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March 18, 2015

VIA ELECTRONIC MAIL

Re: Schiller Station Draft Temporary Permit, Application No. 14-0081

Dear Director Wright:

The proposed temporary permit for installation and operation of ACI/DSI controls at Schiller Station, Application No. 14-0081, suffers from three different flaws that must be addressed prior to finalization.

First, PSNH has failed to carry its burden in establishing that the introduction of large quantities of dry reagents to its flue gas will not increase particulate matter or other emissions. Second, no extension of the Mercury and Air Toxics Standard ("MATS") compliance deadline is warranted or necessary. Third, the proposed permit fails to set limits for sulfur dioxide emissions sufficient to ensure that Schiller Station does not, post-MATS controls, interfere with maintenance or cause nonattainment of the sulfur dioxide national ambient air quality standard ("NAAQS") in neighboring Maine, contrary to the requirements of the New Hampshire state implementation plan.

Accordingly, the proposed permit, with its incorporated proposed MATS compliance extension, must be revised to tighten emission limits, improve monitoring, and deny PSNH's request that it be able to continue emitting mercury and other air toxics for an extra year.

A. The Proposed Permit Fails to Ensure Schiller's PM Emissions Will Not Increase

The results of PSNH's prior testing indicate that it is entirely possible that coal combustion with possible fuel blends, reagent types, mixes, and loading, or certain electrostatic precipitator ("ESP") operation modes may in fact result in significant increases in particulate matter ("PM") emissions from Schiller Station. Accordingly, the proposed permit must be

revised, additional testing conducted, and additional, stricter operation limits and monitoring employed.

1. *PSNH's Prior Testing Does Not Ensure PM Emissions Will Not Increase*

Although the permit application review summary states that "no increase in particulate emissions over the baseline is expected to occur," the research and development trials conducted by PSNH in August of 2012 and 2013 do not provide such certainty.

Particulate emissions from facilities equipped with DSI and ACI controls will depend on numerous factors, including the fuel blend used in the boiler, the types of reagents used in the controls, and the particle size of the reagents. Nonetheless, the Review Summary for the proposed control project merely indicates that sorbents "may include" such things as "trona (sodium sesquicarbonate) and sodium bicarbonate."[1] Similarly, neither the Review Summary nor the draft permit identify the type of ACI PSNH intends to use for mercury compliance. This is not enough information to evaluate the impacts of sorbents and ACI on the existing air pollution control systems, including the ESP and potentially interactions with SNCR. Since the quantity of sorbent and ACI will depend on the type of sorbent/ACI, the additional loading of sorbent/ACI that will be required to meet MATS cannot be evaluated if the type of sorbent and ACI is not known with precision.

This is not an idle point. There are a wide variety of ACI types for coal-fired power plant mercury control. One supplier lists the following types: PowerPAC, PowerPAC Premium, PowerPAC Premium Plus, FastPAC, FastPAC, FastPAC Premium.[2] Another supplier lists ESP-PAC, PAC Non-brominated mercury sorbent, L-PAC, B-PAC, C-PAC, and H-PAC.[3] There are many additional suppliers; this list is not meant to be comprehensive, merely illustrative. Additionally, within each of the control and reagent types, one can have different sizes of the product. Thus, the type/size of ACI will affect the efficiency with which mercury is removed from a unit's flue gases, and therefore the type/size will dictate the quantity of ACI needed to remove the desired quantity of mercury to meet the MATS limit.

With regard to sorbents for the acid gases, as the Review Summary notes PSNH appears to have not narrowed its choices between trona and sodium bicarbonate—with no mention of the sizing within each of these types—that it will use. Thus, like ACI, the quantity of sorbent cannot be evaluated.

Of course, without clear delineation of the type and quantity of sorbent/ACI needed, it is impossible to evaluate the effect of incremental loading of these new materials on the existing ESPs and therefore particulate emissions from the ESP. In addition, without certainty as to the quantity, additional evaluation of emissions associated with the delivery, transport, handling, storage, processing, etc. of sorbent and ACI also cannot be evaluated since these emissions

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[1] Review Summary at 1.
[2] *See, e.g.*, http://www.ada-cs.com/coal-fired-power-plant.
[3] *See, e.g.*, https://www.albemarle.com/products---markets/performance-chemicals/specialty-chemicals/mercury-control/sorbents-164.html.

depend directly on the quantity of sorbents and ACI to be handled.

