August 16, 2019

VIA ELECTRONIC MAIL

Ozone Transport Commission
800 Maine Avenue SW, Suite 200
Washington, DC 20024
Email: ozone@otcair.org

RE: Comments of Sierra Club, Chesapeake Bay Foundation, Clean Air Council, Connecticut Fund for the Environment/Save the Sound, Conservation Law Foundation, and Environmental Integrity Project Regarding Maryland Section 184(c) Petition

Dear Members of the Ozone Transport Commission:

On behalf of their hundreds of thousands of members living in the Ozone Transport Region, the Sierra Club, Chesapeake Bay Foundation, Clean Air Council, Connecticut Fund for the Environment/Save the Sound, Conservation Law Foundation, and Environmental Integrity Project respectfully submit these comments in response to the Ozone Transport Commission's (OTC's) July 17, 2019 Notice on Public Comment Period and Public Hearing. As set forth below, the undersigned groups respectfully request that the OTC states vote to approve Maryland's petition, which would greatly improve air quality and protect public health by imposing reasonable control requirements on Pennsylvania coal-fired power plants commensurate with what other OTC states already impose on their own sources.

I. Ozone Presents a Serious Public Health Concern in the Ozone Transport Region

Ground-level ozone and its precursor pollutants cause real and significant harm to people and the environment, and this problem is particularly acute in the Ozone Transport Region (OTR).

1. Ozone Impacts to Human Health

Ground-level ozone, commonly referred to as smog, forms when volatile organic compounds (VOCs) react with nitrogen oxides (NOx) in the presence of heat and sunlight. Ozone is a corrosive air pollutant that inflames the lungs, constricts breathing, and likely kills people.[1] It causes and exacerbates asthma attacks, emergency room visits, hospitalizations, and other serious health harms.[2] Ozone-induced health problems can force people to change their

[1] *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").
[2] *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.

ordinary activities, requiring children to stay indoors and forcing people to take medication and miss work or school.[3]

Ozone can harm healthy adults, but others are more vulnerable.[4] 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.[5] People with lung disease and the elderly also have heightened vulnerability.[6] People with asthma suffer more severe impacts from ozone exposure than healthy individuals do and are more vulnerable at lower levels of exposure.[7]

2. Ozone and Ozone Precursor Impacts to Ecosystems and Water Quality

In addition to harming human health, ozone and its precursor pollutants are damaging to ecosystems. Ozone damages the leaves of plants and trees and reduces agricultural yields for numerous common and economically valuable plant and tree species.[8] "In terms of forest productivity and ecosystem diversity, ozone may be the pollutant with the greatest potential for region-scale forest impacts."[9] In 2015, EPA set the secondary standard for ozone at 70 ppb, the same as the primary standard, to protect public welfare, including impacts to soils, waters, wildlife, and climate.[10]

NOx emissions also cause ecological harm when they fall to the earth's surface as nitrogen deposition.[11] Excess nitrogen deposited to surface waters can cause acidification and harmful algae blooms.[12] Harmful algae blooms block sunlight from reaching beneficial underwater grasses and, when decomposing, suck oxygen from the water and create dead zones where fish and other aquatic species cannot survive.[13] EPA identified these and other negative ecological impacts when it updated the ozone NAAQS in 2015:

> Even though the primary standards are designed to protect against adverse effects to human health, the emissions reductions would have welfare co-benefits in addition to the direct human health benefits . . . [including] reduced vegetation effects resulting from ozone exposure, reduced ecological effects from particulate

[3] *See*, *e.g.*, PA 4-12.
[4] *See* 80 Fed. Reg. at 65,310/1-3.
[5] *See*, *e.g.*, PA 3-81 to -82.
[6] *See* 80 Fed. Reg. at 65,310/3.
[7] *Id.* at 65,311/1 n.37, 65,322/3.
[8] EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidants*, EPA 600/R-05/004aF-cF, at 9-1 (2006).
[9] EPA, *Regulatory Impact Analysis of the Final Revisions to the Nat'l Ambient Air Quality Standards for Ground-Level Ozone*, EPA-452/R-15-007, at 7-3 (2015), *available at* https://www3.epa.gov/ttnecas1/docs/20151001ria.pdf.
[10] 80 Fed. Reg. 65292 (Oct. 26, 2015); *see also*, 42 U.S.C. §§ 7409(b) (NAAQS must be designed to protect the public health *and welfare*), 7602(h) (defining "effects on welfare" to include effects on water, "whether caused by transformation, conversion, or combination with other air pollutants").
[11] *See id*. at 7-2.
[12] *Id*. at 7-6.
[13] *Id*.

matter deposition and from nitrogen emissions, reduced climate effects, and changes in visibility.[14]

The coal-fired power plant units identified in the 184(c) petition contribute to the interstate transport of NOx which negatively impacts ecosystems, including the 64,000-square-mile Chesapeake Bay watershed. In 2010, in response to pervasive dead zones caused by excessive sediment, nitrogen, and phosphorus pollution, EPA established a federal-state clean-up plan called the Chesapeake Bay Total Maximum Daily Load ("Bay TMDL").[15] To develop the Bay TMDL, EPA calculated the maximum amount of sediment, nitrogen, and phosphorus the Chesapeake Bay could receive and still meet water quality standards.[16] These overall pollutant loads were then allocated to each of the seven Bay jurisdictions. Each jurisdiction is responsible for reducing its amount of pollutant contribution to meet the TMDL goals.[17] The Bay jurisdictions of Pennsylvania, New York, Delaware, Maryland, Virginia, and the District of Columbia are also members of the Ozone Transport Region.

At the time the Bay TMDL was established, EPA found that atmospheric deposition contributed roughly one-third of the total nitrogen loads delivered to the Chesapeake Bay.[18] EPA set a cap of 15.7 million pounds of atmospheric deposition of nitrogen per year directly to the Bay and its tidal tributaries, and allocated responsibility for reductions to meet this cap to EPA.[19] Accordingly, EPA committed to reducing atmospheric nitrogen deposition to the Bay by 3.7 million pounds annually between 2009 and 2025.[20] EPA ensured it would achieve the atmospheric nitrogen reductions based on *state and federal* compliance with Clean Air Act regulations, including efforts to attain and maintain the National Ambient Air Quality Standards (NAAQS).[21] Specifically, EPA explained that "[t]he air allocation scenario represents emission reductions from regulations implemented through the CAA authority *to meet* National Ambient Air Quality Standards for criteria pollutants in 2020".[22] The reductions in NOx emissions proposed by the 184(c) petition seek attainment with the ozone NAAQS in the Ozone Transport Region, an effort that is consistent with the expectations and obligations of the Bay TMDL.

The reduction in NOx proposed by the 184(c) petition also supports obligations under the Chesapeake Bay Watershed Agreement, an interstate compact between EPA and watershed states.[23] The 2014 Bay Agreement provides that EPA and the seven Bay jurisdictions will

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[14] EPA, *Regulatory Impact Analysis of the Final Revisions to the Nat'l Ambient Air Quality Standards for Ground-Level Ozone*, EPA-452/R-15-007, at 1-13 (2015).

[15] U.S. EPA, Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus, and Sediment (Dec. 2010), *available at* https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document.

[16] *See id*. at Executive Summary, ES-1.

[17] *Id*.

[18] *Id*. at Section 4, 4-33.

[19] *Id*. at Section 8, 8-33; *see also*, Bay TMDL Appendix L, at L-23 ("the nitrogen deposition directly to the Bay's tidal surface waters is a direct loading with no land-based management controls and, therefore, needs to be linked directly back to the air sources and air controls as EPA's allocation of atmospheric nitrogen deposition.").

[20] EPA, The Importance of Clean Air to Clean Water in the Chesapeake Bay (Jan. 2015), https://www.epa.gov/sites/production/files/2015-06/documents/cb_airwater_fact_sheet_jan2015.pdf.

[21] Bay TMDL, at Section 6, 6-28.

[22] Bay TMDL, at Section 6, 6-28 (emphasis added).

[23] *See* Chesapeake Bay Watershed Agreement (2014), *available at* https://www.chesapeakebay.net/channel_files/24334/2014_chesapeake_watershed_agreement.pdf (recommitting the

achieve the Bay TMDL water quality goals, including air pollution reduction targets.[24] Reductions proposed by the 184(c) petition will enable the Bay jurisdictions and EPA to reduce the atmospheric deposition of nitrogen to the Bay watershed—consistent with their commitments under the Bay Agreement and TMDL—while simultaneously reducing ozone pollution and the threat to human health in downwind states.

The Bay TMDL depends upon the nationwide implementation of the Clean Air Act, including programs to reduce the interstate transport of NOx and ensure that nitrogen reductions from atmospheric deposition continue and are maintained. EPA estimates that the Chesapeake Bay airshed is about nine times larger than the watershed at 570,000 square miles.[25] Fifty percent of the atmospheric deposition of nitrogen to the Bay watershed comes from areas outside of the Bay watershed,[26] including areas of Pennsylvania. *See* Figure 1. All of the EGUs identified in Maryland's 184(c) petition are located within the Bay airshed.

