation of the existing traveling screens and fish return system at Merrimack Station fail to reflect BTA pursuant to § 316(b)" (emphases added) a "proper BTA analysis" demonstrates that the BTA is continuous rotation of the existing traveling screens, installing a new fish return system, and rescheduling maintenance outages. At the time of the 2011 Draft Permit (i.e., before EPA issued the Final Rule in 2014), in the absence of national, categorical technology guidelines for CWISs at existing facilities, EPA determined BTA on a best professional judgment (BPJ) basis. *See* AR-618 at 221, 225. In 2017, PSNH commented that promulgation of the Final Rule in

2014 did not "negate [PSNH's 2012] conclusion"[7] and, in PSNH's view, "dictates that continued use and operation of existing CWIS technologies (*i.e.*, use of existing traveling screens and the current fish return system) is all that is required to satisfy the BTA standard." Comment III.3 (emphases added). PSNH asserts this is so because, according to PSNH, the rate of impingement at Merrimack Station is so low as to be *de minimis*, the 3-year average AIF at Merrimack Station is below a supposed 125 MGD "compliance threshold" that PSNH reads into the Final Rule, and, even if the Final Rule contains no such "compliance threshold,"[8] entrainment at Merrimack Station is likewise *de minimis.* Thus, PSNH's 2017 comment appears to be that, even if EPA does not agree with PSNH's *de minimis* and 125 MGD "compliance threshold" arguments, then one of PSNH's 2012 BTA conclusions should be applicable. It is not clear, however, which of those 2012 conclusions should, in PSNH's view, be applicable, because they are inconsistent with one another. Specifically, on the one hand, PSNH appears to comment in 2012 that 1) BTA is intermittent operation of the existing traveling screens and use of the current fish return system (i.e., no change), while also commenting that 2) BTA is continuous screen rotation, a new fish return, and maintenance outages. EPA begins the response to these comments by briefly addressing the 2017 comments that impingement and entrainment are *de minimis* and that the Final Rule purportedly contains a 125 MGD "compliance threshold." We then turn to PSNH's 2012 BTA conclusions.

First, the rates of impingement and/or entrainment at Merrimack Station are not *de minimis*. Merrimack Station's CWISs impinge thousands of fish on its intake screens each year, *see* Demonstration Document at 259-60, and the existing traveling screen system does not adequately transport fish back to the source waterbody.[9] Similarly, Merrimack Station's CWISs entrain millions of fish eggs and larvae annually. *See* AR-618 at 245-46. These levels of impingement and entrainment represent adverse environmental impacts that must be minimized with the best technology available to satisfy § 316(b). EPA addresses PSNH's more detailed comments that impingement and entrainment are *de minimis* in Response to Comments III.3.4, 3.5, and 3.6, below. In addition, contrary to the comment, there is absolutely no 125 MGD "compliance threshold" for entrainment in the Final Rule. All facilities subject to the Final Rule, regardless of whether their actual intake flows (AIFs) are above or below 125 MGD, are required to meet the BTA standards for entrainment. *See* 40 CFR § 125.94(d). The 125 MGD threshold in the Final Rule on which PSNH erroneously bases its argument is actually a threshold for additional application requirements for larger facilities; it has no bearing on whether a facility is subject to the entrainment control requirements of the Final Rule. *See* 40 CFR § 122.21(r)(1)(ii)(B). EPA has addressed this issue in Response to Comment III.2, above (and associated comments) and responds in detail in Response to Comment III.3.5, below. In summary, there is no merit to any of the three reasons that PSNH provides to support its comment that the Final Rule "dictates" that existing CWIS technologies are the BTA.

Having established that Merrimack Station must address impingement mortality and entrainment under the Final Rule, EPA focuses in this response on PSNH's comments that the existing CWISs

[7] Although it is not clear to which 2012 conclusion PSNH is referring. *See infra*.
[8] It does not. *See* Response to Comment III.3.5.
[9] As explained below and elsewhere in this Response to Comments, the existing debris return sluice does not allow the fish to enter the river and results in 100% impingement mortality. *See also* AR-846 at 115; AR-6 at 30.

technologies are the BTA at Merrimack Station as it applies to impingement mortality, including comments from 2012 in support of this determination. EPA addresses the BTA for entrainment mortality in Responses to Comments III.4 and III.5, below.

Section 316(b) of the CWA requires that a facility's cooling water intake structure (CWIS) reflect the best technology available to minimize adverse environmental impact. Although § 316(b) does not require every facility to "eliminate completely" the adverse environmental impact of its CWISs, to "minimize" in the context of § 316(b) likewise does not mean maintain the status quo at a CWIS, especially when that status quo does not meet even the barest minimum of available technologies (i.e., returning impinged fish to the source water). Rather, it means "to reduce to the smallest amount, extent, or degree reasonably possible." 40 CFR § 125.92(r); AR-618 at 232; *see* 40 CFR § 125.83 (defining "minimize" identically); *see also Entergy Corp. v. Riverkeeper, Inc*., 556 U.S. 208, 219 (2009) (recognizing the regulatory definition of "minimize" at 40 CFR § 125.83 and acknowledging EPA's "discretion to determine the extent of reduction that is warranted under the circumstances"). In 2012, and again in 2017, PSNH characterizes the existing technology as "traveling screens and fish return system." To be clear, the "fish return system" currently in use at Merrimack Station is in reality a "debris return sluice, which discharges into a dry sump and does not allow the fish to enter the river except under high pool elevations." AR-6 at 30 (emphasis added). Enercon acknowledges that the debris sluice results in 100% impingement mortality. *Id*. In its 2012 comments, PSNH also acknowledges that "impingement survival with Merrimack Station's current system is minimal." AR-846 at 115. The existing technology, which was not designed as a fish return and indeed does not return fish to the Merrimack River, is plainly not the "best technology available."[10] Moreover, PSNH agrees. In its 2012 comments, PSNH states that "certain improvements and/or operational changes are available to make the system more effective and further reduce impingement mortality" and that a "proper" analysis demonstrates that BTA is continuous rotation of the existing traveling screens,

[10] In 2012, PSNH also commented that existing maintenance outages, de-icing recirculation flows, and loss of intake pump efficiency due to hydropower operations result in "significant flow reductions through the CWISs that result in a substantial decrease in overall impingement and entrainment." AR-846 at 113 n.60. Head loss from daily changes in design full pond elevation related to hydropower operation of the Garvins Falls and Hooksett hydroelectric stations accounts for the majority of the difference between actual flow and design flow. After considering available information about the flows used in the Engineering and Biological Reports, actual flow reductions (and proportional actual entrainment reductions) are likely between 10% and 20% (*see* AR-6 at 17, AR-210 Attachment I), which is not as effective as other available technologies for reducing impingement and entrainment. Normandeau derived estimates of impingement and entrainment at both design flow and actual intake flow (reflecting pump efficiency) which demonstrate that both levels are not *de minimis*. *See* AR-2 at 52, 74, 77. In addition, while one-pump operation at Unit 2 for approximately 9 days in response to frazil ice will reduce the through-screen velocity at the Unit 2, CWIS, it will not reduce the velocity as low as 0.5 fps, given that the design velocity with both pumps is 1.82 fps, AR-6 at 15, 28, and the comment concedes (at fn 61) that one-pump operation "results in a roughly proportional reduction in the maximum through screen design velocity." Moreover, the reduction associated with one-pump operation is extremely limited in duration (i.e., on average, 9 days). EPA maintains that it is unlikely that the existing operational measures result in significant reductions in impingement mortality and entrainment in comparison to the proposed improvements to the traveling screens or wedgewire screens. Moreover, PSNH has not demonstrated that the existing "operational measures" and "circumstances" satisfy any of the impingement mortality compliance alternatives at 40 C.F.R. § 125.94(c).

installing a new fish return system, and rescheduling maintenance outages.[11] AR-846 at 113-114. In other words, even PSNH recognizes that installing a "fish-friendly" return, which is technologically feasible and economically practicable based on the 2012 comments, will reduce impingement mortality.

EPA has since established national requirements that reflect the BTA for minimizing adverse environmental impact at existing facilities. *See* 40 CFR part 125, subpart J; *see also* 79 Fed. Reg. 48,300. Under the Final Rule, the owner or operator of an existing facility like Merrimack Station must comply with one of the alternatives identified in the national BTA standard for impingement mortality at § 125.94(c). In addition, the owner or operator of an existing facility like Merrimack Station must comply with BTA standards for entrainment established by the permitting authority on a site-specific basis that reflect "the maximum reduction in entrainment warranted after consideration" of relevant factors specified in 40 CFR § 125.98(f). 40 CFR § 125.94(d). For the Final Rule, EPA aligned the deadlines for complying with the impingement mortality and entrainment BTA standards. *Id*. § 125.94(b)(1) ("After issuance of a final permit that establishes the entrainment requirements under § 125.94(d), the owner or operator must comply with the impingement mortality standard in § 125.94(c) as soon as practicable"); *see also* 79 Fed. Reg. at 48,327. Thus, the Final Rule sequences the entrainment and impingement mortality controls so that facilities select and implement controls for impingement mortality only after the entrainment controls have been determined. *See* 79 Fed. Reg. at 48,358-60. In the preamble to the Final Rule, EPA states that permitting authorities are "encouraged to consider the extent to which those technologies proposed to be implemented to meet the requirements of § 125.94(d) [the BTA standards for entrainment] will be used, or could otherwise affect a facility's choice of technology, to meet the requirements of § 125.94(c) [the BTA standards for impingement mortality]." *Id*. at 48,369. In this way, the facility can take advantage of the potential impingement benefits provided by the required entrainment controls. In response to comments received in 2012, 2014, and 2017, and after considering the relevant factors at 40 CFR § 125.98(f)(2) and (3), EPA has determined that the BTA for entrainment at Merrimack Station is seasonal operation of wedgewire screens. The Final Permit (Part I.E) establishes requirements for meeting this BTA standard, as well as a compliance schedule to achieve compliance as soon as practicable. *See* Responses to Comments III, Sections 4, 5, and 6 (and associated comments). As the Final Permit establishes BTA standards for entrainment, the Permittee must plan to comply with one of the alternatives identified in the national BTA standard for impingement mortality at § 125.94(c) as soon as practicable.

[11] PSNH also comments, in fn 66, that EPA failed to consider other potential options, such as installation of variable speed pumps, without looking at their potential, collective effectiveness if used in combination with upgrades and operational changes. EPA notes here that PSNH did not provide an assessment of the potential improvements of variable speed pumps in combination with other upgrades proposed in its 2012 and 2017 comments. In 2007, Enercon concluded that the use of variable speed pumps would reduce impingement by about 23% at Unit 1 and 5% at Unit 2 and that there would be no corresponding reduction in entrainment. Limits on the thermal discharge (addressed in Chapter II of this Response to Comments) would limit the use of flow reduction via variable speed pumps as a means of reducing impingement and entrainment during spring and summer when entrainment occurs. *See* AR-6 at 90. PSNH has not updated the analysis of the effectiveness of variable speed pumps and EPA agrees that the temperature limits of the Final Permit will likely limit the use of this technology for entrainment.

In its 2017 comments, PSNH maintains that continued use and operation of existing CWIS technologies (*i.e.*, use of existing traveling screens and the current fish return system) is all that is required to satisfy the BTA standard because the rate of impingement at Merrimack Station is *de minimis*. EPA interprets this comment to mean that PSNH selected 40 CFR § 125.94(11) (*de minimis* rate of impingement) as its method of compliance with the impingement mortality BTA standard. See also, Comment III.4, below ("Merrimack Station also is not required to select one of the seven pre-approved impingement mortality options set out in 40 CFR § 125.94(c), because the rate of impingement at the Station is *de minimis*.") This option allows that, "[i]n limited circumstances" the permitting authority may conclude that the documented rate of impingement is so low that no additional controls are warranted. *Id*. As addressed fully in Response to Comment III.3.4 below, EPA rejects the proposal that the documented rate of impingement at Merrimack Station is *de minimis*. Moreover, PSNH does not assert that the existing traveling screens and debris sluice comply with any of the alternative BTA standards for impingement mortality that now exist in the 2014 Final Rule at 40 CFR § 125.94(c)(1) through (7). Nor could PSNH.[12] Therefore, the existing technology cannot be the BTA for impingement. In addition, the existing screens and fish return cannot be the BTA for entrainment, because the 3/8-inch mesh screens do not "minimize" entrainment in any way. *See* 40 CFR §§ 125.92(r), 125.94(d). *See also* AR-6 at 28 (conceding that the 3/8-inch screens do not minimize entrainment), 95 (recognizing that in the Comparative Matrix Enercon expects that "Fish Return Systems" and "Coarse Mesh Screening Technologies" will result in an entrainment reduction of 0% from baseline). EPA addresses the BTA for entrainment in more detail elsewhere in this Response to Comments.

Furthermore, PSNH has not shown that continuous rotation, a new fish return, and rescheduled outages, collectively, will satisfy the impingement BTA requirements of the Final Rule. First, they do not conform to any of the pre-approved technologies, including § 125.94(c)(5) because

[12] The existing screens and debris sluice do not meet the definition for modified traveling screens, because, among other reasons, the screens rotate only intermittently and the sluice does not return fish to the source water, *see* 40 C.F.R. §§ 125.92(s), 125.94(c)(5), as PSNH concedes in the comment. Normandeau (AR-872 at 134) comments that the pressure of the spray wash is much lower than 85 psi or 80-100 psi, as described in the 2011 Draft Determinations Document (at 269), because the "pressure decreases greatly as the water leaves the header" but does not provide any calculation or measurement of the spraywash pressure to demonstrate that the pressure is consistent with the definition of modified traveling screen in the Final Rule. Nor does the existing technology meet the requirements for through-screen velocity under all conditions. *See id.* § 125.94(c)(2), (3); *see also* AR-6 at 15 ("The design through-screen velocity of the Unit 1 CWIS is 1.5 [fps]; for Unit 2, it is 1.82 fps."), 28. Normandeau (AR-872 at 137-140) comments on prolonged versus burst swim speeds of fish commonly impinged at Merrimack Station related to through-screen velocity; however, the compliance alternatives for the Final Rule are based on through-screen velocities of 0.5 fps or less and the existing screens do not meet this requirement. In addition, the existing technology is obviously not a "[c]losed-cycle recirculating system," *id.* § 125.94(c)(1), or an "[e]xisting offshore velocity cap," *id.* at § 125.94(c)(4). Finally, it does not come even close to the impingement mortality performance standard of no more than 24% mortality, *see id.* § 125.94(c)(6), (7), since, as Enercon acknowledged, "[t]he existing traveling screen and fish return system has 100% impingement mortality," AR-6 at 30; *see also id.* at 66 ("Impingement survival at Merrimack Station with the existing sluice is essentially zero, because the end of the screenwash discharge pipe is not above the river's surface except at extremely high river levels, preventing fish washed from the end of the pipe from returning alive to the River."). Finally, Normandeau also comments (AR-872 at 133-4) that EPA incorrectly described the traveling screens as "laden with fish" when an impingement rate of 6 fish per hour would not be "laden" with fish. This description is not EPA's but was quoted directly from the description of the traveling screens ("fish and/or debris-laden mesh panels and shelves") in Enercon's 2007 Engineering Response (AR-6 at 27).

Merrimack Station's existing traveling screens would need to be upgraded to meet the definition of modified traveling screens. *See* 40 CFR § 125.92(s).[13] Second, while EPA agrees that continuous rotation and a new return would reduce impingement mortality, PSNH has not demonstrated that these changes, even when coupled with the rescheduled outages, will reduce it enough to achieve the 12-month impingement mortality performance standard of "no more than 24% mortality." *Id.* § 125.94(c)(7); *see also id.* § 125.94(c)(6) (noting that compliance with the systems of technologies alternative "will be informed by" comparing performance data to the 24% standard in paragraph (c)(7)). In the comment, PSNH assumes that the current system results in 100% impingement mortality. Meanwhile, Enercon estimated that the combination of continuous rotation, a new fish return, and the rescheduled outages could reduce that mortality by up to 51.1% on an annual basis. AR-6 at 95. In other words, even PSNH's submittals estimate 12-month impingement mortality would still be 48.9%—more than twice the standard of 24%. 40 CFR § 125.94(c)(7). These changes have a greater likelihood of satisfying the alternative impingement BTA compliance method at § 125.94(c)(6), however, when combined with the technology EPA determined meets the requirements of § 125.94(d) for entrainment. As EPA explained in the preamble to the Final Rule, "[o]nce the BTA requirements for entrainment have been established, the facility would finalize its chosen method for compliance with impingement mortality under § 125.94(c)." 79 Fed. Reg. at 48,359. The wedgewire screens that will be operated seasonally as the entrainment BTA will be designed with a through-screen velocity less than 0.5 fps, which will protect the vast majority of impingeable aquatic organisms. *See id.* at 48,345. When the Permittee is operating the wedgewire screens (April through August 15) to reduce entrainment, this through-screen velocity should achieve a greater reduction in impingement mortality than the technology on which the Final Rule's impingement mortality standards are based (i.e., modified traveling screens). *Id*. The Final Permit (Parts I.A.1, IA.2, and I.E.2) establish a maximum daily limit of 0.5 fps for intake velocity from April 1 through August 15. Additionally, as discussed at length in Response to Comments II.3.2 (and associated sub-comments), Merrimack Station's operational profile has changed since the 2011 Draft Permit. Based on generating data for the years 2012 to 2019, Merrimack Station rarely operates during the months of September and October, and DMR data for these months reflect low average monthly flows. *See* AR-1717. When the Station is not operating, there is no flow through the CWISs, and the actual through-screen velocity will be less than 0.5 fps (in fact it would be zero), which should also achieve low impingement mortality. When the Station is generating electricity (and withdrawing water) and the wedgewire screens are not operating, Merrimack Station will have to employ another technology to minimize impingement. In the 2009 Supplemental Engineering Report in which seasonal use of wedgewire screens was first proposed, Enercon stated that when the wedgewire screens would not be operating, Merrimack Station's existing

[13] Even with the installation of a new fish return sluice, the existing traveling screens would not meet the definition of modified traveling screens under the Final Rule, which requires "screens with collection buckets or equivalent mechanisms designed to minimize turbulence to aquatic life; addition of a guard rail or barrier to prevent loss of fish from the collection system; replacement of screen panel materials with smooth woven mesh, drilled mesh, molded mesh, or similar materials that protect fish from descaling and other abrasive injury; continuous or near-continuous rotation of screens and operation of fish collection equipment to ensure any impinged organisms are recovered as soon as practical; a low pressure wash or gentle vacuum to remove fish prior to any high pressure spray to remove debris from the screens…" 40 C.F.R. § 125.92(s); *see also* 79 Fed. Reg. 48,329; *compare* AR-618 at 267-69 (describing the existing traveling screens).

coarse mesh traveling screens would be used in combination with upgraded fish return systems. *See* AR-4 at 4. As noted in the comments, PSNH proposed installing a new fish return system and continuously operating the plant's traveling screens from April through December. *See* AR-846 at 114-115. Because the current debris return sluice results in minimal to no survival, a new fish return will be crucial to reduce impingement mortality when the Station is operating and the wedgewire screens are not in use (i.e., the facility is not otherwise achieving through-screen velocities at or below 0.5 fps). Upgrading the Facility's fish return system to ensure fish are transported back to the river (rather than being deposited in a dry sump) will improve the effectiveness of the existing technology. In addition, continuous rotation of the traveling screens from April through December (when the screens are operating) will reduce the duration of exposure and improve survival for impinged organisms. AR-6 at 65-66. *See also* AR-1670 at 3-20. EPA believes that, through the combination of wedgewire screens, actual through-screen velocity less than 0.5 fps when not operating, and continuously rotating the existing traveling screens and installing a new fish return system, the Permittee may be able to comply with the impingement mortality BTA standard at 40 CFR § 125.94(c)(6) ("Systems of technologies").[14] EPA acknowledges that the permittee must first perform the impingement performance technology optimization study, which cannot be completed until after the new fish return has been designed and constructed. *See* 79 Fed. Reg. 48,359.

A schedule must provide for compliance with requirements for both entrainment and impingement mortality as soon as practicable. 40 CFR § 125.98(c); *see also* 79 Fed. Reg. at 48,359 ("It would then be appropriate for the Director to develop a schedule whereby the facility would proceed to design, construct, and implement its technologies for impingement mortality, for entrainment, or for both together should the same technology address[] both impacts."). The Final Permit establishes permit requirements and a schedule to achieve compliance with a BTA standard as soon as practicable. A schedule is necessary because the Facility will have to install technology to meet the impingement mortality standards. To comply with 40 CFR § 125.94(c)(6), the Permittee must complete an *impingement performance technology optimization study* (described in 40 CFR § 122.21(r)(6)(ii)) to demonstrate the systems of technologies have been optimized to minimize impingement mortality. In this case, a new fish return system and

[14] In 2012, PSNH also proposed rescheduling the maintenance outage for Unit 2 during late May to early June to reduce flow and, therefore, entrainment and impingement. EPA has determined that the BTA for entrainment is to operate wedgewire screens during this time period, which suggest rescheduling such an outage may be unnecessary. In addition, recent generating data indicate that Merrimack Station typically operates very little in May and early June, which effectively achieves flow reductions somewhat comparable to those PSNH had proposed achieving by rescheduling the Unit 2 maintenance outage (though EPA recognizes that the energy market, rather than a permit condition, results in Merrimack Station curtailing operations during this period). For example, in the combined average monthly flow for May based on DMR data from 2013 through 2019 was, at most, about 6% of the permitted flow. *See* AR-1717. Actual average monthly flows in June were less than 33% of permitted flow over this same period and less than 10% of permitted flow in 4 of 7 years. *See id*. Finally, rescheduling the maintenance outages would only minimize impingement mortality for the short period that each outage lasts. In the case of Unit 1, PSNH notes that the 5% reduction would only occur every other year. In the case of Unit 2, the Permittee should already be able to achieve a design through-screen velocity of 0.5 fps or less. In both cases, the Permittee would still require an alternative technology to meet the impingement mortality standard for the rest of the year. Thus, rescheduling the maintenance outages as PSNH describes may not contribute all that much to meeting the system of technologies alternative, although the permittee would be free to assess these options in its optimization study.

continuous rotation would likely be the focus of the optimization study, which cannot be completed until after the technologies have been designed and constructed. *See* 79 Fed. Reg. 48,359. Following submission of the optimization study, EPA may choose to incorporate additional permit conditions through a permit modification or in the next permit issuance (e.g., permit conditions specifying the optimal rotation frequency from December through March when conditions may not be suitable for continuous rotation). At the same time, while EPA maintains that compliance with the impingement mortality BTA standard at 40 CFR § 125.94(c)(6) is the most direct and likely method of complying with the impingement mortality BTA standards, the Permittee could choose to operate the wedgewire screens year-round, which would comply with 40 CFR § 125.94(c)(2), or it could upgrade the existing traveling screens to meet the definition of modified traveling screens at § 125.94(c)(5).[15] PSNH stated, however, that it would not operate the wedgewire screens during the fall and winter out of a concern that they could be damaged if used during this time. *See* Comments III.4 (and associated sub-comments). And while PSNH suggested it would not upgrade its traveling screens to meet the regulatory definition, *see* Comment III.3.1 n.63, if the new Permittee later decided to choose that compliance alternative, it would still need to build a fish-friendly return.[16] *See* 40 CFR § 125.92(s). Thus, a new fish return is a necessity to satisfy the impingement standard and is, therefore, a requirement in the Final Permit. The Final Permit also requires the Permittee to complete an impingement technology performance optimization study after installation of the new fish return system which will determine the optimal rotation speed and frequency to minimize impingement mortality. Should the Permittee select an alternative method of compliance (e.g., year-round wedgewire screen use or modified traveling screens), EPA would likely modify the permit to incorporate any changes to the CWIS requirements for impingement mortality.

In summary, impingement at Merrimack Station is not *de minimis*. Therefore, the Permittee must select, and comply with, one of the BTA alternatives for impingement mortality in 40 CFR § 125.94(c)(1) through (7) as soon as practicable. The existing technology at Merrimack Station does not satisfy any of these impingement BTA compliance alternatives. Further, PSNH did not show that its asserted BTA of continuous rotation, a new fish return, and rescheduled outages (collectively, but without additional technology) will satisfy any of the seven alternatives—to the contrary, PSNH's data suggest such changes will not be enough. The Final Rule encourages

[15] In footnote 63 to the comment, PSNH states that it "also considered replacing its existing traveling screens with coarse mesh Ristroph screens or Geiger MultiDisc screens ('MD screens')" for use at Merrimack Station, though it ultimately rejects them. If the facility chose to install such screens at Merrimack Station that otherwise met the definition of a "modified traveling screen" at 40 CFR § 125.92(s), they could also be used to satisfy the impingement BTA alternative at § 125.94(c)(5) when the wedgewire screens were not in use. In addition, either type of screen system would also require a new fish return to satisfy the definition of "modified traveling screen." Following construction of a new return and one of these screen systems, the facility would also need to complete an optimization study. Furthermore, since EPA determined in the Final Rule that modified traveling screens with a fish-friendly return (as defined at 40 C.F.R. § 125.92(s)) are the BTA for impingement mortality and that other methods of compliance at § 125.94(c) could also satisfy this standard, the question of whether the costs of installing coarse mesh Ristroph screens or MD screens (or another impingement mortality technology) at Merrimack Station are "wholly disproportionate" to the benefits of the particular technology is not a consideration in determining the impingement BTA at Merrimack Station. Furthermore, in the Final Rule, EPA assessed costs and benefits and determined that the benefits of the Final Rule justify the costs, pursuant to the principles in Executive Orders 12866 and 13563. 79 Fed. Reg. at 48,349-50.

[16] Similarly, if it chose to install coarse mesh Ristroph screens or MD screens, it would need a new fish return.

permitting authorities to consider the extent to which technologies operated for purposes of minimizing entrainment may also be used to satisfy § 125.94(c). EPA has determined that the BTA for entrainment at Merrimack Station is seasonal operation of wedgewire screens—a technology that would satisfy the impingement BTA alternatives of maximum through-screen velocity of 0.5 fps, at least for the periods it operates. *See* Response to Comment III.4.1 and 4.2. EPA believes that this technology, when combined with PSNH's proposed fish-friendly return, an optimized rotation frequency, and perhaps even flow reductions, may allow the facility to comply with the "systems of technologies" standard at § 125.94(c)(6). Or, the Permittee may choose to comply with another impingement BTA alternative, the most likely of which would be modified traveling screens, which will also require installation of a new fish return. The facility could also choose to comply with § 125.94(c) by operating the wedgewire screens year-round, but it has commented on numerous occasions that it cannot do so based on its assessment of the potential for damage to the screens when operating in the fall and winter. Moreover, Merrimack Station's current NPDES Permit is long expired and the facility has essentially operated with 100% impingement mortality due to the lack of a fish return—a basic impingement mortality control technology. Therefore, the Final Permit sets Merrimack Station on a path to comply with § 125.94(c) as soon as practicable by immediately requiring a new fish return[17] and, once constructed, an impingement technology performance optimization study to evaluate the effectiveness of the system of technologies (i.e., seasonal wedgewire screens, new fish return, optimal rotation frequency). [18] Should the permittee later choose to comply with the impingement BTA standard using modified traveling screens, EPA could modify the permit.

[17] The Final Permit now includes a 6-month compliance schedule to install a new fish return. *See* Final Permit at Part I.E.7.d. This a change from the 2011 Draft Permit, which did not include a compliance schedule. *See* 2011 Draft Permit at Part I.E. As EPA explained in the 2017 Statement, it has been evident since issuance of the 2011 Draft Permit that the Permittee would need time to install a fish return, if required by the Final Permit. AR-618 at 23. When EPA issued the 2011 Draft Permit, it expected to include a schedule for the necessary compliance steps in an enforceable document outside of the NPDES permit, consistent with prior agency practice and interpretation of the CWA. *Id.* In the intervening time, however, the agency has changed its interpretation of the Act with respect to compliance schedules for the installation of cooling water intake structure improvements to meet new permit requirements and has decided that they may be included in an NPDES permit. *Id.* (citing 40 C.F.R. §§ 125.94(b)(1)-(2), 125.98(c), 125.94(h)). Therefore, EPA has added a compliance schedule to the Final Permit for installation of the new fish return. *See also* Response to Comment III.10.3.6. The schedule considers aspects of the schedule that Enercon proposed for the installation of fine-mesh traveling screens (including new fish return troughs). *See* AR-4 at 90.

[18] In the 2011 Draft Determinations Document, EPA proposed, based on BPJ, that the BTA to minimize impingement was a new fish return and upgraded traveling screens. AR-618 at 346. (The 2011 Draft Permit did not, however, require the installation of new traveling screens, because the proposed thermal discharge conditions would have required closed-cycle cooling to be in place, which would provide even greater reductions in impingement mortality than new traveling screens. *Id.*). EPA is not finalizing the determination in the 2011 Draft Permit that the BTA for impingement includes new travelling screens, because, after EPA issued the Draft Permit, the agency issued new regulations that affect the process for determining the BTA for minimizing impingement. As discussed above and elsewhere, *see, e.g.*, Response to Comment III.1.1, the 2014 § 316(b) regulations provide seven alternatives to satisfy the impingement BTA standard and generally allow a permittee to choose from among them. As explained above, EPA believes that the Permittee may be able to comply with the systems of technologies alternative without installing new traveling screens. EPA will consider the information in the required optimization study and modify the permit to incorporate the operating conditions and parameters identified in the study. *See* 79 Fed. Reg. at 48,321, 48,347.

3.2 Existing Impingement Technology Violates 1992 Permit Conditions

Comment III.3.2	AR-851, CLF, pp. 4-5, 27

PSNH has never installed a fish return system that would comply with the terms of its existing permit. Fish handled in PSNH's existing "fish return system" empty into a concrete pit on the riverbank above the normal water elevation. As a result, over the past fifty years, the survival rate for fish trapped (impinged) on Merrimack Station's cooling water intake screen is "*virtually zero*."[20] PSNH's cooling water intake screens are, quite literally, a death trap for Merrimack River fish. . . . EPA should require the most protective fish screening and return technology available.

. . .

Perhaps more shocking than the number of fish impinged, is what happens to them after impingement. The 1992 Permit requires that "[a]ll live fish, shellfish, and other aquatic organisms collected or trapped in the intake screens shall be returned to their natural habitat."[146] PSNH's own consultant, however, has described Merrimack Station's current fish return system as "more of a debris return system."[147] EPA correctly concludes, "Merrimack Station's present fish returns are unacceptable. The returns from both units empty into a concrete pit on the riverbank above the normal water elevation. Therefore, fish survival for impinged fish over the past 50 years of plant operation has been virtually zero."[148] That fact amounts to a gross and continuing violation of the 1992 Permit.

PSNH's blatant non-compliance with this permit condition—and EPA's failure to enforce it—raise substantial concerns. This example of longstanding PSNH disregard for a key requirement of its federal NPDES permit is a red flag signaling to EPA that it should closely scrutinize PSNH's compliance with all of the terms of its new NPDES permit going forward.

[20] Attachment D at 291.
[146] *See* AR 236, 1992 Permit, at I.A.l.c. (emphasis added).
[147] Attachment D at 270 (citing Normandeau 2007d).
[148] *Id*. at 291.

EPA Response:

CLF comments that the existing fish return system is inadequate to protect fish and return them to the receiving water. EPA agrees that the existing technology is not sufficiently protective and, moreover, is not consistent with one of the BTA compliance alternatives for impingement mortality under the Final Rule. *See* AR-618 at 289 (noting that the "existing technology, developed in the 1950s and 1960s, does not include provisions to gently handle impinged fish" and that technologies developed since are available to reduce current levels of impingement mortality). EPA agrees a fish return that transports fish back to the receiving water in a manner that minimizes mortality is a fundamental requirement for traveling screen technology. The Final Permit requires the Permittee to design, install, and operate a new fish return to address the concerns highlighted in the comment. *See also* Response to Comment III.3.1.

3.3 The Proposed Operating Requirements for Screens at Merrimack Are Impracticable

Comment III.3.3	AR-841, UWAG, pp. 62-63

The draft permit for Merrimack has operating requirements for the screens that are impractical. The screens must be rotated every eight hours and, if more than 40 fish are on the screens, they must be rotated continuously. Moreover, the operator must count each dead fish, identify it by species, and measure a certain percentage of the dead of each species. In practice, this is impossible. These operating requirements should be removed from the permit.

EPA Response:

This comment from UWAG asserts, without any explanation or support, that it is "impossible" to (1) rotate the traveling screens every eight hours and, if more than 40 fish are on the screens, rotate continuously; and (2) count each dead fish, identify it by species, and measure a certain percentage of the dead of each species. EPA assumes UWAG is referring to permit conditions related to unusual impingement events at Part I.D and conditions for the traveling screen operation at Part I.E.4 of the 2011 Draft Permit. In contrast to UWAG's conclusory comment, Enercon, on behalf of PSNH, concluded that, in combination with other operating conditions and technologies, continuous operation of the traveling screens from April through December constitutes the BTA for Merrimack Station. *See* AR-6 at 99. In its comments in 2012 and again in 2017, PSNH echoed Enercon's assessment and proposed continuous rotation of the existing traveling screens from April through December. *See* AR-846 at 113; AR-1548 at 126. The operator (at the time the comment was made, now former operator) has not indicated that the rotation speed or counting fish during an unusual impingement event is "impossible" or "impractical" (and in fact has proposed more frequent rotation).

Similar requirements to increase frequency of screen rotation and enumerate impinged fish during unusual impingement events have been included in other NPDES permits, for example, Wheelabrator Saugus (MA0028193), University of Massachusetts Boston (MA0040304), and Kendall Station (MA0004898). EPA has not removed the permit conditions based on this comment because UWAG provides no justification or support for its statement that these requirements are "impossible" or "impractical," the permittee has not indicated that it will have a problem complying with these requirements and in fact, has complied with these conditions during past operations, and similar conditions have been implemented in practice for other facilities' CWISs.

3.4 The Rate of Impingement at Merrimack Station is *De Minimis*

Comment III.3.4	AR-1548, PSNH, pp. 127-131
See also AR-846, PSNH pp. 74-80, AR-872 Normandeau pp. 133-4, 137-141, AR-1231 PSNH et al. pp. 34, Exhibit 4 pp. 11-12, and Attachment 1 pp. 8-10, AR-1549, Enercon, p. 20, AR-1207 EPRI p. 7; AR-1300, LWB, pp. 40-43	

Existing CWIS controls at Merrimack Station constitute BTA for impingement because the rate of impingement at Merrimack Station is *de minimis*.[542] PSNH demonstrated in its 2012 comments to the Draft Permit that the rate or level of impingement experienced at Merrimack Station cannot be anything other than *de minimis* and is not resulting in any adverse environmental impact ("AEI") within the Hooksett Pool.[543] To support this argument, PSNH utilized comprehensive biological sampling at Merrimack Station completed by Normandeau between 2005 and 2007. That data allowed Normandeau to estimate that Merrimack Station 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.[544] To further bolster its conclusions that the rate of impingement at Merrimack Station is *de minimis*, Normandeau next converted the raw numbers for the six species that comprise in excess of 90 percent of this estimated total number of fish impinged in an average year at Merrimack Station and calculated the annual, expected adult equivalent losses due to the estimated impingement to be a mere 517 adult fish lost in an average year due to AIF at Merrimack Station. These numbers are miniscule when one considers the natural mortality of early lifestages of fish, and the exorbitant number of eggs fish produce each season, absent outside influences.

This conclusion was corroborated by PSNH in its 2012 comments by referencing an EPRI study that analyzed the economic benefits of retrofitting existing once-through cooling facilities with CCC.[545] In this study, EPRI gathered and ranked impingement data from 166 facilities with CWISs in the same regulatory category as those at Merrimack Station.[546] Merrimack Station's average annual impingement ranked 136 out of 166 facilities in EPRI's study, meaning the incidence of impingement at the facility was in the bottom 18 percent of all facilities in the database.[547] Remarkably, 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—demonstrating that problematic rates of impingement are limited to a specific subset of CWISs within this regulatory category—and the Merrimack Station CWISs are not within this problematic subset.[548]

Normandeau revisited this *de minimis* issue in an October 22, 2014 report submitted to EPA to examine how, if at all, its previous *de minimis* analysis should be revised in light of the 2014 final § 316(b) rule.[549] Normandeau embraced the illustrative *de minimis* flow-based examples in the final § 316(b) rule to support its 2012 conclusions. Utilizing the mean annual flow ("MAF") of the Merrimack River (4,927 cubic feet per second ("cfs")) from 1996 to 2003, Normandeau determined the Unit 1 DIF of 131 cfs withdraws 2.67% of the MAF, and the Unit 2 DIF of 312 cfs withdraws 6.33% of the MAF.[550]

The final § 316(b) rule does not utilize DIF in its *de minimis* examples, however. Instead, EPA recommends considering average AIFs,[551] which are significantly lower at Merrimack Station—especially in the last 4-7 years. Specifically, Merrimack Station Unit 1 had an AIF of 97 cfs in the

2005 through 2007 timeframe. MAF of the Merrimack River during this time was 7,241 cfs, meaning the 97 cfs of Unit 1 was a mere 1.34% of the total River MAF.[552] Unit 2's AIF during this same time period was 251 cfs, which amounts to 3.47% of the Merrimack River MAF. Utilizing the more conservative 4,927 cfs MAF from 1996 to 2003, the AIF withdrawals from 2005 through 2007 are still a mere 1.97% and 5.09% for Unit 1 and 2, respectively.[553] Normandeau also looked at the most recent three years of Merrimack Station CWIS operations at the time, from 2011 through 2013. Unit 1 had an AIF of 56 cfs, or 1.11% of the MAF of 5,021 cfs for the Merrimack River during those years. Unit 2's AIF during this period was 119 cfs, or 2.37% of the Merrimack River MAF. Utilizing again the more conservative 4,927 cfs MAF from 1996 to 2003, the AIF withdrawals from 2011 through 2013 represent 1.14% and 2.42% for Unit 1 and 2, respectively.[554] All of these examples are within the 5% percent or less MAF withdrawal percentage EPA set out in the final § 316(b) rule and support a conclusion that the rate of impingement at Merrimack Station is *de minimis*.

Furthermore, Normandeau's 2014 report provides the following additional support that the rate of impingement at Merrimack Station must be considered *de minimis*:

> An impingement characterization study was performed at Units 1 and 2 of Merrimack Station from 29 June 2005 through 28 June 2007, weekly during April through December and on alternate weeks during January through March (Normandeau 2007), providing recent and relevant data for estimating impingement abundance. Merrimack Station weekly AIFs have been reduced by about 50% since the 2005 through 2007 Study, by reducing the operation of Units 1 and 2, making the weekly average AIF from Merrimack Station from 1 January 2011 through 31 December 2013 the most current and appropriate CWIS operating regime to estimate impingement abundance and mortality for compliance with the new §316(b) regulations . . . .
>
> Weekly impingement rates (density as number of fish impinged per million gallons of water sampled, adjusted for collection efficiency; Appendix Tables B‐3 and B‐4 of Normandeau 2007) at each Unit (1 or 2) from the 2005 through 2007 Study were multiplied by the associated weekly AIF from Merrimack Station for 1 January 2011 through 31 December 2013 . . . to estimate the current weekly and annual impingement abundance of fish for the two units combined . . . . Fish species impinged at Merrimack Station during the 29 June 2005 through 28 June 2007 Study were also categorized as fragile or nonfragile species according to the specifications of §125.92(m) of the new §316(b) regulations. The only species impinged at Merrimack Station classified as a fragile species was Rainbow Smelt, which accounted for only 2.3% of the total estimated fish impingement over the two-year study (Table A1‐3). Annual impingement abundance of total fish at Merrimack

> Station was reduced by 54% in 2011 through 2013 (compared to the 2005 through 2007 study . . .) due to the recent flow reductions.[555]

To provide proper perspective, Normandeau likewise references the above-referenced 2011 EPRI national survey to highlight the averaged annual impingement rate from its 2005 through 2007 study at Merrimack Station is *de minimis*. Applying numbers that are slightly different than those included in PSNH's 2012 comments to the Draft Permit, Normandeau provides:

> The Merrimack Station annual impingement rate averaged over the two years of study (29 June 2005 through 28 June 2007) was 3,978 fish for Unit 1 and Unit 2 combined (Table A1 – 2), ranking 139th among the 166 facilities responding to the EPRI national survey . . . . Merrimack Station had an annual total far below (0.27% of) the national average. In terms of rank this 2005 through 2007 annual average impingement rate places Merrimack Station in the lowest 17% of the facilities surveyed throughout the United States that had performed impingement characterization studies during the 2004 through 2007 period . . . . Based on the most recent and relevant intake flows from 1 January 2011 through 31 December 2013 applied to the weekly impingement rates from the 29 June 2005 through 28 June 2007 Study . . ., the Merrimack Station annual impingement rate was 1,834 fish for Unit 1 and Unit 2 combined . . ., which was in the **lowest 11%** of the facilities surveyed throughout the United States that had performed impingement characterization studies during the 2004 through 2007 period. Therefore, by comparison with the largest data base of reported annual impingement rates presently available from 166 electric generating facilities representative of all source water bodies throughout the continental United States and Hawaii (EPRI 2011), and using annual total impingement rates for the three most recent years of AIF (2011 – 2013), impingement abundance at Merrimack Station of 0.27% of the national average is de minimis.[556]

Taken together, these data and analyses demonstrate that the rate of impingement at Merrimack Station is *de minimis*. Accordingly, existing CWIS controls and operations at Merrimack Station constitute BTA and additional technologies at the facility are not required.

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542 Should EPA erroneously disagree with this conclusion, the owner or operator of the facility has the right and obligation to choose the method of compliance with the impingement mortality standard. *See id.* at § 122.21(r)(6).

543 *See, e.g.,* AR-846 at 73-82.

544 *Id.* at 74 (citing AR-6 at 6).

545 *See* AR-846 at 81 (citing AR-842 at 7-9). EPRI's economic benefits study is described in more detail in

its comments to the 2012 Draft Permit. *See* AR-842.
546 These 166 facilities comprised 39 percent of the total population of facilities with CWISs that fall within the same regulatory category as the CWISs at Merrimack Station. *Id.* at 7.
547 *Id.*
548 *See id.*
549 *See* AR-1231, Ex. 4, Attachment 1 at 8-10.
550 *Id.* at 9.
551 *See, e.g.,* 79 Fed. Reg. at 48,309.
552 AR-1231, Ex. 4, Attachment 1 at 9.
553 *Id.*
554 *Id.*
555 *Id.* at 8.
556 *Id.* at 10 (emphasis added). Normandeau again references data from its 2014 report in its report submitted with these comments. *See* Normandeau 2017 Response at 27.

EPA Response:

PSNH comments that the existing CWIS controls and operations at Merrimack Station constitute BTA and no additional technologies are required to address impingement mortality, because the level of impingement at Merrimack Station is, in PSNH's view, *de minimis*. In support of this assertion, PSNH points to its 2012 comments, the estimated number of fish impinged and the estimated adult equivalent losses, the rate of impingement at Merrimack Station as compared to other generating stations, and the volume of water withdrawn by Merrimack Station's CWISs in comparison to the mean annual flow of the river. For the reasons that follow, EPA disagrees that impingement at Merrimack Station is *de minimis* and does not find support in any of the information presented in the comment above or in the comments provided in 2012.

EPA considers the loss of, or injury to, aquatic organisms (including fish eggs and larvae, juvenile and adult fish, and other types of organisms) from being entrained or impinged by a CWIS to constitute adverse environmental impact under CWA § 316(b). In the 2011 Draft Determinations Document (AR-618 at 230-32), EPA explains the term "adverse environmental impact" (AEI) and the basis for its interpretation. Neither statute nor regulation expressly limits the extent of adverse environmental impact that may be considered.

In the 2014 Final Rule, EPA concluded that the BTA for minimizing impingement mortality at facilities subject to the rule was "modified traveling screens," as defined in the rule.[19] 79 Fed. Reg. at 48,329; *see* 40 CFR §§ 125.92(s), 125.94(c)(5). In addition to the option to employ modified traveling screens to comply with the standard, the rule includes six alternatives an existing facility may use whose performance is equivalent to, or better than, modified traveling screens. *Id.* Consequently, the Final Rule provides that "[t]he owner or operator of an existing facility must comply with one of the alternatives in paragraphs (c)(1) through (7) of this section, except as provided in paragraphs (c)(11) or (c)(12) of this section, when approved by the" permitting authority. 40 CFR § 125.94(c). Although the comment includes a limited (and

[19] The definition includes, among other requirements, that the system have a fish handling and return system that returns fish to the source water, which PSNH concedes Merrimack Station does not have. *See* Response to Comment III.3.1.

selective) reference to the Final Rule, it inexplicably ignores the actual *de minimis* provision in the regulations—paragraph (c)(11)—which provides in relevant part:

> In limited circumstances, rates of impingement may be so low at a facility that additional impingement controls may not be justified. The Director, based on review of site-specific data submitted under 40 CFR 122.21(r), may conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted.

40 CFR § 125.94(c)(11). Several themes are evident from a review of paragraph (c)(11) and are further explained in the record for the rulemaking. First, the *de minimis* provision will only be available "[i]n limited circumstances." Thus, a decision by a permitting authority that no additional impingement controls are warranted at a facility will be an infrequent occurrence. Indeed, in the record accompanying the Final Rule, EPA explained that it expects the *de minimis* provision to be "rarely used." Final Rule RTC (AR-1697) at 25 n.4; *see also id.* at 118 ("[T]he Agency intends for the *de minimis* provision to be infrequently used."), 212 (noting that only in "the most rare cases" will *de minimis* impingement be demonstrated under § 125.94(c)(11)); AR-1718 at 12-3 ("EPA intends that this provision would not be utilized often"). Second, the rate of impingement must actually be quite low, not just lower than other facilities that may themselves be much larger or withdraw from different types of water bodies. In responding to comments on the Final Rule, EPA described the provision as potentially applicable where rates of impingement are "exceptionally low." AR-1697 at 42 ("The final rule provides flexibility for the Director to decide not to require impingement controls where rates of impingement are *exceptionally low* as to be de minimis.") (emphasis added), 118 ("In seeking to avail themselves of the de minimis provision, facilities are required to submit data to the Director indicating that they experience *exceptionally low* impingement rates; the Director will then determine what measures are appropriate.") (emphasis added); *see also* AR-1718 at 12-3 ("EPA has included a provision in the final rule that permits the Director to conclude that a site-specific determination of BTA for impingement mortality is warranted at sites *with exceptionally low rates of impingement*.") (emphasis added). EPA explained the relationship between the two concepts, noting that EPA had not established "metrics for what qualifies as 'exceptionally low' impingement rates, as the Agency intends for the *de minimis* provision to be infrequently used," and citing as an example an impingement rate of "several fish per month." AR-1697 at 118. Furthermore, in disagreeing with a comment opposing an annual *de minimis* threshold on the basis that it could mask significant short-term impingement, EPA noted that "the absolute number of fish impinged is likely to be sufficiently low" that such masking would not be numerically possible and that such a facility "likely would not qualify for the de minimis provision." *Id.* at 109, 118. Third, the *de minimis* provision is within a permitting authority's *discretion* to invoke in a particular instance and is not automatically applied in any case. 40 CFR § 125.94(c)(11) ("The Director . . . *may* conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted.") (emphasis added); AR-1697 at 264 ("[T]he Director has the discretion to conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted.").

Reviewing the information presented in the comments in light of the *de minimis* provision in the Final Rule, the Region does not agree that the documented rate of impingement at Merrimack Station is low enough for EPA to conclude that no additional impingement controls are warranted. First, PSNH's comment and the supporting data do not suggest that Merrimack Station's impingement is exceptionally low. In particular, PSNH estimates (in its comment) that 6,736 fish were impinged during the first year of the biological study (from June 2005 to June 2006) and 1,271 fish were impinged during the second year of the study (from July 2006 to June 2007). The mean annual impingement based on these two years of monitoring is 4,005 fish, which Normandeau estimates as an annual loss of 517 adult equivalent fish.[20] Moreover, although EPA explained in the Final Rule that it was not establishing a numeric threshold for what qualifies as "exceptionally low," EPA did provide an example of several fish per month. AR-1697 at 118 (citing 77 Fed. Reg. 34,324 (June 11, 2012)). Based on PSNH's estimates above, Merrimack Station by comparison impinges several *hundred* fish per month[21]—a rate considerably higher (by two orders of magnitude) than EPA's example.

PSNH next comments that its estimates of impingement at Merrimack Station "are miniscule when one considers the natural mortality of early lifestages of fish, and the exorbitant number of eggs fish produce each season, absent outside influences." Yet PSNH offers no explanation why the production and/or mortality of eggs and larvae—which are associated with entrainment—should have any bearing on whether the mortality of thousands of juvenile and adult fish due to impingement is *de minimis*.[22] In truth, the CWISs at Merrimack Station present additional sources of mortality not accounted for by the natural mortality rates and life histories of all life stages of fish (or, in the words of the comment, "outside influences"). That an individual egg or larva may not have survived to adulthood naturally does not excuse Merrimack Station from impinging and killing thousands of juvenile and adult fish each year through the use of fundamentally inadequate impingement mortality technology at the facility (which even by PSNH's admission fails to return fish to the source waterbody), nor does it establish that the BTA standard for impingement mortality is satisfied.

[20] In its comments on the 2011 Permit (AR-872 at 141) Normandeau provided different estimates of 4,137 fish in Year 1 and 895 fish in Year 2, or 5,032 fish over the 2-year study, which it comments is nearly double the estimate of "entrapment' of 2,504 fish from 1976-1977. In all cases, the mortality of thousands of fish per year due to the inadequacy of the existing technology represents an adverse environmental impact. Normandeau also comments that impingement estimates are not a good indicator of fish population abundance. In the 2011 Draft Determinations Document, EPA compared the impingement estimates from the 1970s and 2000s to demonstrate only that impingement mortality of thousands of fish per year is an additional stressor on fish populations that may already be experiencing declines. At the same time, as explained in the response, a population-level impact is not necessary to demonstrate adverse environmental impact from impingement. *See also* AR-1300 at 40-1.

[21] Table 4-6 from Normandeau's 2007 Biological Report (AR-6 at 74) indicates the average, adjusted impingement rate at both units combined is about 17 fish per million m3 (about equivalent to the daily design flow of 287 MGD), which equates to an average of about 500 fish per month based on design flow and adjusted for screen collection efficiency. Even corrected for actual flow during the 25 months of study between 2006 and 2007 produces an estimate of thousands of fish each year and a monthly average count of almost 200 fish per month (AR-3 at 77).

[22] Nor does the Final Rule direct a permitting authority to compare a facility's impingement to the number of eggs and larvae in the waterbody when considering a claim that impingement rates are so low that no additional impingement controls are warranted.

The preamble accompanying the Final Rule explains, that "EPA does not expect that a de minimis exemption would apply to facilities with no technology present other than trash racks, a technology that nearly all facilities employ." 79 Fed. Reg. at 48,372. The existing traveling screens at Merrimack Station lack an adequate mechanism to transport fish safely back to the river, as PSNH acknowledged in its 2007 Engineering Response and its 2012 comments. *See* AR-6 at 29, 30; AR-846 at 115. The lack of a fish return trough means that *all* of the thousands of fish impinged annually at Merrimack Station's CWISs are killed. Broadly speaking, traveling screens that allow fish to suffer mortality because the fish are not returned to the receiving water are no better technology for minimizing impingement than are trash racks. The existing screens lack fundamental technology to transport fish directly to the river, which is one of the most basic features of the technology industry-wide. *See* TDD for Final Rule (AR-1718) at 6-20. In effect, the result of impingement at Merrimack Station is even worse than PSNH's estimates might otherwise suggest at a facility that employed some level of effective fish return technology, since impingement mortality at Merrimack Station is essentially equal to the rate of impingement. In addition, to the extent PSNH comments that impingement at Merrimack Station does not result in adverse impacts to fish populations in Hooksett Pool and, therefore, is *de minimis*, EPA has stated that a *de minimis* rate of impingement is to be measured at the organism level, not the population level. 79 Fed. Reg. at 48,371-72. For all of these reasons, EPA does not agree that the annual loss of thousands of individuals at Merrimack Station's obsolete traveling screens due to impingement is *de minimis*.

Second, the comment assumes without explanation that a permitting authority should invoke the *de minimis* provision for a particular facility based on the facility's impingement ranking among a list of facilities compiled by EPRI. According to the comment, it is not important that a facility impinges (and, in this case, kills) thousands of fish in a typical year, only that the facility impinges fewer fish than this select group of other facilities do. But the comment does not provide any statutory or regulatory support for this position, which is reflected nowhere in the Final Rule. *Compare* Final Rule RTC (AR-1697) at 118 (noting as a *de minimis* example a facility that impinged "several fish" per month). More specifically, the comment views Merrimack Station's impingement as *de minimis* because its average annual impingement ranked 136th out of 166 facilities (putting it in the bottom 18%) in EPRI's list. Under this view, however, scores if not hundreds of facilities would qualify for a provision that the regulation states should be applied "[i]n limited circumstances." 40 CFR § 125.94(c)(11).[23] Under PSNH's standard, almost one in

[23] These 166 facilities do not represent the universe of facilities subject to the Final Rule, but, according to PSNH, just 39% of the facilities "with CWISs that fall within the same regulatory category as the CWISs at Merrimack Station." PSNH Comments at 128 n.546. Thus, the comment suggests that a total of roughly 425 facilities are in that category. If 18% of these 425 qualified for consideration under § 125.94(c)(11), that would equate to 76 facilities—which does not square with EPA's stated expectation that the *de minimis* provision would be "rarely used." AR-1697 at 25 n.4; *see also id.* at 118 ("[T]he Agency intends for the *de minimis* provision to be infrequently used."), 212 (noting that only in "the most rare cases" will *de minimis* impingement be demonstrated under § 125.94(c)(11)); TDD at 12-3 ("EPA intends that this provision would not be utilized often"). Moreover, EPA estimated that the Final Rule would apply to 1,065 facilities. 79 Fed. Reg. at 48,305. If 18% of all facilities subject to the rule could potentially be exempted from satisfying the BTA standard for impingement mortality, almost 200 facilities could potentially qualify for a provision that a permitting authority is supposed to apply only "[i]n limited circumstances." 40 C.F.R. § 125.94(c)(11).

five facilities would qualify for a *de minimis* exemption—hardly an indication that the provision would actually be "rarely used."[24] Final Rule RTC at 25 n.4. In short, not only does PSNH fail to explain where its comments about comparative rankings to the EPRI list are reflected in the Final Rule, such comments contradict EPA's record statements about when the agency expects § 125.94(c)(11) to be potentially available.

PSNH also remarks that the bottom 30 facilities in the EPRI list account for 0.02% of impingement, which, in PSNH's reading, "demonstrates that problematic rates of impingement are limited to a specific subset of CWISs within this regulatory category" and that Merrimack Station's CWISs are not "problematic." The comment does not provide a basis for this conclusion, however, merely assuming that facilities that impinge fewer fish than the most "problematic" facilities are *ipso facto* not "problematic." The comment does not consider that this statistic could just demonstrate an obvious truth that some facilities impinge more than others. EPA does not agree that this statistic "demonstrates" that Merrimack Station's CWISs are not "problematic."

In estimating compliance with the impingement standard in the Final Rule, EPA assumed that none of the 1,682 intakes considered in the rulemaking would fall under the *de minimis* provision at 40 CFR § 125.94(c)(11). 79 Fed. Reg. 48,360. If, as PSNH suggests, a *de minimis* level of impingement can be quantified as representing some percentage of the bottom ranking facilities on a national basis, it stands to reason that a known number of these facilities would fall under the *de minimis* provision and, therefore, would have been included in EPA's evaluation of the costs of the Final Rule. That EPA did not consider any facilities *de minimis* in this analysis plainly indicates that the threshold representing a *de minimis* level of impingement constitutes more than a simple ranking of the impingement rate among all facilities subject to the Final Rule.

According to PSNH, Normandeau's comparison of intake flow to river flow supports its conclusion that impingement is *de minimis* based on the "illustrative *de minimis* flow-based examples in the final § 316(b) rule." Normandeau provides estimates of Merrimack Station's DIF and AIF over various years as a percentage of the mean annual flow (MAF) of the Merrimack River. See Table III.1, below.

Table III.1. Merrimack Station intake flow as a percentage of mean annual flow (MAF) of the Merrimack River. *See* AR-1231 at 9.

Averaging Period	Intake Flow Unit 1 + Unit 2	MAF	Percent
1996-2003	DIF 443 cfs	4,927 cfs	8.99%
2005-2007	AIF 348 cfs	7,241 cfs	4.80%
2011-2013	AIF 175 cfs	5,021 cfs	3.49%

[24] In addition, during the development of the Final Rule, EPA considered and rejected a *de minimis* claim by a facility that ranked in the bottom 19% of a similar EPRI list, concluding that "[i]t is unlikely that a rate of impingement that corresponds to . . . 19% . . . in ranking of all power plants represents an unusually low or very low rate of impingement." AR-1719.

PSNH comments that all of Normandeau's estimates[25] are "within the 5% percent or less MAF withdrawal percentage EPA set out in the final § 316(b) rule and support a conclusion that the rate of impingement at Merrimack Station is *de minimis*." To begin with, PSNH mischaracterizes the example of 5% or less MAF in the preamble to the Final Rule as a *de minimis* threshold. The preamble states:

> EPA acknowledged that there may be circumstances where flexibility in the application of the rule may be called for and the rule so provides. For example, *some* low flow facilities that withdraw a small proportion of the mean annual flow of a river *may* warrant special consideration by the Director. As an illustration, if a facility withdraws *less than 50 mgd AIF*, withdraws less than 5 percent of mean annual flow of the river on which it is located (if on a river or stream), and is not co-located with other facilities with CWISs such that it contributes to a larger share of mean annual flow, the Director *may* determine that the facility is *a candidate for consideration* under the de minimis provisions contained at § 125.94(c)(11).

79 Fed. Reg. at 48,309 (emphases added). Withdrawal as a percentage of mean annual flow of the river is given as an example of one condition the permitting authority *could* consider in making a *de minimis* determination, but it is not "set out" as a threshold for a *de minimis* determination. *Id.*; *see also id.* at 48,371 ("The Director *may* want to consider facility withdrawal rates in relation to the mean annual flow of the river…when making a de minimis determination.") (emphasis added). [26] Moreover, it is unlikely to be definitive. For instance, in the TDD for the Final Rule (AR-1718 at 5-16), EPA estimated that about 30 percent of the 331 facilities on freshwater streams or rivers with design flows greater than 2 MGD (and for which data was available) have actual intake flow greater than 5 percent of the MAF of the source waters, meaning that about 70 percent of these facilities have AIFs below 5 percent MAF. If EPA intended for a withdrawal rate of less than 5% of the MAF of the river to be a threshold for *de minimis*, 222 facilities on freshwater rivers would be excluded from having to address impingement mortality. Indeed, this is not borne out in the analysis of the Final Rule, which, as discussed above, estimated that no facilities would qualify for the de minimis provision and specifically provides that the *de minimis* provision may be applied "[i]n limited circumstances." 40 CFR § 125.94(c)(11).

The relative scale of withdrawals at facilities located on freshwater rivers and streams as a percentage of the mean annual flow in the TDD further diminishes the import of the comment's comparisons of AIF to MAF. *See* AR-1718 Exhibit 4-7, p. 4-7. The exhibit shows that more than half of electric generators and the vast majority of manufacturers currently operate CWISs that

[25] EPA notes that in the comment, Normandeau presents withdrawal volumes of each unit as a percentage of MAF. As the intent of the consideration of MAF is to provide context for the potential impact of impingement mortality by the facility on the Merrimack River, it makes more sense to evaluate the cumulative total DIF or AIF of both units rather than each unit separately. *See* 79 Fed. Reg. at 48,371 (noting that, when making a *de minimis* determination, the permitting authority "may want to consider *facility* withdrawal rates in relation to the mean annual flow of the river and possible *co-location with other CWISs*") (emphases added). Table III.1 presents the total DIF and AIF at both CWISs.

[26] Recall also that the *de minimis* provision is within a permitting authority's discretion to invoke in a particular instance and is not automatically applied in any case.

withdraw less than 5% of mean annual flow. Again, if percentage of MAF were a threshold for concluding that the effects of the intake are *de minimis*, then most of the facilities subject to the Final Rule would be *de minimis*. Clearly this was not the intent, as EPA plainly states that it expects the *de minimis* provision to be "rarely used." AR-1697 at 25 n.4, 42 ("The final rule provides flexibility for the Director to decide not to require impingement controls where rates of impingement *are exceptionally low* as to be de minimis.") (emphasis added), 118 ("EPA did not establish any metrics for what qualifies as 'exceptionally low' impingement rates, as the Agency intends for the *de minimis* provision to be infrequently used"); *see also* 40 CFR § 125.94(c)(11) ("*In limited circumstances*, rates of impingement may be so low at a facility that additional impingement controls may not be justified.") (emphasis added); AR-1718 at 12-3 ("EPA intends that this provision would not be utilized often"). For all of these reasons, EPA does not find persuasive PSNH's comments justifying a *de minimis* finding based on the comparison of AIF and MAF at Merrimack Station.

For the above reasons, EPA does not agree that impingement at Merrimack Station is *de minimis*.

3.5 PSNH Should Not Be Required To Address Entrainment Mortality Given Its Average AIF Over the Last 3 Years Is Less Than 125 MGD

Comment III.3.5	**AR-1548, PSNH, pp. 131-135**

Current CWIS technologies and operations at Merrimack Station constitute BTA because the final § 316(b) rule establishes PSNH is not required to address entrainment mortality. Specifically, Merrimack Station is not subject to entrainment controls because the 3-year average AIF at the facility falls below the 125 MGD compliance threshold EPA established in the final § 316(b) rule. In this rule, BTA for entrainment is to be determined on a site-specific basis, including a potential conclusion that no entrainment controls at a facility are necessary—especially for those facilities falling below this 125 MGD AIF. As mentioned above, the regulations require only those facilities with "major cooling water withdrawals"—*i.e.*, an average greater than 125 MGD AIF over the past three years—to submit a robust series of analyses to their respective permit writers as part of the regulatory entrainment mortality assessment because EPA believes it is these facilities that have the highest likelihood of causing adverse entrainment impacts.[557] The three-year average AIF (2014-2016) of the CWISs at Merrimack Station is 69.6 MGD, well below the 125 MGD AIF compliance threshold EPA established in the final § 316(b) rule. Consequently, Merrimack Station should not be subject to entrainment controls.[558]

EPA's reason for establishing this compliance threshold for entrainment is well founded. EPA found that all of the facilities, like Merrimack Station, withdrawing less than this amount, combined, represent only 10 percent of the nationwide potential for AEI from entrainment, despite comprising approximately 70 percent of all facilities potentially subject to the final § 316(b) rule.[559] EPA logically concluded in the final rule that the 125 MGD AIF threshold is therefore "justified on a technical basis" and was selected for the purpose of "focus[ing] on the facilities with the highest intake flows and the highest likelihood of causing adverse impacts."[560] The final rule recognized that facilities, like Merrimack Station, that withdraw fewer than 125

MGD AIF are far less likely to cause entrainment impacts, and it makes practical sense to allow permitting authorities the discretion to require submission of the entrainment studies to make an informed and legally defensible entrainment determination, which often may be that no entrainment controls are justified at all.[561]

EPA recognized in the preamble to the final § 316(b) rule that it is possible a permitting authority may find it necessary to require entrainment compliance for a facility with an average AIF below 125 MGD.[562] However, it is clear that EPA expected this to be the exception and not the norm for such facilities because it went to great lengths to explain that the 125 AIF threshold was created to differentiate between larger facilities whose water withdrawals likely pose a significant risk of AEI due to entrainment from those whose withdrawals do not. Were the final rule and/or the agency to presuppose that facilities withdrawing less than 125 MGD AIF would be subject to the same entrainment requirements as those above that intake threshold, EPA's establishment of the threshold in the first place would be wholly arbitrary, capricious, and as a practical matter, pointless. Therefore, while exemption from entrainment controls is not "automatic," the final rule, at a minimum, presupposes that a facility withdrawing less than 125 MGD AIF likely represents little to no impact to aquatic organisms and thus need not specifically be forced to install costly entrainment compliance controls unless the information available to a permitting authority in fact indicates otherwise.

EPA promulgated entrainment control standards in the final rule to "establish[] a detailed specific framework for determining BTA entrainment control requirements," a critical component of which is requiring that certain information be collected by the facility and submitted to the permitting authority for consideration in making the BTA determination on a site-specific basis.[563] Indeed, EPA requires that entrainment BTA determinations be based upon the specific information provided in a number of specific studies that only facilities withdrawing greater than 125 MGD AIF are required to collect and submit. EPA's Technical Development Document accompanying the final § 316(b) rule highlights the importance of the permitting authority's access to these site-specific studies, explaining the purpose of the requirement is to allow "the permit writer [to] have access to all the information necessary for an informed decision about [a site-specific BTA determination] . . . to reduce entrainment mortality at facilities above 125 MGD AIF."[564] Thus, the requirement to collect and submit specific information about entrainment impacts is inherently tied to the underlying entrainment BTA requirements.

Exempting a facility from submitting "information necessary for an informed decision" about the appropriateness of entrainment controls, yet purporting to make such a decision in the absence of that "necessary" information, defies logic and defeats the purpose of the entrainment study requirement altogether. Permitting authorities enjoy discretion to request specific entrainment-related information from a facility with an AIF below 125 MGD.[565] Yet, EPA has not requested entrainment studies delineated in the final § 316(b) rule from PSNH. Instead, EPA has determined the studies the Company submitted prior to the promulgation of the final § 316(b) rule are sufficient—an assertion PSNH has critiqued in these comments as invalid, arbitrary and capricious.

It is clear from EPA's discussion of the 125 MGD AIF threshold in the final § 316(b) rule

that facilities like Merrimack Station should be exempt from addressing entrainment absent some compelling site-specific information demonstrating actual entrainment mortality at the facility greatly exceeds what is common for facilities that withdraw less than 125 MGD. EPA has not presented or advanced any compelling site-specific information establishing entrainment at Merrimack Station exceeds some critical point, meaning entrainment controls are necessary. In fact, the evidence in the administrative record leads to the opposite conclusion. In the absence of concrete, problematic entrainment information, the 125 MGD AIF compliance threshold promulgated only three years ago by the agency dictates that Merrimack Station is one of the approximately 70 percent of all facilities subject to the final § 316(b) rule that present a negligible risk of environmental impact due to entrainment and that no technological controls are therefore necessary at the facility.

557 *See, e.g.,* 79 Fed. Reg. at 48,309.
558 The final § 316(b) rule clearly provides the three-year average 125 MGD threshold is to be based on a facility's actual (versus design) conditions. It would therefore be improper for EPA to construe PSNH's position as seeking a cap on capacity utilization at the facility or in any way suggesting such a cap would be an acceptable condition to the permit. It would not be an acceptable condition.
559 *See id.*; *see also* Final Rule TDD at 3-8 (providing that the 125 MGD AIF "threshold will capture 90 percent of the actual flows but will apply only to 30 percent of existing facilities").
560 79 Fed. Reg. at 48,309.
561 *See id.* at 48,309-10.
562 *Id.* at 48,361 ("not[ing] that facilities below the 125 [MGD] threshold are not automatically exempt from entrainment requirements").
563 *Id.* at 48,330.
564 Proposed Rule TDD at 7-7 (emphasis added).
565 79 Fed. Reg. at 48,309.

EPA Response:

PSNH comments that Merrimack Station should not be subject to any entrainment controls because its daily actual intake flow ("AIF") falls well below a 125 MGD "compliance threshold" that, according to the commenter, EPA established in the 2014 CWA § 316(b) Final Rule. EPA fundamentally disagrees. Nothing in the Final Rule "establishes" or "presupposes" that facilities with an AIF below 125 MGD have "little to no impact to aquatic organisms" and "should not be subject to entrainment controls." Simply put, there is no such "compliance threshold for entrainment" in the Rule.

EPA notes that this comment essentially restates comments that EPA rejected during promulgation of the 2014 CWA § 316(b) Final Rule.[27] As EPA stated in the preamble to the Rule:

> Contrary to a number of public comments, however, EPA is not implying or concluding that the 125 mgd threshold is an indicator that facilities withdrawing less than 125 mgd are (1) not causing any adverse impacts or (2) automatically qualify as meeting BTA. In other words, the threshold, while justified on a

[27] We reiterate that the Final Rule has since been reviewed and upheld in federal court. *See Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018).

> technical basis, does not result in exemptions from the rule. Instead, EPA is making a policy decision on which facilities must *provide a certain level and type of information*.

79 Fed. Reg. 48,300, 48,309 (Aug. 15, 2014) (emphasis added); *see also* EPA, Technical Development Document for the Final Section 316(b) Existing Facilities Rule (May 19, 2014) at 3-8 to 3-9 (hereinafter referred to as "TDD"). Thus, while the Rule requires certain facilities to submit additional studies and other materials with their permit application materials, *see* 40 CFR § 122.21(r)(1)(B), (r)(9) - (13), these provisions do not establish a "compliance threshold" for entrainment. Indeed, the phrase "compliance threshold" does not appear in either the Final Rule or the preamble to it.

The additional permit application requirements also do not constitute a presumption that facilities below the 125 MGD threshold do not require entrainment controls or suggest that "EPA expected" that requiring entrainment controls at facilities with an AIF less than 125 MGD would "be the exception and not the norm."[28] EPA explained that "any facility *at any flow* may have an adverse environmental impact." 79 Fed. Reg. at 48,355 (emphasis added); *see also* Final Rule RTC (AR-1697) at 101-102 (disagreeing with the comment that "EPA appears to have identified 125 mgd as the flow threshold for the occurrence of adverse impacts and that any facility below that threshold should be presumed to employ BTA for both impingement and entrainment"). In the preamble to the 2014 CWA § 316(b) Final Rule, EPA also explained that it made the policy decision to include additional permit application requirements in § 122.21(r) only for relatively larger facilities partly to reduce the potential burden of the permit application process on relatively smaller facilities. *See* 79 Fed. Reg. at 48,309, 48,357. Similarly, EPA explained in the TDD that it chose the 125 MGD application requirements threshold because it "struck the appropriate balance between the goal of capturing the greatest portion of intake flow while minimizing *the study requirements* for smaller facilities." TDD at 3-8 (emphasis added). The Rule does not exempt facilities that withdraw less than 125 MGD from the Rule's BTA requirements for minimizing entrainment.

