Larry S. Monroe, Ph. D.
Chief Environmental Officer
SVP Research and Environmental Affairs

SOUTHERN COMPANY

600 North 18th Street, 14N-8195
Birmingham, Alabama 35203
lsmonroe@southernco.com

August 18, 2014

Submitted by Overnight Delivery and Email to: demeo.sharon@epa.gov

Sharon DeMeo
U.S. Environmental Protection Agency - Region 1
Office of Ecosystem Protection
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912
(617) 918-1995

Re: Revised Draft NPDES Permit for the Public Service of New Hampshire's Merrimack Station, Bow, NH, NPDES Permit No. NH0001465

Dear Ms. DeMeo:

Southern Company submits the attached comments on EPA Region 1's Revised Draft National Pollutant Discharge Elimination System (NPDES) Permit No. NH0001465 for Public Service of New Hampshire's Merrimack Station, dated April 18, 2014. Southern Company provides these comments on behalf of itself and its six subsidiaries: Alabama Power Company, Georgia Power Company, Gulf Power Company, Mississippi Power Company, Southern Nuclear Company, and Southern Power Company. The majority of Southern Company power plants are subject to NPDES permits like the one at issue in this proceeding.

Southern Company has significant concerns about Region 1's best available technology economically achievable (BAT) determination and corresponding "no discharge" limitation for FGD wastewaters. Since the Merrimack Station permit may be seen as precedent for addressing pollutant discharges from other FGD systems, Southern Company has a strong interest in ensuring that Region 1's Best Professional Judgment (BPJ) determination and corresponding BAT limitation(s) are legally and technically sound. For the reasons included in the attached comments, we have grave concerns that they are neither.

Southern Company and its subsidiaries are members of the Utility Water Act Group (UWAG), a voluntary, ad hoc, non-profit, unincorporated group of 191 individual energy companies and three national trade associations of energy companies with an interest in Clean Water Act (CWA) rulemakings and issues. Southern Company supports the views and positions provided by UWAG in its comments filed in this proceeding.

If you have any questions or need additional information, please don't hesitate to contact me or Donna Hill at 205-257-5234 or dbhill@southernco.com.

Sincerely,

Larry S. Monroe

Enclosure

cc: Donna Hill – Southern Company
Danny Herrin – Southern Company
Brian Toth – Southern Company
Matt Bowden – Alabama Power Company

Comments of the Southern Company on
EPA Region 1's Revised Draft National Pollutant Discharge Elimination System
Permit No. NH0001465 for Merrimack Station

August 18, 2014

TABLE OF CONTENTS

Page

Comments of the Southern Company on
EPA Region 1's Revised Draft National Pollutant Discharge Elimination System
Permit No. NH0001465 for Merrimack Station

The Southern Company appreciates this opportunity to comment on EPA Region 1's Revised Draft National Pollutant Discharge Elimination System (NPDES) Permit No. NH0001465 for Merrimack Station. The specific revisions at issue arise out of EPA Region 1's proposed best professional judgment (BPJ) determination that physical/chemical treatment (phys/chem) plus vapor compression evaporation and crystallizer (VCE/crystallizer) technology represent the best available technology economically achievable (BAT) for pollutant discharges from Merrimack Station's flue gas desulfurization (FGD) system. On the basis of this determination, Region 1 has proposed a "no discharge" limitation for FGD wastewater. Southern Company has significant concerns about Region 1's determination and corresponding "no discharge" limitation, not just in terms of the flawed analysis for Merrimack Station, but also the potentially widespread impact of that flawed analysis elsewhere.

Southern Company is the leading energy provider in the Southeastern United States, supplying approximately 4.4 million customers with clean, safe, reliable and affordable electricity generated from a diverse portfolio of energy resources – nuclear, coal, natural gas, and renewables.

Southern Company subsidiaries include four vertically integrated electric utilities – Alabama Power, Georgia Power, Gulf Power, and Mississippi Power – as well as Southern Power, which owns generation assets and sells electricity in the wholesale market. Another major subsidiary is Southern Nuclear, the licensed operator of Southern Company's three nuclear generating plants in Alabama and Georgia.

We participate in all phases of the electric utility business with more than 46,000 megawatts of electric generating capacity and transmission and distribution lines that would more than circle the earth. Southern Company and its subsidiaries have been serving the Southeast for more than 100 years. The traditional operating companies, Southern Power and Southern Nuclear own and/or operate 33 hydroelectric generating plants, 32 fossil fuel generating plants, three nuclear generating plants, 13 combined cycle/cogeneration plants, seven solar facilities, one landfill gas facility, and one biomass facility across 9 states. The majority of these facilities are subject to NPDES permits like the one at issue in this proceeding.

Ten Southern Company power plants utilize wet FGD systems that, as a result of this air pollution control process, generate wastewater. The Merrimack Station NPDES permit would be precedent-setting for these Southern Company facilities. It is therefore very important to Southern Company that Region 1 get both the substance and the permitting process right. While each Southern Company facility has its own unique characteristics, there is a range of potentially common issues that Region 1 has not adequately addressed (or completely over-looked) in its BPJ analysis (*e.g.*, cost-effectiveness, engineering feasibility and non-water quality impacts).

Southern Company is complying and must plan to comply with a myriad of complex environmental regulations to continue operating its current fleet of units to serve its customers. The possible precedent set by Region 1, and in particular its possible application to future Southern Company permitting actions, creates a new level of uncertainty in the regulatory arena. This unwarranted uncertainty negatively impacts the strategic planning process for Southern Company because of the potential impacts on unit retirement and replacement with new generation decisions.

Since the Merrimack Station permit may be seen as precedent for addressing pollutant discharges from other FGD systems, Southern Company has a strong interest in ensuring that Region 1's BPJ determination and corresponding BAT limitation(s) are legally and technically sound. For the reasons that follow, we have grave concerns that they are neither.[1]

I. Region 1's proposed BPJ determination must be scrapped, not just because of the many flaws in the required analysis for Merrimack Station, but also because of the effect of this flawed analysis elsewhere.

