



March 30, 2016

Ms. Alison Sinclair  
Virginia Department of Environmental Quality  
Piedmont Regional Office  
4949 Cox Road  
Glen Allen, Virginia 23060

**RE: Virginia Electric and Power Company, Registration No. 52525  
Prevention of Significant Deterioration Permit and Stationary Source  
Permit to Construct and Operate the proposed Greenville Power  
Station in Greenville County, Virginia**

Dear Ms. Sinclair:

Please accept these comments and this request for Board consideration on behalf of the Virginia Chapter of the Sierra Club and Appalachian Voices. We believe that Virginians deserve clean air, clean energy, and a secure future. The 1600-megawatt Greenville County Power Station proposed by the Virginia Electric and Power Company (Dominion) threatens these interests. Rather than further the Commonwealth's statutory goals of energy independence, energy efficiency, and increased renewable generation,<sup>1</sup> Dominion continues to invest in carbon-emitting fossil fuels. By doing so, it places all Virginians at the mercy of accelerating climate change.

The proposed project is legally ineligible for a Prevention of Significant Deterioration (PSD) permit under Virginia's State Implementation Plan, Virginia's State Air Pollution Control Law, and the Clean Air Act. Remarkably, Dominion fails to provide any information or analysis on major pollutant-emitting activities connected with the plant. It indefensibly omits any mention of its own Atlantic Coast Pipeline—a project with the potential to emit enormous amounts of methane, a potent greenhouse gas and a major driver of climate change. Because the two projects are linked, both literally and functionally, the law is clear that the pipeline and its compressor stations must be considered alongside the Greenville plant. Accordingly, all activities associated with the proposals require the best available controls on greenhouse gases and other emissions. For this reason alone, Dominion must be sent back to the drawing board.

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1 See Virginia Code § 67-101.

Compounding the problem, Dominion did not conduct a thorough review of all available means of pollution reduction, ignoring processes for reducing emissions and producing cleaner energy. Most notably, it overlooks completely the integration of clean solar power to supplement electricity generation and increase overall efficiency. Like its failure to consider the Atlantic Coast Pipeline, this is fatal to the draft permit.

Further, the proposal fails to incorporate the best available control technology for conventional pollutants affecting human health, an emphatic requirement of the Clean Air Act. The plant's proposed emission rates are higher than those achieved by similar facilities—higher, in fact, than what the Department has uncompromisingly demanded of similar plants in the recent past. And both Dominion and the Department failed to investigate the project's true potential to emit formaldehyde, a known carcinogen and a hazardous air pollutant subject to the maximum achievable pollution controls possible. Until it can ensure the plant's neighbors will be protected from this and other toxic pollutants, the Department cannot issue the requested permit.

The comments below are informed by the Department's January 11, 2016 Engineering Analysis and draft PSD permit, as well as Dominion's February 10, 2016 PSD permit application<sup>2</sup> (the Application); its August 1, 2015 application to the Virginia State Corporation Commission for a Certificate of Public Convenience and Necessity for the plant;<sup>3</sup> its application for a Certificate of Public Convenience and Necessity for the Atlantic Coast Pipeline;<sup>4</sup> and its own filings and statements in support of these applications. The Sierra Club and Appalachian Voices have prepared these comments in coordination with Dr. Ranajit Sahu, Ph.D., QEP, CEM (Nevada), an expert in environmental and mechanical engineering with over twenty-eight years of experience in these fields.<sup>5</sup>

## REGULATORY FRAMEWORK

The Clean Air Act aims to “protect and enhance the quality of the Nation's air resources.”<sup>6</sup> To this end, the Act employs a variety of programs—including the Prevention of Significant Deterioration (PSD) program, which governs air pollution in

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2 The Sierra Club notes that the Application indicates that the air emissions dispersion modeling and impacts analysis may be revised. *See* Application at 1-2. As such, it reserves the right to provide comments on that analysis when it is deemed final.

3 *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075 (2015).

4 *Atlantic Coast Pipeline, LLC*, FERC Docket No. CP15-554 (2015).

5 Dr. Sahu's resume is enclosed as Attachment 117.

6 42 U.S.C. § 7401.

areas where the air quality meets or is cleaner than the national ambient air quality standards.<sup>7</sup> The PSD program prohibits the construction of any “major emitting facility” unless it obtains a pre-construction permit ensuring that the project is subject to the best available control technology (BACT) for each regulated pollutant; that the project will not cause or contribute to a violation of either national ambient air quality standards (NAAQS) or so-called PSD “increments” approaching the NAAQS; and that the project will satisfy all other applicable requirements of the Act.<sup>8</sup>

Virginia administers the PSD program through an approved state implementation plan (SIP). Like its federal counterpart, Virginia’s PSD program requires would-be permittees analyze all potential impact of its proposal on visibility, soils, and vegetation.<sup>9</sup> It also adopts the five-step “top down” BACT analysis propounded by the EPA, further developed by its Environmental Appeals Board,<sup>10</sup> and upheld by the federal courts.<sup>11</sup> The Air Pollution Control Board’s *Air Permitting Guidelines* expressly incorporates the top-down BACT<sup>12</sup> and directs permit writers to the EPA’s *New Source Review Workshop*

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7 42 U.S.C. § 7470.

8 42 U.S.C. § 7475.

9 9 VAC 5-80-1755.

10 The EPA’s Environmental Appeals Board adjudicates appeals from federally-issued PSD permits (as well as state permits issued under federal delegation) and has developed a body of case law on BACT requirements. Because state PSD programs must “implement standards and limitations as stringent as those set by the EPA” and must be interpreted “with an eye to furthering the goals of the [federal] PSD program,” state courts and agencies turn to the Board’s rulings in applying their respective state PSD programs. *Utah Chapter of the Sierra Club v. Air Quality Board*, 226 P.3d 719, 727, 733 (Utah 2009). *Accord Sierra Club v. Wisconsin Department of Natural Resources*, 787 N.W.2d 855, 862 (Wis. Ct. App. 2010), *rev. denied*, 797 N.W.2d 523 (2011); *Cities of Annandale and Maple Lake NPDES/SDS Permit*, 731 N.W.2d 502, 520 (Minn. 2007). In fact, some states have indicated that the Board’s decisions establish a regulatory “floor” for state PSD program: while its decisions are not always binding on a state permitting authority, *Utah Chapter of the Sierra Club*, 226 P.3d at 733, this is largely a function of the fact that state programs may “in certain respects [be] stricter than the federal program.” *See Snyder v. Pennsylvania Department of Environmental Protection*, Docket No. 2015-027-L, 2015 WL 9590755, \*7 (Pa. Env. Hrg. Bd. 2015) (enclosed as Attachment 100). In short, a permitting authority is required to follow the EPA’s analytical framework unless it has clearly articulated (and provided a statutory foundation for) its own alternative. *Creek Generation LLC*, Petition No. IV-2008-1, 9 (E.P.A. December 15, 2009), available at <http://1.usa.gov/1q45FX9> (enclosed as Attachment 99) (*Cash Creek I*).

11 *See generally Sierra Club v. Environmental Protection Agency*, 499 F.3d 653 (7th Cir. 2007).

12 *See* Virginia Air Pollution Control Board, *Air Permitting Guidelines – New and Modified PSD Sources*, Doc. ID APG-309, 4-1 (November 2, 2015), available at <http://1.usa.gov/1SgbYjt> (enclosed as Attachment 1).

*Manual*<sup>13</sup> for additional guidance.<sup>14</sup> Failing to conduct a complete BACT analysis, including failure to consider all potentially applicable control alternatives, is an abuse of the permitting authority's discretion.<sup>15</sup>

## COMMENTS

### I. THE PSD APPLICATION IS MATERIALLY INCOMPLETE.

#### **Comment No. 1: The application fails to identify, describe, and analyze all pollutant-emitting activities of the source.**

Although the permit application does not discuss the proposed plant's fuel supply, Dominion has elsewhere acknowledged that the "site for the Greenville Power Station was selected based in part on proximity to . . . the ACP," or Atlantic Coast Pipeline<sup>16</sup>—a 600-mile, greenfield interstate natural gas pipeline to be operated by Dominion Transmission, a wholly-owned Dominion Resources subsidiary.<sup>17</sup> Dominion intends the ACP to "support [its] fleet of existing and proposed power generation facilities."<sup>18</sup> It's unsurprising, then, that both the Greenville plant and the ACP are scheduled to begin operations in late 2018.<sup>19</sup>

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13 See Environmental Protection Agency, *New Source Review Workshop Manual* (1990), available at <http://1.usa.gov/1UWvgOp> (enclosed as Attachment 2).

14 Virginia Air Pollution Control Board, *Air Permitting Guidelines* at 4-1.

15 See *Louisville Gas & Electric Co.*, 2009 WL 7698409, 13 (E.P.A. 2009) (enclosed as Attachment 98) (citing *Prairie State Generation*, 13 E.A.D. \_\_\_\_, PSD Appeal No. 05-05, slip op. at 19 (E.A.B. 2006); *Knauf Fiber Glass*, 8 E.A.D. 121, 142 (E.A.B. 1999); *Masonite Corp.* 5 E.A.D. 551, 568-569 (E.A.B. 1994)).

16 See Atlantic Coast Pipeline, Resource Report 1 – General Project Description, *Atlantic Coast Pipeline*, FERC Docket No. PF15-5, 89 (September 18, 2015), available at <http://bit.ly/1PFkvIh> (ACP General Resource Report) (enclosed as Attachment 3).

17 See Atlantic Coast Pipeline, Amendment to Application for a Certificate of Public Convenience and Necessity and Blanket Certificates, *Atlantic Coast Pipeline*, FERC Docket No. CP15-554, 4 (March 14, 2016), available at <http://bit.ly/21TiRdh> (Amended ACP Application) (enclosed as Attachment 4).

18 See Atlantic Coast Pipeline, Abbreviated Application for a Certificate of Public Convenience and Necessity and Blanket Certificates, FERC Docket No. CP15-554, 7 (September 18, 2015), available at <http://bit.ly/1V4vUrQ> (Initial ACP Application) (enclosed as Attachment 5).

19 See ACP Application at 18 (stating planned in-service date of ACP is November 1, 2018); Direct Testimony of Robert B. McKinley, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greenville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 12 (August 1, 2015), available at <http://1.usa.gov/1XZXoOT> (enclosed as Attachment 6) (testifying that commercial operation of the Greenville plant is proposed to begin in December of 2018).