Not only are facilities below the 125 MGD threshold "not automatically exempt from entrainment requirements," as PSNH concedes in a footnote to the comment (PSNH fn 562), but EPA made clear in the Final Rule that the permitting authority may determine "that entrainment controls may need to be installed *for any cooling water intake structure*." 79 Fed. Reg. at 48,361 (emphasis added). Indeed, even facilities with an AIF at or below 2 MGD, and to whom the Final Rule therefore does not apply, *see* 40 CFR § 125.91(a), are still subject to CWA § 316(b)'s requirement to minimize adverse environmental impacts associated with the use of cooling water intake structures. *See* 40 CFR § 125.90(b). Thus, the commenter is mistaken when it characterizes EPA's decision not to subject smaller facilities to more costly study requirements as a presumption that facilities with an AIF less than 125 MGD will have "little to no impact to aquatic organisms" and do not require entrainment controls. EPA concluded that the rule

[28] The converse is also true: the 2014 CWA § 316(b) Final Rule does not create a presumption that facilities that withdraw more than 125 MGD through their cooling water intake structures must install any particular entrainment reduction technologies. BTA decisions for entrainment reduction at facilities withdrawing 2 MGD or more are made on a site-specific basis considering the variety of factors specified in 40 C.F.R. § 125.98(f).

applicability threshold of just 2 MGD "ensures that the users of cooling water causing the most adverse environmental impact are subject to the rule." 79 Fed. Reg. at 48,309. During the rulemaking, EPA considered raising this applicability threshold to 50 MGD, but decided against it, in part because facilities below 50 MGD "are twice as likely to have no controls in place for impingement or entrainment than are facilities with intake flows greater than 50 mgd." 79 Fed. Reg. at 48,308. Indeed, as EPA recognized in the Fact Sheet, the CWISs at Merrimack Station essentially have no effective means of minimizing entrainment mortality because "the mesh size of the screens is too large to exclude small life stages, and the plant's intake flow represents a significant proportion of the flow of Hooksett Pool." AR-618 at 271. In sum, the permit application requirements in the regulations simply do not establish a presumption that facilities withdrawing less than 125 MGD "should not be subject to entrainment controls." *See also, e.g.*, 79 Fed. Reg. at 48,309-10 (The 125 MGD permit application requirements are "not an indicator that facilities under that threshold are no longer of concern in the final rule."); Final Rule RTC (AR-1697) at 101-02 ("EPA's selection of 125 mgd as a threshold is not the result of an assessment of biological impacts.... [T]he 125 mgd threshold is not intended to be an indicator of impacts . . .").

The plain language of the regulations indicates that PSNH's theory is without basis. As PSNH concedes elsewhere, the CWA § 316(b) Final Rule "applies to existing industrial facilities that withdraw greater than 2 MGD and utilize 25 percent or more of that water exclusively for cooling purposes." Comment 2 (citing 40 CFR § 125.91(a)).[29] Moreover, the Final Rule states that such existing facilities are required to meet both the impingement mortality standard at 40 CFR § 125.94(c) *and* the site-specific entrainment standard at 40 CFR § 125.94(d).[30] 40 CFR § 125.94(a).

As EPA explained in the preamble to the Rule:

> EPA has established a national BTA standard for entrainment for existing units that requires determination of BTA entrainment requirements on a site-specific basis in a structured permitting setting. The framework for determining entrainment requirements provides for the consideration at a minimum of certain specified factors that must be considered in the Director's determination of the BTA controls.

79 Fed. Reg. at 48,337. Specifically, 40 CFR § 125.94(d) provides that the permitting authority must establish BTA requirements for entrainment reduction on a site-specific basis that reflect the

[29] The commenter does not dispute that the permitted facility is a point source, that it uses CWISs with a cumulative DIF of greater than 2 MGD to withdraw water from waters of the United States, that it uses 25 percent or more of that water on an actual intake flow basis exclusively for cooling purposes, or that it is, consequently, subject to the Final Rule. *See* 40 C.F.R. § 125.91(a).

[30] In the TDD accompanying the Final Rule, EPA specifically noted that the permitting authority's "determination of BTA *for entrainment requirements* under 40 CFR 125.94(d)" is an applicable requirement of the Rule for an "[e]xisting facility with a DIF greater than 2 mgd *but AIF not greater than 125 mgd*." TDD at 3-1 (Exhibit 3-2) (emphases added).

permitting authority's determination of the maximum reduction in entrainment warranted "after consideration of the relevant factors *as specified in §125.98*" (emphasis added). Factors that the permitting authority *must* consider are specified in 40 CFR § 125.98(f)(2), while factors that it *may* consider are listed in 40 CFR § 125.98(f)(3).[31] Notably, neither list includes consideration of whether the facility's AIF is above or below 125 MGD or, indeed, what the facility's AIF is at all.

Instead, the permitting authority is required to consider the "[n]umbers and types of organisms entrained," the "particulate emissions or other pollutants associated with entrainment technologies[, l]and availability inasmuch as it relates to the feasibility of entrainment technology[, r]emaining useful plant life[, and q]uantified and qualitative social benefits and costs of available entrainment technologies." 40 CFR § 125.98(f)(2). The 125 MGD threshold established in the application requirements of § 122.21(r) simply does not represent a presumption that facilities withdrawing less than this amount are having "little to no impact." As the Fact Sheet recounts, Merrimack Station accounts for the loss of millions of eggs and larvae every year and withdrawals at the time of the Draft Permit represented a sizeable fraction of the available river flow. AR-618 at 244-255. The information available to EPA in this proceeding establishes the reasonableness of the Agency's conclusion that entrainment and impingement losses from Merrimack Station's current operation constitute adverse environmental impacts. *See* AR-618 at 244-262. PSNH's assertions that Merrimack Station should not be subject to entrainment controls because its three-year average AIF falls well below a supposed 125 MGD "compliance threshold" established in the Final § 316(b) Rule, or even that the regulations provide that entrainment controls for facilities that withdraw less than 125 MGD would "be the exception," find no basis in the regulation.[32]

In short, the 2014 CWA § 316(b) Final Rule applies to facilities like Merrimack Station withdrawing more than 2 MGD of water, *see also* 2014 CWA § 316(b) Final Rule, Response to Comments at 72 (Entrainment "requirements are applicable to all in-scope facilities (including those with intake flows at or below 125 AIF)."), and it does not establish a 125 MGD "compliance threshold" for entrainment. PSNH's comment that the Final Rule establishes a presumption or "presupposes" that facilities withdrawing less than 125 MGD will be "exempt from addressing entrainment absent some compelling site-specific information" that entrainment at the facility "greatly exceeds what is common for [other similarly-sized] facilities" and/or "exceeds some critical point" is similarly unfounded. (Nor does PSNH explain what level of mortality this would be or how it derived these standards). To the contrary, as EPA stated in the Final Rule, EPA did not conclude that facilities withdrawing less than 125 MGD are not causing any adverse impacts or automatically qualify as meeting BTA. 79 Fed. Reg. at 48,309; *see also*

[31] Moreover, in an ongoing permit proceeding such as this one, the permitting authority's "BTA determination *may* be based *on some* or all of the factors in paragraphs (f)(2) and (3) of this section." 40 C.F.R. § 125.98(g) (emphases added). *See also* Response to Comment III.2.2, III.2.3.

[32] Furthermore, PSNH's theory finds no support in the statute. CWA § 316(b) does not exempt from the requirements of § 316(b) CWISs at facilities whose AIF is less than 125 MGD. By the same token, neither the statute nor regulations mandate that particular entrainment reduction technologies be used by facilities withdrawing *more* than 125 MGD of water. Again, the 2014 CWA § 316(b) Final Rule calls for site-specific, case-by-case BTA determinations for entrainment control.

Final Rule RTC (AR-1697) at 101-102 ("EPA's selection of 125 mgd as a threshold is not the result of an assessment of biological impacts.... [T]he 125 mgd threshold is not intended to be an indicator of impacts . . .."). The statutory language requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. EPA has established, both in the 2011 Draft Determinations Document (AR-618 at 244-262) and in this Response to Comments, that entrainment of millions of eggs and larvae at Merrimack Station's CWISs annually is an adverse environmental impact that must be minimized by implementing technology based on consideration of the appropriate factors at 40 CFR § 125.98(f).

3.6 Entrainment at Merrimack Station is *De Minimis*

Comment III.3.6	**AR-1548, PSNH, pp. 135-137**
See also AR-846, PSNH, p. 70-82; AR-872, Normandeau, pp. 125-143; AR-852, CLF, p. 5; AR-1300, LWB, pp. 38-42	

Normandeau has concluded time and again that the levels of entrainment at Merrimack Station are *de minimis*.[566] The rationale for Normandeau's conclusions are fully set out in its reports and were summarized by PSNH in its comments to the 2011 Draft Permit.[567] In short, Normandeau's comprehensive biological sampling between 2005 to 2007 revealed that an estimated 2.95 million ichthyoplankton were entrained at Merrimack Station in 2006 and approximately 2.5 million were actually entrained in 2007 based on AIF numbers.[568] Normandeau took these estimated, actual entrainment numbers and calculated the potential entrainment estimations if the plant's CWISs operated at maximum DIF capacity throughout the year. This analysis forecast that less than 3.5 million ichthyoplankton would be entrained in an average year.[569]

Normandeau next calculated the annual, expected adult equivalent losses due to the estimated entrainment based on AIF to put the raw entrainment number into proper perspective by accounting for the natural mortality of early lifestages of fish, coupled with the exorbitant number of eggs fish produce each season. Utilizing 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, Normandeau calculated that 14,061 adult fish would be lost in an average year due to entrainment of ichthyoplankton at the plant based on AIF.[570]

PSNH compared these entrainment numbers in its comments to the 2011 Draft Permit to the same EPRI study referenced in Part III.C.1., above, to illustrate how trivial they are compared to the breadth of facilities subject to the CWIS regulations.[571] EPRI collected entrainment data from 90 facilities and 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.[572] Notably, the entrainment losses from the 16 facilities ranked at the bottom of EPRI's database made up a mere 0.04 percent (four ten thousandths) of the entrainment losses from all 90 facilities that provided entrainment data for the EPRI study.[573]

The *de minimis* exception set out the 2014 final § 316(b) rule further bolsters the

conclusion that entrainment is *de minimis* at Merrimack Station. While the regulatory provision and MAF-based examples provided in the final rule apply principally to impingement, EPA makes clear the only reason the "specific regulatory language for *de minimis* entrainment was" not included in the final rule is because "the entrainment requirements are already determined" on a site-specific basis, meaning the permit writer has the opportunity to take into consideration any and all unique characteristics of a given facility—including those that support a finding that entrainment is *de minimis*.[574] Accordingly, the 2014 Normandeau analysis described in Part III.C.1. (Comment III.3.4), above—demonstrating that the AIF of Units 1 and 2 have collectively accounted for less than five percent of the MAF of the Merrimack River over the entire course of Normandeau's data sets—applies equally to assessing what impacts, if any, have been caused by entrainment. This too supports a conclusion that the levels of entrainment at Merrimack Station are *de minimis*.

Taken together, these comprehensive analyses—coupled with the breadth of additional evidence and data included in the administrative record—unquestionably demonstrate that entrainment levels at Merrimack Station are *de minimis* and that no additional CWIS technologies and/or controls are necessary to satisfy the § 316(b) BTA standard.

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[566] *See* AR-1170 at 141-143; *see generally* AR-2.
[567] *See* AR-846 at 75-82; *see generally* AR-6. Also included in PSNH's comments, as well as Normandeau's comments to the 2011 Draft Permit (AR-1170), are a number of points of contention between EPA and Normandeau regarding the collection and/or analyzing methods Normandeau employed in its studies. *See, e.g.,* AR-846 at 75-80. EPA has never responded to the comments and critiques set out in the 2012 comments from PSNH and Normandeau and failed again to do so in the agency's Statement. These comments and critiques are well-founded and remain valid.
Notably, EPA's 2011 criticism of Normandeau's use of the adult equivalency method has since been undercut by the agency's 2014 final § 316(b) rule. In that rule, EPA specifically acknowledges that *de minimis* analyses may utilize an "age-one equivalent count" because: [I]nformation in the record indicates that an overwhelming majority of eggs, larvae and juveniles do not survive into adulthood and the [age-one equivalent count ("A1E")] calculations adjust for differences in survivorship based on species and age-specific mortality rates. EPA recognizes that using A1Es simplifies a complex ecological situation, because some of the smaller fish would provide an ecological benefit to other species as food even if they would not survive to adulthood. Recognizing this as one nonmonetized benefit in the analysis, using an A1E approach is the most reasonable approach available because to date, there is insufficient data to account for the extent to which organisms that do not survive to adulthood provide a benefit to other organisms which can be reliably monetized. *See* 79 Fed. Reg. at 48,371, 48,403.
[568] *See* AR-2.
[569] *See* AR-6 at 12.
[570] *Id.* at 4.
[571] AR-846 at 81.
[572] *Id.* (citing AR-842 at 7).
[573] *Id.* (citing AR-842 at 7).
[574] 79 Fed. Reg. at 48,372.

EPA Response:

PSNH comments that levels of entrainment (both as raw number of individuals and adult equivalent fish based on actual flow) at Merrimack Station are *de minimis*. PSNH also comments that entrainment at Merrimack Station is *de minimis* because it is lower than entrainment at 74

other facilities in an EPRI database that are also subject to the CWIS regulations. According to PSNH, section 125.94(c)(11) in the Final Rule and EPA's examples in the preamble comparing a facility's intake flow to the mean annual flow ("MAF") of the water body from which it withdraws apply not just to impingement, but also to entrainment. PSNH then concludes that its MAF-based argument in Comment III.3.4 therefore "applies equally" to assessing the impacts of Merrimack Station's entrainment. Based on its position that entrainment is *de minimis*, PSNH concludes that no additional technologies or controls are necessary to satisfy the BTA standard for § 316(b) at Merrimack Station.

EPA does not agree that the entrainment numbers recounted in the comment should be considered *de minimis* for Merrimack Station. Neither the Clean Water Act nor the applicable regulations provide a definition for the term "*de minimis*," but it is shorthand for the Latin phrase "*De minimis non curat lex*" (often translated as "the law does not concern itself with trifles") and generally understood to mean a "trifling," "trivial," or "negligible" amount. Black's Law Dictionary (11th ed. 2019). Thus, PSNH essentially comments that removing 2.5 to 3 million ichthyoplankton (most of which are larvae) from the Hooksett Pool every year is a trivial amount that the Clean Water Act was not intended to reach. PSNH does not offer any legal support as to why § 316(b) should not reach such entrainment. Instead, both here and in its 2012 comments, PSNH attempts to defend as *de minimis* what its consultant, Normandeau, concedes are "large" numbers, AR-1170 at 142, by arguing that the natural mortality of early life stages is high and that fish produce an "exorbitant number of eggs" each season. As an initial matter, PSNH does not explain the relevance of the comment that fish produce an "exorbitant number of eggs" where the vast majority of life stages entrained at Merrimack Station are larvae, not eggs. *See* AR-618 at 244-51. In any event, EPA has a long-standing record of considering adverse environmental impacts in terms of eggs and larvae. *See, e.g.*, 79 Fed. Reg. at 48,303 ("The withdrawal of cooling water by existing facilities removes and kills hundreds of billions of aquatic organisms from waters of the United States each year, including plankton (small aquatic animals, including fish eggs and larvae), fish, crustaceans, shellfish, sea turtles, marine mammals, and many other forms of aquatic life. Most impacts are to early life stages of fish and shellfish."). EPA, in this case and in the Final Rule, recognizes that the direct loss of millions of early life stages to entrainment is itself an environmental impact that is adverse to the aquatic environment of the Merrimack River.[33] That an individual egg or larva killed by entrainment would likely not have survived to

[33] PSNH, in a footnote to its comment above, notes that in 2012 it identified "a number of points of contention between EPA and Normandeau regarding the collection and/or analyzing methods Normandeau employed in its studies," including that sampling was not conducted in March, several comments regarding how EPA characterized entrainment at Merrimack Station, and that EPA incorrectly omitted from its analysis a sample from May 2016 in which no eggs and larvae were entrained at Unit 1, which PSNH comments artificially overinflated the entrainment estimate. *See* AR-846 at 70-76; AR-872 at 129-133; AR-1300 at 40-2. EPA noted only that there may be eggs and larvae present prior to April 1, as there is no biological reason to expect that larvae naturally appear on April 1 as opposed to March 29. Having said that, EPA has not, either in the Fact Sheet or in responding to comments, suggested that the relatively smaller number of eggs and larvae that may be captured in late March would meaningfully impact either the estimated number entrained or the determination that entrainment at Merrimack Station is an adverse environmental impact that must be minimized with appropriate entrainment controls. Similarly, the omission of the May 2006 datapoint ultimately results in a difference of 400,000 eggs and larvae. Normandeau also comments (AR-872 at 129) that it incorrectly classified post-larval white suckers entrained in June 2007 and that

adulthood naturally does not excuse Merrimack Station from killing millions of organisms each year due to the absence of available entrainment control technology at the facility, and it does not establish that section 316(b) of the Clean Water Act should not concern itself with Merrimack Station's CWISs. The CWISs at Merrimack Station represent additional sources of mortality not accounted for by the natural mortality rates and reproductive strategies of fish. AR-618 at 254; *see also id.* ("[E]ntrainment losses may deplete the compensatory reserve that fish species may rely upon to ensure their health and survival under natural conditions."). Entrainment mortality may also represent "a significant reduction in available forage for older juvenile fish and other aquatic organisms that typically prey on them," which, while difficult to quantify, "creates added stress on the Hooksett Pool ecosystem." AR-618 at 254. Although PSNH criticizes EPA's statements on this point in the Fact Sheet as "wrongfully omitting the value these [entrained] fish and ichthyoplankton have in providing a food source to many species within the ecosystem," PSNH 2012 Comments at 78 (citing AR-618 at 250-51, 254), PSNH's criticisms miss EPA's point that entrained eggs and larvae may no longer be available to the organisms that typically prey on them, which can alter typical predator/prey relationships and create added stress on the system. AR-618 at 254; *see also* 79 Fed. Reg. at 48,303 (noting potential indirect, ecosystem-level effects of entrainment, including "(1) disruption of aquatic food webs resulting from the loss of . . . entrained organisms that provide food for other species, (2) disruption of nutrient cycling and other biochemical processes, (3) alteration of species composition and overall levels of biodiversity, and (4) degradation of the overall aquatic environment.").[34] EPA maintains that the 2006-2007 entrainment data do not represent a trifling level of entrainment.[35]

PSNH comments that the expected adult equivalent losses, as calculated by its consultant, Normandeau, put the entrainment losses into "proper perspective" by accounting for the natural

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the entrained individuals were actually post-yolk sac larvae. The corrected estimate is 0 post-larval white sucker and 1,153,611 post-yolk sac larval white sucker entrained. This correction changes the estimate of adult equivalent losses, but does not alter EPA's conclusion that entrainment at Merrimack Station results in adverse environmental impact, which is not based on assessment of adult equivalents. Similarly, Normandeau's comments (AR-872 at 130-2) about larval drift to Hooksett Pool, whether certain species are "prone to entrainment," the taxonomic identification of certain species, and the comparison of entrainment numbers to fish abundance data would not alter EPA's determination that the loss of 3.4 million ichthyoplankton annually (as Normandeau estimated) or 3.8 million annually (as EPA estimated) is an adverse impact that must be addressed with the BTA. As such, the omission of the single data point does not alter EPA's determination or demonstrate that the BTA standard is satisfied. Likewise, PSNH's criticisms, *see* AR-846 at 80, of EPA's discussion of Normandeau's entrainment analysis do not support a finding that annual entrainment of 3.4 million ichthyoplankton (as Normandeau estimated) is *de minimis*.

[34] Both Normandeau (AR-872 at 132-3) and Barnthouse (AR-1300 at 39-40) comment that EPA did not justify its arguments that loss of forage as a result of entrainment and entrained organisms are still available as forage for other species, so there is no loss of biomass. EPA considers the loss of aquatic organisms, including phytoplankton and zooplankton, can have cascading effects through food webs. *See* 79 Fed. Reg. 48,319. *See also* 66 Fed. Reg. 65,263. Even beyond their potential role as forage, EPA considers the direct mortality of aquatic organisms from impingement and entrainment at CWISs an adverse environmental impact. *See* 79 Fed. Reg. 48,319-21.

[35] Even if such levels could be considered low, it would not necessarily mean that they are evidence of negligible impact; they "may reflect the compromised state of fish populations in Hooksett Pool, with fewer adult fish available to contribute to the ichthyoplankton community." AR-618 at 253; *see also id.* at 251 ("Fish population assessments using trapnet sampling data, which Merrimack Station described in a 1976 report as 'the most quantifiable sampling technique employed in the Merrimack River Program,' indicate that fish abundance declined by 89.5 percent between the 1970s and 2000s.").

mortality discussed above. According to Normandeau, more than 14,000 adult fish would be lost annually from the Merrimack River based on actual intake flows during the 2006-2007 biological study. AR-6 at 12. Even if the number of adult equivalents were the "proper perspective" in which to view such losses,[36] EPA sees nothing trivial about the removal of over 14,000 adult fish annually from the Hooksett Pool. *See* Response to Comment III.3.4 (disagreeing with the comment that impingement of roughly 4,000 fish per year is *de minimis*); *see also* AR-618 at 252-54. Further, PSNH's comment contains no new explanation for its conclusion, leaning instead on the rationale Normandeau offered in comments on the 2011 Draft Permit on behalf of PSNH asserting that such losses should be considered *de minimis*. In those comments, Normandeau states that a "complete census of the number of fish in Hooksett Pool would be necessary to determine if this is a substantial component of the fish community," conceding, however, that such a census "does not exist." AR-1170 at 142 (emphasis added). Lacking the information it deems "necessary" to support its assertion that such entrainment is negligible, Normandeau then posits that the entrainment losses are *de minimis* because, "[i]f entrainment substantially affected fish populations, it would be reasonable to expect that the abundance of fish with the greatest [adult equivalent] losses would be declining." *Id.* EPA fundamentally disagrees with this premise; any argument that entrainment losses that are not shown to produce a population-level effect are *ipso facto de minimis* conflicts with EPA's long-standing and judicially-upheld interpretation of § 316(b) that entrainment can constitute adverse environmental impact even without demonstrable population-level effects. *See Riverkeeper, Inc. v. EPA*, 475 F.3d 83, 123–25 & n.36 (2d Cir. 2007) ("*Riverkeeper II*"), *rev'd on other grounds, Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208 (2009); *Riverkeeper, Inc. v. EPA*, 358 F.3d 174, 196-97 (2d Cir. 2004) ("*Riverkeeper I*"); *see also* Final Rule Response to Comments (RTC) AR-1697 at 101 ("EPA disagrees that the presence of community- or population-level impacts is required before an AEI has occurred."); 105-107 ("[I]t is inconsistent with 'minimizing adverse environmental impacts' to adopt standards based on ensuring only against the most drastic consequences – decline and destruction of fish populations – rather than preventing these in the first instance through the reduction of impingement and entrainment."). The comments of PSNH and its consultant fail to support the assertion that the loss of 14,000 adult fish at Merrimack Station is *de minimis*.

In 2012, PSNH (AR-846 at 77) and Normandeau (AR-872 at 129) commented that adult equivalency analysis is an accepted standard method for estimating actual impacts to fish populations. EPA agrees that adult equivalency or age-one equivalent counts are widely used by the scientific community, including by EPA in the Final Rule. However, use of adult or age-one equivalent methodology is not essential for establishing adverse environmental impact because, again, demonstrating entrainment impacts to fish populations is not necessary to demonstrate that an environmental impact is adverse. *See supra*; AR-618 at 230-32. While age-one or adult equivalents may be a valid methodology for some analyses related to establishing requirements

[36] The comment provides no legal support for PSNH's position. We note that EPA's entrainment BTA regulations do not specify that the permitting authority consider the number of adult-equivalents entrained, whereas they do specify consideration of the "[n]umbers and types of organisms entrained." 40 C.F.R. § 125.98(f)(2)(i) (emphasis added). We do not suggest that a permitting authority shall not consider adult-equivalents in an entrainment BTA determination, *see, e.g.*, *id.* § 125.98(f)(3)(i), but simply that any suggestion that adult-equivalency is the only relevant inquiry is not reflected in the regulation.

under § 316(b), it is not—as PSNH concedes (AR-846 at 77)—the only factor to consider in assessing the adverse environmental impact of entrainment. AR-618 at 250-51. This type of analysis ignores the substantial non-natural mortality of many millions of organisms. Indeed, the Final Rule does not use adult equivalent fish in the context of assessing adverse environmental impact.[37] *See, e.g.*, 79 Fed. Reg. at 48,303 ("Aquatic organisms drawn into CWIS are either impinged (I) on components of the intake structure or entrained (E) in the cooling system itself. In CWA section 316(b) and in this rulemaking, these impacts are referred to as *adverse environmental impact* (AEI)."); *see also* 40 CFR § 125.98(f)(2)(i). As mentioned earlier, eggs and larvae are a food source for many species. Losses within these life stages may disrupt food webs at multiple trophic levels and have ripple effects, as predators that lose forage due to entrainment may have to shift to other organisms, and compete with other predators, or search elsewhere for prey. AR-618 at 250-51.

In footnote 567 to the above comment, PSNH comments that "EPA's 2011 criticism of Normandeau's use of the adult equivalency method has since been undercut by the agency's 2014 final § 316(b) rule" and claims that EPA "specifically acknowledges that de minimis analyses may utilize an 'age-one equivalent count." The comment provides no reference to any "criticism" of adult equivalency in the 2011 Draft Determinations Document. EPA summarized entrainment data using both the numbers of individuals entrained and the estimated adult equivalents while noting that adult equivalent loss is "not the only factor to consider." AR-618 at 250. EPA sees no conflict with this assessment and the 2014 Final Rule nor does the Final Rule indicate that adult equivalents may be used to support a finding that entrainment is de minimis. PSNH cites to 79 Fed. Reg. at 48,371-72, on which EPA states that EPA "considers low rates of impingement to be measured as an organism or age-one equivalent count." We note, however, that this reference is specifically to impingement, not entrainment. In fact, as discussed herein, the Final Rule does not include a *de minimis* provision for entrainment as it does for impingement, *see* 79 Fed. Reg. 48,372, but rather requires the permitting authority to consider, among other factors, the number of organisms entrained when establishing site-specific entrainment controls. 40 CFR § 125.98(f)(2)(i) (emphasis added). PSNH also includes in footnote 567 a quotation from the preamble to the Final Rule in which EPA discusses age-one equivalents in relation to the Benefits Analysis prepared for the Rule.[38] *See* 79 Fed. Reg. at 48,403. In that analysis, EPA used several metrics, including age-one equivalents and the individual number of eggs, larvae, juveniles, and adults, to quantify the reduction in impingement mortality and entrainment likely to result from implementation of the preferred and proposed regulatory options. *See* 79 Fed. Reg. at 48,402-04. EPA also recognized that adult equivalent losses may be a useful metric in a benefits analysis, particularly where impingement mortality and entrainment data are collected from multiple

[37] PSNH and Normandeau (AR-872 at 129) also comment that EPA incorrectly compared the estimates of yellow perch collected during electrofishing and trapnet sampling in the Merrimack River to the adult equivalent losses from impingement and entrainment in 2007. EPA agrees that the electrofishing and trapnet data are not intended as a complete census of the population, nor did EPA suggest this is so. The 2011 Draft Determinations Document (AR-618 at 251) simply suggests that the electrofishing and trapnet data demonstrate that the abundance of yellow perch in the Merrimack River is low and indicates that this population may be disproportionately impacted by further stressors, such as mortality as a result of being exposed to the CWISs.

[38] Note that, for the Benefits Analysis in the Final Rule, EPA assumed no facilities would have *de minimis* rates of impingement. *See* 79 Fed. Reg. 48,360.

facilities using different protocols, methods, equipment, and volume of intake flows. *Id.* Converting sampling counts to adult equivalents in such a case may help to standardize estimates across multiple facilities. *See* 79 Fed. Reg. at 48,402. In neither case does the discussion of age-one equivalents in the Final Rule "undercut" EPA's statements in the Fact Sheet regarding Normandeau's use of adult equivalents to assess entrainment at Merrimack Station. And, in any event, as noted earlier, EPA does not agree that loss of 14,000 adult fish is a trivial annual amount.

PSNH also comments that the level of entrainment reflected in the 2006-2007 data should be considered trivial and beyond the reach of § 316(b) because it is lower than the entrainment at 74 other facilities in an EPRI list of 90 facilities. Neither PSNH nor EPRI, however, cite any statutory or regulatory support for this position. For entrainment, the Final Rule sets forth a framework for a site-specific analysis that requires the permitting authority to consider a relatively short list of specific factors and provides the permitting authority with the discretion to consider several additional specific factors. 40 CFR § 125.98(f)(2), (3). Importantly, neither list of factors includes a comparison of a facility's entrainment numbers to that of some other unrelated, larger facility on a different water body, let alone to one in the limited group captured in the EPRI study.[39] *See id.*

Further, EPA disagrees that the *de minimis* provision set out in the Final Rule (at 40 CFR § 125.94(c)(11)) supports a conclusion that entrainment at Merrimack Station is *de minimis*. Section 125.94(c)(11) applies by its terms and location to the BTA determination for *impingement* mortality, not entrainment.[40] *See also* 79 Fed. Reg. at 48,322 ("EPA notes that these provisions for impingement mortality [including the § 125.94(c)(11) "*De minimis rate of impingement*" provision] would not apply to entrainment.") (underlining added). Thus, while PSNH claims that the *de minimis* provision applies "principally to impingement," in fact, EPA did not intend § 125.94(c)(11) to apply to entrainment at all.[41] The Final Rule does not include any *de minimis* provision for entrainment, but, as noted, sets forth a framework for analysis that requires the permitting authority to determine the maximum reduction in entrainment warranted after

[39] Even according to PSNH, the EPRI study gathered entrainment data for just 90 facilities—21% of the roughly 425 facilities it estimated were subject to the Phase II regulations. AR-846 at 81. Moreover, EPA estimated that a total of 1,065 facilities will be subject to the Final Rule, including 544 Electric Generators. 79 Fed. Reg. at 48,305.

[40] "*De minimis rate of impingement*. In limited circumstances, rates of impingement may be so low at a facility that additional impingement controls may not be justified. The Director, based on review of site-specific data submitted under 40 CFR 122.21(r), may conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted. For threatened or endangered species, all unauthorized take is prohibited by the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*). Notice of a determination that no additional impingement controls are warranted must be included in the draft or proposed permit and the Director's response to all comments on this determination must be included in the record for the final permit." (underlining added). Moreover, paragraph (11) is within paragraph (c), entitled "*BTA Standards for Impingement Mortality*." (underlining added).

[41] Even if it did apply, it would undermine PSNH's conclusion that entrainment at Merrimack Station is *de minimis*. For instance, EPA stated in the Final Rule that § 125.94(c)(11) would be "rarely used" and invoked only where rates are "exceptionally low." *See* Response to PSNH Comment III.3.4. EPA provided as an example a facility with an impingement rate of several fish per month. *See id.* Here, by contrast, Normandeau estimated that Merrimack Station entrained an adult-equivalent of several thousand fish per month during the entrainment season.

consideration of a number of relevant factors, including the social benefits and costs of available entrainment controls. Only after consideration of the mandatory factors may a permitting authority conclude that no additional entrainment controls are warranted based on the facts of the individual case.

Similarly, EPA does not agree with the comment that the mean annual flow (MAF) example in the preamble to the Final Rule applies to entrainment (or that PSNH's MAF-based argument in Comment III.3.4 therefore "applies equally" to entrainment). PSNH provides no support for this assertion, and, in fact, the preamble contradicts it. In particular, the discussion in the preamble about the MAF example concludes by specifying that a permitting authority may determine that such a facility "is a candidate for consideration *under the de minimis provisions contained at § 125.94(c)(11)*," 79 Fed. Reg. at 48,309 (emphasis added), which of course is the very provision EPA made clear does not apply to entrainment.[42]

In its 2012 comments on the 2011 Draft Permit, PSNH criticizes EPA for failing to consider certain factors in EPA's 1977 "Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment" for assessing adverse impact, while simultaneously arguing (somewhat incongruously) that EPA may not use that guidance "as having the force of law." AR-846 at 73, 79-80 & n.37. As an initial matter, EPA has since rescinded this draft guidance document. *See* Memorandum from David Ross, EPA Assistant Adm'r (Aug. 6, 2019) (AR-1739). But, in any event, EPA agrees that the statute and the Final Rule govern the analysis to be undertaken, not the draft guidance. Section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. EPA considers the loss of, or injury to, aquatic organisms (including fish eggs and larvae, juvenile and adult fish, and other types of organisms) from being entrained or impinged by a CWIS to constitute adverse environmental impact under § 316(b). The 2011 Draft Determinations Document (AR-618 at 230-33) clearly explains the term "adverse environmental impact" (AEI) and the basis for its interpretation. Neither statute nor regulation specifies an impact threshold above which a CWIS's effects must rise before the BTA requirement is triggered.[43] Furthermore, the Final Rule sets out

[42] In its comments on the 2011 Draft Permit, Normandeau argues with EPA's conclusions about the impacts of entrainment based in part of the relative volume of water withdrawn at the CWISs because, according to Normandeau, there is "no quantitative evidence that entrainment at Merrimack Station is related to the fraction of the river withdrawn" and entrainment and the greatest withdrawals (as percentage of river flow) occur in months when ichthyoplankton abundance is low. *See* AR-872 at 132-3, 136. *See also* AR-1300 at 38-9. EPA has a long history of relating entrainment to the volume of water withdrawn and equates reductions in entrainment proportional to the reductions in flow achieved through a particular technology (e.g., a 95% reduction in entrainment based on the 95% reduction in flow achieved with closed-cycle cooling). In the 2011 Draft Determinations Document (AR-618 at 254, 314), EPA notes that the CWIS, at times, can withdraw a large proportion of the flow of the river, which could extend to a sizeable fraction of the eggs and larvae present at the time. As Normandeau points out, the lowest river flows, and highest proportion of river withdrawn through the CWISs, occurs in August and September when the density of eggs and larvae is relatively low. At the same time, EPA's determination that entrainment of millions of eggs and larvae annually is an adverse environmental impact is not predicated on the fraction of the river withdrawn.

[43] As mentioned above, the legislative history behind CWA § 316(b) is sparse, but in the House Consideration of the Report of the Conference Committee for the final 1972 CWA Amendments, Representative Clausen stated that "Section 316(b) requires the location, design, construction and capacity of cooling water intake structures of steam-

at 40 CFR § 125.98(f)(2) the factors that a permitting authority must consider when establishing site-specific entrainment controls for CWISs, which include not just the number of organisms entrained, but also the social benefits and costs of available technologies and other factors. The Final Rule provides that the BTA standards for entrainment "must reflect the [permitting authority's] determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in §125.98." 40 CFR § 125.94(d) (emphasis added); *id.* § 125.98(f) (requiring the permit to "reflect the [permitting authority's] determination of the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology available for minimizing adverse environmental impact at each facility") (emphasis added); *see also id.* § 125.98(f)(4) (providing that a permitting authority may determine that no additional entrainment controls are necessary, "[i]f all technologies considered have social costs not justified by the social benefits"); 79 Fed. Reg. at 48,372 ("Since the entrainment requirements are already determined by the Director for each site, EPA concluded that specific regulatory language for de minimis entrainment was unnecessary."). In other words, a facility's entrainment levels should be considered in the context of the social benefits and costs associated with each available control. The Final Rule provides a framework for determining whether a particular level of reduction is reasonable in light of, among other things, the levels of entrainment and the social costs and benefits of lowering them further. Generally-speaking, reducing truly low levels of entrainment would be expected to provide fewer social benefits, making entrainment controls with higher social costs less reasonable. Thus, EPA agrees that entrainment numbers are an important factor to be considered in a BTA determination (including a determination that no additional entrainment controls are warranted), but PSNH's overall comment is premised on the notion that a permitting authority would look only at a facility's entrainment numbers, conclude they are at a *de minimis* level, and simply stop its analysis. Not only are the raw numbers (or PSNH's adult-equivalent estimates for that matter) not low enough here to justify such an approach, the analysis framework laid out in the regulations disfavors it.[44] In the 2011 Draft Determinations Document, EPA considered not just the numbers and types of organisms entrained, but additional relevant factors included at § 125.98(f), including social costs and benefits. Additionally, EPA indicated in the 2017 Statement that it would re-evaluate whether wedgewire screens are the BTA for Merrimack Station and that it would consider the § 125.98(f)(2) and (3) factors in that evaluation. 2017 Statement at 17-21. EPA does so in the responses to PSNH Comments III.4 and 5.3.

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electric generating plants to reflect the best technology available for minimizing *any* adverse environmental impact" (emphasis added). 1972 Legislative History at 264. At the same time, EPA has interpreted "minimize" to mean "reduce to the smallest amount, extent, or degree reasonably possible" in the context of § 316(b). 40 C.F.R. § 125.92(r). The majority opinion in *Entergy* discusses the term "minimize" in the context of considering whether EPA has discretion to consider a comparison of the costs and benefits of alternative technologies. 556 U.S. 208, 219-20 (2009). Both interpretations include an implicit limitation of reasonableness. The Final Rule, at 40 C.F.R. § 125.98(f)(2) and (3), sets out a list of factors that the permitting authority must or may consider in establishing site-specific entrainment controls, which essentially provides a framework for determining whether a particular level of reduction is reasonable. *See also* AR-618 at 232-33.[44] Such an approach would also be inconsistent with PSNH's own comment that EPA should consider all the factors set forth in § 125.98(f). *See* Comment III.2.2.

[44] Such an approach would also be inconsistent with PSNH's own comment that EPA should consider all the factors set forth in § 125.98(f). *See* Comment III.2.2.

4.0 Wedgewire Screens are a Feasible Technology for Merrimack Station

Comment III.4(i)	AR-1548, PSNH, pp. 137-139
See also AR-846, PSNH, pp. 116-118; AR-841, UWAG, p. 62	

As explained above, PSNH is not required to address entrainment mortality at Merrimack Station because (1) the daily AIF at the facility falls below the 125 MGD compliance threshold EPA established in the final § 316(b) rule, and (2) the rate of entrainment at Merrimack Station is *de minimis*. Merrimack Station also is not required to select one of the seven pre-approved impingement mortality options set out in 40 C.F.R. § 125.94(c), because the rate of impingement at the Station is *de minimis*. PSNH's existing CWIS technologies—traveling screens and its existing fish return system—satisfy the requirements of § 316(b). However, despite the efficacy of the existing technology, PSNH, with an eye to the future and with knowledge of the successful studies conducted at Indian Point, implemented a pilot study to determine the feasibility of wider-slot wedgewire screens in the Merrimack River.

PSNH notified EPA in an April 12, 2017 letter that the Company was preparing to perform an entrainment-related analysis at Merrimack Station.[575] In the letter, PSNH acknowledged it was not obligated to complete any such analysis unless EPA specifically requested such work (which it had not).[576] Nevertheless, PSNH prepared and submitted to EPA for its consideration a Study Plan detailing the entrainment-related analysis.[577] PSNH respectfully requested EPA timely notify the Company of any objections and/or issues the agency had with any aspect of the Plan.[578] The agency never responded to PSNH's correspondence. PSNH interpreted EPA's inaction as acceptance of PSNH's entrainment initiative, which is confirmed in the Statement: "[T]he Agency welcomes submission of the [on-site pilot testing] data by PSNH as soon as it becomes available."[579]

The Study Plan was jointly executed by PSNH's consultants, Enercon and Normandeau, and, as explained below, revealed wedgewire screens are technologically feasible at Merrimack Station and reduce overall entrainment by 89%, compared to current operations at the facility.[580] The installation of 3.0 mm wedgewire screens with a designed through-screen velocity of less than 0.5 fps at Merrimack Station operated annually from April through July would therefore substantially reduce the already *de minimis* level of entrainment at the Station at a greatly reduced cost as compared to CCC.[581]

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[575] *See generally* AR-1357.
[576] *Id.* at 4.
[577] *See* AR-1361.
[578] AR-1357 at 3.
[579] AR-1534 at 20.
[580] *See, e.g.,* Normandeau 2017 Response at 26-27.
[581] Seasonal operation of the wedgewire screens would also have the co-benefit of further reducing already *de minimis* impingement levels at Merrimack Station because the design through-screen velocity of the screens is less than 0.5 fps. *See, e.g.,* Enercon 2017 Comments at 32.

EPA Response:

PSNH begins by reiterating its comments that it is not required to address entrainment at Merrimack Station because the AIF is less than 125 MGD under the Final Rule and because entrainment is *de minimis*. EPA disagrees with, and responds to, these comments in Response to Comments III.3.5 and 3.6, above. In Response to Comment III.3.4, EPA also disagrees with, and responds to, PSNH's comments that impingement mortality at Merrimack Station is *de minimis*. The Final Permit requires improvements to the existing technology to minimize impingement mortality consistent with the compliance alternatives under the Final Rule at 40 CFR § 125.94(c).

Having established that the Permittee must address impingement mortality and entrainment at Merrimack Station in Response to Comment III.3 (and associated comments), EPA focuses here on PSNH's proposed BTA at Merrimack Station as it applies to entrainment. PSNH describes "traveling screens and its existing fish return system" as satisfying the requirements of § 316(b).[45] In this comment, PSNH describes the pilot study completed during the summer of 2017 (which it said it did "despite the efficacy of the existing technology") to determine the feasibility of reducing the Facility's entrainment by installing wedgewire screens in the Merrimack River to work with the Facility's cooling water intake structures. The comment presents wedgewire screens as a feasible technology to minimize entrainment. In comments submitted by PSNH in 2012 and again in comments submitted in 2017, *see* Comment III.3(i) and 3.1, PSNH also suggested that, in combination with a new fish return system, operational changes of continuous screen rotation and rescheduled maintenance outages constitutes BTA. According to PSNH, rescheduling the annual planned maintenance outage of Unit 2 to occur from mid-May to mid-June (during typical peak entrainment) – which would be subject to ISO approval – would reduce annual impingement by approximately 41 percent and entrainment by approximately 40 percent. AR-6 at 91-93.

Turning first to the maintenance outage, the 2011 Draft Determinations Document considered PSNH's proposal and recognized that reducing flow by suspending operations when early life stages are present could reduce entrainment, particularly if the outage period coincides with peak

[45] In 2012, PSNH also commented that existing circumstances at Merrimack Station already result in flow reductions through the CWISs and a substantial decrease in overall entrainment. *See* Comment III.3.1. Specifically, PSNH argues that 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. In addition, the loss of intake pumping efficiency due to head loss from design full pond elevation due to hydropower operation of the Garvins Falls (upstream) and Hooksett (downstream) hydroelectric stations accounts for a 22.9% intake flow reduction for Unit 1 and a 14.5% intake flow reduction for Unit 2. PSNH estimates that these flow reductions result in an overall annual reduction of adult equivalent losses of 17% for entrainment *See* AR-6 at 96. *See also* AR-846 at 113 n. 60. EPA considered available information about the flows used in the Engineering and Biological Reports (AR-6 at 17, AR-210 Attachment I), and determined that actual flow reductions (and proportional entrainment reductions) are likely between 10% and 20%, which is not as effective as other available technologies for reducing entrainment. In addition, Normandeau derived estimates of entrainment at both design flow and actual intake flow, which already reflect pump efficiency. *See* AR-2 at 52, 74, 77. EPA maintains that it is unlikely that the existing operational measures result in significant reductions in entrainment in comparison to wedgewire screens.

entrainment, as PSNH had proposed. *See* AR-618 at 297. However, EPA concluded that this technology was not by itself BTA, because it does not cover the entire period when fish eggs and larvae are present and would not address entrainment losses from Unit 1 at all.[46] *Id.* PSNH commented that EPA erred in rejecting rescheduling maintenance outages as an available technology to minimize entrainment based on the fact that the outage periods do not encompass the entire period during which fish eggs and larvae are present in the Hooksett Pool. *See* AR-846 at 116. The comment ignores the additional reason that EPA cited—namely, that the proposed outage schedule does nothing to minimize entrainment at the CWIS for Unit 1. *Id*. Thus, while the proposed maintenance schedule addressed some entrainment impacts of the CWIS for Unit 2, the comment does not dispute that it would in no way "minimize" the entrainment impacts of Unit 1's CWIS and, thus, would not satisfy the 2014 Final Rule. *See* 40 CFR § 125.94(d) (requiring the permitting authority to "establish BTA standards for entrainment for each intake on a site-specific basis") (emphasis added). In addition, although EPA agrees that § 316(b) does not require every facility to "eliminate completely" the adverse environmental impact of its CWISs, to "minimize" in the context of § 316(b) likewise does not mean merely to achieve some reduction in impact of a CWIS. Rather, it means "to reduce to the smallest amount, extent, or degree reasonably possible." 40 CFR § 125.92(r); AR-618 at 232; *see* 40 CFR § 125.83 (defining "minimize" identically); *see also Entergy Corp. v. Riverkeeper, Inc*., 556 U.S. 208, 219 (2009) (recognizing the regulatory definition of "minimize" at 40 CFR § 125.83 and acknowledging EPA's "discretion to determine the extent of reduction that is warranted under the circumstances").

In this case, as PSNH acknowledges in the comment, an alternative technology, seasonal use of wedgewire screens, is available and will achieve an estimated entrainment reduction of 89% compared to current operations at the facility.[47] Enercon estimated that the rescheduled Unit 2 maintenance outage by itself (which would only address entrainment from Unit 2) would result in a 27% reduction based on biological data from 2006-2007 (AR-6 at 95) which is substantially less than the entrainment reduction that wedgewire screens are expected to achieve. The overall entrainment reduction is limited particularly because, according to PSNH, back-to-back outages are impractical and the latest the outage could be scheduled is mid-June based on operational constraints and power pool demands. *See* AR-6 at 93. While a maintenance outage would eliminate entrainment proportional to the Unit 2 flow reduction during a period of relatively high entrainment density, the entrainment reduction would only extend for the duration of the outage (roughly one month)[48] and would only be achieved at Unit 2. In addition, the effective reduction in entrainment may change if the peak entrainment period shifts earlier or later by a few days or weeks based on natural conditions in any given year, or if the duration of the outage is shorter than average (33 days). EPA maintains that the limited duration of the outage and the fact that Unit 1 would continue to have no entrainment controls limits the potential benefits of the Unit 2 outage as the sole BTA for entrainment. However, EPA considered the potential additional reduction in entrainment that could be achieved by rescheduling Unit 2 maintenance outages from

[46] EPA did conclude that scheduling the annual Unit 2 maintenance outage for mid-May to mid-June could be a component of the BTA in combination with other technologies or operational conditions to minimize impingement and entrainment during other periods. AR-618 at 297-98.
[47] It also addresses entrainment at both units.
[48] By comparison, PSNH's 2006 and 2007 data indicate that larvae may be entrained by the facility during more than four months of the year. AR-618 at 247, 251.

mid-May to mid-June in combination with installing wedgewire screens. Using the weekly entrainment densities observed in 2017 during the wedgewire screen pilot test, *see* AR-1550, EPA confirmed that the expected reduction in entrainment from the use of wedgewire screens (as compared to a control representing the existing open-cycle cooling technology) is 89%. Including an outage at Unit 2 lasting from mid-day on May 12 through June 15 (33.6 days) would increase the entrainment reduction to about 93% at an estimated additional cost (according to Enercon) of $150,140 (in $2017).[49] *See* AR-6 at 92-93. Enercon does not explain why it expects the Permittee to incur this cost for the Unit 2 outage.[50] It is possible that this cost could be associated with lost generation that Merrimack Station would incur by shifting the outage by one month. Since 2012, Merrimack Station has operated a total of 72 days (out of 600, or about 12% of the time) between May 12 and June 15, so it is not clear that there would be a measurable cost associated with lost generation for shifting the outage (at least in most years). In sum, the entrainment reduction achieved by shifting the Unit 2 maintenance outage is unclear because the timing of the entrainment peak may shift year to year, the timing of the outage is subject to approval by ISO New England, and the duration of the outage will be somewhat less than 33 days in most years. While EPA questions the basis for the annual cost of shifting the outage, the estimated annual cost ($150,000) is about three times the estimated annual costs (parasitic losses and operation and maintenance) for wedgewire screens ($30,000 - $40,000). *See* AR-1565 at 11, 16. After considering the relative costs of the outage and expected benefits, EPA determined that shifting the outage is not a component of the BTA for entrainment at Merrimack Station. At the same time, Unit 2 must undergo an annual maintenance outage and scheduling this outage from mid-May to mid-June will reduce entrainment on top of the reductions estimated to be achieved with wedgewire screens. The Final Permit at Part I.G.3 includes a narrative condition to schedule the Unit 2 maintenance outage, to the extent practicable, in mid-May to mid-June as a best management practice. Optimizing the timing of this outage to coincide with the typical peak entrainment period, when practicable, will help to reduce adverse impacts from entrainment.
In considering PSNH's comments and the relevant factors at 40 CFR § 125.98(f)(2) and (3), EPA has determined that seasonal use of wedgewire screens is the BTA for entrainment at Merrimack Station. EPA addresses detailed comments on the pilot study and the cost of the wedgewire screens in Responses to Comment III.4.1, 5.2, and 5.2, below. EPA presents its consideration of the relevant factors for establishing entrainment controls at Merrimack Station in Response to Comment III.5.3. While wedgewire screens is the BTA for entrainment, rescheduling the Unit 2 maintenance outage during mid-May to mid-June will reduce entrainment slightly more than the screens alone (by about 4%) and an annual maintenance outage at Unit 2 must be scheduled regardless of the effect on entrainment. Because it will further reduce entrainment, and because it must be scheduled anyway, the Final Permit includes a narrative condition that Merrimack Station schedule its annual Unit 2 maintenance outage from mid-May to mid-June for entrainment *to the extent practicable*. Any scheduled outage is subject to approval from ISO-NE. The Permittee

[49] To maintain consistency with the PSNH's 2017 comments and the cost and benefits valuation provided by NERA, EPA uses cost values in 2017 dollars throughout this Response to Comments document. Using $2017 values is not likely to significantly affect the cost and benefit valuation because the average inflation rate from 2017 to 2020 was relatively low (e.g., $1.00 in $2017 is equivalent to about $1.06 in $2020) and because all of the dollar values would be affected equally.
[50] It does not appear that NERA considered the inclusion of the Unit 2 maintenance outage in its cost benefit analyses in either 2012 or 2017. *See* AR-1128; AR-1565.

must provide an explanation to EPA and NHDES in the event that the annual outage cannot be scheduled from mid-May to mid-June.

The 2011 Draft Determinations Document explains that requirements that address cooling water structures must satisfy both CWA § 316(b) and any more stringent requirements necessary to satisfy applicable state water quality standards. *See* AR-618 at 224-25, 345-46. *See also* N.H. Code R. Env-Wq 1701.02(b) (Applicability). New Hampshire state water quality standards require that:

> (b) All surface waters shall be restored to meet the water quality criteria for their designated classification including existing and designated uses, and to maintain the chemical, physical, and biological integrity of surface waters.
>
> (c) All surface waters shall provide, wherever attainable, for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the surface waters.
>
> (d) Unless the flows are caused by naturally occurring conditions, surface water quantity shall be maintained at levels adequate to protect existing and designated uses.

Env-Wq 1701.03(b), (c), & (d) (Water Use Classifications). The state's standards also prescribe the following water quality criterion for "biological and aquatic community integrity":

> (a) The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region.
>
> (b) Differences from naturally occurring conditions shall be limited to non-detrimental differences in community structure and function.

Env-Wq 1703.19; *see also id.* 1702.07 (definition of "biological integrity"). In 2011, EPA concluded that allowing the facility "to continue, unchecked, to kill and injure by entrainment and impingement an appreciable number and percentage of the fish larvae, fish eggs, and juvenile and adult fish in the Hooksett Pool, including the larvae of species exhibiting population declines in the pool, would be inconsistent with New Hampshire water quality standards." AR-618 at 345-46.

EPA maintains, as it did in 2011, that such year-round operation of the plant as a baseload facility with the existing technology (once-through cooling and a debris sluice with essentially 100% mortality) would not satisfy either CWA § 316(b) or the state water quality standards for biological and aquatic community integrity referenced above. However, seasonal use of narrow-slot (maximum 3.0 mm) wedgewire screens for entrainment, combined with technology in compliance with one of the alternatives under 40 CFR § 125.94(c) (e.g., the "systems of technologies" option at 40 CFR § 125.94(c)(6), *see* Response to Comment III.3.1), will be consistent with the requirements of the 2014 Final Rule and will minimize the adverse environmental impacts of impingement and entrainment at Merrimack Station's CWIS. While EPA concluded in 2011 that seasonal closed-cycle cooling, coupled with an upgraded fish return and travelling screens would satisfy New Hampshire's water quality standards, AR-618 at 345-46, EPA did not have occasion to consider whether wedgewire screens would also satisfy New Hampshire's water quality standards, because EPA did not consider them to be an available technology at the time, *id.* at 273-80. Thus, EPA is now considering for the first time whether

permit requirements for the use of wedgewire screen technology at Merrimack Station will satisfy New Hampshire water quality standards.

In 2011, EPA concluded that, "if the permit's CWIS-related requirements were made significantly less stringent they would be inconsistent with the state's water quality standards as they would likely interfere with attaining the state's water quality criterion for protecting biological and aquatic community integrity." *Id.* at 346. Based on new information and new CWIS regulations since 2011, EPA has concluded that wedgewire screens *are* available and has changed the CWIS-related requirements in the Final Permit to require use of wedgewire screens during the entrainment season and the use of a new, well-functioning fish return and the existing traveling screens when the wedgewire screens are not in use. The requirements of the Final Permit will minimize adverse environmental impact to an extent not significantly less stringent than would have resulted from the requirements proposed in the 2011 Draft Permit, in part because they will significantly reduce impingement and substantially reduce entrainment (by Normandeau's estimate as much as 89%). *See* Responses to Comments III.3.1, 4.1, 4.2. Moreover, the Final Permit establishes stringent thermal discharge limits (based on a CWA § 316(a) variance) that recognize and, in effect, require Merrimack Station's continued operation as a peaking plant. Thus, the thermal limits cap the facility's operations consistent with its practice since around 2012. This will also have the effect of preventing increases in intake flows and, consequently, impingement and entrainment. For these reasons, EPA concludes that the Final Permit's requirements will also satisfy state water quality standards but if the requirements were made significantly less stringent, the resulting increase in entrainment and impingement would not satisfy state water quality standards. EPA expects that New Hampshire will certify the Final Permit under CWA § 401(a).

4.1 Wedgewire Screens Would Reduce Environmental Impacts

Comment III.4.1	**AR-1548, PSNH, p. 139-140** **AR-1549, Enercon** **AR-1550, Normandeau**
See also AR-846, PSNH, p. 108-110	

EPA acknowledges in its Statement that wedgewire screens:

> [C]an be implemented in the Hooksett Pool section of the Merrimack River, and that this technology may be more effective at reducing the Facility's entrainment than previously thought . . . . In particular, a newly proposed screen design variation (*i.e.,* "wedgewire half-screens") would result in a smaller installation without excessive interference with public uses of the river. . . . Furthermore, additional data has been submitted suggesting that adequate sweeping flows are likely to exist during the time period when the majority of eggs and larvae are present.[582]

PSNH agrees. The Study Plan Enercon and Normandeau carried out this year during the peak entrainment period at the facility confirms EPA's above-referenced statements. Specifically, the study validated that wedgewire screens can be installed and successfully operated at Merrimack Station and, as mentioned above, demonstrated that the 3.0 mm slot width wedgewire screens result in an estimated overall entrainment reduction of 89% compared to current CWIS operations at the facility.[583] Normandeau's 2017 report submitted contemporaneously with these comments provides the detailed results of entrainment reductions from the Study Plan, including a breakdown of the species entrained, entrainment densities, evaluations of the entrainment reductions by life stage and taxon group, and analyses of the frequencies and densities of aquatic organisms entrained based on length;[584] whereas Enercon's 2017 report submitted contemporaneously with these comments explains in detail the proposed design, procurement, construction, and installation of the wedgewire screens, including the ideal number, orientation, and location of the screens in the waterbody, as well as the costs and timing associated with the installation of the technology.[585]

Analyses from Normandeau and Enercon ultimately confirmed use of the wedgewire half-screens with larger diameters yields significant reductions in entrainment and are well suited for the Merrimack River due to its relatively shallow depths in the vicinity of the plant. Also, utilization of larger diameter screens reduces the number of screens required and avoids potential interference with public uses of the waterbody.[586]

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[582] AR-1534 at 18.
[583] *See, e.g.*, Normandeau 2017 Response at 26-27.
[584] *See generally* Normandeau 2017 Wedgewire Report. This report also includes the results of a site-specific current velocity study to quantify the speed of the current, as well as the direction of it. *See id.* at 14-15.
[585] *See generally* Enercon 2017 Comments.
[586] Enercon 2017 Comments at 66.

EPA Response:

PSNH's comment concludes that seasonal use of wedgewire screens is a suitable technology to reduce entrainment at Merrimack Station. EPA acknowledged in its 2017 Statement that wedgewire screens can potentially be implemented in the Hooksett Pool and that it was reconsidering wedgewire screens as the possible BTA for Merrimack Station in light of public comments and new information. AR-1534 at 18. As PSNH indicates in its comment, the reports provided by Enercon and Normandeau in conjunction with PSNH's comments provide additional, site-specific analysis on the technical feasibility and biological effectiveness of wedgewire screens at Merrimack Station. PSNH comments that the 2017 pilot study results indicate that the 3.0 mm slot width wedgewire screens can achieve an estimated overall entrainment reduction of 89% compared to current CWIS operations at the facility. *See also* AR-1549 at 7, 56 and AR-1550 at 18-19. The pilot study confirms that the technology can effectively reduce entrainment under site-specific conditions and enabled Normandeau to more precisely estimate the potential benefits of wedgewire screens as numbers of organisms saved. *See* AR-1567. PSNH comments that these reports, which EPA responds to in detail below, confirm that the proposed design of 3-mm slot wedgewire half-screens yields substantial reductions in entrainment and are suitable for the relatively shallow depth of the Merrimack River in the vicinity of the plant. Importantly, the

proposed design reduces the number of screens required and minimizes potential interference with public uses of the waterbody, which was a concern discussed in the 2011 Draft Determinations Document.

4.2 PSNH Confirmed 3.0 mm Wedgewire Screens Operated Annually in April through July Would be Suitable for Merrimack Station

Comment III.4.2	**AR-1548, PSNH, pp. 140-148** **AR-1549, Enercon, pp. 6-70**
See also AR-846, PSNH, pp. 103-108; AR-864, Enercon, pp. 8-12; AR-872, Normandeau, pp. 134-135; AR-1231 Exhibit 4, Enercon, pp. 11-12, 26; AR-1353, PSNH, pp. 7-8	

PSNH and its consultants have previously explained why 3.0 mm slot size screens are well-suited for Merrimack Station.[587] Specifically, wedgewire screens with this slot width: (1) are beneficial from a maintenance and operational standpoint because they help reduce fouling and debris accumulation issues; (2) require fewer screens to be installed while allowing the system to operate with a desired through-screen velocity of less than 0.5 fps; and (3) are capable of reducing entrainment not only through physical exclusion but also through hydraulic bypass and behavioral avoidance. Each of these factors is discussed below.

Concerns regarding biofouling and clogging associated with wedgewire screens are not unique to Merrimack Station. EPA and EPRI have expressed industry-wide concerns regarding biofouling issues with systems with small slot-widths. Specifically, in its Technical Development Document that accompanied the 2006 Effluent Guidelines Program Plan, EPA provided:

> The Agency is not aware of any fine-mesh wedgewire screens that have been installed at power plants with high intake flows (>100 MGD). However, they have been used at some power plants with lower intake flow requirements (25-50 MGD) that would be comparable to a large power plant with a closed-cycle cooling system. With the exception of Logan, the Agency has not identified any full-scale performance data for these systems. They would be even more susceptible to clogging than wide-mesh wedgewire screens (especially in marine environments). It is unclear whether this simply would necessitate more intensive maintenance or preclude their day-to-day use at many sites. Their successful application at Logan and Cope and the historic test data from Florida, Maryland, and Delaware at least suggests promise for addressing both fish impingement and entrainment of eggs and larvae. However, based on the fine-mesh screen experience at Big Bend Units 3 and 4, it is clear that frequent maintenance would be required.[588]

EPRI has also noted these issues:

> Several full-scale CWIS applications of cylindrical wedge-wire continue to perform satisfactorily. However, these applications employ coarse bar spacings (10 mm). Therefore, other than the existence of encouraging data from small-scale laboratory and pilot field facilities, there is still little information on the use for this technology for protecting early life stages. The potential use of 0.5- to 2.0-mm bar spacing to protect early life stages of fish (particularly eggs and early larvae) has not been evaluated at a CWIS. Therefore, larger-scale pilot studies are needed to identify the full biological potential of these screens. Also, there is a need for further research into biofouling control before the potential applicability of wedge-wire screens can be fully assessed. Biofouling, particularly on internal surfaces that are not readily accessible, remains a concern with both large and small slot sizes.
>
> Results of small-scale field studies conducted primarily in the 1970's and 1980's have shown that substantial fouling can occur over time in all types of water.[589]

When debris accumulates or organisms colonize on numerous functional parts of wedgewire systems, the passage of cooling water flow is impeded and operation of the intake screening equipment itself may be interrupted. Some mesh openings actually become blocked, thereby restricting the flow of water through the screen and increasing the velocity through the unblocked portions of the screen. Less open screen area also results in a higher pressure drop through the screens, which can impair the performance of a facility's circulating water pumps and reduce fish protection by increasing the through-screen intake velocity.[590]

The slot-width of the wedgewire screens is a key variable in the potential risk of biofouling at a facility. This is so because biofouling organisms first attach to a solid piece of screen and, as the organisms grow, the thickness of the biolayer decreases the open portion of the screen. A screen with a greater percentage of solid wire (*i.e.*, one with smaller percent open area) thus will provide space for a greater number of organisms to attach themselves, meaning the resulting biolayer will obstruct the open area of the screen at a faster rate.[591] Biofouling organisms can also bridge the gap between solid portions of the screen to block flow completely. 3.0 mm slot width wedgewire screens alleviate many of these fouling and debris accumulation issues, and these issues would be further minimized by construction of the system with the proposed air burst system[592] and construction of the screen mesh with a Z-alloy that is proven to substantially reduce biofouling compared to stainless steel screens.[593]

As to the number of screens to be installed, EPA provides in its Statement that one of the primary reasons the agency previously rejected the use of wedgewire screen technologies at Merrimack Station is because:

> PSNH's proposed design to serve Merrimack Station's cooling water intake structures, while accommodating the potential limitations of the physical setting (e.g., water depth, current, rate of sediment deposition), would require so many screens and would occupy such a large area of the river, that it would excessively interfere with public uses of the waterway . . . . In its 2007 report responding to an EPA request for information, AR-6, PSNH's consultant Enercon estimated that 24 to 36 [cylindrical wedgewire ("CWW")] screens 5 feet in length and 3 feet in diameter would be required. In its 2009 report providing a supplemental response to EPA's request for information, AR-4, Enercon estimated that 44 to 76 CWW screens 80 inches in length and 2 feet in diameter would be required. The ranges in the number of CWW screens reflect differences in slot size.[594]

These issues are alleviated through the use of 96-inch, 3.0 mm slot-width wedgewire half-screens, as Enercon has determined only seven of these screens would be necessary for the facility.[595] And, because the screens extend approximately four feet from the river bottom, they will not interfere with public recreation in the Merrimack River.[596] Furthermore, the use of 3.0 mm screens means a desirable through-screen velocity of less than 0.5 fps can be maintained; as Enercon discovered during the design phase that installing wedgewire screens with a higher through-screen velocity would result in "an unacceptably high head loss (i.e., energy loss due to friction) through the screens . . . [that] would result in reduced water level within the intake bays, potentially causing cavitation and damage to the circulating water pumps."[597]

Entrainment reductions at Merrimack Station from not only physical exclusion but also hydraulic bypass and behavioral avoidance are optimal with 3.0 mm wedgewire screens, as well. Hydraulic bypass occurs when the wedgewire screens are perpendicularly aligned to the prevailing current in the waterbody and the strength of these natural currents cause organisms to be swept past the screens instead of passing through them. It occurs when the ratio of sweeping flow velocity to through-slot flow velocity of the wedgewire screens is 1:1 or greater. The higher the ratio, the more likely inertia carries otherwise entrainable organisms past wedgewire screens without issue.

Normandeau and Enercon confirmed that a constant and high sweeping flow velocity was present in April through July.[598] The wedgewire screens proposed for Merrimack Station would have a through-screen velocity of 0.4 fps;[599] and, the average observed sweeping flow in the Merrimack River was 2.9 fps during field operations conducted during the peak entrainment period in 2009 and 2012.[600] This results in a ratio of sweeping velocity to the through-slot velocity of the screens of approximately 7:1.[601] The sweeping flows observed during execution of the 2017 Study Plan were 1.0 fps or greater for almost the entirety of the test, resulting in a ratio of 2:1 or greater.[602]

Reductions in entrainment due to larval avoidance are unique to wedgewire screen technologies and occur because the screens have a relatively small "zone of hydraulic influence."

The scope of this zone varies depending upon the length of the screen, the through-slot velocity, and the sweeping flow, coupled with the premise that fish larva are capable of swimming fast in short bursts. The zone of hydraulic influence has an inverse relationship with sweeping flow, meaning as the sweeping flow increases, the zone of hydraulic influence will decrease. Given the small size of the zone of hydraulic influence for wedgewire screens, a single short and fast swimming burst is all fish larva often need to escape this zone and avoid becoming entrained. Larval avoidance is optimized by correctly aligning the slot openings of the screens relative to the sweeping flow direction.

Normandeau provided the following discussion of laboratory and field analyses for the primary exclusionary methods expected to occur in the Merrimack River following installation of the wedgewire screens:

> Applied research in both a laboratory flume and in the Hudson River estuary using test CWW screens demonstrated that the entrainment reduction performance of CWW screens is related to three factors: physical exclusion by the slot width of passive eggs and larvae, behavioral avoidance of the intake flow by the actively swimming larvae, and the hydraulic bypass of eggs and larvae due to sweeping flow of river currents along the surface of the wedgewire screen when they are installed so the river flow is in a direction perpendicular to the slot openings (i.e., parallel to the slot width). CWW screens (12 inch and 18 inch diameter) with slot widths of 2, 3, 6, and 9 mm were tested in a large hydraulic flume using approximately 450,000 fish larvae (including 207,000 White Sucker larvae) and an equal number of neutrally buoyant 1 mm diameter beads (representing fish eggs) at flume velocities of 0.25, 0.50, 1.0, 1.5, and 2.0 feet per second (fps), with through-slot velocities of 0.25 and 0.50 fps, for a total of 24 combinations of slot width, flume velocity, and through-slot velocity among 4,647 individual tests. Physical exclusion was observed to reduce entrainment in a direct relation to limiting dimensions of the test subjects, particularly passive test subjects like beads (eggs) and anesthetized larvae. Fish eggs, larvae, or juveniles with a greatest body depth larger than the slot width were physically excluded and not entrained. Behavioral avoidance was observed to be higher for the two smaller slot widths (2 mm and 3 mm) and for a lower through-slot velocity. Overall, avoidance and hydraulic bypass were higher at higher ratios of sweeping velocity to through-slot velocity, with typically 80% or more of the larvae 12 mm in total length or larger capable of actively swimming to avoid entrainment at a ratio of sweeping velocity to slot velocity greater than 1:1 (Mattson et al. 2011, 2014, and 2015). These mechanistic flume studies demonstrated that hydraulic bypass and avoidance were the prevailing modes of the entrainment reduction effectiveness for

> CWW screens if installed with the river flow perpendicular to the slot width and a sweeping velocity to slot velocity of 1:1 or greater (Mattson et al. 2011).
>
> Field testing of a CWW screen conducted during the 2011 entrainment season in the Hudson River estuary at Indian Point confirmed the entrainment reduction performance observations from the laboratory flume tests. Entrainment sampling was performed at Indian Point *in situ* for 96 continuous hours each week for 24 consecutive weeks from mid-April through mid-September 2011 (Mattson et al. 2014 and 2015). A total of 1,104 pairs of two-hour pumped samples (100 m^3 each) were collected from a 2 mm slot width CWW test screen with a 0.25 fps throughslot velocity deployed 35 feet below the water surface and paired with control samples from coincident 1 m^2 Tucker trawl tows (300 m^3 each) deployed at 35 feet of depth and into the prevailing current immediately upstream from the test CWW screen. A total of 31 ichthyoplankton taxa and 275,245 individuals (83% post yolk-sac larvae) were collected and analyzed from these pairs of Hudson River samples filtered through a 300 micron mesh net. Larval avoidance of the test screen was observed to increase with increasing larval length for the most abundant species (striped bass, 35%; and Bay Anchovy, 28%) as predicted in the flume, and the overall entrainment reduction for 2 mm CWW screens at Indian Point was estimated to be 78% (Mattson et al. 2015).[603]

Lastly, the appropriate time period to operate the wedgewire screen technologies annually at Merrimack Station would be April through July because the overwhelming majority of entrainment occurs at the facility during this time period and because fouling of the screens in other months of the year becomes a potential concern due to traditionally low river flow. Specifically, Normandeau's 2006 and 2007 biological data indicates that the greatest entrainment potential at Merrimack Station typically occurs between late May and late June[604] and Normandeau recently provided that 96.3 percent of total annual entrainment at the facility occurs in April through July.[605]

In its Statement, EPA repeatedly references its belief and conclusion from the 2011 Draft Permit Fact Sheet that entrainment needs to be addressed annually in August "based on the biological data."[606] Yet, a review of that Fact Sheet does not support this assertion and, in fact, reveals EPA actually acknowledges multiple times that entrainment "taper[s] off" in August.[607] A cursory review of Table 11-4 in that Fact Sheet corroborates this fact.[608] EPA instead appears to couch its conclusion that entrainment controls in August are necessary because Merrimack Station's flow withdrawal rates, as a percentage of available river flow, are on average slightly higher than the preceding months.[609] This argument fails, however, when one takes into consideration that few, if any, entrainable organisms are present in the waterbody segment—a fact that is corroborated by a detailed review of Normandeau's data and corresponding

conclusions.[610] In actual fact, EPA has failed to put forth any concrete and/or detailed analyses as to why entrainment controls are necessary at Merrimack Station in August. Accordingly, its conclusions are arbitrary and capricious and must be replaced with Normandeau's well-reasoned and scientifically defensible conclusions that entrainment controls are necessary at the facility only in April through July.