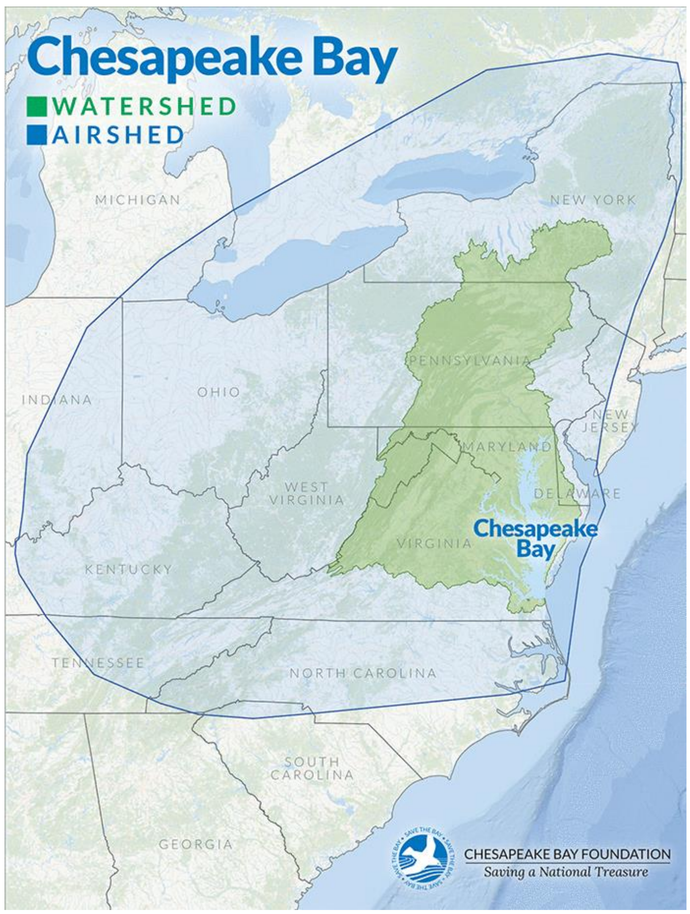

Figure 1. *Source: http://www.cbf.org/about-the-bay/maps/geography/the-chesapeakes-airshed.html*

Chesapeake Bay Program partners, including EPA, to the goals of Chesapeake Bay watershed restoration); *see also*, Executive Order 13508 – Chesapeake Bay Protection and Restoration, 74 Fed. Reg. 23,099 (May 15, 2009).

[24] *See* Chesapeake Bay Watershed Agreement, at 7.

[25] Bay TMDL at Section 4, 4-34.

[26] *Id*.

Air modeling commissioned by CBF estimated the amount of nitrogen that is deposited within the Chesapeake Bay watershed from certain coal-fired power plants.[27] The modeling included two Pennsylvania coal-fired power plants identified by Maryland's 184(c) petition: Homer City and Conemaugh. For each of these plants, the CALPUFF air quality dispersion model (v5.8.5) was used to quantify the amount and geographic extent of nitrogen deposited by NOx emissions from the power plants.

The deposition modeling results show that in 2016, actual NOx emissions from Conemaugh and Homer City contributed more than 1.77 million pounds (805,490 kg) of nitrogen to the land and water surface within the Chesapeake Bay watershed, and 38,497 pounds (17,462 kg) of nitrogen directly to the tidal waters of the Chesapeake Bay. Exhibit A at 20, 22.[28] The geographic extent of the nitrogen deposition from Homer City and Conemaugh is depicted in

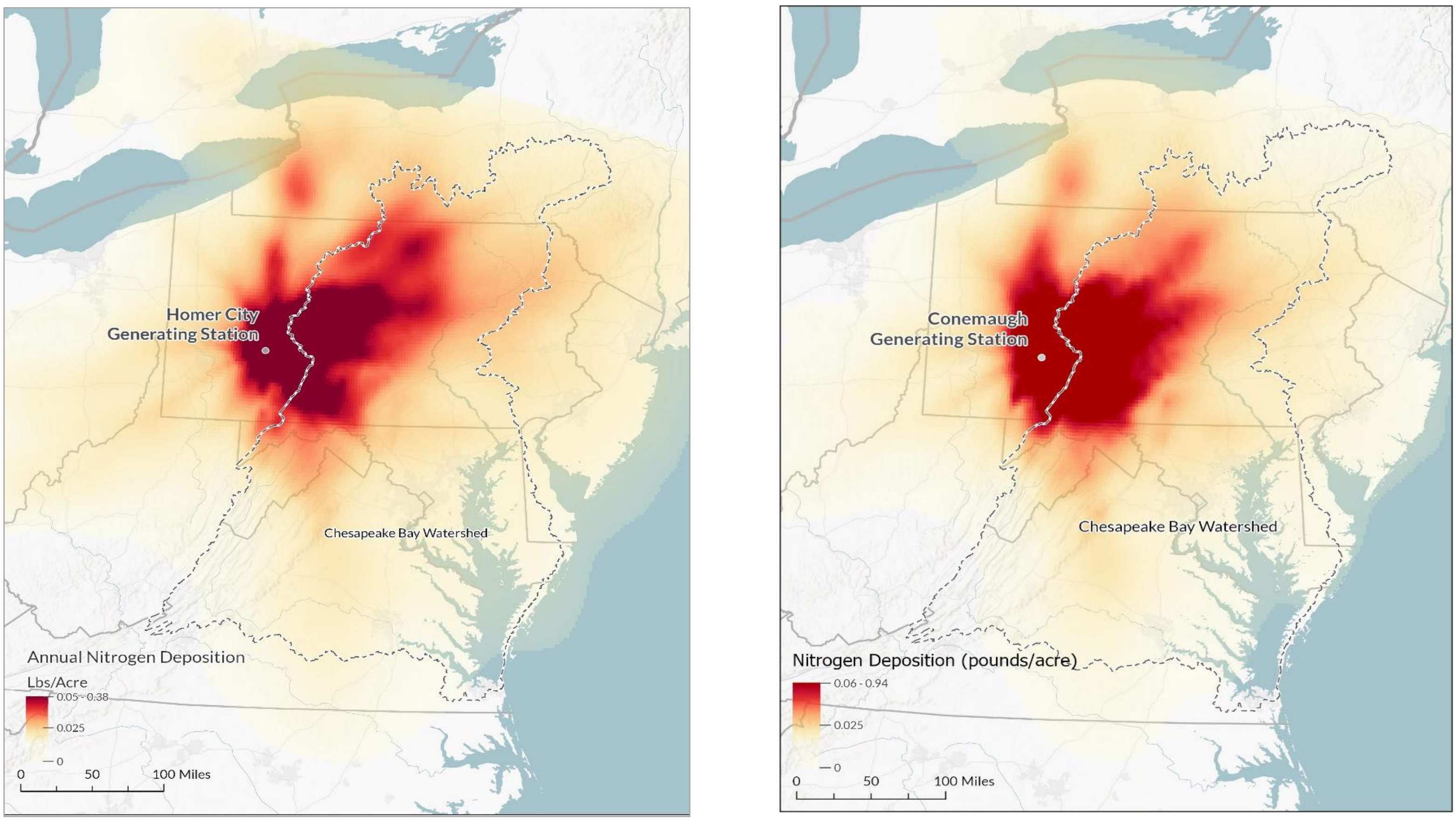

Figure 2a and 2b. *Heat maps depicting geographic extent of nitrogen deposition from the Homer City Generating Station and Conemaugh Generating Station.*
Source: CBF GIS analysis and mapping of modeling results.

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[27] *See* H. Andrew Gray, Modeled Deposition in the Chesapeake Bay Region: Conemaugh, Homer City, and Harrison (July 2018), Exhibit A (deposition modeling report commissioned for Section 126(b) petitions); *see also*, CBF, From Air to Water: How Airborne Nitrogen Pollution Impacts the Waters of the Chesapeake Bay, https://www.cbf.org/issues/air-pollution/the-unseen-traveler.html (describing and visualizing deposition modeling).

[28] 393,590 kg (Conemaugh) + 411,900 kg (Homer City) = 805,490 kg to the watershed. 7,546 kg (Conemaugh) + 9,916 kg (Homer City) = 17,462 kg to tidal waters.

The seven jurisdictions within the Chesapeake Bay watershed are responsible for meeting pollution reduction goals under the Chesapeake Bay TMDL.[29] Recognizing the benefits of a restored Chesapeake Bay—including an economic value of up to $130 billion per year[30]—these jurisdictions, their local partners, and EPA's Chesapeake Bay Program invest significant resources to implement practices that reduce nitrogen, phosphorus, and sediment loads to the Bay watershed.[31] The 184(c) petition would protect and further nitrogen reductions in the Bay airshed and watershed.