Region 1's proposal comes at a time of profound change in the electric power industry. This change is heavily influenced by a series of major EPA rulemakings affecting air emissions, water discharges and waste from power plants. In the water environment, one of the most significant rulemakings underway involves EPA's effort to revise and update the categorical national effluent limitations guidelines for the steam electric power generating point source category, codified at 40 CFR Part 423, first promulgated in 1974 and last revised in 1982 (NELGs). A significant amount of public and private resources have been committed to EPA's current rulemaking. EPA released its proposal on June 7, 2013 (78 Fed. Reg. 34,431) and is under a court-ordered deadline to take final action by September 30, 2015.

The final revised NELGs will address BAT for FGD wastewater. As a consequence, Region 1's attempt to establish BPJ BAT for FGD wastewater from Merrimack Station seems both premature and ill-advised. Region 1 has no mandate to proceed with BPJ BAT but seems intent on doing so anyway.

Region 1's decision will affect more than Merrimack Station. It will have widespread impact. In fact, as described below, Region 1's proposed BPJ BAT determination is already

[1] Southern Company is a member of the Utility Water Act Group (UWAG) and hereby endorses UWAG's comments in this permit proceeding, as well.

being cited in other power plant NPDES proceedings in other EPA regions and states. Thus, it is imperative that Region 1 get it right.

Region 1's proposal is riddled with errors and inconsistencies. Key facts undermine the Region's proposed determination, chief among them: (1) the VCE/crystallizer system at Merrimack Station is not designed for zero discharge and in fact has not operated without a discharge wastewater stream that must be separately managed for disposal; and (2) the system was installed by necessity, not voluntarily.

Much of the Region's analysis hinges on the fact that a VCE/crystallizer system has already been installed and placed into operation at Merrimack Station. But this does not absolve Region 1 of its burden of meaningfully considering all of the required BAT factors, or give Region 1 any lawful basis to shift this burden to the applicant. In point of fact, Region 1 wholly failed to consider one of the required BAT factors and erred in its consideration of others, most notably, by assuming the cost of BAT-based requirements in the revised draft permit to be zero (both as to capital and O&M).

Had Region 1 conducted a meaningful BAT analysis, it would have had no choice but to conclude that VCE/crystallizer technology is not BAT, and that a discharge prohibition on FGD wastewater is fundamentally inappropriate.

The Region's disclaimers aside, this decision will have broad and far-reaching consequences. Region 1 must get it right by correcting its errors and omissions, confirming that phys/chem treatment is BAT for FGD wastewater, and providing a sound record of its decision for others to read and understand.

II. Key facts undermine Region 1's proposed BPJ determination.

A. The system is not zero liquid discharge (ZLD).

Region 1 assumes that the system installed at Merrimack Station is capable of achieving zero liquid discharge, and, on this assumption, proposes a "no discharge" limitation (effectively, a discharge prohibition) on FGD wastewater. Region 1's assumption is factually incorrect.

The system installed at Merrimack Station is designed and operated with a purge stream, which means that the system must discharge from time to time. Moreover, as discussed in more detail in Section VI.C below, the extreme operational and maintenance needs of the system compel regular down-time, which means that the system cannot operate continuously. PSNH's current electrical load cycle allows for maintenance every spring and fall. Higher capacity factors at other facilities, or at Merrimack, would make operations more difficult.

A purge stream is an integral part of the system at Merrimack Station. There are no contract guarantees to exclude or limit the need for periodic purges. In fact, Aquatech's operating manual for the system specifically addresses the need to purge the crystallizer concentrate tank in order to remove the highly soluble salts from the system.

A number of factors necessitate periodic purging of the system at Merrimack Station, including:

- The chloride content of the fuel exceeds design parameters for the system and must be removed through the purge stream; otherwise, excessive salt cake will be generated beyond the maximum design capacity of the salt cake press.

- Highly soluble salts, such as calcium chloride and magnesium chloride, raise the boiling point elevation, thereby increasing the temperature and pressure of the crystallizer to unsafe levels; the only way to prevent this is to purge the highly soluble salts.

- High chloride concentrations cause corrosion in the crystallizer and can only be abated through a purge. High chloride concentrations require exotic metals for vessel construction. These exotic metals can be fragile and unreliable. Severe corrosion will cause a vessel to fail.

- Plugging of the flow surfaces in the crystallizer increases temperature and pressure and forces unavoidable shutdowns. During these shutdowns, only the brine concentrator can operate, thus requiring a purge on a continuous basis with no salts going to salt cake.

- Gases generated from the slurry can build pressure in the vessels, creating legitimate safety concerns. The only way to prevent this is to purge effluent from the crystallizer.

Due to Region 1's failure to authorize the FGD discharge (as discussed in more detail in Section II.B below), purge liquor from the VCE/crystallizer system has to be collected and trucked to neighboring publicly owned treatment works (POTW) facilities for disposal. *See* Fact Sheet at pp. 23-25 (documenting 21 shipments of purge liquor, from June 2012 through March 2014, after completion of the second crystallizer). In the face of Region 1's proposed discharge prohibition, Merrimack Station will have no choice but to continue this practice for so long as the neighboring POTW facilities will accept the purge liquor. This option presents another "catch 22" for Merrimack as the revised NELG rule may place stringent pre-treatment standards (*i.e.*, PSES and PSNS limits) on FGD discharges that will prohibit this practice. The purge liquor is extremely concentrated due to volume reduction and may not meet the proposed rule's arsenic, mercury, selenium, or nitrite/nitrate pre-treatment standards for acceptance by a POTW facility. Region 1 suggests that hauling wastewater for disposal to POTW facilities is a viable option for Merrimack Station to achieve ZLD, but this is apocryphal. The proper test of ZLD is whether a technology is, in fact, capable of eliminating the discharge. Simply collecting and shipping it somewhere else for disposal is patently not ZLD.