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[587] *See, e.g.*, AR-1352, Attachment 1.
[588] AR-644 at 5-7 (emphasis added).
[589] AR-1399 at 66.
[590] *See* Enercon 2017 Comments.
[591] *See* A.Y. Fedorenko, *Guidelines for Minimizing Entrainment and Impingement of Aquatic Organisms at Marine Intakes in British Columbia*, CANADIAN MANUSCRIPT REPORT OF FISHERIES AND AQUATIC SCIENCES, 54 (1991). This manuscript is attached hereto as Exhibit 20.
[592] *See, e.g.*, Enercon 2017 Comments at 21. The proposed air burst system "uses periodic bursts of compressed air to blow accumulated objects from the screens, preventing blockage that can lead to higher capture velocities and pressure drops." *Id.*
[593] AR-1352, Attachment 1 at 10; Enercon 2017 Comments at 52-53, 63.
[594] AR-1534 at 17, 17 n.3.
[595] *See, e.g.,* Enercon 2017 Comments at 66.
[596] *See id*.
[597] AR-1352, Attachment 1 at 10.
[598] *See* Enercon 2017 Comments at 9-10; Normandeau 2017 Wedgewire Report at 14.
[599] *See* Enercon 2017 Comments at 9-10.
[600] *Id.* at 9.
[601] *Id.*
[602] *Id.* at 10.
[603] AR-1352, Attachment 1 of Attachment 1 at 1-2.
[604] AR-2 at 41.
[605] Normandeau 2017 Response at 27.
[606] *See, e.g.,* AR-1534 at 12-13.
[607] *See, e.g.,* AR-618 at 251.
[608] *Id.* at 249-50.
[609] *See, e.g., id.* at 254.
[610] In fact, this increased withdrawal percentage reflects the reality that flows in the Merrimack River typically begin to decrease in August and continue to decrease through November. Given the number of entrainable organisms present in the waterbody in August is negligible, these decreased flows actually further support a conclusion that the wedgewire screens should not be operated during this time because of the increased likelihood that debris could interfere with, damage, and/or clog the screens. Enercon addresses this issue: The primary reason for operating the site with wedgewire screens during part of the year is to limit unnecessary exposure of the screens to potentially damaging objects. The current design for the screens recommends the placement of bollards around the screens when they are not in use to reduce the risk of damage from objects (e.g., submerged tree limbs, refuse, other waterborne debris, etc.) that are travelling downstream on the river currents. Submerged debris can collide with the screens, damaging and altering the form of the screen and/or hampering the ability of the screen to operate properly. An alteration to the shape of the screen could decrease the velocity ratio, decrease the hydraulic bypass, and/or alter the slot size of individual slots. Any of these alterations would decrease the effectiveness of the screens' ability to reduce entrainment.
While the screens are not in operation, bollards placed around the screens would keep them protected from river borne objects. The Station would employ divers to remove the protective bollards and perform inspections/repairs prior to the season of operation. Removal of the bollards helps to maintain the hydraulic flow around the screens while they are in operation. The screens would then be placed into operation during the peak entrainment season. At the end of the operation season, divers would return the protective bollards to the screens and the intake bypass system would be employed, effectively removing the screens from operation. Operation of the screens is

recommended from April 1st to July 31st to provide an effective reduction in entrainment while limiting the unnecessary exposure of the screens to potentially damaging objects. The remaining months of the year when entrainment is at a minimum, the screens would be inoperative and protected . . . to minimize risk of damage to the screens. Enercon 2017 Comments at 67-68.

EPA Response:

PSNH comments that the proposed design with 3.0 mm slot half-wedgewire screens is feasible for reducing entrainment at Merrimack Station from a maintenance and operations standpoint, because fewer screens are required, and because the screens effectively exclude organisms both by physical exclusion as well as by hydraulic bypass and behavioral avoidance. PSNH expands on each of these issues in its comments and in the supporting documents provided by Normandeau and Enercon. Finally, PSNH comments that seasonal use of screens, ending in July, is supported by biological data and that EPA has not provided a justification for requiring that screens be operable in August. EPA responds to the comment above, as well as related comments submitted by Enercon and Normandeau and included as Exhibits to PSNH's comments on the 2017 Statement. In addition, EPA addresses PSNH's 2012 comments on the 2011 Draft Determinations Document related to the potential availability of wedgewire screens in this response.

In the 2011 Draft Determinations Document, EPA rejected wedgewire screens as an available technology based, in part, on its conclusion that the necessary conditions (i.e., sweeping currents, depth) are not present in the Merrimack River on a consistent and reliable basis during the period when fish eggs and larvae are present. *See* AR-618 at 271-280. PSNH initially rejected the technology for Merrimack Station due to the potential for frazil ice to disrupt cooling flow during the winter and because the amount of space that would be required for the large number of screens proposed (23 total) would potentially impact use of the river. *See* AR-6 at 84. PSNH revised this initial finding in its 2009 supplemental evaluation of alternative technologies and, for the first time, proposed seasonal use (April through July) which, according to PSNH, eliminates concerns raised about frazil ice formation and low river flows. *See* AR-4 at 3-10; AR-618 at 274. The 2009 Report did not explain why this screen design with an estimated surface area of 25,000 ft^2, and which includes more screens than the 2007 Report, would not be expected to impact recreational use of the river where the 2007 Report did raise this concern. *See* AR-4 at 17-18.

The 2017 Statement explained that comments on the Draft Permit questioned the draft determination that the physical limitations of Hooksett Pool prevent the use of wedgewire screens. *See* AR-1534 at 18-19. In particular, the 2017 Statement suggested that the half-screen wedgewire design PSNH first proposed in 2014 (AR-1231) and submitted again in 2016 (AR-1352) and with its 2017 comments (AR-1549) appears to be better suited for Merrimack Station than a traditional cylindrical wedgewire screens, may address concerns about adequate depth and the number of screens, and that additional data submitted indicate that adequate sweeping flows exist during the time period when the majority of eggs and larvae will be present. *See id*.; *see also* AR-846, AR-864, AR-872, AR-1231, Exhibit 4 and Attachment 1 to Exhibit 4; AR-1352, Attachment 1, and AR-1361. The 2017 Statement explained that EPA was reconsidering wedgewire screens as the possible BTA for entrainment at Merrimack Station in light of public comments and new information submitted during and subsequent to the public notice of the 2011 Draft Permit (including the design first proposed by PSNH in 2014 and which additional reports

and comments have refined), which collectively suggest that an effective screen array may be implemented in the Hooksett Pool section of the Merrimack River, and that the technology may be more effective in this case than previously thought. *See* AR-1534 at 19-21.

The wedgewire screen designs initially proposed in the 2007 Engineering Response, AR-6, and 2009 Supplement Response, AR-4, indicated that a large number of screens (23 to 76) would be required to meet the appropriate slot and velocity specifications for Merrimack Station. One reason that PSNH (in 2007) and EPA identified for rejecting wedgewire screens was that the proposed installations would interfere with recreational use of the river. *See* AR-618 at 276-77. The half-screen wedgewire design PSNH first proposed in 2014 (AR-1231) and submitted again in 2016 (AR-1352) and with its 2017 comments (AR-1549) proposes to install just 7 narrow-slot screens (2 at Unit 1 and 5 at Unit 2). *See also* AR-1534 at 18. Therefore, the design first proposed by PSNH in 2014, and which additional reports and comments have refined, will not interfere with recreational uses of the river. Another concern that EPA raised was the lack of experience with installations of the size initially proposed. *See* AR-618 at 278. The relatively small number of screens in the proposed design, however, is consistent with other, existing installations of wedgewire screens. *See* AR-864 at 8-9. Finally, the significantly reduced size of the proposed array minimizes the likelihood that a drifting organism will be exposed to the wedgewire screens at all as compared to the large field of screens that extended out as far as 100 feet into the river proposed at the time of the 2011 Draft Permit. *See* AR-4 at 9.

In the 2011 Draft Determinations Document, EPA stated that it was unclear if adequate water depths exist to accommodate wedgewire screens in Hooksett Pool, noting that a study of water depths had not been conducted. *See* AR-618 at 277. EPA also raised concerns that the large area required for the size of the installation could potentially accelerate accretion of sediment and that maintaining depths through dredging could be impeded by the number of screens. *See id*. By contrast, the half-screen design of just 7 screens installed in a single line along the western bank in front of the intake substantially decreases the size of the installation and, with it, the potential for accelerated sedimentation and difficulty maintaining adequate water depth through dredging. *See* AR-1352 Attachment 2 at 11. Furthermore, in its comments on the 2011 Draft Permit (AR-872 at 134), Normandeau summarized the results of its 2009 bathymetric survey of the Merrimack River near the CWISs., noting that water depth in the vicinity of both intakes is about 13 feet. *See also* AR-1231 Attachment 4. The area in front of the intakes is shallowest (6 ft) downstream of the CWISs and typical depths range from about 9 to 13 feet. *See* AR-872 Figure 4-3. Depths are likely to represent the upper range because the study was conducted in May when flows are high, but the bathymetric data provided with Normandeau's 2012 comments nonetheless indicate that the depths at the intake will accommodate the half-screen design, which requires only clearance above the screen (rather than a cylindrical screen, which requires clearance both above and below the screen) and was designed for a depth of 6-8 feet (AR-1352, AR-1549).

In the 2011 Draft Determinations Document, EPA proposed that sweeping currents necessary to ensure eggs, larvae, and fouling debris are swept past the screens are insufficient at critical times. *See* AR-618 at 275. In 2009, Enercon agreed that periods of low flow could cause clogging and block the flow of water to the Station, prompting it to propose operating the screens through July

and use an automated pressurized airburst system to clear the screens. *See* AR-4 at 3. EPA reviewed available data of river current speeds for the 2011 Draft Permit and concluded that, because river current speeds dropped below 1 fps (the minimum flow identified by Enercon in 2009) in August and on "various dates" throughout June and July, wedgewire screens would not perform effectively. In its comments on the 2011 Draft Permit, PSNH, with support from Normandeau and Enercon, maintain that a minimum sweeping velocity of 1 fps is not required for successful use of wedgewire screens and note that screens have been successfully deployed in lakes and reservoirs with little sweeping flow. *See* AR-846 at 103-104, AR-864 at 10. In addition, Enercon comments that the period of greatest entrainment, and therefore the greatest potential for wedgewire screens to reduce entrainment, is in May and June when average river flows are higher and the period most likely to have low flows that could interfere with the effectiveness of the screen is August through November, when entrainment potential is low. *See* AR-846 at 103, AR-864 at 10. In its comments on the 2014 Draft Permit, Normandeau summarized the results of studies that evaluated the relationship between flow and entrainment. *See* AR-1231 Exhibit 4, Attachment 1; *see also* AR-1352 Attachment 1 of Attachment 1. In these studies, larval avoidance and bypass increased as the ratio of ambient to sweeping flow increased and was sufficient so long as a ratio of at least 1:1 was maintained. *See* AR-1231 Exhibit 4, Attachment 1; *see also* AR-1352 Attachment 1 of Attachment 1; AR-1418; AR-1420; AR-1421; AR-246. In the 2017 Statement, EPA summarized results of the studies indicating that, in addition to physical exclusion, wedgewire screens reduce entrainment through hydraulic bypass and larval avoidance as long as a minimum ambient velocity relative to the design through-slot velocity is maintained. *See* AR-1534 at 19. In particular, these studies indicate that a minimum ambient velocity of 1 fps in not necessary for wedgewire screens to effectively reduce entrainment, which, as explained above, was a primary consideration in excluding wedgewire screens on the basis of inadequate sweeping flow in the 2011 Draft Determinations Document.

In addition to comments and supporting documentation that flows greater than 1 fps are not necessary to ensure that wedgewire screens function effectively, PSNH provided river current data in its comments on the 2012 and 2014 Draft Permits. *See* AR-846 at 103-106; AR-864 at 9-11; AR-1231 Exhibit 4 at 11-12; AR-1550 at 14. According to PSNH and Enercon (referencing AR-1231 Exhibit 4 Attachment 1), the mean sweeping velocity during field observations in May and June of 2009 and 2010 was 2.9 fps, which would provide a sweeping flow to through-slot velocity ratio of 7:1. At the proposed design through-screen velocity of 0.4 fps, a velocity ratio of 2:1 could be maintained at an ambient current of 1 fps, which is about 1/3 of the average observed sweeping flow in the study. While the full data set from the field observations was not provided, nor did Enercon or Normandeau report the range of sweeping flow during this time period, the reported river flows during the end of May and beginning of June in both years was below average and the mean velocity over both years was well over the minimum level of 0.4 fps necessary to achieve a ratio of at least 1:1. *See* AR-1673, AR-1674. Normandeau recorded sweeping flows during the 2017 wedgewire pilot study and provided additional data confirming the conclusions from the 2009-2010 study. *See* AR-1550 at 14. The median sweeping flow from May 22 to July 25, 2017 ranged from 1.29 fps upstream of the screens to 1.19 fps downstream of the screens, which would result in a sweeping flow to through-slot velocity of about 3:1. Compared to the long-term average flows for the USGS Goffs Falls Gage, river flows during May and June in 2009 and 2010 were below average, while river flows in May through July 2017

tended to be higher than average.[51] *See* AR-1673, AR-1674, AR-1675. The data for years with below- and above-average flows suggest that sweeping flows are typically greater than 0.5 fps, which would ensure a ratio of at least 1:1 (based on a slot velocity of 0.4 fps). The data provided in support of its 2012 comments and the supplemental data provided with its 2017 comments indicate that minimum ratios will be greater than 1:1 and will provide adequate sweeping flow to ensure that the screens will effectively minimize entrainment during the period when they will be operated and, in particular, during the period of peak entrainment in May and June. Enercon also notes that, while PSNH maintains that impingement is *de minimis*, maintaining a slot velocity of 0.4 fps, which preserves the appropriate ratio of slot to sweeping velocity for reducing entrainment, will also reduce impingement consistent with the maximum design through-slot velocity of 0.5 fps under the Final 316(b) Rule. 40 CFR § 125.94(c)(2). *See* AR-1549 at 63-64.

According to the comment, provided there is adequate sweeping flow (addressed above), significant entrainment reductions were achieved with a 3-mm wedgewire screens through a combination of physical exclusion, hydraulic bypass, and behavioral avoidance. In the 2011 Draft Determinations Document, EPA stated that slot sizes of 1.5 mm or larger would not adequately reduce entrainment. *See* AR-618 at 278. At the time, the prevailing empirical evidence indicated that wedgewire screens primarily reduced entrainment through physical exclusion. For this reason, slot sizes were thought to have to be small enough to exclude the smallest of entrainable organisms (*e.g.*, 0.5 mm). Designing screens to exclude the smallest organisms necessarily increased both the number of screens required and the potential for severe fouling issues. *See id*. The studies from 2010 through 2012, summarized in the 2017 Statement, observed substantial reductions in entrainment even for larvae with a limiting body depth smaller than the slot size. The laboratory and field studies conducted after the 2011 Draft Permit (but prior to the 2017 Statement) support Normandeau's comments that a slot size based solely on physical exclusion may be overly conservative and place major constraints on the technology by requiring more screens and greater potential for fouling issues and that a larger slot size (i.e., up to 3 mm) has the potential to significantly reduce entrainment. *See, e.g.* AR-1231 Exhibit 4 Attachment 1, AR-246. *See also* AR-1534 at 18-19.

Normandeau's 2017 pilot study of 3 mm screens at Merrimack Station confirmed the conclusions from comments and studies submitted since the 2011 Draft Permit and which prompted EPA to reconsider this technology for the Final Permit. Normandeau observed an 89% reduction in entrainment of eggs and larvae compared to compared to control densities. AR-1550 at 18, 29. *See also* AR-1549 at 7. The 3-mm slot wedgewire screens entrained more eggs (72 eggs) than the control study (2 eggs), but overall eggs accounted for less than 1% of organisms entrained in 2017. *See* AR-1550 at 40. Normandeau observed a 96% reduction in entrainment of post-yolk sac larvae, and relatively high exclusion (87%) of length classes that were physically small enough to

[51] In the 2011 Draft Determinations Document, EPA states that the 2009 current study was conducted in "early May" based on Normandeau's characterization (AR-246) and that river flows in early May were relatively high. An estimate of current based on this period could be overestimated. In subsequent comments, Normandeau clarified that a 2009 Acoustic Doppler Current Profiler (ADCP) study was conducted from May 17 through June 13, 2009, during which river flows were below average. *See* AR-1231. Normandeau also provided additional current data from 2010 and 2017 over a range of conditions that also suggests that typical current speeds will maintain a ratio of ambient velocity to through-screen velocity greater than 1:1.

pass through the 3 mm slot size. AR-1550 at 18, 30, 47-48. In the 2011 Draft Determinations Document, EPA posited that wedgewire screens may be less suited for Merrimack Station because entrainment is dominated by larvae and larvae are more fragile even than eggs, potentially require even smaller slot sizes (thus more screens) due to small body depth measurements, and are not likely to survive limited contact with the screens. *See* AR-618 at 278-9. New laboratory and field studies about the biological and operational efficacy of wedgewire screens in between the 2011 Draft Permit and 2017 Statement suggest that, in fact, Merrimack Station may be an ideal site for wedgewire screens because entrainment is dominated by post-yolk sac larvae (particularly white sucker), which are larger and better able to actively avoid the screens with sufficiently low through-slot velocities. *See* AR-1534 at 19. In the pilot study, the test screens were observed to most effectively reduce entrainment of post-yolk sac larvae. *See* AR-1550. The 2017 site-specific study of the proposed wedgewire screen design at Merrimack Station provides additional support to demonstrate that wedgewire screens can operate effectively and will significantly reduce entrainment at Merrimack Station.

Based on review of new information (e.g., laboratory and field studies) since the 2011 Draft Permit, comments submitted on the 2011 Draft Permit, 2014 Draft Permit, and 2017 Statement, and supplemental information submitted between comment periods, EPA concludes that wedgewire screens are a feasible technology at Merrimack Station and will reduce entrainment "to the smallest amount, extent, or degree reasonably possible," 40 CFR § 125.92(r) (defining "minimize" in the context of § 316(b)). At the same time, EPA maintains that larvae that contact the screens may suffer mortality and that, while the pilot study confirms earlier comments and studies suggesting that entrainment will be greatly reduced with wedgewire screens, there is still a level of uncertainty associated with this technology in comparison to the relative surety of entrainment reductions that would be achieved through the flow reduction associated with closed-cycle cooling. The additional laboratory and field studies, including site-specific evaluations for Merrimack Station, indicate that entrainment will be substantially reduced with a small installation of screens. The significant decrease in the size of the installation and number of screens from the designs proposed prior to the 2011 Draft Permit will minimize the likelihood that drifting organisms encounter the screens. These same studies suggest that the relatively low through-slot velocity (designed at 0.4 fps), average ambient flows expected during periods of peak entrainment, and composition of drifting organisms in the Merrimack River will also maximize the potential for entrainment reductions through hydraulic bypass and larval avoidance. Finally, Merrimack Station has recently exhibited reduced operations during spring and summer when entrainment densities are highest. The Facility operates at relatively low capacity from April through June, which will in turn reduce the actual number of days that the Facility is withdrawing significant volumes of cooling water. *See* Response to Comment II.3.2 (and associated sub-comments). The Final Permit also establishes a best management practice to schedule the annual maintenance outage at Unit 2 to coincide with peak entrainment and thermal limits that include a limitation on the capacity factor, which together ensure that the reduced operations in May and June will continue for the next permit cycle. Combined, these factors support the conclusion that entrainment will be substantially reduced from existing conditions even if there is some level of uncertainty around the exact entrainment reduction (estimated by Normandeau to be as high as 89%). For these reasons, EPA concludes that any uncertainty is not

so great as to preclude a reasoned decision that wedgewire screens are an available and effective technology for minimizing entrainment at Merrimack Station.

In its comment, PSNH, with additional supporting comments from Enercon and Normandeau, maintains that entrainment technology is required only through July and argues that EPA failed to justify why entrainment controls would be necessary in August. *See* AR-1549 at 62, 67-68. *See also* AR-618 at 275. According to Enercon, 97% of entrainment was observed to occur between mid-May and early August during the two-year study of entrainment at Merrimack Station. *See* AR-1549 at 67. Enercon comments that operating the screens from April 1 to July 31 will cover approximately 95% of the entrained species discussed in the 2007 Normandeau Report. *Id*. EPA agrees that the entrainment studies performed at Merrimack Station indicate that the presence of early life stages declines beginning in August. At the same time, the 2017 Wedgewire Study observed early life stages in the Merrimack River through at least the 16th week of the study (August 21 - August 27). AR-1550 at 41-42. In the earlier entrainment study, early life stages of carp and minnow were present through the week of August 27. AR-2 Appendix A at 37-38.

PSNH further comments that operating the screens in August is not warranted "because fouling of the screens . . . becomes a potential concern due to traditionally low river flow." According to Enercon, the primary reason to restrict operation to April through July is to limit unnecessary exposure of the screens to potentially damaging objects (e.g., submerged tree limbs, refuse, other debris), though Enercon does not specifically tie such exposure to low river flow. Nor does PSNH explain why debris would be more likely to damage the screens during August except to state that river flow tends be lower. By contrast, EPRI commented that "[p]rior history suggests debris fouling would be triggered by *high*-flow events, particularly during spring and fall." AR-1577 (EPRI 2017 Comments) at 2-7 (emphasis added). PSNH's comments elsewhere similarly undermine the theory regarding low river flow that it expresses in the above comment. *See* Comment III.6.2 n.696 (noting "slower river velocities and a lack of heavy debris in the waterbody during" September). Lower river flows could potentially encourage growth of fouling organisms, but backflushing the screens (or operating an airburst technology, if installed), combined with the Z-alloy material and larger slot size should limit this impact. According to Enercon, the 2017 pilot study confirmed that the "Z-alloy" coating[52] mitigated the effects of biofouling on the wedgewire screen and that when a blockage occurred, backflushing the screen successfully removed large debris. *See* AR-1549 at 28-29, 56-59. Furthermore, Enercon also commented that "blockage of the screens . . . due to either biofouling or largescale debris is expected to be successfully mitigated by the Z-Alloy screen and inclusion of the [air burst system]." Enercon 2017 Comments at 59. Thus, PSNH's comment that the screens should not be operated in August because of increased chances of fouling does not find support in PSNH's submissions and is in some ways contradicted by PSNH's submissions and other information in the record. EPA has also included an emergency intake provision in the Final Permit that would enable the Permittee to operate the existing traveling screens in the event that the screens become fouled or clogged such that continued operation may result in damage. *See also* Response to Comment III.4.3.

[52] Enercon proposes to use screens coated with Z-alloy, which is an anti-fouling, copper-nickel alloy coating designed to prevent or reduce the growth of colonizing organisms.

EPA maintains that, based on limited entrainment sampling (in 2006 and 2017), early life stages are present in the Merrimack River through the month of August, although densities are low as compared to July. *See* AR-2 (Table A-3) and AR-1550 (Table 4-2). Operating the screens through August will ensure that entrainment technology is in place during years when the larval period is naturally later than the few years when samples were collected and larvae are still present into early August. Moreover, the comments do not explain why low river velocities in August would increase the likelihood that the screens would be subject to damage by floating logs, branches, or other debris (and was contradicted by comments submitted by EPRI). Fouling may present an additional challenge, but the design of the screens and emergency intake provisions should limit these impacts. The Final Permit requires operation of the wedgewire screens from April 1 through August 15. If the Permittee documents a high frequency of fouling, screen damage, or operation of the emergency intake during August once the screens are installed and operational, the Permittee may request a permit modification to limit operation of the screens to exclude this period.

4.3 An Emergency Bypass for Wedgewire Screens Is Imperative and Consistent with Sound Engineering Practices

Comment III.4.3	**AR-1548, PSNH, p. 154-157**

EPA specifically seeks comments regarding the use of an emergency bypass mechanism for the wedgewire screen technologies considered for Merrimack Station.[636] Installation and operation of this emergency bypass mechanism is essential to allow the facility to adequately avert potentially catastrophic issues in the event of a significant blockage or damage to the wedgewire screens. A bypass feature of this kind is consistent with sound engineering practices and, when put in use, would protect and prevent harm to valuable infrastructure at the facility by providing the necessary flow of water to cool plant processes, which sustains on-line operations and reduces risks of large equipment thermal transients, incremental wear and damage, and other adverse conditions. Conversely, eliminating the bypass feature would result in added direct costs and reduced reliability at Merrimack Station—both of which negatively impact customer benefits—because the aforementioned conditions would occur more frequently than if a bypass feature were installed for the wedgewire screen technology.

The bypass system is primarily needed to ensure that a continuous supply of cooling water is always available to Merrimack Station. Were the wedgewire screens to become partially or completely blocked, a reduction in the water level within the screen houses would occur. At a certain point, the pumps would become damaged due to air intrusion, pressure differentials, and vortex formation unless the pumps were tripped. A tripping of the pumps means operations at Merrimack Station would likewise be tripped. This would result in lost generating capacity for the Station and loss of cooling to equipment within the plant. Installation of a bypass system ensures operational reliability at the facility by guaranteeing a continuous supply of cooling water would be available. This helps maintain power generation, but is also critical for maintaining the safety and reliability of plant equipment.

EPA discusses the bypass feature as a means for PSNH to operate the wedgewire screen technologies annually during the month of August to address entrainment. PSNH maintains that entrainment at Merrimack Station is *de minimis* and, even if EPA disagrees with this *de minimis* conclusion, that entrainment controls during the month of August are not necessary because ichthyoplankton are not common in the Hooksett Pool in August.[637] As stated above, the foundation for EPA's belief that entrainment controls in August are necessary is due to Merrimack Station's comparatively larger flow withdrawal rates, as a percentage of available river flow.[638] However, when the negligible quantity of entrainable organisms present in the waterbody in August is taken into consideration, this comparatively larger flow withdrawal rate actually undercuts EPA's premise. The reason Merrimack Station's relative withdrawal rates have historically increased in August is because overall flows in the Merrimack River typically begin to diminish and continue to decrease through November. Overall lower flows within the waterbody mean there's an increased likelihood that debris (e.g., submerged tree limbs, refuse, etc.) could interfere with, damage, and/or clog the wedgewire screens. Enercon provides that operating the wedgewire screens in August or at any time other than April through July unnecessarily exposes the screens to damaging objects that could impair and/or alter the shape of the screens, which could ultimately "decrease the effectiveness of the screens' ability to reduce entrainment."[639] For these reasons, Enercon has proposed placing bollards around the screens when they are not in use to protect them and minimize the risk of damage due to objects traveling downstream.[640]

In the end, the installation and use of bypass gates associated with wedgewire screens is consistent with sound engineering practices. The gates serve an imperative emergency function of preventing catastrophic damage to critical infrastructure at the facility. They should not, however, be relied upon by EPA as a basis to justify requiring entrainment control technologies annually in August or during any period other than April through July. The studies and biological data in the administrative record make clear that entrainment at Merrimack Station is *de minimis*. Even if EPA disagrees, operation of entrainment control technologies in August is not necessary because there are few entrainable organisms present in the waterbody and because use of the technologies during this lower run-of-river flow period unnecessarily subjects the infrastructure to an increase of damage or destruction due to waterborne debris.

636 AR-1534 at 20-22.
637 *See, e.g.,* AR-1170 at 126.
638 *See, e.g.,* AR-618 at 254.
639 *See* Enercon 2017 Comments at 67-68.
640 *See id.* at 68.

EPA Response:

As the comment indicates, EPA invited comment on the need for emergency intake capability for the wedgewire screen installation at Merrimack Station due to the potential for fouling and clogging. *See* 2017 Statement at 20-21, 22. In its comment, PSNH first reiterates its conclusion that entrainment at Merrimack Station is *de minimis* and then maintains that an emergency intake

or bypass capability will be necessary, if the permit requires wedgewire screens. PSNH also provides supplemental information from Enercon about the need for a bypass to the screens due to the potential consequences, should the wedgewire screens become fouled or clogged. PSNH, with support from Enercon, also comments that the screens should only operate from April through July, even if a bypass is authorized.

As discussed in Response to Comment III.5.2, wedgewire screens with narrow slot sizes potentially achieve greater reductions in entrainment, particularly for the smaller, floating life stages, like eggs and yolk-sac larvae, which have little to no ability to swim away from the screens. EPA has reviewed the comments by PSNH and Enercon and agrees that, given the risk that fouling and clogging could have serious negative consequences to the cooling water pumps, heat exchangers, and associated equipment, an emergency intake is a reasonable countermeasure to prevent the catastrophic loss of equipment in the event of a sudden, unanticipated blockage.

EPA is persuaded that incorporating an emergency intake into the design of the BTA for entrainment is justified given the risk that clogging could result in operational problems that lead to damaged equipment and render the plant inoperable. However, the emergency intake cannot take the place of proper operation and maintenance of the screens, including operation of the airburst system, visual inspections, and manual cleaning. *See* 40 CFR § 122.41(e). In addition, the wedgewire screen design should incorporate certain features designed to reduce the potential for clogging, such as selecting the optimal slot size, the use of antifouling coatings and biofouling-resistant alloys, and the potential for backwashing the screens. Enercon recommends the use of bollards or posts around the screens when not in use to reduce the risk of damage from tree limbs, refuse, and other waterborne debris. Enercon comments that removal of the bollards while the screens are operating is necessary to maintain hydraulic flow around the screens. AR-1549 at 68. EPA recommends that the Permittee also investigate whether bollards can be used year-round while preserving the hydraulic flow at the screens (e.g., by placing them farther from the screens) or whether other deflecting structures, such as debris-deflecting nose cones, may be used while the screens are operating to eliminate the risk associated with free-floating debris contacting and damaging the screens. When the Permittee is operating the emergency intake the traveling screens must be operated consistent with the conditions of the permit.

PSNH and Enercon also comment that operation of the screens in August is not necessary because ichthyoplankton are not common in Hooksett Pool in this month. EPA agrees that seasonal use of the wedgewire screens is warranted because entrainment at Merrimack Station is limited to the spring and summer months. Biological monitoring during 2006, 2007, and 2017 confirms that the majority of entrainment occurs from May through July. *See* AR-6, AR-1550. EPA has responded in detail to comments on the seasonal use of screens and the appropriate period for their operation in Response to Comment III.4.2, above. EPA concludes that the optimal period for operating the screens to minimize entrainment is April 1 to August 15. This conclusion is based on the biological life history characteristics of the fish in Hooksett Pool and supported by the biological data collected by PSNH in support of the Draft and Final Permits. Authorizing use of an emergency intake ensures that the Station is protected from catastrophic failure of the cooling system and does not impact the biological justification for seasonal operation of the screens.

PSNH comments that authorization of a bypass or emergency intake should not be used to justify operating the screens after July because low river flows typically associated with later months "mean there's an increased likelihood that debris (e.g., submerged tree limbs, refuse, etc.) could interfere with, damage, and/or clog the wedgewire screens." PSNH provides no real explanation for this assertion, or any citation, data, or other evidence. As a result, the basis for the comment is unclear, but to the extent it purports to rely on Enercon's 2017 comments, we note that Enercon does not specifically assert that low flows increase the likelihood for screen interference, damage, or clogging. *See* AR-1549 at 67-68. Moreover, later comments offered by PSNH and comments from EPRI espouse the opposite view—that damage or debris fouling is more likely to occur during months with high flows. *See* PSNH Comment III.6.2 n.696 (noting "slower river velocities and a lack of heavy debris in the waterbody during" September); AR-1577 at 2-6 to 2-7 ("Prior history suggests that debris fouling would be triggered by high-flow events, particularly during spring and fall."). To EPA, this appears a more reasonable conclusion, since higher flows are intuitively more likely to dislodge submerged limbs and larger debris, potentially sending them downriver. In addition, information from Normandeau and Enercon likewise appears to undermine PSNH's comment that low flows mean greater chances for interference or clogging. During impingement sampling between June 2005 and June 2007, Normandeau collected debris washed from the traveling screens during 24-hour and 6- or 13-day samples. *See* AR-2 at 8 and Appendix Table B-2. While the traveling screen debris study did not include larger items (*e.g.*, submerged tree limbs) that would have been excluded by the bar racks at the entrance to the CWISs, it is useful as an indication of when debris loads in the river may be highest. The highest volume of debris was collected in October and November, when fallen leaves (a potential source of clogging) likely made up a large percentage of debris. On average, the dominant debris type collected in August 2005 and 2006 tended to be aquatic rather than terrestrial, and the volume of debris was similar to debris loads from April through July when the Permittee has proposed to operate the screens. Furthermore, Enercon commented that "blockage of the screens . . . due to either biofouling or largescale debris is expected to be successfully mitigated by the Z-Alloy screen and inclusion of the [air burst system]." AR-1549 at 59. Taken together, the above comments and information from Enercon, EPRI, and Normandeau, undercut PSNH's current (and unexplained) comment that lower flows after July increase the likelihood that debris will interfere with, damage and/or clog the screens.

EPA is required to determine the maximum reduction in entrainment warranted based on the best available information. EPA based the seasonal operational conditions in the Final Permit on biological sampling data and the life history characteristics of the fish in Hooksett Pool. Most (95% or more) early life stages of species in the Merrimack River are present from April through the end of July. *See* AR-618 at 86-115, 244-251. Still, larval carp and minnow as well as larval sunfish were still present in early August during the limited sampling conducted in 2006. While PSNH speculates that the likelihood of exposure to potentially damaging debris will be higher during low flow periods, it offers no evidence, and actually advances a contrary view in a later comment. *See* Comment III.6.2 n.696; *see also* Comment III.9.5. Moreover, other comments and information in the record, including site-specific data, further undermine the comment. Therefore, EPA finds that comment unpersuasive. *See also* Response to Comment III.5.2.

PSNH and Enercon propose use of an emergency intake to prevent catastrophic damage to equipment, including cooling water pumps, due to an unanticipated blockage. *See* AR-1549 at 69-70. The emergency intake should be used as a last resort (following proper design, operation, and maintenance) when, due to factors beyond the reasonable control of the permittee, continuing to withdraw cooling water through the wedgewire screens would result in loss of human life, personal injury, or severe property damage. The emergency intake is included as a safety feature of the wedgewire screen installation—the technology that, after consideration of the factors relevant to this determination, EPA concluded is the BTA for entrainment—in that it reduces the risk of equipment damage due to blockages. When the emergency intake is in use, however, there will be no technology operating to reduce entrainment at the CWISs, though the Permittee must operate the traveling screens to continue to minimize impingement mortality consistent with the requirements of the permit. *See also* Response to Comment III.9.8. For this reason, Part I.E.4 of the Final Permit requires the Permittee to minimize use of the emergency intake system to the greatest extent possible. Further, it requires the Permittee to notify EPA (within twenty-four hours of initiating any use of the emergency intake system) of the reason that the wedgewire screens were taken off-line and identify all actions taken or to be taken to address the cause, and minimize the use, of the emergency intake. The Final Permit also requires that the permittee notify EPA within twenty-four hours of the resumption of full operation of the wedgewire screens. The notification requirements will enable EPA to evaluate the use of the emergency system and to revisit the permit conditions if frequent operation occurs.

5.0 Closed-cycle Cooling Is Not BTA for Merrimack Station

Comment III.5(i)	**AR-1548, PSNH, p. 157**

In its 2011 Draft Permit, EPA utilized its BPJ to require extreme measures as BTA for the CWISs at Merrimack Station. EPA sought to require PSNH to, among other things, limit the intake flow volume of both CWISs at Merrimack Station to a level consistent with operating in CCC mode from, at a minimum, April 1 through August 31 of each year. PSNH and other interested stakeholders disputed these determinations as arbitrary and capricious in their February 2012 comments to the Draft Permit.

Since that time, CCC was rejected as BTA for CWISs in EPA's final § 316(b) rule. Instead, the final rule provides broad flexibility to facilities to comply with the CWA 316(b) BTA standard, including seven pre-approved control technologies from which a facility may choose to satisfy the impingement BTA standard, as well as a *de minimis* exception that requires no additional controls because the rate of impingement at the facility is low. For entrainment, BTA is to be decided on a site-specific basis and also includes a possible determination that no entrainment controls at a facility are necessary.

PSNH went to great lengths in its 2012 comments to explain why EPA's § 316(b) BTA determination requiring the installation of CCC at Merrimack Station was arbitrary, capricious, and contrary to law. PSNH reasserts many of the same arguments below, with updates to account for changes in factual and regulatory circumstances that have occurred in the intervening five years.

EPA Response:

In making case-by-case BTA determinations based on best professional judgment (BPJ) prior to the promulgation of the 2014 Final § 316(b) Rule, Region 1 generally looked by analogy to the CWA §§ 301, 304, and 306 for guidance in identifying relevant factors to consider in determining the BTA under § 316(b), though EPA is not legally required to consider the factors in those provisions. *See Riverkeeper I*, 358 F.3d at 187 ("[I]t is permissible for EPA to look to those sections for guidance but to decide that not every statutory directive contained therein is applicable to the Rule"). *See also* permit proceedings for MA0003654 (Brayton Point Station), MA0004928 (Mirant Canal Station), MA0028193 (Wheelabrator Saugus, Inc.), and MA0003905 (General Electric Aviation). In addition to these factors, Region 1 consistently considers the relative costs and benefits of available technologies in its case-by-case, BPJ BTA determinations. In *Entergy*, the Supreme Court held that EPA was permitted to consider a comparison of the relative costs and benefits of the technological options in determination of what is "best" under CWA § 316(b)'s BTA standard. *See Entergy*, 129 S.Ct at 1505 n.5. *See* AR-618 at 234-238. Therefore, EPA correctly considered a number of factors, including secondary environmental effects and cumulative impacts, relative costs and benefits, and (by analogy) factors under sections 301, 304, and 306 of the CWA in its case-by-case, BPJ-based BTA Determination. *See* AR-618 at 147-164 and 325-345. EPA maintains that at the time of the Draft Permit, prior to the 2104 Final § 316(b) Rule, the case-by-case BTA determination based on best professional judgement (BPJ) was made consistent with other case-by-case, BPJ determinations in the Region at the time.

Since the Draft Permit was issued, EPA promulgated regulations establishing requirements under § 316(b) for existing manufacturing and industrial facilities. The comment states that EPA "rejected" closed-cycle cooling as BTA in the Final Rule. To the extent this is meant to suggest that the Final Rule therefore prohibits a permitting authority from determining that closed-cycle cooling is the BTA for a particular facility, EPA disagrees. In the Final Rule, EPA concluded that flow reduction commensurate with closed-cycle cooling reduces entrainment and impingement mortality to the greatest extent and is the most effective performing technology. However, EPA also determined that closed-cycle cooling should not be the basis for a uniform, national BTA entrainment standard for existing facilities because of issues with land availability, air emissions, and useful plant life. The extent of these limitations on installation of closed-cycle cooling systems nationwide could not be precisely identified, leading EPA to conclude that these factors were more appropriately considered in a site-specific determination. While EPA rejected closed-cycle cooling technology as the BTA for the industry as a whole, EPA did not rule out closed-cycle cooling as an appropriate BTA for individual sites. *See* Final Rule Response to Comment at 165-66, 188-89. Instead, the site-specific framework was created to reflect EPA's assessment that there is no single technology basis that is BTA for entrainment at existing facilities. The entrainment provisions of the Final Rule establish a process for a site-specific determination of entrainment controls at existing CWISs and direct the permitting authority to consider a number of factors that are best accounted for on a site-specific basis. *See* 79 Fed. Reg. 48,342. In this way, a site-specific determination for entrainment under the Final Rule may conclude that the BTA is closed-cycle cooling for a given facility and fine mesh screens at another. In addition, the national

standard for impingement mortality is based on modified traveling screens with fish returns, but the Final Rule provides for a number of other compliance alternatives that are equivalent or better in performance than this standard, including closed-cycle cooling. 40 CFR § 125.94(c).

When establishing site-specific entrainment requirements under the Final Rule, EPA must consider the number of organisms entrained, emissions, land availability, remaining useful plant life, and social costs and benefits, though the Rule provides the permitting authority with the discretion to assign differing weight to each factor. *See* 40 CFR § 125.98(f)(2). EPA may also consider additional factors, including thermal impacts, reliability, and water consumption. *See* 40 CFR § 125.98(f)(3). Although it is not bound to consider these factors under the ongoing permit proceedings provision of the Final Rule (40 CFR § 125.98(g)), EPA considers all of the relevant factors for each of the available entrainment technologies in making its BTA determination for Merrimack Station. *See* Response to Comment III.6.3.

PSNH provided comments in 2012, which it largely reiterated in its comments on the 2017 Statement, that closed-cycle cooling is not an available technology at Merrimack Station. EPA responds to each of these comments below. After considering these comments, as well as the relevant factors at 40 CFR § 125.98(f)(2) and (3), as directed or authorized, respectively, by the Final Rule, EPA maintains that closed-cycle cooling is available and would reduce entrainment at Merrimack Station. See Response to Comment III.5.1 and 5.3 (and associated comments). At the same time, in response to comments submitted by PSNH and others in 2012 and in 2017, EPA has determined that wedgewire screens are also an available technology that would reduce entrainment at Merrimack Station. Moreover, after considering the relative costs and benefits of closed-cycle cooling in comparison to wedgewire screens in accordance with 40 CFR § 125.98(f)(2)(v), EPA has determined that the BTA for entrainment at Merrimack Station is the seasonal operation of wedgewire screens. *See* Response to Comment III.5.2.

5.1 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

Comment III.5.1	**AR-1548, PSNH, p. 158**
See also AR-846, PSNH, pp. 68-69, 99-100; AR-864, Enercon, p. 9; AR-841, UWAG, pp. 63-66; AR-1549, Enercon, pp. 11-17	

To be classified as BTA pursuant to CWA § 316(b), a given technological treatment system must be both technologically feasible and economically practicable. The CWA's legislative history makes clear that this BTA standard is to be interpreted to mean "best technology available commercially at an economically practicable cost."[641] 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.[642]

PSNH and its consultant, Enercon, explained in numerous reports and submissions to the agency that 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.[643] PSNH also explained in its 2012 comments to the 2011 Draft Permit that the outrageous sticker price of CCC means the technology cannot be installed at Merrimack Station at an economically practicable cost. Accordingly, CCC cannot constitute BTA for the facility. Set out below is an updated discussion of the economic impracticability of requiring CCC to be installed at Merrimack Station, along with an examination of the mandatory and suggested factors set out in the final § 316(b) rule that demonstrate why installation of CCC is not technology feasible at the facility.

641 *See* WPCA 1972 Legislative History.
642 *See* 69 Fed. Reg. at 41,604.
643 *See, e.g.,* AR-6; AR-846; AR-864.

EPA Response:

In its 2007 Engineering Report, Enercon stated that "the costs of retrofitting such a cooling tower for use in a closed-cycle cooling configuration for both units at the Station would be wholly disproportionate to any environmental benefits that could be conferred by doing so (and, to the extent that it is relevant, closed-loop cooling using a mechanical draft cooling tower would not be the most cost-effective technology available for minimizing AEI, and would raise concerns about negative environmental impacts, energy production, and efficiency)." AR-6 at 32. Thus, Enercon raised the potential for adverse impacts from installation of cooling towers but did not conclude that closed-cycle cooling would be technologically or economically infeasible at Merrimack Station. *See* AR-618 at 143 ("PSNH does not contest the availability of mechanical draft hybrid wet-dry cooling tower technology for Merrimack Station."). Enercon, instead, concluded that, in its opinion, the costs of the technology would be wholly disproportionate to the benefits. PSNH also expressed concerns about the vapor plume, which EPA addressed. *See* AR-618 at 164-167.

In their 2011 and 2017 comments, however, PSNH and Enercon, with supporting reports provided by NERA, *see* AR-1128; AR-1565, state that closed-cycle cooling is neither technologically nor economically feasible at Merrimack Station.

At the time of the Draft Permit in 2011, there were no effective national categorical standards applying to § 316(b) to the CWISs at Merrimack Station. Therefore, EPA developed permit conditions under CWA § 316(b) by determining the BTA on a BPJ, site-specific basis. *See* AR-618 at 221, 225. Neither the CWA nor EPA regulations dictated a specific methodology for developing permit limits based on BPJ at the time of the Draft Permit. EPA considered the location, design, construction, and capacity of the CWIS and available technologies. *See* AR-618 at 227-28. Neither statute nor regulations define the term "available" but in terms of the BTA technology standard, the term is accepted to mean technological feasibility. *Id*. EPA also has read availability to mean economic feasibility. *Id.* at 229. In the 2011 Draft Determinations Document, EPA explained, as stated in the comment, that a technology is deemed available on a case-by-case, BPJ basis only if it is both technologically and economically feasible for the facility in question. *Id*.

Since the Draft Permit, EPA has promulgated regulations establishing requirements under CWA § 316(b) for existing facilities like Merrimack Station. The 2014 Final Rule sets forth a number of compliance alternatives for meeting the BTA standard for impingement mortality and a framework for the permitting authority to establish site-specific entrainment controls. EPA notes that in the following comments, PSNH suggests that EPA's draft analysis inadequately considered certain factors when determining whether closed-cycle cooling was an available technology (e.g., land availability, water usage, emissions). However, EPA first established these as factors that must or may be considered in the 2014 Final Rule, after issuance of the Draft Permit. As discussed elsewhere in this Response to Comments, EPA is considering each of the factors listed at 40 CFR § 125.98(f)(2) and (3) in making a final determination of the BTA for entrainment at Merrimack Station. These factors include land availability, air emissions, water usage, the number of organisms entrained, energy reliability, as well as the costs and benefits of available technologies. *See* Response to Comment III.5.3. In its 2017 Statement, EPA also discussed application of the 2014 Final Rule to the Merrimack Station permit and invited public comment on the relevant issues. *See, e.g.,* AR 1534, pp. 14-15. *See also* Response to Comments III.1 and III.2 (and associated sub-comments).

5.2 Consideration of Costs and Benefits of Available Entrainment Technologies

5.2.1 Wedgewire Screens are Far More Cost Effective Than CCC

Comment III.5.2.1	**AR-1548, PSNH, pp. 148-154**

The costs and relative benefits associated with any CWIS technology must be considered in rendering a BTA determination pursuant to § 316(b). The limited legislative history of § 316(b) makes this clear. Specifically, that legislative history provides that BTA should be interpreted to mean "best technology available commercially at an economically practicable cost."[611] Since at least 1977, EPA has compared costs and benefits in making BTA determinations to minimize AEI pursuant to § 316(b).[612] 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."[613] 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."[614]

EPA embraced this "wholly disproportionate" standard in conducting cost-benefit analyses—and consistently rejected 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.[615] 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 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). 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.[616]

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[.]"[617]

EPA's use of the "significantly greater" standard in its 2004 Phase II 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*,[618] the U.S. Supreme Court definitively confirmed that § 316(b) allows the permit writer to consider costs and benefits in determining BTA to minimize AEI. 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:

> "[B]est 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.[619]

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.'"[620] 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."[621] 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.[622]

EPA enjoys some latitude on what constitutes a ratio of costs that are not "significantly greater than" or "wholly disproportionate" to the relative benefits of a given technology. However, its discretion is not unfettered. In the past 40+ years of rulemaking by the agency, coupled with occasional statements throughout this time frame that explicitly address this issue, a threshold or ceiling of cost-benefit ratios has been established. For instance, 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.[623]

This document plainly establishes a recommended ratio of around 10 to 1 as the threshold for determining whether costs are wholly disproportionate to benefits.[624]

The quantifiable costs and relative benefits of EPA's final § 316(b) rule have a ratio of 8.25 to 1 and/or 10.29 to 1, utilizing a 3 percent and 7 percent discount rate, respectively, and this does not include the costs associated with technologies that may be necessary to address entrainment:[625]

> The cost of additional technologies that may be required to meet the site-specific BTA for entrainment are not included in this analysis because . . . EPA cannot estimate, with any level of certainty, what site-specific determinations will be made based on the analyses that will be generated as a result of the national BTA standard for entrainment decision-making established by [the final rule].[626]

EPA notably referenced the *Entergy* opinion in its final § 316(b) rule to support the agency's proposition that when setting national performance standards for CWISs under 316(b), the permitting agency should compare the costs and benefits of various technologies.[627] Furthermore, there is nothing in the final § 316(b) rule to suggest the "significantly greater" and/or "wholly disproportionate" cost-benefit standards were revoked or superseded by language in the agency's 2014 rulemaking. Accordingly, these cost-benefit standards remain in effect and

must govern EPA's BTA decision-making process.

PSNH's consultant, NERA, assessed the costs and relative benefits of wedgewire screen technologies in a 2012 report[628] submitted to EPA in response to its 2011 Draft Permit and has completed a revised assessment in its 2017 report submitted to the agency contemporaneously with these comments.[629] NERA's report was completed in accordance with the tenets of the final § 316(b) rule[630] and adheres to the principles set out in EPA's Guidelines for Preparing Economic Analyses.[631] In other words, the latest social benefits and costs analysis by NERA "is of sufficient rigor"[632] and must therefore be considered by EPA in rendering its BTA determination for entrainment. Utilizing existing CWIS operations at the Merrimack Station as the baseline, NERA concludes that the cost-benefit ratio for the installation of wedgewire screens at the facility is 192 to 1 and 295 to 1 in 2017 dollars, utilizing discount rates of three and seven percent, respectively.[633] Stated plainly, this means that for every dollar of benefit generated by the installation of wedgewire screens, $192 or $295 would have to be paid in costs to install and operate the technology. These ratios grossly fail EPA's "wholly disproportionate" and/or "significantly greater" cost-benefit standards and far exceed the threshold ratios of approximately 8 to 1 and/or 10 to 1 the agency has advanced as the proper metric for rendering § 316(b) BTA determinations.[634] Accordingly, EPA cannot reasonably classify wedgewire screens as BTA for entrainment at Merrimack Station. Notwithstanding their inability to satisfy EPA's cost-benefit standards, PSNH has shown through its pilot study that installation of 3.0 mm wedgewire screens with a designed through-screen velocity of less than 0.5 fps at Merrimack Station, operated annually from April through July, is highly effective at reducing entrainment at substantially less cost as compared to CCC.[635]

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611 *See* Legislative History of the Water Pollution Control Act Amendments of 1972, 93rd Cong., 1st Sess., 264 (1973) (emphasis added). Hereinafter, references to this document will be cited as "WPCA 1972 Legislative History."

612 *See In the Matter of Pub. Serv. Co. of N.H. (Seabrook Station Units 1 and 2)*, NPDES Appeal No. 76-7, 1977 WL 22370, at *7 (EAB June 10, 1977), *aff'd after remand*, *Seacoast Anti-Pollution League v. Costle*, 597 F.2d 306 (1st Cir. 1979).

613 *Id.*

614 *Id.* (emphasis added); *see also In re Cent. Hudson Gas & Elec. Corp.*, Op. EPA Gen. Counsel No. 63, 1977 WL 28250, at *8 (OGC July 29, 1977) (citing the *Seabrook* Board's "wholly disproportionate" standard with approval and providing that minimization of AEI required under § 316(b) "must be tempered by economic considerations."). "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 the Matter of Pub. Serv. Co. of N.H.(Seabrook Station, Units 1 and 2)*, NPDES Appeal No. 76-7, 1978 WL 21140, at *20 (EAB Aug. 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.

615 *See* 67 Fed. Reg. 17,121 (April 9, 2002) (codified at 40 C.F.R. pts. 9, 122, 123, 124, and 125).

616 *Id.* at 17,145-46 (emphasis added).

617 *See* 68 Fed. Reg. 13,521, 13,541 (Mar. 19, 2003) (codified at 40 C.F.R. pt. 125).

618 556 U.S.at 226.

619 *Id.* at 218.

620 *Id* at 219.

621 *Id.* at 225.

622 *Id.*; *see also Voices of the Wetlands v. State Water Res. Control Bd.*, 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).
623 AR-671 at IV-52.
624 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) (codified 43 C.F.R. pt. 11). 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. Dep't of the Interior*, 880 F.2d 432, 443, n. 7 (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); *Gen. Ry. Signal Co. v. Wash. Metro. Area Transit Auth.*, 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); *see also* 69 Fed. Reg. 41,575, 41,662, 41,666 (July 9, 2004) (codified at 40 C.F.R. pts. 9, 122, 123, 124, and 125) (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).
625 *See* 79 Fed. Reg. at 48,303-04.
626 *Id.* at 48,304.
627 *See id.* at 48,313, 48,318, 48,351.
628 *See* AR-1199.
629 *See generally* NERA 2017 Report.
630 *See* 40 C.F.R. §§ 122.21(r)(10)(iii), (r)(11).
631 EPA, Guidelines for Preparing Economic Analyses (Dec. 17, 2010), available at https://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf. Hereinafter, references to this document will be cited as "EPA Guidelines for Preparing Economic Analyses."
632 40 C.F.R. § 125.98(f)(2)(v).
633 *See, e.g.,* NERA 2017 Report at E-4.
634 *See* 79 Fed. Reg. at 48,303-04; AR-671 at 52.
635 Enercon explains in its 2017 comments that the non-water quality and other environmental impacts associated with wedgewire screens are miniscule compared to those associated with CCC, which are discussed in detail below. *See* 40 C.F.R. §§ 122.21(r)(12); 125.98(f)(2), (3). The only anticipated parasitic load associated with the screens is the operation of the air burst system compressors, which Enercon estimates would require approximately 172 MW-hr per year. Enercon 2017 Comments at 7. And, unlike CCC technologies, there are no water consumption and land availability issues, anticipated increases in air emissions, or icing/fogging concerns associated with operation of wedgewire screens at Merrimack Station. *See, e.g., id.* at 12-16.

5.2.2 The Costs to Install CCC at Merrimack Station Are Wholly Disproportionate, Significantly Greater, or Simply Unreasonable Compared to the Expected Environmental Benefits

Comment III.5.2.2	**AR-1548, PSNH, pp. 159-162**
See also AR-846, PSNH, pp. 68-9, 82-98; AR-841, UWAG, pp. 63-66; AR-1131, Ohio Utility Group, pp. 2-3	

In 2012, PSNH discussed in its comments to the Draft Permit the comprehensive cost-benefit work of its consultant, NERA, and its conclusions that the cost-benefit ratio for CCC at Merrimack Station would be 974 to 1 and that the incremental costs to the incremental benefits of CCC relative to cylindrical wedgewire screens was an astounding 4,317 to 1.644 PSNH likewise outlined the myriad deficiencies and inconsistencies in the supposed cost-benefit analysis EPA set out in its 2011 Fact Sheet, including those errors noted by NERA in its analyses.645 The zenith of these collective critiques is that in assessing costs as a mandatory

BTA factor, EPA engaged in nothing more than an affordability determination and the agency repeatedly failed to adhere to its own standards, guidance, and prior precedent in rigorously assessing whether the benefits of CCC compared to relative costs constitutes BTA at Merrimack Station. PSNH and NERA presented clear evidence that installation of CCC as BTA is unwarranted, arbitrary, and capricious.[646]

EPA has never responded to these comments and elected not to do so again in its latest Statement. Moreover, EPA failed to address in its Statement whether the agency believes its only attempted assessment of CWIS costs and relative benefits in the administrative record—the aforementioned affordability determination set out in its 2011 Fact Sheet—satisfies the relevant study requirements set out in 40 CFR Part 122 and/or the "sufficient rigor" standard the agency established in its 2014 final § 316(b) rule.[647] Specifically, in making the "[q]uantified and qualitative social benefits and costs of available entrainment technologies" a factor EPA must evaluate in rendering a legally defensible entrainment BTA determination, the agency requires the benefit and cost information to be of sufficient rigor to ensure it is based on sound engineering and science.[648] EPA's 2011 assessment ignored the objective scientific data PSNH and its consultants had previously submitted to the agency that would have provided a reasonable basis for quantitatively assessing anticipated benefits and, instead, relied upon a disjointed patchwork of qualitative benefits analyses that, without question, lacks the requisite "rigor" to be of any value to the agency.

NERA revisited and revised its 2012 cost-benefit ratio in its 2017 report to reflect the requirements and considerations included in EPA's final § 316(b) rule, the agency's updated Guidelines for Preparing Economic Analyses, more detailed preliminary estimates on the costs to install and operate CCC,[649] and benefits information that has likewise been updated to incorporate new available information.[650] NERA's 2017 Report was prepared in accordance with the requirements of the Benefits Valuation Study and cost evaluations-portion of the Comprehensive Technical Feasibility and Cost Evaluation Study EPA describes in the final § 316(b) rule and requires facilities with a 3-year average AIF of 125 MGD or more to submit as part of the NPDES permit application.[651] Moreover, no one could reasonably contend NERA's report lacks the "sufficient rigor" required to be utilized by the agency to render a reasoned BTA determination, as it thoroughly evaluates and quantifies each of the key cost and benefit metrics EPA recommends in the final § 316(b) rule, as well as other industry guidelines.[652] The cumulative effect of this new information is a new cost-benefit ratio for the installation of CCC at Merrimack Station that has dramatically increased. Specifically, NERA concluded **the cost-benefit ratio for CCC is now 1,714 to 1 and 2,333 to 1** in 2017 dollars, utilizing discount rates of three and seven percent, respectively.[653] Thus, for every dollar of benefit generated by the installation of CCC, $1,714 or $2,333 would have to be paid in costs to install and operate the technology.

NERA also assessed the ratio of the incremental costs to the incremental benefits of CCC relative to wedgewire screens. Remarkably, that ratio is an astounding $10,081 to 1 in 2017 dollars utilizing a three percent discount rate, meaning that an additional $10,081 would have to be paid for every $1 of additional benefit provided by CCC compared to wedgewire screens at Merrimack Station.[654] Using a seven percent discount rate, the incremental cost-benefit ratio

between wedgewire screens and CCC is $18,499 to 1 in 2017 dollars. Again, that means an additional $18,499 would have to be paid for every $1 of additional benefit provided by CCC compared to wedgewire screens at Merrimack Station.[655]

These ratios woefully fail EPA's "wholly disproportionate" and/or "significantly greater" cost-benefit standards and far exceed the threshold ratios of approximately 8 to 1 and/or 10 to 1 the agency has advanced as the proper metric for rendering § 316(b) BTA determinations.[656] Accordingly, the agency should not and legally cannot render a BTA determination requiring CCC technologies at Merrimack Station that would withstand judicial scrutiny.

644 *See* AR-846 at 88-89.
645 *See id.*
646 EPA is likewise required to consider the costs associated with achieving an effluent reduction in rendering a legally defensible BAT determination for thermal discharges. *See* 33 U.S.C. § 1314(b)(2)(B) (requiring EPA to consider, among other things, the cost of achieving an effluent reduction in rendering a BAT determination for thermal discharges). The critiques and arguments set out in PSNH's 2012 comments and NERA's 2012 report regarding the lack of rigor in EPA's assessment of the costs of CCC technologies therefore apply equally to EPA's § 316(a) BAT determination for Merrimack Station.
647 *See* 40 C.F.R. §§ 122.21(r)(10)(iii), (r)(11); *id.* at § 125.98(f)(2)(v).
648 *See id.*; *see also* 79 Fed. Reg. at 48,367-68.
649 Enercon provided much of this preliminary cost data to NERA and cautions that it is generally accepted in the industry that the total costs formulated in the conceptual design stage of a project almost always increase dramatically in the subsequent stages of the project. *See* Enercon 2017 Comments at 13-14.
650 *See* NERA 2017 Report.
651 40 C.F.R. §§ 122.21(r)(10)(iii), (r)(11).
652 *See* 40 C.F.R. § 125.98(f)(2); *see, e.g.,* EPA Guidelines for Preparing Economic Analyses.
653 *See, e.g.,* NERA 2017 Report at E-4.
654 *See id.*
655 *See id.*
656 *See* 79 Fed. Reg. at 48,303-04; AR-671 at 52.

5.2.3 Closed-Cycle Cooling is Economically Feasible at Merrimack Station

Comment III.5.2.3	**AR-851, CLF, p. 13**

EPA concluded that installing CCC technology at Merrimack Station is economically feasible and that PSNH has not demonstrated otherwise.[55] In examining the costs of installing CCC technology, EPA correctly questioned PSNH's estimate of lost profits associated with construction outage periods during the conversion to CCC. PSNH estimated such lost profits to total $9.1 million.[56] The lost profits were entirely associated with three weeks of operation that PSNH estimated the construction would take on top of the plant's regular four-week outage for regularly scheduled maintenance.[57] EPA correctly noted that PSNH's estimate of lost profits may err on the high side because:

> [F]irst, PSNH has used the units' nameplate ratings rather than the lower production capability ratings that PSNH currently claims in its reports to the regional system operator; and second, PSNH has assumed that the units would

> have been operating at 100 percent capacity rather than a lower figure reflecting the facility's recent actual capacity factors.[58]

PSNH's estimate of its annual operating costs is also biased high. PSNH again calculated its estimate of annual recurring costs based on the assumption that equipment, such as the new booster pumps and tower fans, would be operating and consume electricity in all hours of each year.[59] EPA correctly noted that such constant operation is unlikely, calculated that the annual costs would decrease by approximately $850,000 if PSNH had used Merrimack Station's actual capacity factor over the last eight years, and would come down even further if adjustment for fan usage during the cooler months were included.[60] As with many of the assumptions in its analysis, however, EPA gave PSNH the benefit of the doubt and used the company's estimates.[61] In spite of PSNH's artificially inflated cost estimates for annual operations costs, EPA still correctly concluded that installing CCC at Merrimack Station was economically achievable.

[55] Attachment D at 148.
[56] PSNH's estimate of $8.8 million was in 2007 dollars. EPA brought that value forward to 2010 dollars, which resulted in a figure of $9.1 million. *Id.* at 150.
[57] *Id.*
[58] *Id.*
[59] *Id.* at 152.
[60] *Id.*
[61] *Id.* at 153.

EPA Response to Comments III.5.2.1, 5.2.2, and 5.2.3:

EPA received a number of comments in 2012 and in 2017 related to how the relative costs and benefits of available CWIS technologies should be considered. In its comments, PSNH summarized its understanding of the rulemaking and legislative history as it pertains to the consideration of costs and benefits under Section 316(b) of the CWA. PSNH commented on what it perceived as short-comings in EPA's analysis of costs and benefits in the 2011 Draft Determinations Document and, in 2012, provided a new economic assessment of costs and benefits of available technologies, including closed-cycle cooling, wedgewire screens, and traveling screen upgrades, prepared by NERA. *See* AR-1128. In 2017, NERA updated this economic assessment for two of the technologies – closed-cycle cooling and wedgewire screens – because of the new requirements of the 2014 Final Rule. *See* AR-1565. In addition, CLF submitted comments on the economic feasibility of closed-cycle cooling at Merrimack Station. In this response, EPA addresses PSNH's comments on costs and benefits, the economic analyses provided by NERA, CLF's comments on costs, and associated related comments on costs and benefits submitted by other parties as indicated above.

Legislative History

PSNH asserts that the costs and relative benefits associated with any CWIS technology must be considered in rendering a BTA determination pursuant to § 316(b). In the 2011 Draft Determinations Document, EPA summarized the legal requirements, including an explanation of

how EPA considered costs and benefits for a case-by-case, BPJ-based determination at the time of the 2011 Draft Permit. *See* AR-618 at 234-38, 325-28. Specifically, EPA identified:

> In Entergy, the Court held that EPA was permitted to consider a comparison of the relative costs and benefits of the technological options in its determination of which technology is "best" under CWA § 316(b)'s BTA standard. *See id*. at 1506 n.5 (determining which available technology is best "…may well involve consideration of the technology's relative costs and benefits"), *rev'g in part, Riverkeeper*, 475F.3d 83. *See also generally id*. at 1508-10.

Id. at 234. At the same time, in the 2011 Draft Determinations Document, EPA recognized that, while authorized to consider costs and benefits, it was clear that EPA did not have to do so.[53] *Id*. at 235-36 (citing *Entergy* at 1508 and *ConocoPhillips Co. v. EPA* , 612 F.3d 822, 828 (5th Cir. 2010)); *see also* 79 Fed. Reg. 48,351. Given that EPA could, but was not required to, consider costs and benefits in making a BTA determination, there was no specific test mandated for use in this regard. The 2011 Draft Determinations Document explained that EPA used a "significantly greater than" test in the (suspended) 2004 Phase II Rule, while also noting that this was the first and only use of this test and that all other cases of rulemaking or BPJ permitting under § 316(b) used either a "wholly disproportionate test" or did not compare costs and benefits at all. *See* AR-618 at 236 n.70.

For the 2011 Draft Permit, EPA compared the costs and quantified entrainment reductions of available technologies to assess the benefit of available technologies using information submitted by PSNH and information gathered or developed by EPA. *See* AR-618 at 325-26. EPA also qualitatively evaluated the benefits of reducing entrainment at Merrimack Station, including, but not limited to, benefits to species that have experienced recent population declines (e.g., American shad), benefits to recreationally important species, and the value of enhancing protection for the Merrimack River. *Id*. at 335-38. EPA did not attempt to generate a complete monetized estimate of benefits. This is reasonable and appropriate in this case for a number of reasons, including because undertaking a study to translate the eggs, larvae, and fish saved, along with ecological improvements that result from the entrainment reductions under each BTA option, into a dollar value that fully represents the benefit of each BTA option would be extremely difficult and expensive, and would require specialized expertise outside of the Region, particularly for a BPJ-based determination prior to the 2014 Final Rule.[54] Moreover, such studies to value ecological benefits may be subject to substantial controversy. Therefore, for the

[53] Regarding the *Entergy* decision, PSNH states "[a]lthough 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." EPA again clarifies that in *Entergy Corp. v. Riverkeeper, Inc*. 556 U.S. 208 (2009), the Supreme Court held that the CWA gives EPA the discretion to rely on cost-benefit analysis in establishing § 316(b) permitting requirements. In other words, the discretion was left to EPA to decide not only how, but whether, to take into account costs and benefits in § 316(b) actions.

[54] As an example of the difficulty in monetizing expected benefits from entrainment reductions, EPA developed and fielded an original stated preference survey to estimate willingness-to-pay for improvements to fishery resources from the Final Rule but was unable to finalize the results. For the Final Rule, EPA estimated partial nonuse benefits using the benefits transfer approach and, due to the challenges associated with estimating nonuse benefits, included a qualitative assessment of some nonuse benefits. *See* 79 Fed. Reg. at 48,406.

Merrimack Station permit, EPA quantified the benefits of impingement and entrainment reductions (in terms of individuals saved), qualitatively considered the benefits of those reductions, and compared the benefits to the relative costs of the available BTA options. *See* AR-618 at 333-334. EPA maintains that the consideration of costs and benefits of available BTA options for the 2011 Draft Permit was appropriate based on the law, facts, policy and other available information at the time of issuance.

Consideration of Costs and Benefits under the 2014 Final Rule

Setting aside how EPA considered costs and benefits for its BPJ-based BTA determination in the 2011 Draft Permit, the final determination of the BTA at Merrimack Station is now subject to the 2014 Final Rule. Pursuant to EPA's Final Rule, the permitting authority must establish site-specific entrainment requirements reflecting its determination of the "maximum reduction in entrainment warranted after consideration" of a number factors, including "[q]uantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision." 40 CFR § 125.98(f)(2)(v). Additionally, the regulations specify that the permitting authority "may reject an otherwise available technology as a BTA standard for entrainment if the social costs are not justified by the social benefits." 40 CFR § 125.98(f)(4).

The Final Rule does not specify that EPA must use a particular cost-benefit test. According to PSNH, "there is nothing in the final § 316(b) rule to suggest the 'significantly greater' and/or 'wholly disproportionate' cost-benefit standards were revoked or superseded," and it argues that "these cost-benefit standards remain in effect and must govern EPA's BTA decision-making process." Yet, as EPA has explained in the 2011 Draft Determinations Document and in this Response to Comment, prior to the 2014 Final Rule there was no requirement that EPA consider costs and benefits when making a BTA determination, let alone a requirement that either the "significantly greater than" or "wholly disproportionate" standard be applied. As neither test was ever "in effect" as a legal requirement, no regulation was required to "revoke" or "supersede" these standards as they apply to determinations under § 316(b). The majority opinion in *Entergy Corp. v. Riverkeeper, Inc*., 556 U.S. 208 (2009), allowed that in considering costs and benefits, the "wholly disproportionate" standard and the "significantly greater than" standard, or some other test, would all be within EPA's discretion under the statute. The Court did not conclude that EPA's consideration of costs and benefits under §316(b) *must* use a particular standard.[55]

[55] The Response to Comments for the Final Rule explains that EPA may choose how to consider cost-benefit analyses in determining appropriate site-specific permit requirements for entrainment. *See* AR-1697 at 94. EPA notes that the terms "wholly disproportionate" and "significantly greater than" are not used in reference to the consideration of costs and benefits when establishing entrainment requirements for existing units in the regulations at 40 C.F.R. Part 125 Subpart J, the preamble to the Final Rule (79 Fed. Reg. 48,300), or the supporting documentation for the Final Rule (*i.e.*, the Technical Development Document, Economic Analysis, or Benefits Analysis for the Final Rule). That neither the "wholly disproportionate" and "significantly greater than" tests were specified in the Rule indicates that it was EPA's intention to leave the permitting authority discretion to choose precisely how to consider the costs and benefits of available technologies.

In considering the costs and benefits of the available entrainment control technologies for the Merrimack Station Final Permit, EPA applied the Final Rule, which provides that site-specific requirements must reflect "the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology available for minimizing adverse impact at each facility," 40 CFR § 125.98(f), and allows EPA to "reject an otherwise available technology if the social costs are not justified by the social benefits," *id*. § 125.98(f)(4). When making a site-specific BTA determination for entrainment under the Final Rule, EPA must consider the monetized, quantified, and qualitative social benefits and social costs of available controls, including ecological benefits and benefits to threatened and endangered species. 40 CFR § 125.98(f)(2)(v). EPA's assessment of benefits must take into account all benefits, including categories such as recreational, commercial, and other use benefits; benefits associated with reduced thermal discharges; reduced losses to threatened and endangered species, altered food webs; benefits accruing nonlocally due to migration of fish; nutrient cycling effects; and other nonuse benefits. *See* 79 Fed. Reg. 48,351.

