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Via Electronic Filing at Regulations.gov

Re: <u>Sierra Club Comments on U.S. EPA, Air Plan Approval; New Hampshire; Reasonably</u> <u>Available Control Technology for the 2008 and 2015 Ozone Standards</u> [EPA-R01-OAR-2023-0188]

Dear Bob McConnell,

Sierra Club submits the following comments concerning EPA's proposed Air Plan Approval for New Hampshire concerning Reasonably Available Control Technology ("RACT") for the 2018 and 2015 ozone standards, 88 Fed. Reg. 43,483 (July 10, 2023) (the "Proposed Approval" or "Proposal"). As discussed in more detail below, the Proposal is incorrect in suggesting that the nitrogen oxides ("NOx") emission limits for the coal-fired Merrimack Station power plant constitute RACT: the 0.22 lbs NOx/MMbtu limit is inconsistent with RACT in general and EPA determinations concerning the efficacy of NOx control technology in other rulemakings, and because the coal-fired units at Merrimack have demonstrably achieved far lower NOx emission rates in actual practice. Use of this limit is thus legally insupportable.

Background

A. <u>Ground-Level Ozone Is Dangerous to Human Health</u>

Ozone, the main component of smog, is a corrosive air pollutant that inflames the lungs, constricts breathing, and likely kills people. *See* U.S. EPA, National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65,292, 65,308/3-09/1 (Oct. 26, 2015); U.S. EPA, Integrated Science Assessment for Ozone and Related Photochemical Oxidants 2-20 to -23 tbl.2-1 (EPA-HQ-OAR-2008-0699-0405, Feb. 2013) ("ISA"). It causes and exacerbates asthma attacks, emergency room visits, hospitalizations, and other serious health harms. *See, e.g.*, EPA, *Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards* 3-18, 3-26 to -29, 3-32 (EPA-HQ-OAR-2008-0699-0404, Aug. 2014) ("PA"); ISA 2-16 to -18, 2-20 to -24 tbl.2-1. Ozone-induced health problems can force people to change their ordinary activities,

requiring children to stay indoors and forcing people to take medication and miss work or school. *See, e.g.*, PA 4-12.

Ozone can harm healthy adults, but others are more vulnerable. *See* 80 Fed. Reg. at 65,310/1-3. Because their respiratory tracts are not fully developed, children are especially vulnerable to ozone pollution, particularly when they have elevated respiratory rates, as when playing outdoors. *See, e.g.*, PA 3-81 to -82. People with lung disease and the elderly also have heightened vulnerability. *See* 80 Fed. Reg. at 65,310/3. People with asthma suffer more severe impacts from ozone exposure than healthy individuals do and are more vulnerable at lower levels of exposure. *Id.* at 65,311/1 n.37, 65,322/3.

Ozone also damages vegetation and forested ecosystems, causing or contributing to widespread stunting of plant growth, tree deaths, visible leaf injury, reduced carbon storage, and reduced crop yields. PA 5-2 to -3; ISA 9-1. The damage includes tree-growth losses reaching 30-50% in some areas, and widespread visible leaf injury, including 25-37% of sites studied in just one state. PA 5-13; ISA 9-40. By harming vegetation, ozone can also damage entire ecosystems, leading to ecological and economic losses. 80 Fed. Reg. at 65,370/1-2, 65,377/3.

B. <u>The Legal Standard for RACT</u>

RACT determinations and RACT-based emission limits are required by the Clean Air Act for areas failing to attain National Ambient Air Quality Standards ("NAAQS"). *See* 42 U.S.C. § 7502(c)(1). RACT is a technology-forcing standard intended to ensure that polluting sources are controlled consistent with available methods for reducing pollution. Critically, "RACT is not designed to rubber-stamp existing control methods." *Sierra Club v. EPA*, 972 F.3d 290, 295 (3d Cir. 2020) (observing that RACT "is a technology-forcing mechanism."). As the Third Circuit has recently determined, "[w]hen originally introducing the standard, the EPA noted that 'the control agency, using the available guidance, should select the best available controls, deviating from those controls only where local conditions are such that they cannot be applied there and imposing even tougher controls where conditions allow." *Id*. (citing the Strelow Memo).¹

As a result, RACT is a stringent standard, designed to induce and require improvements in control technology and reductions in pollutant emissions. Indeed, EPA has long maintained that "RACT should represent the toughest level of control considering technological and economic feasibility that can be applied to a specific situation" and that "[a]nything less than this is by definition less than RACT."²

RACT is defined as "the lowest emissions limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering

¹ Memorandum from Roger Strelow, Assistant Administrator for Air and Waste Management, U.S. EPA, to Regional Administrators, Regions I - X (Dec. 9, 1976) (hereinafter "Strelow Memo"), *available at* https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19761209_strelow_ract.pdf.