As yet another option, Region 1 suggests that Merrimack Station can use the purge liquor to condition ash before it is landfilled, in effect switching the media from water to waste. Inasmuch as this is no more "true" ZLD than sending purge liquor to a POTW facility, it is also

not feasible in the specific context of Merrimack Station. Simply stated, the quantity of purge liquor does not match the quantity of fly ash; therefore, this is not a reliable option for the disposal of purge liquor. The volume of the purge stream depends on the chloride content of the coal, which varies widely. By contrast, the quantity of fly ash depends on the ash content of the coal and the ratio between fly and bottom ash. At Merrimack, there is no meaningful correlation between the volume of purge liquor and the volume of fly ash. Merrimack has wet-bottom cyclone boilers. This type of boiler, by design, produces less fly ash than conventional pulverized coal boilers common at most coal-fired facilities. The ratio of fly to bottom ash at Merrimack Station is 20% fly ash to 80% bottom ash, compared to 80% fly ash and 20% bottom ash at conventional coal units. In addition, frequent shutdowns of the VCE/crystallizer system for scheduled and unscheduled maintenance produce increasing volumes of purge liquor. Currently, there is not enough fly ash, and too much purge liquor, to make this option feasible.

In any event, we question whether Region 1's apparent zeal to mandate ZLD overlooks the broader environmental consequences of its decisionmaking. As explained above, the system at Merrimack Station is not ZLD. The wastewater generated from this system must go somewhere. Sending it to a local POTW facility just shifts the point of discharge, not the environmental effect. And sending it to a landfill just shifts the environmental effect from water to waste. Neither "improves" the environment in any material way beyond the substantial pollutant reductions already achieved by way of the Station's phys/chem treatment system, which, we respectfully submit, represents BAT.

B. <u>The system was installed by necessity, not voluntarily</u>.

As described in separate written comments submitted by Public Service of New Hampshire (PSNH), which owns and operates Merrimack Station, the decision to install

VCE/crystallizer technology was not at all voluntary, as characterized by Region 1, but rather the result of a constructive NPDES mandate imposed through Region 1's inaction.

The existing NPDES permit for Merrimack Station was issued in 1992, expired by its terms in 1997, and has been administratively continued for the ensuing 17 years by virtue of PSNH's timely and complete renewal application. Because the existing permit is functionally expired (but still in effect), EPA's long-standing position and practice is that no modifications are allowed. Instead, any changes in the facility's wastewater discharges – or to the limits and conditions in the permit – need to be accomplished by way of permit renewal.

Although apparently unclear to Region 1, it is clear from the record that PSNH was under a mandate from the New Hampshire legislature, known as the Scrubber Law (RSA 125-O:11-18), to install a wet FGD system (also known as a scrubber). PSNH met this mandate in 2011. Installation of the scrubber has turned Merrimack Station into one of the cleanest coal burning power plants in the country, with substantial reductions in air emissions of pollutants such as mercury and sulfur dioxide.

Recognizing that the scrubber project would create a new wastewater stream (*i.e.*, from the FGD system), PSNH initiated a dialogue with EPA about permitting options early in 2009. At that time, EPA directed PSNH to work with the state on a water quality study to assess the impacts of the new wastewater stream. Based on this study, the state proposed new limits, conditions and monitoring requirements for the discharge. In May 2010, PSNH submitted an addendum to its long-pending renewal application to reflect the new wastewater stream. This submittal precipitated a series of EPA information requests and additional meetings, through which PSNH and the state pushed for Region 1 to effectuate the state's proposal by renewing

the permit or by separately authorizing the FGD wastewater stream. EPA did neither, and now, more than four years later, PSNH's application remains pending.

Region 1's failure to take timely action on PSNH's request put PSNH in an impossible position. It's only "choices" were to (1) delay the scrubber project and risk criminal sanctions under the state's mandatory scrubber law; (2) proceed with the scrubber project, commence the FGD discharge and risk criminal sanctions for a knowing, unpermitted discharge under the Clean Water Act; or (3) find some other way to eliminate the FGD wastewater stream, or reduce its volume enough to allow PSNH to proceed with other offsite disposal options. As a practical matter, PSNH had no real choice other than to pursue option 3, installing the VCE/crystallizer system to allow substantial volume reduction for the FGD wastewater stream. Without question, this decision was not voluntary. Rather, it was forced by Region 1's own inaction. We respectfully submit that this is tantamount to an NPDES mandate, since PSNH had no other viable NPDES compliance alternative.

III. Region 1 should never have proposed BPJ BAT in the first instance.

Region 1 claims that "it is appropriate" to develop BPJ BAT limits for Merrimack Station's FGD wastewater. Fact Sheet at pp. 14-15. We respectfully submit that Region 1 was foreclosed from doing so. And even if Region 1 retained some discretionary authority to establish BPJ BAT, its proposed determination and discharge prohibition for Merrimack Station was arbitrary and capricious.

A. Region 1's BPJ determination is foreclosed by the existing NELGs.

BPJ limits may only be imposed when NELGs are inapplicable or incomplete (*i.e.*, when NELGs only apply to certain aspects of a discharger's operation, BPJ limits may be imposed on other aspects of that operation). Here, NELGs apply, and they cover the specific aspects of the operation at issue. *See* 40 CFR Part 423. In particular, "wastewaters from wet scrubber air

pollution control systems" are regulated as "low volume waste sources" (40 CFR § 423.11(b)). Thus, Region 1's proposed determination is foreclosed by the existing NELGs.

We recognize that the so-called Hanlon Memo suggests that BPJ limits for FGD wastewater are not foreclosed and instead must be imposed. *See* Memorandum, James A. Hanlon to Water Division Directors, Regions 1-10, *National Pollutant Discharge Elimination System (NPDES) Permitting of Wastewater Discharges from Flue Gas Desulfurization (FGD) and Coal Combustion Residual (CCR) Impoundments at Steam Electric Power Plants* (June 7, 2010). However, the Hanlon Memo is simply guidance, not binding and, at least as it relates to BPJ limits, wrong.

