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Comments of Public Service Company of New Hampshire

on

EPA's Revised Draft National Pollutant Discharge Elimination System

Permit No. NH 0001465

for

Merrimack Station

Public Service of New Hampshire

A Northeast Utilities Company

Submitted to the U.S. Environmental Protection Agency

August 18, 2014

NOTICE OF CLARIFICATION

As the technology for the treatment of waste water effluent from flue gas desulfurization systems has evolved and continues to evolve, the terminology has as well. To ensure an accurate understanding of the following comments provided by Public Service Company of New Hampshire, the generic term “zero liquid discharge” or “ZLD” is not used at all to refer to a treatment technology because it is not one. Instead, it is a discharge limitation—one that PSNH’s flue gas desulfurization water treatment systems at Merrimack Station cannot achieve. The discharge term “ZLD” is also therefore not utilized to characterize the capabilities of the treatment system in place at Merrimack Station.

Merrimack Station has a highly effective primary waste water treatment system (a physical/chemical treatment system with additional enhanced filtration system), referred to as the “PWWTS,” followed by a secondary waste water treatment system, referred to as the “SWWTS,” consisting of softening, evaporation, and crystallization processes. Thus, the SWWTS at Merrimack Station consists of a brine concentrator (vapor compression evaporation), two crystallizers operated in series, and belt pressure filter. The primary purpose of this unique and complex system is volume reduction. Volume reduction, however, does not equate with the elimination of all effluent, or a zero liquid discharge.

EXECUTIVE SUMMARY

The United States Environmental Protection Agency-Region 1's ("EPA") April 18, 2014 revised draft National Pollutant Discharge Elimination System ("NPDES") permit for Public Service Company of New Hampshire's ("PSNH") Merrimack Station cannot be issued as proposed. EPA's determination that zero liquid discharge limits for flue gas desulfurization ("FGD") waste water using softening, evaporation, and crystallization technology (i.e. PSNH's secondary waste water treatment system ("SWWTS")) is achievable and, therefore, is "best available technology" ("BAT") is simply wrong.[1] In fact, both findings are unsupported and unfounded. The SWWTS installed at Merrimack Station does not and cannot at this time reduce FGD waste water to zero liquid. Likewise, the SWWTS, although a workable and necessary technology at Merrimack Station under the circumstances, does not meet the legal definition of BAT when applying well-established factors.

EPA rushed to judgment in issuing this latest draft permit. In its rush, EPA made decisions based on limited, incomplete, unreliable, and often unverifiable data. EPA's own Fact Sheet shows that it does not have an appreciation for the complexities of running volume-reducing technology like that employed by Merrimack Station's SWWTS. For example, EPA failed to mention, much less recognize, that: the design for each system is different; the equipment itself is different; the chemistry is different; the fuel is different; the influent is different—the list could go on. Rather than address these differences, EPA simply declared that, because a few systems in the world using "similar" technology may or may not be capable of

[1] PSNH's statements in these comments are included solely to address the legal "best available technology" test or analysis EPA is required to complete, pursuant to the Clean Water Act, to lawfully establish technology-based effluent limits for point-source dischargers. The BAT test is a unique one that focuses on a finite set of factors established and perfected through decades of jurisprudence. Words and phrases have very precise meanings within this regulatory framework. PSNH's comments must be reviewed within this regulatory context and may not permissibly be construed and/or excerpted for any other purpose.

eliminating end-of-pipe discharges for FGD waste waters due to exigent factors, Merrimack station could do the same. This is the definition of arbitrary and capricious agency action and ignores the actual, undisputed operational experience at Merrimack Station.

By implication, EPA again got it wrong in deciding that PSNH's primary waste water treatment system—the physical/chemical treatment system with its Enhanced Mercury and Arsenic Removal System (jointly the "PWWTS")—is not BAT, even though that system cost effectively removes a significant amount of the constituents of concern and is the only system that satisfies the legal definition of BAT. In fact, a review of the well-established factors shows that the PWWTS is the BAT for Merrimack Station, and EPA should amend its draft NPDES Permit to reflect limits achievable using this technology.

Any final NPDES permit for Merrimack Station must address the issues raised in these comments. Specifically:

- EPA's draft NPDES permit is a rush to judgment on PSNH's SWWTS considering how little the agency knows about its operations and effectiveness.

- PSNH did not voluntarily install its SWWTS. Instead, it was compelled to do so in order to bring a technologically advanced scrubber on line as required by law, coupled with EPA's unwillingness to issue PSNH a new or modified permit. Since installation and operation of the scrubber in September 2011, Merrimack Station has become one of the cleanest coal burning plants in the nation, reducing mercury volumes by approximately 95 percent and reducing sulfur dioxide emissions by over 90 percent. EPA's suggestion that PSNH could simply wait on an NPDES permit and ignore the clear statutory mandate to commence operation of the scrubber as soon as possible and no later than July 1, 2013, is wrong.

- The phrase "zero liquid discharge" or ZLD is a buzz word that is often mistakenly interchanged with actual technologies. ZLD is not a technological option; rather, it is an effluent limit. EPA and industry alike have misused this term throughout the years – so much so that it is now even used to identify systems that do not actually achieve ZLD – like Merrimack Station's SWWTS. The SWWTS at Merrimack Station is not able to meet a zero limit.

- PSNH's PWWTS is BAT. The PWWTS cost effectively and consistently removes approximately 90 percent of all toxic weighted pound equivalents ("TWPE") from FGD waste waters and satisfies water quality standards established by the New Hampshire Department of Environmental Services ("NHDES").

- Both EPA's identification of PSNH's SWWTS as BAT and the agency's corresponding belief that PSNH's SWWTS achieves ZLD are arbitrary and capricious.

- While described as a "site-specific, case-by-case determination based on the facts at Merrimack Station," EPA's BAT determination ignores the actual, undisputed facts concerning Merrimack Station and instead relies on secondary sources, cursory research, and superficial interviews of companies whose plants and systems differ greatly from Merrimack Station and its FGD waste water treatment system.

- PSNH's SWWTS does not achieve ZLD and must have a purge stream. This purge stream, plus ongoing operational challenges associated with the treatment system, force PSNH to continue to transport FGD effluent to local publicly owned treatment works ("POTWs").

- PSNH cannot eliminate its purge stream or FGD waste waters by mixing them with fly-ash because of the design of Merrimack Station's wet-bottom boilers and the fact that they do not generate enough fly-ash.

- It is unlawful for EPA to rely solely upon the POTW compliance option in establishing a legally permissible BAT standard for any waste stream. Furthermore, additional treatment of Merrimack Station's FGD waste water by a POTW provides little material benefit to the environment, given that the waste stream already satisfies water quality standards. Separately, continued shipments to POTWs in the future will be dictated by many factors and, thus, may not be available to PSNH for the entirety of the permit term; therefore, this cannot be included as a legally permissible compliance option for PSNH's final permit for Merrimack Station.

- EPA wrongly compares the volume reduction technology used at a few other facilities to that at Merrimack Station and assumes all are the same. They are not. Each facility and its associated technology is unique due to differences in coal burned, boiler design, FGD design, FGD waste water treatment technological design, and the overall fuel/boiler/FGD waste water chemistries.

- An analysis of the BAT factors confirms PSNH's SWWTS is not BAT, and EPA's ZLD effluent limit is not achievable.

- EPA correctly abandoned its previous identification of biological treatment technologies as BAT for PSNH's Merrimack Station.

- EPA's decision to utilize its "best professional judgment" authority is unlawful because (a) national effluent guidelines already exist for this waste stream; (b) revised national effluent guidelines are forthcoming in the immediate future; and/or (c) of public policy concerns, not the least of which is that EPA's current BAT determination would impose effluent limits that are more stringent than at any other facility in the country.

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Comments of Public Service Company of New Hampshire

on

EPA's Revised Draft National Pollutant Discharge Elimination System Permit

No. NH 0001465 for Merrimack Station

I. INTRODUCTION

Public Service Company of New Hampshire ("PSNH") submits these comments on the United States Environmental Protection Agency-Region 1's ("EPA") April 18, 2014 revised draft National Pollutant Discharge Elimination System ("NPDES") permit for PSNH's Merrimack Station, Permit No. NH 0001465 ("draft permit"). In its reissued draft permit and supporting Fact Sheet, EPA drastically has altered its Best Available Technology ("BAT") determination for flue gas desulfurization ("FGD") waste waters at Merrimack Station. While the agency correctly rejected its 2012 assertion that biological treatment technologies are BAT for this waste stream, EPA has replaced one arbitrary and capricious BAT determination for another. EPA's current draft permit now lists PSNH's existing primary waste water treatment system ("PWWTS") and its volume reducing secondary waste water treatment system ("SWWTS") as BAT for the treatment of FGD waste waters at Merrimack Station. Erroneously believing that PSNH's vapor compression evaporation, crystallizers, and salt press technologies (i.e., the SWWTS) are capable of eliminating all FGD waste waters, EPA proposes to eliminate all permissible discharges of FGD waste waters from Merrimack Station to the Merrimack River. In sum, EPA has set a zero limit for FGD waste water discharges—a limit that PSNH cannot achieve.

EPA's identification of PSNH's SWWTS as BAT is an improper rush to judgment on a system EPA has made insufficient efforts to attempt to understand. The agency's BAT determination, and the corresponding "no discharge" effluent limitation, are arbitrary, capricious and unlawful and must be reconsidered. While purportedly based on a "site-specific, case-by-case determination based on the facts at Merrimack Station," EPA's zero limit for FGD waste water overlooks the pertinent facts at Merrimack Station—namely, the existence of the purge waste stream not eliminated by the SWWTS and the impossibility for the system to operate with requisite efficiency and reliability to comply with the onerous and flawed terms of the draft permit. Because coal-fired generating facilities are different from one another due to the coal burned (type, chemistry, variability, etc.), boiler design (pulverizers, cyclone, stoker, etc.), FGD design (wet, dry, gypsum capability, internal elements, materials, etc.), scrubber waste water treatment technological design (physical/chemical, softening, vapor compression evaporation ("VCE"), filtration, etc.), and the overall fuel/boiler/FGD waste water chemistries, it is wrong to assume that FGD effluent chemistry and volume results are transferable from one plant to another.

While the SWWTS is serving its intended purpose—volume reduction—and has some incidental pollutant removal benefits, the system was never intended to be a pollutant removal system. EPA states that the SWWTS "can be operated to achieve ZLD." Fact Sheet at 41. This is simply not true. EPA also states in its Fact Sheet that there is "'a rebuttable presumption' that VCE and crystallizer technology is available for Merrimack Station (i.e., it is technologically and economically achievable for the Facility)." Fact Sheet at 19. In these comments to the draft permit, PSNH will overcome this presumption and demonstrate that—despite initial installation and operation of the SWWTS—it does not achieve zero liquid discharge. Moreover, operational experience with the SWWTS to date reveals that tuning and operational optimizations remain ongoing, and obstacles still must be overcome.

PSNH's PWWTS successfully removes all pollutants from the FGD stream to levels that satisfy water quality standards before the SWWTS ever operates. The PWWTS, by itself, is BAT. PSNH's SWWTS then reduces the volume of waste water to manageable levels. It does not eliminate the few remaining constituents in the waste stream altogether or remove all constituents from the waste stream that should permissibly be discharged to the Merrimack River. PSNH has stated and continues to believe, in concert with the New Hampshire Department of Environmental Services ("NHDES"), that discharge from the PWWTS is fully acceptable and satisfies all regulatory requirements. EPA's determination that the PWWTS and SWWTS yield a "zero limit" and are BAT is erroneous. Likewise, because in establishing its zero discharge limit EPA depends on the availability of publicly owned treatment works ("POTWs") to discharge PWWTS effluent and the SWWTS purge stream, EPA's BAT determination is wrong.

As discussed below, EPA relies largely upon secondary sources, cursory research, and superficial interviews having nothing to do with the "site-specific" facts at Merrimack Station as a means to a predestined, yet erroneous, conclusion that "[t]hese technologies are capable of eliminating the direct discharge of pollutants" from the FGD waste stream. Fact Sheet at 48. In reality, there is a dearth of coherent and thorough information supporting the agency's belief that PSNH's SWWTS (or any of the few other loosely-related systems in operation in the world) can currently eliminate FGD waste waters—because it (or they) cannot. EPA cannot ignore the operational realities of PSNH's volume reduction technology that is still in its earliest stages of operation. The draft permit is not based on accurate, representative data and sound analyses. This flaw affects EPA's assessment of technology choices, cost estimates, and benefits.

EPA's final NPDES permit for Merrimack Station must take into consideration the issues raised in these comments and contain reasonable limits and requirements established through a lawful and proper process based upon substantive facts.

II. BACKGROUND

A. Public Service Company of New Hampshire and Merrimack Station

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

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

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

[4] For instance, PSNH has received the following: EPA "Environmental Merit Award," 1996 (recognizing PNSH's demonstrated commitment and significant contributions to the environment); "New Hampshire Governor's Award for Pollution Prevention," 1996 (awarded for installing the Selective Catalytic Reduction ("SCR") control equipment at Merrimack Station); U.S. EPA "Certificate of Appreciation," 1999 (recognizing Merrimack's NO_x emissions reduction project); "Lung Champion Award," 2003 (awarded by the American Lung Association of New Hampshire); "Secretary of Defense Employer Support Freedom Award," 2002 (awarded by the U.S. Department of

Merrimack Station, located in Bow, New Hampshire, is the largest of PSNH's three fossil-fueled power plants with a total electrical output of approximately 480 MW.[5] It typically has produced between 1 and 3 million megawatt-hours of electricity on an annual basis, which is enough energy to supply hundreds of thousands of New Hampshire households. Merrimack Station consists of two primary steam-electrical generating units—Units 1 and 2—along with two smaller, jet-fuel-fired peaking combustion turbines. Unit 1 began operating in 1960 and has a rating of 108 MW; Unit 2 commenced operations in 1968 and has a rating of 330 MW. Merrimack Station withdraws cooling water from and discharges to the Merrimack River.

B. PSNH's Current NPDES Permit for Merrimack Station

EPA issued Merrimack Station's current NPDES permit on June 25, 1992. The 1992 permit, for the most part, set reasonable limits, including monitoring and reporting requirements for each of the then-existing outfalls at Merrimack Station. In 1997, PSNH timely submitted its application for renewal of the 1992 NPDES permit for Merrimack Station. Seventeen years have since elapsed, and the agency has yet to issue a new final permit for Merrimack Station. Moreover, more than five years have elapsed since PSNH first approached EPA to seek authorization to discharge the FGD waste stream generated as a result of the Company's newly

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Defense); U.S. D.O.E. Grant For Mercury Reduction Research, 2007; the EPA Clean Air Excellence Award, available at http://www.epa.gov/air/cleanairawards/winners-2007.html; "Breathe New Hampshire Award," 2008 (recognizing exceptional commitment and support of Breathe New Hampshire); "Edison Electric Institute Common Goals Special Distinction-Environmental Partnerships Award," (recognizing efforts to collaborate with government agencies and environmental groups to develop an ozone reduction strategy); Environmental Business Council's New England Outstanding Environmental-Energy Technology Application Achievement Award (Merrimack Station scrubber); Power Magazine Top Plants: Six Innovative Coal-Fired Plants (2012), also available at http://www.powermag.com/top-plantmerrimack-stations-clean-air-project-bow-new-hampshire/; the International Green Apple Award for Environmental Best Practice (2013) (Merrimack Station scrubber).

[5] EPA again incorrectly classifies Merrimack Station as having operated as a "base-load" facility in previous years. "Base load" is a term of art and use of it by the agency to describe Merrimack Station requires clarification. The term "base load" refers essentially to the minimum continuous demand for electric power. When dispatched, the units at Merrimack Station generate power that helps serve this load. In this sense, the units at Merrimack Station provide base load. However, the term "base load unit" is a separate concept. A "base load unit" is one that operates virtually continuously at or near full power. This does not describe the units at Merrimack Station – either presently or in the past. Instead, the Merrimack Station units are, and always have been, subject to economic dispatch and do not operate virtually continuously at full power output.

installed scrubber system through a modification of PSNH's existing permit or through the issuance of a new NPDES permit for Merrimack Station. Accordingly, PSNH's 1992 permit for Merrimack Station has been administratively continued and remains in effect today.

C. EPA's Latest Draft NPDES Permit for Merrimack Station

EPA has altered dramatically its BAT determination for FGD waste waters at Merrimack Station in its latest draft permit issuance. The agency correctly rejected its 2012 assertion that biological treatment technologies were BAT for this waste stream; no doubt due to the numerous documented operational problems and limitations experienced by any facility in the industry that has employed some version of this treatment system to attempt to treat FGD waste waters. Unfortunately, EPA again has rejected PSNH's PWWTS at Merrimack Station as BAT, despite the fact it is that system that removes 90 percent of toxic-weighted pound equivalents ("TWPE") from the FGD waste stream and was specifically recognized by NHDES as the technology necessary to satisfy state water quality standards.

Instead, in this latest draft permit, EPA identifies PSNH's existing PWWTS, coupled with the SWWTS, as BAT for the treatment of FGD waste waters at Merrimack Station based on an incorrect belief that this technological combination is capable of eliminating all FGD waste waters (i.e. that it achieves ZLD).[6] This is simply not true. In fact, EPA's BAT determination based on its "best professional judgment" ("BPJ") stems from a contrived "rebuttable presumption" that because the SWWTS is already installed and in operation at Merrimack Station, it must be available (i.e., technologically and economically achievable). *See* Fact Sheet at 18-19. EPA cites no legal authority for this supposed legal presumption. In actual fact, a presumption of this kind is unlawful because it impermissibly shifts the burden EPA bears under

[6] In the latest draft permit, EPA has proposed to eliminate all permissible discharges of FGD waste waters from Merrimack Station to the Merrimack River from previously proposed Outfall 003C, and to eliminate certain limits previously proposed for Outfall 003A, based on its erroneous BAT determination.

§§ 125.3(c) and (d) to consider each and every required BAT factor prior to determining which particular technology is BAT. The agency cannot lawfully presume that a technology is BAT and then shift the burden to PSNH to prove otherwise, because doing so would contravene a long and continuous line of cases invalidating such presumptions.[7] *See, e.g.*, *Dir., Office of Workers' Comp. Programs v. Greenwich Collieries*, 512 U.S. 267, 281 (1994); *Chemical Mfrs. Ass'n v. DOT*, 105 F.3d 702, 705 (D.C. Cir. 1997).

In its rush to judgment to find the PWWTS and SWWTS as BAT for Merrimack Station, EPA has relied largely on secondary sources, cursory research, and superficial interviews of companies whose plants and systems differ greatly from Merrimack Station and its FGD waste water treatment system.[8] These secondary, patchwork sources are no substitute for the actual facts concerning Merrimack Station's FGD waste water treatment system.

EPA seemingly recognizes that its BAT determination may be subject to meritorious legal challenges because, despite proposing to eliminate all permissible discharges of FGD waste waters from Merrimack Station to the Merrimack River, the agency specifically sets out a

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[7] Presumptions of this kind are only permissible if there is a sound and rational connection between the proved and inferred facts. *NLRB v. Baptist Hosp., Inc.*, 442 U.S. 773, 787 (1979). In this instance, the fact that the SWWTS is installed proves nothing about whether all of the other legal BAT factors support the selection of the SWWTS as "technologically and economically achievable" under the particular test that Congress laid out in the CWA.

[8] *See e.g.*, Merrimack Station Administrative Record (hereinafter "Admin. Record") Doc. 25 ("Aquatech Project Profile Series #66); Doc. 136 ("Veolia Water Solutions & Technologies Project Profile – FGD Zero Liquid Discharge System"); Doc. 996 (GEA, "Leading Evaporation & Crystallization, Zero Liquid Discharge," Marketing Brochure), Doc. 1019 (Veolia Case Study – "Monfalcone, FGD Scrubber Effluent Treatment Italy Zero Liquid Discharge (ZLD) System"); Doc. 1020 (Veolia, "The CoLD™ Process ZLD Wastewater Treatment for Coalfired Generation"); 1022 (Aquatech Project Profile Series and ZLD Brochure); Doc. 1026 (William A. Shaw, Veolia, "Minimizing Water Discharge, Maximizing Re-Use"); Doc. 895 (Global Water Intelligence, "From Zero to Hero – the Rise of ZLD"); Doc. 900 (William A. Shaw, Veolia, "Benefits of Evaporating FGD Purge Water, powermag.com); Doc. 1001 ("Plant of the Year: KCP&L's Iatan 2 Earns POWER's Highest Honor"); Doc. 1024 ("HPD Awarded Flue Gas Desulfurization (FGD) Effluent Treatment For Monfalcone Coal-Fired Generating Station," Water Online); Doc. 1028 (GEA Process Engineering Inc. website, http://www.niroinc.com/evaporators_crystallizers/forced_circulation_crystallizer.asp); Doc. 996 (webpage definition of "hastelloy" at www.toolingu.com); Doc. 1054 (calculation of Equivalent Annual Cost on mathcelebrity.com); *see also* Admin. Record Doc. 1116 (Email from Sharon DeMeo dated February 7, 2014, summarizing call with Enel).

"multi-faceted approach [for PSNH] to comply with the proposed NPDES permit conditions." *Id.* at 50. Specifically, EPA has provided the following three "scenarios" for PSNH to comply with the zero discharge limit established in the draft permit: (1) operate its "SWWTS as a true ZLD system that eliminates waste water discharges by enabling reuse of the distillate in the FGD scrubbers"; (2) continue to haul "waste water for disposal at municipal waste water treatment plants"; or (3) use "treated FGD waste water for ash conditioning prior to landfilling." *Id.*

As explained at length herein, these "scenarios" do not absolve EPA and its arbitrary and capricious BAT determination. The first option is simply not achievable at this time. The third option is also not a viable one because Merrimack Station does not generate enough ash to condition the volume of FGD waste water generated following processing in the SWWTS. This leaves only the POTW option, which alone: (a) cannot pass muster as a reasonable and/or legally permissible BPJ-based BAT determination, pursuant to Section 402 of the Clean Water Act ("CWA"); (b) provides little (if any) environmental benefit when compared to allowing PSNH to discharge effluent already treated by its PWWTS directly to the Merrimack River; and (c) is not acceptable because it places PSNH in a position of relying entirely upon the actions and/or discretions of one or more third parties (e.g. EPA, NHDES, POTWs, etc.), meaning this compliance option could potentially be eliminated at any time. Compliance with an NPDES permit should not be made dependent on the operations of third-parties beyond PSNH's control.

PSNH will be forced to comply with terms and conditions of its final NPDES for a mandatory five-year term, if not longer. If history is any indication, PSNH could operate under this new permit for 22 years or more. It is therefore imperative that EPA's BAT determination be correct and based on a sound understanding and thorough evaluation of PSNH's SWWTS—including its capabilities and its current limitations. EPA's determination that PSNH's SWWTS is BAT for the treatment of FGD waste waters at Merrimack Station, as well as the agency's corresponding zero discharge limitation for this waste stream, are arbitrary, capricious, unsupported by the facts, and unlawful. These determinations must therefore be revised prior to issuance of the final permit for Merrimack Station.

D. The Relevant Factual History of the FGD Waste Stream and PSNH's Interactions with EPA—"The Rest of the Story"

In its Fact Sheet, EPA goes to great lengths to portray PSNH's installation of the SWWTS as "voluntary" and the early operation of the scrubber (in advance of the statutorily mandated deadline) as intended to maximize "economic incentives."[9] Indeed, EPA effectively dubs the largest pollution control project in New Hampshire's history as the "Economic Incentives Project" in its effort to avoid considering the cost of the SWWTS in EPA's analysis of the BAT factors. Further, EPA criticizes PSNH for requiring that EPA issue formal Section 308 information requests, instead of informal ones, as part of EPA's rush to collect information about PSNH's newly installed SWWTS. This section therefore discusses the events leading to PSNH's installation and operation of the scrubber and the related waste water treatment system, including PSNH's discussions with EPA throughout this process and in response to EPA's information requests. This explanation is important not only for completeness, but, as discussed later, because these facts bear on the "cost" factor to EPA's BAT analysis.

As discussed below, PSNH's installation and operation of the scrubber before the statutory deadline was intended to meet a legislative mandate and the expressed public policy of New Hampshire to make Merrimack Station one of the cleanest coal-fired plants in the country as soon as possible and no later than July 1, 2013. PSNH's installation of the SWWTS was not a

[9] In at least eight different locations and fifteen different times in its Fact Sheet, EPA suggests PSNH installed its FGD waste water treatment system voluntarily to achieve "economic incentives" provided by the state legislation. *See e.g.*, Fact Sheet, at 10 (including footnote 3), 11, 18 (footnote 11), 37 (including footnote 25), 38, 47 (footnote 47).

voluntary undertaking—it was necessitated when it became clear PSNH would have to discharge FGD effluent indirectly, pursuant to a state-approved request to indirectly discharge (approval of an Indirect Discharge Request ("IDR")), because EPA would not establish temporary or permanent discharge limits in time for PSNH to meet its construction and start-up schedule or the statute's deadline. EPA's statement in its Fact Sheet that PSNH's compliance with New Hampshire's statutory mandate was "voluntary" and purposed towards gaining economic incentives is thus hollow and offensive. The following section explains why PSNH, facing the threat of a plant shutdown and criminal liability for non-compliance, could not afford the luxury of EPA's interpretation of New Hampshire RSA 125-O:11-18 (the "Scrubber Law") that compliance was optional. Further, PSNH will explain what EPA omits in its description of its information collection process concerning the SWWTS, including PSNH's desire for formality and its plea that EPA await a period of consistent operations of the SWWTS and not "rush to judgment" concerning the unique and incredibly complex PWWTS <u>and</u> SWWTS operations.

1. PSNH's Installation of the Scrubber System

a. PSNH's Clean Air Project Made Merrimack Station One of the Cleanest Steam Electric Generating Units in the Country

Since the wet FGD or "scrubber" system was placed into operation at Merrimack Station on September 28, 2011, the Station has become one of the cleanest coal burning plants in the nation. The scrubber system has reduced mercury emissions by approximately 95 percent and has reduced sulfur dioxide emissions by over 90 percent. These percentage reductions translate to the removal of in excess of 40,000 tons of sulfur dioxide emissions and more than 220 pounds of mercury from the ambient air emissions of Merrimack Station through June 2014. Because of this extraordinary environmental accomplishment, the scrubber system has garnered regional and national recognition and awards for PSNH and its environmental stewardship. For example, in

2012, PSNH's Merrimack Station was recognized by *Power Magazine* as a top Innovative Coal-Fired Plant. In 2013, because of the scrubber system, PSNH received the International Green Apple Awards for Environmental Best Practice 2013, as well as the Environmental Business Council's 2013 New England Outstanding Environmental-Energy Technology Application Achievement Award.

In an incredible twist of irony, EPA suggests in its Fact Sheet that PSNH should have postponed indefinitely the largest pollution control project in New Hampshire's history. *See* Fact Sheet at 38 ("PSNH could have delayed operation of the FGD scrubbers while NPDES permitting issues were worked out, but it evidently made sense for the company to take the steps needed to eliminate FGD waste water discharges so that it could bring the FGD scrubbers online well before July 1, 2013, and maximize access to the economic incentives.") Had PSNH done so, none of the massive emissions reductions since 2011 would have been achieved, and PSNH would still be waiting on a final NPDES permit. Furthermore, Merrimack Station would not have been available to provide economical electric service to its customers and as such not provide nearly $80 million of benefit.[10] In any case, PSNH did not have the luxury of EPA's interpretation of the statutorily imposed deadline—an interpretation that potentially exposed PSNH to criminal charges and the shutdown of Merrimack Station.

b. New Hampshire's Mandate that the Scrubber Be Installed as Soon as Possible and No Later Than July 1, 2013

The FGD was constructed and placed in operation on an expedited basis in accordance with the provisions of the Scrubber Law (more formally known as the Mercury Emissions

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[10] The energy from PSNH's power generation facilities during the winter of 2014 alone was produced at a cost that was $119 million less than energy sold through the region's wholesale energy marketplace. That marketplace experienced significant volatility during the winter months, when the price of natural gas rose as its supply tightened. Approximately two-thirds of the $119 million in value to PSNH's customers can be attributed to the operation of Merrimack Station during the winter period when the wholesale market cost of energy rose well above the cost of producing power from the Bow, New Hampshire facility.

Reduction provisions of the Multiple Pollutant Reduction Act)—a law that mandated the construction and operation of the scrubber as soon as possible but no later than July 1, 2013. The New Hampshire Legislature established this deadline based on its determination the expedited construction and operation of the scrubber project was in the public interest. This is made clear throughout the statute:

> It is in the public interest to achieve significant reductions in mercury emissions at the coal-burning electric power plants in the state as soon as possible. … To accomplish this objective, the best known commercially available technology **shall be installed at Merrimack Station no later than July 1, 2013.** RSA 125-O:11, I (emphasis added).
>
> The department of environmental services has determined that the best known commercially available technology is a wet flue gas desulphurization system, hereafter "scrubber technology," as it best balances the procurement, installation, operation, and plant efficiency costs with the projected reductions in mercury and other pollutants from the flue gas streams of Merrimack Units 1 and 2. Scrubber technology achieves significant emissions reduction benefits, including but not limited to, cost effective reductions in sulfur dioxide, sulfur trioxide, small particulate matter, and improved visibility (regional haze). RSA 125-O:11, II.
>
> The installation of such technology is in the public interest of the citizens of New Hampshire and the customers of the affected sources. RSA 125-O:11, VI.

The New Hampshire Legislature's findings were corroborated by the New Hampshire Public Utilities Commission ("PUC") in its 2008 Order regarding the meaning and intent of the Scrubber Law:

> We do not find it reasonable to conclude that the Legislature would have made a specific finding in 2006 that the installation of scrubber technology at the Merrimack Station is in the public interest, **set rigorous timelines** and incentives for early completion, and provided for annual progress reports to the Legislature, while simultaneously expecting the Commission to undertake its own review, conceivably arrive at a different conclusion, and certainly **add significant time to the process.** If we concluded otherwise, we **would be nullifying the**

> **Legislature's public interest finding and rendering it meaningless**. ***The legislative history supports a conclusion that the Legislature viewed time to be of the essence."***

(Order No. 24,898, *Investigation of PSNH's Installation of Scrubber Technology at Merrimack Station*, 93 NHPUC 456 (2008)) (emphases added). The Order further states:

> The Legislature has determined that the scrubber project is in the public interest and has directed PSNH to go forward with the project and have it operational ***no later than July 1, 2013***.
>
> In this instance the Legislature has made the public interest determination and required the owner of the Merrimack Station, viz., PSNH, to install and have operational scrubber technology to control mercury emissions ***no later than July 1, 2013***.
>
> The Legislature has already made an **unconditional determination** that the scrubber project is in the public interest.

In 2009, the New Hampshire PUC again had an opportunity to consider the Scrubber Law and reiterated that the July 1, 2013 deadline was firm and compliance was not an option for PSNH. In a June 2009 Order, the Commission held:

> In the instant case, by contrast, the scrubber installation at Merrimack Station does not reflect a utility management choice among a range of options. Instead, installation of scrubber technology at the Merrimack Station is a legislative mandate, with a fixed deadline. See RSA 125-O:11, I, II; RSA 125-O:13, I.
>
> The Legislature, not PSNH, made the choice, required PSNH to use a particular pollution control technology at Merrimack Station, and found that installation is in the public interest of the citizens of New Hampshire and the customers of the affected sources. RSA 125-O:11, VI.