Thus, the level of detail in the application is simply inadequate for evaluation of the emissions impacts associated with the use of generic DSI sorbents and ACI.

This is reflected in the lack of emissions calculations in the cursory New Source Review assessment in the Review Summary. Indeed, in Table 5 of PSNH's application PSNH indicates no expectations of reductions in actual emissions of any pollutant.[4] Instead, it simply notes that post-project emissions will be equal in each and every case to 2009/2010 actual emissions from coal-fired units SR4/SR6. No actual post-project emissions quantifications appear to have been done by PSNH. Instead, PSNH simply assumes that post-project emissions will not exceed pre-project baseline actual emissions. Such an analysis is not consistent with NSR. DES should require PSNH to complete a well-supported NSR analysis. This analysis should start with a proper identification of the type (or types) of sorbents and ACI (including chemical composition and particle size) that PSNH intends to use. If PSNH wants flexibility in is control reagent blend, separate NSR analyses must be conducted for the various options of sorbents/ACI types.

PSNH's response to DES's request for further details on its expectations relating to PM emissions after controls were installed does not provide this missing information.[5] There, PSNH provides, a one page summary of the R&D tests conducted in 2012 and 2013.[6] But there are significant issues with the test summary.

First, a one-page Summary Table is no substitute for the details of the R&D testing such as would be available in full stack test reports. Second, while various coal blends are noted, there is no assurance that future coal use will be limited to these blends.[7] Third, while the Summary Table itself notes that no baseline testing was conducted for Coal Blend F, a significant number of the 2012 and 2013 tests involved this blend. As such, the lack of baseline tests involving this blend is a major short-coming of the R&D testing. Fourth, the tests do not separate the quantity (and type) of ACI used and sorbent used; instead, only the total quantities are listed. Without such information, it is impossible to set proper limits and control requirements to ensure no increase of PM. Finally, and perhaps most importantly, it is clear that in the 2012 testing there were several instances when the baseline (i.e., no sorbent or ACI) PM emissions were exceeded.

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[4] Permit Application at 4. ("[T]he non-attainment NSR and PSD applicability analysis for the proposed DSI system is presented in Table 5. Based on the information presented in Table 5, the proposed installation to SR4 and SR6 are not subject to PSD or non-attainment NSR permitting requirements.")

[5] Letter from DES to PSNH (April 28, 2014) ("[T]he dry sorbent materials that will be injected into the flue gas streams from utility boilers 4 and 6 . . . represent additional particulate matter (PM) loading to the existing electrostatic precipitators . . . . Please provide a detailed explanation as to why there will not be an increase in PM emissions above the significant emission levels specified in 40 CFR §52.21(b)(40).")

[6] Letter from PSNH to DES (May 27, 2014).

[7] Nor is there any corresponding limitation in the proposed permit.

Moreover, in its May 27, 2014 letter PSNH directly provides some insight as to its likely difficulty in avoiding PM increases. There, PSNH stated that

> [T]he Electrostatic Precipitator (ESP) was operated in two modes during R&D testing: 'Energy Management System (EMS)' mode and maximum current mode. The ESP is typically operated in EMS mode, which adjusts the ESP electrode current based on opacity to minimize sparking within the ESP, which results in better collection efficiency. . . . No increase in PM emissions, as compared to baseline, was observed at the outlet of the ESP during the milled trona and sodium bicarbonate R&D test runs while the ESP was <u>operating in EMS mode</u>. . . . . [T]o further evaluate ESP performance, several test runs were conducted while the ESP was operating in maximum current mode. <u>PM emissions at the outlet of the ESP were generally higher during the test runs when the ESP was operated in maximum current mode as compared to the EMS mode test runs</u>. This was likely due to the increased spark rates which were observed during these tests. As a result, we validated that the ESP operation in the EMS mode provides for optimum precipitator collection efficiency as expected.[8]

Effectively, PSNH acknowledges that it cannot use its ESPs in an unfettered manner and that their operation needs to be constrained to the EMS mode to avoid PM emission increases.

Accordingly, based on PSNH's own statements to DES, the draft permit should, at mimimum:

- Limit the ESPs only to EMS mode operation (along with requiring the applicable recordkeeping and reporting obligations);
- Restrict the units from not using Coal Blend F (and require PSNH to first identify all of the various Blends from its testing); and,
- Limit the combined injection rates of sorbent and ACI to those listed in the Summary Table.