3. Residents of the Ozone Transport Region Experience Unsafe Ozone Levels

Ozone Transport Region (OTR) residents are consistently exposed to some of the highest ozone levels in the Eastern United States. As of August 14th of this year, Maryland had already experienced 10 ozone exceedance days during the 2019 ozone season, including four or more at the Beltsville, Edgewood, Essex, Furley, and HU-Beltsville monitors. Based on data to date, Beltsville, Edgewood, Essex, and Furley would all have 2017-2019 design values that exceed EPA's 2015 ozone NAAQS. Other OTR states have experienced numerous ozone exceedance days as well. Through August 14th, Connecticut had already experienced 17 ozone exceedance days, including four or more days at seven separate monitors (Danbury, Greenwich, Groton, Madison, Middletown, New Haven, Stratford, and Westport).[32] Three monitors (Greenwich, Stratford, and Westport) already have fourth highest 8-hour daily maximums above 80 parts per billion in 2019.[33] Through the end of July, New Jersey has experienced 12 ozone exceedance days in 2019,[34] and New York has also experienced 12 exceedance days, largely in the densely populated Downstate region.[35]

II. Pennsylvania Coal Plants Continue to Emit Excessive Nitrogen Oxides During the Ozone Season to the Detriment of Downwind Ozone Transport Region Residents

Pennsylvania coal plants continue to be a significant contributor to the failing ozone air quality in the OTR. Despite the implementation of EPA's Cross-State Air Pollution Rule (CSAPR) Update beginning in ozone season 2017 and Pennsylvania's Phase 2 NOx Reasonably Available Control Technology (RACT) requirements beginning that same year, a number of Pennsylvania plants continue to emit significant avoidable NOx during the ozone season to the detriment of downwind residents of OTR states. Evaluation of recent ozone season operation and

[29] *See* Bay TMDL at Executive Summary, ES-1.
[30] CBF, *The Economic Benefits of Cleaning Up the Chesapeake* 5 (Oct. 2014), *available at* http://www.cbf.org/document-library/cbf-reports/the-economic-benefits-of-cleaning-up-the-chesapeake.pdf.
[31] *See, e.g.*, Chesapeake Bay Program, *Chesapeake Progress: Funding*, http://www.chesapeakeprogress.com/funding (last visited May 21, 2018) (noting the watershed jurisdictions invested an estimated $1.41 billion in watershed restoration programs in 2017).
[32] Connecticut Dept. of Energy & Envtl. Protection, Annual Summary Information for Ozone, https://www.ct.gov/deep/cwp/view.asp?a=2684&q=321802&deepNav_GID=1744 (last checked Aug. 14, 2019)
[33] *See id*.
[34] 2019 New Jersey Air Quality Index (AQI) Exceedance Days (Updated 7/31/2019), available at http://www.njaqinow.net/upload/8hrexceedanceupdate4web.pdf.
[35] New York Dept. of Envtl. Conservation, High Ozone Values During 2019: 8-Hour Averages, https://www.dec.ny.gov/chemical/38377.html (updated July 31, 2019; last checked Aug. 14, 2019).

emissions data reveals that existing state and federal legal requirements are insufficient to ensure optimization of NOx controls and that increases in NOx emissions from demonstrated historic performance levels cannot be explained simply by increased cycling of units as capacity factors for some of the units have declined. Indeed, even when heat input is controlled for, hourly emissions data confirm that many Pennsylvania coal units are performing far worse than they did under the NOx SIP Call indicating that substantial additional emission reductions are achievable with proper operation and catalyst maintenance.

Neither EPA's CSAPR Update nor Pennsylvania's Phase 2 NOx RACT require optimization of NOx controls during every day of the ozone season. The CSAPR Update establishes flexible statewide ozone season tonnage caps that can be met while still enabling individual units to decline to optimize controls on high energy demand and other highly ozone-formation-conducive days. This problem is compounded by the existence of a large bank of emission credits that were carried over from the initial CSAPR and allow even the statewide ozone season tonnage caps to be exceeded. Pennsylvania's Phase 2 NOx RACT likewise fails to require consistent optimization of NOx controls in several ways. First, the Phase 2 RACT regulations combine a 30-day averaging period with lax limits for SCR-equipped units,[36] allowing these units to offset poor performance on some days with better performance on other days. Second, the Phase 2 RACT regulations exempt from their compliance calculations periods of low inlet temperature.[37] Third, the Phase 2 RACT regulations allow averaging across units under common ownership,[38] permitting better performance at certain units in a fleet to offset poor performance by other units.

As data compiled by the OTC aptly demonstrate, NOx control utilization in the OTR is driven by economics. When the cost of pollution allowances are sufficiently high, facilities will optimize operation of installed controls; absent high emissions allowance prices, some units will elect to emit greater quantities of NOx and save on control costs. In April 2015, the OTC Stationary Source Committee conducted an analysis comparing transport rule allowance prices to the cost of operating SCR controls.[39] In conducting the analysis, the Committee observed that "[d]uring recent ozone seasons, a number of coal-fired EGU's equipped with SCR post-combustion NOX controls have demonstrated ozone season average NOX emission rates far in excess of levels that those units demonstrated during previous ozone seasons,"[40] as illustrated in Figure 3 below.

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[36] 25 Pa. Code § 129.97(g)(1)(viii) (establishing a emission limit of 012 lb/MMBtu for SCR-equipped coal units operating above an inlet temperature of 600 degrees Fahrenheit); 25 Pa. Code § 129.98(a) (establishing a 30-day rolling average limit).
[37] 25 Pa. Code § 129.97(g)(1)(viii).
[38] 25 Pa. Code § 129.98(a) (authorizing averaging of NOx emissions on either a facility-wide or system-wide basis using a 30-day rolling average for sources under common ownership or operation within the same ozone nonattainment area in Pennsylvania).
[39] OTC Stationary and Area Source Committee, Largest Contributors Workgroup Comparison of CSAPR Allowance Prices to Cost of Operating SCR controls (Apr. 15, 2015), *available at* https://otcair.org/upload/Documents/Reports/Draft%20Final%20Allowance%20v%20SCR%20operating%20costs%2004-15-15.pdf. Included as Attachment D.
[40] *Id.* at 1.

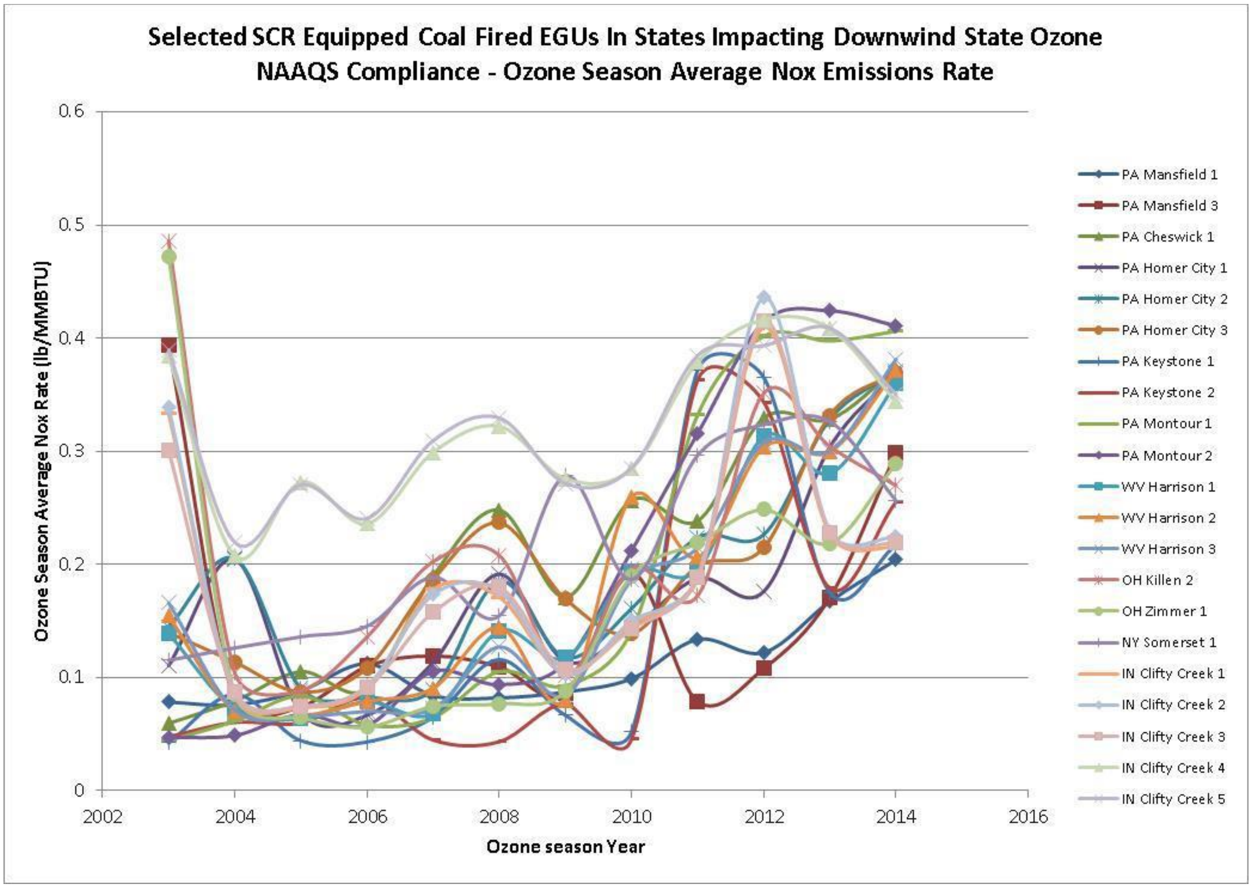

Figure 3. *OTC Analysis. Source: see footnote 38.*

The Committee then analyzed annual and (ozone) seasonal NOx allowance prices from 2005 to 2015.