B. Alternatively, Region 1 has the discretion but not the obligation to establish BPJ BAT.

Even assuming, for the sake of argument, that the existing NELGs are incomplete as they relate to FGD wastewater, Region 1 would have the discretion but not the obligation to establish BPJ BAT. Contrary to the Region's assertion, it is not compelled to establish case-by-case BPJ limits for waste streams or pollutants not covered by the existing NELGs. *See* 33 U.S.C. § 1342(a)(1) (authorizing, but not compelling, permit writers to determine how best to ensure that the provisions of the chapter are carried out).

This distinction may be of little consequence here, since Region 1 seems intent on establishing BPJ BAT, but it is of vital importance elsewhere around the country.

C. Even assuming Region 1 *may* establish BPJ BAT, its decision to do so here was arbitrary and capricious.

Even if Region 1 has discretionary authority to establish BPJ BAT, it was arbitrary and capricious for the Region to do so here in the face of the impending revisions to the NELGs. Under the consent decree entered in *Defenders of Wildlife v. EPA*, No. 10-cv-01915 (D.D.C.), as revised, EPA must take final action on revised NELGs by September 30, 2015. Given the

extensive effort – both public and private – that has gone into this national proceeding, we respectfully submit that it would be premature for Region 1 to proceed with any BPJ determination for Merrimack Station before the final revised NELGs are available. We are bolstered in this position by the fact that after an extensive evaluation of different VCE/ZLD technology (*see* Option 5, 78 Fed. Reg. at 34,458), EPA did not select this technology as a preferred option, thus strongly suggesting that EPA will not mandate ZLD (or partial ZLD) in the final NELGs.

In short, Region 1 is already on precarious ground proceeding with case-specific BPJ limits before the revised NELGs are available. But the Region's position is even more infirm because it fundamentally deviates from EPA's national position and record.

IV. Establishing a rebuttable presumption that VCE/crystallizer technology is technologically and economically achievable for Merrimack Station is unlawful.

Region 1's BPJ determination hinges on a "rebuttable presumption" that since a VCE/crystallizer system is already installed and in operation at Merrimack Station, it must be available (*i.e.*, technologically and economically achievable). Fact Sheet at pp. 18-19. Region 1 goes on to say that "this presumption might possibly be overcome" with facts as to operational costs or technological issues.

The problem with such a presumption is that it impermissibly shifts the burden that Region 1 bears under § 125.3(c) and (d). In short, Region 1 bears the burden of considering all required BAT factors and then determining which particular technology is BAT. It cannot lawfully presume that a technology is BAT and then shift the burden to the applicant to prove otherwise, since doing so would contravene a long and continuous line of cases invalidating such presumptions. *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). Moreover, an agency may only establish a presumption 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). Here, the fact that the system is installed proves nothing about whether all of the other required BAT factors support its selection as "technologically and economically achievable" under the particular test that Congress laid out in the Clean Water Act.

Instead of shifting the burden in this manner, Region 1 is limited to requiring the applicant to meet a reasonable burden of production. On the basis of the produced facts relevant to the BAT determination, Region 1 must then conduct the regulatory analysis required of it by law. PSNH met its burden of production. And the facts that it produced overwhelmingly support the conclusion that VCE/crystallizer technology is not BAT. As described more fully elsewhere in these comments, the system was not installed voluntarily, it is not capable of achieving ZLD, it was enormously expensive to install and will continue to be enormously expensive to operate and maintain, the lifecycle costs are unknown, the long term stability of the solids are yet to be determined, and many engineering issues and non-water quality environmental impacts associated with the system remain to be studied and overcome. In that context, VCE/crystallizer technology is clearly not technologically and economically achievable under 33 USC § 1311(b)(2). Region 1 bears the burden of demonstrating that it is. It cannot lawfully shift this burden or "presume" its way around it.

V. Region 1's proposed BPJ determination is flawed because the Agency completely failed to address one of the required BAT factors.

An agency rule is arbitrary and capricious if the agency has "entirely failed to consider an important aspect of the problem." *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). Although EPA has significant discretion in deciding how much weight to accord each BAT factor, **it is not free to ignore any individual factor entirely**.

Texas Oil & Gas Ass'n v. EPA, 161 F.3d 923, 934-35 (5th Cir. 1998) (emphasis added). Here, however, Region 1 did just that.

In making its BPJ BAT determination, Region 1 was required to consider not just the factors in § 125.3(d), but also the factors in § 125.3(c)(2), including "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information." *See* 40 CFR § 125.3(c)(2) and § 125.3(d); *see also* NPDES Permit Writers' Manual, EPA-833-k-10-001 (Sept. 2010), Chapter 5, Section 5.2.3.3 (confirming that case-by-case determinations must include a consideration of all of the factors in both § 125.3(c)(2) and § 125.3(d)). Importantly, the Region must *document* its consideration of each BAT factor in the permit fact sheet. *Id.* at Section 5.2.3.6 ("Permit writers will need to document the development of case-by-case limitations in the NPDES permit fact sheet…. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the BPJ limitations comply with the CWA and EPA regulations."). For whatever reason, Region 1 completely failed to address "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information" in the Fact Sheet for Merrimack Station.[2]

Region 1's omission is confounding for two reasons. First, by reference to other significant proceedings, it is clear that Region 1 knows it is supposed to consider "the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information." *See, e.g.*, Region 1's Determination Document

[2] We note that § 125.3(c)(2) also requires the permit writer to consider "[a]ny unique factors relating to the applicant." Region 1 seems to assume – without actually addressing or documenting its consideration of this factor in the Fact Sheet – that all of the "unique factors" at Merrimack Station support its BPJ BAT determination. However, as noted above, the Region made critical errors in its analysis. Once these errors are corrected, we respectfully submit that the unique factors at Merrimack Stations support an entirely different outcome, where the existing phys/chem treatment system is determined to be BAT.

for the Brayton Point Power Station in Massachusetts, NPDES Permit No. MA0003654 (July 22, 2002):

> When imposing BAT limits using BPJ under 402(a)(1), a permit writer is required to apply both the statutory BAT factors and the factors specified in 40 CFR § 125.3(d)(3), **and to consider both the "appropriate technology for the category of point sources of which the applicant is a member, based on all available information," and "any unique factors relating to the applicant**" as required by 40 CFR § 125.3(c)(2) (emphasis added).