2. *The Proposed Emissions Monitoring Does Not Ensure PM Emissions Will Not Increase*

Even setting aside the failure of PSNH to demonstrate that adding large quantities of dry sorbent to its flue gas will not result in significant increases in PM emissions, the draft permit fails to require sufficient monitoring to ensure that PM emissions do not increase (or that if they do, DES and the public will be readily made aware of it).

PSNH has had ample time to evaluate and propose its method of MATS compliance monitoring—i.e., whether and for which pollutants it intends to use continuous monitoring systems ("CEMS") (such as PM CEMS, Mercury CEMS, HCl CEMS etc.) or not (and instead rely on periodic stack testing). In its application submitted in February of 2014, PSNH noted

[8] Letter from PSNH to DES (May 27, 2014) (emphasis added).

that it was

> currently in the process of evaluating and selecting alternatives for performance testing and continuous compliance monitoring under Subpart UUUUU. PSNH anticipates that final alternatives will be selected as part of the system design and procurement process. PSNH will provide updated compliance documentation to NHDES once available.[9]

Although PSNH subsequently provided something of a compliance strategy to DES, it is unclear to what extent this document was incorporated into the proposed permit, as it is unmentioned in DES's Review Summary. However, despite the fact that PSNH in this document admits that there are no technical impediments to CEMS for mercury, PM, and HCl,[10] the proposed permit instead contemplates allowing use of stack testing for compliance with MATS. This is improper, as periodic stack testing has well-known limitations in terms of assuring that the MATS limits at Schiller would be met on a continuous basis.

For example, merely noting the average injection rate for activated carbon and comparing it to the injection rate in the most recent performance test is simply not adequate to establish that mercury emissions are in compliance (assuming that the last performance test indicated compliance). It is important to ensure that the same type of activated carbon is also used as was used in the last compliance performance test. In this instance, sorbent type would include the following key characteristics:

- The chemical composition of the activated carbon (which includes the presence of additives such as bromine, etc.);

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[9] Application at 5.

[10] *See* PSNH, "Compliance Strategy, Utility Mercury and Air Toxics Standards (MATS)," October 15, 2014. In this Strategy submittal, PSNH states the following:

> [A]n Hg CEMS may be installed at SR4 and/or SR6 if at any time PSNH elects to do so. If PSNH elects to install an Hg CEMS, the unit will be installed at a similar location as the sorbent traps. The Hg CEMS will be installed and certified according to the procedures and requirements in the current EPA approved performance specifications.

Id. at Section 2.3.1.

> [A] PM CEMS may be installed on SR4 and/or SR6 if at any time PSNH elects to do so. If PSNH elects to install a PM CEMS, the unit will be installed either in the stack, or at a location in the ductwork downstream of the ESP where the PM concentrations are representative of the emissions that exit to the atmosphere. The PM CEMS will be installed and certified according to the procedures and requirements in current EPA approved performance specifications.

Id. at Section 2.3.2.

> [A]n HCI CEMS may be installed at SR4 and/or SR6 if at any time PSNH elects to do so. If PSNH elects to install an HCI CEMS, the unit will be installed either in the stack, or at a location in the ductwork where the HCI concentrations are representative of the emissions that exit to the atmosphere. The HCI CEMS will be installed and certified according to the procedures and requirements in current EPA approved performance specifications.

Id. at Section 2.3.3.

- The manner in which the carbon was activated, which will affect the pore-size distribution of the ACI and therefore its effectiveness; and,
- The particle size distribution of the ACI particles, which will impact the surface area, and therefore the effectiveness of ACI in removing mercury from the flue gases.

Thus, while injection rate is an important parameter, it is, by itself, inadequate to ensure compliance. Similarly, the sorbent particle size, quality, and makeup for DSI is critical to control efficacy, and would not be captured by looking only at reagent flow rate. Likewise, fuel blends—and thus the amount of mercury in the flue gas stream—will undoubtedly change between stack tests, thus rendering mere reliance on mimicking flow parameters from prior stack tests incapable of ensuring compliance with MATS.

This is particularly the case where PSNH has not specified—and the proposed permit does not contemplate requiring—that only identified and tested fuel blends, sorbent and reagent mixes and particle sizes, and ESP operation parameters be used when operating the controls. As such, the proposed permit must be amended to include continuous monitoring for MATS compliance, as PSNH has already deemed is technically achievable.