In support of PSNH's 2017 comments, NERA prepared an economic assessment of the costs and benefits of installing and operating wedgewire screens and closed-cycle cooling at Merrimack Station. *See* AR-1565. This economic assessment builds upon the *Preliminary Economic Analysis of Cooling water Intake Alternatives at Merrimack Station* (AR-1128) prepared by NERA and submitted in support of PSNH's comments on the 2011 Draft Permit, which in turn was based, in part, on the initial cost information provided by Enercon in the 2007 Engineering Report, AR-6, and Enercon's updated cost information included with its 2012 comments (AR-864). The methodology of NERA's 2017 analysis is consistent with the requirements of the Final Rule, specifically the information submission requirements for the Comprehensive Technical Feasibility and Cost Evaluation Study and Benefits Valuation Study. 40 CFR § 122.21(r)(10)(iii), (11). The 2017 economic analysis is the most recent and comprehensive, and it largely builds on analyses already submitted by PSNH or in support of PSNH's comments on the 2011 Draft Permit. For these reasons, EPA evaluates this analysis to support its consideration of the relative costs and benefits of two available technologies for reducing entrainment: wedgewire screens and closed-cycle cooling.[56]

[56] The 2012 economic analysis compared the relative costs and benefits of closed-cycle cooling, wedgewire screens, and traveling screen upgrades. AR-1128. The coarse-mesh traveling screen upgrades are intended to reduce impingement mortality and are not effective for entrainment. Consistent with the Final Rule, EPA focuses here on available technologies for entrainment. EPA assessed the social costs and economic impact associated with the impingement mortality compliance alternatives in the Final Rule and reasonably determined that the benefits justify the costs. *See* 79 Fed. Reg. 48,349. In other words, the Final Rule already considered the costs and benefits of complying with the impingement mortality standards at 40 C.F.R. § 125.94(c) on a national basis, including the potential compliance alternatives that Merrimack Station may select. No further consideration of site-specific costs and benefits for the impingement mortality BTA standards is required. NERA also evaluated the relative costs and benefits of an aquatic filter barrier system in 2012. Both PSNH and EPA have rejected this technology as infeasible for reducing entrainment at Merrimack Station due to concerns over the size of the barrier and the required maintenance. *See* AR-618 at 292-95. PSNH has not indicated that it has changed its position on the unavailability of this technology for entrainment and there is no new information to suggest that it would be feasible and effective for reducing entrainment at Merrimack Station.

Cost of Available Entrainment Technologies at Merrimack Station

NERA estimates that the total net present value social cost for closed-cycle cooling is $112.7 and $77.1 million (in $2017) utilizing discount rates of three and seven percent, respectively, based on information and estimates provided by Enercon. *See* AR-1565 at 18. NERA estimates that the total social cost for wedgewire screens is $10.71 and $8.67 million utilizing discount rates of three and seven percent, respectively. *Id*. The cost estimates include estimates of capital costs, construction costs, and energy penalty costs provided by Enercon in AR-1549. The capital cost estimate for closed-cycle cooling from the 2017 analysis is generally based on the same capital cost estimates initially provided by Enercon, which informed the costs estimates for the 2011 Draft Permit, updated to reflect Enercon's comments from 2012. In its 2012 comments, Enercon stated that the initial cost estimates had considerable uncertainty and an additional contingency was necessary to account for potential cost overruns. *See* AR-864 at 21-22.

In 2012, PSNH suggested that EPA had used "outdated" contingency multipliers for the 2011 Draft Permit.[57] Enercon proposed an additional multiplier of at least 30% added to the existing 25% contingency used for the 2007 estimates, resulting in a 55% contingency factor. *See* AR-864 at 22. Enercon indicates that its cost estimate is preliminary and some challenges would be expected in integrating a closed-cycle cooling system to the existing system. Preliminary cost estimates are more uncertain than detailed cost estimates and a higher contingency (*i.e.*, higher than 25%) could be applied to account for this uncertainty. Enercon appears to justify a 55% multiplier by referencing one 1976 Mitre study that "showed that average project costs exceed projections by a factor of 1.55." AR-864 at 22. Enercon suggests the multiplier of 1.55 is typical of cost overruns of large-scale projects at coal-fired power plants, yet this value appears to be the high point of a curve plotting the ratio of actual-to-estimated costs of coal projects in the early 1970's. The value of 1.55 is representative of projects in 1972-73, during a time when, as explained in the report, several unforeseen factors were in play and inflation was at a high point, which suggests that the 1.55 multiplier is biased high. EPRI's 2011 Report reviewed cost from a number of plants that underwent or evaluated retrofitting closed-cycle cooling and found that contingency was typically 30 to 35%. *See* AR-1740 at 3-11. Enercon's initial cost estimate, which EPA used in the 2011 Draft Permit, included both a 25% minimum contingency and a 12% contingency for "overhead and construction financing" resulting in total contingency of 37% which is slightly above the range recommended by EPRI. At the same time, the capital costs of closed-cycle cooling, which comprise the majority of the net present value estimate, are substantial regardless of which contingency factor is used, particularly relative to the cost of wedgewire screens. In addition, PSNH and Enercon raise concerns that the installation of the FGD system, which occurred after the 2007 Engineering Report, could result in additional complexities and challenges for retrofitting closed-cycle cooling that are unique to Merrimack Station and which were not accounted for in the initial costs estimates. For this reason, a larger contingency factor may possibly be warranted in this case. *See also* Response to Comment 5.3.1. EPA has considered the cost estimates from NERA's 2017 analysis, which reflect the 55% contingency factor, in determining the BTA for Merrimack Station.

[57] EPA notes that it did not independently develop the costs used to assess the technologies for the 2011 Draft Permit. The costs, including the contingency multiplier, were provided to EPA by PSNH. *See* AR-618 at 148.

In addition to capital costs, NERA's total net present value social cost estimates include the annual operation and maintenance costs, the cost of lost generation during the construction outage for each technology, and the costs associated with the energy penalty from both efficiency losses and parasitic losses associated with a given technology. NERA's estimates, presented below (millions of dollars in $2017), utilize discount rates of three and seven percent and are based on estimates provided by Enercon. *See* AR-1565 at 11-16.

	Loss (MWh)	Net Present Value millions of dollars ($2017)	
		3%	7%
Closed-cycle cooling			
Operation & Maintenance	---	$10.37	$4.81
Construction Outage	168,541	$2.25	$1.7
Annual Efficiency Power Loss	11,632	$14.7	$7.22
Annual Parasitic Losses	13,312	$16.57	$8.14
Wedgewire Screens			
Operation & Maintenance	---	$0.52	$0.28
Construction Outage	96,624	$1.5	$1.22
Annual Efficiency Power Loss	---	---	---
Annual Parasitic Losses	172	$0.21	$0.11

Enercon estimates that wedgewire screens result in two, six-week construction outages (one for each unit) during the months of September and October. Closed-cycle cooling results in one two-month construction outage during the months of April and May. See AR-1565 at 12. In its comments on the 2011 Draft Permit, CLF indicated that the cost estimates for lost profits associated with the construction outage is likely biased high because PSNH assumed both units would be operating at 100% capacity rather than reflect the Station's actual operating capacity. For its 2017 analysis, NERA estimated the loss (in MWh) during each construction outage based on the average monthly capacity factors based on historical plant operations during 2007 through 2016. This value is likely still biased high because the average monthly capacity factors used in the analysis are not reflective of the actual recent operation of the plant. For example, NERA's estimate indicates that the September/October outage would result in a loss of 168,541 MWh based on an average capacity factor (both units combined) of 25% in September and 20% in October. *See* AR-1565 at 13 (Table 8). However, the average capacity factor in the months of September and October from 2012 through 2019, which best reflects Merrimack Station's current operation as a peaking unit, was 3.5% and 1.3%, respectively. Similarly, the average capacity factor in the months of April and May from 2012 through 2019, which best reflects Merrimack Station's current operation as a peaking unit, was 6.5% and 0.8%, respectively as compared to NERA's analysis with an average capacity factor of 30% in April and 23% in May. In other words, based on actual current operations it is likely that Merrimack Station would operate very rarely in months when the construction outage is likely to occur, resulting in minimal lost profit. At the same time, while NERA's estimates for the construction outage are biased high, the lost profit due to the outage represents a relatively minor component of overall costs, particularly for closed-cycle cooling. Therefore, EPA uses NERA's 2017 cost estimates in its evaluation of costs for the final BTA determination.

In the 2007 Engineering Report, Enercon estimated that the loss in condenser efficiency from converting to closed-cycle cooling would result in an average power loss of 0.16 MW at Unit 1 and 2.82 MW at Unit 2. In addition, Enercon estimated that the conversion to closed-cycle cooling would result in parasitic losses (*i.e.*, additional electrical load due to operation of pumps and fans) of 1.56 MW at Unit 1 and 5.14 MW at Unit 2. *See* AR-6 at 43-45. While EPA used these estimates to evaluate the cost of the energy penalty, the 2011 Draft Determinations Document explains that they may be biased high because it assumes that the fans and pumps operate at full capacity 24 hours per day and 7 days per week. *See* AR-618 at 152. It is likely that the fans and pumps would not operate when the units are not generating electricity. EPA suggested that, based on the actual capacity factor from 2001-2009, the fans and pumps would likely operate up to 20% less than Enercon's estimate. *Id*. CLF agreed with EPA's assessment in its 2012 comments. AR-851 at 13.

To calculate the cost of the energy penalty in 2017, NERA adjusted Enercon's initial estimates (based on 100% operation) to reflect the average monthly capacity factor for each unit.[58] NERA estimates that Merrimack Station would experience an efficiency loss of 11,362 MWh and an annual parasitic loss of 13,312 MWh. *See* AR-1565 at 13-14. EPA could not replicate NERA's calculations, but the estimated efficiency loss in 2017 is about 55% lower than Enercon's calculation, which would reflect NERA's estimated combined capacity factor of 46% for both units. *Id*. However, NERA's estimated parasitic loss in 2017 is about 77% lower than Enercon's calculation (based on a loss of 6.8 MW per day). This value, which over the life of the technology represents a net present value of $14.7 million and $7.22 million utilizing discount rates of three and seven percent, respectively, would be an underestimate if NERA's estimated annual efficiency loss is too low. That is not likely to be a problem, however, because Merrimack Station is operating less frequently now than it was in 2007-2011 when NERA estimated the average monthly capacity factor. The average annual capacity factor reflective of the most recent operations (from 2012-2019) for both units combined is 22% (compared to NERA's 46%), which would suggest that NERA's estimates, which are based on the 10-year capacity factors from 2007 to 2016, are biased high as compared to the current operations. Still, NERA's analysis does account for the fact that Merrimack Station does not operate at full capacity year-round, which was the issue raised by EPA and CLF, and these numbers are uncertain and variable from year to year. Therefore, EPA it was reasonable to use NERA's 2017 cost estimates in its evaluation of costs for the final BTA determination.

Based on NERA's estimates, the total social cost of closed-cycle cooling (at $77 - $112 million dollars) is about ten times the cost of wedgewire screens (at about $8.7 to $10.7 million). EPA determined that the costs of both technologies provided by NERA may be biased high, in particular because the average capacity factors used for estimated lost generation and energy penalties do not reflect actual current operation of Merrimack Station as a peaking plant. At the same time, the majority of the cost estimates for both technologies are capital costs. In other words, even if the actual cost of the outages and energy penalties are somewhat lower, the overall

[58] NERA did provide a sensitivity analysis of the impact of the capacity factor on cost estimates for available technologies, but only assessed the significance of increasing the capacity factor to 50% and 100%. *See* AR-1565 at 30-31. NERA did not assess the significance of a lower capacity factor on the cost estimates.

cost of wedgewire screens would still be an order of magnitude less than the cost of closed-cycle cooling.

Benefits of Available Entrainment Technologies at Merrimack Station

In its 2012 comments, PSNH argues that a shortcoming of the analysis in the 2011 Draft Determinations Document is that EPA did not monetize expected benefits for each technology and, by failing to monetize benefits, EPA engaged in "nothing more than an affordability determination." *See* AR-846 at 89-93. In support of PSNH's comment, NERA's 2017 economic assessment presents monetized social benefits of closed-cycle cooling and wedgewire screens. NERA estimates the net present social benefit value of closed-cycle cooling at $66,000 and $33,000 utilizing discount rates of three and seven percent, respectively. NERA concludes that the cost-benefit ratio for closed-cycle cooling is 1,714 to 1 (at three percent discount rate) and 2,333 to 1 (at seven percent). NERA estimates the net present social benefit value of wedgewire screens at $56,000 and $29,000 utilizing discount rates of three and seven percent, respectively. NERA concludes that the cost-benefit ratio for wedgewire screens is 192 to 1 (at three percent discount rate) and 295 to 1 (at seven percent). NERA's monetized estimates are based on the value of "recreationally important" and "forage" species based on Normandeau's assessment of the biological benefits of reducing entrainment. *See* AR-1567. According to PSNH, "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." *Id*. at 91.

EPA strongly disagrees that a site-specific entrainment determination requires a monetized benefits analysis. The Final Rule defines "social benefits" as:

> the increase in social welfare that results from taking an action. Social benefits include private benefits and those benefits not taken into consideration by private decision makers in the actions they choose to take, including effects occurring in the future. Benefits valuation involves measuring the physical and biological effects on the environment from the actions taken. Benefits are generally treated one or more of three ways: A narrative containing a qualitative discussion of environmental effects, a quantified analysis expressed in physical or biological units, and a monetized benefits analysis in which dollar values are applied to quantified physical or biological units. The dollar values in a social benefits analysis are based on the principle of willingness-to-pay (WTP), which captures monetary benefits by measuring what individuals are willing to forgo in order to enjoy a particular benefit. Willingness-to-pay for nonuse values can be measured using benefits transfer or a stated preference survey.

40 CFR § 125.92(x). This definition highlights the benefits to society as a whole from the reductions in entrainment that would result from the installation of a particular entrainment technology, rather than costs and benefits that would accrue to limited parties. *See* 79 Fed. Reg. at 48,370. The Final Rule recognizes that it may not be possible to accurately and fully monetize costs and benefits and that assessing costs and benefits on a qualitative and/or quantitative basis is preferable to ignoring those costs and benefits that cannot be accurately monetized. *See id.* at

48,371. EPA's 2010 Guidelines for Preparing Economic Analyses also recognize that "all benefits and costs of a regulation would be expressed in monetary terms, but this is almost never possible because of data gaps, unquantifiable uncertainties, and other challenges. It is important not to exclude an important benefit or cost category from BCA [benefit-cost analysis] even if it cannot be placed in dollar terms." AR-1698 at 11-3. Consistent with these Guidelines, the Final Rule explains "[m]erely because it is difficult to put a price tag on those benefits does not mean that they are not valuable and should not be included at least qualitatively in any assessment." 79 Fed. Reg. at 48,351. The Responses to Comments for the Final Rule states "EPA disagrees that comparing only monetized costs to monetized benefits is an appropriate test that trumps all other Clean Water Act factors for evaluating regulatory options; this casts a shadow of doubt onto any 'benefits that justify the costs,' 'maximize net benefits,' or 'benefits that are commensurate with costs' comparisons that are strictly numeric." AR-1697 at 92.

In summary, the Final Rule plainly does not require monetizing social benefits nor does it direct EPA to use a specific cost-benefit test or cost-benefit ratio in considering the social costs and benefits when establishing site-specific entrainment controls. *See* 40 CFR § 122.21(r)(11) ("Each category of benefits must be described narratively, and when possible, benefits should be quantified in physical or biological units and monetized using appropriate economic valuation methods.") *See also* 79 Fed. Reg. 48,351. That the Final Rule clearly contemplates that where benefits cannot be monetized, the quantified and qualitative social benefits should be considered also indicates that a qualitative analysis of benefits may be considered "of sufficient rigor" for making a BTA determination. 40 CFR § 125.98(f)(2)(v). In place of a monetized cost-benefit analysis, the Final Rule requires a reasoned determination that the benefits justify the costs. This approach allows for a full assessment in permit decisions of both qualitative and quantitative benefits and costs and strikes an appropriate balance between environmental improvements and costs, allowing the permitting authority to consider all the relevant factors on a site-specific basis and determine BTA on the basis of those factors. *See id*. at 48,352. EPA maintains that consideration of the quantitative benefits (in terms of the number of organisms saved) and qualitative benefits (in terms of the impacts of reducing entrainment on the waterbody and aquatic life and habitat) is appropriate and consistent with the Final Rule, EPA's economic guidelines, and past permitting decisions.

NERA's monetized benefits analysis, supported by Normandeau's biological benefits analysis, validates the concerns EPA raised in the Final Rule that the full ecological benefits may not be captured if benefits are expressed only in monetized terms. *See* 79 Fed. Reg. at 48,328. NERA's calculation of the total social benefits for each entrainment technology at Merrimack Station includes only the value of the annual equivalent recruitment losses for "recreationally important" and "forage" species. As NERA and Normandeau point out, there is no commercial fishery in the Hooksett Pool, thus there are no social benefits associated with commercial fish for technologies at Merrimack Station. The benefit transfer analysis calculates the value of recreational losses in terms of willingness-to-pay for catching additional fish based on EPA's benefits analysis for the Final Rule. *See* AR-1741. A review of economic data on the value of water in New Hampshire indicates that the economic impact of recreational fishing in New Hampshire is approximately $215 million per year, and that recreational fishers spend about $208.5 million on trip and equipment related expenditures. *See* AR-1714 at 10-13. NERA did not monetize market direct use

benefits (due to the lack of a commercial fishery), market indirect use benefits (*e.g.*, increases in recreational tourism dollars), nonmarket indirect use benefits (*e.g.*, increase in value of recreational experiences), or non-use benefits (*e.g.*, the value an individual places on improved environmental quality without any past, present, or anticipated future use).

PSNH's benefits analysis, prepared by NERA, likely substantially underestimates the benefits of available entrainment technologies by including only the value from gains to the recreationally important fishery and ignoring other potentially important categories of benefits that cannot be as easily monetized or quantified. As an example, NERA concludes that non-use benefits are not likely to be significant and assigns this entire category of benefits no value. Non-use benefits accrue where individuals value improved environmental quality without any past, present, or anticipated future use of the resource in question. Individuals may gain value from knowing that a particular resource is protected (*i.e.*, existence value) or from knowing that the resource is available for future generations (*i.e.*, bequest value). Non-use benefits may also include population resilience and support, nutrient cycling, natural species assemblages, and ecosystem health and integrity. Nonuse values include improving the survival probability of a threatened or endangered species. Recent economic literature provides substantial support for the hypothesis that economic value of non-use benefits is greater than zero (*e.g.*, Turner et al. 2003, Zhao et al. 2013). See AR-1741 at 4-7 to 9. When a substantial fraction of the population holds even small per capita non-use values, these values can be very large in the aggregate. Both EPA's Guidelines for Preparing Economic Analyses (AR-1698) and the Office of Management and Budget's (OMB) Circular A-4 governing regulatory analysis (AR-1742) support the need to assess non-use values. Excluding non-use values from consideration is likely to understate substantially total social value.

NERA relies on a 2003 literature review, in which Freeman suggests that non-use values are likely to be significant when 1) the resource is unique; and 2) the loss would be irreversible or subject to a long recovery period. *See* AR-1565 at C-65. NERA argues that because the affected resources are not threatened and endangered species or federally-mandated species and can be characterized as "subpopulations of widely dispersed wildlife species," they are not sufficiently unique to generate substantial non-use values. *Id*. at C-X. However, Freeman's discussion of these criteria goes on to state that "at the present time there is no general method for determining whether a resource is sufficiently unique or a resource change is of sufficient duration to generate important nonuse values" Freeman, 2003. *See* AR-1697 at 364. In responding to comments on the Final Rule, EPA explains that "[t]here are no theoretical, necessary conditions for the existence of nonuse values. For example, resources do not have to be unique to be the source of nonuse willingness to pay (WTP). While factors such as uniqueness can affect the magnitude of willingness to pay, the significance of nonuse values depends on individual responses to given conditions." *Id*. at 392. In addition, EPA notes that during the development of the Stated Preference Survey for the Final Rule, "participants in focus groups and one-on-one cognitive interviews cited a variety of motivations for preventing fish losses, including the satisfaction of knowing that fish exist, the desire to bequeath healthy fish populations to future generations, and the desire to protect the functioning of aquatic ecosystems…EPA is aware of no research – empirical or otherwise – that demonstrates that individuals ascribe limited or no value to the aquatic resources affected by the 316(b) regulation." *Id*.

Available research demonstrates considerable public willingness to pay (i.e. non-use value) for similar types of resource improvements to those addressed by entrainment technologies at Merrimack Station. *See* AR-1697 at 366. *See also* AR-1743. Preliminary model results from the analysis of the stated preference survey data for the Final Rule found positive, significant implicit prices (WTP) for various attributes, including reductions in the number of fish saved and improvements in the conditions of aquatic ecosystems. As an example, the preliminary implicit prices for the Northeast survey region (which includes New Hampshire) are $1.12 per household per year for the fish saved attribute and $7.66 per household per year for the aquatic ecosystem conditions attribute. Over 40% of respondents indicated that protection of aquatic ecosystems was very important. *See* AR-1741. Johnston et al. (2011) also found positive WTP for various ecological improvements associated with migratory fish passage restoration in Rhode Island watersheds. Non-use values were rated as "important" or "very important" by 62 and 76 percent of survey respondents, which exceeded the ratings for commercial and recreational fish values. *See* AR-1809. Evidence from economic literature and analysis from the Final Rule indicates that NERA inappropriately rules out non-use values based on flawed criteria for "uniqueness." These studies suggest that household non-use WTP for improvements to aquatic resources similar to those at issue in the Final Permit could be quite substantial.

Finally, even the benefits that NERA did include in its monetized analysis may be underestimated. NERA estimated the value of forage fish as production foregone, that is, the indirect value of the fish estimated by converting to the pounds of commercial and recreational species that would have been gained if the forage fish were available for consumption. *See* AR-1567. While trophic transfer is one component of the value of forage fish, most of the species entrained at Merrimack Station are not consumed by recreational or commercial species. As a result, the value of forage fish is substantially underestimated by only monetizing value through trophic transfer methods, which ignores the non-use value of the remainder of forage fish. As forage fish make up the majority of fish entrained, the remainder of forage fish is a substantial portion of total entrainment for which no value is assigned. *See* AR-1697 at 366.

In the absence of monetizing or quantifying the nonmarket and non-use values, NERA offers no qualitative assessment of the benefits, contrary to the Final Rule, EPA guidance, and other permitting decisions. Instead, NERA concludes that the increase in fish population and catch from reducing entrainment is not likely to result in additional social benefits from any of these categories such that it would significantly impact the overall results of the analysis. *See* AR-1565 at 33-36. Comparing the approximate total costs of a technology based on a design and engineering study to only the subset of benefits that can be reasonably monetized, while ignoring a large proportion of the benefits and likely many that account for the bulk of the benefits of entrainment reductions is *not* an "apples to apples" comparison. EPA maintains that consideration of the benefits of entrainment technologies at Merrimack Station must include a qualitative discussion of environmental effects and a quantified analysis expressed in physical or biological units (in this case, number of organisms saved).

Comparison of costs and benefits of available technologies at Merrimack Station

According to PSNH, "in assessing costs as a mandatory BTA factor, EPA engaged in nothing more than an affordability determination and the agency repeatedly failed to adhere to its own standards, guidance, and prior precedent in rigorously assessing whether the benefits of CCC compared to relative costs constitutes BTA at Merrimack Station." PSNH's comments suggest that it believes the "standards, guidance, and prior precedent" for assessing costs and benefits under § 316(b) should be the "wholly disproportionate" or "significantly greater than" test. PSNH also concludes, based on NERA's analysis, that "EPA cannot reasonably classify wedgewire screens as BTA for entrainment at Merrimack Station" because wedgewire screens do not "satisfy EPA's cost-benefit standards." PSNH argues these cost-benefit ratios "grossly fail EPA's 'wholly disproportionate' and/or 'significantly greater' cost-benefit standards and far exceed the threshold ratios of approximately 8 to 1 and/or 10 to 1 the agency has advanced as the proper metric for rendering § 316(b) BTA determinations."

At the time of the 2011 Draft Permit, a cost-benefit analysis was not a "mandatory BTA factor" in making a determination under § 316(b) of the CWA. The 2011 Draft Determinations Document explained that while EPA was *authorized* to consider a comparison of the costs and benefits of technological options in determining the BTA under CWA § 316(b) based on best professional judgement, it was also clear that EPA's authority was discretionary. *See* AR-618 at 235 (citing *Entergy* at 1508). For the Final Permit, to be consistent with the 2014 CWA § 316(b) Final Rule, EPA is directed to consider both the social costs and social benefits of available technologies when establishing entrainment controls on a site-specific basis if the available information is of "sufficient rigor" to help support decision-making. *See* 40 CFR § 125.98(f)(2)(v). *See also* §§ 125.92(x) and (y) (defining "social benefits" and "social costs"). In other words, consideration of the relative costs and benefits of available technologies is now, as PSNH points out, a mandatory factor in determining the BTA for entrainment controls on a site-specific basis and EPA has considered this factor in determining the maximum reduction in entrainment warranted at Merrimack Station. At the same time, neither the Final Rule nor any of the supporting documentation require a specific cost-benefit standard such as "wholly disproportionate" or "significantly greater than" when considering the relative social costs and benefits of available entrainment technologies.

While PSNH concedes that "EPA enjoys some latitude on what constitutes a ratio of costs that are not 'significantly greater than' or 'wholly disproportionate' to the relative benefits of a given technology," it also argues that EPA's discretion in the assessment of costs and benefits is "not unfettered." In support of this argument, PSNH references the Brayton Point Station Response to Comments (NPDES Permit No. MA0003654), which in turn includes a discussion of a 1991 "guidance document" from EPA Region 4 (AR-671 at IV-52) that PSNH argues "plainly establishes a recommended ratio of around 10 to 1 as the threshold for determining whether costs are wholly disproportionate to benefits." In fact, EPA refuted this argument fully in the Brayton Point BTA determination. The Response to Comments explains:

> the sources cited by the permittee are not binding on the Agency's application of the wholly disproportionate cost-to-benefit test under CWA § 316(b)…EPA has discretion to reasonably determine when costs are wholly disproportionate to the benefits of complying with BTA-based permit limits in a particular case based on

> the facts of that case…A ratio of 10:1 might be appropriate in certain cases, but there is no legally binding requirement that EPA use such a ratio…The EPA document that the permittee refers to as a "guidance" document are only some notes prepared by an employee of EPA Region 4 in 1991.

Id. While these notes, titled "Some Specific Comments on CWA §316(b) Issues" suggest that a factor of 10 or more "may be a reasonable factor to be used," there was no intent to create a binding requirement for all cases. Moreover, a legally binding requirement cannot be created in a "guidance document" that has not undergone public notice and comment. There is simply no basis for PSNH's argument that the notes from a single EPA employee more than 25 years ago and prior to any of the subsequent national rulemakings implementing CWA §316(b) "plainly establishes" any threshold or ceiling of cost-benefit ratios.[59]

The quantifiable costs and relative benefits of EPA's final § 316(b) rule, which PSNH points out do not include the costs associated with technologies that may be necessary to address entrainment, have a ratio of 8.25 to 1 and/or 10.29 to 1, utilizing a 3 percent and 7 percent discount rate, respectively. PSNH argues that the cost benefit ratios that NERA calculated for entrainment technologies at Merrimack Station "grossly fail EPA's 'wholly disproportionate' and/or 'significantly greater' cost-benefit standards and far exceed the threshold ratios of approximately 8 to 1 and/or 10 to 1 the agency has advanced as the proper metric for rendering § 316(b) BTA determinations." However, the cost-benefit ratios for the Final Rule were not intended to establish a threshold or baseline for the site-specific BTA determination for entrainment requirements. In addition, EPA used neither the "wholly disproportionate" or "significantly greater than" standard for the Final Rule and yet concluded that it permissibly and appropriately considered costs and benefits.

EPA, in both the Fact Sheet and in this Response to Comments, has clearly characterized the entrainment (and impingement) at Merrimack Station's CWIS as an adverse environmental impact. The statute requires that the location, design, construction, and capacity of the facility's CWISs must reflect the BTA for minimizing adverse environmental impact. Merrimack Station's existing once-through cooling system is not currently equipped with any technology for reducing entrainment. EPA must establish site-specific entrainment controls that will result in the maximum reduction in entrainment warranted based on consideration of the relevant factors for this site and facility, including consideration of the social costs and benefits. 40 CFR § 125.98(f). Permitting authorities are to determine the BTA based on their consideration of the relevant factors and their judgment of how much of a reduction in entrainment is *warranted* in a particular case. The Final Rule also recognizes that the permitting authority "may reject an otherwise available technology as a BTA standard for entrainment if the social costs are not justified by the social benefits." *Id.,* § 125.98(f)(4). In addition, if all technologies have social costs not justified by social benefits, or have unacceptable adverse impacts that cannot be mitigated, then the Rule allows the permitting authority to determine that no additional controls are necessary. *Id.*

[59] In footnote 624, PSNH adds that a 10:1 ratio is consistent with the Department of Interior's determination and references other cost-benefit ratios that satisfy "analogous" standards. As the Response to Comments for Brayton Point Station (AR-671 at IV-52) explains, the DOI rulemaking and other cases present an entirely different set of circumstances and a different legal framework and are not binding upon EPA under CWA § 316(b).

EPA has explained in detail above that the consideration of costs and benefits should not be limited to only those costs and benefits that can be monetized but should also include the quantified and qualitative social benefits and costs. *Id*. § 125.98(f)(2)(v). NERA estimates that the total net present value social cost for closed-cycle cooling is $112.7 and $77.1 million (in $2017) utilizing discount rates of three and seven percent, respectively. *See* AR-1565 at 18. NERA estimates that the total social cost for wedgewire screens is $10.71 and $8.67 million utilizing discount rates of three and seven percent, respectively. *Id*. EPA has discussed above why the estimated costs of each technology may be biased high; however, EPA has determined that the cost estimates are reasonable to use in light of available information. EPA has also explained that it is likely that NERA's monetized estimates of the net present social benefits are substantially underestimated. Because the benefits valuation for each of the available technologies at Merrimack Station is incomplete and fails to capture what is likely to be the majority of the potential benefits (*e.g.*, non-market and non-use benefits), NERA's estimates for the cost-benefit ratios for closed-cycle cooling and wedgewire screens are insufficient.

Operation of Merrimack Station has declined in recent years such that the actual cooling water withdrawal is substantially less than the design flow at which EPA estimated entrainment impacts for the 2011 Draft Determinations Document. According to ISO New England, the resource mix of the region's installed generating capacity has shifted dramatically towards natural gas as a result of economic and environmental factors.[60] In 2019, coal made up about 0.5% of generation in New England.[61] The decline in coal-fired generation in New England, and at Merrimack Station, is not expected to reverse in the near future.[62] The change in the resource mix in recent years has caused Merrimack Station to transition to a peaking generator, meaning that it runs at very low capacity for much of the year except when demand for electricity is particularly high (typically during winter and summer). Given the long-term decline in coal-fired generation and resulting operation of Merrimack Station, EPA has evaluated the potential entrainment losses at both the design flow and actual intake flow (from 2007 to 2016 as estimated in the economic assessment and biological benefits analysis). *See* AR-1566; AR-1567. To be clear, however, even at actual intake flow (AIF) the CWISs clearly entrain a large number of early life stages and represent an adverse environmental impact.

If operating at design intake flow (*i.e.*, at the DIF), Normandeau estimates that Merrimack Station with its current open-cycle cooling system would entrain about 7.8 million fish eggs and larvae per year. *See* AR-1567 at 42. Based on the Facility's DIF, Normandeau estimates that using wedgewire screens would reduce entrainment to about 970,000 eggs and larvae per year, and that using closed-cycle cooling would reduce entrainment to about 389,000. *See id*. Thus, based on the DIF, wedgewire screens would prevent the entrainment of about 6.8 million eggs and larvae (an

[60] ISO New England, Resource Mix, "Mix of Supply Resources Has Changed Over Time" *available at* https://www.iso-ne.com/about/key-stats/resource-mix (accessed May 15, 2020). *See* AR-1744.
[61] *Id.*, "" available at https://www.iso-ne.com/about/key-stats/resource-mix (accessed Dec. 28, 2017) *See* AR-1744.
[62] *Id.* Of course, EPA cannot be certain how the energy markets will evolve. Only a relatively short time ago, the relative growth in natural gas-powered generation was not foreseen.

88% reduction) and closed-cycle cooling would prevent the entrainment of about 7.4 million eggs and larvae (a 95% reduction).

At the actual average monthly operating flows (*i.e.*, the AIF) from 2007 through 2016, Normandeau further estimates that Merrimack Station would entrain about 3.1 million fish eggs and larvae per year (with post-yolk sac larvae as the predominant life stage). *See id*. Comparing the entrainment estimates for the Facility at DIF to those based on the 10-year AIF (a 60% reduction as compared to DIF) provides a rough estimate that Merrimack Station's reduced operations would lessen entrainment of eggs and larvae by 4.7 million fish eggs and larvae per year. This is only a rough estimate, of course, because the AIF value is based on an average monthly AIF from 2007 through 2016 and the future month-to-month AIF could vary from that average value in months when entrainment is occurring.[63] In addition, based on a 10-year average AIF, Normandeau estimates that with wedgewire screens the Facility would entrain only about 416,000 eggs and larvae per year (an 87% reduction), and that with closed-cycle cooling it would entrain about 159,000 (a 95% reduction). In other words, based on AIF, Normandeau estimates that wedgewire screens would prevent the entrainment of another approximately 2.75 million eggs and larvae each year, and that closed-cycle cooling would prevent the entrainment of about 3 million eggs and larvae each year.

Comparing the three technologies (open-cycle cooling, wedgewire screens and closed-cycle cooling), the distinctions between them become clear. Open-cycle cooling has no mechanism or ability to prevent entrainment. Nevertheless, entrainment is likely substantially less now than it was at the time of the analysis for the 2011 Draft Permit because of the Facility's much reduced operations (according to Normandeau, the average, 10-year AIF from 2007 to 2016 during peak entrainment in May through July is 55% of DIF and, based on EPA's calculations, a capacity factor of 17% in May and June 2012 through 2018). That said, the Facility does tend to operate some during the summer months when densities of eggs and larvae are highest and with open-cycle cooling, entrainment would be maximized at those times. In addition, although the average AIF is lower under reduced operations, an open-cycle permit would not guarantee reduced operations in the future. Alternatively, entrainment would be greatly reduced by both wedgewire screens (approximately an 89% reduction) and closed-cycle cooling (approximately a 95% reduction). Stated differently, and using the estimates discussed above, closed-cycle cooling would reduce entrainment by about 257,000 (at AIF) to 581,000 (at DIF) more eggs and larvae than would fine-mesh wedgewire screens. Thus, both closed-cycle cooling and fine-mesh wedgewire screens would significantly reduce entrainment, though closed-cycle cooling would achieve a greater reduction. The difference in cost between the two technologies to save an additional 257,000-581,000 fish eggs and larvae, however, ranges from $68 to $102 million.

[63] EPA expects that this estimate of entrainment reduction just from reduced intake flow may be on the low side since the AIF values were based on years beginning in 2007, which was before Merrimack Station had shifted to operating as a peaking plant. Of course, the key question is what the expected intake flow reduction would be during the specific months when entrainment is actually a concern (*i.e.*, April – August). Recent experience suggests that the Facility would not be expected to operate at high capacity in April or May but might operate at times in the warmer months of June through August. However, the Final Permit's thermal discharge limits will cap summer operations (May 1 through September 30) to meet the standards of CWA § 316(a). *See*, *e.g.*, Response to Comment II.1.1.

Weighing the social costs and benefits of the available technologies, EPA has determined that the benefits associated with preventing the entrainment of about 2.75 million (at AIF) to 6.8 million (at DIF) eggs and larvae warrant the cost of wedgewire screens. EPA finds on the facts of this specific case that retaining open-cycle cooling with no entrainment reduction technology would not satisfy the CWA § 316(b)'s BTA standard and the requirements of the 2014 Final Rule.[64] The significantly higher cost of closed-cycle cooling, which is estimated to cost 6 to 10 times more, is not warranted by the relatively small incremental benefits of wedgewire screens.

5.3 CCC Is Not the BTA for Merrimack Station According to Consideration of Other Mandatory Factors Set Out in the Final § 316(b) Rule

Comment III.5.3	**AR-1548, PSNH, pp. 162-163**
See also AR-846, PSNH, pp. 98-101, AR-864, Enercon, pp. 16-33	

The final § 316(b) rule requires or authorizes permit writers to consider an array of nonwater quality environmental effects in making an informed BTA determination for a facility, including but not limited to effects on energy reliability, limited land availability, remaining useful plant life, and increased water consumption. EPA mentioned some of these effects in the § 316(a) BAT determination-portion of its 2011 Fact Sheet for the Draft Permit and PSNH made the assumption in its 2012 comments that EPA intended for the same analysis and conclusions to apply to its § 316(b) BTA determination despite the fact that these criterion were not discussed separately or incorporated by reference in the § 316(b) section of the 2011 Fact Sheet.[657] PSNH concluded in its 2012 comments to the Draft Permit that EPA incorrectly surmised 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."[658] PSNH identified this conclusion as "clearly arbitrary and capricious and not supported by the uncontroverted facts and studies available to EPA" and provided a reasoned analysis of the pertinent non-water quality environmental effects that prohibit or substantially complicate the installation of CCC at Merrimack Station.[659] Those comments remain valid today. Set out below is a discussion of these secondary environmental effects, updated to reflect issues that have arisen in the intervening 5+ years that could further complicate the installation of CCC at the facility.

[657] Notably, the following secondary environmental effects delineated in the final § 316(b) rule were not mentioned or adequately considered in EPA's 2011 Fact Sheet and are also lacking from the agency's Statement: "land availability inasmuch as it relates to the feasibility of entrainment technology;" "[r]emaining useful plant life;" and "[q]uantified and qualitative social benefits . . . of available entrainment technologies . . . ." 40 C.F.R. § 125.98(f)(2)(iii)-(v).
[658] *See* AR-846 at 99 (citing AR-618 at 156).
[659] *See id.*

EPA Response:

[64] EPA recognizes that under the 2014 Final Rule, no entrainment reduction technology need be prescribed as the BTA if the permitting authority concludes that the benefits of none of the technologies warrant their costs. 40 C.F.R. § 125.98(f)(4). Under the facts of this case, however, EPA has concluded that the benefits of the Facility using fine-mesh wedgewire screens warrant the cost of the technology.

The Final Rule requires that the permitting authority establish site-specific entrainment controls that "reflect the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology available for minimizing adverse environmental impact at each facility." 40 CFR § 125.98(f). When establishing site-specific entrainment requirements under the Final Rule, EPA must consider the number and type of organisms entrained, air emissions, land availability, remaining useful plant life, and social costs and benefits, though the Rule provides the permitting authority with the discretion to assign differing weight to each factor. *See* 40 CFR § 125.98(f)(2). The permitting authority may also consider additional factors, including entrainment impacts on the water body, thermal impacts, reliability, and water consumption. *See* 40 CFR § 125.98(f)(3). While in the case of a permit proceeding such as this one begun prior to October 14, 2014, EPA's "BTA determination may be based on some or all of the factors in paragraphs (f)(2) and (3)," 40 CFR § 125.98(g), in this case, EPA considers all of the relevant factors for each of the available entrainment technologies in making its BTA determination for Merrimack Station. In addition, EPA again notes that, under the Final Rule, the weight given to each factor is within EPA's discretion based on the site-specific circumstances for each facility. 40 CFR § 125.98(f)(2).

In the comment, and the several that immediately follow, PSNH criticizes EPA's analysis of certain factors relevant to determining the BTA for entrainment at Merrimack Station. The comment also asserts that EPA did "not mention[] or adequately consider[]" several of the mandatory factors. In this response and the Responses to Comments III.5.3.1 through 5.3.5 below, EPA responds to these criticisms and discusses EPA's consideration of the relevant factors at 40 CFR § 125.98(f) as they apply to wedgewire screens and closed-cycle cooling, for the purpose of reconsidering whether closed-cycle cooling, fine-mesh wedgewire screens, or neither (i.e., maintain the existing technology with no entrainment controls), are the BTA for Merrimack Station.[65] This analysis incorporates information and analysis from other Responses to Comments by reference, where noted, and compares the technologies to determine which produces the "maximum reduction in entrainment warranted."

Based on information available at the time of the 2011 Draft Permit, EPA concluded that wedgewire screens were not technically feasible at Merrimack Station due to the physical constraints of the river (for the proposed design) and uncertainty over the potential biological effectiveness of the technology. Since 2011, however, PSNH submitted comments and supporting information, including a new design and plan for seasonal use that overcomes the feasibility

[65] EPA also considered PSNH's proposal to shift the annual Unit 2 maintenance outage to coincide with the typical peak entrainment period in mid-May to mid-June. EPA initially rejected rescheduling the outage by itself as the BTA for entrainment because it does not cover large periods when fish eggs and larvae are present and would not address entrainment losses from Unit 1 at all. *See* AR-618 at 297. EPA reconsidered rescheduling the maintenance outage in combination with wedgewire screens and again rejected this technology as the BTA for entrainment after considering the relative costs and benefits, including that the timing of the outage is subject to change, the timing of the peak entrainment period is subject to change, and the duration of the outage (and thus entrainment reductions) will be somewhat less than the projected average (33 days) in most years. At the same time, EPA recognizes that the timing of the outage, which must be scheduled anyway, could provide some benefit for entrainment and the Final Permit includes a condition, as a best management practice, to schedule this outage from mid-May to mid-June to the extent practicable.

issues and a new assessment of the potential effectiveness of the technology overall, and specifically at Merrimack Station (AR-1550). Based on this information, EPA concludes that wedgewire screens are an available technology to minimize entrainment at Merrimack Station. *See* Responses to Comments III.4(i), 4.1, 4.2. EPA notes that neither PSNH (the former operator) nor GSP (the current Permittee) have indicated to EPA that Merrimack Station has any plans to cease operations. As such, EPA anticipates that Merrimack Station will continue to operate, meaning remaining useful plant life does not affect the availability of any entrainment technologies.

Other than retaining open-cycle cooling, each of the available technologies results in environmental benefits for the Merrimack River associated with reduced entrainment. EPA considered the number of organisms entrained in the 2011 Draft Determinations Document (at 244-55, 314-15) and again in this Response to Comments and determined that levels of entrainment are not *de minimis* and Merrimack Station's open-cycle cooling system has no existing controls to reduce entrainment. *See* Response to Comment III.3.6. Compared to the current baseline (based on the traveling screens), closed-cycle cooling is expected to reduce entrainment by about 95% by reducing the intake flow. *See* AR-618 at 322. Based on entrainment data collected during the 2017 pilot study, PSNH estimates that seasonal use of wedgewire screens will reduce entrainment by 89%. AR-1550. Based on the same 2017 dataset, EPA estimated that rescheduling the Unit 2 maintenance outage to occur from mid-May to mid-June (to coincide with periods of higher entrainment densities) would by itself reduce total entrainment at the facility by about 34%.[66] If Merrimack Station installs wedgewire screens and reschedules the Unit 2 maintenance outage, EPA estimates that the combination of technologies would reduce entrainment by about 93%. *See* Response to Comment III.4(i). Closed-cycle cooling remains the most effective technology for minimizing entrainment, but wedgewire screens are expected to very substantially reduce entrainment as compared to existing conditions. Thus, the entrainment impacts on the waterbody of both technologies are expected to be similar. Compared to the other two technologies, rescheduling the Unit 2 maintenance outage, by itself, is not as effective at reducing entrainment, but when combined with seasonal use of wedgewire screens can approach entrainment reductions achieved by closed-cycle cooling.[67] The

[66] In 2007, Enercon estimated that rescheduling the Unit 2 maintenance outage could reduce entrainment by about 27% (AR-6 at 93, 95) based on entrainment data collected in 2006-2007. EPA's estimates are based on entrainment data collected during the 2017 wedgewire screen pilot study.

[67] EPA recognizes that the reduction in entrainment achieved with wedgewire screens (estimated by Normandeau to be about 89%) includes a level of uncertainty that the flow reductions achieved with closed-cycle cooling do not. In particular, some portion of larvae that are not entrained may still encounter the screens and suffer mortality. However, empirical studies of wedgewire screens suggest that hydraulic bypass and, for larger organisms (e.g., greater than 10 mm), larval avoidance may be a major factor in the effectiveness of wedgewire screens. At Merrimack Station, the relatively low design velocity of the screens (0.4 fps), airburst cleaning system, and likelihood that there is sufficient sweeping flow during the primary entrainment period (May through July) indicates that an effective ratio of ambient to through screen velocity (and therefore, hydraulic bypass) will maintained. In addition, entrainment studies in 2006, 2007, and 2017 indicate that many commonly entrained species (e.g., white sucker) are larger and better able to avoid the relatively low velocity of the screens. Finally, the Final Permit's requirement to schedule the Unit 2 outage from mid-May to mid-June and limitations on capacity factor to meet temperature limits from May 1 through September 30, coupled with the relatively low capacity of the Facility in May and June since transitioning to operations more similar to that of a peaking plant together will limit the number of days that the

EPA considered land availability inasmuch as it relates to the feasibility of entrainment technologies. Unit 2 is required to undergo an annual maintenance outage regardless of whether the timing is planned to maximize the entrainment benefits. For this reason, there is no land availability issue associated with rescheduling the maintenance outage. The limited number of screens required with the new, half-screen design ensures that there is adequate available space to install the screens in the Merrimack River. *See* Response to Comment III.4.2. Enercon agrees that there are no land availability issues associated with the operation of wedgewire screens at Merrimack Station. *See* AR-1549 at 12-16; *see also* Comment III.5.2.1 n.635. PSNH, in its comments in 2012 and again in 2017 suggests that there may be issues of land availability associated with closed-cycle cooling due, in particular, to the installation of new equipment in the period between Enercon's 2007 Engineering Report and the 2011 Draft Permit. *See* Comment III.5.3.1. EPA did not conclude that land availability would eliminate closed-cycle cooling as a viable technology at Merrimack Station and has addressed these comments in more detail in Response to Comment III.5.3, below.

EPA considered the potential impact of changes in particulate emissions or other pollutants associated with each technology. As explained in Response to Comment III.5, Unit 2 is required to undergo an annual maintenance outage regardless of whether the timing is planned to maximize the entrainment benefits. Air emissions would be reduced during this outage because Unit 2 would be out of service. However, because the unit is already shutdown annually, the timing of the outage will have no impact on air emissions or icing/fogging concerns. Similarly, there are no air emissions issues anticipated from the operation of wedgewire screens. *See* AR-1549 at 12-16; *see also* Comment III.5.4 n.635. Parasitic losses associated with wedgewire screens are due only to the periodic operation of the airburst system and as a result, are low (172 MWh per year), which is not expected to result in a measurable increase in air emissions. PSNH, in its comments in 2012 and again in 2017 indicate that there may be impacts from increased air emissions and icing/fogging associated with closed-cycle cooling. *See* Comment III.5.3.4. EPA did not conclude that air emissions or icing/fogging would eliminate closed-cycle cooling as a viable technology at Merrimack Station and EPA has addressed these comments in more detail in Response to Comment III.5.3.4, below.

EPA considered the quantified and qualitative social benefits and costs of available entrainment technologies. *See* Response to Comment III.5.2. Both closed-cycle cooling and wedgewire screen technologies result in a significant reduction in entrainment, though closed-cycle cooling results in the greater reduction. However, the difference in cost between the two technologies to save an additional 257,000-581,000 fish eggs and larvae ranges from $68 to $102 million. Weighing the social costs and benefits of the available technologies, EPA has determined that the benefits associated with preventing the entrainment of about 2.75 million (at AIF) to 6.8 million (at DIF) eggs and larvae warrant the cost of wedgewire screens. EPA concluded that the significantly

Facility is operating, and thus the cooling water withdrawals, during the peak entrainment period. *See* Response to Comment III.4.2. *See also* Response to Comment II.1.1. For these reasons, EPA concludes that the uncertainty is not so great as to preclude a reasoned decision that wedgewire screen technology is the BTA for minimizing entrainment at Merrimack Station in light of the factors at 40 C.F.R. § 125.98(f)(2) and (3), including the relative social benefits and costs of the available entrainment technologies.

higher cost of closed-cycle cooling, which is estimated to cost 6 to 10 times more that wedgewire screens, is not warranted by the incremental benefits as compared to wedgewire screens.

EPA also considered additional factors for each of the available technologies, including thermal discharge impacts, credit for reductions in flow associated with unit retirements, impacts on the reliability of energy delivery, impacts on water consumption, and availability of alternative sources of cooling water (e.g., gray water). *See* 40 CFR § 125.98(f)(3). Merrimack Station has not retired any units in the past 10 years, nor has the Permittee indicated any plans for retirement of either unit in the future; therefore, there is no reduction in flow associated with unit retirement. Similarly, past engineering assessments have not identified an alternative source of water, such as process water, gray water, wastewater, or reclaimed water, that could provide the quantity and quality of cooling water needed at Merrimack Station. *See* AR-1231 Attachment 1 at 16-20. In addition, all the available technologies, independently or in combination, will result in an overall reduction in entrainment as compared to the existing technology.

Rescheduling the Unit 2 outage would not affect water consumption, thermal impacts, or energy reliability. There is no consumptive use of water at Unit 2 during the outage and shifting the timing will not affect this factor. The outage eliminates the thermal discharge associated with Unit 2 for the duration; however, the outage must occur each year and the only change would be to shift slightly its timing to coincide better with the peak entrainment period, thus shifting any potential benefit of reducing the thermal discharge into mid-May and mid-June. EPA has addressed the thermal impacts from the cooling water discharge in Chapter II of this Response to Comments. (Obviously, EPA understands that closed-cycle cooling, unlike wedgewire screens, would reduce thermal discharges, but as discussed in the responses to comments in Chapter II, EPA has developed thermal discharge limits for the Final Permit that will satisfy CWA § 316(a) without mandating closed-cycle cooling.) In addition, the maintenance outage would not impact energy reliability because, as explained, the electricity generating system already accommodates an annual outage. Merrimack Station has operated relatively little during the months of May and June over the past eight years and shifting the outage is not likely to have a measurable impact on the overall regional electric system, since it already operates most years without any power from Merrimack Station. PSNH did not comment that shifting the outage would impact energy reliability. In addition, the requirement to shift the outage to begin in mid-May would be subject to approval from ISO-NE, which would ensure that rescheduling the outage will not impact energy reliability.

Similarly, seasonal operation of wedgewire screens is not associated with any impacts on water consumption, thermal impacts, or energy reliability. Enercon concluded that the non-water quality and other environmental impacts from wedgewire screens are miniscule. *See* AR-1549 at 12-16; *see also* Comment III.5.2.1 n.635. Unlike closed-cycle cooling, which introduces an entirely new system of cooling the condensers that relies on evaporative cooling, wedgewire screens are an alternative method of withdrawing cooling water from the waterbody in an open-cycle cooling system and, as such, do not result in a consumptive use of water or alter the thermal discharge in

any way.[68] *See* AR-6 at 19. Enercon estimates that operation of the airburst system will result in a parasitic load of only about 172 MWh per year, which is miniscule compared to the output from Merrimack Station (rated at more than 10,000 MWh per day) and will not impact energy reliability. Enercon also estimates that installation of the screens will require a construction outage (in addition to the annual maintenance outage), but expects that the outage can occur during periods when Merrimack Station is not likely to be generating (e.g., in spring or fall) and, therefore, will not be associated with impacts on energy reliability. The energy penalty and construction outage are also considered components of the social cost of wedgewire screens. *See* Response to Comment III.5.2. Finally, EPA addresses the potential impacts of water consumption and energy reliability in Response to Comments III.5.3.2 and 5.3.3, below.

Based on consideration of the factors at 40 CFR § 125.98(f)(2) and (3), EPA concludes that seasonal operation of wedgewire screens is the BTA for entrainment at Merrimack Station. In the detailed comments below, PSNH suggests that closed-cycle cooling may not be available at Merrimack Station based on consideration of land availability, energy reliability, water consumption, particulate emissions, and fogging/icing. EPA evaluates these comments in more detail below and concludes that, based on the available information, they do not eliminate closed-cycle cooling from consideration. However, EPA considered the numbers of organisms entrained, the social costs, and the quantified and qualitative social benefits of each of the technologies and determined based on the facts of this permit, that the cost of seasonal operation of wedgewire screens are justified by the entrainment benefits, whereas the costs of closed-cycle cooling are not justified by the benefits. See Responses to Comments III.5.2.1, 5.2.2, and 5.2.3 for a more detailed discussion of EPA's consideration of costs and benefits.

Because the Draft Permit proposed closed-cycle cooling as the BAT for reducing Merrimack Station's thermal discharges and as the BTA for minimizing entrainment, the Draft Permit did not include Outfalls 001 and 002, which are the once-through cooling system discharges at the facility. AR-608 at 12. Similarly, the Draft Permit included Outfall 003D for the discharge of blowdown from a new cooling tower array that would have been used to facilitate closed-cycle cooling. *Id.* at 17. Because the EPA has decided to grant a CWA § 316(a) variance from technology-based BAT thermal limits (and water quality standards-based requirements), *see* Responses to Comments II.1.1 and II.3.4 (and associated sub-comments), and concludes that seasonal operation of wedgewire screen technology, not closed-cycle cooling, is the BTA for entrainment at Merrimack Station, the Final Permit has been changed from the Draft Permit to once again include Outfalls 001 and 002 and to remove Outfall 003D. Similarly, the description of the discharge from Outfall 003 has been adjusted to include in the Final Permit the discharges from Outfalls 001 and 002 (once-through cooling water) and to remove the discharge from Outfall 003D (cooling tower blowdown). Consequently, the Final Permit also includes limitations and monitoring requirements for effluent flow and total residual oxidants ("TRO") for the once-

[68] In addition, the 2011 Draft Permit proposed use of closed-cycle cooling was required to meet technology-based temperature limits. For the Final Permit, EPA reviewed additional information, including the substantially reduced operations, and established numeric thermal limits based on a CWA § 316(a) variance from technology and water quality-based limits. *See*, *e.g.*, Response to Comment II.1.1, II Section 3, and II Section 4. The Final Permit's § 316(a)-variance based temperature limits will control the potential impacts from the thermal discharge associated with open-cycle operations, including use of the wedgewire screens.

through cooling water at Outfalls 001 and 002. The effluent flow limits are equal to the flow limits from the 1992 Permit for each unit consistent with antibacksliding regulations at 40 CFR § 122.44(*l*). The TRO limits and conditions are set at the applicable requirements for once-through cooling water established in the effluent limitation guidelines for the Steam Electric Power Generating Point Source category at 40 CFR § 423.13(b). The effluent flow and TRO limits at Outfalls 001 and 002 are unchanged from the 1992 NPDES Permit. As in the 1992 Permit, although 40 CFR § 423.13(b) specifies limits for total residual chlorine (TRC), TRO sampling both ensures that this limit is met and allows the Permittee to use not only chlorine but also bromine as a biocide. *See also* Response to Comment VI.1.1. Furthermore, pursuant to 40 CFR § 423.13, the TRO limit for Outfalls 001 and 002 is a "maximum concentration" or instantaneous maximum limit not to be exceeded at any time. The Final Permit, therefore, includes footnote 9, which makes clear that this TRO limit is instantaneous and is not a maximum daily limit. *See also* Clarification of "Instantaneous Maximum" as Applied to Steam Electric Facilities Effluent Limitations, EPA-OW-OWM-359 (July 27, 1992), *available at* https://www3.epa.gov/npdes/pubs/owm0320.pdf.

5.3.1 Limited Land Availability at the Plant Makes Installation of CCC Complex if not Impossible

Comment III.5.3.1	**AR-1548, PSNH, pp. 163-164**
See also AR-846, PSNH, pp. 99-100; AR-864, Enercon, p. 42; AR-851 p. 5; AR-841, UWAG, p. 60; AR-1549, Enercon, p. 81	

Other than reference the general discussion for a proposed CCC location at Merrimack Station PSNH provided to the agency in response to a 2007 § 308 information request, EPA said nothing in its 2011 Fact Sheet to the Draft Permit to address this non-water quality issue.[660] EPA has failed again in its Statement to discuss this non-water quality issue even though the new final § 316(b) rule requires the agency to consider this issue "as it relates to the feasibility of entrainment technology."[661]

EPA's evaluation of land availability to accommodate CCC is wholly inadequate and is compounded by the fact that PSNH's previous submittal is now obsolete due to the installation of an 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. A 2012 report from Enercon updated the information contained in PSNH's 2007 § 308 Response and raised a number of potential logistical issues that may inhibit CCC installation due to the FGD system, such as the need for a 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.[662] In actuality, additional studies must be conducted before EPA can definitively state that CCC can actually be installed at Merrimack Station.

Accordingly, it is unclear at the present time whether Merrimack Station has the necessary space to physically install CCC at the plant and EPA's failure to adequately address

this regulatory factor is and remains arbitrary and capricious.

660 AR-618 at 140-141 (citing AR-6 at 34-35).
661 40 C.F.R. § 125.98(f)(2)(iii).
662 AR-864 at 42. If forced to install CCC at Merrimack Station, PSNH would ultimately have to consider running the necessary piping along the shoreline and 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.

EPA Response:

PSNH comments that it is "unclear" whether there is sufficient land available at Merrimack Station to support closed-cycle cooling and that EPA has not adequately considered this regulatory factor. In the § 308 request for information referenced in the comment, EPA asked PSNH to evaluate major modifications that would need to be undertaken to retrofit closed-cycle cooling. *See* AR-237 at 3. In its 2007 Engineering Report, Enercon determined that there were no constraints on space that would limit Merrimack Station's ability to install wet cooling towers and associated infrastructure based on the evaluation and proposed design.[69] *See* AR-06 at 36, 38-39. The 2011 Draft Determinations Document did consider the issue of land availability in that EPA requested and was provided with information about the siting of cooling towers at Merrimack Station. EPA also notes that the Draft Permit was issued prior to the Final Rule, meaning that, at the time of issuance, there was no regulatory requirement for EPA to specifically consider land availability in establishing the BTA for entrainment. Land availability is one of the factors that must now be considered when establishing site-specific requirements for entrainment under the Final Rule. 40 CFR § 125.98(f)(2)(iii). For this reason, and based on the comments, EPA is revisiting its consideration of land availability for closed-cycle cooling.

In the TDD for the Final Rule (AR-1718 at 12-6 to 12-7), EPA discusses space constraints as they apply to availability of technologies for impingement and entrainment. On a national scale, EPA estimated that as many as 25 percent of facilities might have one or more constraints on land availability that would limit retrofit of cooling towers, particularly those located in urban locations or those located on relatively small acreage. *See also* Final Rule Response to Comment at 190-91. Similarly, EPRI (Technical Report 1023452) reported that at least 6% of sites (7 out of the 125 evaluated) were deemed "infeasible" for closed-cycle cooling on the basis that no space was available to locate a cooling tower. EPA notes that in both evaluations, the factor in determining that closed-cycle cooling was infeasible due to space constraints was lack of space to site a cooling tower and was not related to the logistical challenges associated with the piping and infrastructure. Merrimack Station is located on a large, industrial use parcel in Bow, New Hampshire. The area is largely forest and the nearest residential neighborhood is on the other side of the Merrimack River. As Enercon indicated in its initial analysis, there does not appear to be any obvious constraints on land availability for cooling towers as it was considered under the

[69] By comparison, PSNH concluded that dry cooling towers were infeasible at Merrimack Station, based in part on available space at the site, AR-06 at32-33, which EPA considered in its determination that dry cooling is not the BTA for Merrimack Station, Fact Sheet, Att. D at 304.

Final Rule. The additional complexities raised in the comment does, however, have the potential to increase the cost of closed-cycle cooling.

PSNH and Enercon, both in comments on the 2017 Statement as well as on the 2011 Draft Permit, point to challenges in siting closed-cycle cooling given the installation of the FGD system, which occurred between issuance of the Draft and Final Permits. According to PSNH, the FGD scrubber system has taken up previously available land and created "accessibility" issues for interfacing additional technologies that may impact both the cost and space available for installation of CCC. PSNH commented in 2011 that it was "unclear" whether Merrimack Station has the necessary space to physically install cooling towers. AR-846 at 99. Enercon raises logistical concerns that space previously assumed to be available for new piping additions may no longer be available. AR-1549 at 81. The 2007 Engineering Report (AR-06 at 38-39 and Attachment 2) indicated that cooling towers would be located south of the Station on the island created by the discharge canal, which provides adequate space, is relatively close to the Station to minimize piping work and requires minimal earthwork. Enercon also evaluated necessary electrical power supply modifications and noted that the new booster pumphouse would be located where the circulating water piping discharges to the cooling canal with associated piping running from the pumphouse to the towers, and new piping (supplying cooled water to the power plant using the existing circulating water pumps) running along the shoreline of the Merrimack River from the towers to the existing screen houses. At this time, Enercon noted "available space would be adequate for a linear hybrid tower" AR-06 at 36. PSNH has not provided any information to indicate that there is any constraint at Merrimack Station for locating the cooling towers themselves, which then leaves the question of constraints on associated infrastructure and piping. Enercon states "the circulating water return (cold-water) piping from the cooling tower basin would also cross the canal along the roadway built-up area, and the run northeast to supply the existing circulating water pump intakes at the Intake Pumping Station." *Id*.

While PSNH and Enercon both claim that site constraints exist as a result of the installation of the FGD system, neither has identified a specific conflict between the preliminary cooling tower designs and the existing FGD system to support a conclusion that closed-cycle cooling is unavailable due to land availability. Site plans and flow diagrams for the FGD system do not suggest any interference from the new booster pumping station, cooling towers, or substation, all of which are located on the island, along the road to the existing discharge, and along the river shoreline to the existing intake. *See* AR-463.

In 2011, PSNH commented that additional studies are necessary to definitively conclude if closed-cycle cooling can be installed at Merrimack Station. AR-846 at 100. If EPA determined that closed-cycle cooling is the BTA for entrainment in the Final Permit, additional studies and planning would be necessary to finalize the design and location of the towers. In particular, the presence of the FGD system may require adjustments to the installation and routing of piping for the cooling towers as several components of the FGD system are situated above and next to the screen house where the 2007 design had planned for the cold water return pipes for the closed-cycle system. *See* AR-1804. TetraTech reviewed satellite imagery, site photos, and plans of the FGD system to assess whether its presence may require modifications to, or affect the cost of, the conceptual plan for a closed-cycle cooling system at Merrimack Station. Both the FGD flue gas

conduits and the limestone conveyer are located where the cold water return pipes for Units 1 and 2 were planned, but in both cases there appears to be sufficient clearance to allow installation of the piping. Installation may be more complicated due to congestion in the area but it does not suggest that closed-cycle cooling is unavailable. The complexity of the piping will likely increase the cost of the technology. *See id*. As EPA has already determined that the costs of closed-cycle cooling are not warranted as compared to the costs of wedgewire screens, any additional costs resulting from changes to the routing of piping would further support the determination that wedgewire screens are the BTA for entrainment at Merrimack Station.

Consistent with the 2014 Final Rule and in response to comments on the Draft Permit and the 2017 Statement, EPA reconsidered the feasibility of closed-cycle cooling as it relates to land availability at Merrimack Station. EPA concludes that there are no apparent land availability constraints to the installation of the towers or associated structures at the site. The construction of the FGD system may increase the complexity of installing the associated piping, but nothing in the review of available information suggests that the issues are insurmountable. Nor has PSNH (nor Enercon nor UWAG) identified any specific issues that would render the technology infeasible due to land availability. At the same time, the issues PSNH has raised, particularly the complexity of the piping with existing FGD infrastructure, would likely increase the cost of closed-cycle cooling, which EPA has already determined are not justified by the benefits of the technology in comparison to the costs and benefits of wedgewire screens.

5.3.2 EPA Incorrectly Dismisses as Insignificant the Expected Lost Generation that Will Occur if CCC is Installed at Merrimack Station

Comment III.5.3.2	**AR-1548, PSNH, pp. 164-165**
See also AR-846, PSNH, pp. 98, 188-199; AR-864, Enercon, pp. 28-30	

EPA noted in its 2011 Fact Sheet that PSNH estimated an approximately 10 megawatt ("MW") reduction in the average, annual electricity output at Merrimack Station if forced to install CCC.[663] 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 is not lost, per se; instead, it would be needed to power the total booster pumps and tower fans necessary to run CCC at the plant.[664] Despite acknowledging this anticipated reality, EPA ignored the resulting consequence of these expected parasitic power generation losses eliminating enough electricity from the grid to power over 7,900 households.[665] Enercon put these numbers into proper perspective:

> 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.[666]

The retirement of electric generating facilities in recent years only further exacerbates this issue, as removal of this substantial amount of electricity from the grid could dramatically impact the reliability of energy delivery.

In its 2017 report, Enercon suggests EPA initiate a rigorous analysis of how CCC would impact the generating capacity of Merrimack Station.[667] Were EPA to continue to erroneously advance CCC as the proper technology the facility, the agency must first initiate some form of modeling to consider not only the power consumption impacts to Merrimack Station but also the macro effects of setting such a standard within the industry prior to identifying the technology as BTA. The agency's failure to do so in its 2011 Draft Permit and again in its Statement is arbitrary and capricious.

663 AR-618 at 156-57 (citing to AR-6).
664 *See* AR-06 at 45; AR-864 at 28.
665 *See* AR-864 at 28-29.
666 *Id.* at 29 (internal citations omitted).
667 Enercon 2017 Comments at 17.

EPA Response:

The comment requests that EPA assess how retrofitting with closed-cycle cooling will impact the generating capacity of Merrimack Station, including modeling to consider power consumption impacts. The comment does not explain why Enercon's estimate of parasitic losses (annual average loss of 10 MW with up to 22 MW lost during summer peak) would be significant other than the statement that it would power 7,900 homes. EPA did consider the potential impact of lost generation of the reliability of the regional electric system and concluded that there are no issues that would make the technology unavailable. *See* AR-618 at 163-164. EPA and Enercon recognize that 7,900 homes would not be impacted by the retrofit to closed-cycle cooling, rather, the generation would be made up by additional generation by Merrimack Station or by other facilities in the region. In addition, PSNH requests the EPA "initiate some form of modeling" to consider the power consumption impacts from converting to closed-cycle cooling. Enercon provided an estimate of the lost generation at Merrimack Station and while a model might, as Enercon points out, provide a "more rigorous" estimate of the impact (AR-864 at 30), it is unlikely that a more precise estimate would be sufficiently different to warrant the cost of modeling given the relatively small annual loss (10 MW). In addition, if modeling were initiated, the necessary data and site-specific operating information would be more readily accessible to PSNH, not EPA. If PSNH felt that lost generation from converting to closed-cycle cooling was significant enough as to disqualify closed-cycle cooling as an available technology at Merrimack Station, it has had ample time to provide such an analysis.

PSNH's comments in 2011 and 2017, including the excerpt from Enercon's comments above, also focus on the impacts to the reliability of the electrical grid that would result from selecting closed-cycle cooling as the "standard within the industry." The 2014 Final Rule did not select closed-cycle cooling as "the standard for all power plants in the United States." (Nor, obviously, did the Draft Permit, which was applicable to a single facility). Enercon's analysis of the national impacts may be accurate but is unrealistic because it "[a]ssum[es] all open-cycle power plants in the United States [a]re required to be converted to closed-cycle cooling," which is not the case. In the 316(b) Final Rule, EPA determined that a "one-size-fits-all" approach is not feasible and adopted "an overarching regulatory framework under which the Director will establish BTA entrainment requirements on a site-specific basis following prescribed procedures and applying specified factors for decision-making." 79 Fed. Reg. 48,342.

In 2011, EPA considered the impacts of converting Merrimack Station to closed-cycle cooling on the reliability of the regional electric system. *See* AR-618 at 163-164. Based on the information provided by PSNH and Enercon, EPA concluded that even an estimated peak loss of 22 MW represents just 0.1% of the region's 2008 total electric generating capacity and the region can reliably absorb a 22 MW loss. *Id.* In addition, since the 2011 Draft Permit, Merrimack's role in the regional energy market has decreased, particularly the significance of the Station's operation to the overall reliability of electric power in the area. The region's reliance on coal-fired generation such as Merrimack Station continues to decrease as capacity from natural gas, wind, and photovoltaic resources increase. Economic dispatch of coal-fired resources tends to be during winter, when natural gas resources are most likely to experience constraints. *See* AR-1745. *See also* Responses to Comments II.1.1, II.3.2.3.

PSNH's comments (with supporting comments from Enercon) do not support a conclusion that the lost generation at Merrimack Station would be significant enough as to make this technology unavailable. At the same time, as explained elsewhere in this Response to Comments, in light of new information on the availability of wedgewire screens and after considering the relative costs and benefits of available technologies (including the cost of lost generation) consistent with 40 CFR § 125.98(f)(2), EPA ultimately concluded that wedgewire screens, not closed-cycle cooling, is the BTA for entrainment at Merrimack Station.

5.3.3 Increased Water Consumption Due to CCC at Merrimack Station Will Remove an Alarming Amount of Water from the Hooksett Pool Each Day

Comment III.5.3.3	**AR-1548, PSNH, pp. 165-167**
See also AR-1549, Enercon, pp. 12-13; AR-846, PSNH, pp. 100-101; AR-864, Enercon, pp. 16-19; AR-851, CLF, pp. 19-24	

EPA summarily dismissed this critical issue in its 2011 Fact Sheet. In reaching a conclusion that evaporation associated with CCC operations would not have adverse impacts in the Hooksett Pool, EPA argues without support that the substantial, daily water loss anticipated with CCC must be similar to the evaporation rate currently experienced with Merrimack Station's open-cycle system.[668] The agency cites only to Merrimack Station's thermal

discharges to baldly assert that such discharges "probably increase[] evaporation rates from the Hooksett Pool itself."[669] These unsubstantiated statements by the agency are not true. In reality, it is generally recognized within the industry that CCC technologies "consume 70-90% of the water they withdraw as opposed to an open-cycle system[s] which discharge nearly 100% of the water they withdraw."[670]

Enercon estimated in its 2012 report that approximately 4.79 MGD would be lost due to evaporation from the Hooksett Pool if CCC is installed at Merrimack Station.[671] This equals the consumption of approximately 3,325 gallons of water per minute and approximately 2,640 Olympic-sized swimming pools per year.[672] The amount of water lost to evaporation due to PSNH's current thermal discharges and spray module system in its discharge canal pales in comparison. This is partially due to the fact that the power spray modules spray effluent into the air to cool the water through the process of convection—not evaporation—and because the modules are operated only under certain seasonal thermal conditions. Thus, in response to EPA's 2011 Fact Sheet, Enercon acknowledged 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" but noted that this evaporation is properly attributable to naturally occurring heat transfer due to higher ambient water temperatures within the waterbody.[673] Enercon concluded its critique of EPA's self-serving dismissal of this water consumption issue in the 2011 Fact Sheet by stating:

> [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 a cooling pond . . . [and that] closed-cycle systems 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.[674]

In its 2017 report, Enercon provides the following additional cautionary note to convince EPA this water consumption issue deserves a greater level of concern:

> A survey of State Water Managers across the United States designated New Hampshire as one of the more concerning states with respect to expected water shortages. The increased frequency of water shortages is only compounded by increased population growth and a need for more water and electricity. In these circumstances, it is possible that plants retrofitted with closed-cycle cooling may need to return to open-cycle cooling operation for water conservation purposes.[675]

In the end, it is clear EPA's consideration of this water consumption issue in its 2011 Fact Sheet was inadequate, arbitrary and capricious and must be revisited if the agency erroneously elects to require installation of CCC at Merrimack Station to satisfy § 316(b)'s BTA standard.