Order No. 24,979 (June 2009) (internal quotations omitted); *see also* Order No. 25,346 (April 2012) ("Pursuant to the express language in RSA 125-O:11, the Legislature required that PSNH install the Scrubber by July 1, 2013….")

In all, the Commission determined in six different Orders and secretarial letters that PSNH was ***required*** to build the scrubber by a date certain and that the Scrubber Law contained a legislative mandate. These Commission determinations spanned the time period from August 22, 2008—*before* PSNH executed contracts for the manufacture and installation of the scrubber—through April of 2012—seven months *after* the scrubber was completed and successfully placed into operation.

In addition to the New Hampshire PUC, the New Hampshire Supreme Court, NHDES, the New Hampshire Attorney General, and other regulatory bodies recognized the mandate that the scrubber technology begin operation as soon as possible and no later than July 1, 2013.[11] In short, the Legislature and every agency and court to review the Scrubber Law found it created a mandate requiring the installation of scrubber technology at Merrimack Station by PSNH as soon as possible. None suggested PSNH could wait to move forward with the scrubber project until an unidentified, unknown future date when EPA would finally issue a draft NPDES permit for Merrimack Station that would require years to be finalized. And, any failure by PSNH to obey the mandate set forth in the Scrubber Law was punishable by potential felony prosecution and imposition of severe financial penalties. *See* RSA 125-O:7. Thus, EPA's claim in the Fact Sheet that "PSNH voluntarily decided to install and commence operations of the primary and secondary FGD waste water treatment systems" flies in the face of reality.

[11] *See e.g., Hearing on H.B. 1673-FN Before the S. Comm. on Energy & Econ. Dev.*, *33 (N.H. Apr. 11, 2006) (statement of Robert R. Scott, Director, Air Resources Division, DES) ("By calling out scrubber technology in the bill, **we're signaling PSNH from the word go to start to engineer, design and build scrubber technology right away**.") (emphasis added); Majority Committee Report of the New Hampshire House Committee on Science, Technology and Energy, H.B. 496, House Record, Vol. 31, No. 22A, March 19, 2009, at 761 ("The majority was also concerned that the passage of this bill would lead to a pause in or cancellation of the project. This would not only have significant environmental ramifications but also would lead to the loss of several hundred short term and long term jobs related to the construction and operation of the scrubber."); *Appeal of Stonyfield Farm*, 159 N.H. 227, 229 (2009) ("To comply with the Mercury Emissions Program, **PSNH must install** the scrubber technology **and have it operational** at Merrimack Station **by July 1, 2013**.") (emphasis added); *Amicus* Brief of the State of New Hampshire, Submitted by the Attorney General, *filed in Stonyfield Farm*, May 6, 2009, at 2 ("[T]he legislature required PSNH to install 'scrubber technology' at the Merrimack Station **no later than July 1, 2013**.") (emphasis added); New Hampshire Air Resources Council, Docket Nos. 09-10 ARC (*Appeal of Sierra Club*) and 09-11 ARC (*Appeal of Conservation Law Foundation*) ("As a matter of law, PSNH is required to install and operate the Scrubber system. RSA 125-O:11-18.").

c. PSNH's Consultations with EPA and NHDES to Establish Discharge Limitations for the FGD Waste Stream

Against this resounding legislative and regulatory backdrop, in early 2009 PSNH approached EPA to discuss authorization to discharge the FGD waste stream into the Merrimack River. EPA directed PSNH to NHDES for a water quality study to determine water quality-based limits, if necessary. EPA indicated that it would adopt whatever water quality standards were eventually set by NHDES when determining BAT for Merrimack Station. This approach of state review and guidance prior to EPA review is typical in New Hampshire, even though New Hampshire has not been given primacy of the NPDES permitting program under the CWA.

Following EPA's direction, the water quality study was conducted. NHDES ultimately concluded that, based on the net change of flows into and out of the treatment pond, certain elements had no net change to current limits. For other constituents, NHDES concluded the Merrimack River had sufficient assimilative capacity for the effluent from the FGD waste stream. NHDES was further satisfied that there was no "reasonable potential" that the treated FGD waste water discharge would cause or contribute to a violation of state water quality standards at Outfall 003A. Ultimately, NHDES required an additional filtration system be added, set strict but achievable water quality based limits, and imposed reporting and monitoring requirements for several other constituents in Outfall 003A.

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

Rather than responding to PSNH's proposed addendum to its permit application, EPA instead made an information request to PSNH under Section 308 of the CWA to obtain additional information regarding PSNH's plan for discharging the treated FGD waste stream to the Merrimack River. In October 2010, PSNH responded to EPA's § 308 information request and demonstrated how the PWWTS would satisfy any and all water quality based requirements for FGD waste water treatment, why it represented BAT for Merrimack Station, and why other options were not BAT for Merrimack Station. As discussed further in these comments, PSNH's state-of-the-art PWWTS dramatically reduces all constituents of concern in the FGD waste stream to levels that NHDES developed specifically for Merrimack Station and that also satisfied NHDES's anti-degradation review.

In October 2010, PSNH and NHDES jointly requested another meeting with EPA management in an attempt to obtain an NPDES permit modification or some other authorization or approval to allow for the proper discharge of FGD waste water. Meanwhile, the clock was ticking on compliance with the Scrubber Law. At that time, construction of the scrubber was 75 percent complete and the physical/chemical system was 85 percent complete. At this meeting, on November 8, 2010, attended by the Assistant Commissioner of NHDES, the head of the NHDES Air Resources Division, the head of the NHDES Water Division, and PSNH, various options were proposed by PSNH, such as discharging under the authority of Merrimack Station's existing permit, an administrative order, or an independent permit for the FGD waste water effluent. Further, PSNH requested EPA to identify or develop other approval options which would allow the PSNH scrubber to come on-line in 2011 and well in advance of the statutorily imposed deadline.

Rather than cooperate in this effort to reach a constructive result, even a temporary one, EPA stated in that meeting that when companies are faced with new and strict regulatory challenges, they usually find a new way to solve their own problems (which is what PSNH was left to do, and EPA now implicitly criticizes). EPA stated its intent to incorporate any requirements related to the FGD waste stream into Merrimack Station's draft NPDES permit renewal, which, at the time, had been pending for 13 years. EPA's own strategy was now clear—it would not address PSNH's request for FGD discharge limits for Merrimack Station until reissuance of PSNH's NPDES permit establishing all of Merrimack Station's discharge limitations that would take years to complete and finalize.

d. PSNH's Catch-22 and the Decision to Install the Volume Reduction SWWTS

EPA's refusal to modify Merrimack Station's existing NPDES permit or provide any alternative option authorizing discharge of the FGD waste stream into the Merrimack River created a Catch-22 for PSNH—find an alternative method for discharging FGD effluent or indefinitely delay operation of the FGD system, despite New Hampshire's express statutory deadline. Having originally applied for renewal of Merrimack Station's NPDES permit in 1997 and without any action or issuance by EPA over the intervening thirteen years, PSNH well understood that waiting on EPA to issue a final NPDES permit likely meant non-compliance with the Scrubber Law's July 1, 2013, deadline. EPA itself has acknowledged its inability to timely reissue NPDES permits due to a substantial backlog of approximately 150 administratively-continued permits in Region 1 alone.[12] PSNH also expected a number of intervening parties would comment on this draft, further delaying a final permit issuance. Indeed, PSNH's belief that it would not be issued a final NPDES permit before the July 1, 2013 deadline has proven overly-optimistic by this very proceeding.

Failure to meet the July 1, 2013 deadline meant serious consequences for PSNH—including potential shutdown of Merrimack Station and criminal charges. Under the Scrubber Law, PSNH faced felony charges for non-compliance. The law states:

> Any person who knowingly violates any of the provisions of this chapter, or any rule adopted under this chapter, shall be guilty of a misdemeanor if a natural person, or guilty of a felony if any other person. RSA 125-O:7, II.

Further, in March 2009, the New Hampshire Department of Environmental Services issued its temporary air discharge permit for the FGD system. In accordance with the provisions of the Temporary Permit, Merrimack Unit 1 could conceivably have operated only 840 hours (a little over a month) through the bypass stack without the scrubber in operation.

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[12] In 2013, EPA opposed a petition for mandamus by the Sierra Club in the First Circuit Court of Appeals seeking to compel EPA to reissue an NPDES permit and act on PSNH's renewal application for PSNH's Schiller Station. In its brief responding to the petition, EPA explained the issues arising from its significant permit backlog:

> Region 1 is responsible for issuing more major NPDES permits than any other EPA Regional Office. There currently is a backlog of NPDES permits that have been administratively continued in Region 1 and throughout the United States. EPA has been tracking this backlog since 1999 and is working diligently to address it. . . . At present, there is a backlog of approximately 150 administratively-continued permits in Region 1.

In re Sierra Club and Our Children's Earth Foundation, Case No. 12-1860, Respondent EPA's Response to Petition for Mandamus at 9-10, attached hereto as Exhibit 1. EPA later explained that twenty-five of these permits were backlogged for ten years or more, including six for power plants in Massachusetts or New Hampshire administered by Region 1. *See* Excerpts of Declaration of David M. Webster (attached to EPA Response) at ¶ 32, attached hereto as Exhibit 2. EPA also explained the long comment period and the delay between issuance of a draft and final permit. *See* Exhibit 1 at 29 (suggesting a two-year period between issuance of the draft and final Schiller Station NPDES permit.) While PSNH is not critical of EPA for its backlog, as a practical matter, waiting on EPA was not a reasonable option for PSNH given the requirements of the Scrubber Law and the potential exposure of interpreting it in a way that contradicted its statutory mandate and the numerous interpretations of it in New Hampshire.

> 40 CFR 51.308(e)(1) MK2 Beginning on July 1, 2013, the Owner shall not operate MK2 unless MK2-PC7 (scrubber) is in operation.
>
> 40 CFR 51.308 MK1 Beginning on July 1, 2013, the Owner shall not operate MK1 through STMK2 (bypass stack) for more than 840 hours in any consecutive 12- month period.

Furthermore, if the scrubber was not put in service, awaiting the NPDES permitting issues to be "worked out," it could not have been deemed "used and useful", which would have meant: (1) that the project would have continued to add allowance for funds used during construction (AFUDC) costs of over $2 million per month (paid by customers) with no benefit of having Merrimack Station's units run to protect their electric costs from escalating; and (2) would have prevented PSNH from having an eligible facility for cost recovery. RSA 378:30-a.

With EPA's permitting option effectively closed, PSNH was forced to consider additional technologies to allow it to decrease the amount of waste water generated by the Merrimack Station FGD to manageable levels. New Hampshire has permitting procedures in place that authorize POTWs to accept indirect discharges from industrial users in certain circumstances. PSNH ultimately determined that such indirect discharges were a viable short-term solution for the handling of its FGD waste waters. Because the FGD effluent met all water quality standards after its treatment in the PWWTS, that is, PSNH's physical/chemical treatment system with the added EMARS feature, NHDES approved a State IDR to allow PSNH to discharge its effluent to POTWs after treatment in the PWWTS. Therefore, PSNH applied for and received approval from various POTWs and NHDES to indirectly discharge the FGD effluent.

In late 2010, PSNH concluded that construction of effluent volume reduction technology was its best option to allow the Scrubber Project to come online and reduce the liquid discharge to manageable levels without the necessity of an NPDES permit.[13] PSNH made the decision to install the SWWTS at Merrimack Station to generate a manageable volume of clean, concentrated effluent. This effluent could reasonably, economically, and logistically be transported to a facility that has a discharge permit. Thus, PSNH's decision to construct the SWWTS was based on a number of factors, the most significant of which was to keep customer costs down due to project in-service delays and its obligation under New Hampshire law to have the scrubber "installed at Merrimack Station no later than July 1, 2013," EPA's refusal to address the FGD waste water discharge until it issued PSNH's draft NPDES permit for the entire Merrimack Station (which it still had not done for 13 years), and the approval of a state IDR for discharging the effluent from the PWWTS that met all water quality standards. While PSNH's SWWTS dramatically reduces the volume of the FGD effluent, allowing PSNH to operate the scrubber and meet its statutory mandate, as discussed below, at no time has it yielded a "zero liquid discharge" as EPA assumes in the draft permit.[14]

e. PSNH's Installation of the SWWTS Was Not a Voluntary Undertaking as Suggested by EPA

For all of the reasons discussed above, EPA is mistaken with respect to its conclusion in its Fact Sheet that, "PSNH was not legally required to install VCE/crystallizer treatment and eliminate FGD waste water discharges; *it chose to do so.*" *See* Fact Sheet at 18 n. 11. This unsubstantiated conclusion apparently is based on EPA's interpretation of a single sentence in

[13] The SWWTS includes a brine concentrator, crystallizers, and filter press that further treat the FGD waste water treatment system following the physical/chemical system. The entire FGD waste water stream is best viewed as a continuum, a process involving various stages of minimizing the discharge following the treatment of that discharge from the scrubber.

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

the Scrubber Law that states operation by July 1, 2013, is "contingent upon obtaining all necessary permits and approvals from federal, state, and local regulatory agencies and bodies." *See* Fact Sheet at 10 (citing RSA 125-O:13I). EPA's interpretation is wrong. Because PSNH could achieve operation of its scrubber before the statutorily-mandated deadline by virtue of a State–approved IDR to discharge its FGD waste water to POTWs, the provision cited by EPA did not provide PSNH with the safe haven it now suggests.[15] But in addition to its flaws, EPA's brazen interpretation of this single sentence of the Scrubber Law was not one PSNH could afford to take. As a regulated public utility operating prudently under the authority of the State of New Hampshire, its PUC, and NHDES, PSNH simply could not accept the risk that Merrimack Station could be shut down and PSNH exposed to criminal charges for not commencing operation of its system by July 1, 2013. No utility can operate under such uncertainty. PSNH could not simply sit idly by while the statutory deadline passed, when NHDES had issued a permit that would allow PSNH to commence operation of the scrubber.

Thus, PSNH's installation of the SWWTS was not "voluntary" at all. Nor was it for the purpose of receiving the minimal economic incentives for customers that may be available under the Scrubber Law. EPA's reliance on the economic incentives provisions in the Scrubber Law is greatly overplayed. As an initial matter, the statute's incentive language was included as recognition that there could be incremental cost to customers for an earlier in-service date, so it

[15] EPA ignores the latter half of this sentence in its Fact Sheet just as it did throughout its discussions with PSNH and NHDES: "however, all such regulatory agencies and bodies are encouraged to give due consideration to the general court's finding that the installation and operation of scrubber technology at Merrimack Station is in the public interest. . . ." RSA 125-O:13, I. EPA also ignores the statute's non-severability clause which makes clear that PSNH could not interpret one sentence in isolation ignoring the statute's mandate that PSNH commence operation of the scrubber as soon as possible and no later than July 1, 2013. RSA 125-O:11,VIII. ("The mercury reduction requirements set forth in this subdivision represent a careful, thoughtful balancing of cost, benefits, and technological feasibility and therefore the requirements shall be viewed as an integrated strategy of non-severable components.")

was appropriate to provide corresponding benefit or value for earlier operation, which would be passed on to customers – not retained by PSNH. It provides:

125-O:16 Economic Performance Incentives.

> I. (a) The department shall issue to the owner early emissions reduction credits in the form of credits or fractions thereof for each pound of mercury or fraction thereof reduced below the baseline mercury emissions, on an annual basis, in the period prior to July 1, 2013. Ratios of early reductions credits to pounds of mercury reduced shall be as follows: 1.5 credits per pound reduced prior to July 1, 2008; 1.25 credits per pound for reductions between July 1, 2008 and December 31, 2010; and 1.1 credits per pound for reductions between January 1, 2011 and July 1, 2013.[16]

The purpose of the incentives was anticipated to be two-fold. First, any banked early reduction credits could be used by the company to make up any short fall in mercury reductions and remain in compliance after the installation and operation of the scrubber. Alternatively, if the company remained in compliance with the mercury emissions cap, the early credits could be converted to SO_2 credits and sold or used for compliance as a mechanism to reduce cost for customers. To date there have been no economic incentives issued associated with the early completion and operation of the Merrimack Station scrubber determined consistent with RSA125-O:16; however, PSNH is eligible for early mercury emissions reduction credits because actual emissions at the plant are less than the historical baseline mercury emissions due to the outstanding performance by the scrubber. Further, while there is also an option in the statute to convert these earned early Hg reduction credits to SO_2 credits, any subsequent sale of those SO_2 credits would be credited to customers to reduce their costs; although the value of SO_2 credits has dropped significantly since 2006 due to the numerous changes in federal air regulations and

[16] The incentives are calculated based on a baseline mercury emission value (as referenced above) that is defined and calculated as set forth in the statute.

litigation involving those regulations. Where SO_2 allowances historically ranged from $600 to a high of $1700, they are now worth less than $10.[17] PSNH has a significant bank of SO_2 allowances so this opportunity currently does not avoid a purchase of allowances with any earned early reduction allowances, and there is little value to their sale.

Thus, contrary to EPA's suggestions in its Fact Sheet, PSNH's installation of the SWWTS was intended to meet New Hampshire's mandate that the FGD scrubber be installed as soon as possible and the result of EPA's refusal to provide any permitting guidance or cooperation to PSNH, despite a direct plea from NHDES management that it do so in 2010. Lacking a permit to discharge from the scrubber system, even though all state water quality standards would be met following treatment of the FGD waste water by both a physical/chemical system and an enhanced mercury and arsenic removal treatment, PSNH was left with no choice but to try to reduce scrubber waste water, as much as possible, from its operations. EPA achieved its purpose—it forced PSNH to "solve its own problem" resulting from the new and strict regulatory challenges presented by the Scrubber Law and EPA's unwillingness to prescribe FGD discharge limits outside the context of the reissued NPDES permit. While PSNH found a solution that allowed it to comply with the Scrubber Law, no reasonable person would consider compliance with the Scrubber Law a "voluntary" effort.

[17] Although there have been no economic incentives issued by NHDES at this time associated with RSA 125-O, there has been significant customer benefit associated with the early completion and operation of the scrubber. The September 2011 Unit 1 start-up and November 2011 Unit 2 tie-in of the scrubber resulted in millions of dollars of savings every month to customers in avoided AFUDC interest costs and thus a lower total project cost, and provided cleaner plant air emissions sooner as intended by the State Legislature. Specifically, between Fall 2011 through June 2014 in excess of 40,000 tons of SO_2 emissions were eliminated by the scrubber and over 220 pounds in mercury.

2. PSNH's Grounds for Its Responses to EPA's CWA Section 308 Information Requests Are Well Founded and Legitimate

EPA was unwilling to provide any guidance to PSNH about the appropriate treatment for Merrimack Station's FGD waste water effluent before EPA's issuance of the revised draft NPDES permit on September 30, 2011. Yet, after issuing the permit, EPA Region 1 made numerous informal and formal information requests of PSNH concerning its SWWTS. EPA criticizes PSNH in its Fact Sheet, noting that PSNH was resistant to EPA's efforts to informally collect information and conduct an inspection following issuance of the draft NPDES permit in 2012, and instead required EPA to issue information requests under CWA Section 308. *See* Fact Sheet at 21. Further, EPA suggests PSNH unilaterally and without any explanation to EPA discontinued sending monthly reports of off-site disposal to Region 1 in response to its March 26, 2012, information request. *See* Fact Sheet at 23. As explained below, EPA's criticism is misplaced, and the Fact Sheet provides an incomplete description of the discussions between PSNH and EPA leading up to and concerning the Section 308 information requests.

Once the highly controversial draft NPDES permit was issued in 2011, PSNH did "decline" to respond to EPA staff's multiple emails and telephone requests for information about the FGD system addressed to various members of PSNH staff and instead requested EPA to submit its queries through formal 308 information requests or to counsel. Requiring formality and a procedure for EPA's requests became necessary to assure accurate, consistent, complete, and documented responses given the importance of the permitting process and also the possibility of a permit appeal.[18] Indeed, EPA's Chief of the Water Permits Branch of the Office

[18] The wisdom of requiring formality to EPA's information gathering process is revealed by documents in the Administrative Record. *See* Admin. Record Doc. 1078 (Sharon DeMeo Notes of Call with Allan Palmer). EPA's cryptic notes of an informal phone call with a PSNH employee do not capture fully and accurately the information conveyed by PSNH, much less the information needed to understand the SWWTS and its evolving operations.

of Ecosystem Protection for Region 1 acknowledged the likelihood of an appeal in explaining the status of the Merrimack Station draft NPDES permit in early 2013. *See* Exhibit 2 at ¶ 76 ("It appears highly likely that this permit will be appealed, once it is issued, given the extensive, opposing comments submitted on the Draft Permit.") PSNH likewise was concerned about the participation of special interest groups in the NPDES permit proceeding for Merrimack Station—including groups whose stated mission is to shut down Merrimack Station.[19] Extensive public criticism of EPA engaging in "sue and settle" practices with environmental special interest groups,[20] and, later, its "closed door" negotiations with Sierra Club concerning the NPDES permit for PSNH's Schiller Station in Portsmouth, New Hampshire,[21] all exacerbated these concerns.

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[19] *See e.g.*, www.clf.org. (stating the mission of Conservation Law Foundation, a commenter in this proceeding, "to shut down" coal-fired power plants "such as Merrimack Station in Bow."). CLF's correspondence with EPA contained in the Administrative Record demonstrates its involvement in EPA's March 22, 2012 information request to PSNH. *See* Admin. Record Doc. 1095 (May 18, 2012 Letter from Thomas F. Irwin, Conservation Law Foundation, to Mark A. Stein, Esq.) (stating, "we look forward to receiving the requested information, and to coordinating with you to review the records provided by PSNH in response to EPA's March 22, 2012 information request.").

[20] EPA was criticized widely during this timeframe for aligning with environmental groups and allowing them to dictate its policy through "sue and settle" tactics, only heightening PSNH's concerns about the agency's requests. *See* United States Senate Committee on Environment & Public Works (Minority), *Neglecting a Cornerstone Principle of the Clean Air Act: President Obama's EPA Leaves States Behind* (October 31, 2013) ("Cooperative Federalism") (describing EPA's increasing strategy referred to as "sue and settle" where "environmental groups aligned with the current Administration have filed 'friendly lawsuits' against the federal government in hand-picked courts" leading to settlement agreements behind closed doors without consulting the adversely affected entities). Also near this timeframe, EPA Administrator Lisa Jackson resigned in the midst of accusations that she used private e-mail accounts and aliases to conceal some of EPA's communications with environmental groups while these lawsuits were occurring. *See* John Fund, *Email Scandal at the EPA*, National Review Online, Jan. 5, 2013, available at http://www.nationalreview.com/articles/336995/e-mail-scandal-epa-john-fund#!; Michael Bastasch, *EPA Releases More Than 2,100 Emails from Agency Chief Lisa Jackson's 'Alias' Account*, Daily Caller News Foundation, Jan. 15, 2013.

[21] In 2012, PSNH experienced first-hand the threat of "sue and settle" in another NPDES permit proceeding. Sierra Club and EPA engaged in "closed door" settlement discussions seeking to establish deadlines on when Schiller Station's NPDES permit would be reissued and the time period in which PSNH would have to comment. EPA excluded PSNH from these discussions, leaving PSNH to pursue Freedom of Information Act ("FOIA") requests concerning discussions about its own permit. Ultimately, Sierra Club filed a lawsuit seeking to direct EPA's timeframe for issuing an NPDES permit for PSNH's Schiller Station in Portsmouth, New Hampshire. *See* Exhibit 1; *see also* Exhibit 3 (containing correspondence and FOIA requests regarding EPA's exclusion of PSNH from private settlement negotiations between EPA and Sierra Club concerning PSNH's NPDES Permit for Schiller Station). PSNH intervened in that suit to protect its rights as best it could and avoid a "behind closed doors" settlement concerning its NPDES permit.

Equally important, at the time of EPA's requests, PSNH's SWWTS was in its infancy. When EPA made its informal requests concerning the SWWTS in 2012, PSNH's Senior Attorney advised EPA Region 1 counsel that the SWWTS only recently had begun operation. PSNH counsel urged EPA to allow additional time of consistent operations to assure the data was complete and accurate. These requests were made more than once, and culminated in a written response to EPA on December 20, 2012. PSNH explained:

> We are still within what we consider a start-up period with the SWWTS, and as with any new equipment or system, we are in the tuning and adjustment optimization phase, operating equipment and adjusting chemicals as necessary to seek best and reliable operations. We will need 6-9 months of consistent operations before we are able to provide you with accurate operational data.

Email from Linda Landis, Esq., PSNH, to Mark Stein, EPA, dated December 20, 2012, attached hereto as part of Exhibit 4. PSNH went on to provide, informally, responses to four queries from EPA concerning the SWWTS. *Id.* Yet, EPA omits any discussion of this response from its Fact Sheet, and this document appears to be missing from EPA's Administrative Record for this permit renewal proceeding.

Despite PSNH's reasonable request that EPA allow PSNH time to complete start-up of the system and collect accurate data, EPA issued its February 7, 2013 Section 308 information request.[22] In responding and producing the documents requested, PSNH again urged EPA that the information was likely to change over the next year as PSNH continued to operate and learn more about its SWWTS. This explanation also is omitted from EPA's Fact Sheet.

EPA's account of PSNH's response to EPA's March 22, 2012 CWA § 308(a) information request also is incomplete and misleading. In its Fact Sheet, EPA claims Region 1 "initially

[22] EPA's rush to judgment without full information concerning the SWWTS is contrary to the careful and full consideration required in an NPDES permitting process. *See* Exhibit 1 at 21 ("In contrast, a rushed and less fully-considered decision is more likely to result in future challenges and increases the risk of a time-consuming remand that will increase the overall time for EPA to implement the statutory scheme.")

thought that PSNH had stopped hauling treated FGD waste water off-site for disposal after October 2012," and that this "confusion resulted from PSNH's unilateral decision to discontinue submitting the monthly reports regarding off-site disposal that were required by Region 1's March 22, 2012 CWA § 308(a) information request." *See* Fact Sheet at 23. The Fact Sheet goes on to state that, "The Region thought that the lack of report submissions indicated that off-site disposal had ceased, but in August 2013, PSNH informed Region 1 that it had confirmed sending waste water (from the primary and secondary treatment systems) to area POTWs for disposal during 2013." *Id.*

EPA's stated confusion is impossible to reconcile with the statement under oath of Mr. David Webster, its Chief of the Water Permits Branch for Region 1 responsible for the Merrimack Station NPDES permit. In Mr. Webster's signed and sworn declaration dated March 6, 2013, Mr. Webster stated EPA's understanding quite differently:

> The Draft Permit also addresses a number of other waste water discharges from the facility. Most significantly, the permit proposes BAT limits determined on a BPJ basis to control waste water discharges from the facility's new FGD scrubbers. Merrimack has installed a new FGD scrubber system to control its air pollutant emissions, but its control technology results in a waste water discharge stream including a number of toxic pollutants (e.g., mercury, arsenic and selenium). ***EPA understands that the facility has been treating this waste water and trucking it offsite for disposal, but Merrimack has requested authorization to discharge it to the Merrimack River.***

Exhibit 2 at ¶ 76(c) (emphasis added). Mr. Webster's lack of confusion and clear understanding as stated under oath is not surprising. In responding to the March 2012 information request, PSNH made its objections and intentions clear. In its Preliminary Statement included with its May 7, 2012, response, PSNH objected that the request for monthly reports going forward exceeded EPA's authority under Section 308 of the CWA and Section 3007 of the Resource Conservation and Recovery Act. In its response to request 2 seeking monthly reports, PSNH asked EPA to set a reasonable deadline "(e.g., six months, or November 2012), after which PSNH is no longer obligated to provide the aforementioned documents . . . ." Further, with each of its monthly productions for the period September through December 2012, PSNH made clear its intention to provide responsive reports through November:

> September 19, 2012 Email from Allan G. Palmer, PSNH, to John King, EPA ("*As we discussed, I will email similar reports to you for the months of August thru November.* Please contact me if you have questions.")
>
> September 28, 2012 Email from Allan G. Palmer, PSNH, to John King, EPA ("A*s we discussed, I will email similar reports to you for the months of September thru November.* Please contact me if you have questions.")
>
> October 18, 2012 Email from Allan G. Palmer, PSNH, to John King, EPA ("*As we discussed, I will email similar reports to you for the months of October and November.* Please contact me if you have questions.")
>
> December 19, 2012 Email from Allan G. Palmer, PSNH, to John King, EPA (enclosing October 2012 report and stating, "No shipments were made off-site in November, so we have no data to submit for the month. *Based on my understanding, this report concludes our commitment to provide information in response to your 308 letter.* Please contact me if you have questions.")

(emphases added).[23] While there does appear to be some confusion internally among EPA, it is not the result of PSNH's responses, which were clear and, apparently, understood by EPA Region 1's head of water permitting.

3. Conclusion

In sum, EPA's Fact Sheet supporting the reissued, draft permit unfairly portrays the events leading to PSNH's construction and operation of the scrubber, its dealings with EPA, the

[23] *See* Exhibit 5, containing correspondence dated September 10, 2013, from Linda T. Landis, Esq., PSNH, to Mark Stein, Esq., EPA Region 1, attaching portions of PSNH's May 7, 2012 response to EPA's CWA Section 308 Information Request, and correspondence from Mr. Allan G. Palmer, PSNH, to Mr. John King, EPA Region 1. These emails from Mr. Palmer to Mr. King also appear to be missing from the Administrative Record for this permit renewal proceeding.

installation of the SWWTS, and PSNH's cooperation with EPA in this permit proceeding. PSNH installed the FGD system and the related waste water treatment systems to comply with a mandatory New Hampshire law. In doing so, PSNH made Merrimack Station one of the cleanest coal burning plants in the nation.

EPA's attempts to cast PSNH's installation of the SWWTS as voluntary in its Fact Sheet are ineffectual. As mentioned previously, EPA addresses this topic in its Fact Sheet solely to try to support its assertion that it is not required to consider the costs PSNH incurred to install its existing SWWTS because the company supposedly installed the technology voluntarily. The fact that EPA goes to such lengths in its attempt to do so is telling. As EPA currently has portrayed and analyzed the SWWTS in its BAT analysis, ignoring the installation costs purportedly permits the agency to consider only the benefits provided by the treatment system. With no costs to consider, there is arguably no downside to labeling any treatment technology as BAT when it provides any environmental benefit (even if that benefit is an incidental one). The aforementioned discussions debunk EPA's unsupported assertions that PSNH installed the SWWTS voluntarily and render the agency's analysis on this topic invalid.[24] Because the company was required to install the treatment system due to EPA's inaction, coupled with a mandatory state law, the costs of the SWWTS must be considered by the agency in its BAT analysis.

In the end, PSNH's installation of its PWWTS successfully treats the FGD waste stream so that it meets all water quality standards. Although the SWWTS allows PSNH to achieve the

[24] In addition to being invalid, the analysis is also too simplistic. The initial installation costs incurred by PSNH are not the only funds the company would be forced to expend if required to try and comply with the flawed terms of the draft permit. As explained herein, PSNH installed the SWWTS to serve as a volume reduction system, not to achieve a "no discharge" effluent limitation. Additional SWWTS component redundancies (at significant costs) would therefore be required to operate the treatment system with the level of reliability needed to operate Merrimack Station. Even then, a mandatory purge stream from the SWWTS would still be generated. These required redundancies are discussed in greater detail in Section IV.A.2.a.i.(a).

mandate of the Scrubber Law by reducing the volume of the treated FGD waste water with some incidental pollutant removal benefits, the combined primary and secondary systems do not achieve "zero liquid discharge" as EPA concludes in the draft permit. PSNH should be able to discharge the PWWTS treated effluent directly to the Merrimack River. A POTW option for PSNH does not excuse EPA from issuing an appropriate NPDES permit.