Second, although the required consideration of "appropriate technology" is a significant undertaking, the vast majority of the analysis has already been done by EPA in connection with the proposed revisions to the NELGs. Thus, Region 1 had the information it needed – it simply failed to consider it.

Had Region 1 done what it was required to do and considered the different technologies that EPA addressed as part of the NELG proceeding, it would have known that after an extensive evaluation of VCE/ZLD technology (*see* Option 5, 78 Fed. Reg. at 34,458), EPA did not select this technology as a preferred option, thus strongly suggesting that EPA will not mandate ZLD (or partial ZLD) in the final NELGs. We note, as well, that EPA received substantial public comments on its NELG proposal, including detailed written comments from Southern Company, UWAG and other interested stakeholders within the electric power industry. Those comments present substantial and compelling evidence against any VCE or ZLD mandate. Among other things, Southern Company's and UWAG's comments on the proposed NELGs demonstrate that VCE/ZLD technology is not fully demonstrated, commercially available or cost-effective. *See* Letter from Elizabeth Aldridge on behalf of UWAG dated September 20, 2013, and Letter from Chris Hobson on behalf of Southern Company dated September 19, 2013, both of which are accessible through Docket No. EPA-

HQ-OW-2009-0819. EPA evidently reached this same conclusion after its own extensive evaluation. Region 1 failed to consider – and failed to document any consideration of – the record against VCE/ZLD technology as BAT in the NELG proceeding. If the Region disagrees with this record, then it must explain its rationale in the Fact Sheet and re-publish its proposal for public review and comment. Region 1 cannot proceed without first satisfying these minimum public process safeguards.

Fundamental to any BPJ BAT determination is the permit writer's obligation to look at both the industry as a whole and the particular facility.[3] In other words, before making a BPJ BAT determination for Merrimack Station, Region 1 was duty-bound under § 125.3(c)(2) and (d) to conduct a reasoned analysis of control technologies available for FGD waste streams at power plants in general, and then at Merrimack Station in particular.

In sharp contrast to what it was required to do, Region 1 simply identified the technology it believed to be "available," and then jumped to whether it was BAT for Merrimack Station. Determining what is "available" is only the first step in the analysis. *See 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)). After it has identified what is available, the permit writer must then consider all of the required BAT factors, including – perhaps most importantly – "the appropriate technology" for the industry overall, taking into consideration cost, engineering aspects, etc.

In point of fact, there are exceedingly few installations of ZLD-style technology for FGD wastewater worldwide. We are not aware of a single power station using this technology that is able to actually achieve ZLD. For example, Iatan has a purge stream that is used for fly

[3] *See U.S. Steel Corp. v. Train*, 556 F.2d 822, 844 (7th Cir. 1977); *Alabama v. EPA*, 557 F.2d 1101, 1110 (5th Cir. 1977); *NRDC v. EPA*, 863 F.2d 863 F.2d 1420 (9th Cir. 1988).

ash conditioning and a distillate stream that is used for service water. In addition, leachate from the Iatan landfill is collected in a pond and then sprayed on the landfill for dust control. The Duke Mayo system currently under construction is designed like the Iatan system. And the Italian plants, when needed, more than likely discharge their FGD wastewater directly or with the solids that are bagged and hauled to Germany for disposal. According to their wastewater permits, the Italian plants discharge the distillate and condensate streams and are allowed to discharge FGD wastewater from their treatment system during upset or emergency conditions. Due to the complex chemistry of FGD wastewater and the many variables inherent in each particular system (fuel, limestone, fly ash carryover, air pollution controls, etc.), we respectfully submit that it is impossible to achieve a "true" ZLD system with today's technology.

Thus, even if Region 1 had done the necessary analysis of appropriate technology industry-wide, it would have been forced to conclude that VCE/crystallizer technology is not an appropriate technology, and clearly not available to achieve ZLD.

VI. The determination is also flawed because Region 1 acted arbitrarily and capriciously in its consideration of the other required BAT factors.

Just as an agency rule is unlawful where the agency failed to consider a required factor (as in Section V above), it is also unlawful where the agency "relied on factors which Congress [did not intend] it to consider, … offered an explanation for 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." *Motor Vehicle Mfrs. Ass'n*, 463 U.S. at 43. That is the case for Region 1's consideration of the other BAT factors in this proceeding, including cost.

A. Region 1 cannot consider the cost of its BPJ determination to be zero.

Region 1's BAT determination assumes that because "PSNH voluntarily decided to install and commence operations" of the phys/chem and VCE/crystallizer systems at Merrimack Station – outside of any NPDES requirement to do so – "PSNH will incur **no additional costs** to comply with the BAT-based requirements in the revised draft permit." Fact Sheet at p. 51 (emphasis added).

> In other words, the costs of complying with the revised draft permit (including both capital and O&M costs) … **are considered zero** because these technologies are already in operation … and were not installed due to this BAT determination. *Id.* (emphasis added)

This cannot be.

First, as described in Section II.B above, the VCE/crystallizer system was installed and placed into operation as the result of a constructive NPDES mandate imposed through Region 1's inaction on PSNH's renewal request. Region 1 cannot reasonably consider PSNH's decision to be voluntary, since Region 1 effectively forced the decision through its own inaction.

Second, even assuming, for the sake of argument, that Region 1 can permissibly deem the capital cost of the VCE/crystallizer system to be zero, it cannot ignore – or fail to meaningfully consider – the enormous O&M costs associated with that system and currently being incurred by PSNH. As described more fully in Section VI.B below, those costs are more than four times higher than the high end of the cost-effectiveness range that EPA always uses to assess BAT cost. EPA has never required a facility to spend more than the high end of that range.