668 AR-618 at 163.
669 *Id.*
670 Enercon 2017 Comments at 12-13.
671 *See* AR-864 at 17.
672 *See id.*
673 *Id.*
674 *Id.* (internal citations omitted).
675 Enercon 2017 Comments at 13.

EPA Response:

Under the Final Rule at 40 CFR § 1245.98(f)(3)(v), one of the factors that may be considered in determining the site-specific entrainment requirements is the impact on water consumption; however, EPA's analysis suggests that water consumption is unlikely to be a significant factor influencing the choice of cooling system in most waterbodies. For the rulemaking, EPA concluded that, although evaporative losses from closed-cycle cooling are likely greater than that of once-through cooling for a given site, the difference is minimal in terms of gallons lost and in most cases are minor compared to river flow. *See* AR-1718 at 10-11 and AR-1697 at 163-64. In most cases, evaporative losses are minor compared to river flow, with the possible exception of areas with extreme limitations on water availability (e.g., the southwestern desert) or those prone to extreme drought conditions. *See* AR-1807. In the preamble to the Final Rule, EPA stated that its "analysis does not suggest that the difference [in evaporative losses between closed-cycle and open-cycle systems] is substantial enough to outweigh the significant reduction in adverse environmental impacts to aquatic organisms." 79 Fed. Reg. 48,333. For the Final Rule, EPA determined that "the relative difference in evaporation is not so great that it will play a major role in determining a cooling system type in most watersheds." 79 Fed. Reg. 48,333. In particular, the Response to Comment for the Final Rule states that "a source water that is supposedly too small to support a cooling tower (due to evaporative losses) is also too small a source water to provide adequate flow for a once-through cooling system." AR-1697 at 164. It is unclear why PSNH and Enercon now believe that evaporative losses from Hooksett Pool due to cooling towers would represent a significant loss from the Hooksett Pool, especially given that neither indicated that such losses would be significant in 2007 and have not provided any context or additional information in support of this argument. Available information indicates that the operation of a wet cooling system will result in the loss of a relatively small volume of cooling water to evaporation although EPA recognizes that, in nearly all cases, evaporative losses are greater with a wet closed-cycle cooling system than with once-through cooling.

According to PSNH, the amount of water lost to evaporation with the existing once-through system "pales in comparison" to the estimated 4.79 MGD that would be lost due to evaporation with closed-cycle cooling. The power spray module (PSM) system is a series of spray nozzles in the cooling canal that spray a portion of the cooling water discharge flow from the canal into the air. PSNH does not estimate the amount of water lost to evaporation with the existing system or provide any scientific basis for the assertion that the PSMs rely primarily on convection. In fact, the 2007 Engineering Report does not mention convection but does relate the principle of the PSMs to evaporative cooling towers, in that the performance of both is bound by an approach to wet bulb parameter. AR-6 at 20. Both PSMs and cooling towers mechanically induce an increase

in the surface area of contact between heated cooling water and ambient air through formation of suspended water droplets and both use a combination of evaporation and convection. This mix is dependent on meteorological conditions, particularly relative humidity. Greater air flow through cooling towers maximizes surface area and duration and will evaporate more water than the PSMs. However, PSNH did not quantify the difference in evaporation between the PMSs and cooling towers at Merrimack Station to support its assertion that EPA's analysis was inadequate or that this issue of water usage from cooling towers is "critical" for this site.

In its comments, Enercon refers to literature suggesting that closed-cycle systems evaporate 2 to 3 times more water than open-cycle systems. In its 2007 Engineering Report, Enercon estimated the evaporative losses for cooling towers at 4.79 MGD but did not identify evaporation as a concern. See AR-6 at 54 and AR-102 at 15-16. The 2007 Engineering Report's entire analysis regarding the potential impacts of water consumption amounts to a single statement (repeated twice) that "cooling towers evaporate large quantities of water which are effectively lost from the source water body." AR-06 at 54, 116. If Enercon is correct that closed-cycle systems evaporate 2 to 3 times more water than open-cycle systems, the existing system would evaporate from 1.6 to 2.4 MGD, [70] or even slightly more.[71] PSNH has offered no basis to support its assertion that such additional losses (up to 3.2 MGD) from cooling towers would be "alarming" or have any measurable impact on the Hooksett Pool. Even using Enercon's highest estimate, the loss of an additional 3.2 MGD (4.95 cfs) represents 0.9% of the river's 7Q10 flow (578 cfs) and 0.11% of mean annual flow (4,551 cfs) as estimated at the time of the 2011 Draft Permit. *See* AR-618 at 8 AR-6 at 14. In the context of river flow, the evaporative losses expected from closed-cycle cooling are unlikely to be at levels that would impact the Hooksett Pool.

When once-through cooling is used to withdraw a significant portion of the source waterbody, the return of heated water may contribute to greater evaporation from the waterbody relative to the normal evaporation rate.

The magnitude of the additional loss due to evaporation is especially uncertain in light of the likely existing evaporative losses under the current system. Both the 2011 Draft Determinations Document (p. 162-163) and Enercon's comment recognize that there is some unquantified volume of water currently lost with the once-through system. Enercon qualifies this volume as "very small" though the 2011 Draft Determinations Document suggests that it may not be clear which system results in greater overall evaporative losses. A 2011 EPRI study of the environmental impacts of retrofitting power plants with closed-cycle cooling states "net consumptive loss in converting a once-through cooling system to CCC must also account for the loss due to excess evaporation from the warmer discharge plume from the once-through cooled system. AR-1808 at 3-15. Since this involves the entire cooling flow, and not just blowdown, this loss can be significant and can offset a significant portion of the loss that would occur with a CCC tower."

[70] 4.79 MGD ÷ 3 = 1.6 MGD
4.79 MGD ÷ 2 = 2.4 MGD

[71] Enercon's estimate appears to assume no evaporative losses when the PSMs are operating, although Enercon concedes elsewhere that "the PSMs do evaporate a small amount of water." AR-864 at 17.

In 2011, Enercon commented that several power plants in the Southeastern U.S. had to shut down or reduce operations in 2007 due to water shortages. According to drought data from August 2007, this time period was characterized by very hot and dry conditions over much of the southeastern U.S. (https://www.ncdc.noaa.gov/sotc/drought/200708). EPA recognizes that during periods of extreme drought, the consumption of water by power plants may have a greater impact on water resources, and in extreme cases, may require plants to curtail power generation or shut down. However, there is no evidence that plants in the northeastern U.S. have had to curtail power due to drought. In addition, the power plants referred to in the reference (AR-864 at 19) were once-through systems and had to shutdown because river levels became too low for the intakes to operate properly or because the temperature of the receiving water was too warm. See AR-1669. The report does not relate the curtailment of power production during drought to evaporative losses due to closed-cycle cooling towers.

According to PSNH, Enercon's comment about the expected "regional" water shortages anticipated by the State Water Manager for New Hampshire in the 2003 survey of State Water Managers is a "cautionary note" that about the potential importance of water consumption from cooling towers. In response, EPA reviewed the most recent survey data conducted in 2013. The State Water Manager for New Hampshire anticipated "local" water shortages in 2013, a reduction from the 2003 "regional" scale. Of the 43 states that responded to the survey in both 2003 and 2013, New Hampshire was among six states whose expectation of water shortages decreased between the two surveys. EPA also notes that Enercon's statement that only one state had a more negative outlook than New Hampshire was misleading because it ignored the many states that were equally concerned – in the 2003 survey, only one state had an expectation of water shortages on a statewide level (Colorado), while 17 states, including New Hampshire, had expectations of regional shortages. In the 2013 survey, 25 states had more negative outlooks on the likelihood of water shortages than New Hampshire, while 15 states, including New Hampshire, expected "local" water shortages. *See* May 2014 GAO Report to Congressional Requesters: Freshwater Supply Concerns Continue, and Uncertainties Complicate Planning (GAO-14-430).

EPA recognizes that while water resources are not considered scare in New Hampshire due, in part, to its temperate climate and generally abundant precipitation, the region does experience periodic drought conditions. However, EPA believes that the relatively low volume of water expected to be lost from the Merrimack River due to evaporation as a result of the use of closed-cycle cooling, as described in this comment and response, is unlikely to have a measurable, long-term impact on water resources such that the technology would be considered unavailable due to water consumption. Regardless of this factor, however, EPA already determined that the costs of closed-cycle cooling are not warranted as compared to the costs of wedgewire screens and that closed-cycle cooling is not the BTA for entrainment at Merrimack Station.

5.3.4 Increased Air Emissions as well as Fogging and Icing Associated With CCC Offset Any Purported Environmental Benefit of the Technology

Comment III.5.3.4	AR-1548, PSNH, pp. 167-170
See also AR-846, PSNH, pp. 98, 100; AR-864, Enercon, pp. 25-26, 32-34, 45; AR-1549, Enercon, pp. 14-16, 78-80	

40 C.F.R. § 125.98(f)(ii) requires EPA to consider the "[i]mpact of changes in particulate emissions or other pollutants associated with" CCC. EPA's assessment of this issue essentially consists of a conclusory assertion that significant air emissions are not anticipated but that air pollution control laws would adequately control such emissions were they to occur.[676] Through its extensive knowledge and experience with CCC technologies, Enercon knows air emissions would be increased at the facility both through increased stack emissions and new air emissions from the cooling towers.[677] Enercon explains:

> Although the content of the stack emissions would be unaffected, the quantity would increase if closed-cycle cooling were to be implemented due to increased parasitic losses resulting from the cooling tower's electricity demands, reduced efficiency of the turbine and condenser due to warmer condenser water, and increased coal consumption to make up for the newly incurred operational efficiency losses.
>
> There would also be an increase in air emissions resulting from the operation of new cooling towers. Cooling towers are known air emitters that are subject to regulatory air pollution controls. Although EPA dismisses particulate emissions as a serious concern because high quality drift eliminators were specified in the preliminary design, even state-of-the-art drift eliminators still allow some drift to occur. It is estimated that approximately 2,880 gallons of water a day would escape the tower via drift. As a result, it is possible that additional water treatment equipment would have to be installed for any cooling tower to be operated and/or permitted, which could lead to significantly increased costs.[678]

Enercon also notes that EPA inadequately assessed potential icing/fogging concerns associated with CCC in its 2011 Fact Sheet and that this issue is, in fact, "a safety concern that requires a rigorous analysis."[679] Formation of a cooling tower plume decreasing visibility around the facility, "black ice" forming on nearby roads and highways during Winter, damages to vegetation in the vicinity of Merrimack Station, "degradation of the Station heating, ventilating, and air conditioning (HVAC) systems, increased corrosion on Station equipment, and ice accumulation on electrical equipment which could lead to electrical arcing," are all mentioned as possible effects of CCC operations.[680] In fact, Enercon suggests EPA utilize or request a comprehensive modeling program (such as SCATI) to adequately assess these anticipated icing/fogging impacts.[681]

Enercon's discussions of the air emissions and icing/fogging issues reveals that EPA needs to reconsider the cumulative effects of CCC technologies. These anticipated issues clearly

offset supposed benefits of the technology and could lead to increased water treatment costs. The agency's discussion of this issue in its 2011 Fact Sheet is paltry. A thorough and reasoned assessment of these issues is now mandatory pursuant to the final § 316(b) rule, meaning EPA must address them prior to attempting to classify CCC as BTA for Merrimack Station.

676 *See* AR-618 at 156-59.
677 *See* Enercon 2017 Comments at 14-15.
678 *Id.* at 15-16 (citations omitted).
679 *See id.* at 16.
680 *See id.* (citations omitted). Notably, icing concerns are a non-water quality environmental impact that undercuts and/or works against EPA's 2011 decision that installation and year-round operation of CCC is required to satisfy BAT for thermal discharges from Merrimack Station. *See* 33 U.S.C. § 1314(b)(2)(B) (requiring EPA to consider, among other things, non-water quality environmental impacts (including energy requirements) in rendering a BAT determination for thermal discharges). Each of the non-water quality environmental impacts discussed in Part III.E.3. of these comments therefore applies equally to critique EPA's § 316(a) BAT determination for Merrimack Station. Enercon provides the following additional discussion regarding icing concerns associated with CCC technologies in climates similar to New Hampshire, especially for plants that undergo frequent start-ups and shutdowns:

Icing is a primary concern for cooling tower systems operating in freezing conditions, particularly those with frequent startups and shutdowns. Excessive icing can be mitigated through proper maintenance of the cooling tower system; however, final mitigative measures are often left to operator action. Of the mechanical draft designs, induced draft cooling towers are more capable of mitigating icing concerns than forced draft designs; this is largely because induced draft designs inherently pass heated air over the mechanical components, reducing their icing risk (Reference 12.15, Page 7). However, even induced draft cooling towers can build unacceptable levels of ice within the tower, beginning with air inlet louvers and heat transfer fill. This ice build-up can challenge the structural design of the cooling tower if appropriate and timely operator action is not taken to mitigate the icing effect. This presents a significant risk and challenge to the operators and additional costs to the plant (Reference 12.15).

Frequent plant startups and shutdowns during freezing conditions only further complicate and increase the icing risk. During shutdown periods, the cooling tower system would need to be winterized to address the risk of complete freezing of the water basin. Winterization could be accomplished through a number of options including full system draining, installation of a bypass system to ensure that basin water does not stagnate, or installation of a basin heating system. However, these options add additional engineering design costs, construction/maintenance costs, and/or required additional operator actions at the Station for a period when there is no requirement for entrainment control (Reference 12.16, Pages 6-7).

In addition to icing of the cooling tower itself, additional concerns exist for fogging and icing of the surrounding area due to the cooling tower plume. The persistency of cooling tower plumes is typically much greater in the winter due to the decreased air temperature and air moisture capacity. Plumes can present visibility issues downwind of the tower due to fogging and localized freezing/icing concerns as entrained water freezes out of the air onto roads, powerlines, and other equipment.

Lastly, there are other maintenance, reliability, and safety issues associated with frequent cooling tower startups and shutdowns, regardless of the concurrent weather. Transients are introduced during each startup and shutdown of the cooling tower equipment which may subject the equipment to excessive mechanical vibration which can degrade plant equipment and present additional maintenance and capital costs for the plant (Reference 12.17, Page ii). Under freezing conditions, ice that has formed on the cooling tower fan blades can be thrown through the air for several minutes upon startup, creating the potential for damage to the surrounding equipment. Additionally, deposits and bacterial growth that form during periods of inactivity must be monitored and remediated before startup. Left unattended, these deposits and bacterial growths can degrade the cooling tower efficiency, damage plant equipment, and in some cases, endanger the health and safety of the plant employees and public (Reference 12.17, Pages 3, 19,

and 26; Reference 12.18, Page 6; Reference 12.19, Pages 2 and 10). Growth of Legionella bacteria is of particular concern with cooling tower operation as Legionella bacteria are ubiquitous in aqueous environments, including the recirculating water of cooling towers. If not properly maintained, all 50 species of Legionella can potentially become pathogenic (Reference 12.18, Page 2). Once again, these maintenance and operator requirements present additional risk, challenges, and costs to the Station which would be incurred throughout the life of the plant, including those periods when there is no requirement for entrainment control. Enercon 2017 Comments at 78-80.
681 *Id*. at 16.

EPA Response:

In the July 2007 CWA Section 308 Information Request (Section 5(h)), EPA requested that PSNH "describe in detail the non-water quality environmental impacts (including energy, air pollution, noise, public safety), if any, that you have determined will occur from the use of each technology." AR-237 at 4. In the 2007 Engineering Report responding to this request (AR-6), Enercon indicated that closed-cycle cooling could be retrofitted at Merrimack Station. With respect to air emissions, Enercon stated that "closed-loop operation of the Station would generate more stack emissions and material waste per net unit of electricity generated than the Station's current cooling water system," but Enercon neither quantified the increase nor concluded that the increase would be at a level that would potentially make closed-cycle cooling unavailable at Merrimack Station. AR-6 at 55. The Engineering Report also raised concerns that the plume could cause fogging and icing during winter months, which could impact local roads and highways. *See id*. at 51. But again, the Report does not quantify the impacts of potential vapor-related issues or suggest that they would threaten the availability of cooling towers at Merrimack Station. The closed-cycle cooling design proposed in the Engineering Report favored hybrid, or plume abated, towers which are substantially more costly than a non-plume abated tower but will significantly reduce the impacts of drift and vapor plume. *See id*. at 39; *see also* AR-1740 at 7-29.

The 2011 Draft Determinations Document (at 156-167) evaluated the potential impacts from both increased air emissions and icing/fogging from the vapor plume based on the information available at the time, including information provided by PSNH and Enercon, evaluation of Regional energy markets and air emissions policies, EPA staff consultation with engineers familiar with the operation of closed-cycle cooling at other facilities in cold climates, and modeling analysis of vapor plumes performed for other facilities. *See, e.g.*, Telephone Memorandum, Sharon Zaya, U.S. Envtl. Prot. Agency (Jan. 4, 2002) (regarding Call with Ken Daledda, Bergen Station, New Jersey) (AR-744); Memorandum from Mark Stein, U.S. Envtl. Prot. Agency, to Brayton Point NPDES Permit File (Dec. 12, 2001) ("Brief Notes on an Issue Discussed During Conference Call with John Gulvas of Consumers Energy and the Palisades Nuclear power station in Covert, Michigan") (AR-745); 39 Fed. Reg. at 36,192; EPA TDD 2001 – New Facilities at 3-33; Badger Power EIS, Exec. Sum. at xvii, xviii, 18–19, 72–75, 137–39 (AR-380); AES Londonderry Highlights at 6 (AR-743); Nuclear Regulatory Comm'n, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437 Vol. 1) §§ 4.3.4.2, 4.3.5.1.1, 4.3.5.1.3 (AR-721); Response to Comments Document, Public review of Brayton Point Station NPDES Permit No. MA 003654 (Oct. 2, 2003), App. M (evaluation of possible water vapor plumes from mechanical draft wet cooling towers (not hybrid towers) installed at a power plant) (AR-742). EPA concluded that 1) resulting increases in air emissions would be modest and controlled through federal and state air pollution control laws and 2) plume-

related fogging or icing issues would be limited to local roadways, would not affect the closest major highways, and could be mitigated by traffic safety measures. AR-618 at 156-67.

In this comment, PSNH requests that EPA reconsider the cumulative effects of closed-cycle cooling, arguing in a conclusory fashion that the anticipated air-related issues "clearly offset supposed benefits of the technology and could lead to increased water treatment costs." In its 2012 comments, PSNH commented that EPA "failed to adequately consider and/or improperly dismissed as immaterial" secondary environmental effects including, but not limited to, increased air emissions, icing/fogging concerns, and any drift and vapor plume issues. AR-846 at 98. EPA notes that despite two public notice periods, PSNH has never indicated any specific inadequacy in EPA's evaluation of air-related impacts or demonstrated that consideration of these factors would lead to a conclusion that closed-cycle cooling is unavailable on a site-specific basis. PSNH and Enercon's comments are limited to statements that "the quantity [of stack emissions] would increase due to increased parasitic losses" and that there would be "an increase in air emissions resulting from the operation of new cooling towers." Neither PSNH nor Enercon quantify what the increase would be or provide any context for how the increase might impact air quality or site-specific issues in New Hampshire.

When establishing site-specific entrainment controls, one of the factors EPA must consider under the 2014 Final Rule is the "[i]mpact of changes in particulate emissions or other pollutants associated with entrainment technologies." 40 CFR § 125.98(f)(2)(ii). While EPA agrees that air emissions can result from increases in stack emissions due to increased fuel usage, emissions from the towers themselves, and plumes of water vapor, *see* 79 Fed. Reg. 48,341, an increase alone is not necessarily enough to make closed-cycle unavailable at a particular facility. The quantity and the impact of increases are what's relevant. EPA explained why it expected an increase attributable to converting Merrimack Station to closed-cycle cooling to be "very modest," including that Enercon had proposed highly efficient drift elimination equipment to minimize emissions from the cooling towers themselves and that the increase in generation needed (to make up for parasitic losses and reduced condenser efficiency) represented less than 0.1% of total electrical generation in the region. AR-618 at 157-59. PSNH's and Enercon's comments never truly grapple with this analysis.[72] Rather, they assert simply that air emissions would increase[73] but never quantify the increase or explain what impact it would have and why it should lead to the conclusion that closed-cycle cooling is unavailable at Merrimack Station.

[72] The comments often consist of straw man arguments. For instance, Enercon criticizes EPA's analysis by commenting that drift eliminators "would still allow some drift to occur." AR-864 at 26. But EPA did not state that the equipment would completely eliminate drift, but rather explained its basis for concluding that "significant" air pollutant emissions from the cooling towers were not anticipated. Enercon also commented that "cap-and-trade does not constitute a valid justification for stating that long-term emissions [of particulate matter] from the cooling tower will be close to zero." AR-864 at 45. Yet, again, EPA discussed the anticipated effect of cap-and-trade programs on stack emissions of SO_2, NOx, and CO_2, not cooling tower emissions of particulate matter. AR-618 at 158-59.

[73] Furthermore, the basis for Enercon's prediction is incomplete. Enercon comments that other sources would have to compensate for the loss of generation at Merrimack Station, which "could increase air emissions occurring in the region." AR-864 at 25. EPA recognized this possibility, but noted as additional support for its conclusion that any increase in emissions would likely be very modest, that most of the output to replace lost generation would likely come from natural gas-fueled combined cycle units, which "tend to have relatively low emission rates of air

EPA agrees that air emissions could increase as a result of closed-cycle cooling retrofit at Merrimack Station but maintains that the impact of a potential modest increase should not disqualify the technology. *See* AR-618 at 159. In the preamble to the 316(b) Final Rule, EPA explained that it expects the most significant impacts at existing facilities would be $PM_{2.5}$ emissions, which are associated directly with an increase in human health effects. 79 Fed. Reg. 48,341. EPA explained that increased stack emissions from additional fuel usage, however, are more likely to be primary factors because effects of the particulates from cooling tower emissions would be limited (by plume abatement and drift elimination technologies) and confined wholly to the facility property. *See id*. The Technical Development Document (TDD) for the Final Rule (Appendix A) (AR-1718) identified that increased air emissions in areas that are already in non-attainment for an individual pollutant could be an issue. New Hampshire is not in non-attainment, however, for any of the associated pollutants, including particulate matter.[74] The TDD also recognizes that plume abatement might be necessary at certain locations, including where local objections to a visible plume exists, or where the plume may create safely issues on nearby roadways. EPA assumed up to 25% of facilities would be expected to retrofit wet cooling towers with higher cost plume abatement towers. *See* AR-1718 at 10-7. As explained above, Enercon's proposed design at Merrimack Station includes plume-abated towers.

According to Enercon's assessment, impacts from the vapor plume would primarily be icing and fogging during winter conditions, vegetation damage caused by the mineral content of the entrained moisture, and potential degradation of heating, ventilating, and air conditioning (HVAC) systems at the Station. *See* AR-6 at 51. Enercon anticipated that a plume-abated tower would be used, which typically reduces the plume by 95 to 99 percent under optimum conditions. *See* AR-1775. Enercon expects that a visible plume would be limited to the winter months when the ambient air temperature is below 27°F and could either manifest as a vertical plume visible in the sky or as ground-level fog. AR-6 at 51. Enercon indicated that driving on nearby roads and highways could be impacted, "with the possibility of 'black ice' formation during winter months and visibility severely compromised." *Id*. Analysis provided to EPA by TetraTech suggests that drift would result in at most 6 to 12 pounds of solid particulates per day over a relatively large area down wind of the cooling towers. *See* AR-1804.

In its 2012 and 2017 comments, Enercon suggests EPA utilize or request a comprehensive modeling program (such as SACTI[75]) to adequately assess icing/fogging impacts. In its assessment of the cooling tower plume in the 2007 Engineering Document, Enercon stated "the behavior of the plume can be modeled using the SACTI code under environmental conditions

pollutants." AR-618 at 158; *see also* Response to Comment III.5.3 and II.3.2.4 (noting since the 2011 Draft Permit was issued that New England's reliance on coal-generation has continued to decreased and that capacity from lower- (or no-) emission sources, such as natural gas, wind, and photovoltaic resources, has increased). PSNH's/Enercon's comments never dispute this aspect of EPA's analysis.

[74] When the TDD was issued, portions of New Hampshire were designated non-attainment for the 1997 ozone National Ambient Air Quality Standard ("NAAQS") and the 2010 SO_2 NAAQS. EPA later approved New Hampshire's requests to redesignate these areas to attainment for both NAAQS. *See* 40 C.F.R. §§ 52.1520(e), 52.1534(i), 81.330; 84 Fed. Reg. 49,467 (Sept. 20, 2019); 78 Fed. Reg. 6741 (Jan. 31, 2013).

[75] Seasonal Annual Cooling Tower Impacts. *See* AR-864 at iii.

typical of Bow, NH. However, reasonable predictions of plume travel can be made based on the local prevailing wind directions and frequency of occurrence (i.e., site wind rose)." AR-6 at 51. In the 2011 Draft Determinations Document, EPA stated "[m]odels exist for attempting to predict the likelihood that such fogging or icing problems might occur based on tower characteristics and local weather data, but PSNH has not, to EPA's knowledge, conducting such a modeling analysis." AR-618 at 165. Quantifying the potential impacts of the vapor plume with a SACTI (or similar) model requires site-specific engineering and cooling tower design data that are more accessible to the permittee than to EPA. *See*, *e.g.*, AR-1805. As such, EPA has not modeled the vapor plume from Merrimack Station. EPA has, however, reviewed an analysis provided by TetraTech, at EPA's request, of another, similar model that was prepared for a different facility as a qualitative review of the potential impacts of the plume at Merrimack Station. A CALPUFF model generated for Manchester Street Station in Rhode Island (CH2M Hill 2009)[76] predicted fogging and icing would occur for a total of 24 hours per year dispersed over 6 days in winter, with each event expected to cause icing. *See* AR-1804. The model predicted a maximum distance of a fogging event of 2,640 ft with a duration of 1 hour with events during 19 of the 24 hours at distances less than 1,100 ft. The duration, distance, and direction of fogging events may be different at Merrimack Station, but the analysis provides some indication that effects of fogging are likely to be geographically limited and occur over a relatively limited portion of the year. *See id*.

At Merrimack Station, the closest major roads to the west (NH Route 3A and Interstate 93) are at least one mile from the proposed cooling tower location, and the closest major road to the east (NH Route 3) is roughly three-quarters of a mile away across the river. The nearest houses are located more than about 2,000 ft to the east across the Merrimack River. River Road, located about 500 feet from the proposed location of the cooling towers along the western edge of the Station's property, may experience infrequent icing or fogging issues for limited periods during winter if the wind direction is from the east. Ice accumulation on electrical equipment at the switchyard, located about 1,000 ft northwest of the proposed tower location may be affected during a very limited period of time during winter and only when the wind is from the southeast. As Enercon states in its Engineering Report and in its comment, the prevailing wind direction is north or south. Land to the north and south of Merrimack Station is forested with areas cleared for agriculture and industrial activities, which are not likely to be significantly impacted by occasional fogging or icing for a relatively short duration over limited periods of the year. Based on the available information, including a review of other modeling data and information from other electrical generating facilities in the northern and eastern United States, EPA expects that the impacts of fogging and icing would be relatively minor and would not alter the conclusion that cooling towers are an available technology at Merrimack Station. *See* AR-618 at 165-67. If

[76] EPA recognizes that models are site-specific and the results are not transferrable between facilities; however, in the absence of modeling data for Merrimack Station, which PSNH failed to provide in support of its comments, EPA believes that the CALPUFF model allows at least a qualitative understanding of the potential for impacts from fogging and icing at Merrimack Station. Manchester Street Station is a 264 MW Station which is roughly 60% of the generating capacity at Merrimack Units 1 and 2. Impacts at Merrimack Station could be similar but proportionally greater in magnitude given the difference in capacity. At the same time, between the two stations, Manchester Street, situated in a humid, maritime location on the Providence River near Mount Hope Bay, is more likely to experience conditions conducive to generation of fog.

PSNH believed that these impacts were likely to be more than minor, it had the opportunity to provide a more rigorous analysis either during development of the Draft Permit or during either the public comment period in 2011 or 2017.

EPA maintains that, while there is potential for traffic safety problems on local roadways as a result of fogging and icing, the available information indicates that any impacts are likely to be of a relatively short duration and geographically limited. These impacts can be mitigated with best management practices for safe travel on local roadways, *see, e.g.*, AR-618 at 167, and do not appear to rise to levels that would justify disqualifying closed-cycle cooling as an available technology at Merrimack Station. PSNH failed to provide any additional information demonstrating that the plume abatement technology would not effectively minimize impacts from the vapor plume, including fogging and icing, or that the increased air emissions present exceptional circumstances that would make these impacts proportionally greater at Merrimack Station in comparison to other power plants.[77] For these reasons, EPA does not consider that impacts from increased air emissions would impact the availability of closed-cycle cooling on a site-specific basis. Moreover, as explained elsewhere in this Response to Comments, EPA has selected wedgewire screens, not closed-cycle cooling, as the BTA for entrainment at Merrimack Station upon consideration of the relative costs and benefits of this technology as compared to closed-cycle cooling. Thus, PSNH's and Enercon's comments about air emissions and fogging/icing related to closed-cycle cooling do not impact EPA's BTA determination.

5.3.5 Non-Water Quality Environmental Impacts and Other Factors EPA Deemed Appropriate

Comment III.5.3.5	**AR-851, CLF, pp. 13-15**
See also AR-852, Henderson, pp. 17-24	

As required by the CWA, EPA considered non-water quality environmental impacts in assessing BAT for Merrimack Station.[62] EPA examined air pollutant emissions (including those resulting from additional energy requirements associated with conversion to CCC), sound emissions, and visual/aesthetic effects. In all three cases, EPA concluded that the non-water quality impacts would not disqualify CCC from being the BAT for Merrimack Station. In light of EPA's broad discretion and PSNH's lack of evidence to the contrary, EPA's decisions with respect to non-water quality environmental impacts were reasonable.

The CWA also directs EPA to take into account "such other factors as [the agency] deems appropriate. 33 U.S.C. § 1314(b)(2)(B). In this case, EPA considered three factors that were specifically identified by PSNH as concerns: (1) water loss from the Merrimack River due to the

[77] Similarly, in a footnote to the comment PSNH repeats Enercon's comments about additional issues related to icing and other "maintenance, reliability, and safety issues." The comments do not assert that such issues are likely to impact Merrimack Station disproportionately in comparison to other power plants. In fact, the comment inherently recognizes that such issues could exist at other power plants employing closed-cycle cooling "in climates similar to New Hampshire." Moreover, the comment suggests methods for overcoming these issues that mostly impact the cost of closed-cycle cooling, which, as noted, EPA has determined is not the BTA at Merrimack Station.

use of CCC technology; (2) the possible effect of requiring the installation of CCC on the reliability of the regional electric system; and (3) potential adverse effects due to fogging or icing. EPA also considered the beneficial effect requiring CCC would have in terms of reduced impingement and entrainment.

Any argument that water loss from evaporation due to the use of CCC should be grounds not to require that technology is meritless, especially in light of the overall environmental benefits provided by CCC. [63] EPA recognized that changing to CCC may not result in any appreciable increase in evaporative water loss over current once-through cooling technology due to the evaporation that occurs once Merrimack Station's heated effluent is discharged into the cooling canal and the River.[64] PSNH has not accounted for all of the evaporative water loss that occurs due to its current operations, and therefore can make no informed conclusions as to whether evaporative loss will increase under a CCC regime.

As the Henderson Report demonstrates, on a 77 degree summer day evaporative loss in the cooling canal alone can be as high as 67,000 gallons per day.[65] This is likely an underestimate of the actual evaporative loss because it does not take into account the evaporation that occurs as a result of the operation of the power spray modules. Further, water loss from evaporation occurs as the thermal plume discharges into the main stem of the river where there is a greater surface area to facilitate evaporation.[66] Finally, the percentage of River water loss due to evaporation from CCC is small: 1.3% during extreme low flow conditions based on EPA's calculations.[67] That percentage is likely biased high, since EPA accepts PSNH's estimate of water loss of 4.79 million gallons per day and uses the most extreme low flow conditions.[68]

When the average water loss from the Electric Power Research Institute's ("EPRI") 2002 Water and Sustainability Report is used (4 million gallons per day), the percentage of water loss declines to 1.05% using the same extreme low flow.[69] When a more typical low flow rate is used (1000 ft^3/s), the percentage of water loss attributed evaporation from the use of CCC drops further to 0.619%, as compared to 0.387% evaporative water loss caused by current once-through cooling operations.[70] Nevertheless, EPA again in this instance accepted PSNH's estimates, yet correctly concluded that "it is unclear which cooling system would ultimately result in greater overall evaporative losses" and the possible loss of River water due to evaporation should not disqualify CCC as BAT for Merrimack Station, "given the very substantial reductions in thermal discharge available."[71]

EPA also more than adequately addressed PSNH's two other concerns, reliability of the regional electric system and potential fogging and icing. EPA examined the two possible ways the CCC requirement could affect the regional electric supply - the incremental additional electrical demand needed to power the CCC configuration and possible outages needed to implement the conversion to CCC- and found both would have little effect, if any, on the regional electrical supply.[72] The estimated incremental peak demand for electricity to power the CCC configuration is 22 MW, which can be easily absorbed in the projected excess capacity in the region over the next six years of 3700 MW.[73] As discussed above, PSNH projects that only three weeks of

additional outage at Merrimack Station (in addition to scheduled maintenance outages) would be required to convert to CCC. As demonstrated by the fact that PSNH's extensive 2009 outage to repair Merrimack Unit 2's new HP/IP turbine after catastrophic failure had no adverse effect on regional electrical supply, none would reasonably be anticipated as a result of this more limited outage duration.

Although PSNH raised fogging and icing of nearby roadways as a concern, the Company failed to provide EPA with any modeling data for such weather-related effects, nor did PSNH give EPA estimates of the likely timing, frequency, location, or geographic extent of such roadway effects.[74] Even if PSNH had provided data to support its speculative concern, EPA notes that this issue would be easily managed through weather monitoring and notification to the Bow Highway Department in the event that fogging and icing appears possible so icing controls could be initiated.[75] Accordingly, EPA correctly concluded that none of PSNH's concerns, either independently or in combination, are enough to disqualify CCC as BAT for Merrimack Station, especially in light of the expected 95% reduction in entrainment and impingement and 99.5% reduction in temperature of the thermal discharge.

[62] See 33 U.S.C. § 1314(b)(2)(B); see also Attachment D at 152.
[63] See Henderson Report at 24-25.
[64] Attachment D at 163.
[65] See Henderson Report at 22.
[66] See Attachment D at 39 ("the [thermal] plume typically flows across the river under low-flow conditions, reaching the east bank between S-1 and S-3, and disperses throughout the river width as it approaches S-4 ... the plume often extends downstream to a point immediately upstream of Hooksett Dam.").
[67] Attachment D at 163.
[68] *Id.*
[69] See Henderson Report at 24.
[70] *Id.*
[71] *See* Attachment D at 162.
[72] *Id.* at 164.
[73] *Id.*
[74] *Id.* at 165.
[75] *Id.* at 167.

EPA Response

CLF submitted comments on the 2011 Draft Permit supporting the Permit's determination of closed-cycle cooling as both the BTA for impingement and entrainment and the best available technology (BAT) to control thermal discharges to the Merrimack River. Several of these comments, reproduced above, focused on EPA's evaluation of the non-water quality factors associated with closed-cycle cooling, which was presented as part of the BAT analysis (AR-618 at 156-167). As such, CLF's comment addresses closed-cycle cooling as it pertains to permit requirements for both thermal and CWISs. EPA is addressing these comments under § 316(b) because the issues raised in the comments are directly relevant to the Final Rule's requirements for establishing site-specific entrainment controls at 40 CFR § 125.98(f)(2) and (3) (i.e., consideration of relevant factors). CLF comments that in the 2011 Draft Permit, EPA correctly

concluded that non-water quality impacts (including air pollutant emissions, sound emissions, visual/aesthetic effects, water loss, reliability of the regional electric system, and fogging/icing), either independently or in combination, are not enough to disqualify closed-cycle cooling as BAT for Merrimack Station. EPA agrees and has addressed additional comments on these issues raised by PSNH and others in the response to comments above. See Response to Comment III.5.3. At the same time, while none of the issues raised in CLF's comments rise to levels that would render closed-cycle cooling unavailable at Merrimack Station, after consideration of the relative costs and benefits of closed-cycle cooling in comparison to wedgewire screens, EPA determined that the costs of closed-cycle cooling are not warranted by the expedited benefits. The Final Permit includes conditions and requirements to install wedgewire screens as the BTA for entrainment at Merrimack Station.

CLF comments that "water loss from evaporation due to the use of closed-cycle cooling should be grounds not to require that technology is meritless." EPA addressed comments about water consumption in Response to Comment III.5.3.3, above. As explained in that response, the relatively low volume of water expected to be lost from the Merrimack River due to evaporation as a result of the use of closed-cycle cooling is unlikely to have a measurable, long-term impact on water resources such that the technology would be considered unavailable due to water consumption.

6.0 Proposed Compliance Schedules for Installing Closed-cycle Cooing or Wedgewire Screens Are Not Reasonable

Comment III.6(i)	**AR-1548, PSNH, pp. 170-171**

The compliance schedules set out in EPA's Statement for the design, permitting, construction, and tie-in of CCC[682] and wedgewire screens[683] at Merrimack Station are fatally flawed. Schedules such as these are not appropriate at this stage in the permit renewal process. Instead, it is prudent to establish compliance schedules such as these after EPA has rendered its final permit for the facility, the parties have had the ability to negotiate potential resolutions, and administrative and legal appeals (if any) have been fully exhausted. Only then can the permit writer and permittee fully appreciate the scope of the project that will be required and the factual circumstances and constraints at the facility that may complicate the schedule for the construction and tie-in of all retrofitted technologies. Events in the recent past demonstrate that the layout of an electric generating facility can drastically change in a short period of time. Accordingly, a construction compliance schedule developed at this juncture will likely be rendered obsolete by the time it is time to actually take steps to commence construction at the facility.

Nevertheless, PSNH has provided comments on the key aspects of the proposed compliance schedules EPA has set out in its Statement. Should EPA erroneously reject PSNH's recommendation that such schedules are more appropriately established much later in the permit renewal process, PSNH encourages EPA to revise its schedules based on the comments below.

682 *See* AR-1534 at 27-28.

683 *See id.* at 30-32.

EPA Response:

PSNH comments that compliance schedules "are not appropriate at this stage in the permit renewal process" and maintains that the compliance schedules proposed in EPA's 2017 Statement are "fatally flawed." EPA responds to PSNH's more detailed comments about the proposed compliance schedules in Responses to Comments III.6.1 and 6.2 below. Here, EPA focuses on PSNH's broader comment that a compliance schedule is not appropriate until EPA has issued the Final Permit, "the parties have had the ability to negotiate potential resolutions, and administrative and legal appeals (if any) have been fully exhausted." According to the comment, only after such a process can EPA and the permittee "appreciate the scope of the project . . . and the factual circumstances and constraints" that may complicate the schedule.

The comment does not explain this claim in any meaningful way. First, the comment does not dispute EPA's authority to include compliance schedules in NPDES permits. EPA has long understood that when new permit limits or conditions require new equipment that will reasonably take some time to install, a compliance schedule of some kind will typically be appropriate to provide a clear, enforceable timeline for achieving permit compliance. Under 40 CFR § 122.47(a), EPA has the discretion to include compliance schedules in NPDES permits when appropriate. While a schedule for attaining future compliance with technology-based effluent limits whose statutory compliance deadline has already passed cannot be included in an NPDES permit (e.g., a schedule for installing equipment to come into compliance with a permit's thermal discharge requirements), this prohibition does not apply to permit conditions developed pursuant to § 316(b). 40 CFR §§ 125.94(b), 125.98(c); 79 Fed. Reg. at 48,359; *see also* AR-1534 at 23-24 (explaining why a compliance schedule for § 316(b) requirements was not included in the 2011 Draft Permit but why EPA proposed compliance schedules for closed-cycle cooling and wedgewire screens in 2017). Moreover, any schedule established must provide for compliance with § 316(b) requirements "as soon as practicable." 40 CFR §§ 125.94(b), 125.98(c).

Second, the comment does not explain how "factual circumstances and constraints" that may complicate the schedule would change or should be expected to be brought out during an appeal process in particular, especially if they have not already been raised during the public comment periods for this permit. The comment essentially asserts that, as a general matter, EPA should refrain from developing any schedule of compliance until the appeal process has played out completely because of a chance that a permit may change as a result of that process. By that reasoning, however, EPA should never include a compliance schedule in a permit, a notion that, again, is simply not reflected in the NPDES regulations generally, *see* 40 CFR § 122.47, or in the regulations regarding permit requirements under § 316(b) specifically, *see id.* §§ 125.94(b), 125.98(c).

EPA recognizes that it will take facilities time to upgrade existing technologies and install new technologies and takes this into account when establishing a deadline for compliance. In addition, EPA considers the extent to which technologies proposed to meet the CWIS requirements for entrainment will also be used to meet the requirements for impingement mortality. To the extent

the commenter is concerned that "factual circumstances and constraints" or scheduling conflicts may arise during data collection and construction that complicate the schedule, such uncertainties are factored into the compliance schedule to some extent by incorporating interim reporting requirements designed to provide regular updates on the progress of construction without dictating precise steps that will be best left to the discretion of the Permittee and by taking into account the comments submitted during the public comment periods, the schedule proposed by PSNH for wedgewire screens in its 2009 Supplemental Alternative Technology Evaluation (AR-4, Att. B), the schedule proposed in the 2017 Statement (AR-1534 at 31-32), and the schedules for wedgewire screens Region 1 has included in permits for other facilities, including Granite Shore Power's Schiller Station. Furthermore, the compliance date is tied not to the effective date of the permit but rather to the date that the permittee obtains all other necessary permits and approvals. Moreover, a compliance schedule may be modified, if warranted. For these reasons, EPA disagrees that a compliance schedule set forth in the Final Permit will be "rendered obsolete by the time it is time to actually take steps to commence construction at the facility," and the Permittee has not offered any specific evidence that it expects drastic changes at the Facility during the time period between the Final Permit and compliance. Enercon recognizes in its 2017 comments that compliance schedules may be included in the permit but cautions that the schedule should be realistic and reasonable. EPA does not disagree and has included such a compliance schedule for the CWIS requirements.

Furthermore, including the compliance schedule in the permit has the added benefit of providing an opportunity for the public to review and comment on the schedule. Including the compliance schedule in this permit rather than in a separate administrative order is reasonable and makes sense from the standpoint of administrative efficiency. The public has had an opportunity to comment on the permit, inclusive of the compliance schedules proposed in 2017. Considering this and the level of public interest in this permit and the other reasons given above, it is appropriate to include a compliance schedule in the permit for the § 316(b) requirements. *See* Responses to Comments III.6.1 and 6.2. EPA has finalized the compliance schedule to meet the BTA for entrainment and impingement mortality in consideration of the comments received on the 2017 Statement as addressed below.

6.1 The CCC Compliance Schedule Should be Eliminated or, at a Minimum, Substantially Overhauled

Comment III.6.1	**AR-1548, PSNH, pp. 171-174**
See also AR-1549, Enercon, pp. 71-73	

CCC is not needed at Merrimack Station for the reasons articulated in these comments.
A schedule for the system's installation at the facility, like the one EPA sets out in the Statement, is therefore not necessary. In addition, it is short-sighted, premature, and highly speculative for EPA to concoct a compliance schedule for a needless, extraordinarily costly technology without the detailed input of engineers familiar with the site and plant operations. Given the certainty of a multi-year appeal process of a final permit requiring conversion to CCC, coupled with the likelihood that additional changes could occur at the facility during this timeframe, a proper

compliance schedule cannot reasonably be established until after the appeals process is fully resolved—and only then with insight from an engineering firm familiar with all aspects of Merrimack Station's site and operations. Nevertheless, PSNH sets out below as examples some of the more significant problems with the schedule currently proposed by EPA in its Statement, in the event the agency erroneously requires installation of this cost prohibitive technology and includes a detailed compliance schedule in the Final Permit.

Part 1.c. of the proposed compliance schedule must be revised. The six months EPA allocates for the permittee to solidify a final design required to convert Merrimack Station's Unit 1 and 2 from open-cycle cooling to CCC is woefully inadequate.[684] Since the conceptual design for CCC was provided to EPA in 2007, a new FGD system has been constructed.[685] The FGD system is occupying the space intended for routing new piping in the 2007 design. Therefore, the conceptual design, including cost and scheduling, must be reexamined. In order to redraft the design, PSNH needs at least sixteen months, which was the amount of time set out in the construction schedule provided to Region 1 in Enercon's 2007 report.[686]
Furthermore, will EPA first require the permittee to submit a preliminary design for the CCC technology for EPA approval? Such a requirement is included in the proposed compliance schedule for the installation of wedgewire screens.[687] If so, the timeframe within which the permittee is required to complete a final design and engineering for CCC cannot be tied to the effective date of the permit and, instead, must be tied to the date EPA approves the preliminary CCC design.

EPA has also failed to establish any period of time for PSNH to execute construction contracts necessary to commence the next phase of the project. If EPA intends to approve the permittee's final design and engineering submittal, a minimum of 12 months from the date of the agency's approval should be delineated in the schedule to allow the permittee to prepare requests for proposals, accept and review them, and negotiate a contract. More time could possibly be needed given the size, scope, and limited land constraint issues at Merrimack Station. If EPA does not intend to approve the permittee's final design and engineering submittal, a minimum of 12 months from the date the permittee issues this submittal should be provided in the schedule.

The Part 1.d. deadline is also problematic.[688] If EPA intends to approve the preliminary CCC design, this Part 1.d. deadline also must be tied to that agency action. And, irrespective of this approval issue, the proposed nine months from the effective date of the Final Permit to complete submission of all necessary federal, state, and local permit applications are arbitrary and capricious, given it is a mere three months after the final design and engineering for the CCC technology will be completed. This necessarily means the permittee will be required to complete the overwhelming bulk of the work to complete all necessary federal, state, and local permit applications within a span of three months. More time is needed and PSNH suggests a minimum of eight months from the date a final CCC design is completed to finish this task.

Parts 1.f. through 1.j. of EPA's proposed compliance schedule exceed the scope of the agency's authority under the CWA insofar as the provision permits EPA to insert itself into the managerial and/or operational functions of the permittee.[689] At most, the agency can set a deadline by which the permittee may have the CCC technology in operation, but it is properly

left to the permittee's discretion as to how it elects to meet that deadline. Interim requirements—such as when the permittee must commence construction—are unrealistic since construction is inherently fluid and subject to delay. For example, is the permittee required to commence construction in the middle of winter with snow on the ground if its nine-month deadline is approaching?[690] All of these proposed deadlines should be deleted.

Other issues likely exist in this proposed schedule. Unfortunately, these are the only ones PSNH is capable of identifying at this stage in the process.

PSNH maintains that requiring CCC at Merrimack Station to satisfy CWA §§ 316(a) or (b) would be arbitrary and capricious. If EPA ignores the comprehensive and well-reasoned facts and analyses submitted by PSNH and its consultants and ultimately requires CCC technologies at Merrimack Station, a reasonable compliance schedule can only, in actuality, be set following the exhaustion of all administrative and legal appeals and only then in conjunction with an engineering firm familiar with all aspects of Merrimack Station's site and operations.

[684] *Id.* at 27.
[685] *See* AR-6.
[686] *See* AR-6 at Attachment 7.
[687] AR-1534 at 31-32.
[688] *Id.* at 27.
[689] *Id.* at 27-28.
[690] The proposed requirement in Part 1.g. to plan an outage with ISO-New England by a certain date in the year prior to the anticipated tie-in date for CCC for each unit is particularly overreaching. *Id.* at 28. Merrimack Station has been online since 1960 and plant operators are well-versed in handling operations and knowing what needs to be accomplished in order to construct new technology at its facility. Therefore, requirements of this kind are unnecessary and should not be delineated in the Final Permit, as the permittee can ultimately handle such matters without EPA expending its time and resources to micromanage the construction. These tasks are vital to the completion of the overall project, and therefore, they will be completed without arbitrary deadlines.

EPA Response:

In its comment, PSNH raises a number of concerns with the compliance schedule EPA proposed for installation of closed-cycle cooling at Merrimack Station in its 2017 Statement, which was based, in part, on schedules previously proposed by PSNH for retrofitting Merrimack and Schiller Stations. *See* AR-1534 at 24-28. As discussed elsewhere in this Response to Comment, EPA has determined that the costs of closed-cycle cooling are not warranted as compared to the costs of wedgewire screens and that closed-cycle cooling is not the BTA for entrainment at Merrimack Station. As a result, the Final Permit does not include a compliance schedule for installing closed-cycle cooling at Merrimack Station.

6.2 The Wedgewire Screen Compliance Schedule Is Unworkable

Comment III.6.2	**AR-1548, PSNH, p. 174**
See also AR-1549, Enercon, pp. 44-47, 71-73	

The schedule for the design, permitting, construction, and tie-in of wedgewire screens at Merrimack Station must also be revised.[691] The proposed schedule set out in EPA's Statement includes the following key deadlines:

> Preliminary and final design: Provide a preliminary design of the wedgewire screens to be installed to EPA within six (6) months of the effective date of the permit and submit a final design to the agency within two (2) months after receipt of correspondence from EPA approving the preliminary design.
>
> Permits and approvals: Commence the process of obtaining necessary permits and approvals within four (4) months of submitting a final design to EPA.
>
> Construction contract: Execute an engineering, procurement, and construction agreement with a contractor within four (4) months of submitting the final design.
>
> Commissioning of wedgewire screens: Complete site mobilization and modifications, installation, tie-in, testing and commissioning of the wedgewire screens and all other technologies for the CWIS of Units 1 and 2 no later than sixteen (16) months of obtaining all necessary permits and approvals.[692]

PSNH takes issue with these proposed deadlines. EPA's attempt to require the permittee to enter into any construction contract exceeds the scope of the agency's authority under the CWA and is illegal *per se*. At most, EPA may set a deadline by which the permittee must have the CWIS technology in operation. How a permittee elects to ensure it will meet that deadline is left entirely to its discretion and the agency's attempt to insert itself in the managerial and/or operational functions of the permittee is inappropriate. Furthermore, this deadline is more appropriately tied to the date on which the permittee obtains the necessary permits and approvals it needs to commence construction, rather than to the submission of the final design.
Other deadlines EPA has proposed are patently unreasonable or are tied to or triggered by events or occurrences that should be adjusted. Prudent construction schedules mandate that certain deadlines are tied to the date of final permit issuance, while others must be tied to EPA's approval of a final design for the wedgewire screens or the date all necessary permits and approvals have been obtained. The following is a schedule and timeline that is sensible and would be reasonable if the permittee is ultimately forced to install the entrainment technology at Merrimack Station:

EVENT	**TIME** (including a description of the event to which the time is tied)
Effective Date of the Permit	0 mo[693]
Other Data Collection and Preliminary Design	9 mo from the date of Final Permit

Submission: Time to collect additional data EPA has delineated in the Statement, including but not limited to topographic and bathymetric surveys, geotechnical exploration, and other design and marine construction variables,[694] and time to submit a preliminary design of the wedgewire screens to EPA	issuance
Final Design Submission: Time to generate and provide a final design for the wedgewire screens at Merrimack Station based on all data collected.	3 mo from the date the permittee receives correspondence from EPA approving the preliminary design[695]
Permits and approvals: Complete submission of all necessary permit applications and notices required to install the wedgewire screens at Merrimack Station.	6 mo after EPA approves final design
Commissioning of wedgewire screens: Complete site mobilization and modifications, installation, tie-in, testing and commissioning of the wedgewire screens and all other technologies for the CWIS of Units 1 and 2.	18 mo after obtaining all necessary permits and approvals, in order for the permittee to first install the screens for Unit 1, test, monitor, and develop lessons learned, and then install the screens for Unit 2[696]

These are the only dates EPA can definitively establish in the Final Permit for Merrimack Station.

The schedule PSNH has set out above is well-reasoned and includes the minimum amount of time the permittee would need to properly design, install, and optimize the new technology at Merrimack Station. Thus, if EPA requires the permittee to install wedgewire screens at Merrimack Station, the agency must substantially revise its proposed compliance schedule and craft one that is reasonable and will offer a sufficient amount of time to comply with the permit requirement.

691 *See id.* at 30-32.
692 *See id.* at 31-32.
693 The commencement of this schedule may not be triggered by EPA's issuance of the Final Permit if the permit is appealed by one or more parties. Instead, this schedule would become operable once the Final Permit became effective, meaning all administrative and/or judicial proceedings that resulted in a stay of the relevant conditions of the permit have been fully exhausted.
694 *See id.* at 31.
695 More time could actually be required if different and/or multiple engineering and/or construction firms are involved in different phases of the construction project.
696 In fact, more than 18 months may be needed to complete the installation and tie-in of the wedgewire screens, depending upon when the Final Permit becomes effective, because the optimal time for Enercon to commence the construction phase of the project is September due to a historically low capacity factor for Merrimack

Station, coupled with slower river velocities and a lack of heavy debris in the waterbody during this time frame. *See* Enercon Technology Cost Inputs Memo at 6.

EPA Response:

EPA has reviewed the determination for the BTA in the Draft Permit in light of the comments received and maintains that controls to reduce entrainment are warranted at Merrimack Station. EPA concludes that the BTA for entrainment at Merrimack Station is fine-mesh wedgewire screens. *See* Responses to Comments III.4.2 and III.5.3, above. As the comment recognizes, meeting the requirements of the Final Permit for Merrimack Station will require certain improvements to the Facility's CWISs and time will be needed to plan and install the equipment needed to achieve compliance.

EPA's 2017 Statement proposed a compliance schedule by which the Permittee would achieve compliance with entrainment requirements under CWA § 316(b) via the use of wedgewire screens. *See* AR-1534 at 29-32. PSNH provided comments on this schedule and proposed a modified schedule that provides 8 months more than EPA proposed. Both schedules are substantially more accelerated than the final compliance schedule to install wedgewire screens at GSP Schiller Station because the pilot phase for Merrimack Station has already been completed. Compared to EPA's proposed schedule, PSNH's schedule includes an additional 4 months for the design phase (3 months for preliminary design and an additional 1 month for the final design), 2 additional months for submitting complete applications and notices to obtain necessary permits and approvals, and 2 additional months for construction. PSNH's schedule also proposes to stagger the installation of screens at Units 1 and 2 within the 18-month construction period. Enercon states that staggering implementation between the Units will enable the Permittee to incorporate lessons learned during installation and early operation of the screens for Unit 1 to improve installation of the screens for Unit 2.

The 2014 Final Rule requires compliance with the CWIS requirements under CWA § 316(b) as soon as practicable based on a schedule of requirements established by the permitting authority. 40 CFR § 125.94(b)(2) and § 125.98(c). In December 2016, PSNH submitted a Technical Memo prepared by Enercon that included additional information about wedgewire half-screens, including a preliminary design, and described future efforts to complete the design and testing. See AR-1352 (Attachment 1). *See also* AR-1361. A pilot study of wedgewire screens at Merrimack Station was completed during summer 2017. *See* AR-1550. Based, in part, on this pilot study, Enercon's 2017 comments include an update to the conceptual half-screen design, a preliminary cost estimation, and a procurement and construction schedule. *See* AR-1549. Enercon's construction schedule is consistent with the proposed 18-month timeline in the comment and includes a staggered installation for Units 1 and 2. EPA agrees that the additional 2 months for construction and the staggered installation is reasonable and has included 18 months for construction in the final compliance schedule. PSNH also proposes that certain milestones (e.g., preliminary and final design) be tied to EPA approval, which will extend the proposed schedule beyond 36 months. The final compliance schedule includes a milestone for EPA approval of the preliminary design within 60-days of submission, which is consistent with the final compliance schedule for wedgewire screens at GSP Schiller Station. The final compliance

schedule also provides 3 months for the final design submission and 6 months for completing submission of all necessary permit applications and notices, as requested in the comment. However, the comment proposes 9 months for submission of a preliminary design. PSNH offers no explanation for the additional 3 months for the preliminary design, particularly as the record demonstrates that a substantial amount of site-specific work has already been completed to evaluate this technology and develop conceptual designs. The final compliance schedule for GSP Schiller Station included 18 months for pilot study and 3 months for submission of a preliminary design. EPA recognizes that there is additional work necessary to finalize the conceptual designs that have already been submitted, but the comment fails to explain why 6 months for the preliminary design is insufficient given the amount of work that has already been completed on the conceptual designs and pilot study.[78] For these reasons, the final compliance schedule requires submission of a preliminary design within 6 months. The compliance schedule in the Final Permit, which slightly extends the timelines for final design, permitting, and construction and allocates 60-days for EPA approval of the design extends the compliance deadline from 28 months (plus EPA approval time) as proposed in the 2017 Statement to 35 months.

Beyond issues related to the specific timelines proposed by PSNH as addressed above, EPA disagrees with several aspects of the permittee's comment. According to the comment:

> [a]t most, EPA may set a deadline by which the permittee must have the CWIS technology in operation. How a permittee elects to ensure it will meet that deadline is left entirely to its discretion and the agency's attempt to insert itself in the managerial and/or operational functions of the permittee is inappropriate.

The comment provides no authority or explanation for this statement. The Clean Water Act defines "schedule of compliance" to mean "*a schedule of remedial measures* including an enforceable *sequence of actions or operations leading to compliance* with an effluent limitation, other limitation, prohibition, or standard," 33 U.S.C. § 1362(17) (emphases added), and EPA regulations similarly define the term as "*a schedule of remedial measures* included in a 'permit,' including an enforceable *sequence of interim requirements* (for example, actions, operations, or milestone events) *leading to compliance* with the CWA and regulations," 40 CFR § 122.2 (emphases added). Furthermore, a NPDES "permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations." *Id*. § 122.47(a). The existence of § 122.47(a) and the statutory and regulatory definitions contradict the notion that the only "deadline" that EPA is authorized to set is the date for final compliance. If that were true, there would be no need to define a "schedule for compliance" and 40 CFR § 122.47(a) would simply

[78] Enercon (AR-1549 at 72-3) comments that the compliance schedule should be revised because the preliminary wedgewire designs were revised to a design based on a half-screen technology. The conceptual designs and pilot study have all been submitted after PSNH revised the design for wedgewire half-screens and it is unclear why the compliance schedule, which was based on information and submissions after the change to half-screens, should be revisited. In addition, Enercon comments that the recently announced change in Station ownership (at the time of the comments) should be considered. Since the 2017 comments were submitted, the transfer of ownership of Merrimack Station to GSP has been completed and it is not clear why it should be an issue for the purposes of a compliance schedule more than two years after the transfer.

not exist in its current form. Instead, 40 CFR § 122.47(a) would likely only provide that EPA may set the time for final compliance.[79]

The comment asserts that the dates proposed by PSNH "are the only dates EPA can definitively establish in the Final Permit for Merrimack Station." As explained above, 40 CFR § 122.47 stipulates that EPA may specify a schedule leading to compliance with the CWA and its implementing regulations, and neither restricts the steps that may be in the schedule nor limits the schedule to only a final deadline for compliance. The regulation also provides that EPA may set "interim" requirements and dates (*i.e.*, more than just the final requirement and date). *Id.* § 122.47(a)(3) (where "a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement"). Similarly, EPA noted in the preamble to the 2014 § 316(b) regulations that, "[b]ecause an entrainment requirement could require controls that take many years to design, finance and construct, the [permitting authority] may establish interim milestones related to meeting the final requirements to ensure that the facility is making progress." 79 Fed. Reg. at 48,327. These provisions regarding interim requirements and dates are a particularly clear indication that the schedule may, and in some cases must, include steps towards compliance with the permit requirement and not just a "deadline by which the company must have the CWIS technology in operation." The regulation requires EPA in certain instances to set not just interim requirements and dates, but also "dates for the submission of reports of progress *toward completion of the interim requirements*." *Id.* § 122.47(a)(3)(ii) (emphasis added). Finally, the regulation provides several examples of interim requirements that may be in a schedule of compliance, which "include: (a) Submit a complete Step 1 construction grant (for POTWs); (b) let a contract for construction of required facilities; (c) commence construction of required facilities; and (d) complete construction of required facilities." *Id.* § 122.47(a)(3) note. In short, the regulations contradict the comment that EPA may not establish a schedule including anything other than a deadline for the operation of the technology and that the schedule may not include a requirement to enter into a construction contract.

In the proposed compliance schedule, the final compliance date (commissioning of fine-mesh wedgewire screens) is 16 months from the previous date (obtaining all necessary permits and approvals).[80] In addition, once the Permittee submits the necessary permit applications and

[79] Numerous specifics of these provisions also support EPA's reading. For instance, the word "sequence" in each definition reinforces that a schedule of compliance will include more than just the final date for compliance, because a "sequence" includes more than just one item, by definition. Further, the words "measures," "actions," "operations," and "events" in the definitions are plural, where under the commenter's theory, they would be singular or would not exist in the regulation at all. Furthermore, each of these provisions indicates that the sequence of requirements in a schedule will lead to compliance with the CWA and implementing regulations, whereas, under the theory presented in the comment, they would simply set a date for final compliance, not a path or series of milestones leading to compliance.

[80] In its comment, PSNH suggests that the deadline by which the permittee must have the CWIS technology in operation "is more appropriately tied to the date on which the permittee obtains the necessary permits and approvals it needs to commence construction, rather than to the submission of the final design." The schedule proposed in EPA's 2017 Statement always tied the final compliance deadline to obtaining all necessary permits and approvals. *See* AR-1534 at 32. The compliance schedule in the Final Permit also ties this final milestone to obtaining all necessary permits and approvals.

notices, the period of time until the necessary permits are obtained is outside of the control of the Permittee. Under 40 CFR § 122.47(a)(3)(i) and (ii), if the time between interim compliance dates exceeds one year and the time necessary for completion of interim requirements is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date. As a result, interim steps must be included in the compliance schedule during the construction milestone because more than one-year elapses between requirements. Accordingly, the final compliance schedule includes submission of a status reports for each six-month period after the Permittee completes submission of all permit applications and notices and during every six-month period until all necessary permits are obtained. The Final Permit also requires a status update within 12 months after obtaining all permits and approvals, indicating progress toward, and a final date for, commissioning the screens.

The compliance schedule in the Final Permit has extended the final compliance deadline from 28 months (plus EPA review time) to 35 months (including EPA review time). As stated above, this relatively small extension in time is reasonable in order to ensure that the wedgewire screen design will reduce entrainment to the smallest amount reasonably possible for this site.

7.0 Additional Comments Submitted by Conservation Law Foundation, EarthJustice, Environmental Integrity Project, and Sierra Club (CLF et al.)

7.1 New Regulations for Minimizing Adverse Environmental Impact at Cooling Water Intake Structures – Clean Water Action Section 316(b)

Comment III.7.1	AR-1573, CLF et al., pp. 13-14

Cooling water intake structures ("CWIS") can cause or contribute to a variety of adverse environmental effects including "entrainment" (drawing small organisms into the mechanism, killing or injuring them) and "impingement" (trapping larger organisms against intake points). Cooling water intake structures must comply with technology-based requirements under CWA §316(b).

Section 316(b) provides for a technology standard that requires "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available [("BTA")] for minimizing adverse environmental impacts." 33 U.S.C. § 1326(b). For existing sources, section 316(b)'s limitations are technology-based performance requirements analogous to those derived for point sources under Section 301. Although section 316(b) came into effect in 1972, since 1976, when EPA proposed its first 316(b) regulation, the provision has been the subject of extensive litigation.

At the time EPA issued its Draft Permit in 2011, there were no effective § 316(b) national categorical standards to apply to the CWISs at Merrimack. Attachment D at 221. As a result, EPA's BTA determination for Merrimack was governed by 40 C.F.R. § 125.90(b) which provides that "[e]xisting facilities that are not subject [to other requirements] must meet requirements

under section 316(b) of the CWA determined by the Director on a case-by-case best professional judgment (BPJ) basis." See also 40 C.F.R. § 122.44(b)(3). While neither the CWA nor EPA regulations dictate a specific methodology for developing permit limits based on a BPJ determination of BTA, EPA is guided by its own precedent and by the federal courts' interpretation of the § 316(b). Attachment D at 225-26.

EPA previously determined in its Draft Permit that the BTA for Merrimack's CWISs, using its best professional judgment, was closed-cycle cooling on a seasonal basis. Attachment D at 309. After EPA issued the 2011 Draft Permit, in 2014 EPA promulgated new regulations under CWA § 316(b) that apply to existing facilities with CWISs such as Merrimack. See 79 Fed. Reg. 48300 (Aug. 15, 2014) (codified at 40 C.F.R. § 12221(r) and part 125, Subpart J). Although the rules are being challenged in court, the regulations are now in effect. See 40 C.F.R. §§ 122.43(b)(1), 125.91(a) and 125.94(a)(1).

EPA Response

In the comment, CLF, Earthjustice, Environmental Integrity Project, and Sierra Club (hereinafter, "CLF") provide their summary of § 316(b) of the CWA and the basis of the determination of the BTA under § 316(b) in the Draft Permit for Merrimack Station. EPA generally agrees with CLF's view of the statute and the basis of seasonal closed-cycle cooling as the entrainment BTA for Merrimack Station in the Draft Permit as presented in the comment. CLF also comments that the 2014 regulations were, at the time of the 2017 Statement, facing multiple challenges brought by industry and environmental petitioners in Federal court. EPA notes that since this comment was submitted, the Second Circuit denied those challenges and upheld the 2014 Final Rule. S*ee Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018). EPA responds to CLF's substantive comments on the Draft Permit and subsequent Statement below.

7.2 EPA's New Regulations Should Not Affect the Proposed, BPJ-based 316(b) Determination that EPA Reached in 2011

Comment III.7.2	**AR-1573, CLF et al., pp. 15-16**
See also AR-851, CLF, pp. 11-18, 23-27	

The new CWA § 316(b) regulations do not affect EPA's BTA determination at Merrimack. Of course, EPA must make a BTA determination in renewing this permit. The new regulations provide that, "[i]n the case of any permit issued after July 14, 2018, at a minimum, the permit must include conditions to implement and ensure compliance with the impingement mortality standard at § 125.94(c) and the entrainment standard at § 125.94(d), including any measures to protect Federally-listed threatened and endangered species and designated critical habitat required by the Director." 40 C.F.R. § 125.98(b)(2).

However, the new regulations do not require EPA to reopen its BTA determination, nor do they provide incentive or justification for doing so. To the contrary, the regulations invite Region 1 to finalize the determination made in 2011:

> In the case of permit proceedings begun prior to October 14, 2014 whenever the Director has determined that the information already submitted by the owner or operator of the facility is sufficient, the Director may proceed with a determination of BTA standards for impingement mortality and entrainment without requiring the owner or operator of the facility to submit the information required in 40 CFR 122.21(r). The Director's BTA determination may be based on some or all of the factors in paragraphs (f)(2) and (3) of this section and the BTA standards for impingement mortality at § 125.95(c). In making the decision on whether to require additional information from the applicant, and what BTA requirements to include in the applicant's permit for impingement mortality and site-specific entrainment, the Director should consider whether any of the information at 40 CFR 122.21(r) is necessary.

40 C.F.R. § 125.98(g).

For Merrimack, EPA should clearly determine that the information already submitted is sufficient. The 2011 proposed BTA determination was clearly documented and based on a thorough and methodical analysis. EPA determined in 2011 that the information submitted was sufficient, and that is still true today.

Further, the new § 316(b) regulations do not significantly affect EPA's decision-making process. EPA did not set a standard for entrainment in the rule; instead, it effectively codified the case-specific best professional judgment decision-making process already used by EPA in New Hampshire. EPA's rule leaves entrainment BTA decisions to permit writers to be made on a site-specific basis (see 40 C.F.R. § 125.94(d)), using the same factors that have historically been used by EPA in making BTA determinations. See 40 C.F.R. § 125.98(f)(2)-(3)). And in lieu of setting a firm impingement standard, EPA has created a discretionary set of seven options for permit writers to choose from. In essence, the first six options reduce to achieving a through-screen velocity of less than 0.5 feet per second, installing modified traveling screens with a fish return system, use of an existing offshore velocity cap, or otherwise achieving a 76% reduction in impingement mortality. The impingement standard is completely discretionary, however, because the seventh "option" is to use "any combination of measures approved by the Director as BTA on the basis that it is demonstrated to 'minimize impingement mortality of all non-fragile species.'" See 40 C.F.R. § 125.94(c)(6).

It should be noted that EPA is currently in violation of its Clean Water Act obligations to issue NPDES permits for terms that do not exceed five years and to reissue and fully review those permits every five years. See 33 U.S.C. § 1342. The new rule does not change these obligations and does not require any significant reconsideration on the part of EPA. Now that the rule is final, EPA must complete the BTA determination process and issue Eversource's overdue permit as quickly as possible.

EPA Response:

CLF comments that the new CWA § 316(b) regulations (2014 Final Rule) do not require EPA to reopen its BTA determination. EPA agrees that the 2014 Final Rule authorizes the permitting authority to proceed with ongoing permit proceedings begun prior to October 14, 2014 (as is the case for Merrimack Station) without the additional information required at 40 CFR § 122.21(r). *See* 40 CFR § 125.98(g). EPA also agrees that the information already submitted during development of the Draft Permit and upon which the draft BTA determination was made, as well as information submitted subsequent to the 2011 Draft Permit (up to and including information submitted during the public comment for the 2017 Statement) is sufficient to support a BTA determination for the Final Permit. *See* AR-1534 at 16 ("EPA concludes that it can address the appropriate factors under the statute and regulations without additional information submissions under 40 CFR § 122.21(r)") and Response to Comment III.2.3.