As detailed below, the Greenville and ACP proposals comprise a single source of pollution under Virginia’s SIP and the Clean Air Act, requiring a single PSD permit. Virginia’s PSD program mandates a permit for “any new major stationary source,”<sup>20</sup> which it defines as a “stationary source of air pollutants that emits, or has the potential to emit, . . . any regulated pollutant” above certain thresholds.<sup>21</sup> The SIP goes on to define a “stationary source” as “any building, structure, facility, or installation that emits or may emit a regulated [new source review] pollutant”<sup>22</sup>—and a “building, structure, facility, or installation,” in turn, as “*all* of the pollutant-emitting activities that belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel.”<sup>23</sup>

- a. The Greenville proposal and the Atlantic Coast Pipeline proposal comprise a single “facility or installation” as defined by Virginia’s state implementation plan.

Both Chapter 2 of the Greenville Application<sup>24</sup> and the Air and Noise Quality Resource Report prepared for the Atlantic Coast Pipeline<sup>25</sup> propose “pollutant-emitting activities.” These activities include processes at the Greenville site and at the above-ground pipeline facilities. Importantly, the underground pipeline is itself a “pollutant-emitting activity” producing methane and volatile organic compound emissions from component leaks<sup>26</sup> and periodic blowdown<sup>27</sup> activities.<sup>28</sup>

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20 9 VAC 5-80-1605 A.

21 9 VAC 5-80-1615. As Dominion acknowledges in its Application, the proposed Greenville plant exceeds these thresholds. *See* Application at 4-5.

22 9 VAC 5-80-1615.

23 *Id.* (emphasis added).

24 *See* Application at 2-1-2-4.

25 *See* Atlantic Coast Pipeline, Resource Report 9 – Air and Noise Quality, FERC Docket No. CP15-554, 4 (September 18, 2016), available at <http://bit.ly/1q1B1Ot> (ACP Air Resource Report) (enclosed as Attachment 7).

26 Although so-called “fugitive emissions” from component leaks are not always considered for the limited purpose of determining “major source” status under the PSD program, Virginia’s SIP unequivocally considers them “emissions of a stationary source.” *See* 9 VAC 5-80-1615 (definition of “major stationary source”). Accordingly, fugitive emissions from otherwise major sources are included in “all subsequent analyses, including PSD applicability for other individual pollutants (i.e., comparing emissions to the significant emission rates), BACT analyses, and air quality impact analyses.” Environmental Protection Agency, *Counting GHG Fugitive Emissions in Permitting Applicability*, 2 (July 2015), available at <http://1.usa.gov/21NXeuP> (enclosed as Attachment 8).

27 “Blow” or “blowdown” activities involve the venting of natural gas contained inside a pipeline into the atmosphere. *See* Environmental Protection Agency, *Methane Emissions from the Natural Gas Industry, Vol. VII: Blow and Purge Activities*, 2 (1996), available at

All of these pollutant-emitting activities share the same industrial grouping, as they “belong to the same ‘Major Group’ (i.e., [they] have the same first two-digit code) as described in the Standard Industrial Classification Manual.”<sup>29</sup> As Dominion states in its PSD permit application, the proposed Greensville plant is classified under Major Group

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<http://1.usa.gov/22SeLiN> (enclosed as Attachment 9). *See also* ACP Air Resource Report at 9-18 (proposing control measures for blowdown events along the ACP).

- 28 Environmental Protection Agency, *Oil and Natural Gas Sector Leaks*, 3, 21–22 (2014), available at <http://1.usa.gov/25rjCP9> (enclosed as Attachment 10); *Oil and Natural Gas Sector: Emission Standards for New and Modified Sources*, 80 Fed. Reg. 56593, 56607 (proposed September 18, 2015) (enclosed as Attachment 11) (“In addition to vented emissions, methane losses can occur from leaks (also referred to as fugitive emissions) in all parts of the [natural gas] infrastructure, from connections between pipes and vessels, to valves and equipment”); *id.* at 56642 (even a natural gas transmission “facility with proper operation would likely find one to three percent of components to have fugitive emissions”); Intergovernmental Panel on Climate Change, “Fugitive Emissions from Oil and Natural Gas Activities,” in *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, 103–127, 113 (2001), available at <http://bit.ly/1NnD1Ka> (enclosed as Attachment 12) (calculating methane emission factor of .0037 gigagrams per kilometer of U.S. natural gas transmission pipeline); Environmental Protection Agency, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks*, 3-66 (February 22, 2016), available at <http://1.usa.gov/1SxqsMa> (enclosed as Attachment 13) (“Emissions from normal operations [in natural gas systems] include . . . fugitive emissions from system components. Routine maintenance emissions originate from pipelines, equipment, and wells during repair and maintenance activities.”); Environmental Protection Agency National Risk Management Research Laboratory, *Methane Emissions from the Natural Gas Industry, Vol. IX: Underground Pipelines*, 55–57 (1996), available at <http://1.usa.gov/1q2Ledn> (enclosed as Attachment 14); Pennsylvania Department of Environmental Protection, Comments on Proposed Rock Springs Expansion Project, *Transcontinental Pipe Line Company, LLC*, FERC Docket No. CP14-504, 5 (December 15, 2014), <http://1.usa.gov/21U4B3W> (enclosed as Attachment 15) (noting pipeline quality natural gas can have as much as 7.5 percent VOC content and emphasizing need to evaluate VOC emissions from transmission pipeline due to leaks, blowdown venting, and maintenance events). *See also* Environmental Protection Agency Region VI, PSD Permit Statement of Basis for Apex Matagorda Energy, Permit No. PSD-TX-107055-GHG, 6 (January 2013), available at <http://1.usa.gov/21UiMWH> (enclosed as Attachment 16) (including within source and applying BACT to natural gas pipeline and metering station supplying power plant); ACP Air Resource Report at 9-17 (proposing measures to control fugitive emissions from both the ACP and its associated supply header).
- 29 9 VAC 5-80-1615. Though the Department of Labor has largely phased-out the Standard Industrial Classification (SIC) Manual in favor of the newer North American Industry Classification System, it maintains an online, hypertext edition of the Manual. *See* Department of Labor, *SIC Division Structure*, <http://1.usa.gov/1rFQUpM> (accessed March 24, 2016) (relevant portions enclosed as Attachment 17).

49 – Electric, Gas, and Sanitary Services.<sup>30</sup> Major Group 49 also includes any “[e]stablishments engaged in the transmission and/or storage of natural gas for sale” — most notably, “pipelines [for] natural gas”<sup>31</sup>—as well as any establishments that combine aspects of electric generation and natural gas transmission.<sup>32</sup>

The activities are also conducted on contiguous or adjacent properties. According to a Resource Report filed with the Federal Energy Regulatory Commission (FERC), the ACP mainline would connect to the proposed Greenville plant via a one-mile lateral.<sup>33</sup> Once connected, the plant, the pipeline, and all pipeline facilities would be located on (and conduct pollutant-emitting activities on) contiguous properties.<sup>34</sup>

The activities will also be conducted “under the control of the same person (or persons under common control).” Virginia’s SIP defines “person” broadly as any “individual, corporation, partnership, association, a governmental body, a municipal corporation, or any other legal entity.”<sup>35</sup> The proposed Greenville would be operated by the Virginia Electric and Power Company, a wholly owned subsidiary of Dominion Resources, Inc.. Another Dominion subsidiary, Dominion Transmission, Inc., would operate and maintain the ACP.<sup>36</sup> Since these subsidiaries are under the common control of Dominion Resources, their respective activities would be “under the control of . . . persons under common control.”<sup>37</sup>

Finally, none of the pollutant-emitting activities identified above are “activities of [a] vessel.” The “vessel” exception in 9 VAC 5-80-1615 is drawn directly from its federal counterpart, 40 C.F.R. § 52.21(b)(6). Both provisions elsewhere use the term narrowly to denote mobile sources of air pollution.<sup>38</sup> Indeed, within the context of the Clean Air Act,

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30 See Application at 1-4. See also *SIC Division Structure* (Major Group 49 includes Industry Group 491: Electric Services— “[e]stablishments engaged in the generation, transmission, and/or distribution of electric energy for sale”).

31 *Id.*

32 *Id.* (“Industry Group 493: Combination Electric and Gas, and Other Utility”).

33 See ACP General Resource Report at 1-89.

34 That the ACP will serve other units besides those at the Greenville site is inapposite. Structures that will be used in common by more than one unit must be presented in the permit application nonetheless. *Save the Valley v. Ruckelshaus*, 565 F. Supp. 709, 711 (D.C. Cir. 1983).

35 9 VAC 5-10-20.

36 See Amended ACP Application at 4.

37 9 VAC 5-80-1615.

38 See, e.g., 9 VAC 5-80-1615 (definition of “secondary emission,” which excludes “any emissions that come from a mobile source, such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel”); 40 C.F.R. § 52.21(b)(18) (same).

the word “vessel” is generally used to refer to mobile sources, especially marine vessels.<sup>39</sup> The “vessel” exception, then, is merely a recognition that certain mobile sources, while perhaps “emitters,” are not “stationary sources” and are thus beyond the scope of the PSD program.<sup>40</sup> Accordingly, fugitive and maintenance emissions from natural gas pipelines are included within the scope of the PSD program.<sup>41</sup>

- b. This “facility or installation” is a major stationary source subject to the PSD program.

The single “facility or installation” comprised of the Greenville and the Atlantic Coast Pipeline proposals is also a “stationary source,” as its activities emit regulated new source review pollutants.<sup>42</sup> Dominion does not dispute that both the Greenville and ACP proposals entail emissions of nitrogen oxides, carbon monoxide, volatile organic compounds, sulfur dioxide, sulfuric acid mist, particulate matter, and greenhouse gases<sup>43</sup>—regulated new source pollutants all<sup>44</sup>—as well as numerous hazardous pollutants including carcinogens.<sup>45</sup> Nor does it dispute that these emissions exceed the statutory threshold qualifying the “stationary source” as a “major stationary source.”<sup>46</sup>

- c. The application fails to provide necessary information about the pipeline components of the relevant “facility or installation.”

As the relevant “major stationary source” includes both the Greenville plant and the Atlantic Coast Pipeline, both components must “meet all the applicable requirements” of

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39 See generally, e.g., *Natural Resources Defense Council v. Environmental Protection Agency*, 752 F.2d 761 (D.C. Cir. 1984).