Third, given the precedent that any BPJ BAT determination in this proceeding will set elsewhere, Region 1 cannot rationally ignore the very real and enormous costs that PSNH in

fact has incurred. The Region might try to discount the weight of those costs in its assessment of the different BAT factors specific to Merrimack Station, but it still must fully analyze those costs as part of its decision record. It failed to do so here.

B. Region 1 must fully consider the cost-effectiveness of its BPJ determination.

In making BPJ determinations, EPA is required to consider precisely the same statutory factors used to establish NELGs. *See NRDC v. EPA*, 863 F.2d at 1425 ("courts reviewing permits issued on a BPJ basis hold EPA to the same factors that must be considered in establishing the national effluent limitations"). It is self-evident that EPA cannot take a different approach in one versus the other without a reasoned justification. *See Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs*., 545 U.S. 967, 981 (2005) ("unexplained inconsistency" in agency practice is a reason for holding a policy reversal "arbitrary and capricious" under the APA, unless "the agency adequately explains the reasons for a reversal of policy").

In the effluent guidelines context, EPA has consistently – and steadfastly – considered the BAT factor for "cost" using a cost-effectiveness method that is expressed as $/TWPE (where TWPE is a toxic weighting factor that represents the toxic-weighted pound equivalent of a particular pollutant discharge). Thus, Region 1 is bound to do the same here, absent a reasoned justification for some other approach. No such justification is presented in the record for this proceeding.[4]

In EPA's own review of the 25 most recent BAT determinations, cost-effectiveness ranged from $1/lb-eq (inorganic chemicals) to $404/lb-eq (electrical and electronic

[4] In fact, for the draft 2011 Merrimack Station permit, Region 1 relied on pollutant reductions and cost-per-pound-removed values developed by EPA headquarters. For reasons more particularly described in UWAG's comments on that draft permit, the values were not accurate. However, they serve as proof that Region 1 knew that a cost-effectiveness analysis would be needed.

components), in 1981 dollars. *See* 78 Fed. Reg. at 34,504. Typically, the cost has been less than $200. *See* 68 Fed. Reg. 25,686, 25,701 (May 13, 2003). EPA has never required a facility to spend more than $404 per TWPE.

In an unexplained reversal of policy, Region 1 did not conduct a cost-effectiveness analysis for VCE/crystallizer technology at Merrimack Station. Had it done so, it would have seen that the O&M cost alone (setting aside the enormous capital costs) is $1,767/lb-eq (in 1981 dollars), more than four times higher than the high end of EPA's cost-effectiveness range. *See* Table 1 below.[5]

Table 1
Summary of Cost-Effectiveness Analysis

Treatment System	Total Annualized Costs ($M, 2011)	Total Annualized Costs ($M, 1981)	Removal (TWPE/year)	$/TWPE (in $1981)
Phys/Chem	3.96	1.54	4,168	370
Incremental Biological	1.52	0.59	27	21,698
Incremental VCE/Cry	6.39	2.49	555	4,490
Incremental VCE/Cry (O&M Only)	2.52	0.98	555	1,767

As this table highlights, and as described in more detail in UWAG's comments (Section VI), only phys/chem treatment is within the bounds of what EPA deems to be cost-effective. Both incremental biological treatment and incremental VCE/crystallizer are well above the high end of EPA's cost-effectiveness range. Based on conservative estimates, phys/chem treatment removes about 88% of the total pollutant loading. Thus, it is not surprising that the cost of removing the remaining load is very high on a per-pound basis.

[5] The inputs and assumptions for this analysis are set forth in Attachment 1 to these comments. The complete cost-effectiveness analysis is provided in Attachment 1 of the latest UWAG comments on the revised draft NPDES permit for Merrimack Station, dated August 18, 2014.

C. Region 1 cannot ignore other critical facts and circumstances that affect the other required BAT factors.

Whether characterized as "engineering aspects," "non-water quality environmental impacts" or "cost" under § 125.3(d)(3), or "unique factors relating to the applicant" under § 125.3(c)(2) – or all of the above – Region 1 did not meaningfully consider the significant unresolved challenges – and operational costs – of VCE/crystallizer technology at Merrimack Station or more broadly within the industry. These challenges have been widely reported, and many of the studies documenting those challenges are already in the record for this proceeding. *See*, *e.g.*, Roy and Scroggins (2013)(Administrative Record Doc. No. 1079); Nebrig et al. (2011)(Administrative Record Doc. No. 890); Ellison (2013)(Administrative Record Doc. No. 981).

A fundamental challenge in treating FGD wastewater is the high variability in water chemistry, which in turn is influenced by factors such as coal composition, make-up water chemistry, limestone chemistry, FGD design and metallurgy. FGD wastewater typically is much higher in salinity and exhibits much greater compositional fluctuations. Bottom line, treating FGD wastewater with a VCE/crystallizer system is demonstrably more difficult than treatment of cooling tower blowdown because of the differences in wastewater characteristics. These differences have a major impact on the chemistry of thermal evaporative systems. *See* ERG Memorandum, Feb. 10, 2009, *Notes from EPA Meeting on June 5, 2008 with HPD/Veolia Water Solutions and Technologies to Discuss FGD Wastewater Treatment*.

In a VCE/crystallizer system, in particular, as the brine concentrates, the higher solubility salts build up, causing significant operational problems such as a rise in boiling point (thus exacerbating energy demand), an increase in corrosivity and foaming, and frequent internal plugging. Corrosion affects the choice of metal components in the system, requiring

exotic and very expensive metals like titanium, or frequent replacement of more conventional metals. Foaming has become such a notorious issue that, as Roy and Scroggins reported in 2013, the system at Merrimack Station experienced "volcanic" foam that permeated the equipment. The only way to combat these operational problems is to regularly purge the crystallizer liquor and regularly take the system out of service for maintenance (often unscheduled).