CLF comments that the 2014 Final Rule does not affect EPA's decision-making process or the 2011 BTA determination. According to CLF, the 2014 Final Rule establishes that entrainment BTA decisions are made on a site-specific basis using the same factors that have historically been used by EPA in making BTA determinations. The 2011 BTA analysis considered several factors, many of which were similar to those put forth in 40 CFR § 125.98(f)(2) and (3) for establishing site-specific entrainment controls. *See* AR-618 at 228-238. As CLF points out, the Final Rule does not require that BTA determinations which were ongoing at the time of the promulgation of the Final Rule be based on the factors at 40 CFR § 125.98(f)(2) and (3), only that the permitting authority *may* consider these factors. EPA agrees with CLF that the justification for the BTA determination from 2011 is not invalidated by the promulgation of new regulations. At the same time, EPA is not prevented from revisiting its 2011 BTA analysis in light of the new regulations and information subsequent to the initial notice period, and in response to comments received during the multiple notice periods for this permit. As an example, PSNH submitted additional information during the initial and subsequent public notice periods for this permit that is substantially similar to the information required in 40 CFR § 122.21(r). *See*, *e.g.*, AR-1550, AR-1567. EPA would expect to review its preliminary BTA determination based on information and comments submitted during the public notice period prior to issuing any Final Permit. In this case, review is particularly warranted given the number of comments and studies received regarding the draft BTA determination and in light of the new regulations. *See* AR-1534 at 17; Responses to Comments III.2.0 (and associated sub-comments).

According to CLF, rather than establishing a single impingement standard, the 2014 Final Rule creates a "discretionary set of seven options for permit writers to choose from." EPA notes that under the Rule, the permittee would typically elect which of the seven compliance alternatives it will use to meet the impingement mortality BTA requirements. *See* 40 CFR §§ 125.94(c), 122.21(r)(6) (Chosen Method of Compliance with the Impingement Mortality Standard). The existing technology at Merrimack Station does not satisfy any of these impingement BTA compliance alternatives and the Permittee must select, and comply with, one of the BTA alternatives for impingement mortality in 40 CFR § 125.94(c)(1) through (7) as soon as practicable. In addition, the Final Rule encourages permitting authorities to consider the extent to

which technologies operated for purposes of minimizing entrainment may also be used to satisfy § 125.94(c). EPA has determined that the BTA for entrainment at Merrimack Station is seasonal operation of wedgewire screens—a technology that would satisfy the impingement BTA alternatives of maximum through-screen velocity of 0.5 fps, at least for the periods it operates. *See* Response to Comment III.4.2 and III.5.3. EPA believes that this technology, when combined with PSNH's proposed fish-friendly return, an optimized rotation frequency, and perhaps even flow reductions, may allow the facility to comply with the "systems of technologies" standard at § 125.94(c)(6). Or, the Permittee may choose to comply with another impingement BTA alternative, the most likely of which would be modified traveling screens, which will also require installation of a new fish return. The facility could also choose to comply with § 125.94(c) by operating the wedgewire screens year-round. The Final Permit sets Merrimack Station on a path to comply with § 125.94(c) as soon as practicable by immediately requiring a new fish return and, once constructed, an impingement technology performance optimization study to evaluate the effectiveness of the system of technologies (i.e., seasonal wedgewire screens, new fish return, optimal rotation frequency). Should the permittee later choose to comply with the impingement BTA standard using modified traveling screens or an alternative method, EPA could modify the permit. *See also* Response to Comment III.3.1.

Finally, CLF notes that EPA is currently in violation of its Clean Water Act obligations to issue NPDES permits for terms that do not exceed five years and to reissue and fully review those permits every five years, and comments that the 2014 Final Rule does not change its obligation and does not require any significant reconsideration on the part of EPA. As the commenter is no doubt aware, EPA regulations allow for the continuation of NPDES permits beyond the 5-year term under conditions that exist here. 40 CFR § 122.6; *see also* 5 U.S.C. § 558(c). Nonetheless, EPA is acutely aware that the Merrimack Station permit has been administratively continued for a lengthy period of time and is eager to issue a new Final Permit as soon as possible. At the same time, EPA is committed to providing a fair, legally sound process for the development of this Final Permit, and to developing scientifically and legally sound permit conditions that will ensure the protection of the Merrimack River well into the future, including those consistent with the 2014 Final Rule. AR-1534 at 10. Thus, EPA has reviewed its BTA determination for this Final Permit both in response to the voluminous comments received on its preliminary determination and to ensure that the Final Permit is consistent with the effective regulations governing determination of the BTA at CWISs under the 2014 Final Rule.

7.3 The availability of wedgewire-half screens is not demonstrated in-situ and, in any case, remains inferior to the closed-cycle cooling option that EPA already selected and that is required in light of EPA's Denial of a 316(a) Thermal Variance

Comment III.7.3	**AR-1573, CLF et al., pp. 16-18**

EPA should not reopen the 2011 BTA determination because the permittee is now proposing to study a new compliance option, wedgewire-half screens. This determination is long overdue and cannot be further delayed for more studies because, as noted above, EPA is already in violation of

its duty to timely renew this permit. Further, as EPA noted in the Statement of Substantial New Questions for Public Comment, even under EPA's new interpretation of the law, the new regulations "require compliance as soon as practicable" with Section 316(b). SSNQPC at 23. Slowing down the BTA determination process to await new information when EPA has already reached a decision is not consistent with EPA's legal duties.

Further, under the best conditions cylindrical wedgewire-half screens will not be nearly as effective in reducing impingement and entrainment as the cooling towers that EPA has already proposed as BTA. And the 2011 determination to require seasonal use of cooling towers harmonizes with the requirement to install cooling towers to comply with Section 316(a) of the Act.

There is also considerable uncertainty about whether wedgewire-half screens will function in the Hooksett Pool. The permittee has not yet conducted studies to estimate the impingement and entrainment levels to be expected under actual conditions in the Hooksett Pool at the appropriate depth and location. The permittee has not conducted a detailed flow study in the vicinity of the intake. And most importantly, the permittee has not considered the biofouling potential of the Asian Clam to affect operation of narrow slot width wedgewire-half screens. The USGS has noted that "[t]he most prominent effect of the introduction of the Asian clam into the United States," like that of zebra mussels, "has been biofouling, especially of complex power plant and industrial water systems." USGS, "Corbicula Fluminea Fact Sheet," http://nas.er.usgs.gov/queries/factsheet.aspx?speciesid=92 (last visited December 15, 2017). Perhaps the largest uncertainty, however, relates to ambient velocities in the Hooksett Pool and whether they will create adequate sweeping flows for these screens to function under all conditions – particularly under summer low flow conditions.

For wedgewire screen technology to be effective in reducing entrainment, screen systems must be designed with: (1) sufficiently small screen slot size to physically block passage of the smallest lifestage to be protected; (2) low through-slot velocity; and (3) relatively high-velocity ambient current cross-flow to carry organisms and debris around and away from the screen. Only where all of these conditions are present are wedgewire screens effective at reducing entrainment. EPA has acknowledged that for wedgewire screens to perform effectively and avoid fouling, "locations also need to have an adequate source water sweeping velocity." 76 Fed. Reg. 22174, 22000 (April 20, 2011).

Insufficient velocity will greatly increase the impingement and entrainment rate. Larvae are fragile organisms and can be easily damaged by impacts with wedgewire-half screens, particularly on a repeated basis. Wedgewire-half screens are designed to be oriented parallel to that flow to decreased impingement and reduce fouling. But this actually increases screen-to-organism contact times because organisms must travel the full length of the screen before returning to the water body. See EPA, Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule 2-19 (2011) at 6-40. In low current (ambient flow) conditions, larvae will not be moved away from or along the screen by water movement, so they will likely suffer multiple screen encounters as they are repeatedly moved by the current towards the screen, until they are exhausted and pass through or are impinged upon the screen.

Because the Merrimack is dammed both above and below the station, water velocity in the Hooksett Pool is dependent on release rates of the upstream and downstream dams. But these dams are managed for multiple purposes, and releases are not optimized to provide the desired velocities near Merrimack Generation station. The ambient flow in the river is not guaranteed to meet Merrimack's needs for adequate sweeping velocities.

At best, wedgewire screens remain unproven; they may not be at all feasible in the Hooksett Pool. And even if feasible, their operational effectiveness is entirely dependent on river conditions that Merrimack Generating Station cannot control. There may be needs of other users, for power, storage, water level maintenance, or other purposes that render wedgewire screens highly ineffective.

Overall, the performance of a wedgewire-half screen system that has not yet been designed, of an unknown slot-width size, in environmental conditions that have not been fully assessed, cannot be considered equivalent to closed-cycle cooling. In contrast, cooling towers are available, proven, and considerably more effective than wedgewire-half screens at minimizing both entrainment and impingement, as well as thermal discharges. They are the best technology available.

EPA Response

First, CLF comments that "EPA should not reopen the 2011 BTA determination" to study a new compliance option (wedgewire-half screens), because a final BTA determination is long overdue and cannot be further delayed for more studies. EPA agrees that delaying a BTA determination for further study is not necessary. In its 2017 Statement, EPA explained that the existing record (including comments submitted on the 2011 Draft Permit and 2014 Revised Draft Permit) is sufficient to address the relevant factors under the 2014 Final Rule without additional information submissions under 40 CFR § 122.21(r). *See* AR-1537 at 16. The 2017 Statement summarized comments and new information about wedgewire screens received subsequent to issuance of the 2011 Draft Permit indicating that this technology may be an available and effective technology to reduce entrainment at Merrimack Station. *Id*. at 17-20. The 2017 Statement requested public comment on these issues. *Id*. at 21. EPA has reviewed its preliminary conclusions about wedgewire screens in the 2011 Draft Determinations Document in light of comments and new information received since the 2011 Draft Permit issuance, including through the 2017 public notice period, and has determined that wedgewire screens are an available technology for entrainment (and when operating, impingement) at Merrimack Station. *See* Response to Comment III.4.2. EPA is not reopening a BTA determination to study a new compliance option but making a final BTA determination consistent with 40 CFR § 125.94(a)(1) based on its review of all of the comments pertaining to the CWIS requirements submitted in 2012, 2014, and 2017, including comments on the availability and effectiveness of wedgewire screens.

CLF comments that cylindrical wedgewire-half screens "will not be nearly as effective" as cooling towers and "cannot be considered equivalent to closed-cycle cooling." For the 2011 Draft Permit, EPA concluded that seasonal use of closed-cycle cooling would result in a 95% reduction in entrainment at Merrimack Station. *See* AR-618 at 338. EPA recognizes that closed-cycle cooling is the best performing technology in the industry and will achieve the greatest reduction

in entrainment as evidenced by EPA's selection of closed-cycle cooling in the 2014 Final Rule as the BTA for impingement mortality and entrainment at *new* units based on the high levels of flow reduction obtained. 40 CFR § 125.94(e)(1); *see* 79 Fed. Reg. at 48,338. The Final Rule did not settle on closed-cycle cooling as a mandated, industry-wide BTA for entrainment reduction for existing facilities like Merrimack Station, however, opting instead to continue the approach of making entrainment reduction BTA determinations on a site-specific basis after consideration of a diverse suite of factors. *See* 40 CFR § 125.98(f). As the preamble to the Final Rule states, "[t]he entrainment provisions reflect EPA's assessment that there is no single technology basis that is BTA for entrainment at existing facilities, but instead a number of factors that are best accounted for on a site-specific basis." 79 Fed. Reg. at 48,303.

EPA does not take the position that wedgewire screens will be as effective as closed-cycle cooling. EPA recognized in its 2017 Statement that even if wedgewire screens are available and effective at Merrimack Station, "closed-cycle cooling will still be expected to reduce entrainment to a greater degree than wedgewire screens." AR-1534 at 19. At the same time, the expected reduction in entrainment at Merrimack Station under the Final Permit is not that much lower. *See* Response to Comment III.5.2.3 (estimating that wedgewire screens would prevent the entrainment of about 2.75 million to 6.8 million eggs and larvae, at AIF and DIF, respectively, whereas closed-cycle cooling would prevent the entrainment of about 3 million to 7.4 million eggs and larvae, at AIF and DIF, respectively).[81] Moreover, the technology that results in the greatest reduction in entrainment is not necessarily the BTA for a facility after a site-specific consideration of the relevant factors. *See* 40 CFR § 125.98(f)(1) (authorizing EPA to "reject[] any entrainment control technologies or measures that perform better than the selected technologies or measures"), (2) (requiring EPA to consider several factors in addition to numbers of organisms entrained) (3) (authorizing EPA to consider even more factors), (4) (authorizing EPA to "reject an otherwise available technology as a BTA standard for entrainment if the social costs are not justified by the social benefits"). In *Entergy Corp. v. Riverkeeper, Inc.*, the Supreme Court rejected a similar argument, observing that "'minimize' is a term that admits of degree and is not necessarily used to refer exclusively to the 'greatest possible reduction.'" 556 U.S. 208, 219 (2009); *see also Hudson Riverkeeper Fund v. Orange & Rockland Utils.*, 835 F. Supp. 160, 165 (S.D.N.Y. 1993) (noting that, in a site-specific, case-by-case analysis of § 316(b) requirements, "best available doesn't mean perfect"). Instead, the Court found that EPA has the discretion to determine "the extent of reduction that is *warranted under the circumstances*," a "determination that could plausibly involve a consideration of the benefits derived from reductions and the costs of achieving them." *Id.* (emphasis added). EPA explained in the 2017 Statement that it was reconsidering whether the cost of closed-cycle cooling is warranted in light of the potentially better-than-previously-estimated performance of wedgewire screens and the possible resolution of logistical and engineering issues originally discussed in the 2011 Draft Determinations Document. *See* AR-1534 at 20. The difference in cost between the two technologies is substantial

[81]Put another way, closed-cycle cooling would reduce annual entrainment by about 257,000 (at AIF) to 581,000 (at DIF) more eggs and larvae than would fine-mesh wedgewire screens. Normandeau estimated that wedgewire screens at Merrimack Station will reduce entrainment by about 89%, as compared to the existing system, which includes no entrainment reduction technology. The Final Permit's thermal limits, which effectively cap the facility's operation as a peaking plant, and provisions regarding scheduling the Unit 2 annual maintenance outage during peak entrainment provide further entrainment reduction.

and ranges from $68 to $102 million. Weighing the social costs and benefits of the available technologies, EPA has determined that the significantly higher cost of closed-cycle cooling (estimated to be 6 to 10 times more than wedgewire screens) is not warranted by the comparatively small incremental benefits. *See* Response to Comment III.5.2.3. Additionally, the Final Permit sets a maximum through-screen velocity at the wedgewire screens (which, again, would be operated seasonally) of 0.5 fps, which EPA has found protects the vast majority of impingeable aquatic organisms and should achieve a greater reduction in impingement mortality than the technology on which the Final Rule's impingement mortality standards are based (i.e., modified traveling screens). 79 Fed. Reg.at 48,345. The Final Permit also requires installation and operation of a new fish return. This is not to say that EPA expects wedgewire screens to achieve an impingement mortality reduction as high as closed-cycle cooling would, but the reduction will nonetheless be significant. EPA's determination of the BTA at Merrimack Station is reasonable in light of the information in the record and is consistent with the Final Rule.

CLF also suggests that EPA finalize the 2011 BTA determination because a requirement to operate closed-cycle cooling as the BTA "harmonizes with the [2011 Draft Permit] requirement to install cooling towers to comply with Section 316(a) of the Act." The technology-based thermal requirements in the 2011 Draft Permit were based on closed-cycle cooling as the best available technology (BAT) to reduce thermal load to the river. *See* AR-618 at 210-17. In addition, the preliminary determination that seasonal closed-cycle cooling is the BTA for Merrimack Station under CWA § 316(b) was not based on the technology-based thermal limits, although EPA considered that the Facility would have to install closed-cycle cooling to meet the thermal limits in determining the BTA for the Draft Permit. *See* AR-618 at 347-49. There is no regulatory requirement to "harmonize" effluent limitations to meet thermal limits with permit conditions governing the intake of cooling water, nor is there any regulatory bar from doing so. Under the Final Rule, site-specific entrainment controls must reflect the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology for minimizing adverse environmental impact at each facility. 40 CFR § 125.98(f). The permitting authority may consider thermal discharge impacts as one of the relevant factors in making its decision, but ultimately the determination of the BTA must reflect the maximum reduction warranted. In a case where a facility must install closed-cycle cooling to meet thermal requirements, a technology that does not perform to the level of closed-cycle cooling could be the BTA if its performance reflects the maximum reduction in entrainment warranted to minimize adverse environmental impact. At the same time, a facility required to install closed-cycle cooling to meet thermal limits would likely comply with requirements under § 316(b) because flow reductions achieved through operation of closed-cycle cooling would exceed the reduction in entrainment from any other technology. *See also* AR-1534 (observing that, "if closed-cycle cooling is used year-round to limit thermal discharges," EPA could still conclude that wedgewire screens were the BTA, although "the installation of wedgewire screens would be unnecessary" in such a case).

For Merrimack Station, EPA conducted an independent analysis of the impacts of the CWIS, the technological and economic feasibility of available CWIS technologies, and the relative costs and benefits of available technologies. *See* AR-618 at 347. For the Final Permit, EPA reconsidered its determination in response to comments received and to be consistent with the requirements of the

2014 Final Rule. EPA concluded that wedgewire screens are the BTA for entrainment. *See* Response to Comments III.4.2, 5.2, 5.3. If the Final Permit required closed-cycle cooling to meet the thermal limits, this technology would exceed the entrainment reductions achieved by wedgewire screens and would comply with the BTA. However, EPA also revisited the thermal limits of the 2011 Draft Permit and the Final Permit includes temperature limits that do not require closed-cycle cooling, but which EPA believes will be protective of the balanced, indigenous population in compliance with a thermal variance from technology- and water quality-based temperature limits under CWA § 316(a). *See* Response to Comments II.1.1, II.3.4 (and associated sub-comments).

Responding to EPA's request for public comments about the potential availability and performance of wedgewire screens at Merrimack Station, CLF expresses that there remains considerable uncertainty about the functionality of the technology for this Facility. CLF comments that additional study is required to evaluate the performance of the screens in Hookset Pool and questions the suitability of the river for proper functioning of the screens, particularly as related to ambient velocity. CLF also comments that biofouling of the screens may be an issue and that the potential for the Asian clam to foul the screens has not been addressed. For these reasons, CLF maintains that wedgewire screens remain unproven and comments that the technology may not be feasible and, even if feasible, their operational effectiveness not guaranteed.

The 2017 Statement explained that comments received on the Draft Permit question EPA's determination that the physical limitations of Hooksett Pool would prevent the use of wedgewire screens. *See* AR-1534 at 18-19. In particular, the 2017 Statement acknowledged that the proposed half-screen design and seasonal deployment could potentially address concerns about adequate depth and the number of screens, and that data submitted in 2012 suggest that adequate sweeping flows are likely to exist during the time period when the majority of eggs and larvae will be present. *See id*.; *see also* AR-846; AR-864; AR-872; AR-1231, Exhibit 4 and Attachment 1 to Exhibit 4; AR-1352, Attachment 1; and AR-1361. In Response to Comment III.4.2, EPA presents its analysis of the body of information and comments and its conclusion that the half-screen design (first proposed in 2014) is an available technology to address entrainment. CLF does not identify any specific inadequacy in any of the comments and supporting material referenced in the 2017 Statement, which were publicly available as part of the Administrative Record at the time. The record supports the conclusion that the proposed designs are suitable for the location. *See* Response to Comment III.4.2. Since the 2017 Statement, PSNH refined the proposed design (see AR-1549) and completed a site-specific pilot of the screens to evaluate performance under actual conditions in the Hooksett Pool at the appropriate depth and location and confirmed that the screens effectively reduce entrainment at Merrimack Station. *See* AR-1549 at 21-47, 1550; *see also* Response to Comment III.4.2. The compliance schedule in the Final Permit requires that the preliminary design be submitted within 6 months of the effective date of the permit and finalized within 2 months from obtaining EPA approval, which is possible only due to the extensive engineering and biological analyses that have already been completed. *See* Response to Comment III.6.2. Finally, the proposed design considered the potential for colonization by fouling organisms and has proposed both a copper-nickel alloy coating to reduce bio-fouling and prevent corrosion (the "Z-alloy" has been shown to effectively prevent growth of colonizing organisms

like zebra mussels) and an airburst system that uses compressed air to periodically clean the screens. *See* AR-1549 at 28, 44-44. In addition, the larger slot size balances the effectiveness of the screens to reduce entrainment with the potential for biofouling and debris accumulation to interfere with operation. *See* AR-1549 at 26-28.

CLF states that three parameters of wedgewire screens are critical to ensuring entrainment reductions: (1) sufficiently small screen slot size to physically block passage of the smallest life stage to be protected; (2) low through-slot velocity; and (3) relatively high-velocity ambient current cross-flow to carry organisms and debris around and away from the screen. The proposed designs and pilot study are based on a slot size of 3 mm. While the 2014 Final Rule describes fine mesh screens as having a mesh size of 2 mm or smaller, it does not require any specific slot size for establishing entrainment controls. *See* 79 Fed. Reg. 48,349. In the 2017 Statement, EPA noted that it was considering "fine-mesh" wedgewire screens, which it said the agency has generally considered to be "slot sizes less than or equal to 2.0 mm," although it has also said they could range up to 3mm. AR-1534 at 30 n.5. EPA also said in the 2017 Statement that, if it determined that wedgewire screens are the BTA for entrainment at Merrimack Station, it would define the appropriate slot size based on public comments on the 2017 Statement and on the results of the 2017 site-specific pilot study. *Id.* Thus, EPA gave notice that it was considering slot sizes from 0.5mm to 3mm and would make a decision on slot size based on public comments received. CLF, however, chose not to offer any specific comments on this issue, except to suggest in general terms that wedgewire screen technology is only effective in reducing entrainment if the slot size is based on physical exclusion "of the smallest lifestage to be protected." In the past, it was thought that a slot size no larger than the smallest life stage was necessary for wedgewire screens because the primary mechanism for preventing entrainment was physical exclusion. However, recent research highlighted and summarized in the 2017 Statement (and contemporaneously made available in the record) suggests that wedgewire screens reduce entrainment through physical exclusion, hydraulic bypass, and larval avoidance, and that reductions can be achieved even at slot sizes as large as 2 to 3 mm. *See* AR-1534 at 18-19. CLF may disagree with this research, but it must provide more than conclusory statements to explain and justify its disagreement. *See* 40 CFR § 124.13 (requiring commenters to "raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position") (emphasis added). In its 2017 study, Normandeau observed an 89% reduction in entrainment of eggs and larvae with 3-mm slot wedgewire screens compared to control densities. AR-1550 at 18, 29; *see also* AR-1549 at 7. At Merrimack Station, entrainment is dominated by post-yolk sac larvae, which have been shown to effectively avoid wedgewire screens, and eggs account for a relatively low percentage of the organisms entrained; more than half of the larvae collected during the 2006-2007 study were larger than 10 mm. *See* AR-618 at 247; AR-1402; AR-2 (Table 3-3). In the 2017 pilot study, Normandeau observed a 96% reduction in entrainment of post-yolk sac larvae and relatively high exclusion (87%) of length classes that were physically small enough to pass through the 3 mm slot size. *See* AR-1550 at 18, 30, 47-48. Research on the effectiveness of wedgewire screens to effectively reduce entrainment of post-yolk sac larvae, supplemented by the results of the 2017 site-specific pilot study, indicate that this technology is well suited for Merrimack Station, even with slot sizes as large as 3 mm. On the issue of sweeping flow and fouling, certain technologies and techniques can be used to lessen its impact, including air burst systems, fouling-resistant screen alloys and coatings, and manual cleaning, all of which PSNH and Enercon proposed for

Merrimack Station. Indeed, the very page of the preamble to the 316(b) proposed rule that CLF cites in the comment states that "Wedgewire screens may also employ cleaning and de-icing systems such as air-burst sparging to aid in maintaining open intake structures and low intake velocities." 76 Fed. Reg. 21,172 at 22,000 (Apr. 20, 2011). According to Enercon, the 2017 pilot study confirmed that the Z-alloy coating mitigated the effects of biofouling on the wedgewire screen and that when a blockage occurred, backflushing the screen successfully removed large debris. *See* AR-1549 at 28-29, 56-59. Furthermore, Enercon also commented that "blockage of the screens . . . due to either biofouling or largescale debris is expected to be successfully mitigated by the Z-Alloy screen and inclusion of the [air burst system]." Enercon 2017 Comments at 59; *see also* Response to Comment III.4.2, III.4.3

EPA agrees that a minimum ambient velocity relative to the design through-slot velocity ensures that entrainment reductions are achieved through hydraulic bypass and avoidance. *See* AR-1534 at 19. CLF comments that the ambient river flow is not guaranteed to meet Merrimack's needs for adequate sweeping velocities and that insufficient velocity increases the impingement and entrainment rate. Data collected during the 2017 Pilot-Scale Study support a conclusion, however, that sweeping flows are consistently greater than 0.5 fps from April through July (as compared to the proposed design through-slot velocity of 0.4 fps), which will achieve a through-slot to ambient velocity ratio greater than 1:1 for the period when more than 95% of entrainment occurs. *See* AR-846 at 103-106; AR-864 at 9-11; AR-1231 Exhibit 4 at 11-12; AR-1550 at 14; *see also* Response to Comment III.4.2. Maintaining a slot velocity of 0.4 fps, which preserves the appropriate ratio of slot to sweeping velocity for reducing entrainment, will also reduce impingement mortality when the screens are operating consistent with the maximum design through-slot velocity of 0.5 fps under the Final 316(b) Rule. 40 CFR § 125.94(c)(2); *see* Response to Comment III.3.1; *see also* AR-1549 at 63-64.

Larvae that experience multiple screen encounters may suffer mortality if they cannot swim away. However, CLF has not offered evidence that the Merrimack River has insufficient velocity that will result in repeated screen encounters. The Technical Development Document for the Final Rule (at 6-42) indicates that wedgewire screens have a "relatively small flow field in the waterbody" and that this flow field results in a small system profile that minimizes the potential for contact of early life stages against the screens. A 2011 study of wedgewire screens demonstrated that the probability of an organism encountering the screen decreases as the radial distance from the screen axis as it approaches the screen increases. *See* AR-1402. Only those organisms that pass relatively close to the screens will encounter the screens, and those that do need only swim a short distance to be outside of the zone of hydraulic influence (e.g., in one model a release point less than 3 inches from the screen had a 10% probability of encountering the screens at all). The proposed installation for Merrimack Station, with few screens located in a relatively small area, suggests that the probability of encountering the screens may be low (as compared to earlier designs which had more than 70 screens that stuck out into the river). Further, white sucker, which is the dominant species entrained at Merrimack Station comprising more than 40% of total entrainment in 2006 and 2007 (*see* AR-618 at 245), is also larger with greater swimming ability, which makes it more likely to actively avoid the screens. The pilot study confirms that white sucker entrainment density in the wedgewire test samples was reduced by 98% overall as compared to the control. *See* AR-1550 at 41-42.

Finally, CLF comments that because the Merrimack River is dammed both above and below the station, water velocity is dependent on release rates and will not be optimized to provide the desired velocities near Merrimack Station. As a result, CLF comments that the ambient flow in the river is not guaranteed to meet Merrimack's needs for adequate sweeping velocities. In the 2007 renewal of its FERC license (Project No. 1893)[82], each of the three dams: Garvins Falls, Hooksett, and Amoskeag, is required to operate as a run-of-river project with tailrace and bypass minimum flows. *See* AR-1671. A run-of-river hydropower project is defined by limited storage capacity where water is released at roughly the same rate as the natural flow of the river. If the river is below the minimum tailrace flow, the FERC license requires release of 90% of inflow. *See id*.

CLF has not explained why it believes that the operation of the dams will impact river velocity at the wedgewire screens. Operating the dams consistent with the FERC license (i.e., as run-of-river projects) is unlikely to affect the sweeping velocity at the wedgewire screens because the release rates at the dams are roughly the same as the natural flow of the river. Any impacts to river velocities would likely be a result of low river flows, which are most common in August and September. PSNH proposed ceasing operation of the screens in July in part because of issues with low river flows and because densities of eggs and larvae decrease in August. PSNH speculates that the likelihood of exposure to potentially damaging debris will be higher during low flow periods, it offers no evidence, and actually advances a contrary view in a later comment. *See* Comment III.6.2 n.696; *see also* Comment III.9.5. Moreover, other comments and information in the record, including site-specific data, further undermine the comment. Therefore, EPA finds that comment unpersuasive. *See also* Response to Comment III.5.2. However, the periods when low river flow is most likely to impact the efficacy of the screens is also when densities of eggs and larvae are lowest. As such, any impacts on the performance of the screens due to low river flows are likely to be caused by the natural river flow, unaffected by operation of the dams and will not significantly decrease the effectiveness or availability of the technology because low flows occur when entrainment is also minimal. The Final Permit requires operation of the screens through August 15, which strikes a balance between reasonably assuring that the technology is operated to achieve the maximum entrainment reduction warranted and that river conditions are suitable for operation of the technology. *See* Response to Comment III.4.2 and II.4.3.

In summary, in its 2017 Statement, EPA summarized the new information about the availability and effectiveness of wedgewire screens at Merrimack Station. *See* AR-1534 at 17-21. Contrary to the suggestion in the comment that "a wedgewire-half screen system . . . has not yet been designed," PSNH and its consultants proposed a relatively detailed design for seasonal use of wedgewire screens at Merrimack Station that accounts for the physical conditions of Hooksett Pool (AR-1231 Attachment 4) and completed a pilot test (proposed in May 2017, AR-1361) that demonstrates that the screens will reduce entrainment by as much as 89% as compared to the current baseline. CLF has not provided any new evidence that the screens are unproven or that the

[82] PSNH operated the three hydroelectric projects at the time of the comments but has since sold its hydroelectric stations (including these projects) to HSE Hydro NH AC, LLC in the same auction in which Merrimack Station was sold. *See* AR-1625, AR-1774.

conditions of the river preclude their use as the BTA for entrainment. EPA agrees that wedgewire screens may not achieve entrainment reductions equivalent to closed-cycle cooling but nothing in the CWA or implementing regulations requires the BTA at an existing facility to be the best performing technology. The Final Rule requires that EPA establish entrainment controls that reflect the maximum reduction warranted after consideration of factors relevant for determining the best technology available for minimizing adverse environmental impact at each facility. 40 CFR § 125.98(f). After considering the relevant factors for Merrimack Station, EPA concluded that the BTA for entrainment is wedgewire screens and the Final Permit establishes conditions and requirements for implementing this technology. *See* Responses to Comments III.4.2, 5.2, and 5.3 and Final Permit Part I.E.1.

7.4 Environmental Organizations agree with EPA that a reasonable schedule for retrofitting Merrimack's cooling system must achieve full compliance with Sections 316(a) and 316(b) as soon as reasonably practicable and no deviation from that standard should be considered.

Comment III.7.4	**AR-1573, CLF et al., pp. 18-19**

Environmental Organizations agree with EPA's view that federal regulations require compliance with the BTA determination "as soon as practicable." See 40 C.F.R. §§ 125.94(b)(1), (2); 125.98(c).

With respect to the provision in the new regulations that requires EPA to consider "measures to maintain adequate energy reliability and necessary grid reserve capacity during any facility outage," consideration of such measures should neither delay EPA's finalization of the 2011 BTA determination, nor extend the schedule for compliance because of Merrimack's current generating profile. For several years, Merrimack has operated as a peaking facility. This has two implications, both of which EPA has already correctly identified. *See* SSNQPC at 26.
First, construction of a cooling tower should not affect Merrimack's operations. There would be some disruption to Merrimack when the new cooling system is tied in to the existing system, but that process, which should only take a few weeks at most, can be scheduled at any time during the approximately 9 months of the year that Merrimack doesn't run. *See id*. Second, since Merrimack is no longer a baseload facility it has no significant effect on local grid reliability. If Merrimack were needed to ensure adequate capacity, the Regional Transmission Operator (RTO) would address that during upcoming capacity planning and capacity auctions, and EPA could consider that new information when it arises as a basis for permit modification. *See id*.

As noted above, EPA is currently in violation of its Clean Water Act obligations to issue NPDES permits for terms that do not exceed five years and to reissue and fully review those permits every five years. *See* 33 U.S.C. § 1342. The new rule does not change these obligations and does not require any significant reconsideration on the part of EPA. Now that the rule is final, EPA should finalize the 2011 BTA determination – seasonal use of cooling towers – and require compliance as soon as practicable, on the 35-month schedule that EPA proposes, or on a more accelerated schedule if practicable.

EPA Response

CLF's comments that, as EPA discussed in the 2017 Statement (at 23), compliance with entrainment and impingement requirements must be as soon as practicable under 40 CFR §§ 125.94(c) and (d). *See also* 40 CFR §§ 125.94(b)(1)-(2), 125.98(c). CLF also supports EPA's analysis reflected in the 2017 Statement of the potential impacts of installing closed-cycle cooling at Merrimack Station, namely that 1) only a relatively brief outage may be required when "tying in" the new cooling system to the existing operation and 2) adding closed-cycle cooling at would not realistically threaten the reliability of the region's energy supply or grid reserve capacity. AR-1534 at 26. EPA has not altered these conclusions since the 2017 Statement. *See* Responses to Comments 6.C.2 and 7. Nor has EPA altered its conclusions that "wedgewire screens . . . would have an insignificant effect, if any, on the regional energy supply [and] should not require any significant plant outages." AR-1534 at 29.

CLF also comments that EPA should implement the BTA determination from the Draft Permit, seasonal use of cooling towers, in the Final Permit and require compliance as soon as practicable. During development of the Final Permit and in consideration of the many comments and supporting documents received since issuance of the Draft Permit, EPA has reconsidered the BTA determination from the 2011 Draft Permit. *See* AR-1534 at 12-36. Based on this information, EPA has determined that wedgewire screens, not seasonal use of closed-cycle cooling, is the BTA for entrainment at Merrimack Station and explains the basis for this determination throughout the Response to Comments. See Response to Comments III.4 (and associated sub-comments), 5.2, 5.3. In response to this comment, EPA notes that the determination that closed-cycle cooling is not the BTA for Merrimack Station was not based on either potential impacts to local energy reliability or issues related to a compliance schedule.

With respect to the comment that EPA is in violation of its obligations to issue NPDES permit that does not exceed five years and to reissue such a permit every five years, see Response to Comment III.7.2.

7.5 EPA Must Not Consider the Merrimack Auction.

Comment III.7.5	**AR-1573, CLF et al., pp. 27-28**

EPA cannot take into account the completed auction and imminent sale of Merrimack Station in setting NPDES permit limits for Merrimack Station, for multiple key reasons.

First and foremost, as discussed above, none of the considerations that EPA, as permitting authority, must undertake in setting substantive NPDES permit conditions and limits include any reference to the particular owner of a facility. Whichever corporate entity owns Merrimack Station does not play into, for example, EPA's obligations to use its best professional judgment to set technology-based effluent limitations, or to assess water quality-based effluent limitation needs; nor does the ownership of the facility impact EPA's obligation to undertake assessments of

best available technology (or best technology available) for control standards at the facility. Ultimately, the substance of the NPDES permit hinges on the pollution profile and impacts of the plant itself, not whoever owns it.

Second, the auction process has been completed and the New Hampshire Public Utilities Commission has entered an order approving the sale of Merrimack Station and Eversource's other fossil-fired generating plants to Granite Shore Power LLC, with the sale's finalization anticipated to occur early in 2018.[22] As such, there is little to no remaining uncertainty as to the owner of Merrimack.

Finally, even if such indications were relevant, the new owner of Merrimack Station has provided no indication that it intends to accept federally-enforceable operation restrictions that would have any meaning for the pollution impacts EPA must address in this NPDES permit. If, for example, Granite Shore Power LLC wished to retire Merrimack, or to eliminate the intake of water for cooling purposes and the discharge of heated water, those decisions may ultimately need to be reflected in a modification to Merrimack's NPDES permit. However, absent such decisions, the change in ownership at Merrimack can have no substantive impact on the permit that EPA finalizes.[23]

[22] *See* New Hampshire PUC Order No. 26,078 (Nov. 28, 2017), Docket DE 17-124, *available at* https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-124/ORDERS/17-124_2017-11-28_ORDER_26078.PDF.
[23]Nor should EPA further delay issuance of this NPDES permit based on the possibility that Granite Shore Power LLC might at some future date decide that it wishes to operate Merrimack in a way fundamentally different than does Eversource. This permit is already decades overdue, and additional delay only serves to extend and exacerbate the environmental harm that Merrimack causes.

EPA Response

In its 2017 Statement, EPA requested comment on how the Agency should account for the potential sale of Merrimack Station in its development of Final Permit conditions under § 316(b), AR-1534 at 35-36, and Final Permit limits more generally, *id.* at 69. At the time, Merrimack Station was owned and operated by Eversource (also referred to as PSNH) and was in the midst of an auction process mandated by New Hampshire law. *See* N.H. Rev. Stat. Ann. § 369-B:3-a (2015). Merrimack Station was purchased by Granite Shores Power LLC ("GSP"); the sale closed on January 10, 2018. Under the terms of the purchase and sale agreement between PSNH and GSP, GSP Merrimack LLC ("GSP Merrimack"), now owns and operates Merrimack Station and is responsible for compliance with the Facility's NPDES permit. In essence, GSP Merrimack has stepped into the shoes of PSNH with regard to both ongoing NPDES permit compliance and participation in the current NPDES permit development proceeding for Merrimack Station. The existing NPDES permit was modified effective January 10, 2018, to reflect the transfer to GSP Merrimack. 40 CFR §§ 122.61(a), 122.63(d). *See* AR-1642, AR-1650, AR-1701.

In the 2017 Statement, EPA explained its view that the auction and sale should not affect the Final Permit conditions, but nonetheless requested public comment on the subject. AR-1534 at 35-36, 69. EPA has not changed its view now that GSP Merrimack is the owner and operator of

Merrimack Station. Thus, EPA agrees that the sale of the Facility is not a factor in determining the Final Permit conditions.

7.6 The Most Effective Way to Reduce Cooling Water Intake Structure Impact is to Require Closed-Cycle Cooling

Comment III.7.6	**AR-851, CLF, pp. 23-27**
See also AR-852, Henderson, pp. 2-7, 17, 24-5; AR-991, CLF et al., pp. 1-2	

We agree with EPA's determination that the most effective way to reduce cooling water intake structure ("CWIS") impact is to require CCC.[120] EPA has selected as BTA "Option 5," which requires CCC operated on a seasonal basis (Units 1 and 2, April 1 through August 31), and a Type 2 fish return system, which consists of low and high pressure wash, continuous screen operation, and a new fish return system.[121] Option 5 is estimated to reduce annual impingement rates by sixty-five percent, and would save 3.6 million fish eggs and larva.[122] CLF supports EPA's CWIS BTA because we understand that, despite the manner in which the BTA is defined (seasonal CCC operation), EPA has "recognized that the permit's thermal discharge conditions are based on using closed-cycle cooling on a year-round basis." Because the thermal discharge limit effectively requires year-round CCC, that limit will, as EPA states, "provid[e] even greater reductions in impingement mortality" than would be realized with the screening system improvements originally included in Option 5.

EPA concluded that Normandeau's analysis likely underestimated the actual annual entrainment and commensurate adult equivalent loss.[129] For example, EPA noted that Normandeau recorded zero entrainment at Unit 1 in May 2006, when 175 feet downstream at Unit 2, sampling on the same date recorded an estimated entrainment of 742,481 larvae and sampling in May 2007 at Unit 1 recorded an estimated entrainment of 556,360 larvae.[130] Rather than question an obviously erroneous data point, Normandeau used it in its analysis resulting in a 50% lower average annual entrainment rate for Unit 1 in May. When Normandeau's analysis is corrected, the estimated entrainment rate at Merrimack Station rises to 3.8 million fish larvae.[131]

Not surprisingly, when PSNH's consultant looked for entrainment survivors, they found none. Normandeau conducted entrainment survival tests between May 25 and June 18, 2007, when larval abundances in Hooksett Pool were expected to be highest. However, Normandeau reported that no larvae were collected at either Unit 1 or 2 and no eggs or larvae were observed in the samples collected in the control tank either.[132] Amazingly, PSNH's consultant blamed "overall low densities of larvae in the Hooksett Pool"[133] rather than the well-known fact that mortality from entrainment under normal conditions is substantial.[134] EPA correctly and easily concluded that, absent affirmative site-specific evidence to the contrary, 100 percent of fish eggs and larvae entrained at Merrimack Station are killed.[135]

The adult equivalent loss due to entrainment at Merrimack Station must be viewed in relation to the already depleted fish populations. Thus, as EPA correctly noted, "the loss of 195 adult

equivalents [of yellow perch] takes on greater significance" given the overall decline in yellow perch abundance that has occurred since the 1960s.[136] In addition to the direct mortality (or adult equivalent loss) of fish species caused by entrainment, there are indirect effects as well. EPA correctly noted the "ripple effects" that entrainment loss of large numbers of fish eggs and larvae may have, including loss of forage for other species and increased competition among species for other sources of food. It is no wonder given these documented direct and indirect effects that EPA concluded, "entrainment at Merrimack Station represents a significant adverse environmental impact."[137]

Likewise with regard to impingement at Merrimack Station, EPA correctly concluded that "[t]he loss of thousands of juvenile fish per year [due to impingement] from an ecosystem already stressed by the plant's thermal effects and entrainment constitutes an adverse environmental impact."[138] Impingement occurs when larger fish and other aquatic life become trapped on screening devices or other barriers installed at the entrance of the intake structure. Impingement is caused by the force of water passing through the intake structure and can result in starvation and exhaustion (when organisms are trapped against an intake screen), asphyxiation (when organisms are forced against a intake barrier by velocity forces that prevent proper gill movement or when organisms are removed from the water for prolonged periods of time), descaling (when organisms are removed from an intake screen by a wash system), and other physical harms.[139] As the Henderson Report notes, "[a]quatic life is poorly adapted to withstand impingement, and contact with the metal screens frequently results in injury or death."[140] Under normal conditions, a substantial number of the aquatic organisms impinged are killed or subjected to significant harm.[141] Because PSNH has not employed a fish return system to deliver impinged fish back to the river, impingement at Merrimack Station has resulted in 100% mortality.

PSNH's consultant also collected fisheries data between June 2005 and June 2007 to estimate the number of fish subjected to impingement as a result of Merrimack Station's water withdrawals.[142] When adjusted for collection efficiencies, Normandeau estimated the total impingement from July 2005 through June 2006 to be 6,736 fish, and from July 2006 through June 2007 to be 1,271 fish, for a total of 8,007 fish impinged over two years.[143] Again, EPA appropriately put these numbers into context explaining that fish abundance is at a four-decade low in Hooksett Pool and that "while impingement losses result in fewer adult equivalents than losses from entrainment, the numbers are not insignificant based on all the available information on the status of the fish community in Hooksett Pool."[144] Moreover, although PSNH has been required by its current permit to monitor for impingement during low-flow conditions, it is likely that significant impingement events have gone undetected. The sampling data collected by Normandeau demonstrated that the greatest impingement occurred during the month of June (4,300 fish in 2006, or 72% of all fish impinged in 2006), when PSNH is not required to monitor for impingement.[145]

[120] *See* Attachment D at 312, 346.

[121] *Id.* at 346 (noting Draft Permit does not require installation of the new traveling screens that were originally part of the Option 5 package).

[122] *See id.* at 322, Table 12-1.
[123] *See* 66 Fed. Reg. 65,256 at 65,263; *see also* 65 Fed. Reg. 49,060 at 49,072.
[124] *See generally* AR 2, Normandeau Associates, Entrainment and Impingement Studies Performed at Merrimack Generating Station from June 2005 through June 2007 (2007) ("Normandeau E & I Studies").
[125] *Id.* at 52 (Table 3-6).
[126] *Id.*
[127] *See* AR 6, PSNH, Response to United States EPA CWA § 308 Letter, Attachment 6, Table 2-1 (December 10, 2007).
[128] *Id*.
[129] Normandeau initially underestimated the average annual entrainment at Merrimack Station by using actual flow withdrawal data rather than design intake flows. See Attachment D at 252 ("While [actual flow data] may be a fair representation of entrainment rates for the river flow rates and plant operations during the monitoring period, it does not necessarily reflect entrainment rates under other flow conditions and plant operation scenarios."). When entrainment rates were adjusted based on design flow data, those rates rose considerably.
[130] Attachment D at 252.
[131] *Id*.
[132] See AR 2, Normandeau E & I Studies, at 43.
[133] *Id*.
[134] *See* 65 F.R. at 49,072.
[135] *See* Henderson Report at 7 (concurring with EPA's assumption of 100 percent mortality of organisms entrained at Merrimack Station).
[136]Attachment D at 251.
[137] *Id*. at 254; see also Henderson Report at 5-7 (concurring with EPA's conclusion that entrainment at Merrimack Station represents a significant adverse environmental impact).
[138] Attachment D at 261; see also Henderson Report at 3 ("The impingement losses observed due to Merrimack's
current intake structures are significant and have affected the abundance of the local fish populations, both resident and migratory.").
[139] 66 Fed. Reg. at 65,263.
[140] Henderson Report at 3.
[141] *Id*.
[142] See AR 2, Normandeau E & I Studies, at 54-82.
[143] *Id*. at 74 (Table 4-5).
[144] Attachment D at 260.
[145] *Id*. at 261.

EPA Response

In its comment, CLF generally summarizes the entrainment and impingement impacts presented in the 2011 Draft Determinations Document and supports EPA's preliminary determination that the most effective way to reduce cooling water intake structure ("CWIS") impact is to require closed-cycle cooling. For the 2011 Draft Permit EPA determined that the entrainment and impingement impacts, as described in the comment, are adverse environmental impacts and that the Permittee must operate its CWIS with technology that reflects the BTA to minimize those impacts. *See* AR-618 at 242-62. This determination has not changed. *See* Responses to Comments III.3.1, III.3.4, III.3.5, and III.3.6. CLF also supports using closed-cycle cooling on a year-round basis because it will provide greater reductions in impingement mortality and the thermal discharge limit effectively requires year-round closed-cycle cooling. As explained fully in Section II of the Response to Comments, the Final Permit does not require closed-cycle cooling to meet the thermal limits. *See*, *e.g.*, Response to Comment II.1.1. Closed-cycle cooling is also not

required to meet the impingement mortality BTA standards under the 2014 Final Rule. *See* Response to Comment III.3.1.

For the Final Permit, the determination of the BTA for Merrimack Station is subject to new, national standards for establishing requirements for CWISs at existing facilities. *See* Response to Comment III.2 (and associated sub-comments). The Final Rule requires the owner or operation of an existing facility to comply with one of the BTA standards for impingement mortality listed at 125.94(c)(2) through (7), except as provided in paragraphs (c)(11) or (12). 40 CFR § 125.94(c). In addition, the Final Rule requires the permitting authority to establish BTA standards for entrainment on a site-specific basis. These standards must reflect the maximum reduction in entrainment warranted after consideration of factors as specified in 40 CFR § 125.98(f). 40 CFR § 124.94(d). EPA has determined that the BTA for entrainment at Merrimack Station is seasonal operation of wedgewire screens. *See* Responses to Comments III.4.2, III.5.2. and III.5.3. This technology would also satisfy the impingement BTA alternatives of maximum through-screen velocity of 0.5 fps, at least for the periods it operates. *See* Response to Comment III.3.1. EPA believes that this technology, when combined with PSNH's proposed fish-friendly return, an optimized rotation frequency, and potentially flow reductions as a result of reduced operations and/or to meet the thermal limits, may allow the facility to comply with the "systems of technologies" standard at § 125.94(c)(6). Or, the Permittee may choose to comply with another impingement BTA alternative, the most likely of which would be modified traveling screens, which will also require installation of a new fish return. The Final Permit sets Merrimack Station on a path to comply with § 125.94(c) and (d) as soon as practicable.

8.0 Additional Comments Submitted by Normandeau Associates

The EPA's "Statement of Substantial New Questions and Possible New Conditions" posed a number of questions about the potential use of wedgewire screens at Merrimack Station, including questions about mortality to aquatic life with the use of this new technology.

8.1 The extent to which wedgewire screens with different screen slot sizes can prevent mortality to aquatic life from entrainment and/or impingement and satisfy the BTA requirements of CWA § 316(b)

Comment III.8.1	AR-1552, Normandeau, pp. 26-27

The entrainment reduction performance of the 3-mm narrow slot wedgewire screens designed by ENERCON for full scale installation at Merrimack Station Units 1 and 2 and tested by Normandeau for 17 consecutive weeks during the predominant entrainment season from 22 May through 3 September 2017 provided an overall entrainment reduction compared to the paired Unit 1 cooling water intake structure control of 89% for all ichthyoplankton taxa and life stages combined (Normandeau 2017b). The entrainment reduction for fish larvae only (i.e., eggs excluded) was 90% (Normandeau 2017b). With regard to impingement mortality reduction benefits of the 3-mm narrow slot wedgewire screens proposed for installation and operation at Merrimack Station Units 1 and 2, the

screens are designed with a through screen velocity of 0.4 feet per second or less (ENERCON 2017) and therefore are compliant with the §125.94(c)(2) criterion as the best technology available (BTA) standards for impingement mortality specified by CWA §316(b) when in use.

EPA Response

In its comment, Normandeau summarizes the results of its 2017 pilot study of a 3-mm wedgewire screen at Merrimack Station, as presented in the 2017 Final Report (AR-1550) submitted as an exhibit with PSNH's comments on EPA's 2017 Statement. EPA has determined that the BTA for entrainment at Merrimack Station is seasonal operation of wedgewire screens. See Responses to Comments III.4 (and associated sub-comments), 5.2. and 5.3. This technology would also satisfy the impingement BTA alternatives of maximum through-screen velocity of 0.5 fps, at least for the periods it operates. *See* Response to Comment III.4.1 and 4.2. EPA believes that this technology, when combined with PSNH's proposed fish-friendly return, an optimized rotation frequency, and perhaps even flow reductions, may allow the facility to comply with the "systems of technologies" standard at § 125.94(c)(6). Or, the Permittee may choose to comply with another impingement BTA alternative, the most likely of which would be modified traveling screens, which will also require installation of a new fish return. The Final Permit sets Merrimack Station on a path to comply with § 125.94(c) and (d) as soon as practicable.

8.2 Which months (e.g., April 1 through August 31, April 1 through July 31), if any, should wedgewire screens be implemented as the BTA for controlling entrainment

Comment III.8.2	AR-1552, Normandeau, p. 27

The table below shows percentage and cumulative percentage of total annual entrainment density observed by week and month based on the weekly entrainment densities observed in the sampling study performed at Merrimack Station Unit 1 and Unit 2 from May 2006 through June 2007 (Normandeau 2007):

Week of Year		Month	Percent Of 2006-2007 Annual Entrainment Density Units 1 And 2 Combined	
#	begin		Weekly %	Cumulative %
14	2Apr	Apr	0.4%	0.4%
15	9Apr		0.4%	0.8%
16	16Apr		0.4%	1.2%
17	23Apr		0.4%	1.6%
18	30Apr	May	0.4%	2.0%
19	7May		5.3%	7.3%
20	14May		10.1%	17.4%
21	21May		4.1%	21.5%

22	28May		8.1%	29.6%
23	4Jun	Jun	26.0%	55.6%
24	11Jun		6.1%	61.7%
25	18Jun		6.3%	68.1%
26	25Jun		13.4%	81.5%
27	2Jul	Jul	4.5%	86.0%
28	9Jul		3.5%	89.4%
29	16Jul		2.4%	91.9%
30	23Jul		4.5%	96.3%
31	30Jul	Aug	2.0%	98.4%
32	6Aug		0.8%	99.2%
33	13Aug		0.4%	99.6%
34	20Aug		0.0%	99.6%
35	27Aug		0.4%	100.0%
36	3Sep	Sep	0.0%	100.0%
37	10Sep		0.0%	100.0%

These data reveal that 96.3% of the annual total entrainment density observed at Merrimack Station Units 1 and 2 combined from studies performed weekly during 2006 and 2007 occurred from 2 April through 29 July, and 100% of the entrainment was observed during the period 1 April through 31 August. This seasonal pattern of weekly entrainment densities was confirmed during the May to September 2017 3-mm wedgewire screen evaluation study at Merrimack Station Unit 1 (Normandeau 2017).

EPA Response

Normandeau provides entrainment data from 2006 and 2007 to support its comment that the majority of entrainment occurs between April 1 and July 31. EPA agrees that the data suggest a strong seasonal component for the presence of eggs and larvae in Hooksett Pool, which indicates that a high percentage of annual entrainment (as high as 96%) occurred between April 1 and July 31. Similarly, in 2017, more than 99% of entrainment at both the Unit 1 intake and the test wedgewire screen occurred between May 22 (the first date of the study) and July 31. *See* AR-1550 at 41-2. Taken together, the two entrainment studies suggest that the presence of eggs and larvae in Hooksett Pool decreases substantially at the beginning of August and drops to essentially zero by mid-August. The data also suggest that deploying the wedgewire screens from April 1 through July 31 will likely ensure that the entrainment technology is operational during the period when greater than 95% of annual entrainment occurs. At the same time, relatively low densities of eggs and larvae may still be present in early August. For example, in 2016, nearly 5% of entrainment at Unit 1 occurred during August. *See* AR-1567 at 33. Depending on annual variation, this transitional period could potentially experience greater densities in some years (*e.g.*, years when spawning is delayed). EPA has proposed that, at a minimum, the wedgewire screens shall be operational beginning on April 1 through August 15. *See also* Response to Comments III.4.3 and III.9.5.

8.3 For impingement, whether Merrimack Station's impingement mortality should be considered to be de minimis all year, during certain months, or not at all?

Comment III.8.3	AR-1552, Normandeau, p. 27
See also AR-1549, Enercon, pp. 20, 63	

Normandeau performed an analysis of the Merrimack Station Unit 1 and Unit 2 weekly impingement rates from the 2005 through 2007 impingement abundance study (Normandeau 2007), scaled these weekly rates up to the 2011 through 2013 weekly actual intake flows (AIF), and then summed the weekly rates over 52 consecutive weeks to represent the annual impingement rates for 2011 through 2013. These 2011 through 2013 annual impingement rates for Merrimack Station were then compared to annual impingement rates obtained from a data base supplied by EPRI (2011) consisting of results supplied in response to a detailed questionnaire from 166 power generating facilities from throughout the United States with similar once-through cooling systems (Normandeau Attachment 1 to ENERCON October 2014). Based on this comparison of annual impingement rates, Normandeau concluded that annual impingement rate at Merrimack Station (Units 1 and 2 combined) of 0.27% of the national average is *de minimis*.

EPA Response

Contrary to the comment, EPA does not consider that impingement at Merrimack Station is de minimis at any time of year. *See* Response to Comment III.3.4, in which EPA responds to a PSNH comment that relies in part on Normandeau's above reasoning. A separate response to Enercon's 2017 comment regarding *de minimis* impingement is likewise unnecessary because Enercon relies solely on Normandeau for the comment and presents no additional bases. AR-1549 at 20, 63.

8.4 If wedgewire screens are used, should PSNH be authorized to "bypass" the screens under certain conditions and, if so, should additional protective measures for impingement be required during those periods?

Comment III.8.4	AR-1552, Normandeau, p. 28

The response to this question depends on what time of the year bypass would occur, the duration of the bypass flows, and is largely based on engineering and plant operation considerations identifying the need for bypassing the full scale wedgewire screen arrays. Therefore, ENERCON and Merrimack Station should address this question. However, because the annual impingement rate at Merrimack Station (Units 1 and 2 combined) of 0.27% of the national average is considered *de minimis*, additional seasonal or monthly constraints on CWIS flows that bypass the installed and operated full-scale wedgewire screen array at Merrimack Station Units 1 and 2 are unnecessary.

EPA Response

EPA has addressed similar comments about a bypass in Response to Comment III.4.3. Part I.E.4 of the Final Permit authorizes the Permittee to operate an emergency intake when operation of the wedgewire screens would result in unavoidable loss of human life, personal injury, or severe property damage. Further, it requires the permittee to notify EPA (within twenty-four hours of initiating any use of the emergency intake system) of the reason that the wedgewire screens were taken off-line and identify all actions taken or to be taken to address the cause, and minimize the use, of the emergency intake. EPA does not agree that impingement at Merrimack Station should be considered *de minimis*. *See also* Response to Comment III.3.4. The Permittee must operate a technology to minimize impingement under the 2014 Final Rule. Because the use of wedgewire screens is expected to be seasonal, the Final Permit requires the Permittee to operate the existing traveling screens with a new fish return system when the through-screen velocity is greater than 0.5 fps. As the traveling screens will be used during certain periods of the year, the Final Permit reasonably requires that the Permittee rotate the traveling screens during periods when the emergency intake is used.

8.5 There is no evidence that entrainment varies with river flow.

Comment III.8.5	**AR-872, Normandeau, pp. 125-128**

[Responding to AR-618, p. 243 Section 11.2.1] There is no evidence that entrainment varies with river flow. Entrainment will vary directly with the volume of water withdrawn by the Station and the density of ichthyoplankton in the river, neither of which are influenced by river flow.

[Responding to AR-618, p. 245 Section 11.2.1a] USEPA provides no evidence for the assertion that eggs and larvae are equally distributed throughout the river. In fact, the peer-reviewed scientific literature indicates that ichthyoplankton have a very patchy spatial and temporal distribution. USEPA provides no basis for its assumption that the percent of water withdrawn for cooling can provide an estimate of the percentage of the ichthyoplankton lost to entrainment. The percentage of the water withdrawn is a factor in determining entrainment, but density of ichthyoplankton in Hooksett Pool over space and time are also important factors. Existing entrainment and withdrawal data do not support the Agency's assumption that entrainment is proportional to percent water withdrawal because the months with the greatest percentage withdrawal are also the months with the lowest ichthyoplankton densities. Figure 4-1 presents a plot of percent withdrawal on the x axis versus total entrainment on the y axis (Table 3-7; Normandeau 2007b). There is no apparent positive relationship between percent withdrawal and total monthly entrainment. In fact, a non-parametric Spearman Rank Correlation analysis indicates that there is a negative relationship (-0.41) between percent withdrawal and total monthly entrainment. The raw data are presented in Table 4-1. The months with the greatest percent withdrawal, August and September 2006, also have the lowest entrainment because ichthyoplankton are not common in Hooksett Pool during those months. The highest entrainment occurred in June of 2006 and 2007 when percent withdrawal was relatively low (June 2006), or

above average (June 2007) but entrainment was highest due to the high density of ichthyoplankton in Hooksett Pool. The conclusion to be drawn from this analysis of empirical data is that percent water withdrawal alone is not a major factor in determining entrainment at Merrimack Station. Density of ichthyoplankton in Hooksett Pool is also an important factor and the greatest percent withdrawals occur in the months when ichthyoplankton density is low. It can be seen that during May, low ichthyoplankton densities are the norm, and that the entrainment estimate for May at Unit 2 is driven by the relatively large amount of ichthyoplankton collected on the night of 31 May (Table 4-2). The data from the night of 31 May might be considered the outlier rather than the 0 counts at Unit 1, but Normandeau included all data in the analysis because there are no methodological reasons to exclude them. Empirical data should not be excluded because it appears to be "different," but may only be excluded if there is some methodological reason that would justify the exclusion, such as abnormal field sample collection or mishap during laboratory analysis. These incidents did not occur. Therefore, USEPA's rationale for excluding the data for Unit 1 from May, and substituting the Unit 2 data for the Unit 1 data is not valid. Normandeau's data estimated 3.2 million larvae per year were entrained, and USEPA improperly changed this number to 3.8 million larvae entrained.

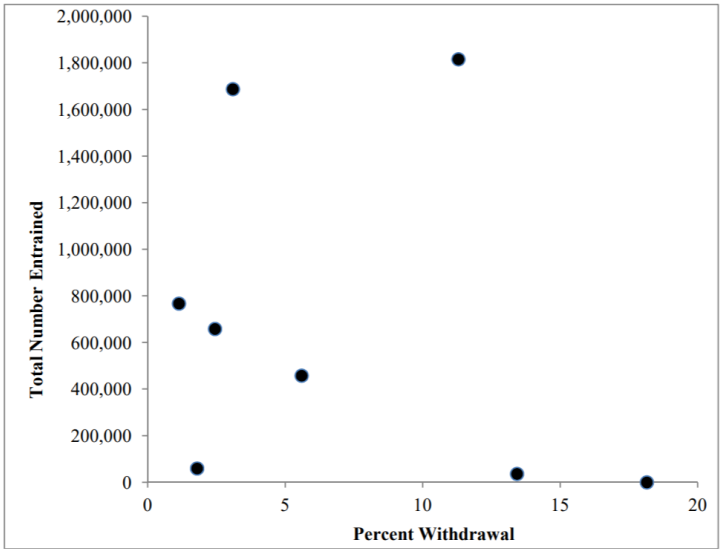

Figure 4-1. Percent withdrawal versus total number entrained during Merrimack River entrainment studies (2006-2007) (Normandeau 2007b).

Table 4-1. Monthly river flow, plant withdrawal and larval entrainment at Merrimack Station, 2006-2007 (Normandeau 2007b).

Year	Month	River Flow (million gallons)	Plant Flow (million gallons)	Percent Withdrawal	Entrainment
2006	May	331,811	3,778	1.14	767,330
	June	236,747	7,344	3.1	1,687,784
	July	141,833	7.944	5.6	457,974
	August	59,157	7,944	13.43	36,445
	September	28,681	5,206	18.15	0
2007	April	290,628	5,245	1.8	59,724
	May	177,852	4,361	2.45	658,544
	June	65,656	7,418	11.3	1,815,937

Table 6-2. Number of larvae collected at Units 1 and 2 of Merrimack Station on 25 and 31 May, 2006 (Normandeau 2007b).

Date	Unit	Diel Period	Amount of Ichthyoplankton collected in sample
31-May	1	Day (10:35-14:37)	0
31 May- 1 June	1	Night (21:15-01:49)	0
25-May	2	Day (12:53-16:31)	0
25 May- 26 May	2	Night (21:43-01:21)	1
31-May	2	Day (09:56-14:12)	2
31 May-1 June	2	Night (21:16-01:08)	28

EPA Response

Normandeau comments that, contrary to statements from the 2011 Draft Determinations Document, there is no evidence that entrainment varies with river flow or for the assertion that eggs and larvae are equally distributed throughout the river. *See* AR-618 at 245. EPA noted that no in-river ichthyoplankton sampling was conducted during any of the entrainment studies to determine the fraction of the total number of eggs and larvae present in Hooksett Pool that are lost to entrainment. EPA made an argument that the fraction could, at times, be substantial because the fraction of total river flow withdrawn for cooling water at Merrimack Station is significant (*e.g.*, 25-64% or more). *See id*. at 254. EPA correctly concluded that the Facility has the potential to withdraw a significant fraction of the river's flows and planktonic community present in the river at certain times of the year.

However, Normandeau correctly states that entrainment varies with the volume of water withdrawn by the Station and the density of ichthyoplankton in the river, neither of which are influenced by river flow, and the periods when the percentage of the water withdrawn is highest (August) is a period of relatively low (though not zero) entrainment. Therefore, even though the Facility could withdraw a substantial fraction of the water (and ichthyoplankton) at certain times, it does not necessarily amount to a sizeable fraction of overall entrainment because ultimately the density of ichthyoplankton when river flows are lowest (and the fraction withdrawn highest) are relatively low. Ultimately EPA's above-referenced conclusions about river flow and entrainment were one of many factors that EPA considered in determining that entrainment at Merrimack Station's CWISs results in an adverse environmental impact. EPA has not changed its position and, as discussed in detail in Response to Comment III.3.6, maintains that entrainment at Merrimack Station is an adverse environmental impact that must be minimized through the implementation of the best technology available.

9.0 Additional Comments Submitted by Electric Power Research Institute (EPRI)

9.1 Cylindrical wedgewire screens of various slot widths can reduce entrainment and impingement at the station sufficient to satisfy BTA requirements

Comment III.9.1	AR-1577, EPRI, pp. 2-1

The administrative record for the Merrimack Station NPDES permit contains ample evidence that cylindrical wedgewire screens (CWWS) of various slot widths can reduce entrainment and impingement at the station sufficient to satisfy BTA requirements. Although some of the evidence was not available at the time EPA reached its 2011 determination, for example AR-1401, AR-1402, AR-1403, AR-1418, AR-1420, AR-1421), the information developed in these recent research efforts expands and supports prior knowledge of CWWS efficacy, rather than supplants it.

That CWWS would act through a combination of modalities, i.e., physical exclusion, active avoidance, and hydraulic bypass, has been recognized, if not explicitly quantified, from the earlier studies of the technology.

A few key examples from the literature on the technology are:

Otto, R. G., T. I. Hiebert, and V. R. Kranz. 1981. The effectiveness of a remote profile-wire screen intake module in reducing the entrainment of fish eggs and larvae. Pp. 47-56 in Dorn and Johnson (1981).

This study examined efficacy of a 3-ft diameter, 13-ft long, 1-mm slot width CWWS in a side channel of the Mississippi River. The screen was oriented parallel to the ambient currents, which ranged from 1.2 to 2.7 fps, with through-slot velocity 0.4 fps, thus a velocity ratio of 3 to nearly 7. Densities of ichthyoplankton in water drawn through the screen was compared to densities in

control samples collected with towed plankton nets and with nets fixed in place beside the CWWS.

Densities of eggs (primarily freshwater drum), and larvae of emerald shiner, carp, and freshwater drum were significantly lower in the CWWS samples than in either type of control samples. For all species of larvae, except crappie, Control sample densities were at least five times as high as the CWWS densities. In addition, larvae collected in CWWS samples were significantly smaller than larvae collected in the controls. For CWWS samples, few larvae were longer than 8 mm, although longer larvae were common in the plankton net controls. Crappie larvae exhibited similar densities in CWWS and net samples; but were smaller in size in CWWS samples. The authors attributed the density reductions for eggs to exclusion, but concluded that exclusion could not explain the reduction of smaller larvae, particularly slender larvae, which could easily pass through the 1-mm slot. The authors attributed the reduced entrainment of smaller larvae through the CWWS to an ability to sense and react to the flow field perturbations induced by the entrainment flow, and for larvae larger than 8 mm to swimming ability which would allow them to escape entrainment even if they came in direct contact with the screen surface.

Zeitoun, I. H., J. A. Gulvas, and D. Roarabaugh. 1981. Effectiveness of fine-mesh cylindrical wedgewire screens in reducing entrainment of Lake Michigan ichthyoplankton. *Canadian Journal of Fisheries and Aquatic Sciences* 38:120-125.

This study examined two sizes of CWW screens at the bottom of Lake Michigan near the J. H. Campbell power plants. One screen was 14.5 in. in length, 18-in. in diameter, with a slot width of 2 mm. The other was 12 in. in length, 15 in. diameter, and a slot width of 9.5 mm (approximately the standard 3/8" mesh of traveling screens). Both screens were designed to withdraw at 0.5 fps. through-slot velocity at the flow rate used for the study. For comparison to CWWS samples, control samples were collected using a 6-in. diameter open pipe and using a towed 0.5 m plankton net.

Common taxa were Rainbow Smelt, Yellow Perch, Alewife, carp, whitefish, unidentified herring/smelt, and unidentified cyprinid minnows. For all larvae, there was no significant difference between larval densities entrained by the 2.0 mm and 9.5 mm screens. The mean density of larvae in the combined CWWS samples was about 68% of the density of larvae in the open pipe control samples, but only 8% of the density in the towed net samples. Egg densities in the CWWS samples and control pipe samples were much greater in the towed net samples. The authors attributed the results for all but minnow larvae to active avoidance of the CWW screens and the open pipe by larvae. They concluded that about 90% of the native fish larvae at the site avoided entrainment and open pipe sampling, raising the issue of the appropriate control sampling methodology for comparison with the CWWS sample.

Jude, D. J., C. P. Madenjian, P. J. Schneeberger, H. T. Tin, P. J. Mansfied., T. L. Rutecki, G. E. Noguchi, and G. R. Heufelder. 1982. Adult, Juvenile, and Larval Fish Populations in the Vicinity of the James. H. Campbell Plant, 1981, with Special Reference to the Effectiveness of the Wedge-wire Intake Screens in Reducing Entrainment and Impingement

of Fish. Special Report Number 96. Great Lakes Research Division, The University of Michigan, Ann Arbor.

This study examined entrainment through a working CWWS providing water to Unit 3 of the J. H. Campbell plant on Lake Michigan. The submerged intake draws water through a CWWS array of screens 48 in.-long, with a diameter of 48 in, and slot openings were 9.5 mm. Design through-slot velocity was 0.38 fps. The array was at a depth of 35 ft and surrounded by a riprap wall, which provided habitat for some local fishes. Sampling was performed in 1980 and 1981 to compare densities of fish eggs and larvae entrained through the CWWS to densities in Lake Michigan near the intake using towed plankton nets.

Although densities of fish larvae in CWWS samples were generally lower than in the lake samples, high sampling variability resulted in few statistically significant differences. Significantly higher densities in CWWS samples were found for Yellow Perch larvae and Slimy Sculpin. The authors attributed this to the riprap wall providing spawning habitat for these species at the edge of the CWWS array. Densities of Alewife larvae were significantly lower and lengths were significantly smaller in CWWS samples than in lake samples. Entrained Yellow Perch, Spottail Shiner, Trout-Perch, and Johnny Darter larvae were also smaller than larvae collected in lake samples. The authors attributed the reduced densities and size differences to active avoidance of the CWWS by larger larvae. Due to the location within the riprap wall, sweeping flows would be reduced, and with 9.5 mm slot width, exclusion of larvae and eggs would not occur.

Weisberg, S. B., W. H. Burton, E. A. Ross, and F. Jacobs. 1984. The effects of screen slot size, screen diameter, and through-slot velocity on entrainment of estuarine ichthyoplankton through wedge-wire screens. Prepared by Martin Marietta Environmental Systems, Inc. for Maryland Power Plant Siting Program.

Weisberg, S. B., W. H. Burton, F. Jacobs, and E. A. Ross. 1987. Reductions in ichthyoplankton entrainment with fine-mesh, wedge-wire screens. ***North American Journal of Fisheries Management*** **7:386-393. [AR-740]**

In this study, CWWS were evaluated at the intake of the Chalk Point Steam Electric Station on the Patuxent River, MD. The screens ranged from 18 to 34 in. in length, and 21 to 30 in. in diameter, with slot widths of 1, 2, and 3 mm. CWWS samples were compared to control samples collected by pumping through an open-port pumped, and with plankton nets. Bay Anchovy and Naked Goby were the most common species collected.

Larval entrainment densities increased as slot width increased, however, the increase was not statistically significant due to low numbers captured in the CWWS samples. Consistent with other studies that used open-port and towed net control samples, higher densities in the plankton net samples indicated significant larval avoidance of the open ports. CWWS efficacy was near zero for small larvae (~4 mm), but for larger Bay Anchovy larvae efficacy ranged from 45% to 100% (open port controls) and 62% to 100% (plankton net controls), with higher efficacy for larger larvae. Naked Goby larvae showed a similar pattern with efficacy ranging from 41% to 97% (open port controls) and 81% to 97% (plankton net controls) as size increased. Except for the

largest size class, efficacy declined slightly with increasing slot width. Efficacy for Bay Anchovy eggs was 66% for the 2-mm screens and 73% for the 1-mm screens.