Table 1: *NOX Allowances Prices from Argus Air Daily*

Date	Annual Nox Allowance Cost (est $)	Seasonal Nox Allowance Cost (est $)	Combined Annual and Seasonal Cost (est $)	Program
4/28/2005	0	3175	3175	NOx SIP Call
4/28/2006	0	2312	2312	NOx SIP Call
4/30/2007	0	983	983	NOx SIP Call
4/30/2008	0	775	775	NOx SIP Call
4/30/2009	425	1232	1657	CAIR
4/30/2010	420	33	453	CAIR
4/29/2011	150	20	170	CAIR
4/30/2012	35	8	43	CAIR
4/30/2013	40	18	58	CAIR
4/30/2014	52	22	74	CAIR
3/31/2015	125	125	250	CSAPR

As Table 1 illustrates, combined annual and ozone season NOx allowance costs between 2009 and 2015 were a small fraction of those costs between 2005 and 2008. As further detailed in the Committee's analysis, based on the relative cost of operating SCR controls and the NOx allowance prices during the 2009 to 2015 period, coal-fired EGUs had no economic incentive to optimize their control efficiency, and this is reflected in their emission rates.

Consistent with the economic incentives identified above, recent emissions and operating data illustrate that a number of Pennsylvania plants are continuing to fail to optimize their controls. In the mid-2000's when allowance prices were at their highest levels (see Figure 3 above), SCR-equipped coal units in Pennsylvania demonstrated consistent and effective operation of their controls, including at lower load levels. As the scatter plots of hourly NOx emission rate by hourly heat input for Montour Units 1 and 2 show, when operating between approximately 50 and 100 percent load in 2005, the unit routinely achieved NOx emission rates around 0.050 lb/MMBtu. The monthly average NOx rate for Unit 1 in July 2005 was 0.045 lb/MMBtu and for Unit 2 was 0.053 lb/MMBtu despite the units operating over a range of load levels during the month.

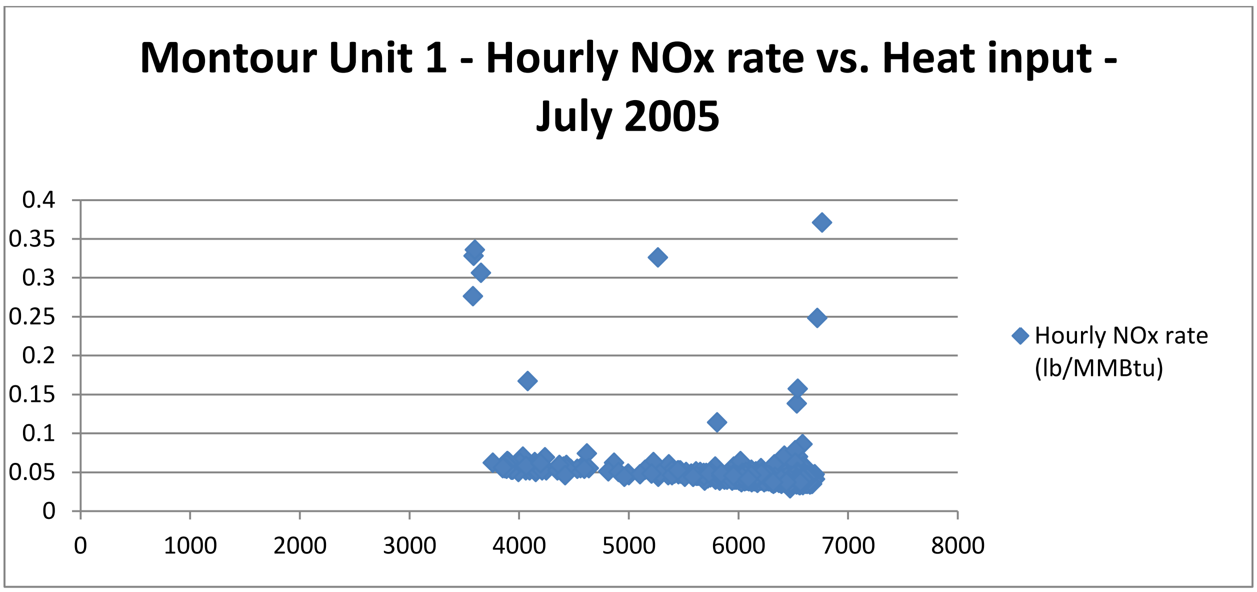

Figure 4 (Source: EPA's Air Markets Program Database)

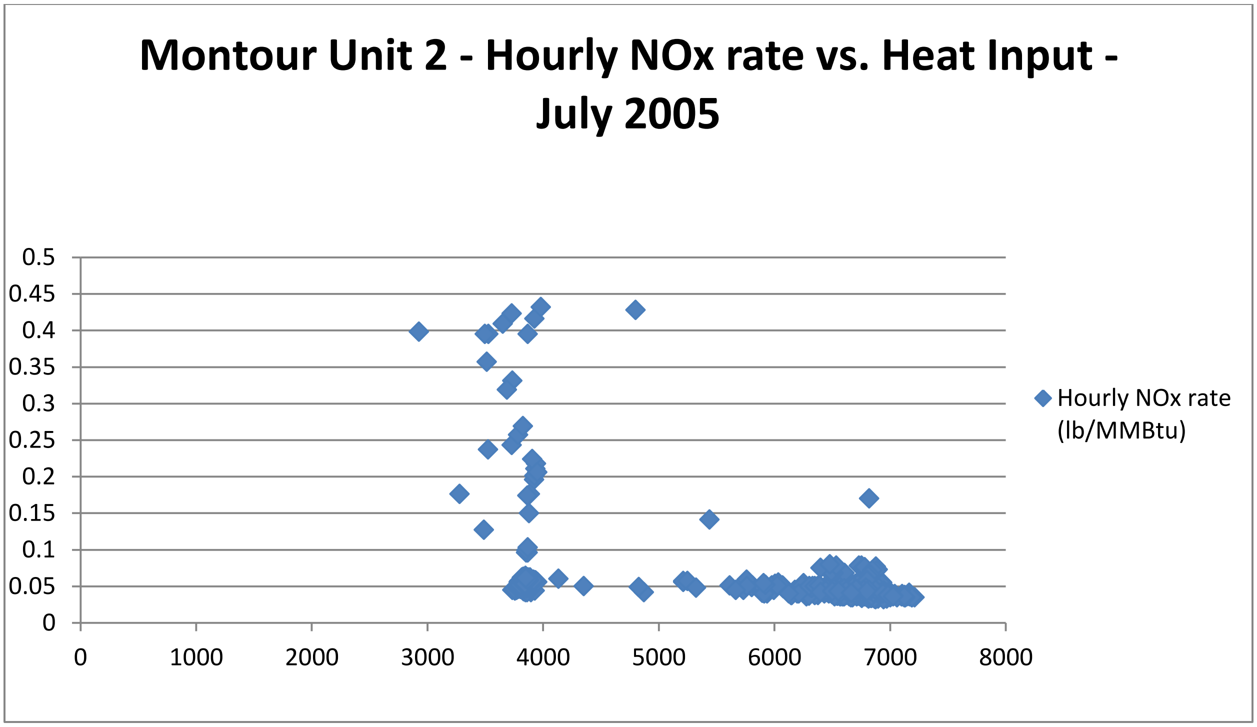

Figure 5 (Source: EPA's Air Markets Program Database)

In 2005, Cheswick likewise demonstrated the ability to consistently achieve NOx rates close to 0.060 lb/MMBtu for the full range of loads between 50 and 100 percent, showing a loss of control efficacy only for the few hours where load was substantially below 50 percent. Over the course of July 2005, the average NOx emission rate for Cheswick was 0.075 lb/MMBtu despite the unit starting up twice and shutting down once.

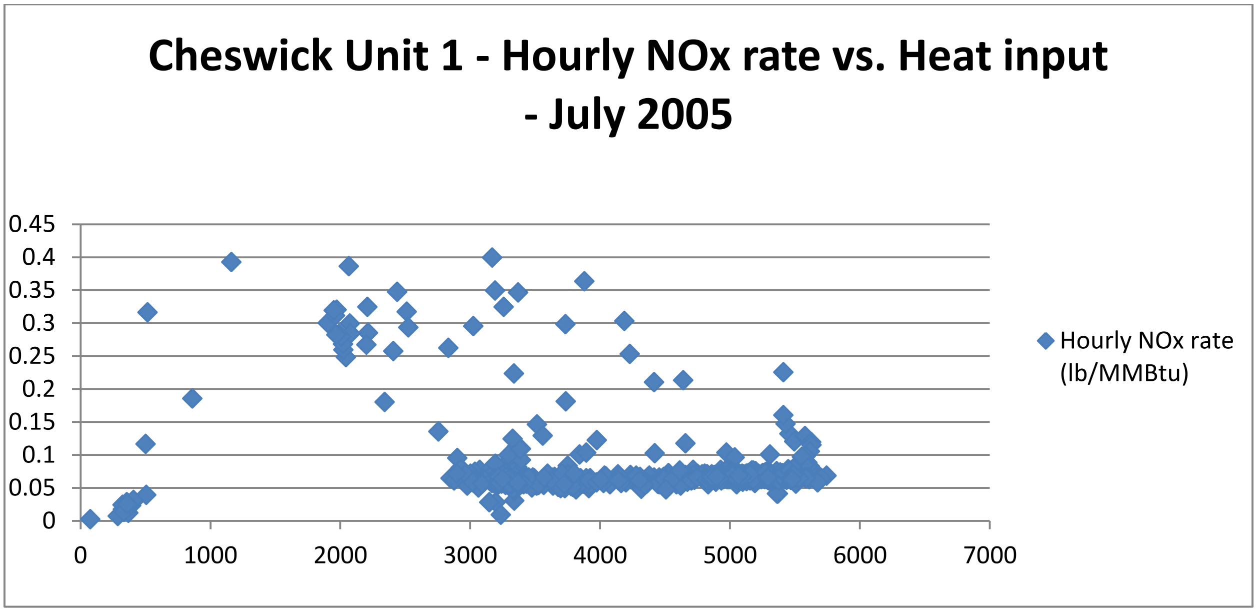

Figure 6 (Source: EPA's Air Markets Program Database)

Other units demonstrated even better SCR performance in 2005, including Keystone 1 & 2, which averaged 0.043 and 0.042 lb/MMBtu respectively during the month of July 2005.