40 See 9 VAC 5-80-1605 A.

41 See, e.g., Environmental Protection Agency Region VI, PSD Permit Statement of Basis for Apex Matagorda Energy, Permit No. PSD-TX-107055-GHG, 6 (January 2013), available at <http://1.usa.gov/21UiMWH> (including within source and applying BACT to natural gas pipeline and metering station supplying natural gas-fired power plant) (enclosed as Attachment 16); Environmental Protection Agency Region VI, PSD Permit Statement of Basis for Indeck Wharton Energy, Permit No. PSD-TX-1374-GHG, 8 (April 2014), available at <http://1.usa.gov/1RrWrOH> (enclosed as Attachment 18) (same); Ohio Environmental Protection Agency, Permit Summary Review for Carroll County Energy, Permit No. P0113762, 26 (September 18, 2013), available at <http://1.usa.gov/1UC6cfY> (enclosed as Attachment 19) (same).

42 See 9 VAC 5-80-1615 (definition of “stationary source”).

43 See Application at 3-2; ACP Air Resource Report at 4.

44 See 9 VAC 5-80-1615 (definition of “regulated NSR pollutant”).

45 See Application at 3-11.

46 See Application at 3-12. Note that this is true even if the facility does not fall within the “100 tons per year” list in subsection (a)(1) of 9 VAC-5-80-1615’s definition of “major stationary source.”

the PSD program.<sup>47</sup> But as for the pipeline component, Dominion has yet to take the first step. Virginia’s SIP requires a “*single* application . . . identifying at a minimum each emission unit subject to” the PSD program.<sup>48</sup> This includes “any part of a station source that emits or would have the potential to emit any regulated NSR pollutant.”<sup>49</sup> The ACP’s Virginia portion alone consists of more than 300 miles of underground pipeline, one compressor station, four metering and regulation stations, fifteen valves, and seven pig launcher and receiver sites.<sup>50</sup> In proceedings before FERC, Dominion has acknowledged that the ACP’s compressor stations will emit nitrogen oxides, carbon monoxide, volatile organic compounds, sulfur dioxide, particulate matter, and greenhouse gases.<sup>51</sup> Metering and regulating stations, valves, and the pipeline itself also have the potential to emit volatile organic compounds and greenhouse gases.<sup>52</sup> As such, the above- and below-ground facilities associated with the pipeline component of the proposed source must be identified in the permit application.<sup>53</sup>

A permit application must also include:

1. a “description of the nature, location, design capacity, and typical operating schedule of the source . . . , including specifications and drawings showing its design and plant layout;”<sup>54</sup>

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47 See 9 VAC 5-80-1625.

48 9 VAC 5-80-1655.

49 9 VAC 5-80-1615 (definition of “emissions unit”).

50 See ACP General Resource Report at 17, 20–22. See also, generally, Amended ACP Application (describing additions to the Virginia portion of the pipeline).

51 ACP Air Resource Report at 4.

52 See *Oil and Natural Gas Sector Leaks* at 3, 21–22. See also 80 Fed. Reg. at 56607 (enclosed as Attachment 11) (“In addition to vented emissions, methane losses can occur from leaks (also referred to as fugitive emissions) in all parts of the [natural gas] infrastructure, from connections between pipes and vessels, to valves and equipment”); *id.* at 56642 (opining that even a natural gas transmission “facility with proper operation would likely find one to three percent of components to have fugitive emissions”); David A. Kirchgessner et al., *Estimate of Methane Emissions from the U.S. Natural Gas Industry*, \*12 as reprinted in Environmental Protection Agency, AP-42, *Compilation of Air Pollutant Emission Factors* (5th ed. 1997), available at <http://1.usa.gov/1Rr7GWy> (enclosed as Attachment 20); Intergovernmental Panel on Climate Change, “Fugitive Emissions from Oil and Natural Gas Activities,” in *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, 103–127, 113 (2001), available at <http://bit.ly/1NnD1Ka> (enclosed as Attachment 12) (calculating methane emission factor of .0037 gigagrams per kilometer of natural gas transmission pipeline based on data from the U.S. natural gas industry). See also ACP Air Resource Report at 9-17 (proposing measures to control fugitive emissions from both the ACP and its associated supply header project).

53 See 9 VAC 5-80-1655.

54 9 VAC 5-80-1745 A 1.

2. a “detailed schedule for construction of the source;”<sup>55</sup>
3. a “detailed description as to what system of continuous emission reduction is planned for the source or modification, emission estimates, and any other information necessary to determine that best available control technology would be applied;”<sup>56</sup>
4. an “analysis of the impairment to visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source;”<sup>57</sup> and
5. an “analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source.”<sup>58</sup>

Dominion’s application includes none of these elements with respect to the proposed pipeline facilities.

Until such time as Dominion substantially amends its PSD permit application, the Department cannot approve the proposal in conformance with Virginia’s SIP or the Clean Air Act.

**Comment No. 2: The application lacks information necessary to determine whether the applicant will apply the best available control technology.**

The Application’s failure to discuss the project’s fueling strategy also violates 9 VAC 5-80-1745 A 3’s requirement that an applicant provide “any other information necessary to determine that best available control technology would be applied.” As the Department points out in its Engineering Analysis, the sulfur content of the fuel will largely dictate the project’s sulfur dioxide, sulfuric acid mist, and particulate matter emissions<sup>59</sup>—and, consequently, the numeric BACT limit that reflects the “maximum degree of reduction” for these pollutants.<sup>60</sup> But while the Department asserts that “[t]he sulfur content of the natural gas is dependent on the location from which the gas is piped,”<sup>61</sup> Dominion alludes only to undisclosed “analytical data for pipeline natural gas in Central Virginia and Northern North Carolina” in proposing a fuel sulfur content of 0.4 grains per 100 standard cubic feet of gas.<sup>62</sup>

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55 9 VAC 5-80-1745 A 2.

56 9 VAC 5-80-1745 A 3.

57 9 VAC 5-80-1755 A.

58 9 VAC 5-80-1755 B.

59 See Engineering Analysis at 21, 23.

60 See 42 U.S.C. § 7479.

61 Engineering Analysis at 21.

62 Application at 5-11.

It's difficult to gauge whether this "current analytical data" is representative of the proposed plant's fuel supply. Dominion provides none of the data on which it bases its projected sulfur content, nor does it explain the source of this data—or, for that matter, what the data even *is*. Importantly, it doesn't tie this data to the specific fueling strategy Dominion has outlined for the Greensville plant. The company's Gas Supply Manager testified before the State Corporation Commission that two interstate pipelines would fuel the plant.<sup>63</sup> One, as discussed in Comment No. 1 above, is Dominion's own Atlantic Coast Pipeline, which will supply natural gas from the Marcellus and Utica shale plays.<sup>64</sup> As for the other—the Transcontinental Gas Pipeline (Transco)—the supply path is less clear. Dominion states it contracted with Transco for "a primary path from the Marcellus Shale supply region, as well as receiving reverse path rights for gas supply via the Gulf production region."<sup>65</sup> Similarly, Transco explained to the Federal Energy Regulatory Commission that, although it has historically "transported natural gas from the Gulf Coast States and offshore Gulf of Mexico via its mainline system to markets in the Northeast," it intends its expansion to Greensville County will "accommodate the transportation of additional volumes of natural gas from points in the northeast to more southerly points on its integrated pipeline system."<sup>66</sup>

It's unclear from Dominion's Application whether the "current analytical data" it refers to reflects the composition of natural gas from the Transcontinental Pipeline and, if so, whether it reflects the changing dynamics of the fuel migration across Transco's line. But given Dominion's emphasis that the ACP's primary purpose is to supply Virginia with "natural gas supplies from a geographically diverse production region,"<sup>67</sup> the relevance of Dominion's "current" data is certainly limited. It is not, at bottom, information sufficient to "determine that best available control technology will be applied."<sup>68</sup>

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63 Direct Testimony of Dale E. Hinson, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 3 (August 1, 2015), available at <http://1.usa.gov/1RO8nwn> (enclosed as Attachment 21).

64 *Id.*

65 *Id.* at 5.

66 See Transcontinental Gas Pipe Line Company, Data Request Response, *Transcontinental Gas Pipe Line Company*, FERC Docket No. CP15-118, 34 (February 25, 2016), available at [1.usa.gov/1pT5NZW](http://1.usa.gov/1pT5NZW) (enclosed as Attachment 22).

67 See Press Release, Atlantic Coast Pipeline LLC, *Atlantic Coast Pipeline Asks FERC For Permission To Build \$5 Billion Interstate Natural Gas Pipeline* (September 18, 2015), <http://bit.ly/1KwmGjI> (enclosed as Attachment 23) (emphasis added).

68 See 9 VAC 5-80-1745 A 3.

**Comment No. 3: The application fails to include information obtained from the manufacturer or other vendors**

Critical emissions estimates have been presented in the Application (and accepted by the Department) relying on manufacturers' data. As the Application states, "the emissions calculation procedures used in determining the potential emissions from the Project are based on CTG information provided by the manufacturer, other equipment vendor data . . . ."<sup>69</sup> Yet, the record does not contain any of these manufacturer or vendor data. Examples include:

- emissions of formaldehyde, discussed in further detail below, which rely on unsupported data to conclude that the Project will not be a major source of HAP emissions;<sup>70</sup>
- emissions for startup and shutdown obtained from the engineering firm Worley Parsons, with no supporting data;<sup>71</sup>
- durations of cold, warm, and hot starts,<sup>72</sup> including the curves presented in Appendix D of the Application;
- the value of leakage of 0.5% for the greenhouse gas SF<sub>6</sub> from the circuit breakers;<sup>73</sup> and
- support for the 1500 ppm TDS level assumed in cooling tower drift emission calculations<sup>74</sup> and why this level is so much greater than the level of 300 ppm TDS assumed in the emissions calculations for the delugeable auxiliary equipment cooler emissions.<sup>75</sup>

These are mere examples. The Application contains numerous instances of references to manufacturer and or the manufacturer's experience with no supporting data. Mitsubishi, the manufacturer of the 501J combustion turbine proposed for this project, states that this model has been in use since 2012,<sup>76</sup> with at least 16 units already in use in Japan and Korea.<sup>77</sup> As such, the Application should have supported its numerous assertions pertaining to the power block with actual data from these operating units.