² Strelow Memo at 2.

technological and economic feasibility."³ The RACT definition comprises two parts: (a) technological feasibility and (b) economic feasibility.

(a) Technological Feasibility

"The technological feasibility of applying an emission reduction method to a particular source should consider the source's process and operating procedures, raw materials, physical plant layout, and any other environmental impacts such as water pollution, waste disposal, and energy requirements."⁴

(b) Economic Feasibility

As EPA has explained, "[e]conomic feasibility considers the cost of reducing emissions and the difference in costs between the particular source and other similar sources that have implemented emission reduction."⁵ Specifically,

EPA presumes that it is reasonable for similar sources to bear similar costs of emission reductions. Economic feasibility rests very little on the ability of a particular source to 'afford' to reduce emissions to the level of similar sources. Less efficient sources would be rewarded by having to bear lower emission reduction costs if affordability were given high consideration. Rather, economic feasibility for RACT purposes is largely determined by evidence that other sources in a source category have in fact applied the control technology in question.⁶

Further, EPA has explained that RACT is not intended to enshrine existing control methods, but rather is technology-forcing.⁷ Thus, "[i]n determining RACT for an individual source or group of sources, the control agency, using the available guidance, should select the best available controls, deviating from those controls only where local conditions are such that they cannot be applied there and imposing even tougher controls where conditions allow."⁸

³ State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, 57 Fed. Reg. 55,620, 55,624/3 (Nov. 25, 1992); *see also Navistar Int'l Transp. Corp. v. United States EPA*, 941 F.2d 1339, 1343 (6th Cir. 1991) ("Since 1976, the EPA has interpreted reasonably available control technology to be the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.") (quotations omitted).

⁴ U.S. EPA, State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Supplemental, 57 Fed. Reg. 18,070, 18,074 (Apr. 28, 1992).

⁵ 57 Fed. Reg. at 18,074.

⁶ 57 Fed. Reg. at 18,074 (emphasis added).

⁷ Strelow Memo at 2.

⁸ Id.

Substantive Comments

A. <u>Merrimack's Own Emissions Demonstrate that the Proposed Limits Are Not</u> <u>RACT</u>

Both units at Granite Shore Power Merrimack Station ("Merrimack") are fully capable of achieving lower emission rates for NOx than EPA assumes in its Proposed Approval. Nonetheless, EPA improperly proposes approving these inadequate emission limits for Merrimack, despite the requirements that RACT be technology-forcing and based on what emission rates could be achieved by other facilities in the source category.

At Merrimack, the Proposed Approval contemplats a maximum NOx emission rate of 0.22 lbs/MMBtu on a 24-hour calendar day average for both units *unless* a "startup or shutdown" occurs on that day, in which case a dramatically less protective mass limit is imposed: 4.0 tons for MK1, and 11.5 tons for MK2. *See* Env-A 1303.06(b) and (c).

Howeve, these limits are far in excess of a proper NOx RACT standard (and indeed, are not that far off from the 0.25 lbs/MMBtu on a 24-hour calendar basis NOx limits for the coal-fired units at Schiller Station, New Hampshire's other coal plant, despite Schiller *not being equipped with SCR*). Env-A 1305.12.

As noted above, RACT is a technology-forcing standard intended to ensure that polluting sources are controlled consistent with available methods for reducing pollution. Critically, "RACT is not designed to rubber-stamp existing control methods." *Sierra Club v. EPA*, 972 F.3d 290, 295 (3d Cir. 2020) (observing that RACT "is a technology-forcing mechanism."). As the Third Circuit has determined, "[w]hen originally introducing the standard, the EPA noted that 'the control agency, using the available guidance, should select the best available controls, deviating from those controls only where local conditions are such that they cannot be applied there and imposing even tougher controls where conditions allow." *Id.* (citing the Strelow Memo).