E. Overview of the Existing Pollution Control Equipment at Merrimack Station

It is critical for EPA to understand not only the complexity of the overall treatment of FGD waste water at Merrimack Station, but also the myriad variables in scrubber chemistry and within this treatment process that can impact the operation and effectiveness of the SWWTS. Changes impacting the SWWTS can occur almost anywhere in the power production and pollution control process—from the coal pile all the way to the residual filter cakes the SWWTS generates. This is because many systems, pieces of equipment, chemical additive processes, and chemical reactions operate and/or take place simultaneously in order for FGD waste water treatment to occur at Merrimack Station. The following subsections are included in these comments to illustrate the complex process PSNH employs at Merrimack Station to treat and greatly reduce the volume of FGD waste water. Some is background information of which EPA is no doubt familiar. However, everything discussed plays a role in the operation and effectiveness of the SWWTS at Merrimack Station. The information is also vital to appreciate why a purge stream from the SWWTS is unavoidable at this time.

1. "Zero Liquid Discharge" is not a technological option upon which BAT may be established, it is a Discharge Limit

EPA's use of the term "Zero Liquid Discharge" or "ZLD" as a technological compliance option is a misnomer. ZLD is <u>not</u> a technology itself; although, the term has been used loosely in recent years to describe any number of wholly distinct technological treatment processes that completely recycle and/or eliminate a liquid discharge for a given waste stream, system, and/or facility. PSNH acknowledges the utility industry (including PSNH) may have contributed to the incorrect use of this term in the past. Use of the moniker "ZLD" has become so ubiquitous within the industry that it is now also erroneously used to refer to treatment technologies that do not in fact eliminate or recycle all discharges associated with the waste stream at issue. EPA has haphazardly perpetuated this mischaracterization in this permit renewal process for Merrimack Station.

As explained in detail below, the SWWTS utilized at Merrimack Station, consisting of a brine concentrator (VCE), two crystallizers operated in series, and a belt pressure filter, does not and cannot currently achieve a "no discharge," or ZLD effluent limitation. Referring to the SWWTS as ZLD is therefore not only incorrect because "ZLD" is not a technology, but also because, at least with regards to PSNH, the SWWTS in service at Merrimack Station is not capable of achieving the "no discharge" limitation at this time. In other words, while PSNH's SWWTS has met its intended purpose, equating the SWWTS with a "zero liquid discharge" is erroneous because it does not and cannot achieve zero liquid discharge.

2. Pollution Control Equipment at Merrimack Station—An Overview to its Development and Operation

Selection and operation of any FGD waste water treatment technology is complex, site-specific, evolving, and unique.[25] This is true for PSNH and its Merrimack Station. This section

[25] *See* Admin. Record Doc. 890 (H.A. Nebrig, Xinjun (Jason) Teng, David Downs, Southern Company Services, "Preliminary Assessment of a Thermal Zero Liquid Discharge Strategy for Coal-Fired Power Plants") ("Choosing an appropriate waste water treatment technology is a site-specific exercise that requires a thorough review of engineering goals, objectives, feasibility, and cost."); Doc. 891 at 10 (Dr. Matthias Loewenberg, GEA Process Engineering Inc., Danny Johnson PE, Duke Energy, John Edelen PE, Duke Energy, "Zero Liquid Discharge System at Duke Energy Mayo Plant"); Doc. 997 (Samuel J. Griffin, Orlando Utilities Commission, Karen E. Schooley, Robert L. Solomon, Ph.D., "The Advantage of Mixed Salt Crystallizers in Zero Liquid Discharge (ZLD) Wastewater Treatment Systems"); Doc. 1079 (Notes of Sharon DeMeo, EPA, of Call with M. Marlett, Aquatech at 3) ([Question:] "In general how long does it take to optimize a VCE system?—understanding it depends on site

discusses the pollution control equipment at Merrimack Station, including its uniqueness, complexity, and the specific circumstances, goals and objectives leading to installation of PSNH's FGD water treatment systems. All of these facts demonstrate why EPA's BAT determination and its zero discharge limit for FGD waste water are arbitrary and capricious.

As discussed above, PSNH has implemented a PWWTS and SWWTS at Merrimack Station for the treatment of its FGD waste water. PSNH's PWWTS consists of a physical/chemical waste water treatment system and an additional Enhanced Mercury and Arsenic Removal System ("EMARS"). Both components target metals reduction. The physical/chemical waste water treatment is an industry standard system, highly reliable, and has a proven track record of effective treatment. The additional EMARS polishing step is a cutting-edge technology designed to reduce mercury and arsenic levels beyond concentrations typically achieved with traditional physical/chemical treatment. Together, these two components of the PWWTS remove the overwhelming majority of constituents of concern from the FGD waste water at Merrimack Station. The efficiency and effectiveness of these two treatment systems make the PWWTS BAT for the treatment of FGD waste waters at Merrimack Station.

The SWWTS at Merrimack Station is a volume reduction system. It also crystallizes the majority of what few constituents are not removed by the PWWTS. The end products of the SWWTS therefore are: (1) stable solids ("salt cakes") consisting of primarily sodium chloride that precipitate in the crystallizers; (2) a purge stream; and (3) distillate and cooling water returned to the scrubber.

As explained in detail above, EPA's unwillingness to issue a new NPDES permit for Merrimack Station left PSNH at a crossroads in terms of how it could legally handle waste

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specific considerations. [Answer:] Not fully ever optimized. Gain confidence & experience on how to react to changes in coal and limestone.")

waters generated from Merrimack Station's scrubber system. Without an ability to discharge directly from its facility, PSNH's options were limited. Shutting the plant down was simply not an option. PSNH was not aware of any technology capable of eliminating all FGD waste water discharges. Instead, PSNH was aware of only a few facilities on the planet making limited gains in reducing the total volume of FGD waste waters to a level that was manageable and could be either properly utilized elsewhere within the facility or could be disposed of in some alternative way. Left with no other choices,[26] PSNH elected to evaluate this volume reduction technology.

As explained earlier in these comments, EPA has a fundamental misunderstanding of vapor compression evaporation technology and this technology's current capabilities. This fundamental misunderstanding has led to the issuance of this arbitrary and capricious draft permit for Merrimack Station. The technology simply does not eliminate all FGD waste waters. PSNH fully appreciated this fact when it ultimately chose to install its SWWTS. In fact, prior to electing to install its SWWTS, this knowledge caused PSNH to diligently work to optimize its PWWTS to obtain the maximum achievable removal percentages from that system—thinking this action would (and should) qualify as BAT for Merrimack Station's FGD waste waters. Once its PWWTS was erroneously rejected by EPA (despite satisfying NHDES's water quality standards), PSNH made the decision to install the SWWTS at Merrimack Station to generate a manageable volume of clean, concentrated effluent.

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[26] It is important to point out that, prior to the issuance of its initial draft permit for Merrimack Station in September 2011, EPA Region 1 had not communicated to PSNH that biological treatment technologies may satisfy the agency's conditions for the treatment of FGD waste waters. Therefore, PSNH did not include this technological option in its evaluation of potential solutions because approval of an IDR would still ultimately be required for the treated effluent. Ironically, EPA Region 1 issued the initial draft permit proposing that PSNH install biological treatment technologies at Merrimack Station the very day the final components of the SWWTS arrived onsite at Merrimack Station. This was a blessing in disguise for PSNH, given the host of issues and shortcomings associated with biological treatment technologies, as explained below in these comments, as well as in PSNH's comments to EPA's initial draft permit and the industry's comments to EPA's draft steam effluent guidelines.

PSNH first evaluated the volume reduction system utilized by Kansas City Power & Light's ("KCP&L") Iatan Station. The advantage to this option was that it would not be dependent on EPA Region 1 because no discharge permit would be required if the system could consistently be operated as designed. To eliminate discharges from the FGD waste stream, the Iatan system reduces (it does not eliminate) the volume of the effluent to match the requirements of its large fly-ash wetting system. PSNH ultimately determined this system could not be mimicked at Merrimack Station because the facility could not produce fly-ash in quantities sufficient to match the effluent disposal requirement due to the coal being burned at Merrimack Station and the boiler design. The cyclone burners at Merrimack Station convert most of the coal ash to bottom ash or slag which is used on roof shingles or as sand-blasting material. Thus, much less fly-ash is created compared to other coal-fired boilers within the industry, as is described in Section IV.A.2.a.i.(b).

A system of this kind is also dependent on the availability of a pug-mill used in the ash wetting and mixing system. In addition to the small quantity of available fly ash at Merrimack Station, PSNH was unable to assure reliability of this mixing system because of known start-up challenges associated with the lines to the pug-mill being prone to plugging and the fact that the treated FGD effluent can be corrosive to the pug-mill. In the end, PSNH reasonably concluded that the concept utilized at the Iatan Station system unaccompanied by other components or technologies did not have merit for Merrimack Station.

PSNH next considered whether discharging treated effluent to POTWs within the vicinity of Merrimack Station could be cost-effective and a potential long-term solution to its permitting problem. As discussed earlier, New Hampshire has permitting procedures in place that authorize POTWs to accept indirect discharges from industrial users in certain circumstances. PSNH ultimately determined that such indirect discharges provided a viable interim solution for the handling of its FGD waste waters. PSNH therefore applied for and received an IDR from NHDES in 2011 for several local POTWs. Specifically, PSNH received approval to indirectly discharge effluent generated: (1) after treatment in the PWWTS (termed Stream A); (2) after processing in the brine concentrator (termed Stream B); or (3) after processing in the crystallizer.

From the outset, PSNH reviewed the long-term practicality of these indirect discharges to POTWs because of the cost factor and because the future use of POTWs is dependent on too many third-party entities (i.e. EPA, NHDES, and POTWs) whose actions could potentially impact PSNH's current ability to transport waste water to POTWs. PSNH therefore continued to search for a feasible long-term solution for the handling of its FGD waste waters at Merrimack Station.

PSNH, as part of its SWWTS technology selection process, considered what benefit the addition of a second crystallizer and a salt filter press would provide to a system similar to the one utilized at Iatan Station. PSNH believed that a second crystallizer would further reduce the effluent volume to be transported to POTWs or mixed with fly-ash in the pug-mill, and therefore improve the two aforementioned options it was also considering. Installation of the salt cake press reduces the quantity of sodium chloride that would need to be either indirectly discharged to POTWs or mixed with fly-ash.

In the end, PSNH determined that it needed to employ its own unique solution: a combination of each of these aforementioned options in order to provide maximum operational flexibility for Merrimack Station and minimize all risks associated with these individual technological options.

To be clear, the SWWTS does not, at this time, eliminate or allow for the recycling of all FGD waste waters at Merrimack Station. In other words, the SWWTS at Merrimack Station cannot operate without a discharge stream. Years of engineering, constructing, commissioning, and operations—as opposed to concepts, anecdotal information, white papers, Internet searches, or conversations—confirm the fact that a purge stream from the SWWTS at Merrimack Station is required, and that the volume and constituents of this stream vary depending upon one or more of the following variables changes within the power production system: fuel characteristics, fuel blends, boiler operation, boiler pollution control devices operation, and scrubber chemistry. The process is a complex multi-variable chemical and equipment sequential series of balances, any one of which can cause deviations from steady state. This starts with the fuel chemistry and follows to the boiler, scrubber, and finally to the FGD waste water treatment systems.

The SWWTS experiences some recurring operational issues, as well, and has certain system constraints, which are explained at length in subsequent sections of these comments. Despite these lingering issues, PSNH has done a world-class job in operating and optimizing its SWWTS in the limited time the treatment system has been in operation. No history anywhere in or beyond the United States was or is available to PSNH to assist in its efforts. Experts capable of discussing selected topics are available, but no person or entity has pursued this waste water treatment process more than PSNH. PSNH has had to methodically manage optimization of all equipment operations and chemical process challenges within the past few years and has successfully solved each. These exceptional method and problem solving achievements have reduced purge stream volumes significantly. Nevertheless, PSNH has continued tuning and optimization activities it is managing and does not know when this effort will be concluded. The periodic occurrence of these problems necessarily means the SWWTS is not "online" or available 100 percent of the time at Merrimack Station.

PSNH has gone to great lengths within the past three years to understand and operate this equipment to its full potential, and the company has made significant strides. PSNH's efforts remain ongoing and will be perpetual as variables continually change at the plant.[27] Even after solving numerous and complex challenges, as explained above, both the purge stream and certain residual operational issues associated with the SWWTS still exist today. PSNH believes the SWWTS eventually will allow Merrimack Station to have a reliable system with a minimal purge stream. These uncontroverted facts mean PSNH's SWWTS is not and cannot be BAT for the treatment of FGD waste waters at Merrimack Station. Understanding the complexity of power plant operation and the uniqueness of any specific plant's operations, including the pollution control equipment at Merrimack Station, is vital to this permit proceeding. Operating the equipment and employing a treatment process is not as simple as "flipping a switch." The discussion below provides a high level, informative overview and summary of operations to clearly illustrate all of the aforementioned critical points.

a. Power Plant Balances

Power plant operation is best understood through the application of two basic physical laws or principles:

(1) Conservation of Matter: Matter cannot be destroyed or created; mass balances.

(2) Conservation of Energy: Energy cannot be destroyed or created; energy balances.

A power plant is an energy conversion facility. The product of a power plant is electrical energy. The electrical energy from a power plant electrical generator is derived from its

[27] EPA acknowledges this need for continuous tuning and optimization. *See* Fact Sheet at 35 ("[C]ontinued adjustments are expected during the life of the system.").

rotational energy, which it gets from the mechanical energy supplied by a stream turbine which is connected to it on a common shaft. The turbine rotational energy is derived from the high energy steam produced in the large power boiler. Energy is transferred to water to make steam in the boiler from hot, high energy, gasses. These hot gasses are produced by combusting fuel. Combustion releases energy stored in the fuel which, when heated and mixed with air, burns and releases the stored chemical energy to become thermal energy in the form of hot combustion gasses.

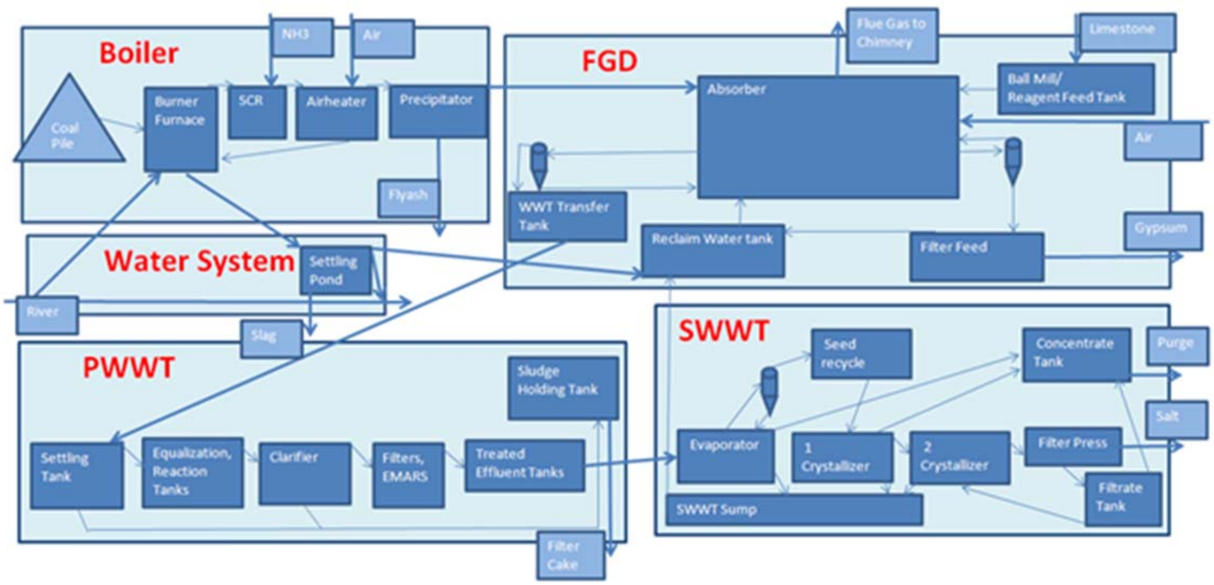
Fuel is a compound made up of many naturally occurring elements. The main energy drivers in fossil fuels are the elements carbon (C) and hydrogen (H), which are converted to the compounds carbon dioxide (CO_2) and water (H_2O). A plant-wide energy balance determines the quantity of these elements in the fuel required to produce a quantity and type of electrical energy; there is a direct relationship between electrical energy generated and the quantity of fuel required. There are also a number of other natural elements in fuels that are converted to higher oxidized state compounds during combustion.

"Coal is formed from plants by chemical and geological processes that occur over millions of years. Layers of plant debris are deposited in wet or swampy regions under conditions that prevent exposure to air and complete decay as the debris accumulates."[28] There are a large variety of natural elements that become combined in coal. Of the 91 elements that occur naturally on earth,[29] over 40 may be found in varying degrees in coal combustion byproducts, scrubber chemistry, and therefore within the SWWTS. These elements will transition to a number of compounds as they travel through the plant processes. Each of these compounds must be identified to understand the partitioning to a number of flow-paths in the

[28] *Steam*, Babcock and Wilcox, at 9-3.

[29] Handbook of Chemistry and Physics, CRC Press, at B-5.

plant. Accounting for all the elements in the compounds that make up the fuel, sorbents, air and water through all the flow-paths in a plant is termed a mass balance. For many of the elements in Merrimack Station's mass balance, the last stage is the SWWTS's crystallizers and salt cake belt filter press. A simplified diagram of flow-paths for the fuel typically utilized at Merrimack Station is shown below.



The energy and mass balance starts at the coal pile. The electrical energy requirements determine the amount of coal to be combusted in the boiler. This coal flowing into the boiler's burners introduces the most critical elements to the mass balance. For each of the elements that are oxidized in combustion there must be an oxidizing agent provided. In this case, the oxygen in air serves as the oxidizing agent. Air adds oxygen, nitrogen and a number of other trace elements to the mass balance. The combustion product compounds are gases and solids. The gases are termed flue gas. The solids are termed ash.

b. The Boiler at Merrimack Station

The coal characteristics and cyclone boiler design determine the amount of coal ash that is fused into slag in the boiler. It should be noted that coal can vary from day-to-day, even from within the same mine. Furthermore, each Merrimack Station boiler burns a blend of two or three coals mixed by a bulldozer, which effectively illustrates the daily variability in coal, even though it is overall considered a typical mix over the course of a day. Thus, there are no static chemistry processes throughout the plant system. For typical Merrimack Station fuels about 75 percent of the total coal ash leaves the boiler as bottom ash or slag (which is sold for reuse).

Slag is quenched in a tank to form a stable, inert glass-like solid compound. The cooled, hardened, and crushed slag is mixed with water and pumped to a settling pond. The slag is reclaimed from the settling pond by a third party and is sold as sand-blasting grit and roofing shingle granules. This beneficial reuse has a number of environmental benefits: there is less fly-ash to be removed from the flue gas stream and it reduces the amount of ash that needs to land-filled. Slag is the first compound to be removed from the boiler in the mass balance. The remaining coal ash elements are solids carried as a component of the flue gas.

The nitrogen from the air and fuel enter the combustion process in the boiler's burner. A portion of that nitrogen is oxidized to form nitrogen monoxide (NO) and nitrogen dioxide (NO_2). Merrimack Station has installed environmental control equipment utilizing the SCR process to reduce the nitrogen back to its elemental state (the lower oxidized form). This reaction uses the oxygen in the nitrogen oxides (NO_x) to oxidize the hydrogen from a reagent, ammonia (NH_3) to form water (H_2O). Ammonia thus enters the mass balance in the SCR process.[30]

The SCR process utilizes a catalyst to aid oxidation of hydrogen in ammonia to water and reduction of NO_x to nitrogen. The catalyst also oxidizes a portion of the mercury in the flue gas stream. The resultant mercury compound is highly water soluble, which is important in downstream environmental controls. The SCR is located just after the economizer section of the

[30] Unit 2 at Merrimack Station was the first coal-fired boiler in the United States to employ this technology back in 1995, and began utilizing it for Unit 1 in 1999.

boiler and prior to the air-heater. This is done to provide the optimal reaction temperature for the catalyst for both NO_x reduction and mercury oxidation.

Flue gas next flows from the SCR to the air-heater. The air-heater transfers heat from the flue gas to the incoming air to be used for combustion and therefore reduces the temperature of the flue gas. Heat transferred from the flue gas to the air increases the overall energy efficiency, meaning less coal is required to produce a given amount of electrical energy. As the gases cool, some of the compounds start to condense to form a liquid. Some of this liquid will form on the fly-ash and boiler elements in the flue gas stream.

The flue gas next flows to the electrostatic precipitators. Each Merrimack Station boiler has two precipitators in series; supplemental precipitators have been added to both units to significantly reduce fly-ash emissions. Fly-ash and any precipitated compounds are removed from the mass balance in the precipitators. The fly-ash is also utilized for beneficial reuse. The design of the Merrimack Station burners to create slag, as well as the utilization of high efficiency precipitators to collect fly-ash from the flue gas stream, are station-specific equipment design features that greatly affect the constituents that eventually end up in the SWWTS.

The fly-ash that is removed from the precipitators is utilized for various purposes, such as soil conditioning and as a component in concrete. To date, the great majority of the fly-ash has been utilized for beneficial uses. The reuse of the fly-ash has a number of environmental benefits: it reduces the amount of material that would need to be land-filled; it reduces the demand for raw materials; and it decreases the energy requirement to excavate another material for remediation.

c. The Scrubber

The flue gas next flows to the scrubber, or FGD system. The scrubber completely saturates the flue gas with a limestone slurry in the absorber vessel. A slurry is a mixture of liquid and solids. This slurry is the beginning of the liquid stream that will directly lead to the SWWTS. The water soluble compounds in the flue gas stream are mixed with and absorbed into the slurry. The small amounts of remaining compounds within the flue gas travel to the chimney, thus leaving the mass balance. The specific compounds that are formed at Merrimack Station, based on the above-described processes, are station specific. It is important to determine the compounds in the flue gas stream entering the scrubber's absorber vessel so that the compounds' corresponding constituent elements can be apportioned either to the absorber slurry or to the flue gas that exits the chimney.

The two critical compounds that can be absorbed into the absorber slurry are sulfur dioxide (oxidized form of sulfur) and mercury compounds (oxidized mercury is highly water soluble), but there are many other compounds that are captured in the FGD. There are over 40 elements that can be traced from the coal pile all the way to the FGD slurry. The previously described processes that affect the compounds in the flue gas, as well as the station specific arrangement of the absorber, have allowed Merrimack Station to reduce over 95 percent of the mercury emissions and over 90 percent of the sulfur from the flue gas stream.

The absorber has four distribution spray header levels to circulate and disperse the slurry though the gas stream. Three spray header levels normally operate when both boilers are at full load, with one header level held in reserve. There are three absorber trays to help mix slurry with flue gas. Each tray builds a "froth" layer of slurry to enhance contact between flue gas and slurry. The intimate contact between flue gas and slurry increases the elements absorbed from the flue gas into the slurry. The trays are part of a station-specific design to increase the capture of mercury to meet the requirements of New Hampshire law.[31] The arrangement greatly affects

[31] PSNH is not aware of another similar absorber configuration optimized for mercury reduction.

the constituents absorbed into the slurry, which, in turn, greatly affects the type and quantity of elements that enter the waste water treatment systems.

The sulfur dioxide absorbed from the flue gas forms a liquid compound in the slurry. Limestone (calcium carbonate) is added to the absorber to react with the sulfur dioxide and is a new component that must be added to the mass balance. Limestone is similar to coal in that it is solid, mined from the ground, and includes a variety of natural elements that are added to the processes and must also be traced through the mass balance. Limestone is dissolved into the absorber slurry and forms a calcium-based liquid compound. Calcium reacts with the sulfur and creates the compound calcium sulfite. Oxidation air is added to the absorber to further oxidize the calcium sulfite to calcium sulfate. This adds more oxygen, nitrogen, and other trace elements in air to the mass balance.

For each compound, there is a finite quantity that can remain in liquid form, which is measured by its solubility in that slurry (solution). If more of that specific compound is formed in or added to the slurry it will come out of the liquid state and precipitate as a solid. Calcium sulfate is not very soluble in absorber slurry. So, most of it precipitates out of the liquid to form a stable solid. Calcium sulfate solids accumulate in the absorber slurry as more sulfur dioxide and limestone are absorbed into the slurry and precipitated. These solids are then separated into a higher density stream by a hydro-cyclone that separates solids from liquids. The lower density, liquid stream is returned to the absorber. The high density calcium sulfate solids stream can then be separated from the slurry on a traveling cloth belt with a vacuum applied under it. The solids are then washed and sold for beneficial reuse. This solid by-product is synthetic gypsum which is sent to a local wallboard manufacturer for producing commercial grade sheetrock. This is the third stable solid removed from the mass balance that has a beneficial reuse and does not require landfilling. Utilizing the gypsum for beneficial reuse has at least three environmental benefits: it reduces the amount that would need to be land-filled; it reduces the demand on raw materials; and it reduces the energy to mine and transport natural gypsum.

The elements that are now in the absorber slurry are dependent on the following factors:

1) the elements in the fuel, limestone, air, water and ammonia;
2) the properties of the compounds that are formed in the specific types of processes from the coal pile to the stack;
3) the phase of the elements (a portion of fly-ash) as they passed through the precipitators;
4) the ability of the elements to precipitate on the fly-ash if they were in liquid phase as they cooled in the boiler and air-heater;
5) the water solubility of the compounds as they came in contact with absorber slurry;
6) if in a solid compound, its size and weight as classified in the gypsum hydro-cyclone;
7) the tendency of the elements to form gaseous compounds and therefore be reemitted; and
8) the ability of the elements to form a liquid compound.

Items 5 through 8 above are also very dependent upon the absorber slurry characteristics measured by the acidity-base scale of the absorber slurry, its pH, and the Oxidation Reduction Potential ("ORP").

The absorber slurry pH is driven by the amount of excess limestone in the slurry. This is a key performance parameter for sulfur dioxide capture. Higher levels of limestone in the slurry allow for more calcium to be available for combination with sulfur. Too high a level of excess limestone can render the gypsum quality insufficient for resale and, in turn, harm the environment due to excess land-fill quantities. Since limestone is a weak base it is also difficult to control at higher levels of pH (too much excess limestone). pH is first optimized for SO_2

capture and gypsum before it can be adjusted slightly to impact the compounds in the absorber slurry.

Recently, it has been discovered that ORP is critical for defining the compounds in the absorber. Most critical, mercury and selenium capture and retention is extremely dependent on ORP. ORP is very dependent on the type of fuel and is slightly dependent on the oxidation air added to the absorber to produce saleable gypsum. High ORP is good for gypsum quality. Lower ORP is optimal for mercury and selenium capture and retention. Both pH and ORP are very site specific parameters influenced by the coal burned (variability can change daily) and greatly affect the compounds in the slurry and their eventual flow-path to SWWTS.

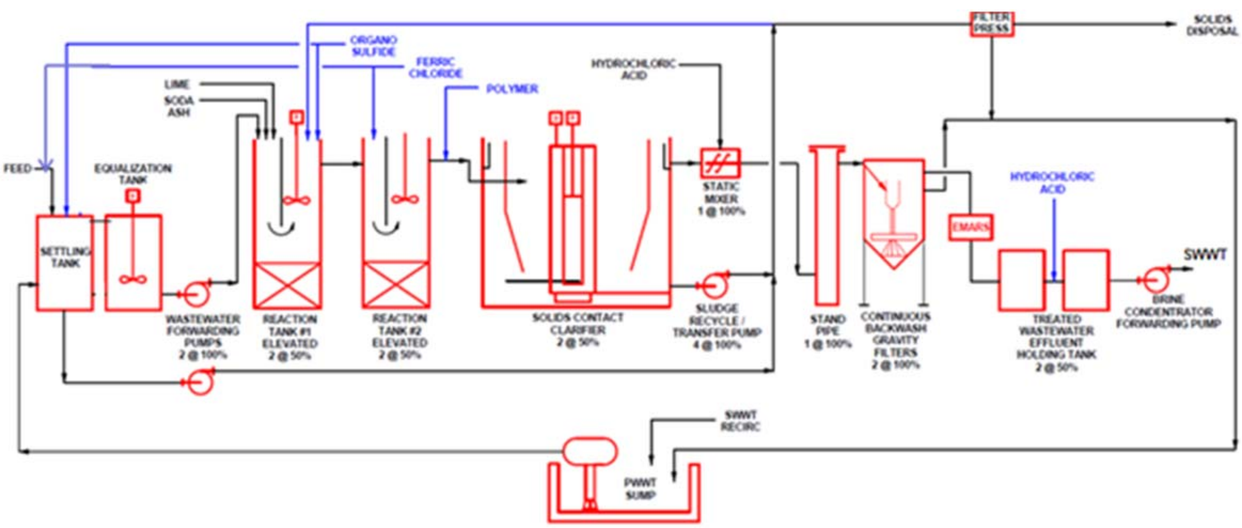
Calcium sulfate particles in the absorber grow, are separated by the gypsum hydro-cyclone, and are removed from the absorber. The soluble compounds (in liquid form) and the smaller particles remain and concentrate in the absorber slurry. These are removed from the system through the purge hydro-cyclone equipment. As opposed to the gypsum hydro-cyclones, the lower density stream is now separated while the high density stream is returned to the absorber.

The efficiency of both sets of hydro-cyclones is determined by operating pressure differential, the size of the feed, the size of the high density outlet, and the size of the low density outlet. The pressures and sizes of the hydro-cyclones were initially set to meet the original design criteria. PSNH has recently conducted studies to optimize the parameters of both hydro-cyclones for the site-specific process gypsum at Merrimack Station. Tuning of the hydro-cyclones is critical to partitioning elements to the PWWTS and SWWTS. This is an area that is site specific and greatly affects element partitioning to waste water treatment, thereby also impacting the mass balance.

The lower density outlet slurry stream from the purge hydro-cyclone is sent to the PWWTS. This stream will hereinafter be referred to as "Scrubber Effluent."

The complexity and lack of steady-state operations should be apparent following review of the aforementioned general and high level description of coal plant operations (fuels, boilers, scrubbers), the numerous processes and systems, and the significant number of chemistry variables. This makes system controls and operator actions critical as PSNH strives to continually optimize processes at Merrimack Station. Scrubber chemistry management and the resultant waste water treatment chemistry management are always in flux and the two systems in place work well to optimize results. However, no day is exactly the same, and while a multitude of variability has decreased, a steady state is not fully achievable.[32]

d. The Physical/Chemical Treatment System with EMARS



Similar to the complex, multi-variable combustion and scrubber absorber operations described above, the multiple treatment process steps and interrelated components in the waste

[32] This variability is key to understanding why a comparison to other facilities employing some form of vapor compression evaporation technology is not proper and that there cannot be a "one-design-fits-all" solution to the handling of FGD waste waters due to the variability in coals, boilers, scrubber designs, and waste water treatment technologies employed at these different facilities.

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> or a combination of components of the SWWTS; operational constraints (other than the SWWTS); maximizing systemic Station operation when generating for a short time period.