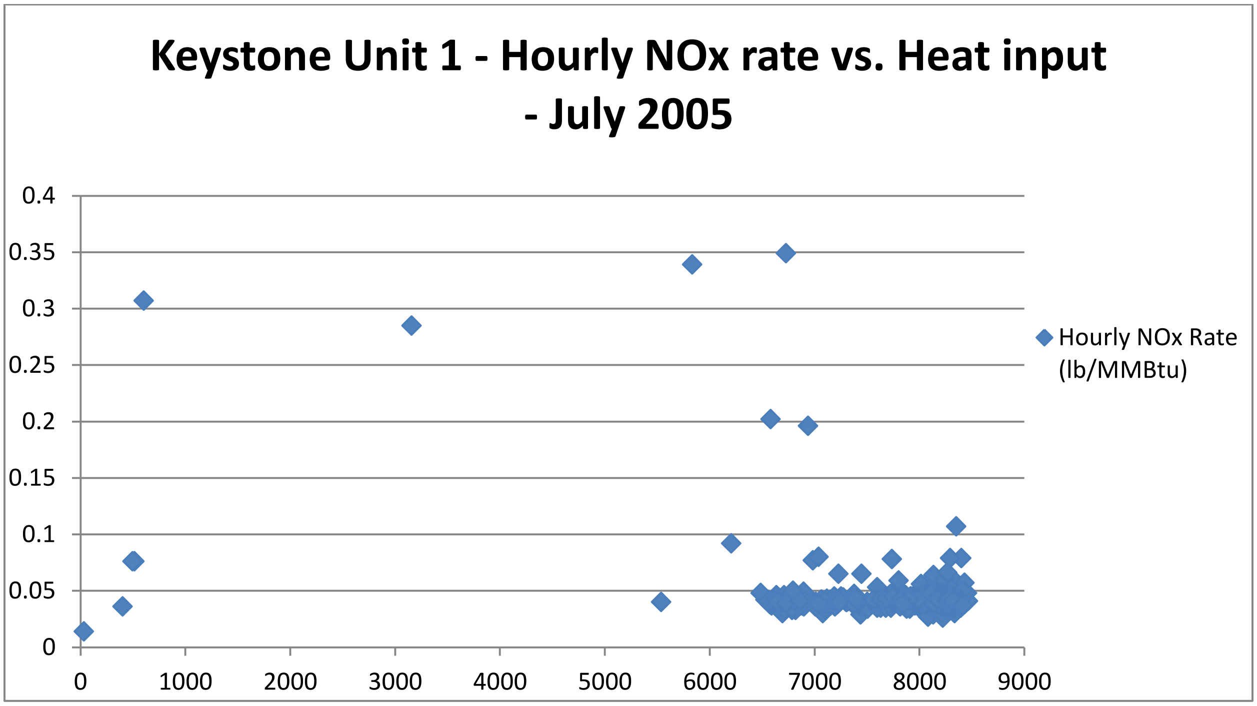

Figure 7 (Source: EPA's Air Markets Program Database)

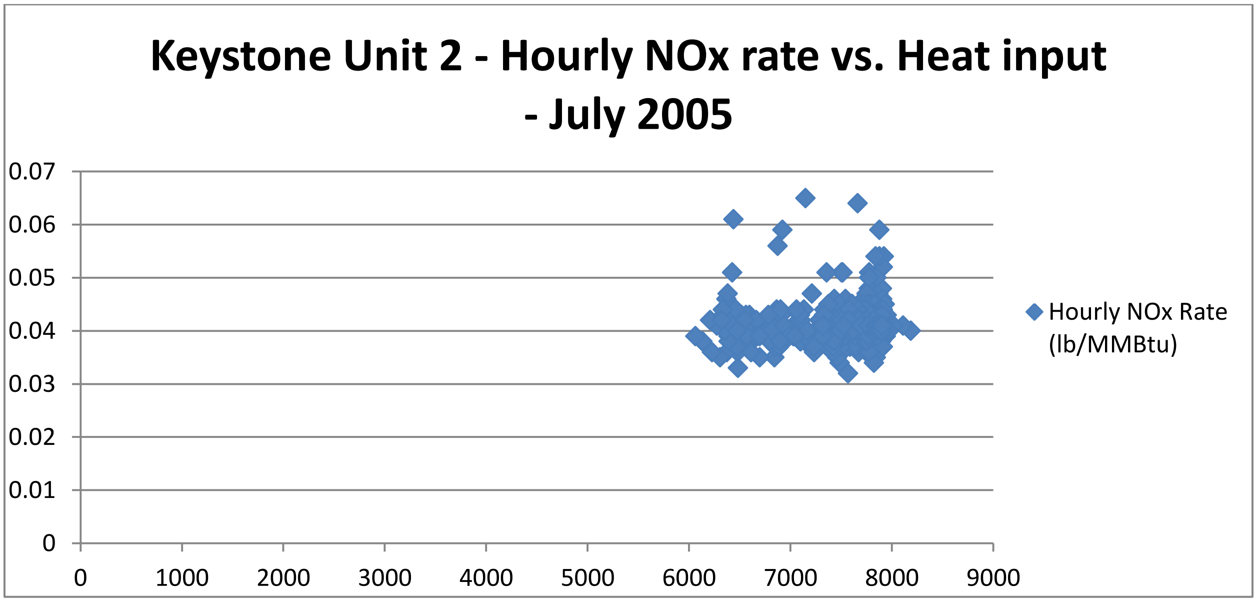

Figure 8 (Source: EPA's Air Markets Program Database)

While a few of the units have maintained comparable performance between the mid-2000's and 2018, most have not. For example, despite its load dropping by nearly 1/3rd between

July 2008 (the first year of operation of its SCR) and July 2018,[41] Bruce Mansfield Unit 3 achieved essentially the same NOx emission rate during these two periods: 0.079 lb/MMBtu in 2005 as compared with 0.083 lb/MMBtu in 2018. This continuing performance over a span of 10 years and in the face of declining load factor demonstrates that deterioration of performance is not an inherent feature of time or load.

By contrast, the two Keystone units, despite having almost exactly the same load factors in July 2005 and July 2018,[42] emitted nearly 2.5 times as much NOx in July 2018 as they did in July 2005: 557 tons versus 236 tons. This corresponds to NOx emission rates of 0.106 and 0.092 lb/MMBtu for Units 1 and 2 in July 2018 as compared to rates of 0.043 and 0.042 lb/MMBtu for Units 1 and 2 in July 2005, strongly suggesting that these units are failing to optimize operation of their SCRs or appropriately maintain and refurbish catalyst.

Emission rates have risen dramatically for other units as well. Cheswick's NOx emission rate more than doubled from 0.076 lb/MMBtu in July 2005 to 0.166 lb/MMBtu in July 2018. This increase was driven by increases in emission rate at both high and low load factors.

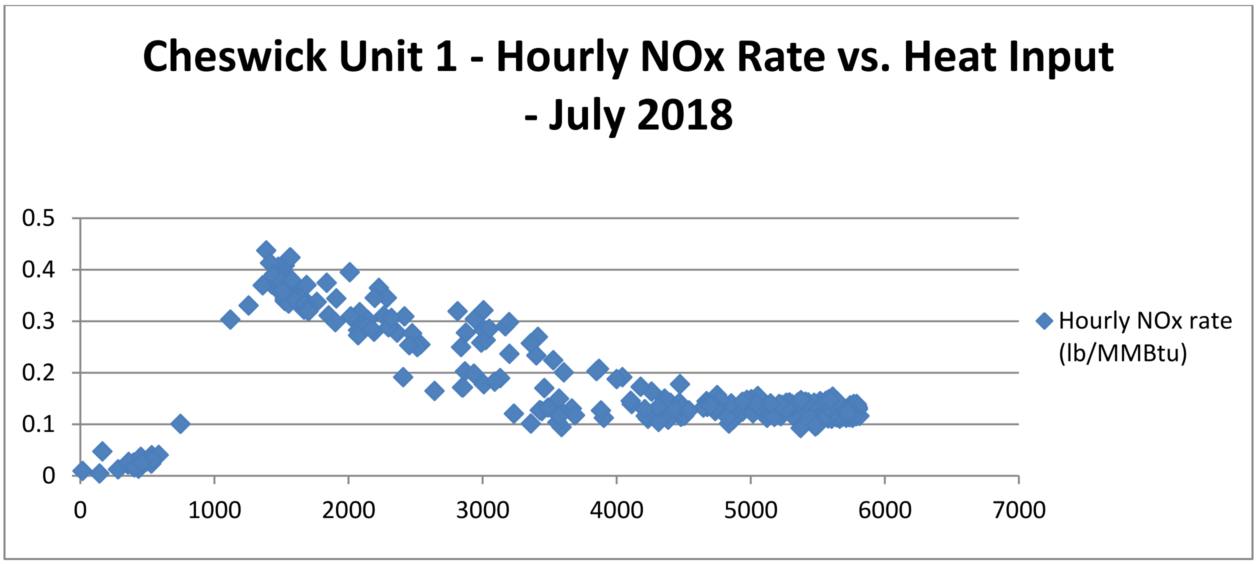

Figure 9 (Source: EPA's Air Markets Program Database)

The Montour units more than doubled their emission rates as well, from 0.045 and 0.053 lb/MMBtu in July 2005 to 0.111 and 0.127 lb/MMBtu in July 2018. As the scatter plots below illustrate, the increase in NOx emission rates for Montour Units 1 and 2 was not a product of the unit operating at lower load factors: The emission rates are higher across the spectrum of load levels and are generally at least as high at full load as at lower load levels.