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69 Application at 3-1.

70 Application, Table B-13, Note (f).

71 Application, Table B-4,

72 Application, Table B-3.

73 Application at Table B-15.

74 Application at Table B-6, Note (c).

75 Application at Table B-12.

76 See Mitsubishi Hitachi Power Systems, "J-Series," <http://bit.ly/1TjfoEA> (enclosed as Attachment 24).

77 See Junichiro Masada et al., *Operational Experience of Mitsubishi M501J GT*, 6 (June 2013), available at <http://bit.ly/1TjfyvD> (enclosed as Attachment 25).

## II. THE PROPOSAL IGNORES OR IMPROPERLY ELIMINATES MORE EFFECTIVE CONTROL TECHNOLOGIES.

### Comment No. 4: BACT for this facility requires analysis of solar-gas hybrid configurations.

In order to achieve the “maximum degree of reduction of each pollutant” possible, BACT requires that a source avail itself of any available “production processes.”<sup>78</sup> In determining what processes are “available,” permitting authorities are “required to look at other recently permitted sources.”<sup>79</sup> “While it is true that each BACT analysis is a case-by-case determination, when a technology has been considered a ‘potentially available control technology’ at otherwise seemingly similar facilities in previous permitting actions,” the applicant or permitting authority must proffer “some explanation as to why the previously ‘potentially available control technology’ is no longer potentially available at the latest facility.”<sup>80</sup> In other words, “the existence of a similar facility with a lower emissions level creates an obligation for the permit applicant to consider or document whether that same emissions limit can be achieved at [the] proposed facility.”<sup>81</sup>

Dominion and the Department both acknowledge that the proposed greenhouse gas emission limits are not as stringent as those considered BACT at other combined cycle facilities.<sup>82</sup> Chief among these is the Palmdale Hybrid Power Project (Palmdale), permitted at 774 pounds CO<sub>2</sub> per megawatt-hour<sup>83</sup>—much lower than Dominion’s proposed rate of 903 pounds CO<sub>2</sub>e per megawatt-hour.<sup>84</sup> Palmdale’s efficiency is a function of its integrated solar component: an on-site array that provides additional input to a steam turbine shared by two natural gas-fired combustion turbines.<sup>85</sup> By integrating

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78 42 U.S.C. § 7479.

79 *American Electric Power*, 2009 WL 7698416 (E.P.A. 2009) (enclosed as Attachment 101) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 135 (E.A.B. 1994)).

80 *Desert Rock Energy Company*, 2009 WL 5326323, \*39 (E.A.B. 2009) (enclosed as Attachment 102).

81 *Indeck-Elwood, LLC*, 13 E.A.D. 126 (E.A.B. 2006) (internal alterations omitted) (enclosed as Attachment 103).

82 See Application at 5-27; Engineering Analysis at 14. See also Comment No. 16, below.

83 See Environmental Protection Agency Region IX, PSD Permit for Palmdale Hybrid Power Project, Permit No. SE 09-01, ¶ X.E.1 (October 18, 2011), available at <http://1.usa.gov/1UkBLuj> (enclosed as Attachment 26).

84 Application at 5-29.

85 See *City of Palmdale*, 2012 WL 4320533 (E.A.B. 2012) (enclosed as Attachment 104).

the solar and gas components, the facility is designed to efficiently provide reliable, baseload power.<sup>86</sup>

Palmdale is just one of several thermal solar-gas hybrids either under construction or already operating in the United States—including Florida’s Martin Next Generation Solar Energy Center<sup>87</sup> and California’s Victorville II Hybrid Power Project.<sup>88</sup> These facilities increase generation and overall efficiency by using concentrated solar power to provide a separate line of steam to the steam turbine, displacing some of the fossil fuel input requirements and, consequently, decreasing emissions. As the Department of Energy’s National Renewable Energy Laboratory explains, concentrated solar power (CSP) “is unique in its ability to integrate with existing fossil fuel generation systems.”<sup>89</sup>

Neither Dominion nor the Department is entirely clear on why it eliminates a solar component as a means of achieving rates comparable to Palmdale’s. Dominion acknowledges that Palmdale’s “solar energy component” enables operations at “a lower heat rate [sic] of 774 lb/MWh for the entire facility”<sup>90</sup> but then discusses the matter no further. While the Department’s analysis is longer, the path of its reasoning is difficult to trace. The Department notes that Dominion has undertaken certain measures—some mandatory, others voluntary—related to renewable energy, including installing solar power at its North Anna facility and submitting proposals to the State Corporation Commission.<sup>91</sup> It also notes that Greensville County is not practical for hydroelectric, geothermal, or wind generation and that nuclear generation “has been demonstrated in Virginia but is not within the scope of this project and would require significant design changes.”<sup>92</sup> It then abruptly “finds that solar power projects are being developed, but, at this point in time, renewable or other alternative energy options are not available or technically feasible on a large scale in Greensville County.”<sup>93</sup> This conclusion comes as something of a *non sequitur*, as the preceding discussion identifies no reason why integrated (or, for that matter, *any* form of) solar generation is unavailable or infeasible.

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86 *Id.* at 45.

87 Florida Department of Environmental Protection, Draft PSD Permit for Martin Power Plant Unit 8, Permit No. PSD-FL-237E, 3 (August 23, 2011), available at <http://bit.ly/1Thk4ut> (enclosed as Attachment 27).

88 *See* Environmental Protection Agency Region IX, PSD Permit for City of Victorville, PSD Permit No. SE 07-02 (March 11, 2010), available at <http://1.usa.gov/1UkBsQl> (enclosed as Attachment 28).

89 National Renewable Energy Laboratory, Technical Report, *Solar Augment Potential of U.S. Fossil-Fired Power Plants*, 2 (2011), available at <http://1.usa.gov/1RIrapB> (enclosed as Attachment 29).

90 *See* Application at 5-27.

91 *See* Engineering Analysis at 13.

92 *Id.*

93 *Id.*

The Environmental Appeals Board has definitively held that permitting authorities cannot engage in this sort of “automatic BACT off-ramp” approach—particularly when considering whether solar integration represents BACT for a combined cycle plant like Greenville.<sup>94</sup> In *La Paloma Energy Center*, the permitting authority dismissed a solar component as BACT for a 735-megawatt combined cycle plant as a “redefinition of the source” because it “represent[ed] the merging of distinct and different source types” that the applicant did not include in its permit application.<sup>95</sup> The Board held that the agency’s analysis was inconsistent “with the NSR Manual, the GHG Permitting Guidance, [and] Board precedent, all of which suggest that a case-specific assessment of the situation be made in concluding that a proposed control option would redefine a particular source.”<sup>96</sup> As explained by the Board, the “redefining the source” doctrine generally prohibits a permitting authority from requiring an applicant “switch to a primary fuel type . . . other than the type of fuel that an applicant proposes to use for its primary combustion process;” but it does not prohibit “a *partial* switch or *supplementation* of the primary fuel with a different type of fuel that the applicant did *not* initially propose as a secondary fuel.”<sup>97</sup> The latter can be eliminated only after the permitting authority takes “a ‘hard look’ at which design elements are ‘inherent’ to the project and which design elements could possibly be altered to achieve pollutant emissions reductions without disrupting the applicant’s ‘basic business purpose’ for the proposed facility.”<sup>98</sup>

Despite the “deficiencies in the [agency’s] explanation,” the Board declined to remand the permit in *La Paloma* because the administrative record below “clearly indicate[d]” logistical difficulties would frustrate the integration of a solar component.<sup>99</sup> Specifically, the Board found that the remaining 39 acres available at the La Paloma site was incapable of supporting any meaningful solar component.<sup>100</sup> But the Board concluded its opinion by emphasizing that permitting authorities must nonetheless provide “a clear and full

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94 See *La Paloma Energy Center*, 16 E.A.D. \_\_\_\_, 2014 WL 1066556, PSD Appeal No. 13-10 (E.A.B. 2014) (enclosed as Attachment 105).

95 *Id.* at \*18.

96 *Id.*

97 *Id.* at \*16 (emphasis in original).

98 *Id.* (quoting *Sierra Pacific Industries*, 16 E.A.D. \_\_\_\_, PSD Appeal No. 13-01 (E.A.B. 2013); *Desert Rock Energy Co.*, 2009 WL 5326323, \*34 (EAB 2009); *Prairie State Generating Co.*, 13 E.A.D. 1, 19 (E.A.B. 2006), *aff’d sub. nom Sierra Club v. Environmental Protection Agency*, 499 F.3d 653 (7th Cir. 2007)).

99 *Id.* at \*19.

100 *Id.*

explanation of any decision to reject comments suggesting the use of a solar component at a proposed facility on the grounds that it would require redefinition of the source.”<sup>101</sup>

One would expect this sort of “clear and full explanation” given the facts at play here. Integral to Board’s ruling in *La Paloma* was its finding that a 39-acre site was insufficient to support a solar array.<sup>102</sup> By contrast, Dominion reports it purchased a 1,143 parcel to host the Greensville project.<sup>103</sup> Not only is this acreage large enough to house the entire Palmdale project three times over,<sup>104</sup> it also represents the ideal for a solar-augmented fossil plant. The Department of Energy’s National Renewable Energy Laboratory has concludes that an ideal site for a gas-solar hybrid contains more than 0.65 acres per fossil plant megawatt.<sup>105</sup> Although the Application doesn’t appear to give the proposed station’s precise footprint, the Plot Plan in Appendix E suggests it’s no more than 100 acres.<sup>106</sup> As such, the parcel appears large enough to dedicate the optimal 0.65 acres for each megawatt of fossil-fueled capacity.<sup>107</sup>

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101 *Id.* at \*20.

102 *Id.* at \*19.

103 See Application at Appendix A, Form 7. See also Direct Testimony of Robert B. McKinley, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 13 (August 1, 2015), available at <http://1.usa.gov/1XZXoOT> (enclosed as Attachment 6).

104 See Palmdale Permit at 2 (noting that both gas and solar components are sited on a 333-acre parcel).

105 See *Solar Augment Potential of U.S. Fossil-Fired Power Plants* at 5.

106 See Application at Appendix E. See also Hearing Transcript, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 141:10–141:16 (January 12, 2016) (testimony of Mark D. Mitchell), available at <http://1.usa.gov/1ZH6PEd> (enclosed as Attachment 30) (testifying that “the physical footprint of the gas facility” was “much less” than the full 1,100 acres).