December 2013 PSNH Response to EPA § 308 Request. EPA acknowledged receipt of this comprehensive answer to its information request. *See* Fact Sheet at 48. Yet, in its Fact Sheet, the agency inconsistently, on the one hand, asserts that it remained perplexed following its review of PSNH's § 308 response, and, on the other hand, attempts to cast PSNH's § 308 response as nothing more than a company decision made solely based on convenience and/or economic conditions. *Id.* PSNH finds EPA's characterization of these earlier interactions troubling and self-serving and has included the following comments in order to explain with greater accuracy the reasons the company continues to transport FGD waste waters to various POTWs.[37]

PSNH first began discharging its FGD waste waters on November 8, 2011, due to EPA's refusal to issue an NPDES permit (or alternative) for Merrimack Station to discharge treated FGD effluent. At that time, only the PWWTS was operational, meaning PSNH had to utilize several trucks each day to handle the volume of FGD waste water being continuously generated. This waste stream was identified as "Stream A" in PSNH's responses to EPA's § 308 requests.

In February 2012, the brine concentrator was commissioned at Merrimack Station. When in service, this equipment enabled PSNH to vaporize the majority of the water from the FGD

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[37] In this latest draft permit issuance, the agency relies on its confusion to justify its "no discharge" limitation and its arbitrary and capricious draft permit. PSNH is aware of no literature upon which EPA could rely to reasonably reach this conclusion (not to mention the fact that if any such literature did exist, it would not be specific to PSNH and its operations at Merrimack Station). As the agency tasked with making comprehensive decisions about what constitutes BAT for a particular waste stream, pleading ignorance is never an acceptable justification.

EPA's simplified portrayal of PSNH's § 308 response as solely a decision based on economics is equally erroneous. PSNH has on several occasions made it abundantly clear to EPA that there are a number of competing technological and process variables that, at any point in time, force PSNH to transport FGD waste waters to one or more local POTWs. At all relevant times (including the present), PSNH has transported treated FGD waste water to POTWs out of necessity.

waste stream, resulting in a more concentrated, treated effluent. This reduced volume of concentrated effluent could not be eliminated or reused within the facility. Thus, PSNH continued to utilize trucks to transport this solution to local POTWs. This more concentrated waste stream was identified as "Stream B" in PSNH's responses to EPA's § 308 requests. Importantly, Stream A effluent was still periodically removed after February 2012 whenever the evaporator and/or concentrator were offline or, for one reason or another, not operating optimally or at all.

PSNH continued efforts to optimize both its PWWTS and SWWTS in 2012 and 2013. As operations and chemistry knowledge increased during this time period, several different variations of the Stream A and Stream B treated effluents were able to be generated. Again, Stream A would be generated and shipped to a local POTW whenever PSNH encountered operational difficulties with the evaporator and/or concentrator. At no time in 2012 or 2013 did PSNH's SWWTS successfully eliminate all FGD waste waters. Therefore, variations of Stream A and Stream B continued to be transported to local POTWs throughout this time period.

In late 2013, the crystallizers were more fully integrated in the treatment process at Merrimack Station and began generating briny waste water. When in operation, the crystallizers further reduce the amount of resulting FGD waste water. Nevertheless, a concentrated stream (or purge stream) is still continuously generated and must be managed through shipments to a local POTW. This purge stream is unavoidable—as PSNH has not been able to eliminate or reuse it within the SWWTS or elsewhere within facility.

PSNH continues to optimize operation of the crystallizers, as well as the entire PWWTS and SWWTS, in order to operate Merrimack Station as efficiently as possible. Its improvements over the past few years have generally led to a drastic reduction in the amount of resulting FGD waste water that must be managed through shipments to a POTW. Generation of a purge stream remains unavoidable at Merrimack Station, however, even during optimal operations of the entire SWWTS. Moreover, the SWWTS continues to experience periodic operational upsets due to the continuing optimization process and existing operational limitations, which are explained in greater detail below. When it is offline, PSNH must resort to generating Streams A and/or B. Due to this reality, PSNH also obtained permission from certain POTWs to transport various sources of treated FGD waste water from various stages in the volume reduction process.

III. RELEVANT LEGAL ISSUES AND APPLICABLE STANDARD OF REVIEW

A. Legal Issues

The CWA requires existing point sources to install BAT that will result in "reasonable" progress toward the national goal of zero discharge. 33 U.S.C. § 1311(b)(2)(A)(i). For major point source categories, the primary vehicle for enforcing such reasonable progress is EPA-determined National Effluent Limitation Guidelines ("NELGs") based on BAT for that industry. *See* CWA § 304(m)(1)(B)–(C). EPA set NELGs for steam electric power generating point sources in 1982, and is in the process of finalizing new standards. *See* 40 C.F.R Part 423; 78 Fed. Reg. 34,432 (June 7, 2013) ("EPA's Proposed Effluent Guidelines for the Steam Electric Power Generating Category").

According to the express terms of the CWA, EPA may use its BPJ to create case-by-case, technology based permit limitations for individual point sources when, and only when, the agency has not already promulgated NELGs for that category of point sources. 33 U.S.C. § 1342(a)(1)(B); CWA § 402(a)(1)(B). Because NELGs exist for steam electric power generating point sources and the FGD waste streams discharged by those sources, EPA has no authority to establish BPJ based limitations.

Even if EPA had such authority, which it does not, it would be inappropriate to exercise that authority where, as here, EPA is in the process of finalizing a rule to amend and update its NELGs for the specific purpose of setting national effluent BAT standards for the precise waste stream at issue (FGD wastes are currently regulated as a low volume waste stream). To undertake a rulemaking to determine BAT for all steam electric power generating units (including Merrimack), while simultaneously undertaking a separate process to make virtually the same determination for just one station (Merrimack) is arbitrary and capricious.

If EPA proceeds under its BPJ despite these glaring issues, it must follow certain procedures. Because BPJ is intended for circumstances where no NELGs exist for an industry waste stream, EPA must first identify "available" technologies by "survey[ing] the practicable or available pollution-control technology for an industry and assess[ing] its effectiveness." *Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 561 (D.C. Cir. 2002) (quoting *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 131 (1977)). It is not appropriate for EPA to deem a technology BAT if the technology has not been proven successful at pollution removal or has not been in place for a sufficient length of time to determine whether it is effective or not. *See, e.g., BP Exploration & Oil v.* EPA, 66 F.3d 784, 802 (6th Cir. 1996). Moreover, if EPA evaluates data, science, and technology from only one plant, EPA must demonstrate the effectiveness of that technology. *Ass'n of Pacific Fisheries*, 615 F.2d at 816–19; *BP Exploration & Oil, Inc*. 66 F.3d at 802 (rejecting reinjection of drilling wastes as BAT in Alaska because even though an offshore oil platform used reinjection, "the technology is still experimental and is not yet available for application.").[38]

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

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

EPA must consider each of the factors in 40 C.F.R. § 125.3(d)(3); a failure to consider any single factor deems the agency's BAT determination and corresponding effluent limits arbitrary and capricious. *See, e.g., Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 934–35 (5th Cir. 1998) (noting that a failure to consider the age of the equipment and the facilities involved when determining the BAT would constitute an abuse of discretion); *Am. Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1048 (3d Cir. 1975) (remanding effluent limits because EPA did not consider the age of the facilities involved and the impact that age would have on the cost and feasibility of retrofitting older facilities). No one factor is determinative; instead, EPA must balance all of the factors to determine BAT. Moreover, it would be incorrect to assert that BAT must be based on the "best single performer in the industry. To the contrary, the CWA's requirement that EPA choose the best technology does not mean that the chosen technology must be the best pollutant removal. Obviously, BAT . . . must be acceptable on the basis of numerous factors, only one of which is pollution control." *BP Oil & Exploration*, 66 F.3d at 796.

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

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

It makes sense that cost is such an important factor in the BAT analysis because "at some point extremely costly more refined treatment will have a *de minimis* effect on the receiving waters." *Id.* at 818; *see also Am. Petroleum Inst. v. EPA*, 787 F.2d 965, 972 (5th Cir. 1986) (providing that "EPA would disserve its mandate were it to tilt at windmills by imposing BAT limitations which removed *de minimis* amounts of polluting agents from our Nation's waters, while imposing possibly disabling costs upon the regulated industry.") (citing *Alabama Power Co. v. Costle*, 636 F.2d 323 (D.C. Cir. 1979) and *Appalachian Power Co. v. Train*, 545 F.2d 1351 (4th Cir. 1976)).

Thus, EPA is *permitted* to "balance factors such as cost against effluent reduction benefits." *BP Exploration*, 66 F.3d at 796. Courts have upheld EPA's decision to reject a technology based on high economic impacts that might otherwise have been the most effective pollution control technology. *See, e.g., id.* (rejecting a technology as BAT, in part, because of the cost of the technology).

EPA asserts that the BAT analysis and the establishment of effluent limits based on BAT do not *require* EPA to engage in a cost-benefit analysis. However, even if EPA's assertion is correct—which PSNH does not concede[39]—this does not mean that cost is not important in the BAT analysis and the establishment of effluent limits. EPA must implicitly consider the costs of the technology and the benefits received from the technology because of the duty to consider all of the factors in the BAT analysis. Additionally, the final BAT limits that are established must be economically achievable for the source. *Texas Oil & Gas Ass'n*, 161 F.3d at 934. In fact, the BPJ analysis requires a further step: the chosen technology must also be *appropriate* for point sources like the point source subject to the BPJ, based on all available information. 40 C.F.R. §

[39] Importantly, neither does the Supreme Court or the President. Specifically, in *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208 (2009), the Court responded to Petitioner's argument that a "cost –benefit analysis is precluded under the [BAT] test" by stating that "[i]t is not obvious to us that [this] proposition is correct, but we need not pursue that point, [since we assuredly agree with other points]." *Id.* at 221-22. Likewise, the requirements of President Obama's Executive Order mandates such a cost-benefit consideration on significant regulatory matters. *See* 76 Fed. Reg. 3821 (Jan. 16, 2011) ("Our regulatory system . . . must take into account benefits and costs, both quantitative and qualitative.").

125.3(c)(2). "All available information" certainly includes the costs of implementing the proposed BAT at each similar facility. And, EPA cannot permissibly rely solely on the fact that a facility or the public can "afford" a treatment technology as a basis for determining whether it is cost-effective and therefore BAT.[40] The cost-benefit evaluation must be more than pretextual.

Once EPA determines the BAT for a category of sources or on a case-by-case basis pursuant to its BPJ, EPA takes the technology standards established under the factors described above and applies that BAT to create actual effluent discharge limitations under § 304 of the CWA. It is through the creation of these effluent limitations that EPA imposes technology based treatment requirements into permits. *See* 40 C.F.R. § 125.3(c).[41] Because EPA has already established NELGs for Steam Electric Power generating sources, it is not authorized to determine BAT on a case-by-case basis, using its BPJ. Moreover, EPA expects to complete a revision to these NELGs in 2015. EPA wrongly decided that, until those revisions are finalized, it is authorized to use its BPJ to create case-by-case effluent limits.

B. Standard of Review

Whether EPA has authority to apply BPJ to create case-by-case, technology based effluent limitations for Merrimack's FGD waste water despite both currently-existing effluent limitation guidelines limits applicable to that waste stream (i.e., low volume waste limits) and the agency's revised FGD standards in the ongoing NELGs rulemaking is a question of law that must be determined by the court. 33 U.S.C. § 1342(a)(1)(B). *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1162 *opinion amended on denial of reh'g*, 197 F.3d 1035 (9th Cir. 1999) ("[T]he

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

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

Supreme Court devised a two-step process for reviewing an administrative agency's interpretation of a statute that it administers. . . . Under the first step, we employ 'traditional tools of statutory construction' to determine whether Congress has expressed its intent unambiguously on the question before the court. . . . If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress." (citing *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 842-44 (1984)).

Assuming, *arguendo*, that EPA had authority to apply BPJ, a court will review EPA's decision that PSNH's SWWTS is BAT for Merrimack Station despite the short and inconsistent track record of the underlying technology under the Administrative Procedure Act's ("APA") arbitrary and capricious standard. *Pamlico-Tar River Found v. U.S. Army Corps of Eng'rs*, 329 F. Supp. 2d 600, 612 (E.D.N.C. 2004) ("agency action under the CWA is reviewed under the arbitrary and capricious standard"); *c.f., Conservation Law Found v. Fed. Highway Admin.*, 827 F. Supp. 871, 885 (D.R.I. 1993) *aff'd*, 24 F.3d 1465 (1st Cir. 1994) ("under the APA standard, courts reviewing permit Section 404 decisions must determine whether the Corps' action was 'arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.'" (citing 5 U.S.C. § 706(2)(A); *Hough v. Marsh*, 557 F. Supp. 74, 81 (D.Mass.1982)). The APA requires the reviewing court to "hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law." *Alliance to Save the Mattaponi v. U.S. Army Corps of Eng'rs*, 606 F. Supp. 2d 121, 127 (D.D.C. 2009) (citing 5 U.S.C. § 706(2)(A)). An agency decision is arbitrary and capricious if "the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation of its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Alliance to Save the Mattaponi*, 606 F. Supp. 2d at 127 (citing *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43, 103 S. Ct. 2856, 77 L.Ed.2d 443 (1983)).

IV. PSNH'S COMMENTS ON EPA'S DRAFT PERMIT

A. EPA's BAT determination for the FGD system waste stream is arbitrary, capricious, and erroneous

EPA's BAT analysis and proposed "no discharge" effluent limitations are unreasonable and without justification. A proper BAT analysis would result in a conclusion that the PWWTS already operating at Merrimack Station is BAT. Indeed, effluent from that treatment system satisfies water quality standards established by NHDES, meaning it is protective of human health and the environment. PSNH strongly urges EPA to reconsider and revise its draft permit for Merrimack Station accordingly. The ability to discharge treated effluent from the PWWTS continues to be the outcome sought by PSNH as part of its NPDES permit renewal process and the reasonableness of this desired outcome has been demonstrated by the chemistry and environmental facts provided by PSNH to EPA and supported by a vigorous review by NHDES.

The agency correctly abandoned its assertion that biological treatment technologies constitute BAT for Merrimack Station's FGD waste stream in this latest draft permit. PSNH's SWWTS, on the other hand, is not and simply cannot be BAT for Merrimack Station at this time because the elimination of all discharges associated with the FGD waste stream is neither technologically nor economically achievable and is thus, unreasonable. For these same reasons, EPA's proposed "no discharge" or "zero liquid discharge" effluent limit is equally arbitrary and capricious. EPA has erred in its analysis and conclusions and its corresponding proposed limits are therefore arbitrary and capricious and must be reevaluated prior to issuing any final permit.

PSNH offers the following detailed comments to support each of its above-referenced assertions.

1. The PWWTS is BAT for Merrimack Station

Merrimack Station's existing PWWTS for the treatment of FGD waste waters is BAT. It is one of the most effective treatment systems in the country and removes the overwhelming majority of constituents of concern from the FGD waste stream generated by the scrubber.[42] This, in turn, means that effluent from the FGD PWWTS is some of the cleanest in the country. In fact, NHDES specifically determined that discharges from the treatment system satisfy applicable water quality standards. The technology has a proven track record of treating FGD waste waters. It is adaptive and, unlike other contemplated technologies, is not saddled with myriad concerns relating to the sensitivity of its operations and the corresponding effects those sensitivities can have on plant operations and/or system reliability. A thorough and reasonable analysis of all relevant factors and considerations confirms this fact. EPA's rejection of this technology as BAT is therefore arbitrary and capricious.

a. The BAT Factors Confirm that the PWWTS is BAT for Merrimack Station

The factors EPA is legally required to evaluate bolster the fact that the PWWTS is BAT for Merrimack Station. Those factors include a consideration of the age of the equipment and facilities involved; the process employed and process changes; the engineering aspects of the application of various types of control techniques; the cost of achieving such effluent reduction; and non-water quality environmental impacts (including energy requirements). *See* 40 C.F.R. § 125.3(d)(3)(i)–(vi). While each component of this analysis must be studied, the key factors the

[42] William Kennedy, a renowned expert on waste water treatment within the industry and one of PSNH's consultants, corroborates the fact that the PWWTS at Merrimack Station is one of the best in the country. *See* William Kennedy, P.E., *Comments Regarding the Proposed NPDES Permit for Public Service of New Hampshire's Merrimack Station* (August 2014) at 6-9 (hereinafter "Kennedy Report"), attached hereto as Exhibit 6.

agency typically relies upon in making its BAT determinations are: (1) technical feasibility; (2) the cost to install, operate, and maintain the technology; and (3) the amount of pollutants removed annually by the system, which is usually assessed as a factor of pounds and TWPE.

The PWWTS is technically feasible, as PSNH has installed and runs the system with little to no complications or operational constraints. It is both the cost and relative effectiveness of the PWWTS that sets it apart from any other potentially available technology and demonstrates that this treatment system is BAT for the treatment of Merrimack Station's FGD waste waters. PSNH paid $19.3 million dollars to install its PWWTS. Annual operation and maintenance ("O&M") costs for the system are approximately $1.8 million. As for the benefits (i.e. pollutant removals), the Electric Power Research Institute ("EPRI") and the Utility Water Act Group ("UWAG") analyzed influent and effluent data from PSNH's PWWTS and determined that the PWWTS consistently removes approximately 90 percent of the relevant pollutants (expressed in TWPE). *See* EPRI Comments on the Revised Draft Determination of Technology-based Effluent Limits for the Flue Gas Desulfurization Wastewater at Merrimack Station in Bow, New Hampshire at 1 (Aug. 18, 2014) ("EPRI 2014 Comments"); UWAG Comments on Revised NPDES Permit for the Merrimack Station, Attachment 1 (Aug. 18, 2014) ("UWAG 2014 Comments").

Based on these numbers, EPRI and UWAG reached the following conclusions as to the overall cost-effectiveness of PSNH's PWWTS:

	TWPE Removed	TWPE Remaining	Capital Costs ($M) 2011	O&M ($M/yr) 2011	Total Annualized ($M/yr) 2011	Total Annualized ($M/yr) 1981	Cost-Benefit ($/TWPE) 2011	Cost-Benefit ($/TWPE) 1981
UWAG	4,168	555	19.3	1.84	3.96	1.54	$970	$370
EPRI	4,307	478				1.4		$324

See EPRI 2014 Comments at 1; UWAG 2014 Comments, Att. 1.

EPA has used this cost-effectiveness analysis in this context as a litmus test since at least the late 1970s. At no point has the agency exceeded a cost per TWPE of $404 in 1981 dollars:

> A review of approximately 25 of the most recently promulgated or revised BAT limitations shows BAT cost-effectiveness ranging from less than $1/lb-eq (Inorganic Chemicals) to $404/lb-eq (Electrical and Electronic Components), in 1981 dollars.

78 Fed. Reg. at 34,504. Typically the cost has been <u>less than $200</u>. *See* 68 Fed. Reg. 25,686, 25,701 (May 13, 2003). EPA has largely relied upon this cost-effectiveness analysis to determine a technology is not BAT, as well. *See* 68 Fed. Reg. 25,686, 25,701-02 (May 13, 2003) (providing in a rulemaking for the Metal Products and Machinery category that a particular technology was not BAT when it had a cost of $1000/TWPE because this was "substantially greater" than what EPA had typically imposed for BAT technology in other industries). Both EPRI's and UWAG's calculations of the cost-effectiveness of PSNH's PWWTS provide clear and objective support that this technology is BAT for Merrimack Station. A comparison of the relative cost-effectiveness of the other technologies EPA has proposed for Merrimack Station, discussed herein, *infra*, further corroborate that PSNH's PWWTS is BAT.

A review of what EPA has identified as the key constituents of concern in the FGD waste stream provides similar support for labeling the PWWTS as BAT. While EPA has in the past expressed concerns to the industry that physical/chemical treatment systems do not significantly treat dissolved constituents of concern in the FGD waste stream, this is simply not the case at Merrimack Station. Instead, the facility's physical/chemical treatment system, <u>coupled with its additional polisher (EMARS)</u>, consistently removes the overwhelming majority of mercury and other constituents of concern. Specifically, the PWWTS at Merrimack Station removes 99.997 percent of the already small amounts of mercury present in the FGD waste stream, as well as 98 percent of selenium and arsenic from that influent.[43] EPA itself recognized that these resulting mercury levels are "low" and represent "a tiny fraction . . . of the total mercury previously released to the atmosphere prior to the scrubber installation." Fact Sheet at 34. Therefore, the overwhelming majority of regulated pollutants of concern are fixed and removed with the solids in the PWWTS prior to even entering the SWWTS at Merrimack Station.

In the end, the PWWTS at Merrimack Station employs unit processes that are standard in the water and waste water treatment industry with a long history of successful operation. Its additional EMARS polishing step makes the PWWTS at Merrimack Station one of the most effective systems in the country at removing constituents of concern from FGD waste waters and should be studied and promoted as a model technology for the NELGs. PSNH is constantly updating and/or modifying its PWWTS to optimize its effectiveness. Operation and necessary maintenance is accomplished by trained, experienced individuals. The process is tuned to maximize the reduction of suspended solids and dissolved solids, including metals, which are usually present in FGD waste water and is incredibly effective at this task. EPA has in the past recognized the efficiency and longstanding success of this technology. *See* 2009 Detailed Study Report, at 4–50 (noting that the "data show that chemical precipitation is an effective means for removing many metals from the FGD waste water").

Based on the BAT factors, the PWWTS is the appropriate technology for Merrimack Station. Most important, the system is an available, proven, effective, and operationally efficient technology. Similar systems are utilized at power plants around the country and enjoy a proven and impressive track record, and Merrimack Station's particular system is more effective than

[43] *See* The Air Compliance Group, LLC, *Performance Test Report for FGD Wastewater Treatment System of Units 1 and 2 at the PSNH Merrimack Station in Bow, New Hampshire* (June 1, 2012), attached hereto as Exhibit 7; *see also* GZA GeoEnvironmental, Inc., *Summary of Historic Stream A Analytical Results* (January 2012 to February 2013), attached hereto as Exhibit 8.

most. In light of the relevant statutory factors, EPA's rejection of this technology as BAT is therefore arbitrary and capricious and must be revisited prior to the issuance of any final permit for Merrimack Station.

b. Waste Water Effluent from the PWWTS at Merrimack Station Complies with Water Quality Standards Established by NHDES

Effluent from Merrimack Station's PWWTS complies with the water quality-based limits established by NHDES following a comprehensive antidegradation review of both the Merrimack River and PSNH's FGD waste waters. Irrespective of the BAT factors, this should satisfy EPA's technological BAT determination and complete the § 402 analysis, as water quality standards have historically been the more demanding limits to meet. Water quality-based limits are developed by states and primarily focus on the potential impact every proposed surface water discharge may have on the quality of the receiving water. States establish water quality limits for pollutants at levels that ensure the safety of individuals who drink from the waterway, fish in it, and/or recreate on it. Accordingly, NHDES's determination that effluent from the PWWTS at Merrimack Station satisfies applicable water quality standards necessarily means these effluent discharges do not detrimentally impact the safety of individuals who drink from, fish in, and/or recreate on the Merrimack River. EPA's decision to reject these water quality-based limits in lieu of unachievable technology-based limits based on unproven and/or developing technologies for immeasurable benefits to water quality is arbitrary and capricious.

As discussed at length in Section II.D.1., above (and in PSNH's 2012 Comments) it was EPA back in 2009 that: (1) directed PSNH to consult NHDES in the first place in order to develop the aforementioned water quality limits; and (2) implied that it would adopt whatever water quality standards were eventually set by NHDES when determining BAT for Merrimack Station, which has been standard practice in the past on NPDES permit topics such as these.

Specifically, an April 8, 2009 email from an EPA representative communicated the following message to NHDES:

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

Email from John King, EPA Permit Writer, to Stergios Spanos, NHDES, April 8, 2009, 8:22 a.m. ("AR #437) (emphasis added).[44] Immediately following this email, an NHDES engineer responded to that same email stating that NHDES would start looking at antidegradation requirements and impairment status based on the content of the discharge.

EPA was consulted throughout this lengthy dialogue with NHDES and never once suggested that the water quality limits established by NHDES would be insufficient to meet EPA's technology standards. Trusting in, and relying on, this collaborative process, PSNH reasonably decided to install the PWWTS at Merrimack Station, given this robust treatment system would unquestionably meet the water quality-based standards established by NHDES. Only after this installation was under construction did EPA interject the possibility that it was considering technology-based limits that could be more stringent than the limits established by NHDES, despite the fact that EPA had numerous earlier opportunities to do so. EPA's actions in this regard are inappropriate and the agency should be equitably estopped from taking these inconsistent actions, given PSNH's reliance on the agency's previous communications, actions, and acquiescence in deciding to invest substantial funds in PWWTS.

[44] The above-quoted email from EPA's Region 1 representative, John King, clearly indicates that he understood the purpose of the meeting with NHDES was to set effluent limits *that PSNH could expect.* PSNH reasonably understood this to include *all* effluent limits—both water quality and technology based.

Perhaps more egregious, EPA has abandoned the primary focus of technology-based limits. Rather than focusing on what a given receiving water body can properly receive based on water chemistry and science, technology-based limits focus on the capabilities of available pollution control equipment and what a facility can achieve using these treatment technologies. Such limits were created by Congress to achieve the maximum removal of pounds of constituents of concern from a particular waste stream in a cost-effective manner, usually expressed in pounds per liter of waste water (lb./L).[45]

EPA has erroneously ignored this Congressional directive in this draft permit. It is an unavoidable structural reality of all cost-benefit analyses that insubstantial marginal benefits do not justify substantial marginal costs. If 90 percent of the TWPE from a discharge stream can be removed for a certain cost, the removal of the remaining percentage is only justified if the corresponding additional cost is also very small. As explained above, so few TWPEs remain following treatment of FGD waste waters in the PWWTS at Merrimack Station that it would be impossible for EPA to even attempt to peddle as reasonable and/or justified the additional costs associated with another treatment to eliminate those few remaining TWPEs in the PWWTS effluent. The fact that NHDES has determined this PWWTS effluent satisfies water quality standards subjects EPA's attempts to require additional treatment prior to discharge to further scrutiny. Specifically, because the agency tasked with protecting the Merrimack River (and those who drink from it and/or recreate in it) has already determined that these discharges will not cause harm to human health and the environment, EPA would have to put forth a very compelling case (in this instance, a technology that can eliminate the remaining TWPEs by and through the investment of very little additional funds) in order for the agency, the Environmental

[45] *See*, U.S. EPA's NPDES Permit Writer's Manual, at 5.2.1.2 (Sept. 2010); *available at*: http://cfpub.epa.gov/npdes/writermanual.cfm?program_id=45.

Appeals Board, and/or a reviewing court to even fathom affirming any NPDES permit requiring the technology in order to satisfy BAT and the CWA. No such technology exists at this time, meaning PSNH's PWWTS must be BAT. EPA's contrary conclusions are erroneous.

2. EPA's Zero Discharge Limitation Based on an Evolving SWWTS is Arbitrary, Capricious, and Without Rational Basis

a. EPA's Belief that PSNH's SWWTS Achieves a "No Discharge" Effluent Limitation and is Therefore BAT is Erroneous

PSNH's SWWTS at Merrimack Station does not and cannot achieve a zero discharge limitation at this time. EPA's assertions to the contrary are erroneous and based on a perfunctory patchwork of incomplete and/or unreliable information. Seemingly recognizing the weakness in its assertion, EPA has provided PSNH with three purported options to comply with the zero discharge limit established in the draft permit in hopes that doing so will allow its flawed conclusions and corresponding permit limits to skirt by the tenets of the CWA for establishing BAT. As stated earlier, these "scenarios" include the following: (1) operate its "SWWTS as a true ZLD system that eliminates waste water discharges by enabling reuse of the distillate in the FGD scrubbers;" (2) continue to haul "waste water for disposal at municipal waste water treatment plants;" or (3) use "treated FGD waste water for ash conditioning prior to landfilling." Fact Sheet at 50. Two of the three options EPA proposed are simply not viable at this time; and the third option, although currently viable: (a) cannot alone legally satisfy Section 402 of the CWA; (b) provides little to no additional benefit to the environment and subjects PSNH to unnecessary expenditures; and (c) places PSNH in a position of relying entirely upon the actions and/or discretions of one or more third parties (e.g. EPA, NHDES, POTWs, etc.), meaning this compliance option could potentially be eliminated at any time. What follows is a discussion of the fallacies of each of the three compliance "scenarios" EPA has set out in the Fact Sheet to its draft permit.

i. PSNH's SWWTS is Incapable of Achieving a "no discharge" effluent limitation

EPA's first compliance option for achieving its proposed zero discharge limitation is for PSNH to operate its "SWWTS as a true ZLD system that eliminates waste water discharges by enabling reuse of the distillate in the FGD scrubbers." Fact Sheet at 50. This is simply not technologically achievable at this time. The SWWTS must have a purge stream that cannot be reused or recycled for the reasons set out below.[46]

(a) A Purge Stream from PSNH's SWWTS at Merrimack Station is Unavoidable

A purge is, and always has been, integral to PSNH's SWWTS. There are no contract guarantees to exclude or even limit a purge from the SWWTS. In fact, PSNH's operating guidelines specifically refer to a purge to the Crystallizer Concentrate Tank that can be utilized to remove the highly soluble salts in order to control BPE. The Crystallizer Concentrate Tank holds effluent that must be handled or discharged through some means beyond the SWWTS. There are many inherent characteristics to the full plant mass balance that necessitate a purge. The principle characteristics are described in the following subsections.

(1) High chlorine content fuel increases salt loading to a level that exceeds the SWWTS's design capacity

All coal contains chlorine. That chlorine ends up in the FGD effluent as chlorides. That effluent is collected in the absorber and the chlorides are concentrated between 13,000 ppm to 18,000 ppm in the absorber slurry. Notably, the absorber vessel itself will degrade if the chloride

[46] The unavoidable purge stream is not the only reason PSNH cannot achieve a ZLD limitation at this time. Section IV.A.2.b.i., *infra*, describes a number of operational activities with PSNH's SWWTS at Merrimack Station that would separately inhibit the company from achieving a ZLD limitation with the level of consistency needed to reliably operate Merrimack Station. These periodic episodes sometimes cause PSNH's SWWTS to not be available and/or operational to treat FGD waste waters following treatment in the PWWTS. PSNH must have operational flexibility to discharge treated effluent from the PWWTS in these situations.

level is over 18,000 ppm for long periods of time. Therefore, if the absorber chloride level reaches 18,000 ppm, the flow to the PWWTS must be increased or plant electrical output must be decreased in order to decrease the incoming chlorine stream. Effluent from the absorber is fed to the PWWTS where most of the chlorides are converted from calcium chloride to sodium chloride. After going through the PWWTS and a softening process, the effluent containing mostly sodium chlorine is then sent to the SWWTS. The chlorine content of coal can vary widely and its impact on the SWWTS is significant. Within the SWWTS, the chloride effluent stream is fed to the brine concentrator, where the concentration increases to between 50,000 ppm and 75,000 ppm, eventually going to Crystallizer 2.[47]

The chloride content in Crystallizer 2 eventually reaches saturation near 150,000 ppm. Chlorides are then either precipitated out utilizing a salt press to form crystals that can be removed as a salt cake, or the chlorides must be removed by purge. There is no other path to remove chlorides from the system. If there is more chlorine in the coal being fed into the boiler than the salt press can remove, it must be purged.