As a result, RACT is a stringent standard, designed to induce and require improvements in control technology and reductions in pollutant emissions. Indeed, EPA has long maintained that "RACT should represent the toughest level of control considering technological and economic feasibility that can be applied to a specific situation" and that "[a]nything less than this is by definition less than RACT."⁹

Here, the proposed 0.22 lbs/MMbtu NOx limits for the two Merrimack units are inconsistent with both RACT and Regional Haze requirements. First, such limits appear to be little more than improper rubberstamping of existing behavior at Merrimack. Figures 1 and 2 below look at the NOx emission rates for both Merrimack units on operating days reporting 24 hours' worth of operations (thereby excluding startup and shutdown periods). As can be seen, with the exception of some excursions at MK1, and even more excursions at MK2, both units seem to comfortably keep their 24-hour NOx emission rates at or below 0.20 lbs/MMbtu—roughly 10% below the limit. Indeed, MK2 keeps its daily NOx emission rate below 0.19

⁹ Strelow Memo at 2.

lbs/MMbtu half the time, and MK1 manages to keep its daily NOx emission rate at or below 0.184 lbs/MMbtu half the time.



Figure 1: Merrimack Unit MK1 Full Operating Day NOx Emissions¹⁰





Accordingly, 0.22 lbs/MMbtu is inadequate as RACT.

¹⁰ See Exhibit 1. Data taken from U.S. EPA, Air Markets Program Data, available at https://ampd.epa.gov/ampd/.

¹¹ See Exhibit 1. Data taken from U.S. EPA, Air Markets Program Data, available at https://ampd.epa.gov/ampd/.

B. <u>As EPA Recognizes, SCR-Equipped Coal Plants Achieve Far Lower NOx Emission</u> Rates than 0.22 lbs/MMbtu

More than that, however, 0.22 lbs/MMbtu is completely out of step with what other states—and with what EPA—considers to be achievable by SCR-equiped units. Multiple other states in the Ozone Transport Commission (the "OTC," of which New Hampshire is a member) impose short-term NOx emission limits on their coal plants in keeping with RACT requirements. As detailed in the OTC's recommendation that EPA impose, under section 184(c) of the Clean Air Act, short-term NOx emission limits on Pennsylvania's coal fleet, Delaware, Maryland, and New Jersey all have regulations controlling NOx pollution from coal plants with short averaging periods. *See* 86 Fed. Reg. 4,049, 4053-54 (Jan. 15, 2021) (detailing Delaware's 0.125 lbs/MMbtu NOx emission limit on a 24-hour rolling basis for coal plants and Maryland's 0.10 lbs/MMbtu 24-hour block average limit "without any exceptions based on load levels or operating conditions").

Similarly, EPA has imposed a Federal Implementation Plan ("FIP") setting NOx emission rates for large coal-fired power plants equipped with SCR. There, EPA concluded that Pennsylvania's coal units could achieve NOx emission rates of between 0.102 and 0.072 lbs/MMbtu—between half and one-third the emission rates EPA now proposes to approve for Merrimack. *See* 87 Fed. Reg. 53,381, 53,389 (Aug. 31, 2022).

Not only do these regulations in nearby states demonstrate the technological and economic feasibility of such a short-term emission limit in New Hampshire, but they are significantly more protective of air quality than the extremely permissive 0.22 lbs/MMbtu NOx limits at Merrimack.

EPA's analysis in the context of the Revised Cross State Air Pollution Rule addressing ozone transport under the 2008 ozone standards likewise demonstrates that the proposed NOx limits at Merrimack are entirely out of step with what SCR-equipped coal units are capable of achieving. In promulgating the 2021 Revised Cross State Air Pollution Rule Update, EPA determined that a NOx emission rate of 0.08 lbs/MMbtu was achievable by SCR-equipped units, even using a very conservative system of regarding the *third-best* ozone season performance of a coal unit:

EPA updated the timeframe to include the most recent and best available operational data (i.e., 2009 through 2019). Considering the emissions data over the full time period of available data results in a third-best rate of 0.08 pounds per million British thermal units (lb/mmBtu). EPA notes that over half of the SCR-controlled EGUs achieved a NOX emission rate of 0.068 lbs/mmBtu or less over their third-best entire ozone season. Moreover, for the SCR-controlled coal units that EPA identified as having a 2019 emission rate greater than 0.08 lb/mmBtu, EPA verified that in prior years, the majority (approximately 95 percent) of these same units had demonstrated and achieved a NOX emission rate of 0.08 lb/mmBtu or less on a seasonal and/or monthly basis. This further supports EPA's determination that 0.08 lb/mmBtu reflects a reasonable emission rate for representing SCR optimization... 86 Fed. Reg. 23,054, 23,088 (April 30, 2021) (emphasis added). EPA's conclusions in the recent Good Neighbor Plan, addressing interstate transport of ozone under the 2015 ozone standard, are in full accord:

[C]onsistent with the Revised CSAPR Update, where EPA identified 0.08 lb/mmBtu as a reasonable level of performance for units with optimized SCR, the **EPA finalizes a rate of 0.08 lb/mmBtu** as the optimized rate for this rule... **This emissions rate assumption of 0.08 lb/mmBtu reflects what those units would achieve on average** when optimized ...

88 Fed. Reg. 36,654, 36,721 (June 5, 2023) (emphasis added). By way of comparison, Merrimack, on an annual, plantwide basis, comes in at emission rates of roughly *triple* what EPA presumes such SCR-equipped units should be able to achieve.

Figure 3: Merrimack Plantwide NOx Emission Rate, 2015-2022¹²



C. Cyclone Boilers Achieve Low NOx Emission Rates

EPA appears to suggest that cyclone boilers, like those at Merrimack, emit higher amounts of NOx and thus a NOx emission limit for Merrimack dramatically higher than for other SCR-equipped coal plants is justified. *See* 88 Fed. Reg. at 43,488. However, nothing about Merrimack's configuration of cyclone boilers necessitates higher NOx emission rates.

¹² See Exhibit 1. Data taken from U.S. EPA, Air Markets Program Data, available at https://ampd.epa.gov/ampd/.



Figure 4: SCR-Equipped Cyclone Boiler Coal Unit NOx Emissions¹³

Other cyclone boilers with SCR routinely and in most cases *consistently* achieve NOx emission rates one-half to one-third that of Merrimack. Even the New Madrid and Thomas Hill units in Missouri, which sometimes emit at rates as high as that of Merrimack, appear capable of achieving much lower emission rates in particular ozone seasons. The difference appears to be that Merrimack operates its SCR to achieve the emission limit New Hampshire has imposed, and does not seek to remove NOx beyond that requirement.¹⁴

Indeed, as a comparison of Figures 1 and 2 on the one hand and Figure 3 on the other demonstrates, Merrimack's extraordinarily high NOx emission rates appear to have little to do with increased startup and shutdown cycling as its capacity factor has decreased over time— Merrimack appears to operate such that even when using its SCR controls, it comes in just under the limit that New Hampshire has imposed and which EPA proposes to approve.

This is plain when looking at past operational data demonstrating that Merrimack's two units are in fact capable of achieving significantly lower NOx emission rates than they do presently:

¹³ See Exhibit 1. Data taken from U.S. EPA, Air Markets Program Data, available at https://ampd.epa.gov/ampd/.

¹⁴ Moreover, nowhere in the Good Neighbor Plan preamble does EPA conclude that cyclone boilers like Merrimack's cannot achieve such emission rates; instead, EPA concludes that *all* coal plants can achieve those lower rates. 88 Fed. Reg. at 36,721. Likewise, although New York no longer has any cyclone boiler EGUs burning coal, it has daily NOx limits on the books for such units that are 10% lower than the limits for Merrimack: 0.20 lbs/MMbtu. *See* 6 CRR-NY 227-2.4(b).