107 In addition, Dominion has elsewhere indicated that the meteorological conditions at its Greensville site are amenable to solar generation. Before the State Corporation Commission, the company testified that it was already “looking at adding [photovoltaic] solar to the Greensville facility.” See Hearing Transcript, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 141:10–141:16 (January 12, 2016) (testimony of Glenn A. Kelly), available at <http://1.usa.gov/1ZH6PEd> (enclosed as Attachment 30). According to a Department of Energy map on concentrating solar energy potential, the proposed site appears to have a relatively similar watt-hour/square-meter/day quotient to the area immediately surrounding the Martin Next Generation Clean Energy Center hybrid plant in Indiantown, Florida. See Department of Energy, *Concentrating Solar Power Facilities and CSP Energy Potential Gradient*, available at <http://1.usa.gov/25uZ3RY> (enclosed as Attachment 31).

Nor is there any evidence that a hybrid configuration would frustrate the “basic business purpose” motivating Dominion’s proposal. In making this inquiry, the Department must take a “hard look” at all information in the record, including the application and “related documents,”<sup>108</sup> to determine the proposed facility’s “goal, objectives, purpose, or basic design.”<sup>109</sup> Dominion has elsewhere stated that the plant is intended to meet a projected capacity gap beginning in 2019.<sup>110</sup> In a Request for Proposals for options to meet this gap, the Company defined the resources consistent with this basic business purpose: dispatchable base load or intermediate facilities capable of providing between 300 and 1600 megawatts of summer capacity.<sup>111</sup> The Board has similarly cast a power plant’s “basic business purpose” in terms of whether it is designed to function as a “base load” or “peaking” facility.<sup>112</sup> And in this regard, the Board expressly recognizes that construction of a solar–gas hybrid is entirely consistent with the overarching business purpose of providing “reliable, baseload” power.<sup>113</sup>

An incomplete BACT analysis, including a failure to consider all potentially applicable control alternatives, is fatal to a permit.<sup>114</sup> As such, the Department cannot issue the permit so long as its analysis takes the “automatic BACT off-ramp” at odds with a valid top-down BACT analysis.

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108 See *Sierra Pacific Industries*, 16 E.A.D. —, PSD Appeal No. 13-01, slip op. at 59 (E.A.B. 2013) (enclosed as Attachment 106).

109 See *Desert Rock Energy Company*, 2009 WL 5326323 (E.B.A. 2009) (enclosed as Attachment 102).

110 See Direct Testimony of Glenn A. Kelly, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 8 (August 1, 2015), available at <http://1.usa.gov/21Saz5m> (enclosed as Attachment 31).

111 See Direct Testimony of Michael S. Hupp, Jr., *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 5–6 (August 1, 2015), available at <http://1.usa.gov/1UANBRq> (enclosed as Attachment 32).

112 *Prairie State Generating Company*, 13 E.A.D. 1, 25 (E.A.B. 2006) (enclosed as Attachment 107), *aff’d sub. nom Sierra Club v. Environmental Protection Agency*, 499 F.3d 653 (7th Cir. 2007). See also *City of Palmdale*, 2012 WL 4320533 (E.A.B. 2012).

113 *Id.*

114 *Louisville Gas & Electric Co.*, 2009 WL 7698409 (E.P.A. 2009) (citing *Prairie State Generation*, 13 E.A.D. \_\_\_\_, PSD Appeal No. 05-05, slip op. at 19 (E.A.B. 2006); *Knauf Fiber Glass*, 8 E.A.D. 121, 142 (E.A.B. 1999); *Masonite Corp.* 5 E.A.D. 551, 568-569 (E.A.B. 1994)).

**Comment No. 5: BACT requires consideration of restricting fuel to natural gas from processing and transmission infrastructure with effective fugitive emission controls.**

The definition of BACT expressly includes “clean fuels” as a means of achieving the “maximum degree of reduction of each pollutant . . . which results from any major emitting facility.”<sup>115</sup> As such, any BACT analysis “*must* include consideration of cleaner forms of the fuel proposed by the source.”<sup>116</sup>

Dominion readily identifies “low carbon fuels” as BACT for this facility.<sup>117</sup> But in selecting natural gas as its “low carbon fuel” of choice, Dominion merely states that “on a ton/MMBtu basis, GHG from coal combustion are 76% higher than natural gas.”<sup>118</sup> While this may be true, combustion alone doesn’t tell the whole story. Methane (CH<sub>4</sub>)—the principal component of natural gas—is some thirty times more potent a greenhouse gas than carbon dioxide.<sup>119</sup> Multiple studies indicate that any “climate benefits from [natural gas] use depend on system leakage rates.”<sup>120</sup> The evidence suggests these so-called “fugitive emissions” are substantial: several researchers have concluded that the net “GHG footprint of shale gas approaches or exceeds coal,” even when considering natural gas’s “greater efficiencies of generation.”<sup>121</sup> This “large GHG footprint of shale gas undercuts the logic of its use as a bridging fuel over coming decades, if the goal is to reduce global warming.”<sup>122</sup>

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115 See 42 U.S.C. § 7479(3).

116 *Prairie State Generating Co.*, 13 E.A.D. at 17 (E.A.B. 2006) (enclosed as Attachment 107) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 145 (E.A.B. 1994)) (emphasis added).

117 See Application at 5-27.

118 *Id.* at 5-18.

119 See 40 C.F.R. § 98 Table A-1.

120 A.R. Brandt et al., *Methane Leaks from North American Natural Gas Systems*, 343 Science 733, 733 (2014), available at <http://bit.ly/1qllwkd> (enclosed as Attachment 34). See also Daniel Zavala-Araiza, et al., *Towards a Functional Definition of Methane Super-Emitters*, 49 *Envtl. Sci. & Tech.* 8167, 8167 (2015), available at <http://bit.ly/1VazlgF> (enclosed as Attachment 35) (“The climate implications” of a transition to natural gas-fired energy “are heavily influenced by the amount of methane that is emitted to the atmosphere along the natural gas supply chain.”); Ramón A. Alvarez et al., *Greater Focus Needed on Methane Leakage from Natural Gas Infrastructure*, 109 *National Academy of Sciences Proc.* 6435, 6437 (2012), available at <http://bit.ly/1WZVhdH> (enclosed as Attachment 36) (concluding that “new natural gas power plants produce net climate benefits relative to efficient, new coal plants using low-gassy coal . . . as long as leakage in the natural gas system is less than 3.2% from well through delivery at a power plant”).

121 See Robert W. Howarth et al., *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, 106 *Climatic Change* 679, 687 (2011), available at <http://bit.ly/1RPGZhj> (enclosed as Attachment 37).

122 *Id.* at 688.

But methane leakage is not a necessary evil. The installation of controls or other operator interventions can dramatically reduce fugitive methane emissions.<sup>123</sup> Device-level measurements can be performed at facilities of a variety of designs, vintages, and management practices to find low-cost mitigation options,<sup>124</sup> including better storage and compressors or improved leak monitoring systems.<sup>125</sup>

Because the BACT analysis requires consideration of cleaner forms of the proposed fuel, it must include a consideration of restricting fuel to upstream processes that have demonstrated effective control of fugitive greenhouse gas emissions. Such a restriction fits well within the definition of BACT, which includes not only emission reductions “from . . . any major emitting facility” but also reductions “which *result*[ ] from any major emitting facility.”<sup>126</sup> It also fits within the Act’s broad definition of “emission limitation” as including “any requirement relating to the operation or maintenance of a source.”<sup>127</sup>

The Clean Air Act already regulates characteristics of fuel, and it allows sources to demonstrate compliance with fuel restrictions by producing relevant “purchase contract[s], tariff sheet[s], or transportation contract[s].”<sup>128</sup> The same or similar documents could contain certifications that, for example, processes were subject to leak detection and repair (LDAR) programs, regular leakage audits, or—as Dominion proposes for its own pipeline project— “best in class engineering design and operational measures to minimize fugitive and episodic methane emissions.”<sup>129</sup>

Such a restriction may become less feasible the farther back it roves into the supply chain. Nonetheless, EPA guidance is clear that a control option’s “offsite logistical barriers” are considered during Step 2 of the BACT analysis,<sup>130</sup> and its elimination for this reason must

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123 See Zavala-Araiza et al. at 8169.

124 See Brandt et al. at 735.

125 See Howarth et al. at 688. See also Tom Muscenti, *Emission Quantification Techniques and Strategies for Shale Gas Operations*, EM, June 2012, at 44, available at <http://bit.ly/1RzWa99> (enclosed as Attachment 38) (“Fugitive emissions . . . reductions can be applied through the implementation of a leak detection and repair (LDAR) program”).

126 42 U.S.C. § 7479(3).

127 42 U.S.C. § 7602(k).

128 See, e.g., 40 C.F.R. § 60.4365 (governing compliance with fuel sulfur content performance standards).

129 See Atlantic Coast Pipeline, Resource Report 9 – Air and Noise Quality, FERC Docket No. CP15-554, 4 (September 18, 2016) (ACP Air Resource Report) (enclosed as Attachment 7).

130 See Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 36 (2011), available at <http://1.usa.gov/1VaBEjY> (enclosed as Attachment 39).

“be adequately explained and justified” in the administrative record.<sup>131</sup> Further, while the proposed Atlantic Coast Pipeline supplying Greenville is already subject to BACT as explained in Comment No. 1 above, it is certainly feasible for Dominion to certify that it undertook leak prevention measures for a pipeline it operates.

**Comment No. 6: The BACT analysis altogether ignores alternatives to duct firing.**

Dominion proposes to augment steam production in its HRSGs with natural gas-fired duct burners.<sup>132</sup> As illustrated by the terms of the draft permit, duct firing will push the plant’s overall emissions up significantly: Condition 38 contemplates a 60% increase in carbon monoxide emissions while duct firing, a 40% increase in volatile organic compounds, 35% in fine particulate matter, 30% in coarse particulate matter, and 13% in sulfuric acid mist.<sup>133</sup> The Department’s Engineering Analysis also points out that duct firing can have a significant adverse impact on the plant’s overall efficiency.<sup>134</sup>

And to what end? Approximately 65 megawatts of output per burner.<sup>135</sup> It’s not obvious that this extra “kick” of output is so fundamental and necessary an element of the plant’s design as to justify the significant impacts on pollutant emissions and efficiency. As discussed in Comment No. 4 above, the “basic business purpose” of the proposed plant could be met by a facility that provides *between* 300 and 1600 megawatts of firm summer capacity.<sup>136</sup> The 1600 megawatts of capacity enabled by the duct burners represents the absolute *maximum* capacity consistent with the company’s “basic business purpose,” and an otherwise identical 1400-megawatt plant with no duct burners would satisfy the

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131 *Pio Pico Energy Center*, 2013 WL 4038622, slip op. at 48 (E.A.B. 2013) (enclosed as Attachment 108) (quoting *Knauf Fiber Glass*, 8 E.A.D. 121, 131 (E.A.B. 1999)).