The chlorine content of coal varies based on type, source, and even along a coal seam as it is mined. The original design maximum of Merrimack Station's SWWTS was based on the scrubber project's design basis coal and its chlorine content. That maximum chlorine content, with a design margin, is 900 ppm which would generate about 8.4 tons per day if all constituents ended up as salt cake. At the time of design, the expected chlorine content of the aggregate coal blend typically used at Merrimack Station was 700 ppm, which would generate about 6.85 tons per day if all constituents ended up as salt cake. However, during this last winter, one of the coals in Merrimack's fuel blend could not be delivered due to mine related issues, while another

[47] In terms of loading in a mass balance, the chlorides all go to Crystallizer 2.

that typically makes up the blend could not be fed easily due to cold weather related freezing issues. The last coal that comprises the blend was therefore the only one available for a brief period of time. However, that coal came from a portion of the coal seam where the chlorine content was 1200 ppm. This set of facts demonstrates that if all constituents ended up as salt cake, 10.74 tons per day of salt cake would be generated. The salt cake press at Merrimack was designed for a maximum of 9.2 tons per day of salt cake, which is 10 percent higher than the maximum design level for chlorine content, with a margin. In February and March of 2014, the SWWTS required a purge of up to 3 gpm on a continuous basis to remove the chlorine that could not be removed by the salt press. Without the purge, the excess chlorine likely would have caused operational risks for the SWWTS.[48]

(2) Elevated concentrations of calcium chloride, magnesium chloride, nitrates, and sodium sulfate impact the BPE within the SWWTS

As discussed in Section II.E.2. above, softening in the PWWTS minimizes, but does not eliminate, calcium chloride and sodium sulfate. The PWWTS clarifier operation likewise minimizes, but does not eliminate, magnesium chloride, and does not remove nitrates. Effluent from the PWWTS containing these constituents flows to the brine concentrator, where it becomes more concentrated. These constituents become further concentrated as they progress through the SWWTS in Crystallizer 1, and then again in Crystallizer 2. Because these constituents have higher solubilities, calcium chloride, magnesium chloride, nitrates, and sodium sulfate precipitate at higher concentrations than sodium chloride. Once the effluent reaches Crystallizer 2, it is concentrated until the solubility of sodium chloride is reached. Sodium

[48] This past winter is representative of the significant reliability issues that will continue to plague the New England area with what remaining units are on line within the region and what is required to operate and provide economic power to customers due to the extremely stressed, highly at risk, and well publicized New England Independent Systems Operator ("ISO-NE") energy supply circumstances.

chloride crystals are formed and removed from the system in the belt filter press; however, the other constituents remain and buildup in Crystallizer 2. If not removed by a purge, the calcium chloride, magnesium chloride, sodium sulfate, and nitrates will each continue to increase in concentration in Crystallizer 2.

Dissolved components in the effluent raise the actual boiling point, termed BPE. Each dissolved component has a unique ability to raise the boiling point. For the dissolved components in Merrimack's second effect crystallizer, sodium chloride has the least effect on BPE. A system dominated by sodium chloride would boil at a lower temperature. However, calcium chloride, magnesium chloride, nitrates, and sodium sulfate raise BPE. A higher BPE can have detrimental impacts on SWWTS operations and has the potential to shut the system down. What follows are a few concrete examples of the problems that could occur with an elevated BPE within the SWWTS.

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is neither an economically nor environmentally prudent short-term or long-term solution for the handling of FGD waste waters.

(1) The quantity of fly-ash at Merrimack Station does not match the volume of the purge stream and there is no way to synchronize fly-ash generation and the volume of the purge stream

The cyclone burner design of the boilers at Merrimack Station cause most of the coal ash to leave the boiler as bottom ash or slag, which is used for roof shingle aggregate or sand-blasting material. Very little fly-ash is therefore created compared to other facilities within the industry, and the quantity of what fly-ash is generated at Merrimack Station does not match the volume of the purge stream generated by the SWWTS.

Even if Merrimack Station did generate the minimum amount of fly-ash required to handle the purge stream from the SWWTS (which it does not), this is not a reliable or predictable option for the handling or disposal of that stream because there is no connection between the quantity of fly-ash generation and the quantity of purge at Merrimack Station. The largest driver of the volume of the purge stream is the chlorine content in the coal; whereas, the largest driver behind the quantity of fly-ash is the ash content of the coal being burned by the units. Any fuel variations have the potential to drastically change the mix of purge and coal ash. Attempting to match the quantities of both would be difficult because there is no correlation between chlorine and ash content in any coal type. For instance, the chlorine content of Powder River Basin ("PRB") fuel, which is used at Iatan Station, is low and the coal ash content is drastically high. Merrimack Station's coal generally has a higher chlorine and lower ash content. Making matters more difficult, future coals could have completely different mixes of chlorine and ash compared to the fuels of today.

As explained above in Section IV.A.2.a.i.(a), there are a whole host of physical and operational conditions that greatly affect the volume of the purge stream that must be generated to manage the SWWTS at Merrimack Station. To alter the operation of either the fly-ash generation or the purge stream generation to suit the needs of the alternate system is not sound engineering, especially when there is no reasonable link between the productions of the two byproducts. Attempting to do so would lead to decisions that adversely affect each system.

(2) Solids in the brine create operational issues in the fly-ash mixing system

Solids in the purge stream under certain operating conditions can plug the lines to the pugmill and plug the nozzles in the pugmill. To solve these plugging issues, PSNH has tested many locations in the SWWTS to find the best point within the system from which a purge stream with consistently low solids can be generated. The filtrate line, identified on the diagram set out in Section II.E.2., is the current "best practices" location to generate a purge stream low in solids. Despite this optimal location, there have been numerous occasions in the recent past when a purge stream has been sent to the pugmill, resulting in the nozzles becoming plugged, causing the fly-ash operation to cease. The belts in the belt filter press have been changed to a tighter weave to reduce the solids in the filtrate line to specifically allow operation of the pugmill immediately following generation of a purge stream. Issues and plugging still occur, however. There is no other location for filtrate and fly-ash to come together at the station other than at the pugmill. Shutting down the pugmill for mixing with the purge stream is not desirable because fly-ash removal is necessary for reliable operation of the full plant.

(c) Continued Shipments to a POTW Legally Cannot be PSNH's Only Available Compliance Option

EPA's other compliance "scenario"—and only viable one at this time—is for PSNH to continue to haul "waste water for disposal at municipal waste water treatment plants." Fact

Sheet at 50. Yet, it is unlawful for EPA to rely solely upon a compliance option of this kind in establishing a legally permissible BAT standard for any waste stream. Moreover, the transport of this FGD waste water from Merrimack Station to a POTW, as opposed to discharging the effluent from its facility, provides nominal, if any, benefit to the environment (especially given that the waste stream already satisfies water quality standards) and results in an additional expenditure that PSNH and its customers should not have to incur. Perhaps worse, this compliance option subjects PSNH and its continued operation of Merrimack Station to the actions and/or discretions of one or more various third parties (e.g. EPA, NHDES, POTWs, etc.), over which PSNH has no control. This reliance on third-parties is not acceptable and has the potential to jeopardize PSNH's operation of Merrimack Station within this permit cycle. EPA's inclusion of this "scenario" in the draft permit is therefore arbitrary and capricious and should be completely disregarded as a compliance option for the fixed 5-year term of any final NPDES permit issued by the agency.

(1) EPA Cannot Legally Require Mandatory Shipments to a POTW

EPA lacks legal authority to compel a facility to transport waste waters offsite for additional treatment in order to satisfy BAT-based technology effluent limits. Instead, the agency is empowered only to set effluent limits for a given facility based on technologies that are legally available and capable of consistently achieving the established limits following treatment <u>at the permitted facility</u>. *See Nat'l Wildlife Fed'n v. EPA*, 286 F.3d 554, 561 (D.C. Cir. 2002) (providing that EPA must first identify "available" technologies by "survey[ing] the practicable or available pollution-control technology for an industry and assess[ing] its effectiveness.") (quoting *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112, 131 (1977)); *see also BP Exploration & Oil v.* EPA, 66 F.3d 784, 802 (6th Cir. 1996) (stating that it is not appropriate for

EPA to deem a technology BAT if the technology has not been proven successful at pollution removal or has not been in place for a sufficient length of time to determine whether it is effective or not.). The regulated entity has complete discretion as to how it achieves any established BAT effluent limits. And, that discretion includes the freedom to transport waste waters to POTWs to comply with applicable BAT limits. Yet, if EPA knows the only way a facility can reasonably achieve its proposed limits is through additional treatment by one or more third-party entities, its BAT determination is irrefutably unlawful. *See Nat. Res. Def. Council, Inc. v. E.P.A.*, 863 F.2d 1420, 1426 (9th Cir. 1988) ("Technology-based limitations under BAT must be both technologically available and economically achievable. . . . To be technologically available, it is sufficient that the best ***operating facilities*** can achieve the limitation.").[49]

[49] The absence of any discussion within EPA's NPDES Permit Writer's Manual regarding the use of nearby POTWs in setting BAT is compelling and further supports a conclusion that EPA's attempt to require use of a POTW to comply with BAT effluent limits is unlawful. *See* U.S. EPA, NPDES Permit Writers' Manual, EPA-833-K-10-001, at 5-14 (Sept. 2010) ("The site-specific TBELs reflect the BPJ of the permit writer, taking into account the same statutory factors EPA would use in promulgating a national effluent guideline regulation, but they are applied to the circumstances relating to the applicant."); *id*. at 5-19 ("In developing numeric limitations in effluent guidelines, EPA first determines an average performance level (the long-term average) that ***a facility with well-designed and operated model technologies reflecting the appropriate level of control is capable of achieving***. . . . EPA expects that all facilities subject to the limitations will design and operate ***<u>their</u> treatment systems*** to achieve the long-term average performance level consistently because facilities with well-designed and operated model technologies have demonstrated that it can be done." (emphasis added)); *id*. ("If a facility operates ***<u>its</u> treatment system*** to meet the long-term average, EPA expects the facility will be able to meet the limitations specified in the effluent guidelines based on that long-term average." (emphasis added)); at 5-14 ("EPA's goal in establishing effluent guidelines is to ensure that industrial ***facilities with similar characteristics*** will meet similar effluent limitations representing the best pollution control technologies or pollution prevention practices ***regardless of their location or the nature of the receiving water into which the discharge is made***" (emphasis added)); *id*. at 5-16 ("For the ***direct discharge*** of toxic and non-conventional pollutants, EPA promulgates effluent guidelines based on BAT. . . . EPA generally defines BAT on the basis of the performance associated with the best control and treatment measures that ***facilities in an industrial category*** are capable of achieving." (emphasis added)); *but see* id. at 5-14 ("For point sources that introduce pollutants directly into the waters of the United States (direct dischargers), the effluent guidelines promulgated by EPA are implemented through NPDES permits . . . . For sources that discharge to POTWs (indirect dischargers), EPA promulgates pretreatment standards that apply directly to those sources and are enforced by POTWs and state and federal authorities . . ."); *and id*. at 5-17 ("The categorical pretreatment standards for existing ***indirect dischargers*** are technology-based and ***are analogous to BAT***.").

(1) Regardless of Legality, Continued Shipments to a POTW Provide Minimal Environmental Benefit

In its proposed NELGs, EPA speculates that third-party POTWs are not materially treating some constituents of concern within FGD waste waters. *See* 78 Fed. Reg. 34540-41 (establishing pretreatments standards for existing sources for certain constituents of concern, based on an assumption that those constituents typically pass through a POTW facility). EPA made a similar statement in its Fact Sheet for this draft permit. *See* Fact Sheet at 49 ("It is unclear whether these pollutants receive any treatment at the POTWs. These constituents are generally expected to pass through a typical municipal sewage treatment plant."). Following treatment in its PWWTS at Merrimack Station, PSNH's FGD waste water discharges already satisfy NHDES's established water quality standards. It is therefore necessarily true that requiring any additional treatment of this waste stream will provide nominal environmental benefit, if any. Due to this reality, PSNH should be permitted to discharge its FGD waste waters directly to the Merrimack River. Requiring any senseless interim step that subjects PSNH to the continued, needless spending of additional resources is the epitome of government bureaucracy at its worst.

(1) Even if Legally Permissible, this Compliance Option May be Eliminated in the Foreseeable Future

The POTW compliance option is legally impermissible and of no material benefit to the environment, for the reasons set out above. Setting those fatal defects aside, inclusion of this compliance option within PSNH's final permit for Merrimack Station is improper because it may not be available to the company for the entirety of the permit term. POTWs have the discretion to accept or deny waste waters from industrial users; whereas NHDES possesses the discretion to approve or deny IDRs for the transport of waste waters to POTWs. PSNH currently possesses the necessary approvals from NHDES and certain POTWs, enabling the company to transport its FGD waste waters to the POTWs for additional treatment. However, one or more of these approvals could be terminated at any time for myriad reasons (e.g., regulatory changes, limited POTW capacity, the frequency or infrequency of PSNH's waste water transports).

Separately, EPA suggests in its Fact Sheet that the NELGs, proposed by EPA in May 2013, may eliminate this POTW compliance option.[50] *See* Fact Sheet at 49. The NELGs, which EPA is obligated to finalize by the end of September 2015, set Pretreatment Standards for Existing Sources ("PSES") for indirect discharges from electric generating utilities to POTWs based on whether the discharged pollutant "passes through" or "interferes" with the POTW to ensure, among other things, that "standards for indirect dischargers [are] equivalent to standards for direct dischargers." 78 Fed. Reg. at 34,457. In its draft NELGs, EPA proposed effluent limits based on eight different BAT technological compliance options for the treatment of FGD waste waters—ranging from physical/chemical precipitation technology to VCE technology. The discharge limits for the proposed PSES were identical to the BAT effluent limits set out in the proposed rule, meaning EPA determined that all constituents of concern within FGD waste waters pass through POTWs. If EPA identified VCE technology as BAT in its final NELGs and

[50] The Fact Sheet also mentions that until EPA's NELGs are finalized that "the sewage treatment plants accepting this waste water will have to ensure that any necessary pretreatment requirements are in place, which may include local limits." Fact Sheet at 49. This too signifies that EPA believes this compliance option may be eliminated within the foreseeable future and, furthermore, infers that EPA may apply pressure to the various POTWs accepting PSNH's treated FGD effluent to compel them to adopt local limits requiring additional pretreatment of PSNH's FGD waste waters.

Local limits may be set, pursuant to 40 C.F.R. Part 403, to require an industrial user to prevent recurring pass-throughs. *See* 40 C.F.R. § 403.8(f)(4). POTWs to whom PSNH transports its waste waters have adopted such limits when necessary. Any additional local limits suggested by EPA should be informed and established by individual head works loading calculations, rather than EPA (by and through promulgation of a standardized set of PSES based on the averaged effectiveness of POTWs throughout the country). Env-Wq 305.05(a). This will ensure that any local limits established: (a) serve a legitimate purpose of protecting human health and the environment; and (b) permit each POTW to accept waste streams it knows it can reasonably treat based on the specific pollution control equipment installed, rather than establishing a national average for POTW treatments that ignores unique equipment certain POTWs have installed that is more effective at treating certain constituents and, in fact, penalizes or deters such POTWs for/from voluntarily going beyond the national average.

established a corresponding "no discharge" limit, the PSES would likewise eliminate all permissible discharges of constituents of concern to any POTW.

PSNH's PWWTS removes the overwhelming majority of constituents of concern from the FGD waste stream at Merrimack Station (and the SWWTS provides some incidental, additional removal, as well). However, the mandatory purge stream often contains a small amount of residual constituents, meaning PSNH would no longer be permitted to transport this stream to a POTW following promulgation of the aforementioned PSES. Under this scenario, PSNH would be left with no means to discharge its treated effluent. The requirements of the draft permit therefore are not and cannot represent a legally permissible exercise of EPA's CWA authority for establishing available technological compliance options for the treatment of industrial waste waters.

In the end, EPA's statements in the Fact Sheet reveal that the agency believes its proposed POTW compliance "scenario" could be eliminated in the foreseeable future—either through promulgation of its PSES or through the actions of POTWs and/or NHDES. PSNH must comply with the terms of any final NPDES permit for five years, if not longer. This compliance option may well be eliminated within that timeframe. PSNH is a regulated entity that must plan, forecast, and be available to run its facilities when requested. The company cannot effectively operate Merrimack Station or properly forecast its future availability within any regulatory setting that subjects PSNH to the independent actions or decisions of one or more third parties possessing authority to eliminate the company's only viable compliance option for operating Merrimack Station under the terms of the draft permit. It is therefore of little or no benefit to PSNH to have a supposedly valid compliance option that will not exist for the length of the permit term. It is likewise arbitrary and capricious for EPA to assert this "scenario" as a viable compliance option for PSNH's handling of its FGD waste waters at Merrimack Station in order to support its erroneous BAT determination—knowing full well there is a possibility it may cease to exist before the end of the permit term.

ii. No Other Facilities Employing Similar Technologies are Achieving ZLD, and a Comparison to Such Facilities is Inappropriate Under the BPJ Standard

EPA's determination that evaporation technology—like that used in the Merrimack Station SWWTS—is BAT not only is based on incorrect factual assumptions, but also demonstrates a lack of understanding of the complexities and evolving nature of this technology when used with FGD waste streams. As an initial matter, EPA omits any reference whatsoever to facilities where this technology has failed to treat FGD waste water. And, EPA's analysis does not recognize that, even at those facilities where the technology is running, significant barriers must be overcome before this technology will be a proven and reliable system for reducing the volume of FGD waste streams. Finally, EPA's attempt to compare the Merrimack Station SWWTS with systems at other facilities is misplaced because it fails to account for the significant differences in operations and outcomes at each of those facilities.

EPA's BAT determination glosses over the fact that the current, worldwide status of treating FGD waste waters using thermal technologies is relatively new and the numbers of operational facilities are few. In fact, at some facilities, the installed treatment systems were mothballed shortly after commissioning. The concept of eliminating liquid discharges from such treatment systems, termed "zero liquid discharge" or ZLD in the industry, always comes with the caveat that periodic purges of waste water are required to keep the overall system in balance, to prevent fouling and plugging, and to avoid costly maintenance, repair, or other issues. Due to the very different chemical makeup of the FGD waste stream compared to conventional power plant waste water, there are more challenges and difficulties in its application.

While thermal technology has been well proven with cooling tower blowdown and demineralizers, it is novel in application for the treatment of FGD waste waters. The learning curve remains steep for the use of thermal technology for the treatment of FGD waste waters. FGD blowdown water chemistry is highly variable and depends on many factors, including: coal composition, makeup water chemistry, limestone chemistry, FGD type and operation, FGD metallurgy, and waste stream pretreatment.

EPA did not take this complexity into account when referring to the other facilities using thermal treatment. By way of example, the coal used in the Italian facilities referenced by EPA all comes from South Africa; hence, its chemical composition is very different from the coal burned at Merrimack Station and leads to varying water chemistry in the FGD waste waters. Overall, a fair analysis of the other facilities using this technology demonstrates why it is not BAT for Merrimack Station or the electric power industry as a whole.

(a) Systems No Longer In Use

EPA completely fails to discuss, much less mention, facilities that attempted to achieve a ZLD result for FGD waste water with evaporative technologies, all of whose efforts were abandoned due to operational and technical problems.[51]

(1) Centralia Big Hanaford Generating Station

This facility, located in Centralia, Washington, attempted to use a thermal treatment system consisting of a large crystallizer. It experienced boron plugging issues in the crystallizer heat exchanger, which the facility was not able to resolve. The system was abandoned after some FGD blowdown treatment modifications were made, which allowed the waste water to be treated and discharged.

[51] The Kennedy Report describes each of these abandoned facilities. *See* Exhibit 6 at 3-4.

(2) Milliken

Milliken Generating Station in New York was the first application of a thermal treatment approach for FGD waste water and was conducted as a one-year ZLD demonstration project. The FGD waste water treatment system was started in 1995. The goal was to make road salt as an end product. Because this was the first application to FGD waste water, the technology used was a direct transfer of a conventional power plant vapor compression evaporator (brine concentrator) system. Numerous operational problems were encountered in the form of plugging, scaling, and compressor problems. While some of the processing issues were resolved, including plugging problems resulting from the very high boron content in the feed, the system was mothballed after the one year pilot program ended. In fact, the Department of Energy ("DOE") noted:

> The brine-concentration system experienced numerous operating problems and did not work satisfactorily at any time during the demonstration. Problems encountered included excessive vibration in the vapor compressor, a high-boron concentration in the feed to the brine concentrator, suspended solids in the concentrated brine, scaling and plugging of the evaporator tubes, and corrosion in various parts of the system. After some process modifications, including changes to the vapor compressor, addition of a filter on the product brine, addition of sodium sulfate and sodium hydroxide to control scaling, and replacing some stainless steel parts with hastelloy, a 10-day trial run was performed in December 1997. The unit ran satisfactorily except that the impurities levels, such as boron, in the product brine were higher than allowed by product specifications. Thus, satisfactory operation of the brine concentration system was not achieved during the time frame of this project.[52]

The problems with the brine-concentration system necessitated temporary approval from the NYSDEC to discharge the brine stream into Milliken's Process Waste Reclamation Facility.

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52 http://www.netl.doe.gov/File%20Library/Research/Coal/major%20demonstrations/cctdp/Round4/Milliken/netl1156.pdf at 31.

DOE ultimately concluded in its final assessment: "The brine-concentration system never worked satisfactorily, so that the goal of zero wastes was not achieved." *Id.*at 32.

(3) Dallman

Springfield City Water, Light and Power's Dallman Generating Station is located in Springfield, Illinois. Unit 4 at the facility is a 200 MW, FGD scrubbed unit designed to burn high sulfur Illinois Basin coal and was brought on-line in 2009. Due to an increase in boron in their FGD purge, two Aquatech-designed brine concentrators were purchased, followed by a spray dryer. A fourfold increase in projected capital costs, coupled with concern over the hydroscopic nature of the salts generated and how they would behave in a landfill, operating costs, and complexity of operation, caused the project to be abandoned. In lieu of primary treatment, Dallman was permitted to discharge their FGD waste water to a local POTW.

(b) Systems Currently in Use

Currently, PSNH is aware of only eight ***functioning*** FGD thermal treatment systems around the world: Merrimack Station; Iatan Station (KCP&L); LaSpezia Power Station (ENEL facility in Italy); Brindisi Power Station (ENEL facility); Torrevaldaliga Power Station (ENEL facility); Monfalcone Power Station (a2a facility in Italy); Nordjyllands-værket Power Station (Vattenfall facility in Denmark); and a Chinese facility about which very little information is known.

A comparison of the Merrimack Station SWWTS to other installed systems attempting to achieve ZLD for the treatment of FGD waste waters is not valid due to site specific factors, i.e. system configurations, type of fuel burned, chemistry, redundancy, etc. For instance, KCP&L's Iatan station is designed to burn a sub-bituminous PRB fuel, low in sulfur and chlorides. The Italian systems in FGD service, installed by Aquatech and HPD/Veolia, have required several years of optimization, trouble shooting, and technical support to achieve their current state of operation.

(1) Iatan

"Region 1 acknowledges that there are several differences between the Iatan VCE system and the system installed at Merrimack Station." Fact Sheet at 31. Yet, EPA attempts—but fails—to draw a fair comparison between the Iatan system and the SWWTS installed at Merrimack Station. EPA makes the sweeping statement that Iatan has "been able to apply VCE technology in a particular way to treat [its] FGD waste waters." Fact Sheet at 31. This statement overlooks the differences between the systems at Iatan and Merrimack Station and fails to recognize the various operational issues experienced at Iatan. For instance, the Iatan system does not utilize a settling tank prior to physical/chemical treatment, it does not have physical/chemical treatment, it does not have softening, it does not have EMARS, and it does not have crystallizers or a belt press. As discussed above in Section II.E.2., the chemistry starting at the coal pile is monitored at Merrimack Station and modified to effect crystallization in the crystallizers; without crystallizers, it is a completely different system. It is also important to note that Iatan uses a drastically different fuel with different ash content, different burners, different make-up water to the absorbers and different absorber operating characteristics. Thus, the only commonality between these systems is that both Merrimack Station and Iatan are working with very challenging systems to do their best to protect water quality.

EPA's Iatan discussion also utterly fails to consider, much less acknowledge, the significant challenges faced by KCP&L with its FGD thermal treatment processes. The Aquatech-designed brine concentrator system, a subset of the Merrimack Station design, requires a continuous purge to remove highly soluble compounds from the system. Following a protracted start-up, numerous system operating modifications to address plugging issues have been made and are ongoing in an attempt to achieve reliable, steady state operations.

KCP&L's own comments to EPA's proposed NELGs regarding its technology illustrate why this technology is not and cannot currently be labeled as BAT anywhere in the country:

> KCP&L agrees with EPA that . . . Chemical precipitation/co-precipitation with ZLD should not be a preferred option. Based on KCP&L's experience, which was witnessed by EPA during a site visit on April 28, 2010, employing ZLD to treat FGD waste water has been technologically challenging and continues to be a work in progress. ZLD technology is a relatively new approach to treat FGD waste water so there is limited design and operating experience to reference. The complex chemistry involved has made keeping the system on-line challenging even for the small bleed system that is being treated at KCP&L's Iatan Generating Station. Costs of this treatment technology have been significant and continue to grow to achieve the necessary system reliability. Given the high costs and reliability issues, ZLD should not be considered Best Available Technology for FGD waste water at this time.

KCP&L's September 20, 2013 Comments to EPA's Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category. Finally, KCP&L's challenges are confirmed by the fact that it is investigating alternate technologies to its existing thermal treatment process at Iatan, because it has applied (in March 2014) to the Missouri Department of Natural Resources for permission to utilize an alternate process for reducing the volume of its FGD waste water flows.[53] It is entirely disingenuous for EPA to present a discussion of Iatan Station's VCE technology and not discuss public permitting documents that plainly show an alternate to this technology is being considered.

[53] *See* March 17, 2014 correspondence from the Missouri Department of Natural Resources' Air Pollution Control Program granting Kansas City Power & Light Company's request for a temporary air permit at Iatan Generating Station, attached hereto as Exhibit 9.

(2) Duke's Mayo Plant

PSNH is aware that Duke Energy is installing an FGD waste water treatment system at its Mayo facility in Roxboro, North Carolina. EPA concedes that the Mayo facility will be utilizing a "partial ZLD system." While the installation will be similar in technological approach to KCP&L's Iatan Station, this facility has not yet started operation. As with the other facilities discussed above, the as-yet-operational "partial ZLD" Mayo system cannot be used to support EPA's BPJ-based BAT determination for Merrimack Station. The Mayo technological approach is drastically different from Merrimack Station (as detailed above in regard to the Iatan process). With as many failures as successes with this technology (Milliken, Centralia, etc.), a new installation hardly seems relevant to this BAT determination for Merrimack Station.

(3) The Italian Facilities

It is obvious from the Fact Sheet's discussion of the FGD waste water treatment systems in Italy—and EPA's claim that the Merrimack Station system "closely resembles" the Italian systems—that EPA performed little or no true due diligence on these facilities. Indeed, the bulk of the information considered by EPA appears to be from self-serving statements of FGD waste water treatment contractors and high-level presentations made at the International Water Conference. An excellent illustration of the cursory nature of EPA's research into the Italian facilities is a February 7, 2014 EPA email authored by Sharon DeMao (AR-1116), in which she states the following:

> I called Italy today and was told that the plants do not discharge anything to any receiving waters or have any waste water hauled off-site. Leonardo Arrighi said that all the equipment was working properly. (AR-1116).

From this single phone call with a random Enel employee, EPA makes the sweeping determination that "the Italian plants with VCE and crystallizer technology . . . do not discharge or haul waste water from their facilities (i.e., they are true ZLD systems) and the systems are reported to be working properly." Fact Sheet at 48. Similarly, EPA's statements about the Monfalcone facility, that the FGD waste water treatment system "is performing as designed and running on a continuous basis," (Fact Sheet at 17-18) are taken solely from the vendor's self-serving sales literature located by a search on the Internet.[54] These are two prime examples of the arbitrary and capricious nature of EPA's determination that PSNH's SWWTS at Merrimack Station is BAT.

Given the short comment period, PSNH was not able to perform a full-scale investigation of the Italian facilities. However, research performed by PSNH during the past few months—which appears to be significantly more than that conducted by EPA—including review of permits, review of available public information,[55] and a site visit by PSNH consultants to the Torrevaldaliga facility, demonstrates fundamental differences between the operations and permitting of the Italian facilities and Merrimack Station.[56] But they share one thing in common: an examination of the Italian facilities reveals that they, too, have discharges and continue to have technical and operational issues with their FGD waste water treatment systems, further undermining EPA's determination that this technology is BAT for Merrimack Station. Notably, most of the Italian facilities have permits allowing them to discharge FGD effluent. The permits for Brindisi, Fusina, La Spezia and Torrevaldaliga all specifically allow discharges from the

[54] *See* Admin. Record Docs. 22 & 136.

[55] *See* Exhibit 10 (which includes a compilation of permits and other publicly available information concerning each of the Italian facilities discussed herein).

[56] These differences cast doubt on EPA's unfounded optimism that Aquatech will have some magic bullet for Merrimack Station by "apply[ing] lessons learned at its installations in Italy." Fact Sheet at 36.

FGD treatment system due to operational issues with their waste water treatment systems.[57] Because of its failure to fully investigate the treatment systems at these facilities for the purposes specific to this NPDES permit, EPA has erroneously determined otherwise. As a result, EPA's draft permit for Merrimack Station does not allow for the same necessary operational flexibility available at these Italian facilities.

There is available operating experience for the falling film evaporator treating FGD waste water at the Italian facilities. However, operation of the FGD waste water treatment systems requires a brine blowdown, which controls the concentration of all of the dissolved solids. The operation of the forced circulation system is different because it relies on a thermal compressor or steam to evaporate the liquid component to the degree that solid crystals are formed that can be filtered from the recirculating flow. However, all compounds do not necessarily form a crystalline product and cannot be removed from the crystallizer by filtration. Certain ionic species may volatilize at high concentrations and carryover with the vapor to be present in the distillate. The presence of these ions is dependent on the coal being burned and may not be identified until they concentrate in the crystallizer. Typical coal analyses are limited and would not include these trace elements. Rather than cause operational problems in the crystallizer, it is best to periodically purge the crystallizer to control these highly soluble products. Such a purge stream is allowed by most, if not all, of the Enel facilities.

It is worth noting that the current European Union ("EU") Guidelines on BAT (Reference Document on BAT - Large Combustion Plants, July 2006) do not indicate any ZLD technique for wet FGD waste water discharge treatment (Sections 4.4.7, 4.5.13). In fact, the BAT indicated for wet FGD discharges is optimized, traditional physical/chemical treatment and closed loop for

[57] The La Spezia plant's discharge permit contains three discharge points from which FGD waste waters could potentially be discharged: one for returned seawater, one for oily water treatment discharge, and a third for all other waste water. The permit merely states that the evaporator/crystallizer does not produce a direct discharge.

waste water reduction (with no specific details on how to implement the closed loop); furthermore, the Guidelines state that the application of these techniques is "site specific." ZLD techniques, such as evaporation and crystallization, are not even mentioned in Section 4.6, entitled "Emerging Techniques." The proposed revision to the EU Guideline on BAT is still in draft form (BAT Reference Document for Large Combustion Plants – Draft 1, June 2013). The draft mentions ZLD techniques in a short paragraph (Section 3.1.10.4, page 119): "In some cases, a ZLD system is adopted to ***reduce*** the environmental impact even further. After the neutralization and sedimentation unit (pH adjustment, ferric co-precipitation, flocculation, clarification, etc.), a softening, evaporation, crystallization system ("SEC") can be installed. The products of this system are high quality water, to be recycled, and salts, to be disposed of." (emphasis added). The draft guidelines refer to "concentrated waste water and/or sludge production" as a cross-media effect of the SEC technology and acknowledge that a liquid purge stream will be produced from this treatment technology (page 291). The Italian guideline on BAT for large combustion facilities, issued with Ministerial Decree 01/10/2008, does not mention ZLD techniques, consistent with the current EU Guidelines on BAT.