B. <u>The Proposed Extension of the MATS Compliance Period Is Unwarranted and Unnecessary</u>

PSNH has been long aware that the compliance date for the MATS Rule was April 16, 2015 since the final rule was published on February 16, 2012.[11] The technologies proposed by PSNH to comply with the MATS Rule—DSI and ACI—are well established and have been long and well known to the utility industry.[12] Indeed, PSNH conducted and completed testing of

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[11] *See* http://www.epa.gov/mats/actions.html.

[12] Considering ACI, for example, a paper authored by staff and consultants from Southern Company, a large utility with signifiicant coal-fired assets, notes that

> [A]ctivated carbon injection for coal-fired power plants was first tested and introduced through programs conducted collaboratively by the U.S. Department of Energy, National Energy Technology Laboratory, Electric Power Research Institute, and utilities in the early 1990s. Since the mid-2000s, ACI has been determined to be both the best available control technology (BACT) and maximum achievable control technology (MACT) for mercury control on a case-by-case basis for certain coal-fired power plants, and today there are hundreds of commercial systems operating or contracted, designed to control mercury emissions to meet state mercury limits, permit limits, or MATS mercury standards.

Available at http://www.powermag.com/the-role-of-activated-carbon-in-a-comprehensive-mats-strategy/?pagenum=1. Similarly, for DSI, a recent technical paper notes that "dry sorbent injection (DSI) systems have been in service for more than 20 years at coal-fired generating stations, providing an effective tool for reducing sulfur dioxide acid gas emission levels." *See* Power Engineering, "A Low-Cost Pollutant Control Solution: Installing a DSI System at a Midwest Utility," (Sept. 19, 2014), *available at* http://www.power-

these systems in 2012 and 2013,[13] and apparently no additional testing for evaluation purposes was conducted in 2014. The leisurely schedule described in the February 27, 2014 cover letter accompanying the permit application or the modified schedule in the May 27, 2014 letter from PSNH notwithstanding, installation of equipment associated with these technologies (injectors, sorbent handling systems, sorbent delivery systems, etc.) and operation of these technologies is possible in a matter of months if needed, and certainly does not require more than 12 to 18 months.[14] Upon completion of its evaluation testing in 2013, PSNH had over a year and a half to comply with the MATS Rule on April 16, 2015. There is thus no reason to now allow PSNH an additional year-long compliance extension. PSNH has had more than adequate time to prepare for and achieve compliance with MATS by April 16, 2015.

Indeed, the past and likely future operation of the coal-fired units at Schiller Station indicates that Schiller is unlikely to appreciably operate those units until Summer or late Fall of 2015 anyway, giving PSNH plenty of time to complete installation of the control technology that it began testing and installing in 2013:

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eng.com/articles/print/volume-118/issue-9/features/a-low-cost-pollutant-control-solution-installing-a-dsi-system-at-a-midwest-utility.html.

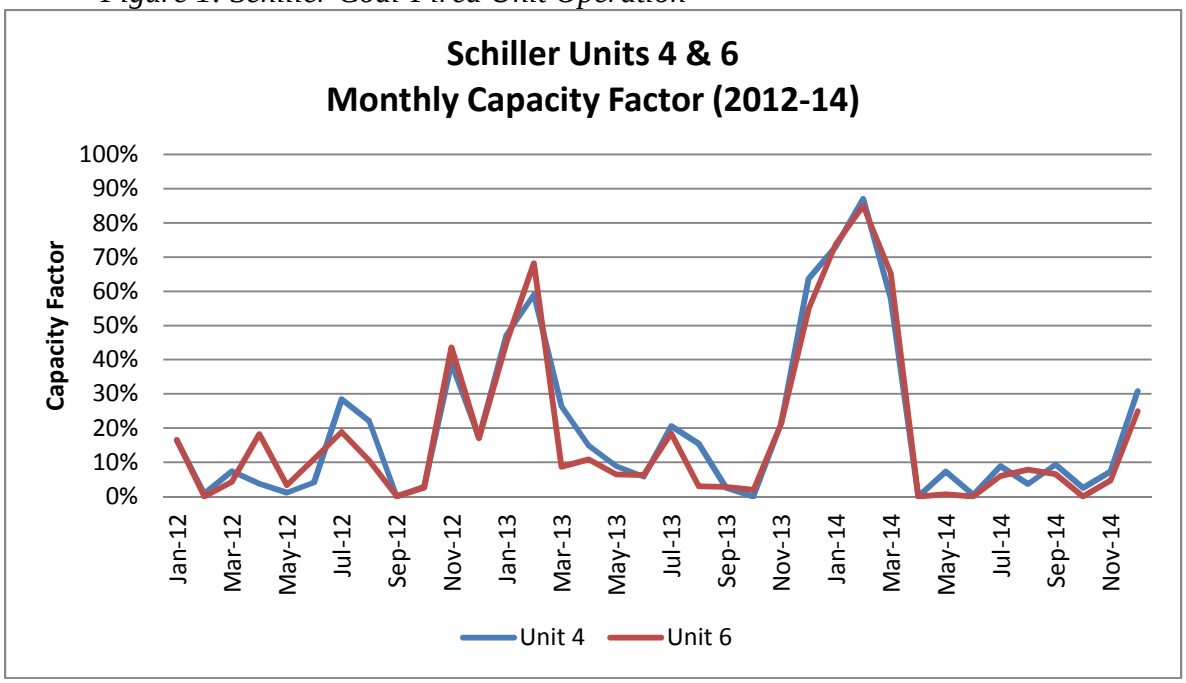
[13] See Review Summary at 4:

> PSNH conducted dry sorbent injection research and development (R & D) trials in August of 2012 and 2013. R & D trials were performed during the firing of several coal blends, sorbent types and sorbent injection rates. PSNH provided the summary of EPA Method 5 test results for the R & D trial runs.

The Application, Section 2.1, notes that the research was concluded in August 2013.

[14] "ACI and DSI can be deployed in 1-1.5 years." *See* presentation by Brattle, Slide 10, *available at* http://www.brattle.com/system/publications/pdfs/000/004/450/original/Environmental_Retrofits__Costs_and_Supply_Chain_Constraints_Celebi_MISO_June_20_2012.pdf?1378772106.

Figure 1: Schiller Coal-Fired Unit Operation[15]



Accordingly, PSNH's request to be allowed to emit mercury and other air toxics from Schiller Station for an additional, gratuitous year, should be denied.

C. <u>The Proposed Permit Fails to Set Emission Limits Sufficient to Ensure Schiller Does Not Interfere with Maintenance or Cause Nonattainment of the SO_2 NAAQS in Maine</u>

Although DES explicitly states that the proposed ACI/DSI system will impact emissions of sulfur dioxide ("SO_2") from Schiller Station,[16] the proposed permit fails to follow the requirements in New Hampshire's federally-approved state implementation plan ("SIP") and set emission limits for SO_2 sufficient to ensure that Schiller Station does not significantly contribute to nonattainment of, or interfere with maintenance with the SO_2 national ambient air quality standard ("NAAQS") in neighboring Maine.

Under the CAA, New Hampshire is charged with preventing air pollution emitted within its boundaries from blowing into adjoining states and causing violations of air quality standards there. Section 110 of the CAA requires that states adopt regulations "prohibiting . . . any source or other type of emissions activity within the State from emitting any air pollutant in amounts

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[15] Data taken from EPA's Clean Air Markets Program Data Database, *available at* http://ampd.epa.gov/ampd/.