[41] From 5,941,406 MMBtu in July 2008 to 4,087,723 MMBtu in July 2018. Data from EPA's Air Markets Program Database.

[42] Heat input for Unit 1 + Unit 2 in July 2005 (5,513,428 MMBtu + 5,638,788 MMBtu = 11,152,216 MMBtu) versus July 2018 (5,796,898 MMBtu + 5,457,698 MMBtu = 11,254,596 MMBtu).

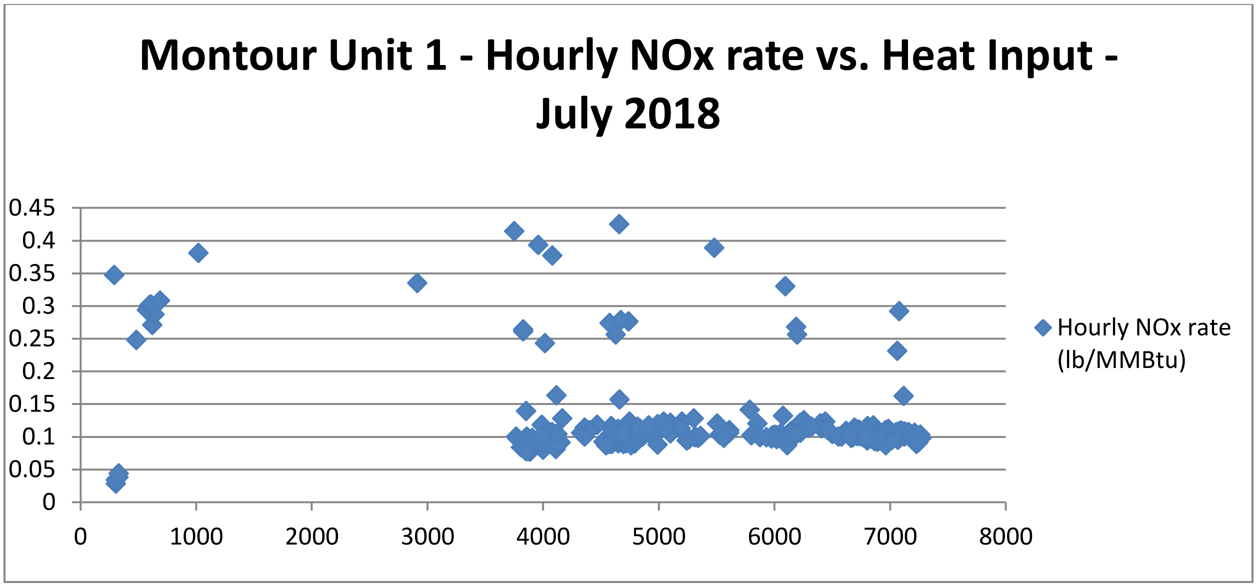

Figure 10 (Source: EPA's Air Markets Program Database)

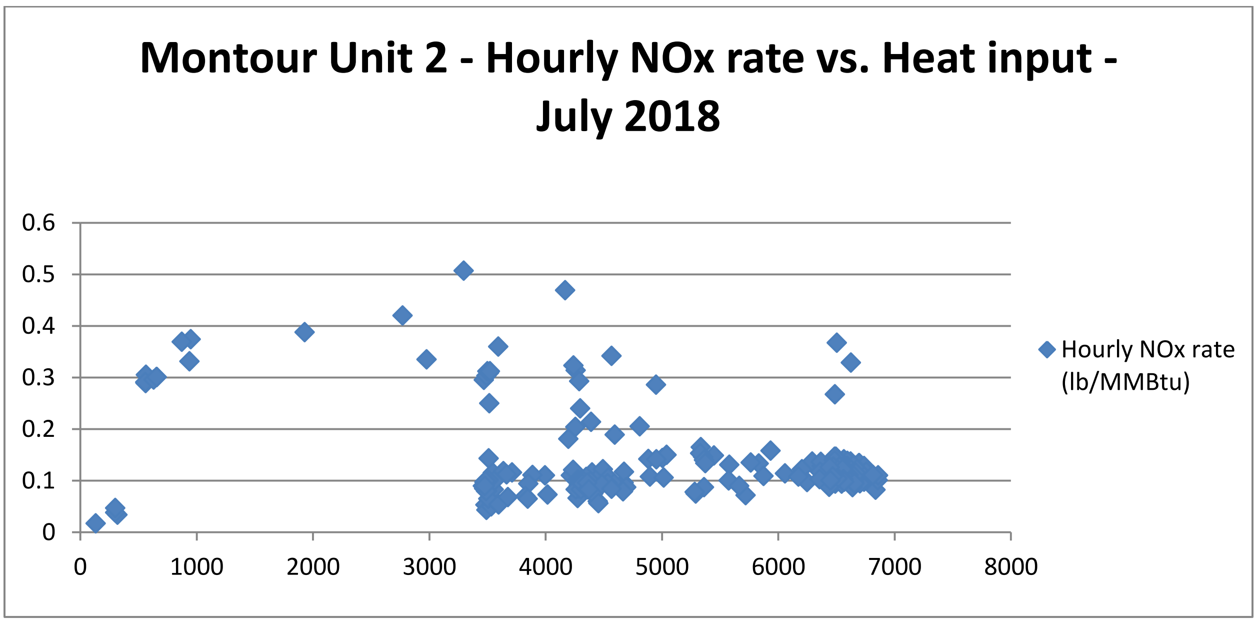

Figure 11 (Source: EPA's Air Markets Program Database)

Homer City Unit 3 increased its NOx emission rate by 60 percent between July 2005 and July 2018, driven by increased NOx emission rates across the load spectrum.

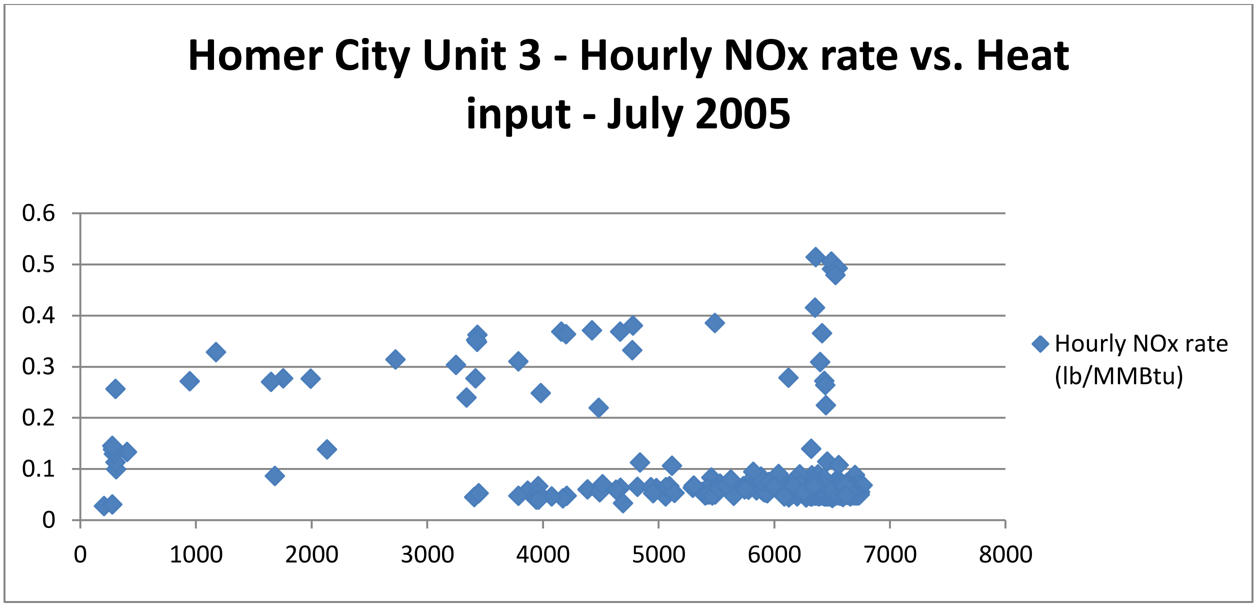

Figure 12 (Source: EPA's Air Markets Program Database)