FGD waste water treatment systems have been installed at six coal-fired power projects in Italy, including five for Enel Produzione S.p.A., and one for a2a, S.p.A. In 2006, Italy promulgated a rule, Legge 152, that updated waste water discharge requirements for coal-fired facilities in Italy. This rule placed more restrictive water treatment requirements on FGD discharges. During this time frame, Enel and others decided to proceed with upgrades at their FGD waste water treatment facilities. Substantial completion and performance testing of all of the Enel systems were completed in 2008. The basic configuration of the five Enel secondary treatment systems are similar, using falling film evaporators operated as seed slurry concentrators followed by forced circulation crystallization. However, the degree of redundancy and the level of concentration obtained in the evaporators and/or crystallizers differ between systems.

Some of the major operational challenges at these facilities have included:

- Gypsum scaling in the pre-heater and deaerator;
- Calcium and magnesium chloride buildup in the evaporator;
- Glauberite ($Na_2Ca(SO_4)_2$) scaling in the evaporator;
- Insufficient amount of calcium sulfate seed slurry in the evaporator;
- Evaporator/crystallizer pH control;
- Volatility of ammonia and boron;
- Foaming; and
- Moisture content of the dewatered cake.

The design chemistry for each Enel facility was site specific, as shown in the following table:

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- The Enel facilities are not ZLD, as ZLD is defined by the Agency;
- The permits for the Enel facilities allow for a discharge of waste water; and
- The Enel facilities are significantly different from Merrimack Station.

Each of the above items will be discussed in detail below. It should be noted at the outset that PSNH has tremendous respect for the staff at the Enel facilities and their efforts to develop this technology. PSNH looks to continue a relationship of information sharing with the Enel facilities so that both organizations remain leaders in environmental stewardship. PSNH found the Enel facilities to be well designed, well operated, and well maintained.

i) The Enel facilities are not ZLD, as defined by EPA

EPA has confused many of the terms describing water permitting and pollution control technologies. As used in its present context, ZLD is a permitting term that means the total sequestration of any liquid associated with a designated process (VCE and/or SEC) from any discharge to the local water body from any system connected to the designated process. The Agency has very tightly defined the term ZLD to indicate no liquid discharge, and/or no liquid discharge possible, of any liquid from the overall system that comes in contact with a designated process. This includes the reuse of distillate from an evaporation system as described in the 2013 TDD pages 7-14. All of the Enel facilities mix evaporator distillate with effluent from the facilities' seawater reverse osmosis systems and then use that water in the facilities' service water that is eventually discharged to the sea. Thus, the Enel systems do not meet the permitting definition of ZLD as defined in the Fact Sheet by EPA, yet EPA continually references the Enel facilities as ZLD.

The Enel permits have a stated goal of limiting waste water (not all liquid) discharge. There is no discussion in the Enel permits of limiting the discharge of liquid from all systems associated with the SEC systems. The Enel permits would not meet the definition now being applied by EPA. The Enel permits also do not limit all waste water discharges. There are limits and provisions for discharges. So, if EPA is attempting to emulate the Enel facilities, there should be provisions for discharges in the proposed permit for Merrimack Station. The net result is that EPA is using BPJ to select technologies such as VCE or SEC and then trying to apply constraints that are well beyond the technology. If EPA is going to apply a technology-based solution, then the draft permit must reflect the accurate use of that technology.

ii) The Enel permits allow for a discharge of waste water

An analysis of the Italian facilities reveals that their permits allow for discharges of waste water.

a) Fusina

The Fusina facility has a total capacity of 975 MW (Unit 1 – 165 MW, Unit 2 – 170 MW, Unit 3 – 320 MW, and Unit 4 – 320 MW). The facility utilizes a wet FGD and a traditional physical/chemical treatment system (so called "ITSD") for FGD discharge treatment. Before 2008, the ITSD discharge was sent directly into the Venice lagoon. In 2008, an SEC section was installed to treat the ITSD discharge and attempt to eliminate waste water discharges from the FGD. The section included an upgrade to 2 x 50% second stage softeners with soda ash feed for calcium noncarbonated hardness reduction. The 2 x 50% capacity falling film evaporators are each provided with a dedicated vapor compressor, 1 x 100% forced circulation crystallizer, and 2 x 50% capacity felt filter presses. The falling film evaporators are design to treat 2 x 77 gpm, and the crystallizer treats 1 x 54 gpm. The crystallizer has an installed thermo-compressor. The new 2nd stage clarifier produces a $CaCO_3$ precipitate that can be recycled back to the FGD as a scrubber additive. The evaporators are designed for a 3.0 C BPE. The crystallizers are unique at this Enel site in that they utilize cooling water from a closed loop cooling system with a cooling tower whose sole purpose is heat rejection from the SEC system. The makeup source to the cooling system is distillate produced within the SEC system, and the blowdown from the system is sent to the SEC for treatment. The crystallizer feed tank is similarly sized to Torrevaldaliga with approximately 19 hours of retention time.

The Fusina permit (dated November 2008) allows (page 41) the facility to send the ITSD discharge to an external WWTP (so called "SIFA") in case of upset/emergency of the SEC section. Based on a permit update granted by the Ministry of Environment dated December 23, 2010, the ITSD waste water discharge (previously sent to the SEC unit) is currently treated by an external WWTP operated by SIFA. This change was made in the context of a project, sponsored by the regional authority, aimed at improving the water quality of the Venice lagoon. SIFA discharges waste water to the open sea, rather than into the Venice lagoon. Thus, it appears that the Fusina facility at present prefers to send its ITSD waste water discharge to an external WWTP, rather than treating it using the SEC section installed by Aquatech.[58] The Fusina SEC system is not currently operated. Enel currently contracts with Vesta to dispose of their FGD purge stream. The Fusina facility therefore is not achieving ZLD with an evaporative treatment process.

b) Torrevaldaliga Nord

The Torrevaldaliga Nord facility was converted from oil-firing to coal-firing and required a new wet FGD system. The facility has three 660 MW coal-fired units. All three units are generally base loaded and operate year-round exclusive of planned maintenance outages.

58 Although EPA acknowledges in the Fact Sheet that Fusina is not running, it cites to an Aquatech email referring to "commercial contracts."

The Torrevaldaliga Nord facility utilizes a wet FGD and a dedicated treatment system for the FGD discharge treatment composed of a traditional physical/chemical treatment section (ITSD) and an SEC section. The facility also has another physical/chemical treatment system (so called "ITAR") for the treatment of all industrial discharges other than FGD discharge.

The SEC treatment system was included as part of the oil to coal conversion and was the last Enel SEC facility commissioned. The treatment process consists of a 1 x 100% two stage softening (lime followed by soda ash), 2 x 50% capacity falling film evaporators, 1 x 100% forced circulation crystallizers, and 2 x 50% belt filter presses. The two stage softening system is designed to treat 154 gpm, the evaporators 2 x 77 gpm, and the crystallizer 1 x 60 gpm. The crystallizer was provided with two thermo-compressors, 1 x 50% and 1 x 100% to accommodate various load requirements. Additional margin was also integrated into the base design of the crystallizer. The 2nd stage clarifier which consists of soda ash softening produces a $CaCO_3$ precipitate that is recycled back to the FGD system. This reduces limestone feed to the FGD and landfill costs associated with 2nd stage clarifier sludge. Several additional storage tanks were designed and provided with the system. The storage capacity for the softening system feed tank is approximately nine days. The evaporator feed tank (upstream of the evaporator mix tank where pH adjustment occurs) has 2.5 hours of retention time, while the crystallizer feed tank has 19 hours of retention time.

Torrevaldaliga Nord's permit states (page 41) that "the site, while confirming the goal of 'zero waste water discharge,' estimates a maximum quantity of waste water (including industrial acid/alkaline waste water from production units and waste water from FGD) potentially discharged by the ITAR treatment system through discharge point 'UTc' of 1,270,000 m^3/y." Thus, the facility is permitted to make discharges for operational flexibility. In fact, in 2008 and in 2009 ITAR industrial waste water discharge was 135,000 m^3 and 161,590 m^3, respectively. As long as such discharges are being made, the facility is not achieving ZLD for its FGD waste water stream.

In the technical description of the FGD discharge treatment provided in its permit, the Torrevaldaliga Nord facility acknowledged "an issue" related to the formation of highly soluble salts, due to an excess of calcium ions with respect to sulfate ions. This was addressed with softening by substituting calcium with sodium in order to obtain a solid residue that can be handled more easily. Moreover, the evaporator hydro-cyclone overflow and belt press feed piping experienced scaling and plugging early in operation. The piping runs for both of these lines were long and somewhat torturous. Enel rerouted piping to minimize elbows and provided cleanouts where elbows were still required. Enel also has reported some plugging within the crystallizer feed tank. This was attributed to decreased recirculation within the tank.

c) Sulcis

The Sulcis facility has three power generation units, two of which use dry scrubbers (Units 1 and 2). For Unit 3, which uses a wet scrubber, the wet FGD blowdown is mixed with fly-ash from all three units. The SEC section is not operating at the present time. At the Sulcis facility, both a wet FGD and a traditional physical/chemical treatment system (ITSD) for FGD waste water discharge treatment are in operation.

The FGD system design was modified to feed the pre-scrubber with effluent from the SWRO and to install the SEC system to eliminate all FGD system discharges. The SEC treatment consists of 1 x 100% soda ash softener, 1 x 100% falling film evaporator with 53 gpm capacity, 1 x 100% forced circulation crystallizer with 15 gpm capacity, and 2 x 50% belt filter presses. The evaporator feed tank (upstream of the evaporator mix tank where pH adjustment occurs) has eight hours of retention time, while the crystallizer feed tank has 19 hours of retention time.

The SEC section, while authorized in the permit and installed, is still in an "experimental phase." The permit states (page 20) that with the start-up of the SEC section "the discharge of the ITSD is expected to decrease by 600,000 m^3/y and to reduce the seawater intake from 1,000,000 m^3/y to 500,000 m^3/y". No information is available from public sources regarding when the SEC section will be started.[59] At present, FGD blowdown is reportedly mixed with fly-ash generated onsite and landfilled. Thus, this facility is not yet achieving ZLD with respect to its FGD waste water stream.

d) La Spezia

The La Spezia facility has one 600 MW coal unit and two 350 MW gas units. The facility has a wet FGD and a dedicated treatment system for the FGD discharge treatment composed of a traditional physical/chemical treatment section (ITSD) and an SEC section. The permit states that (page 33) the site also has another physical/chemical treatment system (ITAR) for the treatment of acid and alkaline industrial waste water other than FGD discharge and the FGD discharge, if the flow rate exceeds the treatment capacity of ITSD/SEC systems. The estimated annual flow rate of the FGD discharge is of 200,000 m^3/y; while the treatment capacities of the ITSD/SEC systems are 15 m^3/h (i.e. 131,400 m^3/h). Thus, the ITSD/SEC systems appear to be undersized with respect to the actual FGD discharge flow rate.

The SEC technology at the facility consists of a single 100 percent lime softener with sodium sulfite feed for the removal of metals, temporary hardness, and suspended solids followed by a single 100 percent capacity second stage of soda ash softening for the permanent

[59] EPA acknowledges that the Sulcis FGD treatment system is not operating.

hardness reduction. The design flowrate for the softening system is 132 gpm. Calcium carbonate produced in the second stage softener is recycled back to the FGD as a scrubber additive. The falling film evaporator and crystallizer consist of a single 100 percent capacity falling film evaporator, a single 100 percent capacity forced circulation crystallizer, and 2 x 50% belt filter presses. The evaporator is sized to treat 66 gpm and the crystallizer 27 gpm. The crystallizer was provided with two thermocompressors, 1 x 50% and 1 x 100% to accommodate various load requirements. The evaporator is designed for a 3.0ºC BPE. Several additional storage tanks were designed and provided with the system. The storage capacity for the softening system feed tank is approximately 16 hours. The evaporator feed tank (upstream of the evaporator mix tank where pH adjustment occurs) has 2.8 days of retention time, while the crystallizer feed tank has 20 hours of retention time.

In the monitoring plan (Table 16, page 26) issued by the Ministry of Environment (attached to the permit) the waste water discharge to the sea of the ITAR treatment system (namely “SF1 No. 3”) is reported as including a purge stream from the FGD. Additionally, the waste water flow diagram provided by the site for the permit application and included in the EMAS statement for 2012 makes clear that the FGD discharge can go either to the ITSD/SEC systems (chemically treated, evaporated, condensed and then reused) or directly to the ITAR (chemically treated and then reused or discharged to the sea).

Based on the facility’s EMAS statement for 2012 (page 53), the 2012 data, compared to 2011 data, show a sudden drop (more than 50 percent) of sludge production from the ITSD/SEC systems, and a sudden increase of sludge from the ITAR, while the production of ash remains stable. One likely explanation for this is that a part of the FGD purge stream has been shifted from the ITSD/SEC to the ITAR. Again, it appears that this facility is not achieving complete ZLD with its evaporative treatment systems.

e) Brindisi Sud

The Brindisi Sud facility utilizes a wet FGD, a traditional physical/chemical treatment system (ITSD) and an SEC system for the FGD discharge treatment.

The Brindisi SEC system is also the largest of the five treatment facilities. Like Sulcis, makeup to the pre-scrubber was changed from seawater to fresh water and the SEC system was added to eliminate all FGD discharges. In order to obtain the desired dissolved solids concentration in the SEC, each SEC includes two vapor compressors operating in series. The added SEC treatment system consisted of 2 x 50% soda ash softeners, 2 x 50% falling film evaporators with two vapor compressors operating in series for each evaporator, 1 x 100% forced circulation crystallizer, and 2 x 50% belt filter presses. The evaporators are designed for a 3.0ºC BPE.

The permit (dated June 2012) states that this configuration entails "zero waste water discharges;" however the permit (pages 31-33 and 93) allows sending the ITSD waste water discharge (namely "DeSOx purge") directly to the sea through discharge point "S9S" in case of upset/emergency of the SEC section. In case of SEC unavailability and of "S9S" discharge to the sea activation, the permit prescribes a waste water sampling procedure to be followed; the procedure is included in the monitoring plan (page 20) attached to the permit issued by the Ministry of Environment. The sampling procedure has to be activated within three hours from the upset/emergency situation. Thus, the permit for this facility, anticipating releases in case of upset or emergency, acknowledges and anticipates that this system will not be capable of achieving complete ZLD.

f) Monfalcone[60]

As stated above, EPA appears to base all of its statements about the Monfalcone facility and its claim that the FGD waste water treatment system "is performing as designed and running on a continuous basis" on internet sales documents. This is not a sufficient basis for a BAT determination. PSNH's limited research has revealed characteristics that distinguish the facility from Merrimack Station.

The Monfalcone facility consists of two 160 MW coal-fired units, built in 1965, and two 320 MW oil-fired units built in 1982 for a total output of 1,000 MW. Located on the Adriatic Coast, the facility uses once-through seawater cooling to minimize its fresh water consumption.

Low sulfur coal is purchased via a long term contract from Russia. The coal has a sulfur content of about 0.3 percent with a chloride level of about 300–400 ppm. The fuel is supplemented with about 6–7 percent biomass, which is added to the boiler as a separate stream. The biomass, sourced from animal farms and petroleum refinery residuals, has a heating value ranging from 3,000 to 4,000 kcal/kg (5,400 to 7,200 BTU/lb). The biomass results in "Green Credits" for the facility.

The FGD system serving both coal units is Mitsubishi technology and consists of a single absorber. The FGD operates at SO_2 removal efficiencies of about 95 to 96 percent. FGD makeup is "industrial water" consisting of mainly city water mixed with some low TDS facility water. Gypsum is dewatered via a belt filter, yielding a product of relatively high quality (the gypsum is almost white), which is sold for construction material use. Most of the filtrate goes to a storage tank before being returned to the absorber. A portion of the waters is blown down for treatment in the FGD waste water treatment system. The pretreatment is similar to that used for

60 The Monfalcone facility is owned by a2a, not Enel.

the Enel facilities, including dealkalization (metals removal using lime and ferric chloride), soda ash softening, followed by a brine concentrator, a crystallizer, and salt dewatering using a belt pressure filter.

A block flow diagram for the system (from the facility's permit), plainly shows a discharge from the system (labeled "Distillate for Industrial Water Use").

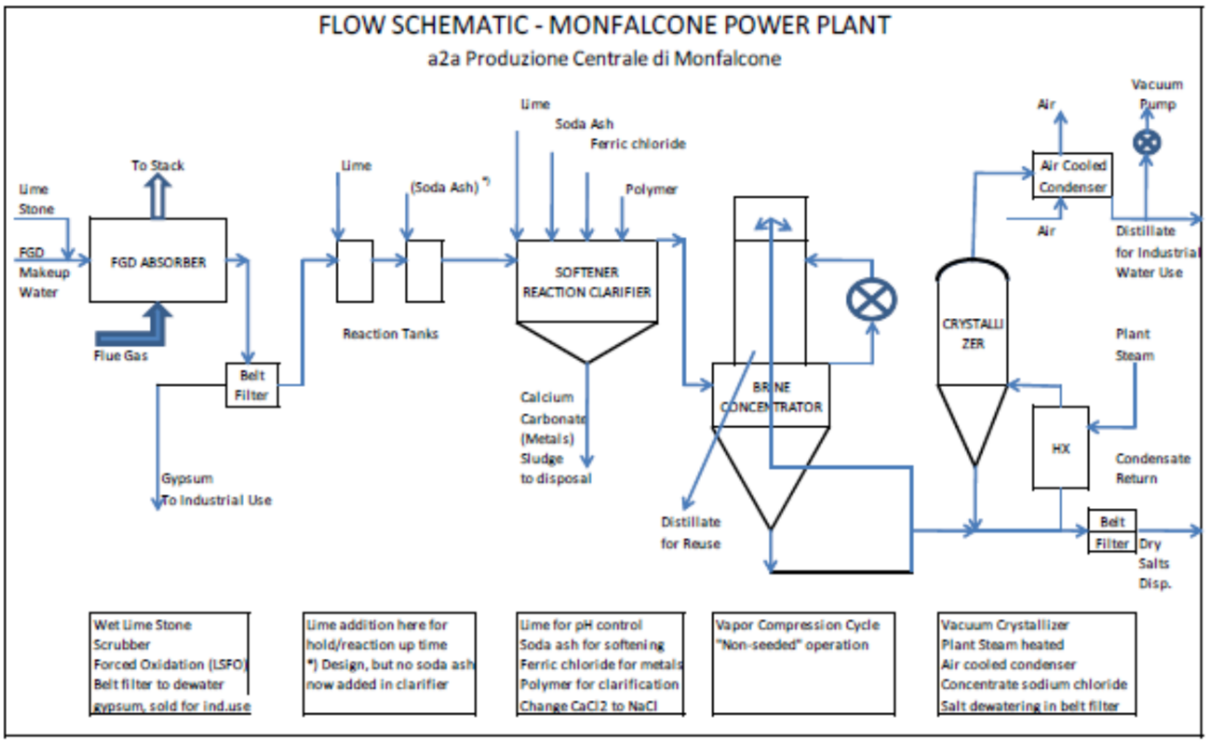

Figure 4-4
Monfalcone Power Station - FGD Treatment System Flow Schemati

Thus, the system does not achieve complete ZLD.

iii) The Enel facilities are significantly different from Merrimack Station

The Enel FGD treatment systems are significantly different from Merrimack Station's SWWTS in at least the following ways:

- As discussed above, the Enel facilities have more avenues for distillate reuse. This allows for more flexibility in operation during times that absorber evaporative load does not match SEC distillate production.

- The Enel facilities operate at 50 percent of design chloride loading. This provides an effective doubling of system capacity. As discussed in the section on coal chlorine content, the Merrimack Station system operates at design chlorine loading.

- Only Torrevaldaliga has a single absorber vessel like Merrimack Station; the other two facilities operating SEC systems use pre-scrubber and scrubbers which drastically affect the effluent chemistry.

- All of the Enel physical/chemical systems operate two clarifiers in series; whereas Merrimack Station has one, with the solids of the softening clarifier being returned to the absorber. This drastically affects the water chemistry. All elements captured in the second clarifier are returned to the absorber, thus dramatically changing absorber chemistry, as well as the feed to the SEC system.

- All of the Italian SEC systems have much more redundancy, which allows for more flexibility to handle maintenance while maintaining system capacity.

- The Enel sites do not have a settling tank ahead of the physical/chemical system, which is part of the current Merrimack Station operation.

- The coal burned in the Enel facilities contains very low sulfur, which greatly impacts the operating chemistry.

    - The sulfur loading to the absorber is much lower, which means the gypsum production is much lower. There will then be fewer elements that can be contained in the gypsum thereby changing the elements partitioned to the effluent going to the physical/chemical treatment system.

    - Because the sulfur capture requirements are low, the absorber operating pH is low which greatly affects element partitioning between the absorber gypsum solids and the effluent to the physical/chemical system.

    - With lower pH, the calcium carbonate in the absorber slurry would be very low. This also affects the element portioning to the effluent to the physical/chemical system as well as the calcium loading to the physical/chemical system as it is used as a softening target.

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Overall, EPA misconstrues the Italian experience with evaporative treatment systems. An analysis of these facilities reveals significant differences from Merrimack Station, purge streams, permits allowing discharges, and ongoing operational issues. The processes employed by these treatment systems for FGD waste water are evolving and, at present, are only achieving volume reduction.

b. An Analysis of the BAT Factors Reinforces the Conclusion that PSNH's SWWTS and the Corresponding "No Discharge" Effluent Limitation are Not BAT for Merrimack Station

EPA bears the burden of demonstrating a reasonable basis for its conclusion that the chosen "no discharge" effluent limit is achievable. The agency has not and indeed cannot, satisfy this burden, meaning its proposed BPJ-based BAT limits are arbitrary, capricious, and "not the result of reasoned decisionmaking." *Ass'n of Pac. Fisheries v. EPA*, 615 F.2d at 820; *Chem. Mfr's Ass'n v. EPA*, 885 F.2d 253, 265 (5th Cir. 1989); *Reynolds*, 760 F.2d at 559.

A technology must be legally "available" before it can properly be identified as BAT by EPA. This necessarily means it is not appropriate for EPA to deem a technology BAT if the technology has not been proven successful <u>at pollution removal</u> or has not been in place for a sufficient length of time to determine whether it is effective or not. *See, e.g., BP Exploration & Oil v.* EPA, 66 F.3d 784, 802 (6th Cir. 1996). Once EPA has identified available technologies, the agency considers a number of factors to determine BAT, including: the age of the equipment and facilities involved; the process employed; the engineering aspects of the application of various types of control techniques; process changes; the cost of achieving such effluent reduction; and non-water quality environmental impacts (including energy requirements). 40 C.F.R. § 125.3(d)(3)(i) – (vi). EPA must consider each of the factors in 40 C.F.R. § 125.3(d)(3), as a failure to consider any single factor deems the agency's BAT determination and corresponding effluent limits arbitrary and capricious. *See, e.g., Texas Oil & Gas Ass'n v. EPA*, 161 F.3d 923, 934–35 (5th Cir. 1998) (noting that a failure to consider the age of the equipment and the facilities involved when determining the BAT would constitute an abuse of discretion);

Am. Iron & Steel Inst. v. EPA, 526 F.2d 1027, 1048 (3d Cir. 1975) (remanding effluent limits because EPA did not consider the age of the facilities involved and the impact that age would have on the cost and feasibility of retrofitting older facilities).

Because EPA's BPJ-based BAT effluent limits are flawed, inaccurate and based on haphazard attempts to understand the corresponding technology employed at Merrimack Station upon which EPA bases its erroneous BAT determination, the limits "cannot stand" and must be reconsidered by the agency prior to issuing any final NPDES permit. *See Texas Oil & Gas Ass'n*, 161 F.3d at 935.

i. Numerous engineering challenges associated with the SWWTS at Merrimack Station illuminate the fact that it is not BAT

The power generation system in the United States is one of the most reliable of such processes in the world and was not designed and built in a few years. It took many years to develop efficient turbines, boilers, and generators, and these are only the primary parts of the power station. Power plants use thousands of other systems to support, monitor, and operate this equipment. To be forced to rely exclusively (i.e. 100 percent of the time) upon the efficient operation of the SWWTS at Merrimack Station for the treatment of FGD waste water—considering all of the processes connected to these systems and the constant variables during power plant operation—is simply not reasonable at this time.

In virtually every complex mechanical system and with new chemical processes, the initial versions require more maintenance and heightened attention. PSNH's SWWTS is no exception and continues to experience episodic operational issues. The flawed draft permit assumes PSNH can operate its SWWTS without issue all of the time. This is simply not true at this point in time. By way of example, even if one were to assume that each of the five major components of a SWWTS (brine concentrator, two crystallizers, belt pressure filter, and auxiliary boiler) operates at 95 percent availability, problems may not occur concurrently. Therefore, *the potential total availability for the system would be approximately 77 percent, which is simply unacceptable.* Power plant operators typically strive for new pollution control process systems with availability guarantees greater than 98 percent. Even though PSNH continues to strive for this reliability goal, it is simply not achievable at this time with the existing SWWTS, and any attempt in the final NPDES permit to require PSNH to operate Merrimack Station in this manner will affect the overall reliability of the power facility.

Due to these current operational realities and corresponding effects on SWWTS availability, PSNH would be forced to install redundant or "back-up" pieces of the SWWTS if forced to comply with the terms of the flawed draft permit. Remarkably, these redundancies would not work to eliminate the SWWTS's mandatory purge stream. Instead, the duplicative equipment would be necessary to ensure PSNH could continue to reliably operate Merrimack Station and endeavor to comply with the terms of the erroneous and excessively stringent draft permit.

PSNH discusses the principal operational constraints associated with its SWWTS at Merrimack Station in the following subsection and concludes this section of the comments with a discussion of the required redundant equipment PSNH would be forced to install if the draft permit is improperly finalized in its current form. These operational constraints further demonstrate the SWWTS is not BAT and the draft permit's zero limit for the FGD waste stream is arbitrary and capricious.

(a) Operational Issues Associated with the SWWTS

PSNH has experienced a variety of tuning and optimization issues with its SWWTS since purchasing and installing it approximately three years ago. The operational learning curve has been steep and the troubleshooting frequent. Encountering these issues has been invaluable for learning the intricacies of the SWWTS, however. It has permitted PSNH to make significant strides in a short period of time to the operational effectiveness of its SWWTS. With this increased knowledge, PSNH has in the recent past been able to effectively eliminate a host of operational challenges that affected the SWWTS since it went into service. Nevertheless, some challenges related to this system remain, which affect its optimal operations or cause elements of the system to be unavailable. The nature and frequency of these recurring issues have been reduced over time. Nevertheless, these continuing operational issues necessitate a conclusion that PSNH's existing SWWTS and EPA's corresponding ZLD effluent limitation are not and cannot be BAT. To better illustrate this reality, the following non-exhaustive overview of the most common operational issues PSNH has experienced, and likely will continue to experience, albeit with reduced frequency and reduced downtime, with its SWWTS is set out below.[61]

[61] The fact that both units at Merrimack Station have been load cycling in the recent past and will likely continue to be dispatched in this manner for the foreseeable future has made it more difficult for PSNH to minimize these periodic operational issues. The SWWTS operates best with a consistent feed chemistry. Load variations cause the feed chemistry to vary, which affects SWWTS operations. PSNH has had to secure additional storage capacity to serve as a buffer for SWWTS operations due to this frequent load cycling.

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The draft permit establishes a zero discharge limit for the FGD waste water at Merrimack, not allowing for a purge stream, potential operating upsets, routine maintenance, or unscheduled breakdowns in the system. PSNH notes that the system cannot be operated without a purge stream. With that said, in order to operate as closely to those limits and conditions as possible, the SWWTS at Merrimack Station would require certain key components of the system to have redundancy. Currently, if the SWWTS goes down, PSNH has a water quantity issue that it manages by storage or discharging to a POTW. If the draft permit is finalized with its existing zero limits and the SWWTS goes down, everything changes. PSNH could not further treat or discharge that effluent and would have to shut down. The corrosive nature of high chloride streams, the potential for high solids loading, and the propensity for solids to agglomerate in the system would preclude the installation of on-line or in-line spares within the SWWTS, however. Without continuous flow, these redundant components can plug or corrode, meaning that when they were needed, they likely would not be functional. To avoid these issues, the component redundancy required would have to be provided by inventoried spares that could be installed expeditiously following the malfunction of the in-service SWWTS equipment. Described below is each piece of redundant equipment PSNH would be required to purchase and inventory to improve its ability to achieve EPA's unachievable draft permit limits.

Further, even with the redundancies described herein, PSNH's SWWTS at Merrimack Station would still generate a purge stream that must be disposed of in some manner. No amount of redundancy can evade that truth. The redundancies set out below are merely what PSNH must have to operate the SWWTS, and in turn, Merrimack Station, reliably if forced to comply with the terms of the flawed draft permit. PSNH maintains and reasserts its earlier arguments that the proposed "scenarios" for compliance set out in the Fact Sheet to the draft permit are either not viable and/or impermissible. This, in turn, renders EPA's BAT determination arbitrary and capricious.

(1) An additional upstream storage tank

A storage tank upstream of the brine concentrator would be mandatory to account for downtime anywhere in the SWWTS, but specifically to account for times when the brine concentrator is not available.[62] Because this equipment has many elements and is supported by many subsystems, risk of imperfect reliability is a reality, whether due to equipment problems or chemistry problems. Most components of the brine concentrator system can be replaced or repaired in a short period (i.e. less than seven days), which includes the time it would take for the impaired component to cool, be drained and isolated, repaired, refilled with necessary operational materials (if any), and reheated before it can be put back in operation. Storage volume for an equivalent duration would therefore be required.[63]

The upstream storage tank would allow effluent to continue flowing from the absorber purge hydro-cyclone overflow. Permitting this continuous flow from the absorber even when the SWWTS is offline helps maintain an acceptable chloride balance within the absorber. Otherwise, chlorides would continue to build in the absorber until they reach the limit of 18,000 ppm and electricity operations must be curtailed to stop the incoming chloride stream from the coal.

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[62] PSNH currently has limited tank storage that allows for the accumulation of relatively small quantities of effluent during finite maintenance outages. Even once the SWWTS is back in service, however, this stored fluid is not processed until the end of the operational cycle of electrical generation. A key component to utilizing tankage for redundancy is an electrical generation cycle that allows for periods of reduced generation capacity. Long periods of high generation capacity, such as those experienced at Merrimack Station the past two winters, reduces the efficacy of tankage as a redundancy option.

[63] This required seven-day storage capacity could likewise be used to store absorber overflow from multiple smaller periods of SWWTS downtime during longer periods of electrical generation.

(2) In-Place fully redundant brine concentrator train

An in-place redundant train would also be required to operate the SWWTS at Merrimack Station with the minimum required reliability. Iatan and many of the ENEL facilities have fully redundant brine concentrator trains. An in-place redundant brine concentrator train would allow the brine concentrator to continue to operate as designed in times when the in-service operational train requires maintenance or is otherwise offline. For unplanned problems with the current train, some lead time would be required to start the new train and get it online. Additional manpower resources would be required to seamlessly bring the new train in service. The added manpower would oversee the primary brine concentrator train as it cools, is drained and isolated, and to perform maintenance work on the train while it is offline. The other set of staff would manage the operations of the new train as it is brought in service.