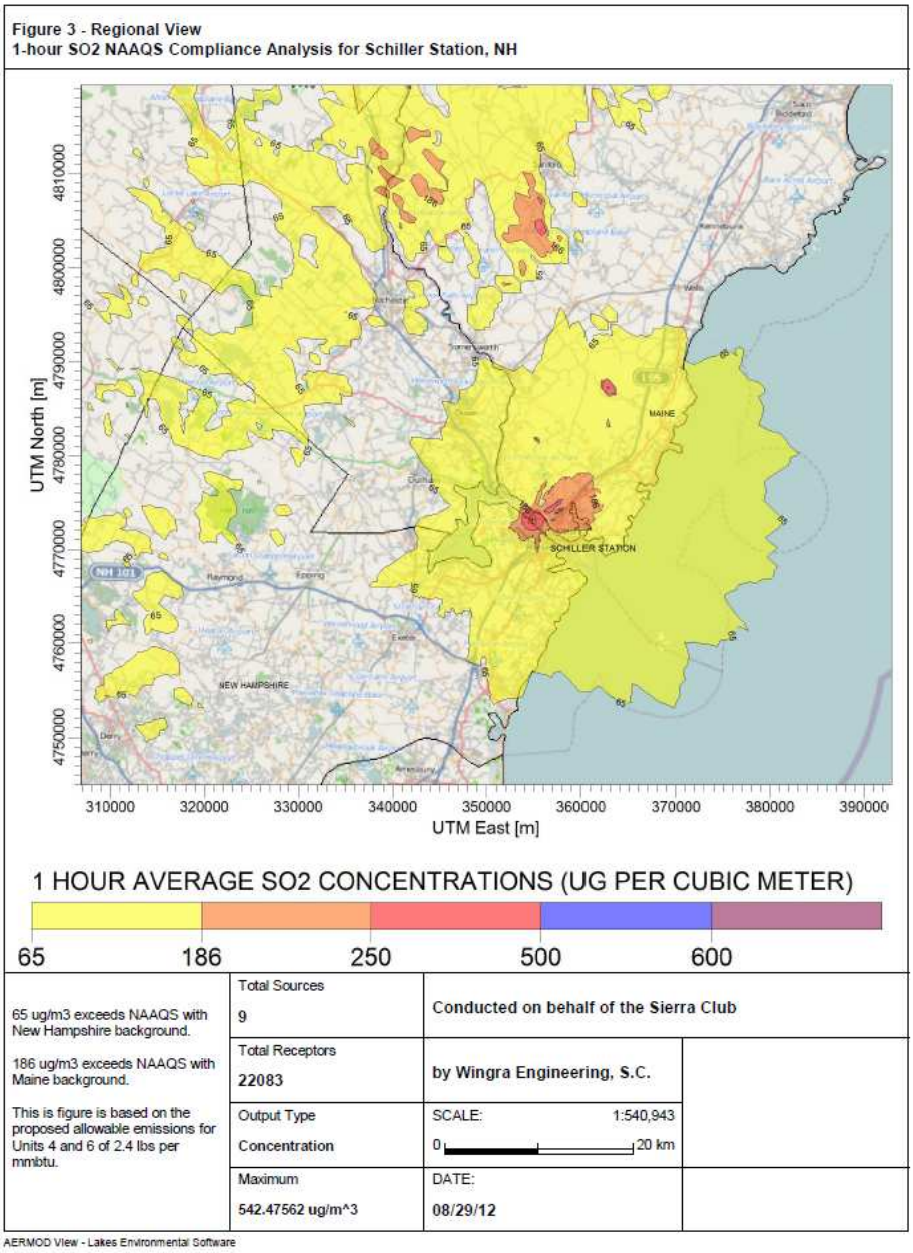
[16] *See, e.g.*, Permit Application Review Summary at 1 ("The DSI system will be used to control the emissions of acid gases such as hydrogen chloride (HCl) and sulfur dioxide (SO_2)"); *id.* at 4 ("The DSI system will also lower SO_2 emissions"); *see also* Draft Permit at 3 ("The DSI system will be used to control the emissions of acid gases such as hydrogen chloride (HCl) and SO_2").

which will . . . contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard." 42 U.S.C. § 7410(a)(2)(D).

Under DES's own federally-approved regulations in New Hampshire's SIP, this means that New Hampshire must "*apply special emission limits to stationary sources* on a case-by-case basis *to insure* that their air quality impacts on adjacent states . . . *shall not prevent the attainment or maintenance of National Ambient Air Quality Standards in those states*." New Hampshire SIP Env-A 616.01 (emphasis added).[17]

Schiller Station most certainly does send much of its air pollution, including SO_2 pollution, out of New Hampshire and into neighboring Maine communities, as Schiller is located just across the Piscataqua River from Maine. Moreover, air dispersion modeling shows that the pollution from Schiller—even with the emission limits in the Proposed Permit—spreads over a vast area in both states:

[17] *See also* Env-A 615.01. ("The department shall apply special emission limits to a stationary source to ensure that its air quality impacts on adjacent states . . . shall not prevent the attainment or maintenance of the NAAQS in those states.")



See Exhibit 1, Klafka August 2012 Report at Figure 3.