Consistent with other studies, these results demonstrate: 1) CWWS efficacy is an increasing function of larval length, 2) avoidance of the screens is a significant modality of effectiveness, and 3) larval avoidance of open ports significantly biases efficacy estimates.
These results demonstrate that CWWS' mode of action is a combination of avoidance, bypass, and exclusion are consistent with the work done by EPRI (2005, 2006).

Electric Power Research Institute (EPRI). 2005. Field evaluation of wedgewire screens for protecting early life stages of fish at cooling water intake structures. Palo Alto, CA. EPRI Report 1010112. [AR-114]

EPRI 2006. Field evaluation of wedgewire screens for protecting early life stages of fish at cooling water intake structures: Chesapeake Bay studies. Palo Alto, CA. EPRI Report 1012542. [AR-

In 2005 and 2006, EPRI published results of field tests of CWW screen efficacy performed in Sakonnet River, RI, the Portage River, OH, and in Chesapeake Bay. The studies used small CWWS with slot width of either 0.5 or 1 mm. Intake velocities were 0.5 and 1 fps. Both studies compared densities of eggs and larvae entrained through CWWS to control densities collected by an intake with a 9.5 mm mesh and plankton net tows.

The 0.5 mm screens were more effective than the 1 mm screens at reducing entrainment. Larval length significantly influenced CWWS efficacy, consistent with exclusion of larvae with head widths larger than the slot widths. Efficacy estimates were based only on comparisons between CWWS densities and control intake densities, even though densities of larvae in towed net samples were often higher than control port densities. Large larvae were most common in the net samples.

Although not explicitly discussed in the reports, the results were consistent with avoidance of the CWWS by larger larvae being an important factor in CWWS efficacy.

These studies are all evidence of the multiple modes of effectiveness of CWWS beyond that of simple passive filters, which can allow high efficacy of CWWS with slot widths larger than 1 mm. The more recent studies (AR-1401, AR-1402, AR-1403, AR-1420, AR-1421) already in the administrative record have provided quantification of expected efficacy as a function of organism size, through-slot and sweeping current velocities, and slot widths.

One additional aspect of CWWS efficacy is that the more valuable, from a population perspective, members of the ichthyoplankton community receive the highest level of protection. The larger larvae and early juveniles, which typically have a far greater probability of surviving to adulthood, than eggs and smaller larvae, are protected by all three modes of effectiveness, while the less valuable stages may principally be protected by hydraulic bypass, and exclusion for small-slot screens. Thus, a strictly numerical view of effectiveness as percent reduction of total

entrained ichthyoplankton may greatly underestimate the biological effectiveness of CWWS technology.

As a final point, it is important to note that physical exclusion of early life stages by CWWS may not have the protective effect that is desired. Recent work (EPRI 2017) on survival of eggs and larvae excluded by fine-mesh traveling screens has shown that it is better to let them be entrained, at least at the site studied, than to collect them on a traveling screen. The question of subsequent survival of eggs and larvae excluded by CWWS has not yet been investigated thoroughly.

EPA Response

EPRI's comment generally summarizes research on the efficacy of wedgewire screens for reducing entrainment and provides additional references to support EPA's summary of recent research on this technology from the 2017 Statement. See AR-1534 at 17-21. EPA has included the additional references in the Administrative Record. See AR-1579, AR-1581, AR-1586, and AR-1590, AR-1594, AR-1595.

9.2 The probable cost of cylindrical wedgewire screens would be significantly less than closed- cycle cooling

Comment III.9.2	AR-1577, EPRI, pp. 2-5

EPRI has not investigated the expense of CWWS installation and use at Merrimack Station. However, the probable cost of the CWWS would be significantly less, as much as an order of magnitude, than a closed cycle cooling (CCC) alternative (EPRI 2012), and quantitative estimates of the cost should be far less uncertain for CWWS than for CCC due to the lower engineering complexity and lack of effect on the thermodynamic processes involved in electrical generation.

EPA Response

In its comments on the 2017 Statement, PSNH submitted updated cost information for wedgewire screens and closed-cycle cooling. See AR-1549, AR-1565, AR-1566. The cost of wedgewire screens is substantially less than the cost of closed-cycle cooling and this cost differential was a major consideration in determining the BTA for entrainment at Merrimack Station. See Response to Comment III.5.2.1, 5.2.2, and 5.2.3 for a more detailed discussion of the cost of the technologies.

9.3 There appears to be no reason to believe that half-screens would perform differently than full cylindrical screens

Comment III.9.3	AR-1577, EPRI, pp. 2-5

Studies performed to date have used full cylindrical screens. However, for the Merrimack Station, the water depths are not sufficient to support a typical full-cylinder installation. There appears to be no reason to believe that half-screens would perform differently than full cylindrical screens if the same design principles are used to maintain even flow distribution and low slot velocities over the screen face.

EPA Response

EPRI comments that the proposed half-screen wedgewire design would be expected to perform similar to the traditional cylindrical screens. In its comments on the 2017 Statement, Enercon provides additional support for the proposed half-screen design and similarly suggests that the screens would be expected to perform similar to the cylindrical screen tested in the pilot study. EPA addresses this issue, and additional comments about the proposed design, in Response to Comment III.4.2.

9.4 The costs of closed-cycle cooling are likely to be far greater and more uncertain than cylindrical wedgewire screens

Comment III.9.4	AR-1577, EPRI, pp. 2-5

As commonly occurs, it is highly likely that the social costs of the CWWS alternative are far higher than the monetized benefits. Whether the costs of CWWS sufficiently outweigh the benefits to rule out CWWS as BTA is a social issue and EPRI offers no comment on that decision. However, in comparison, costs of a CCC alternative are likely to be far greater (EPRI 2012), and far more uncertain, than the CWWS alternative.

EPA Response

In its comments on the 2017 Statement, PSNH submitted a comparison of the costs and benefits for wedgewire screens and closed-cycle cooling. *See* AR-1565, AR-1566. As the comment suggests, the cost of wedgewire screens is substantially less than the cost of closed-cycle cooling. EPA considered the costs and benefits of each technology and explains how this issue was factored into its BTA determination in Response to Comments III.5.2.1, 5.2.2, and 5.2.3 and III.5.3.

9.5 It would make sense to operate cylindrical wedgewire screens during August to the extent that river flow and debris fouling permit

Comment III.9.5	AR-1577, EPRI, pp. 2-6

Entrainment BTA is only needed during the time when entrainable life stages are present. Although entrainment numbers are generally lower in August than in earlier spring and summer months, those organisms that would be entrained may be older (PYSL and early juvenile stages)

and therefore more valuable from a population perspective. Thus, since CWWS would be installed already, it would make sense to operate them during August to the extent that river flow and debris fouling permit.

EPA Response

EPRI comments that operating the wedgewire screens during August when river flow and fouling conditions permit is sensible and would ensure that any older larval and early juvenile stages present during this time would be protected from entrainment. EPA agrees that there may still be life stages vulnerable to entrainment present during August, albeit in relatively low densities (*See*, *e.g*., AR-1567 at 33), and agrees that, when conditions permit, operating the screens into August will ensure that the river experiences the greatest entrainment reduction benefit reasonably possible. The Final Permit requires that the wedgewire screens be operated into August 15 when conditions permit. *See also* Responses to Comment III.4.2.

9.6 Low river flows or screen fouling could trigger the need to bypass the cylindrical wedgewire screen system

Comment III.9.6	**AR-1577, EPRI, pp. 2-6**

Low river flows or screen fouling could trigger the need to bypass the system in order to obtain sufficient cooling water flow to maintain station operations. Without experience with CWWS on the Merrimack River, it is not possible to accurately determine the frequency or severity of fouling events that would require bypass of the CWWS system. If CWWS are selected as BTA for either entrainment and/or impingement, the station will be able to monitor conditions that necessitate bypass and report to EPA on bypass events.

EPA Response

PSNH and Enercon also commented that Merrimack Station should be permitted to bypass the wedgewire screens. EPA is persuaded that incorporating an emergency intake into the design of the BTA for entrainment is justified. *See* Response to Comment III.4.3. Part I.E.4 of the Final Permit allows for an emergency intake system and requires the permittee to minimize use of the system to the greatest extent possible. Further, it requires the permittee to notify EPA (within twenty-four hours of initiating any use of the emergency intake system) of the reason that the wedgewire screens were taken off-line and identify all actions taken or to be taken to address the cause, and minimize the use, of the emergency intake. When the Permittee is operating the emergency intake the traveling screens must be operated consistent with the conditions of the permit.

9.7 Wedgewire screens could meet the criteria to be determined to be BTA under § 125.94(c)(2), (6), or (7).

Comment III.9.7	AR-1577, EPRI, pp. 2-6

If wedgewire screens are designed to provide a maximum through-slot velocity of 0.5 fps or less, then they would meet criteria to be determined to be BTA under § 125.94 (c)(2). Even if through-slot velocity exceeded 0.5 fps, wedgewire screens would still provide impingeable fishes the opportunity to escape impingement, and the ambient currents would assist fish that are impinged in escaping from the screen surface. For these reasons, wedgewire screens alone could qualify as impingement BTA under (c)(6) or (c)(7).

EPA Response

EPRI comments that the design through-screen velocity of the screens is less than 0.5 fps and complies with one of the BTA alternatives for impingement mortality under the Final Rule. EPA agrees that, when operational, the screens would satisfy the BTA for impingement mortality at 40 CFR § 125.94(c)(2). While it may be possible that, even with actual through-screen velocities above 0.5 fps, ambient currents and the relatively small zone of hydraulic influence associated with the screens could also allow the facility to achieve the impingement mortality performance standard, thus satisfying the BTA alternatives at 40 CFR § 125.94(c)(6) or (7) ("systems of technologies" and "impingement mortality performance standard," respectively), meeting either of these compliance alternatives would require additional demonstrations, biological monitoring, and time. *See also* 40 CFR § 122.21(r)(6)(ii). Moreover, EPRI assumes in its comments below, *see* Comment III.9.8, that the wedgewire screens would only operate for "part of the year," and PSNH has commented that wedgewire screens should not be operated year-round at Merrimack Station, based on PSNH's assessment of the potential for damage to the screens when operating in the fall and winter, *see* Response to Comment III.3.1 and III.4.2. Obviously, wedgewire screens would reduce impingement mortality otherwise occurring at the facility only during those periods the screens are in use.

9.8 If cylindrical wedgewire screen technology is in place for part of the year, then use of some other technology during another part of the year would require strong justification

Comment III.9.8	AR-1577, EPRI, pp. 2-6

The protective aspects of wedgewire screens for impingeable fish are that fish may not be impinged due to the low through-slot velocities, and that fish that may be impinged would be swept from the screen surface or assisted in escape from the screen surface by ambient currents. All of this occurs without fish being removed from their habitat. If CWWS technology is in place as BTA for part of the year, then use of some other technology during another part of the year, which would require additional capital costs and may not be as effective, would require strong

justification. Occasional by-pass of the CWWS system during periods of extreme fouling would not constitute such justification unless bypass events are frequent and prolonged.

EPA Response

EPRI comments that use of an impingement technology during parts of the year when wedgewire screens are not in use "would require strong justification," because of the "additional capital costs" required and that another technology "may not be as effective." EPA disagrees. Pursuant to EPA's 316(b) regulations:

> the owner or operator of an existing facility must comply with one of the [impingement BTA] alternatives in paragraphs (c)(1) through (7) of this section, except as provided in paragraphs (c)(11) or (12) of this section, when approved by the Director. In addition, a facility may also be subject to the requirements of paragraphs (c)(8), (c)(9), or (g) of this section if the Director requires such additional measures.

40 CFR § 125.94(c). Merrimack Station impinges several thousand fish annually throughout the twelve months of the year. This impingement presents an adverse environmental impact that must be minimized in compliance with CWA § 316(b) and, under the regulations, may be complied with through any number of alternatives. If wedgewire screens (with a through-screen design velocity of 0.5 fps) are in operation whenever Merrimack Station withdraws water through its cooling water intake structure, then the facility will comply with the impingement mortality BTA at 40 CFR § 125.94(c)(2). When the facility withdraws without operating the wedgewire screens, it must still comply with CWA § 316(b) and 40 CFR § 125.94(c).[83] *See also* 40 CFR § 125.94(c)(2) (providing that, for facilities that comply with the maximum design through-screen intake velocity of 0.5 feet per second option, the "maximum velocity must be achieved *under all conditions*") (emphasis added). EPRI cites nothing in the rule that would excuse a facility that complies with one of the impingement BTA alternatives for part of the time it operates from complying with § 125.94(c) for the rest of the time. Under the logic of the comment, Merrimack Station could be excused from the requirements of § 125.94(c) for more than half the year. The Act and its implementing regulations, however, require the facility to "minimize" impingement, which means the facility must reduce impingement "to the smallest amount, extent, or degree reasonably possible." 40 CFR § 125.92(r).

Furthermore, options are available to address year-round impingement at Merrimack Station and comply with 40 CFR § 125.94(c) when the wedgewire screens are not in use. Upgrading the existing traveling screens to ensure that the fish return trough transports fish back to the Merrimack River under all conditions is relatively cost effective and will improve survival of impinged fish in comparison to the existing trough, which doesn't presently return fish to the

[83] The exceptions to § 125.94(c) at subparagraphs (11) and (12) do not apply to Merrimack Station, because the rate of impingement is not *de minimis*, *see* Response to Comment III.4.a., and because the facility does not meet the requirements for a low capacity utilization power generating unit.

river.[84] Because the Permittee will use traveling screens and a fish-friendly return for any seasonal periods it does not operate the wedgewire screens, operating the traveling screens and return during those limited periods the facility uses the emergency intake (i.e., when the wedgewire screens are bypassed to prevent catastrophic damage) would not be overly burdensome and will ensure that impingement mortality continues to be reduced to the smallest amount reasonably possible. *See* 40 CFR § 125.92(r). In addition, during periods when the Facility is not generating power (typically in the fall and spring months, based on net generation over the last five years), it may achieve an actual intake velocity of no greater than 0.5 fps. It may be possible for Merrimack Station to comply with the impingement mortality BTA standard year-round using a combination of these and other technologies and operational measures under 40 CFR § 125.94(c)(6) without substantial additional costs. *See* Response to Comment III.3.1.

Finally, EPRI's comment justifying no impingement control technology when the wedgewire screens are not in use on the basis that another technology "may not be as effective," does not make any sense. It is essentially a claim that, if the more effective available technology cannot be used for part of the year, then no technology, even if available, should be required during that time. Such a view finds no support in the statutory and regulatory requirement to "minimize" adverse environmental impact.

9.9 Debris fouling is typically episodic and seasonal in nature

Comment III.9.9	AR-1577, EPRI, pp. 2-6

EPRI cannot provide comment on the expected frequency of CWWS fouling at the Merrimack station. However, EPRI's ongoing program on debris management at cooling water intakes (refs) would indicate that debris fouling is typically episodic and seasonal in nature. Prior history suggests that debris fouling would be triggered by high-flow events, particularly during spring and fall. Biofouling typically occurs during summer months when ambient river temperatures are high. Although systems can be installed to alleviate fouling, such as air burst and brush cleaning for debris/biofouling and warm water recirculation for frazil ice, there may still be occasions when a bypass system is required to maintain station operation.

EPA Response

EPA agrees that brush cleaning and an air burst system can be used to reduce the likelihood and impact of fouling but that a bypass is nonetheless justified given the potential for clogging to cause significant damage to the screens and other equipment. *See* Response to Comment III.4.3. Consequently, Part I.E.4 of the Final Permit allows for an emergency intake system but requires the permittee to minimize its use to the greatest extent possible. Further, it requires the permittee to notify EPA (within twenty-four hours of initiating any use of the emergency intake system) of

[84] "PSNH acknowledges that impingement survival with Merrimack Station's current system is minimal." AR-846 at 115. "The existing traveling screen has 100% impingement mortality due to the location of the debris return sluice, which discharges into a dry sump and does not allow the fish to enter the river except under high pool elevations." AR-6 at 30 (emphasis added).

the reason that the wedgewire screens were taken off-line and identify all actions taken or to be taken to address the cause, and minimize the use, of the emergency intake. Moreover, the emergency intake cannot take the place of proper operation and maintenance of the screens, airburst system, and associated equipment. *See* 40 CFR § 122.41(e).

9.10 Without a bypass, damage to the screens and to the plant could be catastrophic

Comment III.9.10	AR-1577, EPRI, pp. 2-7

Without a bypass to allow maintenance of the plants heat sink, damage to the screens and to the plant could be catastrophic; i.e., the wedgewire screens could collapse requiring complete replacement and the plants condenser system could be severely damaged resulting in long-term (weeks, months) of outage to effect repairs. Plant outage may have local impacts on grid reliability and result in potential increase in rate payers cost. Bypasses are common at most plants including those with traveling water screens. Bypasses are typically actuated when pressure differential across the screen face reach a predetermined safety point.

EPA Response

EPA agrees that a bypass is justified given the potential for clogging to cause significant damage to the screens and other equipment. *See* Response to Comment III.5.D. Consequently, Part I.E.4 of the Final Permit allows for an emergency intake system but requires the permittee to minimize use of the emergency intake system to the greatest extent possible. *See also* Response to Comments III.4.3 and III.9.9.

10.0 Additional Comments Received Super Law Group LLC (on behalf of Sierra Club and Conservation Law Foundation) Regarding BTA After the 2017 Comment Period

It has been more than eight years since EPA determined that converting the Station's antiquated once-through cooling system to closed-cycle cooling with the addition of a proper fish return system is necessary to comply with Clean Water Act section 316(b)'s best technology available ("BTA") requirement and New Hampshire water quality standards. We urge EPA to finalize that determination and issue a final NPDES permit containing the same BTA-related requirements that are in the 2011 draft permit (and the 2014 draft permit) without further delay.

If, however, EPA were to not finalize its proposed BTA determination, then the agency would have to comply with several mandatory obligations imposed by the Administrative Procedure Act (APA) and the Clean Water Act (CWA). As described below, EPA must make a BTA determination with every NPDES permit it issues. Such determination must be grounded in evidentiary support in the record. The agency may not issue a NPDES permit that defers – either explicitly or effectively – the BTA determination until additional studies have been completed.

And EPA may not deprive the public of its right to participate in permitting, either by putting BTA requirements in a later-developed ancillary document outside of the permit, or by issuing a final permit that is not a logical outgrowth of the draft. Finally, EPA is prohibited from issuing a NPDES permit that allows a permittee to indefinitely or permanently avoid compliance with Section 316(b)'s best-technology requirements.

10.1 Executive Summary

Merrimack Station's antiquated once-through cooling system withdraws extremely large volumes of water – nearly 200,000 gallons a minute at its peak – from the Merrimack River's Hookset Pool, thereby killing and injuring large numbers of fish, shellfish, and other aquatic organisms.

In 2011, EPA determined that the best technology available ("BTA") for minimizing the adverse environmental impacts of the Station's cooling water intake structures is closed- cycle cooling. After extensive analysis, EPA found that to satisfy Clean Water Act section 316(b) and New Hampshire water quality standards, the Station must convert its once-through cooling system to a closed-cycle cooling system, operate that system from April to August, when the highest densities of aquatic life are present in the river, and add a fish return system. In determining that closed-cycle cooling is BTA for Merrimack, EPA carefully evaluated and specifically rejected wedgewire screens as BTA, due to numerous technical problems and uncertainties as to the feasibility and effectiveness of installing and operating such screens in the Hookset Pool.

In 2014, while making other changes to other aspects of the permit, EPA issued a new draft NPDES permit for the Station containing exactly the same cooling water intake structure requirements as the 2011 draft permit.

In 2017, without issuing a new draft permit, EPA sought public comment on certain questions relating to the 2011 and 2014 draft permits. In particular, EPA stated it had received new information, which raised substantial new questions about the *potential* for fine-mesh wedgewire screens to qualify for BTA at the Station. EPA stated that it was reconsidering wedgewire screens as the *possible* BTA because, in light of new information, the screens *appear potentially capable* of reducing fish kills to a greater degree than previously estimated (but still not to the same degree as closed-cycle cooling) and logistical and engineering concerns *may* be surmountable. The 2017 notice made clear that EPA remained uncertain as to whether wedgewire screens would, in fact, be feasible and effective at Merrimack. EPA did *not*, at that time, change its 2011 determination that closed-cycle cooling is BTA for the Station. EPA stated that it was looking forward to receiving the results of on-site pilot testing that PSNH intended to conduct in the spring/summer of 2017 to investigate the efficacy of wedgewire screen technology. The agency stated it would consider those results and other information in making permitting decisions. As discussed below, the 2017 testing was apparently inconclusive, leading the Station owner to request an opportunity to conduct even more study feasibility and effectiveness.

In 2018, Granite Shore Power (GSP)[1] acquired the Station, fully aware that EPA's 2011 and 2014 draft permits require closed-cycle cooling. Since then, rather than finalizing the NPDES permit,

EPA has instead met with GSP frequently to discuss possible changes to the permit. In September 2018, GSP told EPA that not only does the company not want to install closed-cycle cooling, but it is "no longer interested in installing wedgewire screens" (which PSNH proposed as recently as 2017) because they "do not want to spend the money."[2] A year later, in August 2019, GSP told EPA that it was amenable to receiving a NPDES permit with wedgewire screen requirements, but it still wanted an opportunity to consider whether another compliance option might be preferable to the company. Although PSNH had conducted the pilot testing of wedgewire screens in 2017 and submitted the results to EPA, GSP told EPA that the testing was insufficient to determine the feasibility and effectiveness of a wedgewire system and that GSP wants to do additional studies after receiving a final NPDES permit.

GSP appears to be seeking a final NPDES permit that nominally "selects" wedgewire screens at BTA for the Station (despite the absence of sufficient studies on their feasibility and effectiveness) but does not actually require GSP to install wedgewire screens. GSP wants to conduct additional studies after the permit is issued, and then propose to the agency, based on such studies, that it should be allowed to install something other than wedgewire screens, or to do nothing at all, thereby continuing use of its antiquated, destructive once-through cooling system for the life of the Station. What GSP seeks would be unlawful in numerous respects.

EPA should proceed to issue a final NPDES permit for Merrimack Station with cooling water intake structure requirements matching those in EPA's 2011 and 2014 drafts. If EPA and GSP have not been able to determine the feasibility and effectiveness of wedgewire screens in all the years leading up to the 2011 draft permit and the more than eight years since then, the agency should not cause further delays for additional studies of uncertain technologies. Closed-cycle cooling with a fish return system is proven, effective technology that represents BTA for the Station, and EPA should issue a final NPDES permit reflecting that determination.

If, however, EPA were to revise its proposed BTA determination, then the agency would have to comply with several mandatory obligations imposed by the APA and CWA. First, the CWA requires EPA to make a BTA determination as part of each draft or final NPDES permit the agency issues. The law does not allow EPA to explicitly or effectively defer its BTA determination until the agency has had an opportunity to review additional studies to be submitted after permit issuance. If the agency were to "select" a generic category of technology as BTA without specifying the essential attributes and parameters to be achieved at the permitted facility, and without requiring the permittee to achieve performance meeting those parameters, then there would be no BTA determination at all.

Second, EPA's BTA determination (like all agency decisions) must have adequate supporting evidence in the record, be based on a reasoned determination, and include an explanation that rationally connects the facts found to the choice made. Otherwise, it will be set aside as arbitrary and capricious under the APA. If future studies are still necessary to determine feasibility and effectiveness, then the current record is lacking adequate evidence on those fundamental issues.

Third, NPDES permits must set forth all operative requirements within the four corners of the permit. They may not be structured in a way that allows critical substantive requirements to be

developed only after permit issuance by the permittee (with or without agency oversight) and contained in a separate document apart from the permit itself, because that would violate the CWA's and APA's public participation requirements.

Fourth, a permit containing cooling water intake structure requirements similar to those sought by GSP would plainly not be a "logical outgrowth" of the 2011 and 2014 draft permits. Sierra Club and Conservation Law Foundation hereby request, and are legally entitled to, a formal opportunity to review (with the assistance of their technical experts) and submit comments on any new draft permit provisions that are not a logical extension of the prior drafts.

Fifth, and finally, in issuing a NPDES permit, EPA must not only determine which technology is BTA, it must also "require compliance as soon as practicable." Because the deadline for compliance with Section 316(b) has long passed and the Station's NPDES permit is 22 years overdue for renewal, the temporal aspect of compliance is critically important here. A compliance schedule may be used only to allow the permittee a reasonable amount of time to construct and install needed technologies. It must provide a deadline for compliance. A compliance schedule may not be used to gather information for a post-permit-issuance BTA determination. A compliance schedule certainly may not be used to allow a permittee to postpone compliance indefinitely while it develops arguments as to why the permit should be modified to remove the BTA- based requirements it prefers not to spend money to comply with. Relatedly, a compliance schedule should not give a permittee strong incentives to not only delay but also to undermine the feasibility and effectiveness of technologies it does not want to install.

1 Granite Shore Power LLC and GSP Merrimack LLC are referred to collectively as "GSP."

2 U.S. EPA, Memorandum Documenting September 20, 2018, Meeting Between EPA and Granite Shore Power Concerning the Merrimack Station NPDES Permit (Oct. 26, 2018) at 7.

EPA Response to Comments III.10 and III.10.1:

Although the re-opened comment period for certain questions, issues, and information closed on December 18, 2017, Sierra Club and the Conservation Law Foundation ("CLF") submitted additional comments to EPA in a letter dated January 7, 2020, "concern[ing] cooling water intake structure issues in the permit renewal process" ("2020 CWIS Comments"). *See* AR-1680. In general, in the 2020 CWIS Comments, Sierra Club and CLF "urge EPA to finalize [its preliminary BTA] determination and issue a final NPDES permit containing the same BTA-related requirements that are in the 2011 draft permit (and the 2014 draft permit) without further delay."

As the Final Permit indicates, EPA does not agree that the Final Permit's § 316(b)-related requirements should simply match those in the 2011 Draft Permit.[85] EPA reiterates that, in the 2011 Draft Permit, EPA proposed to determine that closed-cycle cooling and a new fish return constitute the best technology available ("BTA") at Merrimack Station, as described and

[85] Moreover, the 2014 Revised Draft Permit is not relevant here as it only addressed the modified proposed limits for FGD wastewater discharges.

explained in the 2011 Draft Determinations Document in the accompanying Fact Sheet. EPA has explained, however, that, since that time, new information has been submitted or become available to EPA that raises substantial new questions concerning the 316(b)-related analysis supporting that proposal. *See* AR-1534. As EPA explained in the 2017 Statement, these new questions and information include:

1. new EPA regulations under CWA § 316(b), 33 U.S.C. § 1326(b), pertaining to cooling water intake structures at existing facilities, 79 Fed. Reg. 48300 (Aug. 15, 2014) (Final Rule) (2014 CWA § 316(b) Regulations);
2. questions about how the 2014 CWA § 316(b) Regulations should be applied to the Merrimack Station NPDES permit;
3. new information regarding the efficacy of cylindrical wedgewire screen technology for reducing impingement mortality and entrainment by cooling water intake structures;
4. new information concerning cylindrical wedgewire screen design (*e.g.*, wedgewire "half-screens") that could facilitate deploying the technology at Merrimack Station;
5. new questions about what would constitute a reasonable schedule for retrofitting Merrimack Station to comply with CWA § 316(b) either by installing cooling towers to enable the facility to operate on a closed-cycle basis or by installing cylindrical wedgewire screens to operate in conjunction with open-cycle cooling;
6. questions about how, if at all, EPA should, when setting NPDES permit limits for Merrimack Station, take account of the substantial drop in the facility's overall capacity utilization, while recognizing that the units still run a great deal at certain times; and
7. questions about how, if at all, EPA should, when setting NPDES permit limits for Merrimack Station, take account of the current state-administered auction process through which PSNH is expected to divest of its electrical generating assets, including Merrimack Station.

AR-1534 at 3-5. EPA agrees that the BTA determination must be rational in light of the information in the record. A rational determination, however, considers the new information, data, and arguments that have become available since the 2011 Draft Permit and that raise substantial new questions. Therefore, EPA reopened the comment period on the Draft Permit in order to provide the public with an opportunity to comment on the new information and the substantial new questions. *Id.* at 3. EPA also responded to the new information and questions by developing options for certain new (or revised) Draft Permit conditions (including for a determination that wedgewire screens—rather than closed-cycle cooling—is the BTA), and by developing new (or revised) analyses in support of the Draft Permit conditions. *Id.* at 3-4. In connection with the reopened comment period, EPA prepared a "Statement of Substantial New Questions for Public Comment" ("2017 Statement") to describe the new information, the substantial new questions, the potential new permit conditions, and the new supporting analyses, so that the public could review the material and comment on it to EPA. *Id.* at 4. With respect to wedgewire screens and closed-cycle cooling, EPA stated that "new information suggests that an effective screen array potentially *can* be implemented in the Hooksett Pool section of the Merrimack River, and that this technology may be more effective at reducing the Facility's entrainment than previously thought" and that, consequently, EPA

was reconsidering whether to determine that wedgewire screens, rather than closed-cycle cooling, is the BTA. *Id.* at 18. EPA even included draft permit conditions and a compliance schedule for a finding that wedgewire screens is the BTA at Merrimack Station. *Id.* at 29-32. Thus, Sierra Club and CLF should have anticipated (and did, as demonstrated in these supplemental comments as well as in their timely comments) that the BTA determination in the Final Permit could be wedgewire screens in light of the discussion in the 2017 Statement. Thus, EPA does not agree that the BTA determination is not a "logical outgrowth" of the permit proceeding, including the 2017 Statement. Nor does EPA agree that another—which would be the fourth—notice-and-comment period is necessary at this point. The APA does not require that conditions in a final permit necessarily be subject to a new round of public comment whenever they vary from the conditions proposed in the earlier draft permit. If that was the rule, then agencies would be unable to change permit conditions in response to public comments without first holding a new round of public comment. Such a rule could discourage agencies from fairly considering public comments that might lead to changed permit conditions for fear of repeatedly having to reopen the public comment period. *See Conn. Light & Power Co. v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 533 (D.C. Cir. 1982); *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1031 (D.C. Cir. 1978).

As part of its careful consideration of the 2020 CWIS Comments, Region 1 has reviewed and considered the opening comments and the Executive Summary to the letter. Sierra Club and CLF further discuss the issues identified in more detail later in the 2020 CWIS Comments. Region 1 responds to this material in the more detailed EPA responses that follow.

10.2 EPA Should Issue a Final NPDES Permit Consistent with its 2011 BTA Determination and the 2011/2014 Drafts Without Further Delay

For the following reasons, we ask that EPA proceed to finalize the cooling water intake structure requirements the agency first issued in draft form in 2011.

10.2.1 Merrimack Station's Antiquated Cooling System Kills and Injures the Merrimack River's Aquatic Organisms

The Merrimack Station, built in the 1960s, utilizes an antiquated, once-through cooling system. Since 2001, virtually all new power plants have been required to have closed -cycle cooling systems.[3] But even before that requirement became law, the power industry was rapidly moving to closed-cycle cooling. Roughly three-quarters of the coal-fired power plants and all of the large combined-cycle power plants built in the 1980s and 1990s have closed-cycle cooling systems.[4] As we enter the third decade of the 21st century, the Merrimack Station still lacks cooling technology that became commonplace in the last quarter of the last century.

The once-through cooling system at Merrimack Station withdraws nearly 200,000 gallons per minute (287 million gallons per day ("MGD")) from the Merrimack River killing and injuring large numbers of fish, shellfish, and other aquatic organisms at all of their life stages in several ways, principally through "entrainment" and "impingement." As EPA has explained, entrainment

occurs when very small organisms in the river water, such as fish eggs and larvae, are pulled with the water through the cooling water intake structure's screens and into the cooling system. These organisms are subjected to physical impacts, high water temperatures, pressure changes, and exposure to harmful chemicals, such as chlorine. Impingement occurs when larger aquatic organisms, such as juvenile and adult fish, are caught and held against intake screens. When rotating intake screens are rotated, a fish return system is supposed to safely return the impinged organisms to the water. (This will protect certain, more robust species, but not sensitive species.) At Merrimack Station, however, the fish return does not reach the river and, thus, EPA expects that none of the organisms impinged by the Station can survive.[5]

[3] 40 C.F.R. § 125.84(b)(1).

[4] 66 Fed. Reg. 28853, 28855-56 (May 25, 2001).

[5] EPA Region 1 - New England, 2011 Fact Sheet, Attachment D, *Clean Water Act NPDES Permitting Determinations for the Thermal Discharge and Cooling Water Intake Structures at Merrimack Station in Bow, New Hampshire, NPDES Permit No. NH 0001465* (hereinafter, "2011 Intake Structure Determinations") at iii.

EPA Response:

Sierra Club and CLF state that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because, among other reasons, the current once-through system kills and injures "large numbers of fish, shellfish, and other aquatic organisms at all of their life stages in several ways, principally through 'entrainment' and 'impingement.'" EPA agrees that the adverse environmental impacts of the current technology at Merrimack Station are significant and that the current once-through system is not the BTA for minimizing entrainment and impingement within the meaning of § 316(b). *See* Responses to Comments III.3.1, III.3.2, and III.3.6. The determination of which technology(ies) constitutes the BTA under § 316(b), however, is not limited to a consideration of only the numbers of organisms impinged and entrained. Nor is it limited to a choice between just the current system and closed-cycle cooling.

The question of how many organisms a particular system impinges and entrains is an important one, but it is not the only one. In the case of impingement, as the commenter is aware, *see* Comment III.7.2, unless the numbers are so low as to be *de mimimis*,[86] the Final Rule contemplates that the permittee will choose from among a suite of technology alternatives that EPA decided via rulemaking satisfy the requirements of § 316(b) for minimizing impingement, *see* 40 CFR § 125.94(c). EPA agrees that the current system at Merrimack Station does not satisfy any of those impingement mortality control alternatives, *see* Response to Comment III.3.1, but this does not mean that only closed-cycle cooling will satisfy the impingement BTA, *see* 40 CFR § 125.94(c)(2) – (7). Further, EPA never made a preliminary determination that closed-cycle cooling is the BTA for minimizing impingement mortality at Merrimack Station. *See* AR-618 at 347 ("With regard to reducing impingement mortality . . . EPA determined that the BTA involves implementing certain improvements to the fish return system and the intake screens."); AR-1534 (noting that 2011 Draft Permit "proposed certain intake screen operations and fish return system improvements to reduce impingement" at the facility). In the case of entrainment, as the

[86] They are not in this case. *See* Response to Comment III.3.4.

commenter is also aware, *see* Comment III.7.2, the number of organisms entrained is only one of several mandatory and discretionary factors that EPA considers in determining the BTA, *see* 40 CFR § 125.98(f). The entrainment requirements in the permit must reflect EPA's determination of "the maximum reduction in entrainment warranted after consideration of factors relevant for determining the best technology available for minimizing adverse environmental impact at each facility." *Id.* Closed-cycle cooling remains the most effective technology for minimizing the numbers of organisms entrained, but wedgewire screens are expected to substantially reduce entrainment as compared to existing conditions. *See* Responses to Comments III.4(i), III.4.1, III.4.2. When determining the "maximum reduction in entrainment warranted," EPA is required to consider additional factors beyond the numbers entrained, including "[q]uantified and qualitative social benefits and costs of available entrainment technologies." 40 CFR § 125.98(f)(2)(v). In this case, the social costs of closed-cycle cooling are significantly higher than wedgewire screens. *See* Response to Comment III.5.2.1, 5.2.2, and 5.2.3.

EPA may reject "any entrainment control technologies or measures that perform better than the selected technologies or measures," so long as EPA explains why it has rejected such measures. 40 CFR § 125.98(f)(1). As EPA discussed at length in the 2011 Draft Determinations Document, a number of technologies other than closed-cycle cooling exist, which, depending on various considerations, might be appropriate choices for BTA at the facility. At the time, EPA concluded that it appeared that the conditions necessary for an effective wedgewire screen installation would not exist in the Hooksett Pool on a consistent and reliable basis, based on the information in the record at the time. *See* AR-1534 at 17 (citing AR-618 at 271-80). EPA expressed concern that PSNH's proposed design would require so many screens and would occupy such a large area of the river, that it would excessively interfere with public uses of the waterway. *Id.* EPA recognized uncertainties related to sweeping flows, through-screen velocities, slot size, and swimming abilities and overall hardiness of the species of aquatic organisms in question. *Id.* at 18. As EPA acknowledged in the 2017 Statement, however, new information had been submitted or otherwise become available that raised substantial new questions about EPA's conclusions in the 2011 Draft Determinations Document regarding wedgewire screens. *Id.* at 18-22, 33-34. In addition, use of Merrimack Station has changed from a baseload plant to operations more consistent with that of a peaking facility.

As with any NPDES permitting decision, EPA is required to exercise its "considered judgment" when making a BTA determination. *See In re Charles River Pollution Control Dist.*, 16 E.A.D. 623, 626 (EAB 2015). This means that EPA must duly consider issues raised in comments on a Draft Permit and ultimately adopt an approach that is rational in light of all the information in the record. *Id.* EPA must explain with reasonable clarity the reasons supporting its conclusions and the significance of the record facts upon which it relied. *Id.* A BTA determination that does not reasonably consider this new information could be subject to challenge. Furthermore, under the Clean Water Act, EPA "is required to exercise its judgment even in the face of some scientific uncertainty." *In re City of Taunton*, 17 E.A.D. 105, 134 (EAB 2016) (quoting *Upper Blackstone Water Pollution Abatement Dist. v. EPA*, 690 F.3d 9, 23 (1st Cir. 2015)). Accordingly, EPA explains in this Response to Comments document how it has considered the new information regarding wedgewire screens and the impact it has on EPA's proposed determination in the 2011 Draft Permit and Draft Determinations Document that the necessary conditions for an effective

wedgewire screen installation are not present at Merrimack Station on a consistent and reliable basis and that wedgewire screen technology is therefore not the BTA. *See* Responses to Comments III.4.2 and III.7.3. EPA concludes that, in light of all of this new information, closed-cycle cooling is not the "best technology available" within the meaning of Section 316(b). See Responses to Comments III.5.2.1, 5.2.2 and 5.2.3 and III.5.3 (including associated responses).

10.2.2 In 2011, EPA Determined that the Station's Antiquated Cooling System Must Be Converted to Closed-Cycle Cooling to Comply with Clean Water Act Section 316(b)'s Best Technology Available Requirement and Issued a Draft NPDES Permit Reflecting That Determination

In 2011, EPA "determined that significant changes to Merrimack Station's current [cooling water intake structures] are necessary to satisfy CWA § 316(b)'s . . . requirement that the location, construction, design and capacity of the facility's [cooling water intake structures] reflect the Best Technology Available for minimizing adverse environmental impacts (BTA)."[6] Specifically, EPA determined that closed-cycle cooling, operated on a seasonal basis (*i.e.*, from April 1 through August 31, when the highest densities of aquatic life are present), is BTA for the Station. Consistent with that determination, the 2011 Draft Permit included the following requirements:

- The intake flow volume for Units 1 and 2 shall be reduced to a level consistent with operating in a closed-cycle cooling (CCC) mode from, at a minimum, April 1 through August 31 of each year (1.77 MGD for Unit 1, 4.20 MGD for Unit 2);

- During any periods that Units 1 and 2 are operating in an open-cycle mode, new travelling screens (or screen inserts) employing all the features of a modified Ristroph, MultiDisc, or WIP screen design shall be installed and operated for the CWISs. At a minimum, these screens shall have:

    - A mesh size no greater than 3/8-inch using smooth-woven screen mesh to minimize fish de-scaling; and
    - Fish buckets that provide a hydraulically stable "stalled" fluid zone that attracts fish, prevents injury to the fish while in the bucket, and prevents fish from escaping the bucket.

- A low-pressure (<10 psi) spray wash system shall be used for each travelling screen to remove fish prior to high-pressure washing of the screens for debris removal;

- The location of the low-pressure spray systems shall be optimized to transfer fish gently to the return sluice;

- Travelling screens shall be operated continuously;

- A new fish return sluice with the following features shall be installed for each CWIS:

  - Maximum water velocities of 3-5 ft/s within the sluice;
  - A minimum water depth of 4-6 inches at all times;
  - No sharp-radius turns (i.e., no turns greater than 45 degrees);
  - A point of discharge to the river that is slightly below the low water level at all times;
  - A removable cover to prevent access by birds, etc;
  - Escape openings in the removable cover along the portion of the sluice that could potentially be submerged; and
  - A slope not to exceed a 1/16 foot drop per linear foot, unless the plant can demonstrate that this is not feasible.

- The fish return sluice shall be in place and operational at all times.[7]

EPA also found that these intake structure requirements would satisfy New Hampshire's applicable water quality standards and that if they "were made significantly less stringent they would be inconsistent with the state's water quality standards as they would likely interfere with attaining the state's water quality criterion for protecting biological and aquatic community integrity."[8]

Furthermore, EPA specifically determined that an alternate technology, wedgewire screens,[9] was not BTA. In an extended discussion in its 2011 Intake Structures Determinations, EPA identified many issues and many uncertainties that prevent wedgewire screens from being BTA at Merrimack Station, including but not limited to:

- Whether wedgewire screens may be effective or not at a particular facility depends on a variety of factors, including the screen slot size, water depths, local hydrodynamics, the relative sizes of the screen mesh and the local organisms, and water withdrawal volumes and velocities.

- Wedgewire screens that have been used or tested at other facilities have had varying degrees of effectiveness.

- There are specific minimum hydrologic and hydrographic conditions that must exist within the waterbody in order for wedgewire screens to operate effectively.

- The performance of wedgewire screens depends on, among other things, the presence of sufficient ambient current to sweep eggs and larvae past the intake screens rather than being drawn into or onto them.

- Minimizing entrainment depends upon the slot width of the screen being small enough to prevent organisms from passing through.

- In particular, EPA stated that "[r]esearch indicates that a slot size of 0.5 mm is likely needed to maximize entrainment reductions and that substantially more entrainment will occur as slot sizes increase to 1.0 mm or larger."

- EPA also expressed concern, based on the in-river configuration of screens presented by PSNH, that the ability of larvae and eggs to survive contact with the screens as they drift downstream is questionable.

- Minimizing impingement depends upon maintaining a low enough intake velocity to allow fish to avoid being trapped against the screens by the force of the water withdrawals.

- Even the slot sizes and velocity are small enough and low enough, adequate ambient sweeping velocity is critical to move the organisms away from the screens, so that they do not end up being impinged on the screens by a combination of forces in the water.

- Adequate ambient sweeping velocity current is also needed to prevent the accumulation of debris ("fouling") on the screen surfaces.

- The fouling of intake screens not only interferes with maintaining adequate withdrawals of cooling water, but also increases the velocity of water passing through unrestricted (unfouled) slots, which can increase impingement or entrainment.

- Yet, as EPA noted, "it is evident that sweeping currents in Hookset Pool are insufficient at critical times."

- PSNH itself expressed concerns about the potential for "frazil ice" (*i.e.*, ice that forms when turbulent water is cooled below the freezing point) to form on the screens and clog the openings.

- Wedgewire screens must also be located in an area with sufficient water depth to enable them to operate effectively.

- Yet, as EPA noted "it is unclear whether adequate water depths exist in Hooksett Pool to accommodate an effective wedgewire screen installation."

- Related issues include whether wedgewire screens would be located in areas where sediment accumulates and must be regularly dredged, whether dredging in and around an area with tightly-packed screens and underground piping is feasible, and whether the screen structures would likely trap branches and other debris drifting downstream.

- As wedgewire screen slot sizes are reduced, the number and size of the array of wedgewire screens increases, as does the potential for fouling of those smaller slots.

- The estimated number of wedgewire screens estimated to be needed at Merrimack ranged from 23 to 76 (depending upon slot width), with each screen over 13 feet in length, forming an array projecting well over 100 feet into the river, which could interfere with the public's use of the river to an excessive degree.

- EPA found that the "number of screens that would be required at Merrimack Station is unprecedent for facilities in the United States."

- EPA also noted that wedgewire screen installations at other facilities have been in waterbodies of very different depth, size, and type than Hooksett Pool, and "[t]he absence of comparable existing wedgewire screen operations raises concerns of the technology's suitability in Hookset Pool."[10]

Based on its extensive analysis of why wedgewire screens would not be feasible or effective in the Hooksett Pool, EPA concluded as follows:

> Having reviewed PSNH's submissions, as well [as] relevant technical and scientific literature, EPA concludes that PNSH's 2009 wedgewire screen proposal would not satisfy the BTA standard of CWA § 316(b) at Merrimack Station. Furthermore, EPA concludes that the rates of entrainment and impingement mortality reduction that the company predicts for its proposal are not supported.[11]
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> * * *
>
> [T]he necessary conditions for an effective wedgewire screen installation are not present at Merrimack Station on a consistent and reliable basis during the period when fish eggs and larvae are present. . . . EPA has identified a number of problems that are likely to undermine the effectiveness of wedgewire screens at Merrimack Station and, therefore, EPA rejects this technology as an option for the BTA at this facility.[12]

[6] EPA Region 1 - New England, 2011 Fact Sheet, Draft National Pollutant Discharge Elimination System (NPDES) Permit to Discharge to Waters of the United States Pursuant to the Clean Water Act (CWA), NPDES Permit No. NH0001465 ("2011 Fact Sheet") at 52.

[7] 2011 Fact Sheet at 52.

[8] 2011 Intake Structure Determinations at 346.

[9] The term "wedgewire screen" refers to a general category of slotted intake screens consisting of wedge-shaped wire welded to a frame. There is no particular slot width common to all or even most wedgewire screens.

[10] 2011 Intake Structure Determinations at 273-280.

[11] 2011 Intake Structure Determinations at 275.

[12] 2011 Intake Structure Determinations at 280.

EPA Response:

Sierra Club and CLF comment that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because, among other reasons, EPA proposed in the 2011 Draft Permit and accompanying Fact Sheet that seasonal closed-cycle cooling is the BTA. To be clear, in 2011, EPA proposed that seasonal closed-cycle cooling was the BTA for entrainment and that the BTA for impingement "involves implementing certain improvements to the fish return system and the intake screens." AR-618 at 347. EPA did note, however, that "the screening system improvements were not needed during closed-cycle cooling operations because closed-cycle cooling was even more effective for reducing impingement mortality." *Id.* at 347-48. In any event, there is, of course, no requirement that a final permit include every limit and condition unchanged from the draft permit. It is the very nature of the public participation process that a final permit may differ from the draft permit as a result of comments and new information received by the permitting authority. Furthermore, in this case, EPA issued a Statement of Substantial New Questions for Public Comment ("2017 Statement") in which it specifically notified the public that it was reconsidering the preliminary BTA determination for Merrimack Station in light of public comments and new information. AR-1534 at 4, 6-7, 12-36. As EPA explained:

> various data, information and arguments submitted during prior comment periods, or that were submitted or became known to EPA after the comment periods,[footnote omitted] raise a number of substantial new questions concerning the Merrimack Station Draft Permit. In response, EPA has decided to issue a public notice reopening the comment period on the Draft Permit in order to provide the public with an opportunity to comment on the new information and the substantial new questions. EPA has also responded to the new information and questions by developing options for certain new (or revised) Draft Permit conditions, and by developing new (or revised) analyses in support of the Draft Permit conditions. In connection with the reopened comment period, EPA has prepared th[e 2017 Statement] to describe the new information, the substantial new questions, the potential new permit conditions, and the new supporting analyses, so that the public can review the material and comment on it to EPA.

Id. at 3-4 (citing 40 C.F.R. § 124.14(b)). EPA expressly noted that it was "reconsidering wedgewire screens as the possible BTA for Merrimack Station in light of public comments and new information," *id*. at 18, and reconsidering "whether the greater cost of closed-cycle cooling is warranted in light of the potentially better-than-previously-estimated performance of wedgewire screens and the possible resolution of logistical and engineering issues," *id.* at 19-20.[87] Sierra Club and CLF's 2020 CWIS Comments make clear that they understood this to be the case. AR-1680 at 2 ("EPA stated it had received new information, which raised substantial new questions about the potential for fine-mesh wedgewire screens to qualify for BTA at the Station" and that EPA "was reconsidering wedgewire screens as the possible BTA.") (emphasis omitted). Furthermore, their comments on the 2017 Statement show that they foresaw that the Final Permit could include a determination that wedgewire screen technology rather than closed-cycle cooling is the BTA for entrainment. *See* Comment III.7.3. Sierra Club and CLF point to no requirement

[87] EPA also reopened the comment period as to the preliminary BTA determination for impingement at Merrimack Station. AR-1534 at 21-22.

that a Final Permit reflect the conditions of a Draft Permit unchanged, and there is none. *See City of Stoughton, Wis. v. US EPA*, 858 F.2d 747, 753 (D.C. Cir. 1988) ("If it were not possible for an agency to reexamine and even modify the proposed rule, there would be little point in the comment procedures."); *Nat'l Black Media Coal. v. FCC*, 791 F.2d 1016, 1022 (2d. Cir. 1986) ("[A] final rule need not be an exact replica of the rule proposed in the Notice."). If EPA was required to re-notice every change between a Draft Permit and a Final Permit, "the comment period would be a perpetual exercise rather than a genuine interchange resulting in [an] improved" permit. *Conn. Light & Power Co. v. NRC*, 673 F.2d 525, 533 (D.C. Cir. 1982). EPA must evaluate any new data, information, or arguments that raise new substantial new questions concerning the conditions in Draft Permit. In this case, EPA has done so and concludes that wedgewire screen technology is available at Merrimack Station and, considering the factors relevant for determining BTA for minimizing environmental impact, reflects the "maximum reduction in entrainment warranted." 40 CFR § 125.98(f); *see* Responses to Comments III.4, III.5.2, III.5.3 (including associated sub-responses).

Sierra Club and CLF also state that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because EPA also found that the cooling water intake structure conditions in the Draft Permit "would satisfy New Hampshire's applicable water quality standards and that if they 'were made significantly less stringent they would be inconsistent with the state's water quality standards as they would likely interfere with attaining the state's water quality criterion for protecting biological and aquatic community integrity.'" EPA has already addressed this issue in Response to Comment III.4.(i) above.

Finally, Sierra Club and CLF state that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because, in 2011, EPA identified "many issues and many uncertainties" associated with wedgewire screens and concluded that the rates of entrainment and impingement mortality reduction from wedgewire screens that PSNH predicted in 2009 are not supported, that the necessary conditions for an effective screen installation are not present on a consistent and reliable basis during the entrainment period, and that, therefore, wedgewire screens are not the BTA at the facility. As also explained above, EPA has re-evaluated wedgewire screen technology at Merrimack Station in light of new information in the record since the above-referenced statements in the 2011 Draft Determinations Document and pursuant to the framework for entrainment BTA determinations laid out in the § 316(b) regulations promulgated after EPA issued the 2011 Draft Permit. EPA's analysis addresses the uncertainties and conclusions noted in the comment. *See* Responses to Comments III.3.1, III.4.2, III.7.3.

10.2.3 In 2014, EPA Re-Issued the Draft NPDES Permit with No Changes to Any of the Cooling Water Intake Structure Requirements.

Three years later, in 2014, EPA issued a second version of the Merrimack Station's draft permit for public comment (hereinafter, the "2014 Draft Permit"). In the 2014 Draft Permit, EPA determined, based on public comments received during the comment period on 2011 Draft Permit and additional information the agency had gathered since then, that vapor compression evaporation (VCE) technology is the best available technology for the Station's discharges of wastewater from its wet flue-gas desulfurization (FGD) scrubber. EPA thus gave public notice

that it was reconsidering and revising particular provisions of the 2011 Draft Permit, specifically the effluent limits and reporting requirements for Outfall 003C at Part I.A.4 and for Outfall 003A at Part I.A.2 of the draft permit.

Significantly, despite having also received substantial comments from PSNH in objection to EPA's 2011 cooling water intake structure determinations, EPA did *not* state in its 2014 public notice, or in the 2014 Draft Permit, or in its fact sheet, that EPA was reconsidering, revising, or reopening any of its cooling water determinations or permit provisions.

Indeed, the 2014 Draft Permit issued for public comment retains all of the cooling water intake structure requirements, based on closed-cycle cooling and improvements to the travelling screens and fish return systems, verbatim from the 2011 Draft Permit.

EPA Response:

Sierra Club and CLF state that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because, among other reasons, when EPA issued the 2014 Draft Permit, it did not state that it "was reconsidering, revising, or reopening any of its cooling water determinations or permit provisions," but instead "retain[ed] all of the cooling water intake structure requirements, based on closed-cycle cooling and improvements to the travelling screens and fish return systems, verbatim from the 2011 Draft Permit." Sierra Club and CLF are correct that the 2014 Draft Permit did not revise or revisit the cooling water intake structure conditions of the 2011 Draft Permit. EPA explained in the accompanying Fact Sheet that it was only revising certain effluent limits and reporting requirements in the 2011 Draft Permit relating to Merrimack Station's flue gas desulfurization ("FGD") system in light of new information, data, and arguments EPA had received about the FGD system. AR-1135 at 3. EPA further noted that it was "not seeking additional comment on the [2011] Draft Permit's other provisions." The 2020 CWIS Comments do not explain, however, why a 2014 Draft Permit revising FGD-related provisions but not the CWIS-related conditions of the 2011 Draft Permit should prevent EPA from ever reconsidering portions of its § 316(b) analysis. As mentioned earlier, EPA explained in the 2017 Statement that it was, pursuant to 40 CFR § 124.14(b), reconsidering the BTA preliminary determination from the 2011 Draft Permit in light of new information, data, and arguments it had received that raised substantial new questions about elements of the § 316(b) analysis, *see* Response to Comment III.10.2.2, including information received after the 2014 Draft Permit was issued, *see, e.g.*, 2017 Statement at 18 (citing AR-1231, Exhibit 4; AR-1352, Attachment 1; AR-1361), 33-34 (listing additional information "submitted to, or collected by, EPA relevant to whether cylindrical wedgewire screens should potentially be determined to be a component of the BTA"); Comment III.10.2.4 (recognizing that EPA "promulgated national cooling water intake structure regulations for existing facilities in 2014, after the 2011 and 2014 Draft Permits for the Station were issued for public comment") (emphasis added). The fact that EPA has previously revisited some provisions of the 2011 Draft Permit does not mean that it may never revisit any other provisions of the 2011 Draft Permit, particularly in the face of subsequent new information that raises substantial new questions as to those provisions, because EPA must duly consider such

information and adopt a permitting approach that is rational in light of all information in the record. *See In re Jordan Dev. Co., LLC*, 18 E.A.D. 1, 5 (EAB 2019).

10.2.4 In 2017, EPA Sought Public Comment on "New Questions" Related to Cooling Water Intake Structures, But Did Not Change its BTA Determination and Expressed Continuing Uncertainty About the Feasibility and Effectiveness of Wedgewire Screens in Hooksett Pool.

In 2017, without issuing a new draft permit, EPA reopened the public comment period for the Station's draft NPDES permit with respect to what it called "substantial new questions."[13] Some of these questions related to cooling water intake structures.

First, EPA noted that the agency had promulgated national cooling water intake structure regulations for existing facilities in 2014, after the 2011 and 2014 Draft Permits for the Station were issued for public comment. Among other things, the new regulations (the "2014 CWA § 316(b) Regulations") specify categories of information that applicants for renewed NPDES permits must submit to EPA or a state permit writer. However, the 2014 CWA § 316(b) Regulations also provide that, for ongoing permitting proceedings – like the Merrimack permit renewal proceeding – the permit writer should determine whether the permit application materials already submitted are adequate or should be supplemented by information described in Section 122.21(r) of the regulations. EPA determined that such additional information was unnecessary and would unnecessarily delay the final NPDES permit for the Station:

> EPA has considered whether any of the 40 C.F.R. § 122.21(r) information submissions are necessary for this proceeding and has decided that they are not. *EPA has sufficient information in the record to determine the BTA requirements for the Merrimack Station permit.* EPA has collected this information from PSNH's permit application materials as well as from Company responses to EPA requests for information. . . . In addition, EPA has obtained information from research and analysis by EPA's staff and contractors. Moreover, since issuance of the 2011 Draft Permit, EPA has garnered additional information . . . . In light of all of this information, EPA concludes that it can address the appropriate factors under the statute and regulations without additional information submissions under 40 C.F.R. § 122.21(r). In fact, *directing PSNH to make those submissions now would unnecessarily delay completion of the Final Permit for Merrimack Station.* Therefore, EPA declines to call for new submissions from PSNH under 40 CFR 122.21(r).[14]

Second, EPA stated that it had received new information about the *potential* for wedgewire screens to qualify as BTA at the Station. EPA reiterated in 2017 that its analysis for the 2011 Draft Permit documented "significant uncertainty about the effectiveness of wedgewire screens."[15] EPA then stated that it was "reconsidering wedgewire screens as the *possible* BTA,"[16] but also made clear that, even despite the new information, substantial questions remain about the *possible* or *potential* feasibility and effectiveness of wedgewire screens in Hooksett Pool.[17] For example, EPA again raised the concerns about fouling of wedgewire screens by debris during

August due to low flow conditions and in winter due to "frazil ice."[18] And EPA explained that, even if the engineering and other feasibility problems could be surmounted, and even if the performance of wedgewire screens might be "potentially better-than-previously-estimated," "closed-cycle cooling would still be expected to reduce entrainment to a greater degree than wedgewire screens."[19]

EPA did *not*, in 2017, change its 2011 determination that closed-cycle cooling is BTA for the Station. In particular, EPA noted that PSNH informed the agency that it intended to do on-site pilot testing in the spring/summer of 2017 to investigate the efficacy of wedgewire screen technology. EPA stated that it welcomed submission of the data and would consider those results and other information in making permitting decisions.[20] However, as discussed below, although PSNH conducted the testing in 2017, GSP has told EPA that the study was not sufficient and that even more studies are needed to assess the potential feasibility and effectiveness of wedgewire screens in Hooksett Pool.

[13] EPA Region 1 – New England, Statement of Substantial New Questions for Public Comment, Merrimack Station (NPDES Permit No. NH0001465) (hereinafter "2017 Statement of New Questions").
[14] 2017 Statement of New Questions at 16.

[15] 2017 Statement of New Questions at 18.

[16] 2017 Statement of New Questions at 18.

[17] For example, EPA stated "new information *suggests* that an effective screen array potentially can be implemented . . . and that this technology *may be more effective* . . . than previously thought." "[T]his *suggests* that . . . wedgewire screens *could potentially be viable* . . ." "[N]ew information *suggests* that . . . slot sizes larger than 0.5 mm *may be able* to reduce . . . entrainment . . . more effectively than previously thought." "*It is possible* that . . . the sweeping flow *may be sufficient* to enable a substantial number of eggs and larvae to avoid entrainment." "*[S]ome larvae may* actively avoid entrainment." "[W]edgewire screen technology *appears potentially capable* of reducing entrainment . . . to a greater degree than previously estimated." 2017 Statement of New Questions at 18-19 (emphasis added).

[18] 2017 Statement of New Questions at 20, 22.

[19] 2017 Statement of New Questions at 19-20.

[20] 2017 Statement of New Questions at 20, 29.

EPA Response:

Sierra Club and CLF comment that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because, among other reasons, in the 2017 Statement, EPA expressed "continuing uncertainty" about the availability and effectiveness of wedgewire screens at Merrimack Station and did not "change its 2011 determination."[88]

[88] Although the comment also highlights EPA's finding that certain submittals from the Permitttee under 40 C.F.R. § 122.21(r) are not necessary for EPA to make a BTA determination, it fails to explain the significance of this finding to Sierra Club and CLF's assertion that EPA may only finalize a permit that determines that closed-cycle cooling is

While the 2017 Statement did not "change [EPA's] 2011 determination" or include "a new draft permit," it explained that new information about wedgewire screens raised substantial new questions about their availability and effectiveness for minimizing entrainment at Merrimack Station, directed the public's attention to specific information, data, and arguments in the record, made clear that EPA was reconsidering wedgewire screens as a candidate technology at the facility based on this new information, and even included draft BTA permit conditions for wedgewire screens and a compliance schedule for installing them there. AR-1534 at 17-21, 30-32. The comment cites no legal authority for the proposition that EPA was required to issue a new draft permit along with the 2017 Statement or otherwise "change" its preliminary BTA determination. EPA issued the 2017 Statement pursuant to 40 CFR § 124.14(b), which authorizes EPA to "take one or more" listed actions. *See* AR 1534 at 3-4. One such action includes reopening the comment period—"to give interested persons an opportunity to comment on the information or arguments submitted"—but nowhere requires EPA to also issue a new draft permit. 40 CFR § 124.14(b)(3). It was not improper or incomplete for EPA to issue the 2017 Statement for the purpose of soliciting public comment on the new information, data, and arguments without also issuing a new draft permit or changing the preliminary BTA determination.

Furthermore, for EPA to refer to new information in the 2017 Statement as "suggesting that the conditions in Hooksett Pool can, in fact, accommodate an appropriate wedgewire screen installation," AR-1534 at 18 (emphasis added), or "suggesting that adequate sweeping flows are likely to exist during the time period when the majority of eggs and larvae are present," *id.* (emphasis added), is entirely reasonable in light of EPA's determination that "substantial new questions" had been raised. The comment seems to take the position that EPA should have given definitive "answers" in the 2017 Statement, yet it provides no authority and offers no explanation for such a position. Moreover, EPA's characterization of the information does not demonstrate profound uncertainty that would prevent EPA from later determining that wedgewire screens are the BTA for Merrimack Station. To the contrary, EPA recognized that the new information called into question EPA's previous conclusions about the availability and efficacy of wedgewire screens at Merrimack Station. *See also* Response to Comment III.4.2. Nor is it inappropriate, or even surprising, for EPA to highlight in the 2017 Statement, for example, "[l]aboratory investigations, field studies, and new analysis" that "suggest that wedgewire screens with slot sizes larger than 0.5 mm may be able to reduce the entrainment of fish larvae at Merrimack Station more effectively than previously thought," *id.* at 18-19 (emphasis added), since uncertainty is inherent in most scientific inquiry. To the extent the comment suggests that absolute certainty is required to support a permitting decision, it is at odds with established case law recognizing that some level of uncertainty is expected and acceptable and does not necessarily prevent EPA from exercising its permitting discretion. *See In re City of Attleboro*, 14 E.A.D. 398, 413 (EAB 2009); 40 CFR § 125.98(f) (providing that the entrainment requirements in a permit must reflect the permitting authority's determination of the maximum reduction in

the BTA at Merrimack Station. As EPA said in the 2017 Statement, "EPA concludes that it can address the appropriate factors under the statute and regulations without additional information submissions under 40 C.F.R. § 122.21(r)."AR-1534 at 16.

entrainment warranted); *see also Miami-Dade Co. v. EPA*, 529 F.3d 1049, 1065 (11th Cir. 2008). It would be ill-advised to demand that EPA "ignore evidence simply because it falls short of absolute scientific certainty." *Northwest Ecosystem Alliance v. U.S. Fish & Wildlife Serv.*, 475 F.3d 1136, 1147 (9th Cir. 2007).

Elsewhere in this Response to Comments document, EPA has considered the uncertainties with wedgewire screens that it highlighted in 2011 and determined that the new information resolves or sufficiently lessens those uncertainties such that EPA may reasonably conclude that wedgewire screen technology is available at the facility and will reduce entrainment "to the smallest amount, extent, or degree reasonably possible," 40 CFR § 125.92(r) (defining "minimize" in the context of § 316(b)), based on new designs that overcome logistical and engineering concerns, developing scientific research on the impact of hydraulic bypass and larval avoidance on entrainment, and confirmatory results of PSNH's site-specific pilot study of wedgewire screens. *See* Response to Comment III.4.2. EPA recognizes that some uncertainty remains, but it is not so great as to preclude a reasoned decision. *See id.* Significant in EPA's determination that wedgewire screens would reflect the "maximum reduction in entrainment warranted," 40 CFR § 125.98(f), at Merrimack Station is the large difference in the social costs of installing and operating wedgewire screens and closed-cycle cooling at the facility, particularly in light of the much closer estimates of entrainment reduction from each technology.[89] EPA analyzes these and other relevant factors in Responses to Comments III.5.2.1, 5.2.2, and 5.2.3 and III.5.3 and associated responses.

10.2.5 Because EPA Has Ample Record Support for the Feasibility and Effectiveness of Closed-Cycle Cooling as BTA and Lacks Evidence to Support Any Other Technology as BTA, EPA Should Proceed to Finalize its 2011 BTA Determination.

In December 2017, Conservation Law Foundation, Sierra Club, Earthjustice and Environmental Integrity Project submitted comments regarding the cooling water intake structures at Merrimack Station in response to EPA's Statement of New Questions. Those comments stressed that EPA's preliminary BTA determination – that Merrimack Station should achieve reductions in impingement and entrainment equivalent to seasonal use of cooling towers and continual use of rotating screens with an improved fish return system – was sound, supported by record evidence, and should be finalized promptly because it was long overdue.

[89] To the extent the comment asserts that closed-cycle cooling should be the BTA because it "would still be expected to reduce entrainment to a greater degree than wedgewire screens," we note that the standard is not simply which requirements would reduce entrainment to the greatest degree, but rather which reflect the "maximum reduction in entrainment warranted after consideration of [relevant] factors." 40 C.F.R. §§ 125.98(f) (emphasis added); *see also Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, (219 2009) (rejecting an interpretation of § 316(b) that would require EPA to select the technology that "achieves the greatest possible reduction in environmental harm"). For instance, EPA is required to consider the "[q]uantified and qualitative social benefits and costs of available entrainment technologies." *Id.* § 125.98(f)(2)(v). In this case, the social costs of closed-cycle cooling are significantly higher than wedgewire screens, while the social benefits are comparatively much closer.

In contrast, we noted that the permittee's request for more time to demonstrate that wedgewire screens could be used as a complete replacement for cooling towers, was ill considered:

> EPA should not reopen the 2011 BTA determination because the permittee is now proposing to study a new compliance option, wedgewire…screens. This determination is long overdue and cannot be further delayed for more studies… Overall, the performance of a wedgewire...screen system that has not yet been designed, of an unknown slot-width size, in environmental conditions that have not been fully assessed, cannot be considered equivalent to closed-cycle cooling. In contrast, cooling towers are available, proven, and considerably more effective than wedgewire . . . screens at minimizing both entrainment and impingement, as well as thermal discharges. They are the best technology available.[21]

Two years later, little has changed in the record or in the river. Merrimack Station is still running the same fish-killing cooling system that it had in place in 1992, when the NPDES permit was last issued. EPA was required by law to make a BTA determination decades ago, and actually published a draft determination in 2011, nearly a decade ago at this point. EPA reaffirmed that determination in 2014 and took additional comment and reviewed additional studies in 2017. But as discussed above, that additional inquiry did not establish a record that warrants any changes to EPA's long-delayed 2011 BTA determination.

The time for studies is over. Between them, PSNH and GSP have had nearly a decade to research, prepare, and work towards installing more protective cooling water intake technologies based on EPA's 2011 draft BTA determination and the 2014 reaffirmation of that determination. After all those long and illegal years of delay, Merrimack Station's owners still have not assembled evidence that would justify overturning that determination.

The only lawful and reasonable course of action is for EPA to finalize the 2011 BTA determination and require compliance on the shortest possible schedule. As EPA noted in the 2017 Statement of New Questions, EPA's new regulations "require compliance as soon as practicable" with Section 316(b).[22] EPA should impose the schedule of deadlines and milestones for installing closed-cycle cooling that the agency set forth in its 2017 Statement of New Questions.[23]

Accordingly, EPA has built an extensive record in support of the 2011 Draft Permit and the 2014 Draft Permit, has made rational decisions, supplied explanations that connect its decisions to the facts found, and nearly a decade has passed without the Station being directed to upgrade its cooling system as EPA found was necessary to comply with the Clean Water Act and New Hampshire water quality standards. EPA should proceed to issue a final NPDES permit for the Station containing cooling water intake structure requirements matching those in the 2011 Draft Permit and the 2014 Draft Permit.

[21] AR-1573 at 16, 18.

[22] 2017 Statement of New Questions at 23.

[23] 2017 Statement of New Questions at 27-28.

EPA Response:

Sierra Club and CLF state that EPA should find that closed-cycle cooling is the BTA for Merrimack Station because EPA's preliminary BTA determination "was sound, supported by record evidence, and [is] long overdue." Sierra Club and CLF reiterate some of their timely comments on the 2017 Statement in which they, along with other organizations, said that "the performance of a wedgewire-half screen system that has not yet been designed, of an unknown slot-width size, in environmental conditions that have not been fully assessed, cannot be considered equivalent to closed-cycle cooling." They further comment that, EPA "took additional comment and reviewed additional studies in 2017[, b]ut "as discussed above, that additional inquiry did not establish a record that warrants any changes to" the 2011 preliminary determination.

EPA agrees that the preliminary BTA determination was sound and supported by the information in the record at the time. And, as EPA said in the 2017 Statement:

> EPA is acutely aware that the Merrimack Station . . . permit[] ha[s] been administratively continued for a lengthy period and is eager to issue [a] new final permit[] for [the] facilit[y] as soon as possible. At the same time, EPA is also committed to providing a fair, legally sound process for the development of the permit[], and to developing scientifically and legally sound permit conditions.

AR-1534 at 9. EPA reiterates that new information, data, and arguments regarding the BTA analysis, particularly as they relate to the availability and efficacy of wedgewire screen technology at Merrimack Station, have come to light since the 2011 Draft Permit that raised substantial new questions as to whether EPA should determine that this technology is the BTA for entrainment at the facility. Moreover, new § 316(b) regulations have become effective, which, although in some respects are very similar to EPA's historical practice of establishing BTA requirements for entrainment based on Best Professional Judgment ("BPJ"), establish a particular framework for the analysis and specify factors relevant to that inquiry. 79 Fed. Reg. 48,300 (Aug. 15, 2014) (codified at 40 CFR § 122.21(r) and part 125, subpart J). In addition, Merrimack Station operates far less now than it did when the 2011 Draft Permit was developed and proposed. AR-1534. PSNH also conducted a successful site-specific pilot study in 2017 demonstrating significant entrainment reductions from wedgewire screens. EPA also reiterates that it is committed to providing a fair, legally sound process for the development of the permit that takes this information into account. EPA has appropriately evaluated the new information and the impact of these developments on its preliminary BTA determination. In the face of technical and scientific complexity and some measure of remaining uncertainty, EPA in this case has reasonably exercised its technical expertise and scientific judgment and concluded that wedgewire screen technology is the BTA at Merrimack Station. *See* Responses to Comments III.4.2 and III.5.3, and associated responses.