(3) Storage tank ahead of crystallizer.

A storage tank located ahead of the crystallizers would also be required if a new objective was to increase the SWWTS's overall reliability. This tank would allow the brine concentrator to continue to operate whenever the crystallizer system is down for maintenance by storing effluent from the brine concentrator until the crystallizers are placed back in service. Currently, the brine concentrator continues to operate whenever the crystallizers are offline and the 10 gpm of waste water from the brine concentrator is purged to the concentrate tank, before eventually being discharged to a POTW.

(4) In-place salt press.

A fully redundant salt press would also be an additional element to increasing the reliability of the SWWTS at Merrimack Station. The salt press requires a periodic maintenance component due to occasional pluggage associated with salt crystals agglomerating on component parts. The belts are cloth and require maintenance or replacement as needed. Like the brine concentrator train, the redundant press would at times also require additional staff support to assist in the start up of the reserved press while the other staff oversees the shutdown, isolation, and repairs of the primary press.

A redundant salt press would require added space, especially for the disposal dumpster that must be located below the press. This presents questions regarding the need for building space for added equipment at the SWWTS.

(5) In-place auxiliary boiler.

Like the salt press, a redundant auxiliary boiler would also increase the SWWTS's operational reliability. The auxiliary boiler is needed to start up the brine concentrator and it is required for operation of the crystallizers. Additional staff would once again be required to start up the redundant boiler while the other staff oversees the shutdown, cooling, and isolation of the primary boiler. Similar to the redundant salt press, a redundant boiler would require significant space and proximity to clear electrical wiring back to the electrical room.

ii. The "no discharge" limitations associated with the required SWWTS technology will result in unconscionable operational constraints at Merrimack Station

Even if PSNH's SWWTS is operating without upsets or the aforementioned operational issues, the system will still require extensive and continual maintenance. As Nebrig et al. note:

> Both the brine concentrator and the crystallizer will scale. Calcium sulfate formation on the evaporation tubes in the brine concentrator is the primary scale in the brine concentrator. The formation of the scale reduces heat transfer and results in loss of capacity in the unit. . . . Most vendors recommend cleaning the brine concentrator at least once a year. More frequent cleaning may be necessary, but the down time will reduce the amount of water that can be processed.

(AR # 890 at 11-12). This is occurring at Merrimack Station, where, to successfully operate the SWWTS, "diligent, ever tightening, plant-wide (coal pile to salt cake) process control" is required. (AR # 893). In other words, to keep the SWWTS functioning, every other aspect of Merrimack Station requires extra diligence and control, a clear case of the "tail wagging the dog."

This means that Merrimack Station has limited flexibility to make changes in other parts of its process (e.g., changing the coal blend) unless it wants to risk an upset at the SWWTS stage. This is a serious detriment to overall power plant management.

iii. The costs associated with eliminating all FGD waste waters at Merrimack Station under all circumstances grossly outweigh the corresponding benefits

As explained in these comments, the SWWTS was designed and installed at Merrimack Station as a volume reduction system. The SWWTS has consistently served this purpose for PSNH. The SWWTS allowed PSNH to comply with New Hampshire law and bring the scrubber online, providing significant reductions in air emissions.

The SWWTS was not designed or installed at Merrimack Station to function as a pollutant reduction system; rather, Merrimack Station's PWWTS serves this role. EPA's consideration of the SWWTS as such a system, and its establishment of effluent limits (or lack thereof) in the draft permit based on this false premise, is improper. The SWWTS cannot achieve the "no discharge" limit included in EPA's draft permit. The SWWTS must have a purge stream that cannot be handled by PSNH through any means other than discharging that purge stream from Merrimack Station to the Merrimack River. The system also continues to experience periodic operational issues, which is expected given that the technology is cutting-edge and is still being optimized. There is simply no escape from, or end-run around, these operational realities. Because EPA's draft permit fails to consider these issues, it is flawed, arbitrary and capricious, and must be revised prior to any final permit issuance.

Assuming for the sake of argument that PSNH could somehow, within its current operational circumstances, comply with the "no discharge" effluent limit in EPA's draft permit (which, for the reasons explained extensively in these comments, it cannot), the SWWTS would not meet the legal cost-benefit analysis threshold for the removal of what few constituents remain in Merrimack Station's FGD waste water following treatment by the PWWTS. Indeed, no such treatment system exists or likely will exist within the foreseeable future that would meet EPA's cost-benefit analysis threshold.

To be clear and leave no room for ambiguity, PSNH's remaining comments within this subsection are nothing more than a hypothetical exercise included to prove only that the SWWTS, if conceivably operated in the manner EPA erroneously assumes it can in its draft permit for Merrimack Station, would not meet any cost-benefit test utilized by EPA in the past for determining BAT. As explained herein, PSNH cannot possibly operate the SWWTS in this manner. The system must have a purge stream and continues to require tuning and optimizations in order to minimize recurring operational issues.

PSNH expended $35.3 million capital dollars to install the SWWTS and spends approximately $2.5 million annually in O&M costs.[64] Although the SWWTS is currently

[64] PSNH has updated certain cost estimates, as well as certain TWPE removal estimates, in these comments. The cost estimates have been changed to reflect current market conditions. Some of the TWPE estimates also differ from those provided in PSNH's 2012 comments and, in fact, are based on data collected over the past few years that better reflect the capabilities of PSNH's existing pollution control equipment during steady-state operations.

PSNH has also taken the additional step of generating certain cost estimates the company did not previously itemize in order to more precisely approximate the average costs PSNH has incurred to operate and maintain its treatment technologies. PSNH did not previously maintain these new itemized cost estimates in the infancy operational period of the SWWTS because the company knew such estimates would not be representative of expected future costs to operate and maintain the system, once operations became more homogeneous.

operating as expected, PSNH would have to install the redundant components of the SWWTS outlined in Section IV.A.2.b.i.(b) above, to operate the system with the reliability necessary to dependably comply with the "no discharge" effluent limit under this theoretical scenario. This redundant equipment would cost PSNH an additional $42.2 million to install, according to PSNH's vendors' current price lists, and would further imbalance the cost-effectiveness of operating the SWWTS in this hypothetical way.

Knowing the unfavorable outcome a cost-effectiveness analysis would produce, EPA attempts to circumvent the number-crunching altogether by asserting that PSNH voluntarily installed the existing SWWTS at Merrimack Station, meaning the agency purportedly is not required to consider the costs PSNH incurred to install the treatment system.[65] As explained in Section II.D.1., above, EPA's assertions are not only misplaced, they are also disingenuous given that it was the agency's refusal to act that put PSNH in the regulatory predicament of having to install the SWWTS. PSNH's installation of the SWWTS at Merrimack Station simply was not voluntary. EPA is therefore required to compare the costs of that installation (coupled with annual O&M costs) with the corresponding benefits the hypothetical operation of the SWWTS as a pollutant reduction system would yield.

Both EPRI and UWAG evaluated the incremental cost-effectiveness of this hypothetical operation of PSNH's SWWTS and found that, even if one conservatively assumes the SWWTS

[65] In fact, UWAG outlines and critiques the incomplete actions EPA took to attempt to evaluate the cost-effectiveness of PSNH's SWWTS. *See* UWAG 2014 Comments at 15-16. EPA attempted to quantify the pollutant reduction capabilities of various treatment technologies. Yet, the agency did not even utilize pollutant loading data from Merrimack Station and, instead, used and evaluated heavily scrutinized data collected by EPA Headquarters to inform its ongoing NELGs rulemaking. Moreover, EPA Region 1 did not take the next required step in the overall analysis by comparing the cost of installing and operating each technological option with the total TWPE removed by that technology. *See id.* EPA's failure to perform this fundamental analysis that has been an integral part of so many of the agency's previous BAT determinations is arbitrary and capricious.

could eliminate all of the remaining TWPE from the PWWTS effluent, the benefits would be grossly outweighed by the costs:

	TWPE Removed	TWPE Remaining	Capital Costs ($M) 2011	O&M ($M/yr) 2011	Total Annualized ($M/yr) 2011	Total Annualized ($M/yr) 1981	Cost-Benefit ($/TWPE) 2011	Cost-Benefit ($/TWPE) 1981
UWAG	555	0	35.3	2.1	6.39	2.49	$11,513	$4,490
EPRI	478	0				2.2		$4,563

As indicated, the cost per TWPE ranges from $4,490 to $4,563 in 1981 dollars. As previously mentioned, at no point has EPA exceeded a cost per TWPE of $404 in 1981 dollars and, in fact, the agency typically strives to keep this ratio below $200. *See, e.g.,* 78 Fed. Reg. at 34,504; 68 Fed. Reg. 25,686, 25,701-02 (May 13, 2003).

Furthermore, setting aside the argument over whether PSNH's initial capital costs for the installation of the SWWTS should be considered, EPA must evaluate the costs of the mandatory redundancies PSNH would have to purchase and install at Merrimack Station to comply with the agency's unattainable effluent limit against the benefits of the treatment system. As stated above, EPA failed to so much as consider whether PSNH would need any such redundancies to comply with the agency's unachievable limitations and conditions. This is improper. PSNH considered this scenario utilizing TWPE calculations from both UWAG and EPRI and found that the costs of the required redundancies versus the relative incremental benefits are completely imbalanced:

	TWPE Removed	TWPE Remaining	Capital Costs ($M) 2014	O&M ($M/yr) 2014	Total Annualized ($M/yr) 2014	Cost-Benefit ($/TWPE) 2014	Cost-Benefit ($/TWPE) 1981
UWAG Data	555	0	42.2	2.6	4.0	$11.789	$4,494
EPRI Data	478	0	42.2	2.6	4.0	$13,688	$5,217

PSNH conservatively assumed that the SWWTS could eliminate all of the remaining TWPE from the PWWTS effluent under this hypothetical scenario.[66] Using this scenario, the cost per TWPE ranges from $4,494 to $5,217 in 1981 dollars, clearly outside any established and reasonable cost benefit range.

Lastly, even if EPA erroneously does not recognize the fact that PSNH would need the aforementioned redundancies to attempt to comply with the "no discharge" effluent limit in EPA's draft permit (which it cannot), the agency cannot dispute that it is obligated to evaluate the annual O&M costs to operate the SWWTS against the incremental benefits the system could theoretically provide under this contrived scenario. Both UWAG and PSNH evaluated these numbers and found that the annual O&M costs alone outweigh the corresponding incremental benefits provided by the treatment technology:

	TWPE Removed	TWPE Remaining	Capital Costs ($M) 2011	O&M ($M/yr) 2011	Cost-Benefit ($/TWPE) 2011	Cost-Benefit ($/TWPE) 1981
UWAG	555	0	0	2.52	$4,532	$1,767
EPRI Data	555	0	0 (2014 $)	2.6 (2014 $)	$5,356 (2014 $)	$2,042

It was once again conservatively assumed in this hypothetical scenario that the SWWTS could eliminate all of the remaining TWPE from the PWWTS effluent and the annual O&M costs still far outweighed the costs. Just the O & M cost per TWPE ranges from $1,767 to $2,042 in 1981 dollars.

In the end, operation of the SWWTS in the manner EPA advances in its draft permit is not possible. Even if it were, the costs and corresponding benefits under each of the above-

[66] If EPA considered the initial installation costs and the cost of necessary redundancies, which it should, the cost-benefit ratio becomes even more imbalanced. PSNH calculated those incremental cost-benefit totals as $6,837 and $7,939 in 1981 dollars utilizing TWPE calculations from UWAG and EPRI, respectively.

described scenarios do not satisfy any cost-benefit test consistently used by EPA in the past for determining BAT. This is an inescapable truth because so few constituents remain in Merrimack Station's FGD waste water following treatment by the PWWTS, which is why that treatment system alone is BAT for Merrimack Station.

iv. Existing spatial constraints at Merrimack Station would make the construction of a redundant and/or new technological system at Merrimack Station difficult, if not impossible

Access will be one of the most challenging aspects of constructing the necessary redundant equipment for the SWWTS at Merrimack Station, should EPA proceed with the effluent limitations in the draft permit. On a greenfield site, access and optimal arrangement is virtually unrestricted. But on an existing power plant site, such as Merrimack Station, a contractor must consider all of the existing operating equipment, the power line location, and each system adjacent to the SWWTS area. Air, water, and waste control equipment "compete" for space at Merrimack Station because there is limited space in which to achieve the maximum environmental benefit from control technologies. Retrofits are generally very expensive and, once installed, necessarily preclude other technologies from occupying the same space. One also has to consider those features affected by the existing underground work for system electrical, instrument and control, and all of the numerous water sources that transverse the power station site.

Due to space limitations at the time, the existing SWWTS building was not designed to accommodate additional equipment. While the current arrangement is workable, there is no additional space in the existing SWWTS building for any of the redundant equipment.

A new building would need to be constructed for the required redundant equipment. As seen in Exhibit 11, a recent site plan of Merrimack Station, the existing SWWTS building is on the edge of the cooling canal, next to the PWWTS building and an access road. The access road is used for delivery and maintenance of the two existing water treatment buildings. There is no space to the north, south, or east of the existing SWWTS.

v. The Sizeable Parasitic Load Associated with Operating PSNH's SWWTS casts doubt on its identification as BAT

The SWWTS has a large parasitic load that cannot be disregarded by EPA. The crystallizers at Merrimack Station are the largest users of energy in the SWWTS process because they must evaporate clean water from the brine concentrator at a one-to-one ratio. Crystallizers use a "brute force" of electrical power to create clean distillate. Specifically, it takes approximately one pound of steam from the auxiliary boiler to generate one pound of clean water from the distillate.

EPA attempts to discount these energy requirements by claiming that the energy demand value "is a tiny fraction of the total energy generated at the Station." Fact Sheet at 46. EPA's assertions are beside the point because no technology or equipment at a large power plant will ever be comparatively significant in terms of energy demand. A meaningful energy consumption analysis cannot be made by comparison to the energy production capacity of a power plant. Instead, EPA is obligated to evaluate the energy demand of one available technology versus another to determine which is technologically and economically achievable.

EPA failed to compare the energy demand associated with each technology available at PSNH's Merrimack Station. Energy demand required for the SWWTS is not inconsequential. Approximately 1.2 MW are required to operate the SWWTS. For the sake of comparison, PSNH's Canaan Hydroelectric Station generates about 1 MW when operating at full capacity. This parasitic load translates to an estimated annual energy cost of approximately $374,000 to PSNH.

3. EPA correctly dismissed Biological Treatment as BAT in its revised permit issuance

EPA was correct to abandon its previous BAT determination that would have required PSNH to install biological treatment technology at Merrimack Station. Such technologies remain unproven and ineffective for the treatment of FGD waste waters and therefore cannot be considered legally "available" when conducting the requisite BAT analysis for FGD waste waters generated at Merrimack Station. Moreover, biological treatment technology removes only a small mass of a limited subset of pollutants, making it cost-prohibitive. A comparison of this technology with Merrimack Station's physical/chemical system with EMARS, which removes the overwhelming majority of a wider array of pollutants of concern, clearly confirms this fact.

PSNH addresses biological treatment technologies again in these comments because the company believes EPA will be forced to abandon its identification of the SWWTS at Merrimack Station as BAT in any final NPDES permit following review of PSNH's comments, as well as comments from other interested stakeholders. This section of PSNH's comments is therefore included to: (1) reiterate the key points from its February 28, 2012 comments to EPA's original draft permit for Merrimack Station;[67] (2) provide what new information PSNH has learned about the operations and overall effectiveness of biological treatment technologies since submitting its 2012 comments; and (3) provide key points of insight from the industry's comments to EPA's 2013 draft NELGs regarding the operations and overall effectiveness of biological treatment technologies. Collectively, this information again demonstrates why biological treatment

[67] PSNH incorporates as if fully set out herein its February 28, 2012 comments relating to EPA's 2011 determination that biological treatment technologies are BAT at Merrimack Station. *See* PSNH's 2012 Comments, at 134-49; 158-69.

technologies are not, and cannot legally be declared, BAT for the treatment of waste waters at Merrimack Station.

a. The Effectiveness of Biological Treatment Technologies are Unproven or, at Best, Speculative and Site-Specific

Biological treatment cannot be considered a legally "available" technology for possible application as BAT for the treatment of FGD waste waters. It is still utilized today at only a handful of plants in the country[68] to treat FGD waste waters and was only recently installed at each such facility for this purpose. Existing data regarding the overall effectiveness of this technology is therefore patently lacking. What data does exist casts serious doubts on whether biological treatment is even effective at the plants that currently employ the technology—much less whether the technology may be successfully utilized at other facilities, including Merrimack Station—given that each biological treatment system must be able to adapt to the conditions in its own plant in order to successfully and consistently remove any constituents. Specifically, as mentioned above, both Roxboro Station and Mayo Station have abandoned biological treatment because of the narrow focus of the treatment ability of this system and turned to other treatment technologies that accomplish better removal rates for a wider range of metals and pollutants.

EPA also did not consider all of the limited available data regarding biological treatment technologies before labeling it as BAT for Merrimack Station in 2011. Instead, EPA relied upon data from two essentially identical facilities located in North Carolina utilizing the technology (Duke Energy's Allen and Belews Creek Stations) in order to justify its predestined BAT determination. Duke Energy completed the Belews Creek waste water treatment system in 2008 and used experience gained from the design and operation of Belews Creek to subsequently build

[68] Biological treatment is currently operational at only the Allen, Belews Creek, and Flint Stations within the United States. It was previously installed at the Roxboro and Mayo Stations, as well, but has been abandoned at these plants due to the limited application of the technology.

the same type of treatment system at Allen—with both facilities utilizing GE's ABMet system. The two facilities burn the same types of low sulfur coal—primarily Central Appalachian coal—and have essentially the same process configurations. Compared to the industry as a whole, influent to the FGD treatment system at both facilities is also markedly low in total suspended solids ("TSS"), TDS, nitrate/nitrite levels, and chlorides, making it relatively easy to treat. EPA did not evaluate any biological systems optimized for both selenium and nitrate/nitrite removal, nor did the agency evaluate systems subjected to influent with consistently higher levels of selenium and/or nitrate.[69]

The Belews Creek and Allen systems generate a sizeable FGD stream, on the order of 400 to 600 gallons/minute, as well. Comparatively, Merrimack Station generates an FGD stream on the order of 50 gallons/minute and the existing PWWTS has minimal capacity to process additional effluent from the bioreactors. EPA did nothing in its initial draft permit issuance to explain or prove that the performance of the chemical precipitation plus biological treatment systems at Belews Creek and Allen could potentially be mimicked at Merrimack Station or elsewhere in the country. In reality, biological treatment cannot be effectively implemented at Merrimack Station and EPA was therefore correct to omit the technological option from its latest draft permit.

Even Duke Energy expressed its reservations to EPA regarding the viability of biological treatment technologies on a national level or at facilities with differing operating characteristics in response to the agency's proposed NELGs:

[69] It is believed that biological treatment of nitrogen is more complicated than treatment of selenium because the former requires a series of denitrification/nitrification steps, which can be dramatically impacted by numerous factors such as ambient temperature, coal characteristics, scrubber design and operation, and pretreatment steps. Regardless of the exact processes for treating nitrogen and selenium, it is very likely that nitrates and oxidized selenium compounds compete against each other for the same microbes found in biological treatment and that optimizations required for the treatment and removal of the former differ from the conditions that are optimal for the removal of oxidized selenium compounds.

EPA has failed to demonstrate that other utilities would be able to achieve similar removal performance as the treatment systems at Allen and Belews Creek. These systems encounter a number of challenges and even EPA has acknowledged that they are "aware of industry concerns with the feasibility of biological treatment at some power plants. Specifically, industry has asserted that the efficacy of these systems is unpredictable, and is subject to temperature changes, high chloride concentrations, and high oxidation reduction potential in the absorber (which may kill the treatment bacteria)." [78 Fed. Reg. at 34470.]

First, the performance of biological treatment systems has not been demonstrated over a wide range of fuels. [The limited data EPA collected for the rulemaking does not include] enough samples to account for the variations in the bioreactor influent (i.e. baseline) concentrations due to changing fuel conditions or the subsequent impacts to treatment system performance for bioreactors. The data that EPA used for its analysis was collected when Allen and Belews Creek burned primarily low sulfur Central Appalachian coal. However, there is a wide range of coal types available and used outside of the Central Appalachian region.

Duke Energy has significant concerns with demonstrating continuous compliance with the proposed BAT limits for biological treatment systems with alternate fuels. Duke Energy's experience has shown that when coal is combusted with constituents or properties that are different from Central Appalachian coal (i.e. Northern Appalachian coal, Illinois River Basin, etc), increases in the ORP (oxidation reduction potential) of the scrubber slurry have been observed. High ORPs (greater than 500 mv), result in the formation of free available oxidants (FAO), which can adversely impact the microbe health in the bioreactor. This decline in microbial health can lead to reduced performance of the biological system. As an example, in late 2011, the Allen Steam Station conducted a test burn of a high sulfur blended coal containing Illinois River Basin coal. During the test burn, increased ORP values within the influent to the FGD waste water treatment system and within the FGD scrubber were observed. With the increased oxidizing environment within the scrubber, a noticeable chorine-like smell was observed and an increase in FAO [free available oxidant] was detected within the influent to the FGD waste water treatment system. To prevent damage to the microbes within the bioreactors, the test burn was stopped immediately and flow to the bioreactors was interrupted for several days . . . . If the test burn had been allowed to continue, and elevated ORP values continued, there was a concern that the increased oxidizing environment would cause substantial harm to

> the organisms in the bioreactors. Upon investigating this incident, it has become apparently clear that the waste water matrix generated during this test burn was completely different than any previously observed FGD waste water matrix at Allen or Belews Creek.
>
> Second, biological systems rely on living organisms to treat the water. The microorganisms are susceptible to performance degradation due to operational and ambient variations. For example, it is difficult to maintain the microbe's health when units are offline. In past years, large coal plants have operated continuously as base loaded units. It would be challenging to maintain a biological system for coal stations that cycle or are peaking units, especially in colder regions. A real concern is the recent sporadic operational trend of coal units, due to low natural gas prices, coupled with the increased environmental costs.

Duke Energy's Comments on EPA's NELGs (Sept. 19, 2013) at 14-16.

As Duke Energy aptly states, changes in fuel type, FGD scrubber operations, temperatures, plant size, boiler type, combustion process, testing capabilities, as well as other variables all have the potential to significantly alter the operations and overall effectiveness of biological treatment systems. Because these variables vary greatly from plant to plant, this treatment option is anything but widely applicable. Instead, its proven capabilities are, at best, marginal and limited in application to two identical plants with optimum FGD influent and operating conditions.

Because of the novelty of this biological treatment option and its limited application to FGD waste waters, EPA and the regulated community alike do not yet fully understand the successes and limitations associated with this technology. The technology has not yet been fully vetted and evidence of its supposed success is at best speculative and may not be transferrable, especially because the sensitive microorganisms in the biological reactors must adapt to the conditions of each individual plant in order to successfully remove any constituents.

In 2011, EPA hastily and improperly seized upon the idea of biological treatment technology, believing it useful for the treatment of a minute subset of pollutants at Merrimack Station despite a dearth of valid and sound science to support its theories. Without a doubt, PSNH would have experienced countless operational issues had it installed this unproven technology at that time. Nearly three years later, EPA has all-but abandoned this technology in the latest draft permit and grasped at yet another technology *de jour*. The agency's actions in this regard are similarly unsupported.

EPA is the primary agency of the federal government tasked with protecting and safeguarding human health and the environment. The agency is obligated to foster the sound use of science and technology to fulfill this mission. Its actions in this permit renewal process fall far short of this straightforward goal and, instead, have been supplanted by an unwavering initiative to set a lofty precedent for the future treatment of FGD waste waters within the industry without sufficiently supporting and justifying its BAT determinations.

b. A Proper BAT Analysis Demonstrates that Biological Treatment is Not BAT for Merrimack Station

As stated above, before EPA may permissibly label a technology or treatment system as BAT for a given facility utilizing its BPJ, the agency must specifically evaluate: the age of the equipment and facilities involved; the process employed and process changes; the engineering aspects of the application of various types of control techniques; the cost of achieving such effluent reduction; and non-water quality environmental impacts (including energy requirements). 40 C.F.R. § 125.3(d)(3)(i)–(vi). EPA should also take the following into account in its BAT analysis: (1) "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and (2) [a]ny unique factors relating to the applicant." 40 C.F.R. §§ 125.3(c)(2)(i)–(ii); 125.3(d)(3); 33 U.S.C. §

1311(b)(2)(A). When evaluated correctly, each of these factors supports a conclusion that biological treatment is not BAT for Merrimack Station and that EPA correctly deserted this technological option in its latest draft permit.

i. The Cost and Relative Benefits of Biological Treatment Validate that it is not BAT

EPA Region 1 estimated in its initial draft permit that the addition of a biological system at Merrimack Station capable of treating 50 gallons of influent per minute would cost approximately $4.95 million to install and $297,000 annually to operate and maintain:

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

See Admin. Record Doc. 118 (Memorandum from Ronald Jordan to Sharon DeMeo (Sept. 13, 2011)). As PSNH explained in its 2012 comments, EPA's cost estimates were grossly understated, incomplete, and inaccurate. In reality, the cost to install such a system today at Merrimack Station would be approximately $9 million[70] due primarily to the need for a: (1) treatment system with capacity to handle a flow as high as 70 gallons/minute to accommodate the peak flow of waste water that could be generated; and 92) large building to enclose all of the technological equipment because of the mortality risk of the microorganisms (bugs) in the biological treatment process at temperatures below 40ºF. The agency also underestimated the capital costs associated with engineering and design, construction management, training, and PSNH labor, among other things. Likewise, the annual O&M costs associated with this system at Merrimack Station are much greater than EPA estimated in 2011 and would range from

[70] Again, PSNH has updated both its technological cost and TWPE removal estimates in these comments. The technological cost estimates have changed to reflect current market conditions. The TWPE estimates also differ from those provided in PSNH's 2012 comments and, in fact, are based on data collected over the past few years that better reflect the capabilities of PSNH's existing pollution control equipment during steady-state operations.

$500,000 to $600,000 annually because of the need to constantly monitor and periodically backwash the biological treatment system, handle and dispose of treated waste once it has been processed by the biological treatment system, and the need to maintain a year-round temperature-controlled environment to maintain the effectiveness of the system.

Using its understated cost numbers, EPA Region 1 found that biological treatment was not cost-prohibitive for Merrimack Station. In fact, the agency claimed the technology was more cost-effective than physical/chemical treatment alone but failed to disclose in the administrative record any concrete calculations or documentation to support this assertion. The sole analysis included in the record is Document 118, which includes the table set out above. *See id.* In this email correspondence, EPA provides that it purportedly formulated its cost estimates from data collected from the industry and various vendors.[71] Yet, there is nothing to indicate that the agency even attempted to evaluate how unique site-specific conditions at Merrimack Station could impact those installation cost numbers. *See id.* Without concrete work papers, as well as evidence of any evaluation by EPA as to how site-specific conditions may alter the agency's generic cost estimates, PSNH still to this day has no idea how EPA reached these purported conclusions.[72] PSNH can only assume that in evaluating the cost-effectiveness of various technological options for Merrimack Station that EPA made errors substantially similar to those made by the agency in formulating pollutant removal estimations and cost-effectiveness analyses in the NELGs. Specifically, in the NELGs, EPA erroneously reduced the estimated pounds of pollutant removed from physical/chemical treatment systems and, conversely, inflated the

[71] Notably, none of this data is included in Region 1's administrative record for this draft permit. EPA also failed to provide this documentation in response to numerous FOIA requests submitted by PSNH over the years specifically seeking these records.

[72] Failing to provide this most basic supporting documentation violates not only the Administrative Procedure Act and the tenets of due process guaranteed by the United States Constitution, it also runs counter to President Obama's January 21, 2009 Memorandum on Transparency and Open Government. *See generally* http://www.whitehouse.gov/open/about.

estimated pollutants removed from biological treatment. In fact, EPA credited biological treatment with pollutant removals for numerous pollutants (such as boron, magnesium, manganese, and cyanide) that are not even removed by that treatment technology. UWAG addressed these errors at length in its comments to the NELGs. *See, e.g.*, UWAG's Comments to EPA's NELGs, at 132-48 (Sept. 20, 2013).

As mentioned in PSNH's 2012 Comments, UWAG tried to recreate EPA's calculations of pounds removed and the costs of removing them and found that it was impossible. *See* UWAG Comments on Proposed NPDES Permit for the Merrimack Station, at 44-45 (Feb. 28, 2012) ("UWAG 2012 Comments"). EPA's estimate of 16,900 lb/yr of pollutant reduction by the physical/chemical treatment system was low and incorrect. *See* Admin. Record Doc. 118. Instead, UWAG estimated that Merrimack Station's PWWTS removes in excess of 80,000 lb/yr. UWAG 2012 Comments at 48-49. UWAG believed EPA's erroneous pollutant reduction calculations were based on an assumption that Merrimack Station has a settling pond prior to its physical/chemical treatment system. It does not.

UWAG also found that biological treatment at Merrimack Station will not remove in excess of 622,000 pounds per year of additional pollutants, as EPA claimed in its justification for the initial draft permit. Instead, UWAG determined in 2012 that less than 3,000 additional pounds per year would be removed by the biological treatment technologies. *Id.* at 48-49. Again, PSNH must believe that EPA's inflated removal numbers stem from the agency's decision to credit biological treatment technologies with pollutant removals for pollutants that are not even eliminated by that treatment technology. In projecting the expected pollutant removal totals for Merrimack Station, UWAG relied upon data from the Belews Creek and Allen plants and adjusted the data to correspond with the average flows of Merrimack Station. UWAG

Comments at 46-48. UWAG utilized this methodology because PSNH had only just commenced use of its PWWTS at the time. As described in Section IV.A.1., above, PSNH's PWWTS has proven to be quite effective. In fact, PSNH's current data reveals that its PWWTS consistently removes all but 555 TWPE per year, according to UWAG's calculations.[73]

In the end, the culmination of EPA's incomplete, self-selected, and erroneous data resulted in an invalid determination in its 2011 draft permit that the cost-per-pound (not the proper analysis of cost-per-TWPE) estimate for the removal of pollutants by biological treatment technologies at Merrimack Station is only **$1.23 per pound**. EPA's grossly misstated annual pollutant removal calculations made biological treatment appear vastly more effective than it is, and even more egregiously, made biological treatment appear more effective than Merrimack Station's PWWTS—which is far from true.[74]

By comparison, the cost-per-pound removed for biological technology is actually $503 per pound and $728 per pound at the Belews Creek and Allen plants, respectively, according to UWAG's 2012 estimated removal rates and EPRI's annualized costs. *Id.* at 49-50. Because PSNH's current data shows that its PWWTS will remove all but 555 TWPE per year, according to UWAG, and that biological treatment technologies would only remove an additional 27 TWPE annually, the incremental cost-per-TWPE removed, if Merrimack Station were required to install biological treatment to meet the draft permit limits, would be **$21,627 per TWPE ($1981).** *See* UWAG 2014 Comments, Att. 1. EPA has never required such arbitrary limits based on cost-prohibitive technologies in an NPDES permit and the agency was therefore correct

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[73] And, EPRI's calculations indicate that PSNH's PWWTS consistently removes all but 478 TWPE annually. *See* EPRI 2014 Comments at 1.