132 Application at 2-2.

133 See Draft Permit at ¶ 38.

134 See Engineering Analysis at 14 (“When comparing a heat rate limit, it is important to know whether it is based on a . . . duct fired or not duct-fired operation.”).

135 Cf. Mitsubishi Hitachi Power Systems, Comments on Proposed *Standards of Performance for Greenhouse Gas Emissions for New Sources: Electric Utility Generating Units*, 6–7 (April 14, 2014) (estimating J-class turbine combined cycle output at 470 megawatts); Application at 5-1 (estimating gross capacity of 3 x 1 block at Greenville will be 1,600 megawatts). See also Atallah E. Batshon et al., *Alternate Fuels for Supplementary Firing Add Value and Flexibility* (2011), available at <http://bit.ly/1PBA0B7> (enclosed as Attachment 40) (estimating that 100 MMBtu duct burners produce about 13 megawatts of additional output).

136 See Direct Testimony of Michael S. Hupp, Jr., *Application of Virginia Electric and Power Company for approval and certification of the proposed Greenville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 5 (August 1, 2015), available at <http://1.usa.gov/1UANBRq> (enclosed as Attachment 33).

projected capacity gap motivating the project.<sup>137</sup> It would therefore not be an improper “redefinition of the source” to prohibit duct firing altogether .

Assuming, for the sake of argument, that requiring anything short of a 1600-megawatt plant would constitute a redefinition of the source, a top-down BACT analysis must look at cleaner processes for achieving the additional on-peak energy provided by the duct burners. Integrating solar components, as described in Comment No. 4 above, seems particularly well-suited for the task, as times of high demand within Dominion’s summer-peaking service area<sup>138</sup> are likely to coincide with optimal solar generation conditions.<sup>139</sup> Battery storage, an additional combustion turbine, or some combination of these processes could also provide peak generation at the scale of the proposed duct burners while improving the overall efficiency of the plant.

**Comment No. 7: The BACT analysis improperly eliminates carbon capture and sequestration.**

Carbon capture and sequestration (CCS) is an add-on control that is categorically “‘available’ for facilities emitting CO<sub>2</sub> in large amounts, including fossil fuel-fired power plants.”<sup>140</sup> As such, a permitting authority may eliminate this option only if “the grounds for doing so [are] reflected in the record with an appropriate level of detail.”<sup>141</sup>

- a. The BACT analysis ignores closer deep formations and saline aquifers.

Analyses of carbon capture and sequestration by both Dominion and the Department assume that the “Brea [sic] sandstone deposits” of Southwestern Virginia are the most viable sequestration-friendly formations available to the proposed plant.<sup>142</sup> Despite honing in on Southwest Virginia due to its “proximity to Greensville County,” the Application

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137 See Hearing Transcript, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 246:17–246:21 (January 12, 2016) (testimony of Rachel S. Wilson), available at <http://1.usa.gov/1ZH6PEd> (enclosed as Attachment 30) (noting that Greensville is intended to satisfy a projected capacity gap of 1069 megawatts in 2019).

138 See Dominion Virginia Power, *Integrated Resource Plan*, 14 (July 1, 2015), available at <http://bit.ly/1URCyCZ> (enclosed as Attachment 41).

139 See Direct Testimony of J. Scott Gaskill, *Application of Virginia Electric and Power Company for approval and certification of the proposed Remington Solar Facility*, State Corporation Commission Case No. PUE-2015-00006 (January 20, 2015), available at <http://1.usa.gov/1WT60Xj> (enclosed as Attachment 42) (testifying that proposed solar facility will “provide customer energy benefits primarily during on-peak hours”).

140 Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 32 (2011).

141 *Id.* at 33.

142 Application at 5-16; Engineering Analysis at 13.

altogether ignores the Richmond and Taylor Mesozoic Basins—both of which, according to the Application’s own “Figure 5-1: Preliminary Assessment of Deep Geological Formations in Virginia,” lie much closer to Greensville County.<sup>143</sup> Although it appears from this figure that the Richmond and Taylor basins feature fewer deep formations, the Application does not consider whether they provide sequestration capacity sufficient for total or partial sequestration of proposed carbon dioxide emissions.

And despite the fact that the proposed site lies just twelve miles from the North Carolina border, the Application ignores any potentially viable formations in other states. In fact, the proposed site lies closer to parts of West Virginia, Maryland, South Carolina, and Delaware than the Berea formations Dominion estimates are “approximately 200 miles” away.<sup>144</sup> But Dominion does not assess the availability (let alone feasibility) of formations in these states.

Nor does the BACT analysis consider nearby deep saline aquifers. Researchers at the Michigan Institute of Technology conclude that these aquifers provide “storage supply . . . sufficient to store large quantities of CO<sub>2</sub> for long times.”<sup>145</sup> Among the viable aquifers analyzed by their study—all of which were selected because “they are large, exhibit few basin-scale faults, and [are] relatively well characterized”—is the “Lower Potomac” aquifer along Virginia’s Delmarva Peninsula.<sup>146</sup> The most recent edition of the Department of Energy’s *Carbon Storage Atlas* similarly recognizes saline formations “represent an enormous potential for CO<sub>2</sub> storage.”<sup>147</sup> This is particularly true in Virginia, where, according to the *Atlas*, saline aquifers comprise the bulk of potential storage resources.<sup>148</sup>

- b. The BACT analysis must consider coordinating a CO<sub>2</sub> pipeline with the proposed Atlantic Coast Pipeline.

Dominion ultimately eliminates carbon capture and sequestration because the “capital cost increase for [a CO<sub>2</sub>] pipeline represents an excessive economic impact.”<sup>149</sup> Dominion’s assumption that sequestration would require a brand new greenfield pipeline, however, is unsupported. As discussed at length in Comment No. 1 above, Dominion is

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143 See Application at 5-16.

144 See Application at 5-17.

145 Michael L. Szulczewski et al., *Lifetime of Carbon Capture and Storage as a Climate-Change Mitigation Technology*, 109 Proceedings of the National Academy of Sciences 5185, 5188 (2012), available at <http://bit.ly/1Rs7aJ4> (enclosed as Attachment 43).

146 *Id.* at 5187.

147 Department of Energy, *Carbon Storage Atlas*, 28 (5th ed. 2015), available at <http://1.usa.gov/1UVyoJh> (enclosed as Attachment 44)

148 *Id.* at 11.

149 Application at 5-25.

concurrently proposing a pipeline to connect Southside Virginia to the rich shale formations in the Appalachian basin—a region that, like Southwestern Virginia, also hosts a wealth of sequestration-friendly formations.<sup>150</sup> Since BACT analysis of carbon capture and sequestration must consider “case-specific . . . availability and access to transportation and storage opportunities,”<sup>151</sup> a proper analysis for the proposed Greenville plant must consider any potential economic and logistical advantages of coordinating, consolidating, and/or co-locating a CO<sub>2</sub> pipeline with the Atlantic Coast Pipeline.

**Comment No. 8: The BACT analysis improperly eliminates biodiesel for limited use engines.**

In proposing BACT for its emergency generator and fire-water pump, Dominion states that “[f]or GHG emissions, the only available emission control methods are efficient design and the use of low carbon fuels.”<sup>152</sup> Dominion acknowledges that biodiesel is among these “low carbon fuels.”<sup>153</sup> In fact, the Department of Energy’s National Renewable Energy Laboratory estimates that biodiesel has the potential to reduce greenhouse emissions by 41%.<sup>154</sup>

However, Dominion summarily eliminates biodiesel from its BACT analysis due to unspecified “storage concerns.”<sup>155</sup> It does not clarify whether it seeks to eliminate biodiesel as “unavailable” during Step One or as “technically infeasible” during Step Two of the analysis. More importantly, it doesn’t specify the particular “storage concerns” it believes remove biodiesel from the analysis. To be sure, the quality of biodiesel “can degrade during storage and handling.”<sup>156</sup> But researchers at the Department of Energy’s National Renewable Energy Lab conclude that certain additives allow reliable biodiesel storage “for longer than 6 months and up to several years.”<sup>157</sup> The Laboratory elsewhere notes that stability and flow can be regulated through additives or

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150 See generally *Carbon Storage Atlas* at 24–30.

151 Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 40 (2011).

152 See Application at 5-68.

153 *Id.*

154 National Renewable Energy Laboratory, *Biodiesel Handling and Use Guide*, 8 (4th ed. 2008), available at <http://bit.ly/1Tiv9vy> (enclosed as Attachment 45).

155 See Application at 5-68.

156 Earl Christensen *et al.*, *Long term storage stability of biodiesel and biodiesel blends*, 128 *Fuel Processing Technology* 339, 339 (2014), available at <http://bit.ly/1MSItQG> (enclosed as Attachment 46).

157 *Id.* at 347.

by blending with low-cloud point petroleum diesel.<sup>158</sup> Elsewhere, the Laboratory notes that “most tanks designed to store diesel fuel” will store even pure biodiesel (B100) “with no problem.”<sup>159</sup>

In any case, Dominion’s cursory elimination of the technology is unsupported by the administrative record. Merely invoking “storage limitations” is not grounds to eliminate a cleaner-burning fuel from the BACT analysis.<sup>160</sup> Instead, where storage concerns are “central to the BACT analysis,” the Clean Air Act requires “a robust presentation of evidence in the record” to this effect.<sup>161</sup> Virginia’s Administrative Process Act similarly requires that the record reflect the factual basis for such a determination.<sup>162</sup>

**Comment No. 9: The BACT analysis improperly eliminates a spark-ignited natural gas engine for emergency generation.**

Dominion proposes a diesel-fueled engine to power its emergency generator, but acknowledges that a “spark ignited natural gas fired engine would result in lower GHG emissions.”<sup>163</sup> It seeks to eliminate this as a BACT option, however, by stating “the capital cost for a spark ignited natural gas fired engines [sic] is typically twice the cost of a diesel engine.”<sup>164</sup> Dominion continues that “[a]vailable guidance on reasonable BACT cost effectiveness is limited to the Interim Phase I Report of the Climate Change Work Group, which identifies a range of cost effectiveness recommendations from \$3 to \$150 per ton CO<sub>2</sub>.”<sup>165</sup> Because it estimates a spark ignited natural gas engine would cost approximately \$466 per ton of CO<sub>2</sub> emissions controlled,<sup>166</sup> Dominion declares the technology “not cost effective.”<sup>167</sup>

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158 See *Biodiesel Handling and Use Guide* at 10.