Indeed, the modeling shows that Schiller Station—at emission levels left unaddressed by the proposed permit—is predicted to cause peak concentrations of SO_2 in Maine of over 700 µg/m3, compared to the standard of 196 µg/m3. *See* Exhibit 2, Klafka July 2013 Report at 4.[18] Notably, the impacts in Maine are significantly *higher* than those in New Hampshire. *Id.*

[18] PSNH disputed this modeling, and complained of certain technical issues. As detailed in Exhibit 3—an April 2014 letter sent to EPA Region 1 concerning the modeling—addressing PSNH's complaints actually resulted in *increased* modeled impacts. Additionally, underlying modeling files for Exhibits 1 and 2 have been previously provided to DES.

Table 1 - SO_2 Modeling Results for Schiller Station Modeling Analysis

3-Year Time Period	Emissions Type [4, 5, 6]	Average Emissions from Each Unit (lbs/hr)	Maximum Impact All Locations ($\mu g/m^3$)	Maximum Impact In Maine ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
2006 – 2008	Allowable	1,377.6	745.9	745.9	196.2
	Maximum	1,129.1	611.4	611.4	
	Actual SO_2 & Velocity	508.2	338.0	338.0	
2007 – 2009	Allowable	1,377.6	824.1	824.1	
	Maximum	1,129.1	676.0	676.0	
	Actual SO_2 & Velocity	466.8	332.7	332.7	
2008 – 2010	Allowable	1,377.6	767.7	767.7	
	Maximum	1,129.1	629.4	629.4	
	Actual SO_2 & Velocity	448.1	276.2	276.2	
2009 – 2011	Allowable	1,377.6	794.8	794.8	
	Maximum	1,129.1	651.1	651.1	
	Actual SO_2 & Velocity	323.7	204.2	204.2	
2010 – 2012	Allowable	1,377.6	763.9	763.9	
	Maximum	1,129.1	625.3	625.3	
	Actual SO_2 & Velocity	215.3	168.8	168.8	
4/2010 – 3/2013	Allowable	1,377.6	746.8	746.8	
	Maximum	1,129.1	611.2	611.2	
	Actual SO_2 & Velocity	211.1	192.9	192.9	

Indeed, modeling of historical, actual emissions provides further confirmation that the limits proposed in the Proposed Permit are insufficient. Sierra Club retained Steven Klafka to model emissions from Schiller Station using as inputs actual, hour-by-hour emissions of SO_2 as reported in the EPA Clean Air Markets Database for every hour from 2006 up through March of 2013. This modeling shows that Schiller Station has historically caused exceedences of the standard in the 2010 SO_2 NAAQS in Maine for the 2006-2008, 2007-2009, 2008-2010, 2009-2011—despite Schiller Station operating at historically low levels for much of that period. *See* Klafka July 2013 Report at 4.

Critically, these concentrations are without reference to background concentrations of SO_2. With even a small ambient background from other sources (e.g., vehicle traffic, other fossil fuel-fired facilities, etc.), the combined total would be in excess of the limit. Put another way, the modeling demonstrates that Schiller Station all by itself prevents attainment and interferes with maintenance of the NAAQS in Maine. Clearly, the failure of DES to set SO_2 emission limits in this draft permit fails to insure that air quality is protected in downwind states, as the New Hampshire SIP requires.[19]

[19] Nor is the potential argument that Schiller does not often emit SO_2 at levels as high as it is permitted particularly compelling. First, the SO_2 NAAQS is a short-term, hourly standard, reflecting the need to protect against the harmful effects of SO_2 exposure that can accrue in as little as five minutes. *See, e.g.*, http://www.epa.gov/airquality/sulfurdioxide/health.html. The

The proposed temporary permit must be revised to include emission limits for SO2 sufficient to ensure that Schiller Station does not cause or contribute to NAAQS exceedences in Maine.

Conclusion

For the foregoing reasons, the proposed temporary permit must be revised substantially, in keeping with the above discussion, before it is finalized.

Respectfully submitted,

_____/s/_____

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possibility of Schiller emitting SO_2 at levels that only sometimes cross the threshold is still nonetheless enormously problematic from an air quality and human health perspective. Second, to the extent that Schiller may claim that it does not contribute to exceedences of the NAAQS because of its low-level operation, DES would merely be tightening up some slack in the permit by setting emission limits appropriately protective of human health and the environment. Indeed, requiring Schiller Station to adhere to the SO_2 emissions surrogacy requirement for HCl reductions under MATS would likely address the problem with the existing numerical SO_2 emissions limit for Schiller Station (although it would not address the difference between the 1-hour averaging period for the SO_2 NAAQS and the longer averaging period contemplated under MATS).