Facility	Unit	Month	Voar	Avg. NOx Rate	NOx (tops)	Heat Input (MMBtu)
Merrimack	1	7	2001	0 1025	49 15	962 331
Merrimack	1	6	2001	0.1134	49.73	916 929
Merrimack	1	9	2002	0.1136	16.30	290.046
Merrimack	1	5	2002	0.1196	57.69	985.096
Merrimack	1	9	2001	0.126	47.77	812,182
Merrimack	1	7	2002	0.1293	55.17	972,914
Merrimack	1	5	2001	0.1351	56.24	894,224
Merrimack	1	8	2002	0.1442	51.90	844,872
Merrimack	1	6	2002	0.1444	59.30	918,895
Merrimack	1	9	2003	0.1454	64.31	884,447
Merrimack	1	8	2004	0.1464	68.91	942,012
Merrimack	2	6	2000	0.1468	154.80	2,260,073
Merrimack	2	3	2007	0.1471	184.50	2,516,901
Merrimack	2	7	2005	0.1481	183.53	2,478,920
Merrimack	1	6	2004	0.1484	63.36	855,322
Merrimack	2	8	2006	0.1489	189.78	2,571,196
Merrimack	2	9	2004	0.149	173.45	2,328,003
Merrimack	2	1	2007	0.1493	193.08	2,589,197
Merrimack	2	7	2006	0.1501	182.39	2,447,539
Merrimack	2	8	2004	0.1506	184.64	2,451,613
Merrimack	1	8	2006	0.1507	72.09	957,026
Merrimack	2	7	2000	0.1507	154.16	2,194,990
Merrimack	2	8	2003	0.151	177.02	2,433,076
Merrimack	2	6	2006	0.1513	169.44	2,261,309
Merrimack	2	7	2007	0.1513	193.49	2,568,221
Merrimack	1	9	2004	0.1515	63.52	847,186
Merrimack	1	5	2004	0.1516	56.42	774,207
Merrimack	1	7	2004	0.1521	66.70	896,742
Merrimack	2	1	2009	0.153	190.91	2,495,046
Merrimack	1	9	2005	0.1538	68.51	918,112
Merrimack	1	4	2007	0.1541	69.94	922,615
Merrimack	1	1	2007	0.1545	73.33	949,242
Merrimack	1	7	2006	0.1549	71.20	951,955

Table 2: Historical Monthly Low NOx Emission Rates at Merrimack¹⁵

¹⁵ Data taken from U.S. EPA, Air Markets Program Data, *available at* https://ampd.epa.gov/ampd/. Data taken from U.S. EPA, Air Markets Program Data, *available at* https://ampd.epa.gov/ampd/.

1	1					1
Merrimack	1	3	2009	0.1554	67.96	889,726
Merrimack	2	12	2008	0.1558	185.38	2,390,772
Merrimack	1	6	2003	0.1559	65.90	849,663
Merrimack	1	8	2001	0.1561	55.88	851,827
Merrimack	1	2	2009	0.1564	61.68	805,314
Merrimack	2	9	2006	0.1566	151.89	1,925,637
Merrimack	1	6	2005	0.1573	71.54	918,010
Merrimack	2	2	2007	0.1576	148.76	1,981,815
Merrimack	1	7	2005	0.1577	74.70	958,182
Merrimack	1	2	2007	0.1584	68.34	878,358
Merrimack	2	5	2005	0.1596	12.73	192,586
Merrimack	2	9	2001	0.1599	180.10	2,266,748

There is no reason why Merrimack cannot now achieve lower NOx emission rates like it did throughout the early and mid-2000s, under varying load conditions.

Moreover, EPA has concluded that SCR-equipped coal units could not only achieve low NOx emission rates on an ozone-season basis, but that such units are capable of achieving emission rates lower than what EPA here proposes to approve for New Hampshire on a daily basis as well:

A rate of 0.14 lb/mmBtu represents the daily average NOX emissions rate that has been demonstrated to be achievable on approximately 95 percent of days covering more than 99 percent of total ozone-season NOX emissions by coalfired units with SCR controls that are achieving a seasonal NOX average emissions rate of 0.08 lb/mmBtu (or less), which is the seasonal NOX emissions rate that the EPA has determined is indicative of optimized SCR performance by units with existing SCR controls.

88 Fed. Reg. at 36.769. A daily emission rate of 0.22 lbs/MMbtu is plainly inconsistent with RACT and EPA's own prior findings about the NOx control efficacy of SCR-equipped coal units like Merrimack.