[74] EPA repeated this same "error" in its draft NELGs and the inaccuracies of EPA's calculations and assertions were critiqued by many in comments submitted to the proposed rule. *See, e.g.,* UWAG's Comments to EPA's NELGs at 129-150 (Sept. 20, 2013).

in eliminating any technological limits from the draft permit based on this limited and ineffective technology.

ii. Engineering Processes Associated with Biological Treatment Also Confirm it is Not BAT for Merrimack Station

Biological treatment technologies have various significant limitations, many of which are due to the fact that the technology relies upon biological processes that require precise conditions in order to function properly. As discussed at length above, EPA based its proposed BAT limits for selenium and nitrate/nitrite-N on data collected at Belews Creek and Allen plants, but those plants are neither representative of Merrimack Station (or the rest of the coal-fired electric utility industry, for that matter) and the limits derived from EPA's limited analysis of those plants will be difficult if not impossible to achieve. Because EPA used only these two plants, which have ideal operating conditions for utilizing biological treatment of FGD waste water, EPA ignored the limitations of this technology that would prove problematic if PSNH were required to implement it. PSNH offers the following discussions of the currently known sensitivities or problems PSNH anticipates if forced to implement this technology.

(a) Temperature

Water temperature has to be well controlled to ensure good selenium and nitrate/nitrite removal in biological treatment systems. Sustained extreme temperatures, as well as periodic variations of water temperature could impact the behavior of the bacteria. In fact, research has revealed that the denitrification reaction rate could decrease by 50 percent with a 10°C temperature drop, and by 80 percent with a 20°C temperature drop.[75] Therefore, biological

[75] *See* Carrera, J., Vicent, T., Lafuente, F., "Influence of Temperature on Denitrification of an Industrial High-Strength Nitrogen Waste water in a Two-Sludge System," Water SA, 2003. Vol. 29 No. 1, pp. 11-16; Lewandoswki, Z., "Temperature Dependency of Biological Denitrification with Organic Materials Addition," *Water Research*, 1982, Vol. 16, pp. 19-22.

systems must be designed to keep water temperatures stable in order to keep the reaction rate stable.

In 2010, four GE ABMet systems were in operation in the industry. Belews Creek and Allen are two of those systems and both have chemical precipitation pretreatment and heat exchangers to control the water temperature. One of other two biological systems—Roxboro Station—used only a pretreatment pond and did not have temperature control equipment.[76] As stated above, the Roxboro facility has since abandoned biological treatment because of the poor performance of the technology, as well as because of the narrow focus of the treatment ability of the system.

PSNH's Merrimack Station will experience additional complications with biological treatment due to its cold weather climate because the microorganisms in the biological treatment process have a mortality risk below 40ºF. New Hampshire experiences sustained temperatures at or below 40ºF most of the winter season, meaning PSNH would have to construct large buildings at Merrimack Station to enclose the equipment needed. This equipment includes, among other things: tanks, pumps, piping, electrical and control system, foundations, sumps, curbs, trenching for exterior interconnection piping for numerous systems, an electrical power supply line, and an HVAC system to control the temperature. The need for stable temperatures will significantly increase the cost to maintain and operate the system and will also increase the parasitic load at the facility.

[76] Sonstegard, J., J. Harwood, T. Pickett, and D. Johnson, *Full Scale Operation of GE ABMet Biological Technology for the Removal of Selenium from FGD Waste waters*, 2008 International Water Conference, IWC-08-31. Steam Electric Power Generation Point Source Category: Final Detailed Study Report (2009), EPA 821-R-09-008.

(b) Nitrate/Nitrite Levels

Proponents of the GE ABMet biological treatment system claim that it is "designed to handle . . . suspended solids up to 100 ppm, nitrate/nitrite loading less than 100 ppm."[77] Despite this claim, Belews Creek and Allen both have nitrate/nitrite levels lower than 100 ppm, meaning those facilities can more easily meet the nitrate/nitrite and selenium limit. In truth, GE's ABMet system was not designed to effectively remove nitrates, only selenium. Under high nitrate/nitrite scenarios, biological treatment systems may become less effective at removing sufficient amounts of selenium and nitrate from the waste water.

(c) Oxidation Reduction Potential (ORP)

High ORP in FGD waste waters may also impact the effectiveness of biological treatment. Biological treatment systems for denitrification and selenium removal are anoxic-anaerobic processes, meaning the technology must first consume oxygen or other oxidants present, then nitrate/nitrite, and finally selenite/selenate. High ORP means that the FGD waste water has high concentrations of oxidants that could consume the biological system's reduction capability, which could consequently reduce its capability to remove nitrate/nitrite and selenite/selenate. Even worse, in extreme cases within high ORP scrubbers, hypobromite (BrO-) could be produced, which could kill the bacteria. The ORP at both Belews Creek and Allen are typically very low, meaning they also do not experience this potential problem that could affect operations at Merrimack Station.

Duke Energy discussed this very issue in its comments to EPA's initial draft permit for PSNH's Merrimack Station. Specifically, Duke noted that "[m]any factors affect ORP, including the use of selective catalytic reduction (SCR) equipment, the generating load, the

[77] Sonstegard, J., J. Harwood, and T. Pickett. *Setting the Standard for Selenium Removal*, 2010 International Water Conference, IWC-10-18 at 5.

amount of sulfur in the coal, the pH, [and] the quality of makeup water for the scrubber." Duke Energy's 2012 Comments to EPA's Draft Permit, at 2 (Feb. 27, 2012) ("Duke Energy 2012 Comments"). In fact, the test burn described in Duke's Comments to EPA's draft NELGs, set out in Section IV.A.3.a., above provides a first-hand account of how difficult it can be to control ORP levels because so many factors have the potential to impact it.

(d) Production of Ammonia

EPA also failed to consider the potential additional costs associated with ammonia produced during the biological treatment process. Specifically, ammonia may be generated as a byproduct of the biological treatment system at some facilities during the anaerobic biological process. The formation of this byproduct can be impacted by temperature, ORP, and microbial activity and could vary greatly within the industry. This may present additional issues at Merrimack Station if biological treatment technologies were required to comply with applicable permit limits.

(e) Biological Backwash

Another issue with biological treatment is the saturation of the biological filter and the need to backflush the system's microbes and collected waste. Activated carbon layers in various reactors are used where biological mass is grown. There are typically two stages of biological carbon filters which do require backwash on a periodic basis. The frequency with which this backwash process must occur is based on operational needs and the quantity and volume of backwash that plant personnel will be able to manage. This biological filter might need to be constantly monitored to ensure that it does not become saturated. This will require operational changes and resource allocation and renders this technology even more cost-prohibitive and ineffective.

This biological backwash has the potential to negatively impact Merrimack Station's PWWTS, as well. The only feasible option for Merrimack Station, given operational and site constraints, is to recirculate the treated waste back through the PWWTS. This must be done at slow feed rates in order to prevent overloading the system. However, plants that have installed and operated physical/chemical systems specifically for FGD waste water treatment (such as Merrimack Station), will likely lack added margin to accept this new flow through its normal operations, and it would be very difficult for such a system to also be charged with treating the sludge from the biological treatment process. Therefore, adding the waste back from a biological system would bring the guaranteed removal rate of the physical/chemical system into question.

As explained earlier in these comments, Merrimack Station's PWWTS is carefully designed and operated to provide the maximum reduction level of all constituents of concern. Many FGD waste water treatment systems like Merrimack Station's are finely tuned to accept a high ORP which, for example, affects mercury speciation and capture. It is critical to the operation of the PWWTS to maintain the correct ORP level, which at Merrimack Station is elevated. A biological reactor necessarily changes the anaerobic levels which, in turn, lower the ORP significantly. If this stream containing lower ORP is then reintroduced to the PWWTS, it could also significantly impact the effectiveness of the system. In fact, the addition of lower ORP is not consistent with the original design guidelines and could likely jeopardize the guarantees of the PWWTS itself. Moreover, the high ORP will significantly reduce the effectiveness of any contemplated biological reactor.[78]

The recirculated effluent from the biological system would necessarily contain biological solids and waste. Current physical/chemical systems are not designed to process biological

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

waste or the expected volume of that waste. If facilities were required to recirculate the treated waste back through the physical/chemical system, the effluent would exceed the design solids loading. EPA failed to so much as even consider this aspect or consequence of utilizing biological treatment at Merrimack Station prior to issuing its initial draft permit. If the agency had done so, it could not have reasonably identified biological reactors as BAT for Merrimack Station due to its PWWTS.

Where a facility like Merrimack Station is unable to dispose of the backwash via ponds, and because a recirculation methodology is not feasible, it would be forced to seek out other disposal options. EPA similarly failed to consider the cost of waste disposal in its cost-estimate analysis associated with biological treatment in the initial draft permit.

(f) Footprint Concerns

Similar to the spatial issues associated with the installation of redundant components of the SWWTS, Merrimack Station also does not likely possess the necessary space to physically install any biological treatment system and building. Merrimack Station is currently very constrained and congested for siting the necessary infrastructure. This fact means that existing facilities would likely have to be removed to make room for the infrastructure and building and to interconnect it to the Station's PWWTS, which would make the installation of this treatment technology even more cost-prohibitive.

iii. Operational Constraints Created by the Scrubber Effluent Dictate that Biological Treatment is Not BAT

A number of factors, including but not limited to the particular scrubber system installed at a particular facility, as well as the type of coal burned at the plant and other additives, can have a dramatic impact on the waste water generated by the FGD scrubber system. Merrimack Station's FGD waters are different than the waters associated with many scrubber systems, and are certainly different from the two Duke Energy plants on which EPA based its entire conclusion to identify biological treatment as BAT in the initial draft permit.

Nitrate levels within Merrimack Station's FGD waste water stream contain comparatively more nitrates and lower levels of ammonia than Duke Energy's facilities. These levels are atypical and lend credence to the belief that Merrimack Station's existing treatment systems are converting ammonia into nitrates, which is similar to what happens in a biological treatment system. This is problematic because power plants do not operate in a steady state condition and have many changing factors that must be taken into account during operation. For example, nitrate concentrations that are elevated to the level that Merrimack Station experiences cannot be effectively treated by available biological treatment systems. Moreover, if the microorganisms in the biological treatment system become acclimated to living among elevated nitrate levels (around 60 to 100 mg/l or higher), they could very well be more sensitive to upsets in conditions. This is a real possibility if the high nitrate levels are not consistently maintained, which is a likely outcome given that the scrubber at Merrimack Station is associated with two different sized units, each burning different and variable coal blends, coupled with the fact that each unit can change output levels frequently during the week, causing numerous transient conditions and resultant chemistry and process changes.[79] Each of these changes, alone or in combination, would undoubtedly interfere with the efficacy of biological treatment technologies.

[79] Higher nitrate levels also require more backwashing, adding to the overload of the PWWTS.

iv. The Non-water Quality Environmental Impacts Associated with Biological Treatment Technologies also Validate that it is Not BAT for Merrimack Station

(a) The Sensitivities of Biological Treatment Operations Will Impact the Reliability of Merrimack Station and the Regional Grid

At this point in time, the reliability of biological systems is unproven, especially when intermittent and variable pollutant loadings to the treatment system are taken into account. When one considers each of the above-referenced engineering variables, the reliability of biological systems for treatment of FGD waste water is even further called into question and would likely affect the overall reliability of Merrimack Station. In some cases, one or more of these variables could cause the entire biological system to fail or even result in the dying off of the microbes (or "bugs") that make up the biological system. This could force the plant to be offline for days because obtaining replacement microbes can often take that long, as most vendors deliver them by truck. This could have a detrimental impact on the local community or electric grid reliability issues, especially if any such issues occurred during an extreme weather event. The cycling of plant operations more often than originally designed due to the unreliability of the biological treatment equipment will greatly increase plant O&M costs, as well.

EPA has publicly acknowledged that it does not have sufficient expertise within the agency to evaluate and consider the adverse reliability impacts of its directives applicable to coal-fired generation facilities.[80] EPA's insufficient expertise is most pronounced in the areas of

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

local and regional grids. EPA has acknowledged the "complexity of the electric system and the local nature of many reliability issues" and stated its intent to consult with "reliability experts, including but not limited to the Federal Energy Regulatory Commission ("FERC"), Regional Transmission Operators ("RTOs"), Independent System Operators ("ISOs"), and other planning authorities . . . the North American Electric Reliability Corporation ("NERC") and affiliate regional entities, such as state public service commissions ("PSCs") and public utility commissions ("PUCs")". Enforcement Responses Policy at 2. Yet, EPA did not consult with any reliability experts before issuing either draft permit for Merrimack Station.

c. The 2011 Effluent Limits Based on Biological Treatment Technologies Were Unreasonable and Could Not Be Met by the Facilities EPA Utilized in Creating the Limits

Comments submitted by Duke Energy in response to EPA's initial draft permit demonstrate that even the Belews Creek and Allen plants could not consistently comply with the effluent limits contained in that draft permit. *See* Duke Energy's 2012 Comments at 7-11. PSNH hereby incorporates as if fully set out herein the aforementioned Duke Energy comments, as well as Duke's thorough evaluation and critique of the data from its facilities that was either used or excluded by EPA in formulating limits for the initial Merrimack Station permit. *See id.* at 3-11.

PSNH also incorporates by reference EPRI's comments to EPA's latest draft permit for Merrimack Station describing the 10-month pilot test EPRI recently completed with a certain utility to assess the effectiveness and performance of various FGD treatment technologies and their respective capabilities to meet the proposed numeric standards for certain constituents of concern set out in the draft NELGs. *See* EPRI 2014 Comments at 2-4. EPRI's data and analysis establishes that these evaluated technologies could not remove constituents of concern to levels necessary to consistently comply with the effluent limits proposed in the draft NELGs. *Id.* at 3-4.

B. EPA Improperly Relies Upon Agency Guidance and Treats it as Law

In 2010, EPA Headquarters issued to each of its Regions a memorandum intended to "guide" the case-by-case BAT determination for FGD waste streams. *See* Letter from Jim Hanlon, Director, Office of Waste water Management, to Water Division Directors Regions 1-10 (June 7, 2010) (hereafter referred to as the "Hanlon Memorandum"). The Hanlon Memorandum specifically calls upon each Region, as well as state permit writers, to formulate case-by-case BAT limits for FGD waste streams utilizing the agency's apparent BPJ authority. The memorandum also bluntly asserts that biological treatment and/or VCE technologies, in addition to physical/chemical treatment, represent BAT for FGD waste streams, as opposed to some other treatment option or physical/chemical treatment alone. EPA Region 1 relied heavily upon the Hanlon Memorandum in its 2011 BAT determination for the FGD waste stream. PSNH must assume that the agency again relied upon this guidance document in formulating its latest arbitrary and capricious BPJ-based effluent limits in the draft permit for Merrimack Station. Any reliance upon the Hanlon Memorandum is unlawful and should not be repeated in formulating final technological limits for Merrimack Station's FGD waste stream.

As a threshold matter, the Hanlon Memorandum is fundamentally incorrect in its assertion that the EPA Regions possess the authority to determine BAT on a case-by-case basis because NELGs already exist for Steam Electric Power generating sources, as discussed in Section IV.C.1. below. Distinct from this error, the Hanlon Memorandum is also unlawful because EPA Headquarters has oppressively forced permit writers to employ the tenets of the memorandum. Doing so has removed any discretionary determinations from the case-specific analysis permit writers are supposed to carry out. EPA has, in effect, treated and applied the

Hanlon Memorandum as a rule having the force of law. Yet, agency guidelines must be subjected to public notice and comment before they carry the force of law. Here, EPA has unlawfully circumvented the notice and comment process by using a guidance document to establish a rule.

Congress equipped EPA with a process for promulgating legally binding substantive rules—*i.e.*, those "agency pronouncements that have the force and effect of law"—through notice and comment rulemaking prescribed in 5 U.S.C. § 553. "Ad hoc national policy determinations developed through internal agency memoranda standing alone without promulgating regulations or guidelines through public notice and/or an opportunity for a public hearing, are not proper procedures for EPA to enforce the FWPCA." *Ford Motor Co. v. EPA*, 567 F.2d 661, 671–72 (6th Cir. 1977) (citing *Assoc. Indus. of Ala. V. Train*, 9 ERC 1561, 1568–69 (N.D. Ala. Dec. 6, 1976)). In *American Mining Congress v. Mine Safety & Health Administration*, 995 F.2d 1106 (D.C. Cir. 1993), the D.C. Circuit established the following four factors to determine whether a rule has a legally binding effect, and thus whether it must undergo notice and comment rulemaking:

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

Id. at 1112.

In recent years, courts have seen an increasing number of lawsuits challenging EPA's use of guidance documents to impose mandatory standards. The courts have resoundingly chastised EPA and its attempts to set binding norms through guidance documents as incompatible with the APA. *See Nat'l Mining Ass'n v. McCarthy*, 2014 U.S. App. LEXIS 13156, at *22-26 (D.C. Cir. July 11, 2014); *Iowa League of Cities v. EPA*, 711 F.3d 844 (8th Cir. 2013) (striking down EPA's use of a guidance document to "create[] a new legal norm").

The transmittal letter accompanying the Hanlon Memorandum clearly articulates EPA's intent in issuing this "guidance":

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

Hanlon Memorandum, at 2. Elsewhere in the memorandum, EPA tells the Regions that "[i]n cases where State permitting authorities do not consider the attached guidance . . . you should work with the States to make appropriate changes," and separately provides that "where the technology-based effluent guidelines do not address all waste streams or all pollutants discharged by the industrial discharge, EPA must establish technology-based effluent limitations on a case-by-case basis." (emphases added). This clearly sets binding policy on EPA regional offices, the kind of binding policy that courts have previously struck down for failing to comply with notice and comment rulemaking. EPA's failure to subject this guidance document to the strictures of notice and comment rulemaking exceeded its authority under the APA and the CWA, and the contents of the guidance document are therefore void and may not be properly relied upon by EPA or any permit writer.

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

Regardless of EPA's specific BAT determination, the agency's attempt to determine BAT on a case-by-case basis, using its BPJ is improper because EPA has established NELGs for Steam Electric Power generating sources. EPA expects to complete a revision to these NELGs by Fall 2015. EPA wrongly decided that, until those revisions are finalized, it is authorized to use its BPJ to create case-by-case effluent limits. Despite the fact that revised effluent guidelines are expected a little over a year from the date of these comments, EPA nonetheless determined that it was necessary to ignore the existing NELGs and establish case-by-case BAT using its BPJ to set effluent guidelines. This was improper and contrary to the CWA. Finally, EPA's decision to use its BPJ to attempt to set macro-level energy and environmental policy at the micro level is unsupported.

1. EPA's Decision to Use its BPJ was Unlawful Because National Effluent Guidelines Already Exist

EPA regulations explicitly state that NELGs for low volume waste cover FGD waste water. 40 CFR Part 423.11(b). BPJ-based limits are designed to fill the gap when no standardized effluent limitations exist. Therefore, EPA's attempt to establish BAT on a case-by-case basis using its BPJ is not authorized by the CWA. *See, e.g., NRDC v. EPA*, 822 F.2d 104, 111 (D.C. Cir. 1987) (noting that a state or permit writer may set BPJ-based limits only if "no national standards" have been promulgated for a point-source category); *Citizens Coal Council v. EPA*, 447 F.3d 879, 881 n.11 (noting that BPJ applies only when "EPA has not promulgated an applicable guideline"); *Riverkeeper*, 358 F.3d at 203 ("It is, of course, true that once the EPA promulgates applicable standards, regulation of those facilities subject to those standards on a best professional judgment basis must cease.").

In the preamble to the 1980 proposed NELGs, EPA stated that it was reserving the right to separately regulate FGD waste water for future rulemaking because there was insufficient data to establish BAT or NSPS for these discharges. 45 Fed. Reg. 68,328, 68,333 (Oct. 14, 1980). In "the interim," however, EPA applied "the BPT control for low volume wastes limiting TSS, pH, and oil and grease . . . to discharges from flue gas cleaning systems using wet scrubbing." *Id*. Thus, EPA intended for the existing technology-based effluent limits for low volume waste streams to apply to FGD waste streams until additional national standards were set.[81] For this reason, EPA's own regulations define "low volume waste sources" to include "waste waters from wet scrubber air pollution control systems." 40 CFR Part 423.11(b).

In a 2009 final "Detail Study" report on the steam electric power generating point source category, EPA confirmed that FGD waste water from wet FGD systems is already considered a "low volume waste" under the Steam Electric Power Generating Guidelines promulgated in 1982 and, therefore, subject to NELGs. Final Detailed Study Report, at 3-17 ("FGD waste waters are currently regulated by the effluent guidelines as low volume wastes generated at steam electric plants [40 C.F.R. 423.11(b)]." (emphasis in original)).[82] EPA Region 1 also confirmed EPA's position by classifying and regulating the FGD waste stream produced at the Brayton Point Power Station in Somerset, Massachusetts as low volume waste. Region 1 explained:

> The facility will be installing selective catalytic reduction (SCR) systems on units 1 and 3, and a wet flue gas desulfurization (FGD) system on unit 3. . . As a result of these technologies, the facility will generate new waste streams which will go to the waste water

[81] Consistent with these policies, the EPA Permit Writer's Manual instructs permits writers to consider whether a pollutant "was not considered by EPA when the agency developed the effluent guidelines" and whether the pollutant is already controlled by the effluent guidelines before the permit writer uses BPJ to regulate the pollutant. Permit Writers' Manual at 5–46.

[82] *Available at* http://water.epa.gov/scitech/wastetech/guide/upload/finalreport.pdf. EPA did not remove FGD waste water from the definition of low volume waste in the Final 1982 NELG rule even though it indicated the intent to regulate FGD waste streams separately from low volume waste streams in the future. *See* 40 C.F.R. § 423.11(b).

> treatment system, and ultimately discharge though 004. *These waste streams are considered low volume waste streams*.[83]

Thus, until EPA finalizes the NELGS, we are still in the "interim" regulatory period identified by EPA in the proposed 1982 effluent limitations." Consequently, waste water from steam electric power generating point sources still remains a low volume waste subject to specified, technology-based effluent limits. For EPA to disregard this decades old application of its own rule is completely arbitrary.[84]

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

Even if the low volume waste stream limits were not applicable to FGD waste water, EPA's use of BPJ is clearly improper in light of the impending release of finalized NELGs next year. Despite EPA's cursory ambivalence about the forthcoming final rule, it includes express, nationally-applicable FGD effluent limits for all new and existing facilities, including Merrimack Station. Thus, EPA's hypothetical ability to establish BPJ-based BAT technology standards will cease to exist after release of the final NELGs. EPA's decision to ignore that nationwide rulemaking and proceed with a case-by-case analysis for Merrimack Station's FGD waste waters is arbitrary, capricious, contrary to law, and frankly, makes no sense unless EPA is attempting to

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[83] EPA Fact Sheet, Draft NPDES Permit Brayton Point Station, at 9 (July 22, 2002), *available at* http://www.epa.gov/region1/braytonpoint/pdfs/Braytonfs.pdf. (emphasis added).

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

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

impose limits on Merrimack Station that will not be required by other facilities in the industry. *See* 78 Fed. Reg. at 34,488 (listing VCE technology as a potential compliance option upon which BAT limits may be established but specifically stating that this technological option is not a preferred one).[85]

EPA, itself, has argued the unreasonableness of proceeding with a BPJ analysis at an individual facility while the agency is simultaneously setting national standards for that category of point sources. In *Nat. Res. Defense Council, Inc. v. EPA*, EPA defended its common sense decision to abstain from using its BPJ authority to set effluent limits at an individual facility until after national effluent discharge limitations were promulgated, arguing that the BPJ decision was "intertwined with the development of" a national rulemaking setting effluent guidelines for the offshore oil industry. 863 F.2d 1420, 1427 (9th Cir. 1988) ("NRDC"). Specifically, the agency restrained from deciding that reinjection of produced water was BAT for an individual permit. *Id.* at 1424, 1427. Because national standards would soon be promulgated to set a nationwide, uniform requirement for that waste stream, EPA did not want the BPJ determination to conflict with the forthcoming national effluent limits. *Id.* The court agreed with EPA's reasoning, explaining:

> The recent "anti-backsliding" amendment to the Act is designed to prevent "backsliding" from limitations in BPJ permits to less stringent limitations which may be established under the forthcoming national effluent limitation guidelines. . . . If the EPA were to require as BAT the retrofitting of all drilling sources for reinjection of produced water in the Gulf of Mexico, and, the *eventual* national standards were less stringent in any respect, there would be an <u>inconsistency between BAT for Gulf drilling and BAT for the rest of the nation's off-shore drilling. This inconsistency would lack any apparent scientific or equitable basis.</u> If, on the other hand, the eventual national standards embody more

[85] EPA thoroughly examined VCE systems during this regulatory rulemaking. After this evaluation, the agency notably did not select VCE as a preferred option among the proposals for regulation of FGD waste water.

> stringent standards that this permit requires, this permit can be reopened and its standards made more stringent. Given the large commitment of resources that would be necessary to begin retrofitting, <u>the values of certainty and uniformity inherent in the congressional scheme [of the CWA] take on added significance. There is a justification for some delay in this situation in order to ensure that the produced water limitation in the Gulf conforms with the national standard.</u>

Id. (emphasis added) (internal citation and quotation marks omitted); *see also* 49 Fed. Reg. 37,998, 38,020 (Sept. 26, 1984) (in addressing concerns about EPA's proposed anti-backsliding standard and the expectation that more permits issued based on a permit writer's BPJ would be challenged as a result, EPA provided its policy would be that "if promulgation of a [national effluent limitation] guideline is expected, [it] will generally defer permit issuance rather than issue a BPJ permit"). In short, as EPA and at least one federal court have already recognized, it makes little sense that EPA would seek to formulate and impose BPJ-based BAT standards for Merrimack Station when a national standard is imminent. Until this national standard is finalized, the FGD waste stream at Merrimack Station should be regulated as a low volume waste, as it has been for decades. Doing so would avoid any debate over the reasonableness of EPA's BPJ-based BAT limits while still ensuring that the Merrimack River is protected because effluent from Merrimack Station's PWWTS already satisfies state water quality standards. And, once the NELGs are finalized, EPA could assign applicable effluent limits for Merrimack Station that are assured to be consistent with those imposed upon the industry.

a. Requiring more stringent limits at Merrimack Station Than Elsewhere in the Country is Punitive and Wrong

As the Ninth Circuit noted in *Nat. Res. Defense Council, Inc.*, the "inconsistency" of imposing irreversible standards on one facility that are not subsequently imposed on the rest of the industry is both unscientific and inequitable. *Id*. Because of anti-backsliding provisions that prevent EPA from changing, renewing, or reissuing an NPDES permit with technology limits that are less strict than the limits in the previous permit, EPA's proceeding with BPJ-based BAT limits requiring Merrimack Station to utilize its SWWTS technologies and granting it no ability to discharge FGD waste waters would unreasonably and unfairly deprive PSNH of its rightful opportunity to pursue the options afforded to the rest of the industry by the new nationally-applicable NELG regulations. *See* 33 U.S.C. § 1342(o). This will place PSNH at a competitive disadvantage and create unnecessary costs which get passed on to the hundreds of thousands of households and businesses that depend upon it for affordable electricity.[86] EPA has a responsibility to ensure that guidelines and/or technology standards are applied as equally as possible to all facilities and do not unfairly single-out or burden certain, individual entities. To force PSNH to go through timely, costly, and unnecessary efforts to comply with the BPJ-based BAT limits that may never be applied to any other source is both arbitrary and capricious.

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

By continuing to pursue these BPJ-based BAT limits for Merrimack Station's FGD waste waters in light of the impending finalized NELGs, EPA is essentially making an end run around the rulemaking process. The extensive requirements of federal administrative law—including provisions of notice of proposed rulemaking in the Federal Register, making underlying materials accessible, an extensive public comment period, and the issuance of a final rule—subject rulemakings to intense public scrutiny, preventing EPA from using legal technicalities to impose regulatory standards that are contrary to the CWA or otherwise not in accordance with the law.

[86] This result is particularly harmful in a highly-regulated industries like electrical power generation where small increases in costs can have very large impacts on sales. Moreover, this result will injure customers who depend on PSNH to keep their power bills as low as possible.

While NPDES permits are subject to notice and comment requirements, the limits set in an individual plant permit are very unlikely to draw the same amount of attention as a nationwide rulemaking for the most obvious reason: they are not nationally applicable. Because there is less attention paid to the limits in these permits at the national level, there is inevitably less widespread scrutiny of the agency's actions, leaving individual permit holders more vulnerable to overreaching. Here, the contrast between EPA's conclusions about BAT in the NELGs and at Merrimack Station create the appearance that EPA has singled-out Merrimack Station for especially stringent limits and is creating a backdoor means for doing so: BPJ plus anti-backsliding. If EPA wants to impose the same limits that will result from the new NELGs, as science and equity demand, why not just wait? Apparently, it does not.

There are other administrative policy reasons not to allow EPA to establish BAT on a case-by-case basis using its BPJ when national effluent guidelines will likely be promulgated shortly thereafter. To do so allows EPA to use individual permits to set national policy by imposing strict permit limits that would not survive national scrutiny, and then holding up those permits as examples of facilities operating under more advanced technology when it comes time to set nationally-applicable limits. Here, if the proposed permit is erroneously finalized in its current form, Merrimack Station will inevitably be held up as an example of a plant currently operating with "ZLD" requirements. If EPA intends to set national limits, it should be forced to look at the industry as a whole, which is exactly what it is doing with the imminent promulgation of the NELGs.

In short, the agency appears to have singled-out Merrimack Station for special treatment, and is using BPJ authority pretextually to impose technology-based limits on that facility that EPA suspects cannot survive the public scrutiny of a national rulemaking. Using the administrative process in such a manner is never justified and is patently arbitrary and capricious.

D. The Requirements of the Final NPDES Permit for Merrimack Station Should Conform to EPA's New § 316(b) Rule

On August 15, 2014, EPA released its final rule to regulate cooling water intake structures at "existing" facilities. *See* 79 Fed. Reg. 48, 300 (Aug. 15, 2014). The rule will become effective on October 14, 2014. The terms and conditions of the NPDES permit for Merrimack Station must be revised to comply with the new rule. A revised draft permit must therefore be made available for public comment, given that the revisions to the § 316(b) portions of the permit will be substantial.

V. CONCLUSION

PSNH requests that EPA reconsider its determination in the revised draft permit that the SWWTS at Merrimack Station is BAT and its erroneous conclusion, with no sound basis, that this SWWTS can achieve a ZLD limit. The draft permit, as it stands now, is an attempt to impose an unrealistic discharge limit based on a flawed and incomplete understanding of the specific roles and complex interaction of the PWWTS and the SWWTS, both of which are continuously impacted by many process variables unique to Merrimack Station. The revised draft permit lacks an adequate scientific basis, accurate information regarding technological capabilities, and a defensible cost analysis—in brief, it is the essence of unreasonable, arbitrary, and capricious.

PSNH has a long history of achieving significant environmental accomplishments, including the construction of the first Selective Catalytic Reduction system on a coal-fired unit in the country, the largest conversion of a coal-fired unit to biomass in the country at that time (2006), and, in accordance with state law, one of the first FGDs specifically—and successfully—

targeting the reduction of mercury emissions with concomitant reduction of sulfur dioxide emissions. All of these goals and others were accomplished by working cooperatively with the regulatory community. It is difficult to understand why, in light of these significant accomplishments and good regulatory relations, EPA would issue a draft permit which can be viewed as punitive in the imposition of more stringent requirements on Merrimack Station than any imposed on other power plants in the country.

Any final NPDES permit issued by EPA for Merrimack Station must take into consideration the issues raised in these comments and contain reasonable limits based on sound science that are achievable by and through available treatment technologies.