Due to their purpose and operation, both the brine concentrator and crystallizer will scale, thereby reducing the heat transfer and design capability of the system. Scaling also creates the risk that other salts, such as Glauberite, will form. Typically, scaling has to be addressed by (1) taking the system out of service and hydro-blasting the surfaces, and/or (2) installing a softening process. The problem with softening is that it dramatically increases both chemical demand and the volume of waste generated from the softening process. In one study conducted by a UWAG member for its own 410-gpm FGD wastewater system, softening required approximately 5 truckloads of lime and soda ash per day, and another 5 truckloads of sludge for disposal, at costs approaching $10 million per year.

In addition to the cost of chemicals like lime, soda ash and the countless other treatment chemicals required for a VCE/crystallizer system to function, not to mention the corresponding costs of solids disposal, there are also substantial environmental and public safety risks associated with loading, unloading and transporting the chemicals and wastes. Region 1 failed to meaningfully address any of these costs or risks.

Solids from the VCE/crystallizer system are another concern, since the salts are naturally hygroscopic and will readily absorb moisture from the air. Due to softening, the salts are primarily sodium chloride, which is hygroscopic and soluble. Moreover, due to the fact that

softening is incomplete, a fraction of the salt will also be calcium chloride, which is extremely hygroscopic to the point of being deliquescent. These salts will re-liquefy to landfill leachate as rainwater encounters the material in the landfill, thereby creating a situation where pollutants in the salts, such as selenium and mercury, may be released back into the environment. Also, high ionic strength leachate could pose risks to clays in existing landfill liners and jeopardize the integrity of the landfill system.

The problem with soluble and hygroscopic salts in the VCE/crystallizer solids is that they may not be allowed in landfills (because they are not able to pass the paint filter test), and even if they are, chlorides and other constituents from the solids may end up in leachate and run-off, causing further environmental problems. Importantly, unlike other wastewater treatment technologies, no chemical transformation of constituents to less harmful forms takes place in the VCE/crystallizer process; it is strictly a volume reduction tool. As a result, any constituents that were in the water entering the VCE/crystallizer system will still be present in the materials exiting the system in the same form, albeit more concentrated. We note that for the systems in operation at the Brindisi and Monfalcone power plants in Italy, the solids have to be bagged and transported out of country to Germany for disposal in a hazardous waste facility. Region 1 gives passing consideration to the amount of solids generated from the system, discounting it as a "relatively small percentage increase in the amount of solids generated at the site overall." Fact Sheet at p. 44. However, even if this is accurate (which we dispute[6]), it misses the point. Region 1 failed to consider the quality of those solids for purposes of disposal limitations, disposal costs, and long-term environmental impacts.

[6] We question whether it is actually "small" once you factor in not only the salts, but also the solids from softening and from any upstream phys/chem treatment. The production of all of these new solids is necessary for the system to operate.

Even assuming, for the sake of argument, that a VCE/crystallizer system is capable of being operated without major upsets (which has not yet been demonstrated, anywhere), it will require extensive and continual maintenance. This comes at enormous cost, estimated at $2.5 million per year for a system like the one at Merrimack Station. This cost is compounded by the fact that all power plant systems will have to be cycled more frequently than designed due to the unreliability of the VCE/crystallizer system, and will experience additional fatigue from being started and stopped, thereby exacerbating the risk of damage (especially to the boiler tubes). It also fundamentally constrains the flexibility that any and all power plants need for proper and safe operation (*e.g.*, changing the coal blend, minimizing pressure increases).

VCE/crystallizer systems also have a large parasitic load. Region 1 attempts to discount the energy requirements by claiming that the energy demand value for the system at Merrimack Station "is a tiny fraction of the total energy generated at the Station." Fact Sheet at p. 46. Whether or not this is true, a meaningful energy analysis cannot be made by comparison to the energy production capacity of a power plant, because the analysis will inevitably be self-serving. In other words, no technology or equipment at a large power plant will ever (or rarely ever) be comparatively significant in terms of energy demand/energy capacity. The more meaningful analysis – and the one compelled by the Clean Water Act – is to consider how the energy demand of one technology compares to the energy demand of another, for purposes of determining which one is technologically and economically achievable. This is especially important in terms of understanding the carbon emissions associated with each technology, per unit of energy output. Region 1 did nothing of the sort here. Energy costs associated with the VCE/crystallizer system at Merrimack are estimated at $416,000 annually, based on 1.2 MWh

of load at $99 per MWh. This rate is derived from the New England ISO average wholesale electricity price for December 2013 through March 2014.

Finally, there are unresolved (and for purposes of this proceeding, unaddressed) concerns about possible recontamination of the environment from volatile releases of pollutants such as mercury, selenium, boron and ammonia from the crystallizer vacuum system and the brine concentrator deaerator. The scope and potential for these releases have not been fully studied; thus the concerns associated with possible recontamination cannot yet be vetted in any meaningful way.

VII. Region 1's disclaimer that its decision will have no effect elsewhere is plainly wrong.

Perhaps recognizing the far reaching consequences of its proposed BPJ BAT determination for Merrimack Station, Region 1 attempts to disclaim these consequences.

> This is a site-specific, case-by-case determination based on the facts at Merrimack Station and this determination neither applies to nor establishes that this technology is that [sic] BAT at any other facility or group of facilities. Fact Sheet at p. 6.

Like UWAG, we certainly agree that the proposed determination *should not* be precedent for any other power plant. But we are concerned that it will have this effect, even in the face of Region 1's disclaimer.

As Region 1 acknowledges, the starting point for identifying BAT – industry-wide or facility-specific – is to look at the "single best performing plant in an industrial field" in terms of its capacity to reduce pollutant discharges. *See, e.g., Chemical Manufacturers Assoc. v. EPA*, 870 F.2d 177, 226 (5th Cir. 1989). Region 1 goes on to say that "[t]o the extent that VCE and crystallizer systems are able to achieve ZLD operations, they are the best performing systems…" Region 1 has – in effect – identified Merrimack Station as "the single best performing plant" notwithstanding critical errors in its analysis (as explained herein). This, by

itself, does not establish BAT for any other facility, or for the industry as a whole, but it does establish the starting point for other decisions. As a result, it is imperative that Region 1 get it right.