Merrimack's inadequate NOx control appears even more stark when compared to New Hampshire's other coal plant: Schiller Station ("Schiller"). Schiller *lacks* SCR, and is equipped with SNCR only—a much less effective control. Nonetheless, for the past several years, Schiller's two coal units combined have achieved a *better* annual NOx emission rate than Merrimack has.



Figure 4: Schiller Coal Unit NOx Emission Rate, 2015-2022¹⁶

Table 3: Merrimack and Schiller Plantwide Coal Annual NOx Emission Rates¹⁷

Year	Schiller	Merrimack
2015	0.2341668	0.27383277
2016	0.2109529	0.28239461
2017	0.2195951	0.29635324
2018	0.2191149	0.2500424
2019	0.1890279	0.24039448
2020	0.1558938	0.23315201
2021	N/A	0.21744514
2022	N/A	0.23717556

There is plainly considerable control slack available at Merrimack, and RACT requires Merrimack to make use of it.

D. Increased Startup/Shutdown Cycling Does Not Compel Deviation from RACT Requirements

Nor is it necessary that DES allow Merrimack to emit greater quanties of NOx at higher emission rates on the days in which a unit undergoes startup or shutdown. Notwithstanding the theory that lowered control inlet temperatures during startup and shutdown necessitate bypassing the SCR, recent information shows that SCR controls can in fact be operated at low-temperature levels with no detriment to control efficacy or longevity.

¹⁶ See Exhibit 1. Data taken from U.S. EPA, Air Markets Program Data, *available at* https://ampd.epa.gov/ampd/. Data taken from U.S. EPA, Air Markets Program Data, *available at* https://ampd.epa.gov/ampd/. No data is available for 2021 and 2022, as Schiller did not operate in those years.

¹⁷ Data taken from U.S. EPA, Air Markets Program Data, *available at* https://ampd.epa.gov/ampd/. No data is available for Schiller in 2021, as Schiller did not operate in 2021.

As AECOM has reported, for example, sodium-based solution or "SBS" injection can control SO3 levels in flue gas such that ammonium bisulfate deposition can be greatly reduced in SCR systems. This means that ammonia injection can be elevated to achieve higher NOx removal rates without ill effect, and catalyst maintenance and replacement costs can be reduced. Since the low temperature loophole is premised on the avoidance of bisulfate deposition, this form of injection system could at low cost remove any purported "need" for the loophole. *See* AECOM "SBS Injection for Enhanced SCR/SNCR Performance."¹⁸

Likewise, Duke Energy presented on the use of sorbent injection systems as a method for enhancing SCR control performance at the Worldwide Pollution Control Association Coal & Gas Seminar on August 24, 2016. There, Duke observed that SCR can be operated at low loads if sorbent injection systems are employed to remove SO3 in the flue system prior to gases reaching the SCR, which "can greatly reduce" the minimum operating temperature ("MOT") of the control. *See* Duke Energy "Sorbent Injection for Low Load Operating Flexibility," (Aug. 30, 2016) at 9.¹⁹ Indeed, issues with catalyst fouling can be managed with sorbent injection by allowing higher ammonia slippage with the SCR, which can ensure that any low temperature depositions on the catalyst can be removed during higher temperature operations. *Id*.

Accordingly, EPA should, consistent with the requirements of RACT under the Clean Air Act, disapprove New Hampshire's proposed SIP revision as concerns Merrimack Station, and instead impose a significantly lower set of NOx emission limits at Merrimack through a FIP.

Conclusion

As explained above, EPA should not approve a SIP revision with NOx emission limits for Merrimack multiple times higher than what EPA has elsewhere determined SCR-equipped coal units are capable of avhieving. Instead, EPA should impose in a FIP limits consistent with RACT and significantly lower than those currently in place at Merrimack.

Sincerely,

/s/

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¹⁸ Available at https://www.aecomprocesstechnologies.com/wp-content/uploads/2016/08/AECOM-Process-Technologies-SBS-Injection-for-Enhanced-SCR-Performance.pdf.

¹⁹ Available at http://wpca.info/pdf/presentations/Gallatin2016/9-

Sorbent%20Injection%20for%20Low%20Load%20Operating%20Flexibility%20by%20Chad%20Donner,%20Duke .pdf)