In response to Sierra Club and CLF's reiteration of its timely, general comment "that 'the performance of a wedgewire-half screen system that has not yet been designed, of an unknown slot-width size, in environmental conditions that have not been fully assessed, cannot be considered equivalent to closed-cycle cooling," EPA offers several observations. First, there is no requirement that the performance of wedgewire screen technology be "equivalent to closed-cycle cooling" in order to be the BTA at Merrimack Station, because EPA is required to consider additional factors beyond just number of organisms entrained and, in fact, may reject a technology that performs better than the selected technology. 40 CFR § 125.98(f)(1) (authorizing EPA to reject "entrainment control technologies or measures that perform better than the selected technologies or measures"), (2) (requiring EPA to consider several factors beyond entrainment numbers), (3) (authorizing EPA to consider several more factors), (4) (authorizing EPA to "reject an otherwise available technology as a BTA standard for entrainment if the social costs are not justified by the social benefits"); *see also* Responses to Comments III.7.3, III.10.2.1, III.10.2.2. Second, the comment again ignores that PSNH submitted a preliminary design for wedgewire half-screens in 2014. *See* AR-1231 (Attachment 4). Third, in the 2017 Statement, EPA gave notice that it was considering slot sizes from 0.5mm to 3mm and that it would define the appropriate slot size in the Final Permit based on public comments on the 2017 Statement and on the results of the 2017 site-specific pilot study. AR-1534 at 30 & n.5. Sierra Club and CLF, however, chose not to offer any specific comments on slot size, either in response to the 2017 Statement or in their 2020 CWIS Comments. *See* Comments III.7.3, III.10.2.2. Fourth, as noted in the 2017 Statement, PSNH continued to explore the feasibility of wedgewire screens at Merrimack Station, refining the proposed design, and submitting additional data regarding sweeping flows. AR-1534 at 18. EPA also listed additional materials and submittals relevant to the issue of whether wedgewire screen technology is the BTA at Merrimack Station. *Id.* at 33-34. But Sierra Club and CLF did not submit technical comments on this information. Finally, PSNH submitted with its comments on the 2017 Statement a site-specific pilot of 3 mm slot screens to evaluate performance under actual conditions in the Hooksett Pool at the appropriate depth and location, confirming existing information that supported their feasibility and effectiveness. *See* AR-1549 at 21-47; 1550. Two years on, Sierra Club and CLF continue to submit comments that advocate against wedgewire screen technology as the BTA but never offer any specific criticisms of the design or implementation of PSNH's proposed design or confirmatory pilot study.

In this comment and in Comment III.10.3, Sierra Club and CLF claim to have "discussed above" in the 2020 CWIS Comments that EPA's "additional inquiry" highlighted in the 2017 Statement does not "establish a record that warrants any changes to" the 2011 preliminary determination. EPA notes, however, that the 2020 CWIS Comments limit themselves to simply repeating uncertainties about wedgewire screens that EPA mentioned in 2011, broadly claiming that they all remain simply because EPA referred to the new information in the 2017 Statement as "suggesting" wedgewire screens are available and "may" be more effective than previously thought. *See, e.g.*, Comments III.10.2.2, III.10.2.4. The 2020 CWIS Comments do not contain any specific discussion of the information and studies cited in the 2017 Statement, explaining why they are inapplicable and do not support a determination that wedgewire screen technology is BTA at Merrimack Station. Nor did Sierra Club and CLF's timely comments ever specifically criticize the new information or studies added to the record. In the Responses to Comments III.4.2, III.5.2, and III.5.3, EPA addresses the uncertainties highlighted in 2011 and explains its

entrainment BTA determination. We also reiterate that, contrary to any suggestion by Sierra Club and CLF, absolute scientific certainty is not required; EPA may exercise its considered judgment even in the face of some uncertainty. *Taunton*, 17 E.A.D. at 134.

10.3 If EPA Proposes Making Significant Changes to the Permit's Cooling Water Intake Structure Provisions, the Agency Must Comply with Mandatory Legal Requirements

As discussed above, EPA should proceed to issue a final NPDES permit for the Station, containing the cooling water intake structure provisions that are in the 2011 Draft Permit and the 2014 Draft Permit. However, if EPA is considering taking the permit in a different direction, the agency must: (i) make a BTA determination; (ii) avoid making an arbitrary and capricious BTA determination; (iii) include all substantive requirements for location, design, construction and capacity of the cooling water intake structures in the permit itself; (iv) allow public comment on the new proposal; and (v) not allow GSP to indefinitely or permanently avoid compliance with Section 316(b)'s BTA mandate by using a compliance schedule to conduct more studies and then seek a modification of the permit's BTA-related requirements that the company prefers not to spend money to comply with.

EPA Response:

In this introductory comment, Sierra Club and CLF summarize major points made in their more detailed comments that follow. EPA provides responses below.

10.3.1 Since it Bought the Station in 2018, GSP and EPA Have Met Frequently and Discussed Possible Changes to the Permit's Cooling Water Intake Structure Requirements.

Documents provided by EPA under the Freedom of Information Act indicate that, since GSP acquired the Station in 2018, GSP and EPA have met frequently – at least five times in person over the past fifteen months, as well as in numerous phone calls – to discuss the cooling water intake structure requirements (and other issues) in the Merrimack NPDES permit. It is becoming readily apparent that GSP not only wants to avoid installing closed-cycle cooling, but it also wants to avoid installing the wedgewire screen system proposed by PSNH as recently as 2017. Indeed, it appears that GSP's goal is to secure a final NPDES permit that will ultimately not require any changes to Station's antiquated once-through cooling system and intake structures.

In September 2018, GSP told EPA that it is "no longer interested in installing wedgewire screens" because they "do not want to spend the money."[24] Although GSP told EPA a year later (in August 2019) that it was now "likely amenable to a permit with wedgewire screen requirements,"[25] GSP also made clear that what it actually wants is for EPA to nominally select wedgewire screens as BTA without specifying in the permit what the slot size should be, when the screens must be operated, what level of effectiveness the screens must achieve, or when they must be installed. Instead, GSP has told EPA that it is seeking a permit containing a "two-stage compliance schedule." That is, GSP wants, an extended period of time after the final NPDES permits is issued

"to study screen feasibility and effectiveness."[26] And, then, GSP wants a second, subsequent period of time to "select and implement [an] option for achieving similar effectiveness [to wedgewire screens, if deemed feasible and effective in the studies to be conducted]."[27] Specifically, GSP has asked EPA for a compliance schedule that "would allow the Permittee to recommend a specific slot-size for the screens for its final design."[28]

GSP told EPA that it wanted to be given this extra time after the final NPDES permit is issued in order to study wedgewire screen "feasibility and effectiveness" – even though PSNH had already done pilot testing in the Merrimack River – because GSP believes that it has only "in essence, 'one data point' from that single study and it want[s] to do some additional work to develop a more robust estimate of site-specific wedgewire screen effectiveness to provide a well-supported target effectiveness for the compliance approach to be applied to satisfy CWA § 316(b)."[29] Thus, in GSP's own words, there is not yet sufficient, robust, or well-supported data on the effectiveness of wedgewire screens in the Hooksett Pool.

Furthermore, GSP has made clear that it is requesting a lengthy, two-step compliance schedule not merely to give the company time to complete a final design and install wedgewire screens, but rather to give the company "an opportunity to consider whether another compliance option might be preferable," at which time there might be a "modification of the permit to incorporate the new requirements."[30] Thus, GSP is seeking a permit containing a compliance schedule that allows GSP to propose altogether different permit requirements.

What GSP is seeking would not be legally valid under the CWA or the APA.

[24] U.S. EPA, Memorandum Documenting September 20, 2018, Meeting Between EPA and Granite Shore Power Concerning the Merrimack Station NPDES Permit (Oct. 26, 2018) at 7.

[25] U.S. EPA, Memorandum Documenting August 19, 2019, Meeting Between EPA and Granite Shore Power Concerning the Merrimack Station NPDES Permit (Sept. 8, 2019) at 2.

[26] GSP, "Merrimack NPDES Permit" – Open Items," (undated), provided to EPA Region 1 on September 10, 2019.

[27] GSP, "Merrimack NPDES Permit" – Open Items," (undated), provided to EPA Region 1 on September 10, 2019.

[28] U.S. EPA, Memorandum Documenting August 19, 2019, Meeting Between EPA and Granite Shore Power Concerning the Merrimack Station NPDES Permit (Sept. 8, 2019) at 3.

[29] U.S. EPA, File Memorandum, Notes on October 1, 2019, Telephone Conference Call Between EPA Region 1 and Granite Shore Power, LLC (Oct. 7, 2019) at 3.

[30] U.S. EPA, Memorandum Documenting August 19, 2019, Meeting Between EPA and Granite Shore Power Concerning the Merrimack Station NPDES Permit (Sept. 8, 2019) at 2.

EPA Response:

Sierra Club and CLF begin the comment by noting that EPA and the new Permittee, Granite Shore Power ("GSP"), have "met frequently" to discuss the Merrimack Station NPDES Permit. To the extent the comment is meant to suggest something improper in EPA having such discussions, EPA notes that the comment points to nothing in the statute, regulations, or case law that discourages or prohibits EPA from meeting with a permittee. *See Texas Office of Pub. Utility Counsel v. FCC*, 265 F.3d 313, 327 (5th Cir. 2001) (rejecting "the Petitioners' speculative and perhaps sinister scenario imputed to the *ex parte* communication between the FCC and the interested parties" and noting that such contact "is not shunned in the administrative agency arena," but is often necessary) (citing *Sierra Club v. Costle*, 657 F.2d 298, 400-01 (D.C. Cir. 1981). EPA created records of these conversations, added them to the administrative record for the permit, and, as the comment indicates, provided them to the commenter. EPA notes that it voluntarily provided the commenter with most records documenting EPA's communications with GSP, rather than provided them only in response to FOIA requests as the comment might suggest. *See* AR-1814, AR-1816, AR-1820. Regardless of whether the commenter had requested them directly, EPA was still going to include those records in the Administrative Record for the Merrimack Station permit. It also should be mentioned that while EPA had discussions and shared information with GSP about the Merrimack Station permit, it also discussed the permit and shared information with the commenter. *See* AR-1635; AR-1637; AR-1773; AR-1818.

Sierra Club and CLF continue by commenting that "[i]t is becoming readily apparent that GSP not only wants to avoid installing closed-cycle cooling, but it also wants to avoid installing the wedgewire screen system proposed by PSNH as recently as 2017." EPA notes that this is also the position PSNH took. *See* Comment III.5 (commenting that closed-cycle cooling is not the BTA at Merrimack Station), III.5.2.1 (commenting that, although wedgewire screens are "highly effective at reducing entrainment at substantially less cost as compared to CCC," they are still too costly to be the BTA). Thus, GSP's "apparent" position is nothing new and should not surprise Sierra Club and CLF. The organizations further comment that "it appears that GSP's goal is to secure a final NPDES permit that will ultimately not require any changes to Station's antiquated once-through cooling system and intake structures." But this, too, should surprise no one; many a permittee would prefer a permit that does not require it to make any upgrades.

Next, Sierra Club and CLF comment that a "two-stage compliance schedule" for entrainment would not be appropriate. EPA generally agrees and has not included one in this permit, in part because compliance with the entrainment standard is required "as soon as practicable," 40 CFR § 125.94(b)(2), and because the agency has enough information to make a BTA determination. And while the comment asserts that GSP has said "there is not yet sufficient, robust, or well-supported data on the effectiveness of wedgewire screens in the Hooksett Pool," this is not how PSNH, Enercon, and Normandeau characterized the 2017 pilot study. *See* Comments III.4.1 ("Analyses from Normandeau and Enercon ultimately confirmed use of the wedgewire half-screens with larger diameters yields significant reductions in entrainment and are well suited for the Merrimack River."), III.4.2, III.5.2.1 ("PSNH has shown through its pilot study that installation of 3.0 mm wedgewire screens with a designed through-screen velocity of less than 0.5 fps at Merrimack Station, operated annually from April through July, is highly effective at reducing entrainment.").

The Final Permit establishes a compliance schedule for wedgewire screens that is very similar to the schedule EPA proposed in the 2017 Statement, with slight alterations as described and explained in Response to Comment III.6.2. Sierra Club and CLF had the opportunity to comment on the proposed schedule but chose not to. The schedule in the Final Permit requires compliance "as soon as practicable" with EPA's determination in the Final Permit that wedgewire screens are the BTA for entrainment. Thus, EPA has not just "nominally selected" wedgewire screens. That said, while GSP is working on complying with this schedule, there is nothing that would prevent it from contemporaneously developing new information on another compliance option and submitting a permit modification request based thereon. For instance, GSP could choose to study how specific flow reduction strategies compare to the entrainment reductions achieved by wedgewire screens with a 3.0 mm slot size. If EPA proposed to modify the permit in response to such a request, the public would have the opportunity to participate in that decision. *See* 40 CFR § 122.62.

10.3.2 EPA May Not Issue a NPDES Permit that Defers a BTA Decision Until Further Studies Are Conducted.

Under federal law, EPA cannot lawfully re-issue a NPDES permit without making a BTA determination – that is, without first determining which technology is the best available for minimizing the adverse environmental impact of its cooling water intake structures. Likewise, the agency may not issue a NPDES permit that does not require a level of protection for aquatic life that is consistent with the use of the technology that EPA has determined to be BTA. Deferring either the determination of BTA or the establishment of permit requirements reflecting that determination would violate several provisions of the Clean Water Act and its regulations.

To begin with, Section 316(b) requires EPA to make a BTA determination every time it issues a NPDES permit. Section 316(b) imposes a mandatory, enforceable, time-limited duty on EPA to implement the requirements of that section within the time limits set forth in CWA sections 301 and 306.[31] For existing facilities, the deadline for complying with BTA was March 31, 1989. As EPA's general counsel explained in 1976, "[i]nsofar as neither § 316(b) nor the regulations thereunder specify a time limitation for the application of best technology available, the ultimate compliance date under § 316(b) is governed only by § 301(b)(2)(A) which requires compliance not later than July 1, 1983,"[32] which Congress later extended to March 31, 1989.[33] This 1989 deadline is absolute, and permit writers are without authority to grant an extension in NPDES permits of the Act's time limits for the imposition of technology-based standards.[34] In addition to the statutory obligation to make a BTA determination, EPA's 2014 § 316(b) Regulations provide that, for any permit issued after July 14, 2018, EPA must include permit conditions to implement and ensure compliance with the regulation's entrainment and impingement mortality standards.[35]

In addition to Section 316(b), Section 402 also forbids issuing a NPDES permit without a BTA determination. Section 402(a)(1)(A) authorizes EPA to issue NPDES permits for point source discharges "on condition that such discharge will meet … all applicable requirements under sections [301 and 306]," one of which is Section 316(b)'s requirement that cooling water intake structures reflect BTA.[36] NPDES permits are issued to point sources,[37] which are defined as

"conveyances … from which pollutants are or may be discharged,"[38] and Section 316(b) expressly applies BTA requirements to "point source[s]." One of the requirements on which a point source's *discharge* to the surface waters must be conditioned, then, is that its *intake* of those waters for cooling be done in accordance with Section 316(b). If it does not, that discharge does not "meet … all applicable requirements" of Section 301 or 306. Further, Section 402(b) provides a detailed list of the provisions a permit must contain. Included among these is the mandate that such permits "apply, and insure compliance with, any applicable requirements" of Sections 301 and 306.[39] Accordingly, Section 402 prohibits the issuance of a NPDES permit that does not condition the discharge on compliance with Section 316(b).

Indeed, EPA Region 1 has admitted that "[Section] 316(b) determinations *must be revisited with each permit reissuance*. Permit conditions imposed under § 316(b) *must satisfy the statute* and may be based either on applicable regulatory guidelines or, in their absence, on case-by-case Best Professional Judgment (BPJ) determinations."[40] EPA is thus required to compel adherence to the CWA's "best technology available" standard every time it issues a NPDES permit for a point source with an intake structure. In other words, there is no authority allowing EPA to issue a NPDES permit that defers the Section 316(b) BTA determination.

Here, as noted above, GSP is apparently suggesting to EPA that the agency issue a final NPDES permit that nominally selects "wedgewire screens" as BTA, but does not determine what the slot size must be. However, there is no universally accepted definition or standard for the slot size of a wedgewire screen. As discussed above, the slot-size is a critical parameter. All else being equal, smaller slot sizes increase intake velocities leading to increased impingement and entrainment as well as fouling, and also increase the size of the screen array and the interference with the use of the river. Larger slot sizes can increase entrainment because smaller organisms will pass through the screen's mesh. The engineering of wedgewire screen's slot size is critical to feasibility and effectiveness.

Consequently, in the absence of determining the slot size for a wedgewire screen, EPA will not know if the screen system will be feasible or effective. Likewise, without specifying exactly when the screens must be operated, or what level of effectiveness the screens must achieve, or when they must be installed, EPA would not have made a BTA determination in the permit at all, but would be unlawfully deferring that determination until a later time. (In stark contrast, when EPA made its 2011 BTA determination, it included in the draft permit specific numeric requirements for each parameter, such as the maximum volume of cooling water that may be withdrawn, during specified months, and the velocity and other features of the fish return system.[41]) Further, without including a deadline in the permit for when compliance with specified BTA standards must be achieved, EPA would not be requiring the permittee to comply with BTA. That would be illegal under the CWA and would not survive judicial review.

[31] *See Cronin v. Browner*, 898 F.Supp. 1052, 1059 (S.D.N.Y. 1995).
[32] *In Re Brunswick Steam Electric Plant*, U.S. EPA, Decision of the General Counsel, EPA GCO 41 (June 1, 1976).
[33] CWA § 301(b)(2); 33 U.S.C. § 1311(b)(2).
[34] *See, e.g., Bethlehem Steel Corp. v. Train*, 544 F.2d 657, 663 (3rd Cir. 1976) *cert. denied* 430 U.S. (1977); *United States v. Hoboken*, 675 F. Supp. 189, 194 (D.N.J. 1987) ("EPA had no authority to extend

secondary-treatment standard deadlines beyond July 1, 1983"); *State Water Control Bd. v. Train*, 559 F.2d 921, 925 (4th Cir. 1977) ("the legislative history indicates that Congress viewed it as an inflexible target") (quoting *Bethlehem Steel*, 544 F.2d at 661)..
[35] 40 C.F.R. § 125.98(b)(2).
[36] 33 U.S.C. § 1342(a)(1)(A).
[37] Section 402(a)(1) states that permits are issued "for the discharge of [a] pollutant," which is in turn defined as the addition of a pollutant to the waters "from [a] point source." 33 U.S.C. § 1362(12).
[38] *Id.* § 1362(14).
[39] *Id.* § 1342(b)(1)(A).
[40] U.S. EPA – New England, Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA (July 22, 2002) at § 7.2.2 (emphasis added).
[41] See bullet points on pages __, above.

EPA Response:

Sierra Club and CLF comment that the Final Permit must include a BTA determination and must "require a level of protection for aquatic life that is consistent with the use of the technology that EPA has determined to be BTA." The commenters do not explain exactly what they mean by that phrase, although they later state that EPA may not defer permit conditions reflecting the entrainment BTA determination and that, if EPA concludes that wedgewire screen technology is the BTA, the permit must specify the required slot size, period of operation, level of effectiveness, and when the screens must be installed.

EPA agrees that the Final Permit "must include conditions to implement and ensure compliance with the impingement mortality standard at §125.94(c) and the entrainment standard at §125.94(d)" and include "conditions, management practices and operational measures necessary to ensure proper operation of any technology used to comply with" the impingement and entrainment standards. 40 CFR § 125.98(b)(2). EPA also agrees that the regulations require the permittee to comply with the impingement and entrainment BTA determinations in the Final Permit "as soon as practicable." *Id.* § 125.94(b)(1), (2). Further, we note that the regulations allow for aligning compliance deadlines for impingement and entrainment requirements, such that a permit may require compliance with impingement requirements after the permittee has installed the necessary entrainment and impingement technology and completed an impingement technology performance optimization study. *See id.* § 125.94(b)(1), (2); 79 Fed. Reg. at 48,327 (describing how EPA sought to coordinate compliance scheduling for entrainment and impingement requirements), 48,346-48 (explaining that, in some cases, the optimization study cannot be undertaken until the technologies are installed). The regulations also contemplate that EPA would modify the permit to include conditions and parameters identified in an impingement technology performance optimization study. 79 Fed. Reg. at 48,347. EPA also notes that, while the reference to the 1989 deadline for compliance is applicable to BAT, BPT, and BCT technology standards, *see* 40 CFR § 125.3; 33 U.S.C. § 1311(b)(2), it is not applicable to the BTA standard of § 316(b). In the past, EPA interpreted CWA § 316(b) to incorporate the compliance deadlines from CWA § 301(b)(2) and, as a result, any compliance schedule would have been handled outside an NPDES permit. *See, e.g.*, *Cronin v. Browner*, 898 F.Supp. 1,052 (S.D.N.Y. 1995); *EPA General Counsel's Opinion No. 41* (1976). In the 2014 CWA § 316(b)

Final Rule, however, EPA revised its legal interpretation and decided that, because there is no stated compliance deadline within the "four corners" of CWA § 316(b), compliance with the BTA standard is due *as soon as practicable*. 79 Fed. Reg. at 48,359.

As explained in previous responses, the Final Permit includes a BTA determination that seasonal operation of wedgewire screens with a through-screen velocity no greater than 0.5 fps and slot size no greater than 3 mm is the BTA for entrainment at Merrimack Station and conditions necessary to ensure proper operation, including monitoring of the through-screen velocity, orienting slot openings perpendicular to the predominant direction of ambient flow current, and requiring an airburst system for clearing debris from the screens.[90] Final Permit at Part I.E.1; *see also* Responses to Comments III.4.2, III.5.3, III.7.3; AR-1534 at 30. With respect to impingement, EPA recognizes that, during periods when the facility is not generating electricity or is operating the wedgewire screens, the Permittee would achieve compliance with alternative impingement mortality BTA methods regarding design or actual through-screen velocity because the facility would either not be withdrawing water at all or would be withdrawing in compliance with the Final Permit's maximum through-screen velocity condition of 0.5 fps at the wedgewire screens.[91] *See* 40 CFR § 125.98(c)(2), (3); *see also* Response to Comment III.3.1; Final Permit at Part I.E.2. The Final Permit also includes conditions requiring the Permittee to install and operate a new fish return, with specific conditions relating to its design and operation. *See* Final Permit at Part I.E.3.a. Moreover, the Final Permit contains compliance schedules for installing and operating these new technologies. *See* Final Permit at Part I.E.7. The Final Permit also requires the permittee to conduct an impingement technology performance optimization study, which would be performed after the new technologies have been installed. Final Permit at Part I.E.3.b; *see* 79 Fed. Reg 48,300 at 48,321, 48,347; Response to Comment III.3.1. Optimal screen rotation frequency would also be evaluated in the optimization study.[92] After the optimization study is submitted, EPA could modify the permit pursuant to 40 CFR § 122.62 to reflect additional conditions and measures identified in the study, as appropriate.

Thus, the Final Permit meets the regulatory requirements to include conditions to implement and ensure compliance with the entrainment and impingement standards and to include conditions necessary to ensure proper operation of the technologies used to comply with those standards. The Final Permit also satisfies the comment's demand that the permit set the slot size, the period of operation, and a deadline for when the wedgewire screens must be installed and operational. With regard to the comment that the Final Permit must specify the "level of effectiveness the screens must achieve," EPA reiterates that the Final Permit does specify a maximum through-screen velocity at the wedgewire screens of 0.5 fps and requires monitoring to ensure that

[90] The Final Permit requires use of the wedgewire screens from April 1 to August 15 each year, whenever the facility is withdrawing water through one or both of its cooling water intake structures, except during periods of emergency bypass when performed in accordance with the applicable emergency intake condition of the permit. Final Permit at Parts I.E.1 and I.E.4.

[91] PSNH proposed wedgewire screens for Merrimack Station with a design through-screen velocity below 0.5 fps, specifically, 0.4 fps. *See* Comment III.4.2.

[92] The permittee could also choose to evaluate flow reductions.

velocity is not exceeded.[93] Final Permit at Part I.E.2 (also Parts I.A.1 and I.A.2). To the extent the commenters would consider that these conditions do not go far enough to address their "level of effectiveness" concern, Sierra Club and CLF have not explained how or why any additional permit condition is required by the statute, regulations, or case law. The comment asserts that "without specifying . . . what level of effectiveness the screens must achieve . . . EPA would not have made a BTA determination in the permit at all, but would be unlawfully deferring that determination until a later time." But Sierra Club and CLF do not explain this conclusion and it does not logically follow, because EPA has not deferred the BTA determination; it has made that determination as discussed above. Sierra Club and CLF attempt to support the comment by drawing a comparison to the 2011 Draft Permit, stating that the preliminary determination included "specific numeric requirements for each parameter, such as the maximum volume of cooling water that may be withdrawn, during specified months, and the velocity and other features of the fish return system." But the Final Permit also includes such requirements, including a flow limit, specific months when the wedgewire screens must be used, a through-screen velocity limit, and specific requirements for the new fish return. Nothing in the statute, regulations, or case law Sierra Club and CLF cite leads to an inexorable conclusion that EPA must include more in the Final Permit to specify the "level of effectiveness" to be achieved, and the comment does not offer any compelling reason to include such conditions.

The Final Permit does not defer an entrainment BTA determination, but rather establishes wedgewire screens with certain specific characteristics as the BTA for entrainment. Moreover, it includes a compliance schedule to implement, and conditions to ensure proper operation of, the wedgewire screens to comply with the BTA determination. With respect to impingement, the Final Permit appropriately aligns compliance with the impingement standard to follow installation of the new technologies to minimize adverse environmental impact and completion of the impingement technology performance optimization study.

10.3.3 EPA's BTA Determinations Must Be Supported by Record Evidence, a Rational Basis, and an Explanation that Logically Connects the New Decisions Made to the Facts Found.

As with any administrative decisionmaking by a federal agency, EPA's Section 316(b) BTA determinations must conform to the APA and be based on "reasoned decisionmaking."[42] "Not only must an agency's decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational."[43] A court must reject an agency

[93] The comment is irrelevant that "All else being equal, smaller slot sizes increase intake velocities leading to increased impingement and entrainment as well as fouling," because of the Final Permit conditions regarding maximum through-screen velocity and attendant monitoring. EPA also notes that Sierra Club and CLF's comment that "Larger slot sizes can increase entrainment because smaller organisms will pass through the screen's mesh" ignores new information highlighted by the 2017 Statement that larval avoidance and hydraulic bypass are other mechanisms by which wedgewire screens reduce entrainment. Further, it ignores EPA's statement that it was considering wedgewire screens with slot sizes up to 3 mm and specific request for comment on "the extent to which wedgewire screens with different screen slot sizes can prevent mortality to aquatic life from entrainment and/or impingement and satisfy the BTA requirements of CWA § 316(b)." AR-1534 at 30 n.5. Instead of offering specific comment on this issue, Sierra Club and CLF limited their comment to this one-sentence, generic, and incomplete statement.

decision that, *inter alia*, is based on explanation "that runs counter to the evidence before the agency" or lacks "a satisfactory explanation . . . including a rational connection between the facts found and the choice made."[44]

When EPA preliminarily determined, in 2011, that BTA for the Station was closed-cycle cooling with a fish return system, and that less stringent requirements would fail to comply with either Section 316(b) or New Hampshire water quality standards, the agency did so based on an extensive record and its own independent analysis of data supplied by the applicant. EPA supplied a detailed explanation of its process and its reasoning, including a rational connection between the facts found and the choice made. In 2014 and in 2017, EPA issued new public notices relating to aspects of the Station's NPDES permit, but did not change its BTA determination.

If EPA were to change its 2011 BTA determination, the APA would require the agency to explain how the extensive record that supported its 2011 conclusions, plus any new information obtained since then, will support any new conclusions. In particular, EPA could not finalize a decision that wedgewire screens are "available," and, indeed, the "best technology available," before the evidence needed to support such a conclusion is collected. It would be arbitrary, capricious, and an abuse of discretion for EPA to select wedgewire screens over cooling towers as BTA when the permittee has indicated that it is not yet possible to conclude that wedgewire screens would be feasible and effective or to determine the slot size, level of effectiveness, or other parameters. In the absence of supporting record evidence, a rational basis, and an explanation logically connecting the decisions to the facts, agency action will be held unlawful and set aside as arbitrary and capricious under the APA.[45]

Or, if EPA were to issue a final NPDES permit that not only selects wedgewire screens as BTA, but also contains detailed requirements as to the required slot size, the dates on which the screens must be operated, the area of river that the screens may occupy, the level of effectiveness that the screens must achieve, and all other necessary parameters, including a deadline for installing the screens and having them fully operational, then EPA must have sufficient evidentiary support in the record and a reasoned explanation logically connecting all of those newly-made decisions to the evidence. But EPA does not have the evidence necessary to make those decisions for wedgewire screens. As GSP itself maintains, additional studies on the feasibility and effectiveness of wedgewire screens in the Hooksett Pool are needed to have a well-supported basis for determining their slot size and effectiveness

Similarly, EPA continues to lack needed information about whether ambient velocities in the Hooksett Pool are adequate to create sufficient sweeping flows for wedgewire screens to function and whether there will be adequate water depth.

Indeed, the answers to these questions cannot definitively be determined given the hydrology and hydrography of Hooksett Pool, which is an impoundment between two dams, the Garvins Falls Dam to the north and the Hooksett Dam to the south. Water volume and velocity in the Hooksett Pool is dependent on release rates of the upstream and downstream dams. But these dams are managed for multiple purposes, and releases are not optimized to provide the desired velocities or depths near Merrimack Station. The ambient flow in the river is not guaranteed to meet

Merrimack's needs for adequate sweeping velocities. In other words, operational effectiveness of wedgewire screens is entirely dependent on river conditions that the Station cannot control. There may be needs of other users, for power, storage, water level maintenance, or other purposes that render wedgewire screens highly ineffective despite any potential they may have for use at other locations.

Accordingly, there is not an adequate basis in the record on which EPA could base a determination that wedgewire screens are BTA for Merrimack Station.

[42] *See Allentown Mack Sales & Serv. v. NLRB*, 522 U.S. 359, 374 (1998) (quoting *Motor Vehicle Mfrs. Ass'n of the United States, Inc. v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 52 (1983)).
[43] *Id.*
[44] *Grosso v. Surface Transp. Bd.*, 804 F.3d 110, 116 (1st Cir. 2015) (quoting *State Farm*, 463 U.S. at 43); *see also Southcoast Hosps. Grp., Inc. v. NLRB*, 846 F.3d 448, 453 (1st Cir. 2017).
[45] 5 U.S.C. § 706(2)(a).

EPA Response:

Sierra Club and CLF comment that, if EPA determines in the Final Permit that wedgewire screen technology is the BTA at Merrimack Station, EPA must explain how the record information supports its determination. EPA agrees and has done so. *See* Responses to Comments III.4, III.5.2, III.5.3 (including associated responses).

Sierra Club and CLF comment that EPA may not determine that wedgewire screen technology is the BTA "when the permittee has indicated that it is not yet possible to conclude that wedgewire screens would be feasible and effective or to determine the slot size, level of effectiveness, or other parameters." Sierra Club and CLF comment that "GSP itself maintains [that] additional studies on the feasibility and effectiveness of wedgewire screens in the Hooksett Pool are needed to have a well-supported basis for determining their slot size and effectiveness." The comment ignores, however, PSNH's statements and supporting information to the contrary based on its site-specific pilot study of wedgewire screens and EPA's statements that it would carefully consider the data collected in this study in its BTA determination. Overall, PSNH reported that its biological and engineering consultants, Normandeau and Enercon, concluded that "wedgwire screens are technologically feasible at Merrimack Station" and that the "installation of 3.0 mm wedgewire screens with a designed through-screen velocity of less than 0.5 fps at Merrimack Station operated annually from April through July would therefore substantially reduce" entrainment at the facility. Comment III.4.1. More specifically, PSNH reported that:

> Normandeau and Enercon confirmed that a constant and high sweeping flow velocity was present in April through July.[fn omitted] The wedgewire screens proposed for Merrimack Station would have a through-screen velocity of 0.4 fps;[fn omitted] and, the average observed sweeping flow in the Merrimack River was 2.9 fps during field operations conducted during the peak entrainment period in 2009 and 2012.[fn omitted] This results in a ratio of sweeping velocity to the through-slot velocity of the screens of approximately 7:1.[fn omitted] The sweeping flows observed

> during execution of the 2017 Study Plan were 1.0 fps or greater for almost the entirety of the test, resulting in a ratio of 2:1 or greater.[fn omitted]

Comment III.4.2. PSNH's site-specific study also concluded that screens with 3 mm slot width "alleviate many of the[] fouling and debris accumulation issues, and [that] these issues would be further minimized by construction of the system with the proposed air burst system[fn omitted] and construction of the screen mesh with a Z-alloy that is proven to substantially reduce biofouling compared to stainless steel screens." *Id.* In addition, the study concludes that issues identified with the large number of screens previously thought to be required "are alleviated through the use of 96-inch, 3.0 mm slot-width wedgewire half-screens," and that, "because the screens extend approximately four feet from the river bottom, they will not interfere with public recreation in the Merrimack River." *Id.* Thus, the previous permittee—whose "shoes" GSP has "stepped into" for purposes of this permit proceeding—concluded, based on a site-specific study by its biological and engineering consultants, that the conditions for installation and operation of wedgewire screens exist and that the technology is feasible and would be effective at Merrimack Station. EPA generally agrees, as provided in Response to Comment III.4.2.

Sierra Club and CLF also comment that EPA "continues to lack needed information about whether ambient velocities in the Hooksett Pool are adequate to create sufficient sweeping flows for wedgewire screens to function and whether there will be adequate water depth." Again, the comment simply ignores the new information, data, and arguments that ambient velocities and water depth are adequate. *See supra*; Response to Comment III.4.2. Sierra Club and CLF fail to substantiate the comment by, for instance, confronting the new information and explaining why it is insufficient. EPA explains why these previously identified uncertainties do not prevent EPA from finding now, based on new information emphasized in the 2017 Statement, including site-specific data collected by PSNH since 2011, that wedgewire screen technology is the BTA for entrainment at Merrimack Station. *See* Responses to Comments III.4, III.5.2, III.5.3 (including associated responses).

Finally, Sierra Club and CLF also reiterate comments they submitted in 2017 related to the Garvins Falls Dam and Hooksett Dam. EPA provides responses to those comments at Response to Comment III.7.3.

10.3.4 EPA May Not Issue a NPDES Permit that Allows Material BTA Requirements to Be Developed After the Fact and Contained Only in a Separate, Non-Permit Document.

As the federal courts have held, when issuing a NPDES permit, EPA must include all of the effluent limitations and other discharge-related limitations in the permit itself. EPA may not issue a NPDES permit with a provision allowing critical substantive requirements to be developed by the permittee at a later time (with or without EPA oversight and approval) and contained only in some other document, outside the permit, because that would violate, among other things, the CWA and APA's public participation requirements.

For example, in *Waterkeeper Alliance, Inc. v. United States EPA*,[46] the United States Court of Appeals for the Second Circuit remanded an EPA regulation that would have allowed NPDES permits for concentrated animal feeding operations to omit critical aspects of the operations' pollution control requirements, which would instead be developed by the permittees and contained in a separate nutrient management plan. The court explained at length that this was illegal for various reasons:

> [T]he permitting scheme established [by EPA] . . . violates the Clean Water Act's public participation requirements and is otherwise arbitrary and capricious under the Administrative Procedure Act.
>
> Congress clearly intended to guarantee the public a meaningful role in the implementation of the Clean Water Act. The Act unequivocally and broadly declares, for example, that "public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States." 33 U.S.C. § 1251(e). Consistent with this demand, the Act further provides that there be an "opportunity for public hearing" before any NPDES permit issues, see 33 U.S.C. §§ 1342(a), 1342 (b)(3); that a "copy of each permit application and each permit issued under this section [1342] shall be available to the public," see 33 U.S.C. § 1342(j); and that "any citizen" may bring a civil suit for violations of the Act, see 33 U.S.C. § 1365(a).
>
> The . . . Rule deprives the public of the opportunity for the sort of regulatory participation that the Act guarantees because the Rule effectively shields the nutrient management plans from public scrutiny and comment [by] fail[ing] to require that the terms of the nutrient management plans be included in the NPDES permits . . .This scheme violates the Act's public participation requirements in a number of respects. First and foremost, in light of our holding that the terms of the nutrient management plans constitute effluent limitations that should have been included in NPDES permits, the . . . Rule deprives the public of its right to assist in the "development, revision, and enforcement of . . . [an] effluent limitation." 33 U.S.C. § 1251(e) (emphasis added). More specifically, the . . . Rule prevents the public from calling for a hearing about – and then meaningfully commenting on – NPDES permits before they issue. See 33 U.S.C. §§ 1342(a), 1342 (b)(3). The . . . Rule also impermissibly compromises the public's ability to bring citizen-suits, a "proven enforcement tool" that "Congress intended [to be used . . .] to both spur and supplement government enforcement actions." Clean Water Act Amendments of 1985, Senate Environment and Public Works Comm., S. Rep. No. 50, 99th Cong., 1st Sess. 28 (1985). Under the . . . Rule, as written, citizens would be limited to enforcing the mere requirement to develop a nutrient management plan, but would be without means to enforce the terms of the nutrient management plans . . . This is unacceptable.

> And even assuming, arguendo, that the nutrient management plans did not themselves constitute effluent limitations, we would still hold that the . . . Rule violates the Act's public participation requirements. Nutrient management plans are . . . a critical indispensable feature . . . a sine qua non of the "regulation, standard, plan, or program" . . .Given that the . . . Rule forestalls – rather than "provides for, encourages, and assist[s]" – public participation in the development and enforcement of nutrient management plans, and given that nutrient management plans are an important "regulation, standard, effluent limitation, plan or program" established by the EPA to regulate . . .discharges, the . . . Rule violates the plain dictates of 33 U.S.C. § 1251(e).[47]

The structure of the NPDES permit that GSP is apparently seeking here for Merrimack Station would run afoul of all the legal dictates articulated by the Court of Appeals in that case. For example, like effluent limitations the BTA requirements are required to be in every NPDES permit that EPA issues to a facility that has a cooling water intake structure.[48] If EPA does not specify in the permit the slot size, the required operational dates, the size and location of the screen array, the degree of effectiveness in reducing impingement and entrainment, when the screens must be installed, and other important parameters but instead leaves the permittee to later propose a plan for these terms, then permit is missing key elements. These are all "critical indispensable features" of BTA requirements based on wedgewire screens.

Further, if EPA were to issue a NPDES permit that leaves out these critical elements, it would violate the public's guaranteed rights of public participation. Whether commenting on a draft permit, appealing a final permit, or enforcing a final permit – all of which Congress included as important procedural safeguards in the CWA – the public would be deprived of the opportunity to review, comment on, appeal, or enforce critical components of the permit's BTA requirements, because they would not be in the permit and not available because they would not yet have been developed. They would be only in separate reports to be prepared later by the permittee or in subsequent correspondence between the permittee and EPA. This is unacceptable.

For all of these reasons, too, EPA should not issue a NPDES permit like that requested by GSP.

[46] 399 F.3d 486 (2d Cir. 2005).
[47] 399 F.3d at 503-04.
[48] See discussion associated with footnotes __ to __, on pages __ to __, above.

EPA Response:

Sierra Club and CLF comment that the Final Permit must "specify . . . the slot size, the required operational dates, the size and location of the screen array, the degree of effectiveness in reducing impingement and entrainment, when the screens must be installed, and other important parameters" because a permit without these details would "violate the public's guaranteed rights of public participation." The comment relies on *Waterkeeper Alliance, Inc. v. United States EPA*, 399 F.3d 486 (2d. Cir. 2005), a case in which the United States Court of Appeals for the Second Circuit overturned certain provisions of EPA's promulgation of a rule governing permitting

requirements and effluent limitation guidelines for concentrated animal feeding operations (CAFOs)—which are point sources regulated by the CWA—because the Court found they would deprive the public of the opportunity to participate in the development of important permit provisions. 399 F.3d at 492, 503-04.

The Second Circuit did not have occasion in *Waterkeeper Alliance* to examine § 316(b) of the Act. Thus, the case does not specifically hold that "the slot size, the required operational dates, the size and location of the screen array, the degree of effectiveness in reducing impingement and entrainment, [and] when the screens must be installed" are required elements of a NPDES Permit. In any event, the Final Permit does include, for various other reasons, "the slot size, the required operational dates, the size and location of the screen array, [and] when the screens must be installed."[94] More specifically, the Final Permit requires the Permittee to operate a wedgewire screen intake system with a slot size "no greater than 3.0 mm," "from April 1 through August 15," "positioned as close to the west bank of the Hooksett Pool segment of the Merrimack River and the CWIS as possible, while" meeting other specifications and requirements. Final Permit at Part I.E.1. The Final Permit also includes a compliance schedule establishing "when the screens must be installed." *See* Final Permit at Part I.E.7.

Sierra Club and CLF comment that the Final Permit must specify "the degree of effectiveness in reducing impingement and entrainment." EPA has already responded to this comment with respect to entrainment, *see* Response to Comment III.10.3.3, and Sierra Club and CLF do not offer any additional reason why such a condition is required by *Waterkeeper Alliance*. With respect to impingement, as explained in greater detail in Response to Comment III.3.1, EPA believes that the Permittee may choose to comply with the "systems of technologies" standard at § 125.94(c)(6). Or, the Permittee could instead choose to upgrade its existing traveling screens to meet the definition in the rule. *See* 40 CFR § 125.92(s). In either case, the permittee will be required to develop impingement mortality performance data based on an impingement technology performance optimization study performed after the new fish return is installed and, in the latter case, after the traveling screens are upgraded. Only then would EPA modify the permit to incorporate the operating conditions and parameters identified in the study.[95] Final Permit Part I.E.2.b. Thus, the regulations do not require the Final Permit in this case to specify "the degree of effectiveness in reducing impingement." EPA further notes that the same court that reviewed the CAFO-related rule in *Waterkeeper Alliance*, reviewed the 2014 § 316(b) regulations and upheld them in their entirety. *Cooling Water Intake Structure Coal. v. EPA*, 905 F.3d 49 (2d. Cir. 2018).

[94] Sierra Club and CLF also comment that the Final Permit must, under the holding of *Waterkeeper Alliance*, include "other important parameters." The comment fails, however, to offer any specifics about such parameters. As such, it is too vague and imprecise a comment for EPA to evaluate or respond to, let alone adjust the Permit to incorporate. *See In re Sutter Power Plant*, 8 E.A.D. 680, 694 (EAB 1999); *see also* 40 C.F.R. § 124.17(a)(2) (requiring EPA to respond to "all significant comments") (emphasis added).

[95] The modification would be subject to public participation requirements, *see* 40 C.F.R. § 122.62, and, thus, does not implicate the Second Circuit's concerns about public comment and citizen enforcement in *Waterkeeper Alliance*.

Finally, in light of Sierra Club and CLF's comments stressing the Second Circuit's holdings regarding public participation in *Waterkeeper Alliance*, EPA reiterates that, in this permit proceeding, it has thrice sought public comment—first in 2011, again in 2014, and finally in 2017. In the most recent round, EPA specifically notified the public that it was reconsidering as the BTA seasonal operation of wedgewire half-screens from April 1 to August 31[96] with a slot size up to 3 mm and a maximum through-screen velocity of 0.5 fps. AR-1534 at 17-21, 29-31 & n.5. EPA sought comment specifically on these issues and included sample permit provisions in the event it "determines that the BTA for Merrimack Station includes the cylindrical wedgewire screen option." *Id.* EPA also notified the public that new information, data, and arguments appeared to address the uncertainties EPA identified in the 2011 Draft Permit that caused EPA to conclude at that time that wedgewire screens were not available at Merrimack. *Id.* at 17-21, 33-34. EPA further discussed the site-specific pilot study that PSNH had been working on and notified the public that it would carefully consider data and results of that study in its BTA determination. *Id.* at 18, 20, 30 n.5. EPA also included a compliance schedule for wedgewire screens and sought public comment on it. *Id.* at 29-33. EPA also sought comment on how the new information and regulations should affect the impingement BTA. *Id.* at 14-17, 21-22. While Sierra Club and CLF participated in the 2017 public comment period, they chose not to offer specific critiques of the new information, data, and arguments regarding BTA that EPA identified in the 2017 Statement. *See* Comments III.7 (and associated sub-comments). In 2020, Sierra Club and CLF submitted more comments to EPA in which they again chose not to identify any specific inadequacies of the new information, including the pilot study, and do not specifically dispute PSNH's findings about the effectiveness of the screens. EPA has offered repeated opportunities (with extended comment periods)[97] for the public to offer comment on permit provisions regarding § 316(b) requirements and participate in the development of the Final Permit.

10.3.5 A NPDES Permit Determining that Wedgewire Screens Are BTA, or a Permit Containing the Approach to BTA Sought by GSP, Would Not Be a Logical Outgrowth of the 2011 Draft Permit.

As EPA is well aware, the APA, EPA's regulations, the federal courts, and EPA's Environmental Appeals Board (EAB) all require that a final permit issued by EPA must be a "logical outgrowth" of the draft permit; otherwise, EPA would have failed to give proper notice and allow the public the legally required opportunity for public comment.[49]

Although EPA has issued two draft permits for public comment (in 2011 and 2014) and has sought comment on "significant new questions" (in 2017), a new determination that wedgewire screens are now BTA would not be a logical outgrowth of the draft permits. Nor would a permit

[96] EPA also recognized that the Permittee proposed to deploy the screens from April 1 to July 31, AR-1534 at 20, and specifically sought public comment on the period over which wedgewire screens should be operated, *id.* at 21.
[97] The comment period for the 2011 Draft Permit lasted five months. AR-1534 at 6. On the 2014 Draft Permit, EPA offered a two-stage comment period that lasted roughly six months. *Id.* The comment period for the 2017 Statement ran for roughly four-and-a-half months.

that makes a nominal selection of BTA and leaves the selection of the critical parameters to later determination based on future studies of feasibility and effectiveness.

As explained above, the record does not support any change to EPA's BTA 2011 determination. If EPA were to obtain further new data that would support a change in that determination, such material and EPA's supporting rationale must be subjected to public comment. Sierra Club and Conservation Law Foundation request an opportunity to engage technical experts to review the permit provisions and EPA's supporting rationale for any changes to the 2011 BTA determination them and to submit comments based on their evaluation.

In 2016 and 2017, when PSNH wanted EPA to change its BTA determination from closed-cycle cooling to wedgewire screens, the company told the agency that, in light of the 2014 § 316(b) Regulations and the new technical information submitted to EPA, a revised permit would not be a "logical outgrowth" of the draft permits and that, under the APA as well as EAB and judicial precedent, EPA would be obligated to issue a Revised Draft Permit for public comment.[50]

In the final analysis, EPA has two choices under the law – it can proceed to finalize a NPDES permit that is similar enough to the 2011 and 2014 draft permits that it is a "logical outgrowth," or, if EPA proposes to make dramatic changes like those sought by GSP, then the agency must subject that new permit to public notice and public comment as the company itself requested.

[49] 5 U.S.C. § 553(b), (c); 40 C.F.R. §§ 124.6(d), 124.10(a)(1)(ii). The first judicial decision using the "logical outgrowth" language was a First Circuit case involving an EPA air quality transportation control plan for the Boston area. *South Terminal Corp. v. EPA*, 504 F.2d 646, 659 (1st Cir. 1974). *See also, e.g.*, *NRDC v. EPA*, 279 F .3d 1180, 1186 (9th Cir.2002); *In re D. C. Water and Sewer Auth.*, NPDES Appeal Nos. 05-02, 07-10, 07-11, 07-12, 2008 EPA App. LEXIS 15, *112 (EAB March 19, 2008) (holding that "new language in the Final [NPDES] Permit was not a logical outgrowth of the language in the previous draft and, accordingly, [Friends of the Earth and Sierra Club] were denied the opportunity to provide meaningful comments," and remanding the permit to EPA Region 3).

[50] Letter from Eversource Energy to U.S. Environmental Protection Agency – Region 1 (Dec. 22, 2016) (AR-1352) at 7-8; Letter from Eversource Energy to U.S. Environmental Protection Agency – Region 1 (Apr. 12, 2017) (AR-1357) at 2.

EPA Response:

Sierra Club and CLF comment that a determination that "wedgewire screens are now BTA would not be a logical outgrowth of the draft permits." They further comment that "a permit that makes a nominal selection of BTA and leaves the selection of the critical parameters to later determination based on future studies of feasibility and effectiveness" would not be a logical outgrowth. As to the latter point, the Final Permit does not do that. *See* Response to Comment III.10.3.2. As to the "logical outgrowth" requirement in general, EPA discussed the standard in the 2017 Statement. *See* AR-1534 at 10-11. EPA notes that the comment mischaracterizes the standard to the extent it contends that the Final Permit must be a logical outgrowth of only the 2011 and 2014 Draft Permits in this case. The logical outgrowth inquiry should not ignore the 2017 Statement. *See Miami-Dade County v. EPA*, 529 F.3d 1049, 1059–60 (11th Cir. 2008); *Nat'l Elec. Mfrs. Ass'n v. EPA*, 99 F.3d 1170, 1172 (D.C. Cir. 1996); *In re DC Water & Sewer Auth.*,

13 E.A.D. 714, 760 (EAB 2008) (noting that the EAB "consider[s] the evolution of the permit condition at issue").

"A rule is deemed a logical outgrowth if interested parties 'should have anticipated' that the change was possible, and thus reasonably should have filed their comments on the subject during the notice-and-comment period." *Ne. Md. Waste Disposal Auth. V. EPA*, 358 F.3d 936 (DC Cir. 2004); *see also Riverkeeper, Inc. v. EPA*, 358 F.3d 174, 202 (2d. Cir. 2004) ("The EPA is only required to 'fairly apprise interested persons of the subjects and issues' of its rulemaking."). The key question, then, is whether Sierra Club and CLF should have anticipated from the combination of the 2011 Draft Permit, the 2014 Draft Permit, the 2017 Statement, and the supporting record that the Final Permit could include a determination that seasonal use of wedgewire screen technology with a 3 mm slot size is the BTA for entrainment at the facility. In the 2011 Draft Permit, EPA explained that it was, based on the information available to EPA at the time, proposing to reject wedgewire screen technology as the BTA for Merrimack Station based on a variety of site-specific considerations and the effectiveness of wedgewire screens for reducing entrainment. *See* AR-618 at 271-280. In the 2017 Statement, EPA explained that comments and new information raised substantial new questions as to EPA's earlier reasons for not proposing wedgewire screens. As explained earlier, *see* Responses to Comments III.4.2, III.7.3, III.10.2.2, in the 2017 Statement, EPA notified the public that it was reconsidering the preliminary BTA determination for Merrimack Station in light of these public comments and new information. AR-1534 at 4, 6-7, 12-36. As EPA explained:

> various data, information and arguments submitted during prior comment periods, or that were submitted or became known to EPA after the comment periods,[footnote omitted] raise a number of substantial new questions concerning the Merrimack Station Draft Permit. In response, EPA has decided to issue a public notice reopening the comment period on the Draft Permit in order to provide the public with an opportunity to comment on the new information and the substantial new questions. EPA has also responded to the new information and questions by developing options for certain new (or revised) Draft Permit conditions, and by developing new (or revised) analyses in support of the Draft Permit conditions. In connection with the reopened comment period, EPA has prepared th[e 2017 Statement] to describe the new information, the substantial new questions, the potential new permit conditions, and the new supporting analyses, so that the public can review the material and comment on it to EPA.

Id. at 3-4 (citing 40 CFR § 124.14(b)). EPA expressly noted that it was "reconsidering wedgewire screens as the possible BTA for Merrimack Station in light of public comments and new information," *id*. at 18, and reconsidering "whether the greater cost of closed-cycle cooling is warranted in light of the potentially better-than-previously-estimated performance of wedgewire screens and the possible resolution of logistical and engineering issues," *id.* at 19-20.[98] Sierra Club and CLF's 2020 CWIS Comments make clear that they understood this to be the case. AR-

[98] EPA also reopened the comment period as to the preliminary BTA determination for impingement at Merrimack Station. AR-1534 at 21-22.

1680 at 2 ("EPA stated it had received new information, which raised substantial new questions about the potential for fine-mesh wedgewire screens to qualify for BTA at the Station" and that EPA "was reconsidering wedgewire screens as the possible BTA.") (emphasis omitted). Furthermore, their comments on the 2017 Statement show that they foresaw that the Final Permit could include a determination that wedgewire screen technology, rather than closed-cycle cooling, is the BTA for entrainment. *See* Comment III.7.3. The 2017 Statement also indicated that EPA was considering seasonal operation of the screens and slot sizes up to 3 mm. AR-1534 at 21, 30 n.5. The 2017 Statement even included an option for new Draft Permit conditions for wedgewire screens and a compliance schedule applicable to such a BTA determination. *Id.* at 29-32. EPA sought public comment on all of these issues raised within the statement. *Id.* at 70. Thus, Sierra Club and CLF were fairly apprised and should have anticipated that the Final Permit could include a determination that wedgewire screen technology is the BTA. Moreover, in both their initial comments on the 2017 Statement and their 2020 CWIS Comments, they reveal that they did anticipate that the Final Permit might include such a BTA determination. Accordingly, EPA disagrees with the comment that the BTA determination is not a logical outgrowth.

Sierra Club and CLF comment that they have explained in their 2020 CWIS Comments that "the record does not support any change to EPA's BTA 2011 determination." EPA disagrees. Sierra Club and CLF have voiced general opposition to EPA reconsidering the bases for rejecting wedgewire screens in the 2011 Draft Permit, but neither their organizations' timely comments nor their 2020 CWIS Comments offer specific, detailed refutation of the new information EPA emphasized in the 2017 Statement, including new designs since 2011 to overcome issues with size and number of the array originally envisioned, research regarding efficacy of wedgewire screens as it relates to hydraulic bypass and larval avoidance, and site-specific data collected by PSNH. Sierra Club and CLF "request an opportunity to engage technical experts to review the permit provisions and EPA's supporting rationale for any changes to the 2011 BTA determination them [sic] and to submit comments based on their evaluation." But they have already had such an opportunity and have twice passed on it. In particular, they do not explain why they could not engage technical experts to review the new information and rationale during the nearly four-and-a-half month comment period for the 2017 Statement. The 2017 Statement also included new draft permit conditions related to a wedgewire screens BTA determination, but Sierra Club and CLF did not offer comments, technical or otherwise, on those either. Furthermore, even in the 2020 CWIS Comments two years on, Sierra Club and CLF again pass on the opportunity.[99] In other words, Sierra Club and CLF have had multiple "opportunit[ies] to engage technical experts" to review the new information, data, arguments, and new Draft Permit conditions specified in the 2017 Statement, but have failed to seize them. Moreover, Sierra Club and CLF do not need to review every new BTA permit provision in order for the Final Permit to be a logical outgrowth of the 2017 Statement. Likewise, EPA does not agree that any new data used by EPA to support the BTA determination "must be subjected to public comment." Courts have recognized that "the

[99] Nor did they include technical comments on PSNH's site-specific study, which provides supplementary data confirming information already in the record. The study, and Normandeau's analysis of the potential biological benefits of wedgewire screens at Merrimack Station based on the study, have been publicly available since the 2017 public comment period. *See* AR-1550, AR-1567. Moreover, EPA specifically noted in the 2017 Statement that it would "carefully consider" the study when making the final BTA determination for Merrimack Station. AR-1534 at 20, 30 n.5.

public need not have an opportunity to comment on every bit of information influencing an agency's decision." *Texas Office of Pub. Utility Counsel v. FCC*, 265 F.3d 313, 326 (5th Cir. 2001) (internal quotation marks omitted); *see also BASF Wyandotte Corp. v. Costle*, 598 F.2d 637, 644-45 (1st Cir. 1979). If that were the case, permitting decisions could be subject to a never-ending circle of public comment. *Cf. Rybachek v. EPA*, 904 F.2d 1276, 1286 (9th Cir. 1990).

Similarly, EPA does not agree that it must reopen the comment period to subject the permitting decision to a fourth round of public comment. EPA may, in its discretion, reopen the public comment period "[i]f any data[,] information[,] or arguments submitted during the public comment period . . . appear to raise substantial new questions concerning the permit." 40 CFR § 124.14(b). But EPA does not find in this case that Sierra Club and CLF's comments—during the comment period or after—raise substantial new questions about the availability and effectiveness of wedgewire screens at Merrimack Station, in part because Sierra Club and CLF do not confront the new information with any specificity. And while Sierra Club and CLF's comment states that they want "an opportunity to engage technical experts to review the permit provisions and EPA's supporting rationale for any changes to the 2011 BTA determination them [sic] and to submit comments based on their evaluation," they do not explain why a new comment period is needed, given the opportunity they had during the lengthy comment period provided on the 2017 Statement or since, as they developed their 2020 CWIS Comments. Moreover, the record (including this Response to Comments document and information referenced in the 2017 Statement) adequately explains EPA's reasoning for the BTA determination so that a dissatisfied party could develop a permit appeal. *In re Town of Concord*, 16 E.A.D. 514, 531-32 (EAB 2014). Furthermore, as Sierra Club and CLF themselves have recognized, *see* Comments II.3.2.3, III.7.2, III.7.3, III.10.2.5, III.10.3.6, III.10.4, further delay in this permit proceeding would be inadvisable. *Town of Concord*, 16 E.A.D. at 531-32. In addition, Sierra Club sued EPA in 2016 complaining of unreasonable delay in issuing the Merrimack Station NPDES permit. AR-1534 at 8-9. The case was ultimately dismissed by the U.S. Court of Appeals for the First Circuit, but EPA agreed that finalizing this permit was an important priority, and the Agency is trying to do just that. Reopening the comment period at this time is neither necessary nor in the public interest.

10.3.6 Compliance with BTA Is Long Overdue at Merrimack Station. A "Compliance Schedule" Cannot Be Used to Allow GSP to Undo the BTA Determination in the Permit and Avoid Ever Having to Comply with BTA.

Finally, in issuing a NPDES permit EPA must not only determine which technology is BTA, it must also "require compliance as soon as practicable."[51] Because the deadline for compliance with Section 316(b) has long passed and the Station's NPDES permit is 22 years overdue for renewal, the temporal aspect of compliance is critically important here. A compliance schedule may be used only to allow the permittee a reasonable amount of time to construct and install needed technologies. Further, it must provide a deadline for compliance. A compliance schedule may not be used to gather information for a post-permit-issuance BTA determination. And a compliance schedule certainly may not be used to allow a permittee to postpone compliance indefinitely while it develops arguments as to why the permit should be modified to remove the BTA-based requirements it prefers not to spend money to comply with.

Under the CWA and EPA's regulations, compliance schedules are never available simply to give an agency time to make a permitting decision. The CWA defines "schedule of compliance" as a schedule of "*remedial measures* including an enforceable sequence of actions or operations leading to *compliance* with an effluent limitation, other limitation, prohibition, or standard."[52] Thus, "any compliance schedule contained in an NPDES permit *must include an enforceable final effluent limitation*."[53] In other words, "in order to grant a compliance schedule in an NPDES permit, the permitting authority has to make a reasonable finding, adequately supported by the administrative record, that the compliance schedule 'will lead[] to compliance with a … limitation' … 'by the end of the compliance schedule.'"[54] EPA's guidance makes crystal clear that compliance schedules (where they are otherwise permissible) may only be used to allow the permitee time to add the equipment necessary to meet the operational conditions established in the permit, not to give the regulator time to develop those conditions in the first place: "a compliance schedule based solely on time needed to develop a site specific criterion" for NPDES permits "is not appropriate."[55]

As EPA's general counsel stated in the cooling water context, "a compliance schedule under the § 316(b) regulations must take into consideration the time necessary to implement the appropriate technology at a given intake structure,"[56] and thus relevant factors are "whether there is any need for modifications to treatment facilities, operations or measures," "the steps needed to modify [them] and the time those steps would take."[57] Thus, it is improper to use a compliance schedule for gathering information to be used by EPA to determine or establish a BTA limitation that should have been in the permit in the first place.

If EPA were to need more information to make a BTA determination, it would have to obtain that information *before* making the determination; it cannot use a compliance schedule in the permit to do so. But EPA is out of time to collect more studies. As EPA acknowledged again in 2017, "the statutory deadline for compliance with the BTA standard of CWA § 316(b) ha[s] already passed."[58] Indeed, it passed decades ago. EPA must renew this permit now, and the renewal must include a BTA determination.[59] EPA's regulations do not require Region 1 to reopen its 2011 draft BTA determination, nor do they provide incentive or justification for doing so. To the contrary, the regulations authorize Region 1 to finalize the determination it made in 2011. As noted above, EPA determined in 2017 that, given that this is an "ongoing permitting proceeding" with extensive information already having been collected and analyzed by the agency, it is not necessary for the application to be supplemented by the information described in Section 122.21 of the 2014 § 316(b) Regulations.[60] If EPA has the information it needs to make a BTA determination, then there is no reason to conduct further studies. If EPA were to believe that further studies are needed to determine key parameters of the BTA for Merrimack Station, then the agency would have to use CWA section 308 request to obtain such studies before making a permitting decision, rather than making a BTA determination and using a compliance schedule in the permit to obtain such studies after the fact.

Moreover, apart from the improper use of a compliance schedule to gather data to make a BTA determination, there is another aspect of the compliance schedule GSP is seeking that is also not permitted under the CWA because it improperly creates incentives not only for GSP to delay but

also for it to undermine the effectiveness of wedgewire screens in any further study. As discussed above, GSP has admitted that it is no longer interested in installing wedgewire screens, and is amenable to a permit containing wedgewire screen requirements only if it can, after the permit has been issued, conduct a study on wedgewire screens that the company will then use to propose some other compliance option. If GSP submits a study purporting to show that wedgewire screens are infeasible in Hooksett Pool due to fouling, insufficient sweeping flows, insufficient water depth or other factors (which EPA already determined in 2011), then GSP would likely use that study to argue that it should be relieved of the obligation to install wedgewire screens. Or if GSP's study shows that wedgewire screens are feasible but have low effectiveness, then GSP can be expected to use that study to argue that some alternative method of compliance (or no changes to its cooling system at all) would provide a similar level of performance to wedgewire screens and should be allowed by EPA. (Indeed, GSP's proposed two-stage compliance schedule states that the second period would be "to select and implement [an] option for achieving similar effectiveness [to wedgewire screens]."[61] Only if GSP submits a study purporting to show that wedgewire screens would be both feasible and highly effective in Hooksett Pool, would GSP have to actually install wedgewire screens (after the delay caused by the study) or some other technology shown to have an equally high level of effectiveness. The more effective wedgewire screens are shown to be, the more likely they would have to be installed and the higher the bar for substitute technology or operational measures. Thus, while PSNH had an incentive to show that wedgwire screens would be effective, if a permit were issued determining wedgewire screens to be BTA, from that point forward GSP's economic incentives would be reversed; the company would have nothing to gain by proving their feasibility and effectiveness, and would have much to gain by trying to prove the opposite, that wedgewire screens would not be feasible or that their effectiveness would be limited. (Of course, GSP would also have an economic incentive to delay, by seeking extensions and/or submitting incomplete or inclusive studies requiring supplementation.) EPA should not allow GSP to game the system in such manner.

[51] 40 CFR § 125.94(b).
[52] CWA § 502(17); 33 U.S.C. § 1362(17) (emphasis added); see also 40 C.F.R § 122.2; U.S. EPA, Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits, May 10, 2007 memorandum from EPA Headquarters ("May 10, 2007 EPA Guidance") at 2, ¶ 2.
[53] May 10, 2007 EPA Guidance at 2, ¶ 3 (citing CWA §§ 301(b)(1)(C) and 502(17); Star-Kist Caribe, Inc. 3 E.A.D. 172, 175, 177-178 (1990); 40 C.F.R. §§ 122.2, 122.44(d), and 122.44(d)(I)(vii)(A)).
[54] Id. at 2, ¶ 5 (citing CWA §§ 301(b)(I)(C) and 502(17); 40 C.F.R. §§ 122.2, 122.44(d)(1)(vii)(A)).
[55] May 10, 2007 EPA Guidance at 3, ¶ 11. Likewise, compliance schedules are not appropriate to allow time to develop a Total Maximum Daily Load (TMDL) or a Use Attainability Analysis (UAA). Id. at 3, ¶¶ 10, 11.
[56] In Re Brunswick Steam Electric Plant, U.S. EPA, Decision of the General Counsel, EPA GCO 41 (June 1, 1976)
[57] May 10, 2007 EPA Guidance at 3, ¶¶ 8, 9.
[58] 2017 Statement of New Questions at 23.
[59] 40 C.F.R. § 125.98(b)(2).
[60] 2017 Statement of New Questions at 16; see also 40 C.F.R. § 125.98(g).
[61] GSP, "Merrimack NPDES Permit" – Open Items," (undated), provided to EPA Region 1 on September 10, 2019.

EPA Response:

Sierra Club and CLF reiterate and expand upon earlier comments about the use of a compliance schedule to delay the BTA determination. In particular, the organizations comment that the compliance schedule must provide a deadline for compliance. EPA responds that the compliance schedule in the Final Permit for the entrainment BTA is very similar to the one proposed in the 2017 Statement (on which Sierra Club and CLF chose not to offer specific comments) and does provide a deadline for compliance. Sierra Club and CLF also comment that a compliance schedule may only provide a reasonable amount of time to construct and install needed technologies, may not be used to gather information for a post-permit-issuance BTA determination, and may not be used to allow a permittee to postpone compliance indefinitely. While the schedule in the Final Permit provides a reasonable time to construct and install the needed technologies, it does not provide additional time "to gather information for a post-permit-issuance BTA determination" or "allow [the] permittee to postpone compliance indefinitely." EPA has enough information to make a BTA determination now. That said, while the Permittee is working on complying with this schedule, there is nothing that would prevent it from simultaneously developing new information on another compliance option and submitting a permit modification request based thereon. *See also* Response to Comment III.10.3.1. The Final Permit establishes a compliance schedule that requires compliance "as soon as practicable" with EPA's determination in the Final Permit that wedgewire screens are the BTA for entrainment.

Sierra Club and CLF also comment that EPA acknowledged in 2017 that, "the statutory deadline for compliance with the BTA standard of CWA § 316(b) ha[s] already passed." The comment, however, misreads the 2017 Statement. The 2017 Statement recounts that, in the past, EPA interpreted the Act to mean that the statutory deadline for compliance with the BAT, BPT, and BCT technology standards also applied to the BTA standard. AR-1534 (citing *In re Brunswick Steam Elec. Plant*, EPA General Counsel's Opinion No. 41, 1976 WL 25235 (1976)). The 2017 Statement notes, however, that EPA revised this interpretation in the 2014 CWA § 316(b) Final Rule and decided that § 316(b) has no statutory deadline for meeting the BTA standard. *Id.* (citing 79 Fed. Reg. at 48,359). In other words, the statutory deadline for compliance with the BTA standard has not passed. As a result, final permits may include compliance schedules for BTA requirements and require compliance with the BTA standard "as soon as practicable." *Id.*

Finally, Sierra Club and CLF comment that the type of schedule they discuss could incentivize the Permittee to perform studies that attempt to prove that wedgewire screens are not feasible at Merrimack Station or are less effective than some other compliance option. First, the schedule Sierra Club and CLF describe is not in the Final Permit. Second, EPA has sufficient information to support the BTA determination and compliance schedule in the permit. Third, even with a determination that Sierra Club and CLF's preferred technology (i.e., closed-cycle cooling) is the BTA and without the type of compliance schedule described in the comment, the Permittee may still be incentivized to perform such studies and may present new information to EPA in an attempt to change the BTA determination. EPA is well aware that a permittee may prefer to avoid fiscal expenditures necessary to make facility upgrades to comply with a NPDES Permit, if possible. If the Permittee chooses to perform additional studies to support a request for a modification, it may do so and present them to support a request for a permit modification, which would be subject to appropriate public participation requirements. 40 CFR § 122.62; *see* Response to Comment III.10.3.2.

10.4 Conclusion

EPA should proceed, without further delay, to finalize its 2011 BTA determination and to issue a final NPDES permit containing cooling water intake structure requirements based on closed-cycle cooling it proposed in 2011 and 2014. If, however, EPA were to change its determination, EPA would not be legally authorized to issue a NPDES permit with the approach to BTA that GSP is seeking, for all of the reasons given above.

The permitting process for Merrimack Station has taken far too long already. EPA should not, at the behest of a new owner of the Station, further delay issuance of the permit and disregard years of work and analysis by the agency. Changing course, as requested by GSP, would not only continue degradation of the Merrimack River and undermine the integrity of the Clean Water Act and its permitting process, but would also amount to an unwarranted windfall to the company, which acquired the Station knowing full well that EPA had made a proposed determination that BTA and state water quality standards required converting the Station's cooling system to closed-cycle cooling (and whose bid and purchase price for the Station must have factored in that risk). GSP is now objecting not only to installing cooling towers but also to wedgewire screens or any other technology that might cost more than they want to spend. EPA should not be complicit in GSP's evasion tactics.

EPA Response:

Although the process has been lengthy, EPA has proceeded without unreasonable delay to finalize this NPDES Permit. As EPA explained in the 2017 Statement, numerous events and issues have contributed to the time required to issue this permit. *See, e.g.*, AR-1534 at 5-9. EPA reiterates them and incorporates them here by reference. EPA agrees with the comment that EPA should not "delay issuance of the permit." EPA notes, however, that Sierra Club and CLF's comment to issue another Draft Permit and institute a fourth comment period, *see* Comment III.10.3.5, would do just that (i.e., "delay the issuance of the permit"). Another comment period is not necessary, and, for the reasons explained in the responses above and to avoid "further delay," EPA declines to take that step.

EPA likewise agrees with the comment that it should not "disregard years of work and analysis by the agency." EPA has not done so here; rather, EPA has evaluated all of the information, including public comments on, and the new information, data, and arguments highlighted in, the 2017 Statement, and considered how it impacts the 2011 preliminary BTA determination. Based on all the information in the record, EPA has reasonably concluded that wedgewire screen technology is the BTA for Merrimack Station.[100]

[100] With respect to the comment that "GSP is now objecting not only to installing cooling towers but also to wedgewire screens or any other technology that might cost more than they want to spend," such a position would be no different than that taken by the previous permittee. See Comments III.3, III.4, and III.5 (including associated comments).