159 *Id.* at 22.

160 See *Northern Michigan University*, 14 E.A.D. 283, 299 (E.A.B. 2009) (enclosed as Attachment 109).

161 *Id.*

162 See, e.g., *Virginia Retirement System v. Cirillo*, 676 S.E.2d 368, 371–373 (Va. Ct. App. 2009).

163 Application at 5-68.

164 *Id.*

165 *Id.*

166 It’s worth noting that Dominion’s cost analysis relies in part on the sixth edition of the Environmental Protection Agency’s *Air Pollution Control Cost Manual* (2002), available at <http://1.usa.gov/1ME50FZ> (enclosed as Attachment 47). Though the Manual professes to “provide[ ] up-to-date information on . . . air pollution controls,” this operative “date” is more than a decade ago. See *Air Pollution Control Cost Manual* at 1-3. Even then, the Manual admits to ignoring the “new and emerging technologies” of its day. *Id.* It’s no surprise, then, that Congress recently mandated EPA update the Manual—a process the Agency forecasts will conclude by fall of 2017. See Environmental Protection Agency, “Timeline for Activities Needed for Development of EPA Air Pollution Control Cost Manual, 7th

As an initial matter, Dominion’s characterization of the Interim Phase I Report as the only “[a]vailable guidance on reasonable BACT cost-effectiveness” is misplaced. The Interim Phase I Report states, in no uncertain terms, that the “Work Group *could not reach consensus on the issue of establishing cost-effectiveness thresholds.*”<sup>168</sup> In fact, some members “did not support . . . particular limits or establishing fixed values” whatsoever.<sup>169</sup>

Dominion’s BACT analysis fails on other grounds, however. It is important to remember that an applicant bears the burden of demonstrating that any given control technology is economically infeasible.<sup>170</sup> In *Alaska Department of Environmental Conservation v. Environmental Protection Agency*, the Supreme Court affirmed the EPA’s § 113(a)(5) order enjoining a state permitting agency from issuing a PSD permit when the agency refused to incorporate as BACT a more effective control technology that would cost “between \$1,586 and \$2,279 per ton” of pollutant controlled. The EPA and the Supreme Court agreed that the state agency violated the Act by declaring such costs economically infeasible—at least without “an analysis of whether requiring [the applicant] to install and operate [the technology] would have any adverse impacts upon [the applicant] specifically.”<sup>171</sup>

In light of *Alaska v. EPA*, Dominion’s protest that a spark-ignited natural gas engine is “not cost effective” is insufficient. Of course, the benefits of controlling one ton of NO<sub>x</sub> may differ from the benefits of controlling one ton of greenhouse gases.<sup>172</sup> But this is the applicant’s burden to carry. And neither Dominion nor the Department have explained

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Edition” (Nov. 18, 2014), available at <http://1.usa.gov/1RMrNyx> (enclosed as Attachment 48). But more importantly, the Manual does not, by its own admission, “directly address the controls needed to control air pollution at electrical generating units (EGUs),” as these sources are better analyzed through “levelized costing,” a methodology “different from [that] used” in the Manual. See *Air Pollution Control Cost Manual* at 1-3 & n.1.

167 Application at 5-68.

168 See Environmental Protection Agency, *Interim Phase I Report of the Climate Change Work Group of the Permits, New Source Review and Subcommittee, Clean Air Advisory Committee*, 15 (2010), available at <http://1.usa.gov/1qiUZUJ> (enclosed as Attachment 49) (emphasis added).

169 *Id.*

170 *Alaska Department of Environmental Conservation v. Environmental Protection Agency*, 540 U.S. 461, 494 (2004).

171 *Id.* at 479.

172 But see Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 40 (2011) (“There are compelling public health and welfare reasons for BACT to require all GHG reductions that are achievable” as they “endanger both the public health and the public welfare of current and future generations”).

why this technology is not cost effective while the technology at issue in *Alaska v. EPA*—which, on a dollar-per-ton basis, could cost nearly five times more—was so obviously “economically feasible” as to occasion an exercise of the EPA’s “rare[ly] exercise[d] authority” under § 113(a)(5) of the Act.<sup>173</sup> It’s unsurprising, then, that both state and federal permitting authorities have determined that natural gas-fired engines represent BACT for greenhouse gas emissions from emergency generators.<sup>174</sup>

**Comment No. 10: The BACT analysis improperly eliminates an oxidation catalyst for the auxiliary boiler.**

After claiming that its proposed carbon monoxide emission rate of 0.037 pounds per million Btus represents “the top level of control,” Dominion acknowledges “it may be technically feasible to achieve lower CO emissions by also applying an oxidation catalyst.”<sup>175</sup> It dismisses this option, however, “due to the high cost.”<sup>176</sup>

BACT requires a more robust analysis. At this juncture, Dominion bears the burden of demonstrating the infeasibility of a control option.<sup>177</sup> When using the EPA’s top-down BACT methodology—as Virginia does<sup>178</sup>—a control technology “should initially be considered economically achievable, and therefore acceptable as BACT,” where the cost “is on the same order as the cost previously borne by other sources of the same type in applying that control alternative.”<sup>179</sup> And more generally, where an emission limit departs from a more stringent limit imposed elsewhere, there must be a “detailed discussion” of the *source-specific* considerations that make the more stringent limit infeasible.<sup>180</sup>

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173 See 540 U.S. at 490 n.14.

174 See, e.g., Environmental Protection Agency Region VI, Statement of Basis for PSD Permit for Apex Matagorda Energy Center, Permit No. PSD-TX-107055-GHG, 13 (January 2013), available at <http://1.usa.gov/1RIslp7> (enclosed as Attachment 16); Kansas Department of Health and Environment, PSD Permit Summary for Abengoa Bioenergy Biomass of Kansas, 14 (January 22, 2013), available at <http://bit.ly/25wbjS8> (enclosed as Attachment 50); Environmental Protection Agency, PSD Permit for GHG Emissions from Apex Bethel Energy Center, Permit No. PSD-TX-104511-GHG (March 13, 2014), available at <http://1.usa.gov/1olP1AQ> (enclosed as Attachment 51).

175 Application at 5-62.

176 *Id.*

177 *Alaska Department of Environmental Conservation*, 540 U.S. at 494.

178 See Virginia Department of Environmental Quality, *Air Permitting Guidelines – New and Modified PSD Sources*, Doc. ID APG-309, 4-1 (November 2, 2015), available at <http://1.usa.gov/1SgbYjt> (enclosed as Attachment 1).

179 Environmental Protection Agency, *New Source Review Workshop Manual*, B.22 (1990) (enclosed as Attachment 2).

180 *Indeck-Elwood LLC*, 13 E.A.D. 126, 163 (E.A.B. 2006) (enclosed as Attachment 103) (quoting *BP Cherry Point*, 12 E.A.D. 209, 232 (E.A.B. 2005)).

Dominion’s Application acknowledges that the Marshalltown Generating Station, a combined-cycle natural gas plant in Marshall County, Iowa, is permitted to discharge carbon monoxide from its auxiliary boiler at a rate of 0.0164 lb/MMBtu<sup>181</sup>—less than half of the proposed 0.037 lb/MMBtu rate for the Greenville boiler.<sup>182</sup> Presumably, the oxidation catalyst required under Marshalltown’s PSD permit enables this lower rate.<sup>183</sup> Dominion gives no source-specific reason why this same technology is infeasible or otherwise inappropriate at its own facility. It points to no reason why, for example, the costs it would incur implementing this technology are greater than the costs incurred at the Marshalltown Generating Station. As such, its elimination of the oxidation catalyst is unsupported by the administrative record.<sup>184</sup>

### III. THE DRAFT PERMIT OMITTS EMISSION LIMITATIONS ON COMPONENTS SUBJECT TO THE BEST AVAILABLE CONTROL TECHNOLOGY.

#### **Comment No. 11: The draft permit lacks emission limitations on fugitive emissions from the plant itself.**

Once a facility’s potential to emit exceeds the major source threshold, its fugitive emissions— or those that cannot “reasonably pass through a stack, chimney, vent or other functionally equivalent opening”<sup>185</sup>—are subject to BACT the same as all other emissions.<sup>186</sup> This includes emissions from “leaking valves and flanges,”<sup>187</sup> and facilities like the proposed Greenville plant typically “include natural gas piping components” that “are potential sources of CH<sub>4</sub> [methane] emissions . . . from rotary shaft seals, connection interfaces, valve stems, and similar points.”<sup>188</sup>

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181 Application at C-45.

182 *See id.* at 5-62.

183 Iowa Department of Natural Resources, PSD Permit for Marshalltown Generating Station, Permit No. 13-A-501-P, 1 (April 14, 2014), available through Permit No. Search at <http://bit.ly/1UjakRS> (enclosed as Attachment 52).

184 *See Indeck-Elwood*, 13 E.A.D. at 160–163.

185 40 C.F.R. § 52.21(b)(20).

186 *See Alabama Power v. Costle*, 636 F.2d 323, 369 (D.C. Cir. 1979). *See also* Environmental Protection Agency, “Counting GHG Fugitive Emissions in Permitting Applicability” (2015), available at <http://1.usa.gov/1P969je> (enclosed as Attachment 8) (“For PSD, once it is determined that [a] source is major for at least one regulated New Source Review (NSR) pollutant based on non-fugitive emissions, fugitive emissions are then included in all subsequent analysis, including . . . BACT analyses.”).

187 *See* Environmental Protection Agency, *New Source Review Workshop Manual*, A.10 (1990).