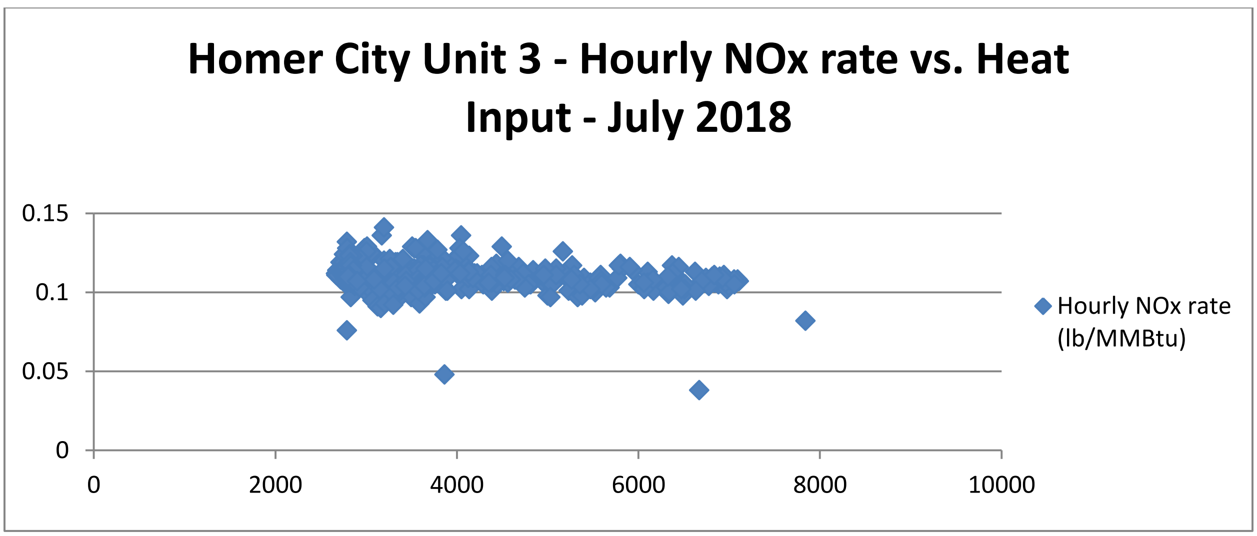

Figure 13 (Source: EPA's Air Markets Program Database)

And Homer City Unit 1's July 2018 NOx emissions rate *increases* at higher load, belying any argument that poor performance is a function of unit cycling. The monthly NOx emission rate for Homer City Unit 1 nearly tripled from 0.061 lb/MMBtu in July 2005 to 0.170 lb/MMBtu in July 2018.

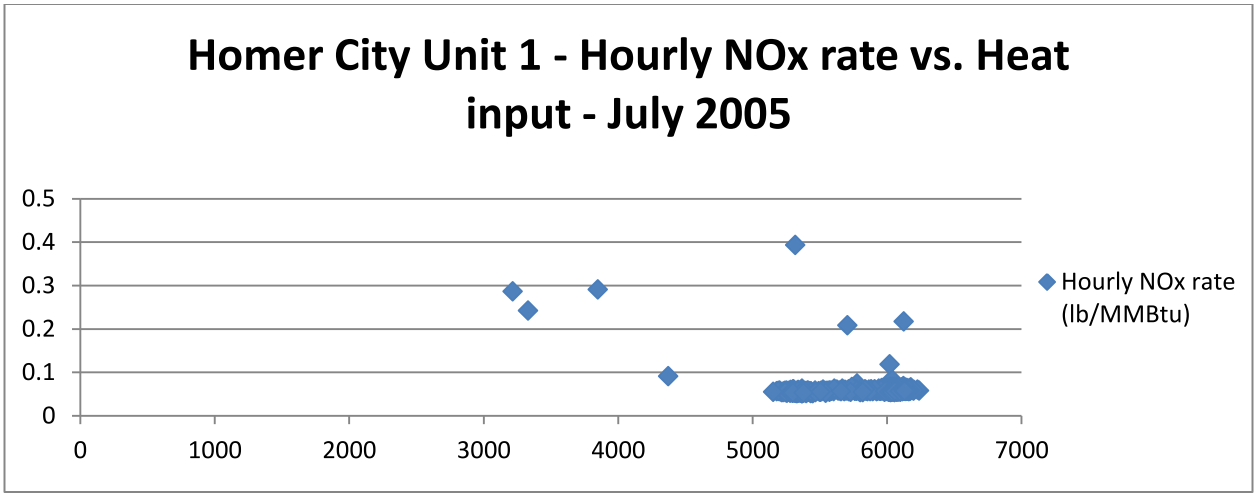

Figure 14 (Source: EPA's Air Markets Program Database)

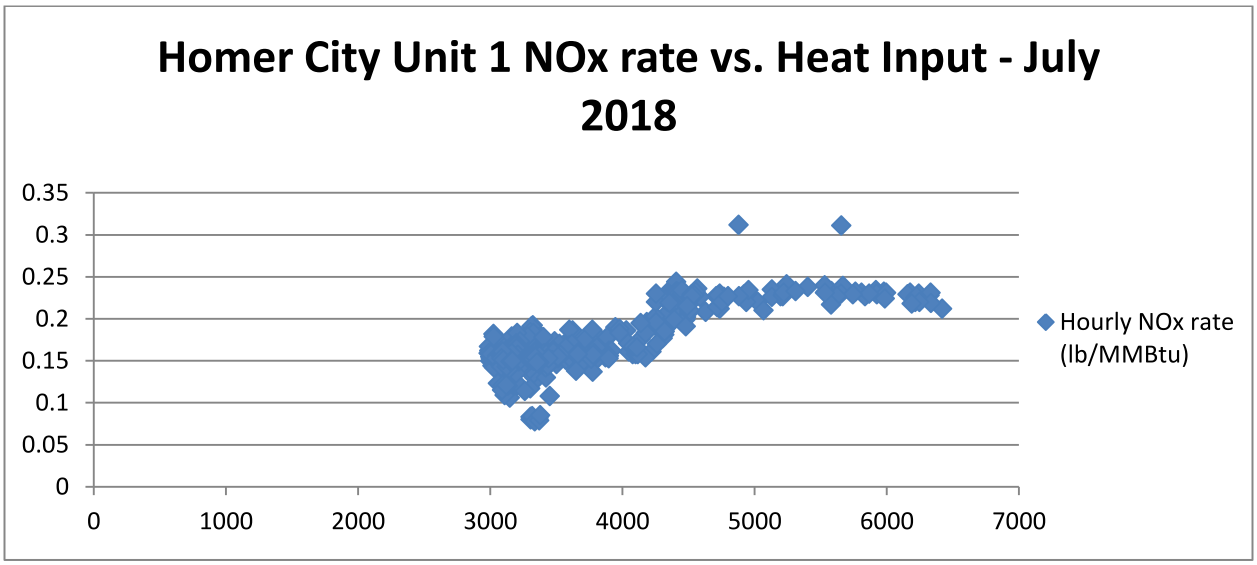

Figure 15 (Source: EPA's Air Markets Program Database)

As set forth in the attached Technical Note from Dr. Ranajit Sahu,[43] which was previously submitted to EPA in responding to EPA's proposed denial of Maryland's Section 126(b) petition, the existing SCR systems are fully capable of achieving equal or greater control efficiencies than they have in the past. This is because control efficiency can be restored by replacement and arrangement of catalyst, a fact that EPA acknowledges in its 2017 revised Control Cost Manual.[44] In that Manual, in discussing SCR controls, EPA observes that "the catalyst life for regenerated catalyst is equal to or longer than the catalyst life of new catalyst; regeneration can fully restore the NOx catalyst activity, and by increasing the number of catalyst

[43] Attached as Exhibit B.
[44] *Id.* at 6.

sites available, can increase the NOx catalyst activity from the original catalyst (by up to 25 percent)."[45]

Consistent with Dr. Sahu's accompanying technical assessment, there are many examples of SCR-equipped coal-fired EGUs that achieved control efficiencies commensurate with best past performance, even after undergoing a period of non-optimization of controls. These units confirm the reasonableness of imposing protective daily emission limits on Pennsylvania plants consistent with past performance. By way of illustration, Unit 2 at the Gibson coal plant in Indiana showed an initial period of optimizing its SCR between 2005 and 2006 (during which it achieved ozone season average NOx emission rates of 0.084 and 0.067 lb/MMBtu respectively). It then ceased optimizing its SCR, reaching a maximum ozone season average NOx emission rate of 0.218 in 2011 before achieving a lowest-ever ozone season average NOx emission rate of 0.063 in 2017.

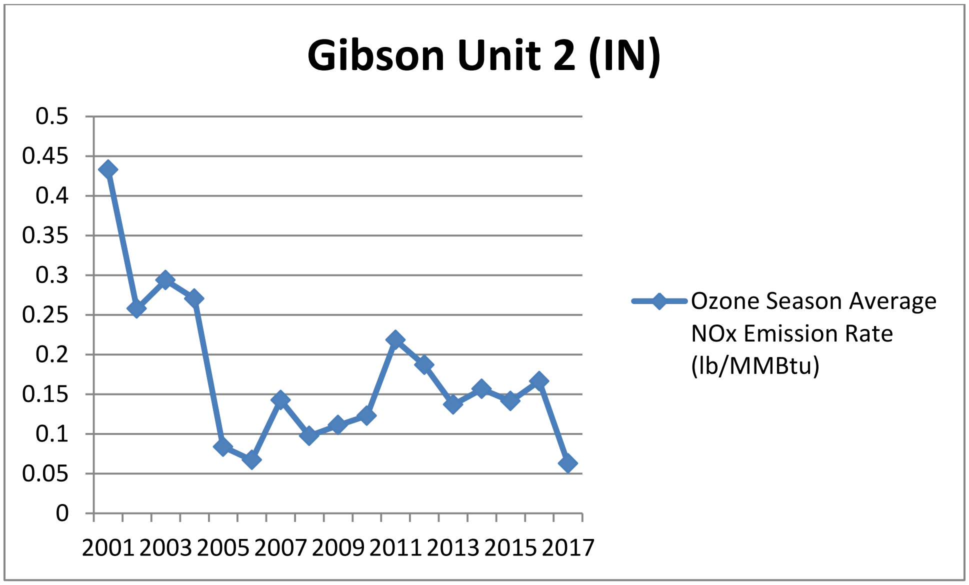

Figure 16 (Source: EPA's Air Markets Program Database)

Unit 1 at Bruce Mansfield in Pennsylvania follows the same trend. The facility achieved average ozone season NOx emission rates as low as 0.078 and 0.076 lb/MMBtu in ozone seasons 2003 and 2004 respectively, then emissions increased up to a high of 0.242 lb/MMBtu for ozone season 2015 before achieving a lowest-ever ozone season NOx emission rate of 0.072 lb/MMBtu in 2017. Emissions profiles for the other units at the Bruce Mansfield facility are similar.