Already, environmental groups are citing to the revised draft NPDES permit for Merrimack Station as precedent. *See, e.g.*, Comments of PennFuture on draft renewal NPDES permit for PPL Brunner Island in York County, Pennsylvania, July 7, 2014 ("EPA Region 1 made clear in its recently-released 2014 Merrimack Fact Sheet that its revised BAT determination is limited to the Merrimack Station.... Nevertheless, EPA's explanation of its tentative decision **helps to establish certain elements relevant to the BAT analysis for any FGD wastewater treatment facility**…. Although EPA notes that the general availability of evaporation/crystallization technology 'does not, however, demonstrate by itself that the technology is available for the industrial category as a whole, or for any individual power plant,' **the fact that such systems are generally available means that they must be among the technologies evaluated in any FGD wastewater BAT analysis**.") (emphasis added).

To avoid compounding this flawed proceeding by having it cited and used elsewhere, Region 1 must do more than disclaim the consequences of its proposal. It must correct the proposal, confirm that phys/chem treatment is BAT for FGD wastewater, and provide a sound record of its decision for others to read and understand. For this purpose, the phys/chem treatment system in operation at Merrimack Station may very well make Merrimack Station "the single best performing plant." We would support that outcome.

VIII. Region 1 properly rejected phys/chem plus biological treatment as BAT.

Inasmuch as we vigorously oppose Region 1's BPJ BAT determination, we do support Region 1's decision to reject biological treatment as BAT. We note that given the peculiar procedural posture of this permitting action, the Region has limited this comment period to its

revised BPJ BAT determination (based on VCE/crystallizer technology as ZLD) and corresponding "no discharge" limitation for FGD wastewater. *See* Fact Sheet p. 3. If the Region ever decided to revert to its earlier BPJ BAT determination (based on biological treatment), it would need to go through another round of public notice and comment. We urge the Region not to revert to biological treatment as BAT, for all of the compelling and substantial arguments that are already a part of the record from the 2011 draft permit.

Furthermore, incremental biological treatment at Merrimack is not cost-effective as shown in Table 1, Section VI.B. The removal for biological treatment is estimated at 27 TWPEs or $21,698 per TWPE (in 1981 dollars), more than 53 times higher than the high end of EPA's cost-effectiveness range.

Then and now, we respectfully submit that phys/chem treatment represents BAT for FGD wastewater, and we ask that Region 1 make such a determination here.

Attachment 1
Inputs and Assumptions for Cost-Effectiveness Analysis

1. For FGD influent data, we used the average of 5 days of sampling documented in the *ACG Performance Test Report for FGD Wastewater Treatment System of Units 1 and 2 at PSNH Merrimack Station* (June 1, 2012), and the average of non-softening data of Stream A, Merrimack Station, for ammonia, nitrate, cyanide, boron, calcium, cobalt, sodium, molybdenum, tin, titanium, and vanadium.

2. For physical/chemical effluent data, we used the average of five data points of Stream A (without softening), collected at Merrimack Station in 2012. For magnesium, we used the physical/chemical effluent data in the *ACG Performance Test Report for FGD Wastewater Treatment System of Units 1 and 2 at PSNH Merrimack Station* (June 1, 2012).

3. For biological treatment effluent, we used data from Table 10-7, *EPA's Technical Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*, EPA-821-R-13-002 (April 2013). We assumed biological treatment removals consistent with Duke's Belews Creek and Allen biological treatment systems. Constituents with removals greater than 20% at both plants were assumed to be removed.

4. For data below the method detection limit (MDL), the actual MDL value was used to estimate the concentration of the constituent.

5. We conservatively assumed there was no purge from the VCE/crystallizer system, even though the actual purge flow is, on average, 3 gpm. Also, we assumed that the distillate/condensate would be reused in the plant and not discharged or managed separately for disposal.

6. We used a 40% capacity factor, which represents the average capacity factor for Merrimack during 2012. The 2012 capacity factor is appropriate to use because the influent and effluent data used in the analysis were collected during 2012.

7. We based our annual costs on a 15-year service life and 7% rate of interest.

8. We based our capital costs on the actual Merrimack cost for its primary and secondary FGD treatment systems. The biological capital cost is based on EPRI's model, using a 50-99 gpm maximum design flow, as documented in EPRI's comments on the proposed ELG rule (EPA-OW-HQ-2009-0819-4499). The capital costs are as follows:

Treatment System	**Capital Costs (in $M, 2011)**
Physical/chemical + EMARS	19.3
Biological (estimated from EPRI model)	9.0
Softening, VCE/Crystallizer	35.3

9. For operation and maintenance costs, we used actual costs provided by Merrimack for the primary and secondary treatment systems. For the biological treatment system estimate, we based O&M costs on the EPRI model, and used a 38 gpm average flow rate. The O&M costs per system were as follows:

Treatment System	**O&M Costs ($M, 2011)**
Chemical precipitation + EMARS	1.84
Biological (estimated from EPRI model)	0.53
Softening, VCE/Crystallizer	2.52

10. Energy costs associated with the VCE/crystallizer system at Merrimack are estimated at $416,000 annually, based on 1.2 MWh of load at $99 per MWh. This rate is derived from the New England ISO average wholesale electricity price for December 2013 through March 2014. This parasitic load for the VCE/crystallizer system is included in the O&M costs in the above table.

11. Total annualized costs were converted to 1981 dollars to compare cost-effectiveness (in terms of $/TWPE) to EPA's most recent 25 BAT determinations in national effluent guidelines rulemakings across various industrial categories. The conversion factor was obtained from Engineering News Record, Construction Cost Index, http://enr.construction.com/economics/historical_indices/construction_cost_index_history.asp