[45] *Id.* at 6 (citing EPA, 2017 revised Control Cost Manual, Section 4, Chapter 2), *available at* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#cost%20manual. The Manual is included as Attachment E.

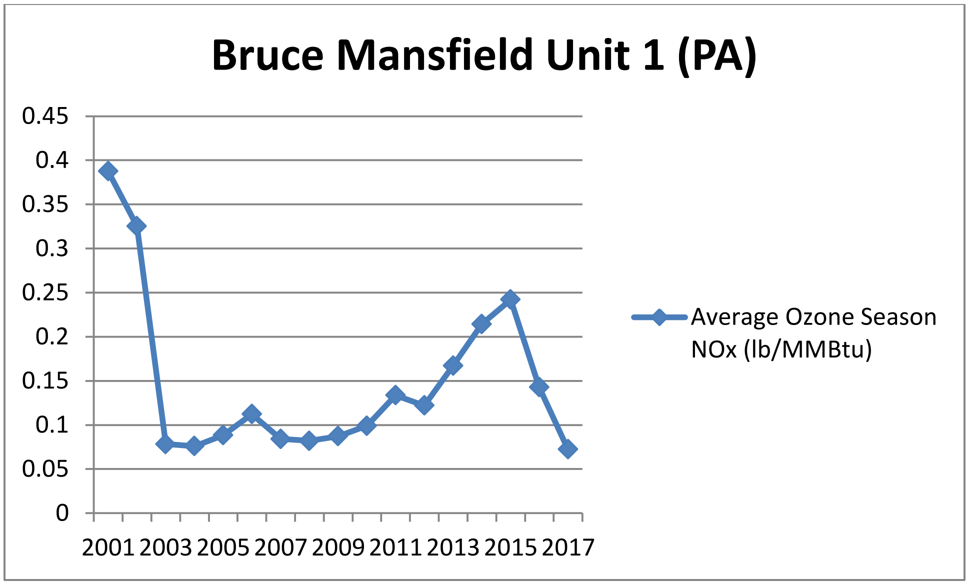

Figure 17 (Source: EPA's Air Markets Program Database)

The five units at Kyger Creek in Ohio provide further illustration of the same point. As the data for Unit 1 (plotted below) show, the unit installed an SCR and achieved its lowest average ozone season NOx emission rate to date at 0.079 lb/MMBtu in 2005. The plant then ceased optimizing control and in ozone season 2016 had an average NOx emission rate of 0.192 lb/MMBtu. In ozone season 2017, the plant achieved its lowest ever ozone season average NOx emission rate: 0.065 lb/MMBtu. The other four units at the facility have nearly identical annual NOx emission profiles.

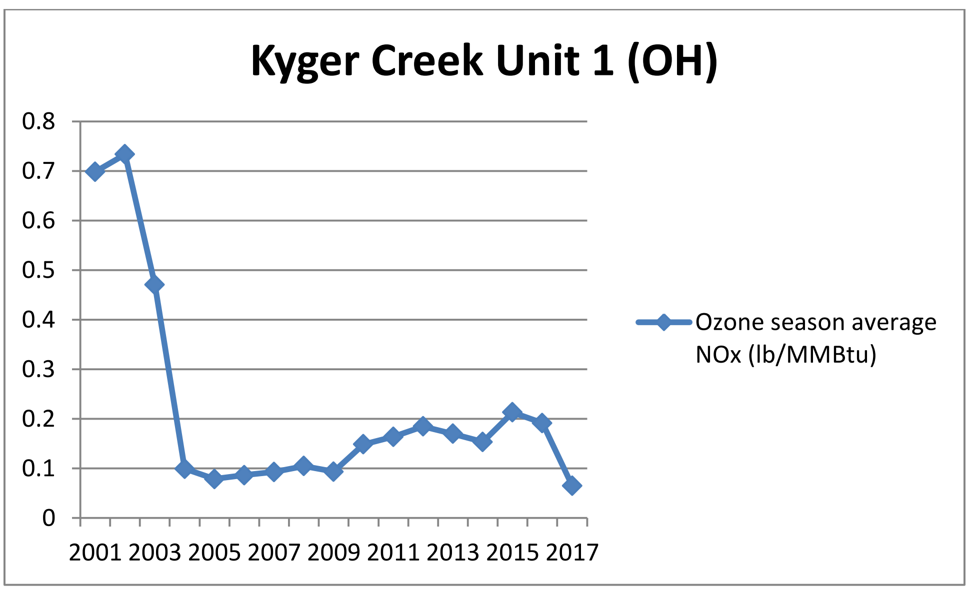

Figure 18 (Source: EPA's Air Markets Program Database)

In sum, there is no technical impediment to Pennsylvania coal plants resuming consistent, effective NOx control as they have demonstrated they can achieve with their already-installed SCR controls.

III. Maryland's Requested Relief that Pennsylvania's Coal Units be Required to Run Their Existing Controls in an Optimized Manner Every Day of the Ozone Season is Appropriate

As the above actual unit emission data demonstrate, the SCR-equipped Pennsylvania coal units have shown that they are capable of achieving superior performance, including controlling NOx emissions to achieve low daily emission rates. Other OTC states impose—and their sources achieve—more aggressive daily NOx emission limits during the ozone season, making it eminently reasonable to apply comparable requirements to the units in Pennsylvania. For example:

- Maryland: Pursuant to COMAR 26.11.38.03 and .05, each coal-fired electric generating unit (EGU) in Maryland must achieve a unit-specific 24-hour block NOx emission rate. For SCR-equipped units these range from 0.07 lb/MMBtu to 0.08 lb/MMBtu depending on the unit.[46]

- New York: New York imposes NOx emission rates for coal-fired EGU boilers of 0.12 lb/MMBtu for tangential and wall-fired boilers, 0.08 lb/MMbtu for fluidized bed boilers, and 0.20 lb/MMBtu for cyclone boilers, all with an averaging time of 24 hours.[47]

- Connecticut: Connecticut's NOx RACT limit for EGU coal boilers is 0.12 lb/MMbtu on a daily block average.[48]

- Delaware: Delaware has established a uniform standard of 0.125 lb/MMBtu as a 24-hour rolling average that applies to coal-fired and residual oil-fired electric generating units located in Delaware with a nameplate capacity rating of 25 MW or greater beginning January 1, 2012.[49]

- New Jersey: New Jersey requires coal-fired EGUs to meet a 24-hour emission limit of 1.5 lb/MWh.[50]

OTR states suffering from Pennsylvania's coal plant pollution have imposed daily NOx emission limits on their coal-fired power plants. It is both reasonable and appropriate to require a similar degree of control from Pennsylvania's coal EGUs.

IV. Conclusion

As set forth above, Maryland and other OTC states continue to suffer from unsafe levels of ozone pollution. As part of their effort to address their own in-state contributions, particularly

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[46] *See* COMAR 26.11.38.05.A(2). For Brandon Shores Unit 2, the regulations differentiate the applicable emission rate depending upon whether the unit is operating above or below 650 MW (gross).
[47] 6 NYCRR § 227-2.4(a)(1)(ii).
[48] RCSA 22a-174-22e(d)(2)(C).
[49] 7 Del. Admin. Code § 1146-4.3.
[50] NJAC 7:27-19.4(a), Tbl. 3.

on high energy demand days conducive to ozone formation, these states have established limits on NOx from power plants with 24-hour averaging times. By contrast, Pennsylvania's Phase 2 NOx RACT provides for a 30-day averaging time and EPA's CSAPR Update establish only ozone season pollution caps. As the actual hourly emissions data provided above illustrate, a number of the coal units in Pennsylvania are taking advantage of the flexibilities in the Pennsylvania and EPA regulations to continue to emit excessive amounts of NOx to the detriment of air quality in Maryland and other downwind states. Maryland has already attempted through other Clean Air Act mechanisms, including Section 126, to address pollution from the Pennsylvania coal plants. To date, those efforts have not achieved the needed emission reductions. The undersigned groups respectfully request that the OTC states vote to approve Maryland's Section 184(c) petition. Doing so will help Maryland and other OTR states to achieve current ozone National Ambient Air Quality Standards and the goals of the Bay TMDL and Bay Watershed Agreement, improving air quality, protecting public health, and reducing damage to the natural environment.

Respectfully submitted,

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