188 *See* Environmental Protection Agency Region VI, Statement of Basis for GHG PSD Permit for Tenaska Brownsville, 31 (October 10, 2014), available at <http://1.usa.gov/1PHKMpu>

In any case, Dominion representatives have elsewhere testified that the proposed plant will include “facilities to receive gas” from the Atlantic Coast Pipeline and the Transcontinental Pipeline (Transco),<sup>189</sup> including two “metering and regulating stations to interface with the[se] pipelines.”<sup>190</sup> Despite Transco’s statement to the Federal Energy Regulatory Commission that “[e]missions associated with the [metering and regulation] station” at the terminus of its Virginia Southside Expansion II “were captured within [Dominion’s] prevention of significant deterioration (PSD) air permit application for the Power Station,”<sup>191</sup> this does not appear to be the case. Nor does the Application discuss the metering and regulating station at the terminus of the Atlantic Coast Pipeline—though Dominion elsewhere projects the station will emit approximately 26,523 tons of CO<sub>2</sub>e per year (in addition to lower levels of nitrogen oxides, carbon monoxide, volatile organic compounds, sulfur dioxide, and particulate matter).<sup>192</sup>

Neither Dominion’s Application nor the Department’s Engineering includes a BACT analysis for fugitive emissions from *any* source. Dominion’s failure to do so is perplexing given that the lone greenhouse gas BACT discussion it cites in its own analysis—EPA Region VI’s 2012 Statement of Basis for the Channel Energy Center in Pasadena, Texas—expressly lists “Fugitive Natural Gas emissions from piping components” as

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(enclosed as Attachment 53). See also David A. Kirchgessner et al., *Estimate of Methane Emissions from the U.S. Natural Gas Industry*, \*12 as reprinted in Environmental Protection Agency, AP-42, *Compilation of Air Pollutant Emission Factors* (5th ed. 1997), available at <http://1.usa.gov/1Rr7GWy> (enclosed as Attachment 20) (concluding that fugitive methane emissions from metering and regulating stations account for more than 10% of the natural gas industry’s total fugitive methane emissions).

189 See Direct Testimony of Dale E. Hinson, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greenville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 8 (August 1, 2015), available at <http://1.usa.gov/1RO8nwn> (enclosed as Attachment 21) (testifying that Dominion “will design, construct, own, operate, and maintain the facilities to receive gas” from pipeline facilities).

190 See Direct Testimony of Robert B. McKinley, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greenville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 5 (August 1, 2015), available at <http://1.usa.gov/1XZXoOT> (enclosed as Attachment 6).

191 See Data Request Response, *Transcontinental Gas Pipe Line Company*, FERC Docket No. CP15-118, 20 (February 10, 2016), available at <http://1.usa.gov/1WZYV79> (enclosed as Attachment 54).

192 See Atlantic Coast Pipeline, Resource Report 9 – Air and Noise Quality, FERC Docket No. CP15-554, 9-16 (September 18, 2016) (enclosed as Attachment 7).

among the “devices . . . subject to th[e] GHG PSD permit”<sup>193</sup> and then proceeds to conduct a substantive BACT analysis for fugitive emissions, ultimately arriving at an enforceable emission limit.<sup>194</sup> Other greenhouse gas PSD permits incorporate similar limits.<sup>195</sup> Presumably because “the magnitude of fugitive emissions depends on how many . . . valves, connectors and pumps[ ] are present,”<sup>196</sup> BACT sometimes requires a numeric limits on components in addition to a weight-based limitation.<sup>197</sup> The omission of any similar analysis or enforceable limit here renders the draft permit invalid.<sup>198</sup>

**Comment No. 12: The draft permit lacks ammonia slip limitations.**

As the Department notes in its engineering analysis, selective catalytic reduction (SCR) entails “the possibility of ‘ammonia slip,’ or emissions of excess (unreacted ammonia).”<sup>199</sup> Because these “ammonia slip” emissions can contribute to condensable particulate, regional haze, and nitrogen deposition (and also indicate poor SCR

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193 See Environmental Protection Agency Region VI, Statement of Basis for PSD Permit for the Channel Energy Center, Permit No. PSD-TX-955-GHG at 7 (August 2012), available at <http://1.usa.gov/1Rtus34> (enclosed as Attachment 55).

194 See *id.* at 25–26.

195 See, e.g., Environmental Protection Agency Region VI, Statement of Basis for PSD Permit for Tenaska Brownsville, Permit No. PSD-TX-1350-GHG (October 2014), available at <http://1.usa.gov/1pKhuRQ> (enclosed as Attachment 53); Environmental Protection Agency Region VI, Statement of Basis for PSD Permit for Thomas C. Ferguson Plant, Permit No. PSD-TX-1244-GHG (November 11, 2011), available at <http://1.usa.gov/1MSxAyf> (enclosed as Attachment 56). See also *Consolidated Environmental Management, Inc.*, 2014 WL 4292232, \*53 (E.P.A. January 30, 2014) (declining to object to permit that “include[d] state-of-the-art ambient monitoring for fugitive emissions, such as additional monitoring and deposition gauges . . . intended to provide for information from which numeric emission levels can be calculated”).

196 See *Oil and Natural Gas Sector: Emission Standards for New and Modified Sources*, 80 Fed. Reg. 56593, 5661 (proposed September 18, 2015) (enclosed as Attachment 11).

197 See Environmental Protection Agency Region VI, Statement of Basis for PSD Permit for Thomas C. Ferguson Plant, Permit No. PSD-TX-1244-GHG, 40 (November 11, 2011), available at <http://1.usa.gov/1MSxAyf> (enclosed as Attachment 56) (limiting facility to “520 gas/vapor valves, 1460 gas/vapor flanges and 3 gas/vapor compressors”).

198 See *Cash Creek Generation*, Petition No. IV-2010-4 (E.P.A. June 22, 2012) (*Cash Creek II*) (enclosed as Attachment 110) (objecting to issuance of operating permit because the “BACT analysis that appeared in the permit application . . . omitted any discussion of . . . requirements serving as BACT for fugitive CO emissions”).

199 See Engineering Analysis at 16.

performance),<sup>200</sup> the Department has typically imposed “permit limits for ammonia slip on the order of 2 to 5 ppmvd of ammonia emissions.”<sup>201</sup>

The Department’s PSD permit for Dominion’s Warren County plant, for example, requires that ammonia slip emissions “shall not exceed 2 ppmvd during steady-state conditions and 5 ppmvd during non-steady-state operations.”<sup>202</sup> The Department incorporated similar conditions into a PSD permit for the Green Energy Partners / Stonewall combined-cycle facility in Loudoun County.<sup>203</sup> And consistent with this approach, the Department has rejected as incomplete other PSD permit applications that do not adequately address ammonia slip emissions.<sup>204</sup> Virginia is no outlier in this regard. State and federal authorities alike require PSD permits incorporate ammonia slip limitations.<sup>205</sup>

And while the Department has previously concluded that the odor potentially attendant to ammonia slip emissions is subject to BACT,<sup>206</sup> there is no indication that any appropriate analysis was performed for this proposal. In fact, Dominion’s application contains only passing references to ammonia slip emissions, and neither the Engineering Analysis nor the Draft Permit explains the departure from the Department’s erstwhile policy of limiting ammonia slip in a PSD permit. Although Dominion provides an “Engineering Estimate” that its ammonia slip emissions will not exceed 2 ppmvd at 15%

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200 See Virginia Department of Environmental Quality, Engineering Analysis for Green Energy Partners / Stonewall, Reg. No. 73826, 58 (April 30, 2013), available at <http://1.usa.gov/1qllOaS> (enclosed as Attachment 57).

201 See Virginia Department of Environmental Quality, Initial Letter of Determination for CPV Smyth Generation Company, Reg. No. 11750, 5 (March 5, 2014), available at <http://1.usa.gov/1QSVUnA> (CPV Smyth ILOD) (enclosed as Attachment 58)

202 Virginia Department of Environmental Quality, PSD Permit for Warren County Power Station, Reg. No. 81391, ¶ 24 (June 17, 2014) (enclosed as Attachment 59).

203 See Virginia Department of Environmental Quality, PSD Permit for Green Energy Partners / Stonewall, Reg. No. 73826, ¶ 31 (April 30, 2013) (enclosed as Attachment 60).

204 See CPV Smyth ILOD at 5–6 (enclosed as Attachment 58).

205 See, e.g., Environmental Protection Agency Region IX, PSD Permit for Victorville 2 Hybrid Power Project, Permit No. SE 07-02, ¶ 7.1.1 (June 2008), <http://1.usa.gov/1UkBsQl> (enclosed as Attachment 28); Texas Commission on Environmental Quality, Preconstruction Permit for Sandy Creek Energy Station, Permit No. 70861 / PSD-TX-1039, ¶ 10A (July 24, 2006), available at <http://bit.ly/25va7yv> (enclosed as Attachment 61); West Virginia Department of Environmental Protection, Permit to Construct the Moundsville Combined Cycle Power Plant, Permit No. 051-00188 at ¶ 4.1.9 (November 21, 2014), available at <http://1.usa.gov/1XKqku3> (Attachment 62).

206 See Smyth ILOD at 6 (enclosed as Attachment 58). See also 9 VAC 5-50-140 (requiring the use of “best available control technology . . . for the control of odorous emissions”).

O<sub>2</sub> under any operating scenario,<sup>207</sup> the draft permit contains no corresponding emission limitation.

Once incorporated, this limit, like all BACT limitations under the PSD program, must be “enforceable as a practical matter.”<sup>208</sup> To this end, the draft permit requires the installation of a continuous emission monitoring system (CEMS) to document compliance with the ammonia slip limit.<sup>209</sup>

**Comment No. 13: BACT for auxiliary boiler emissions requires annual boiler tune-ups.**

In addition to so-called “add-on” technologies, the definition of BACT also includes all “available methods, systems, and techniques” for reducing emissions.<sup>210</sup> State and federal permitting authorities alike have determined that this includes regular tune-ups for industrial boilers.<sup>211</sup> The EPA’s Energy Star program recognizes that “[t]uning-up a boiler optimizes the air-fuel mixture for [its] operating range,” thereby “ensur[ing] less fuel is wasted” and “reduc[ing] emissions of hazardous air pollutants produced by inefficient combustion.”<sup>212</sup> Members of the Climate Change Work Group have similarly acknowledged “regular tune-ups of boilers can reduce fuel use and GHG emissions.”<sup>213</sup> The Department must include an annual tune-up requirement as a component of BACT

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207 See Application at B- 2.

208 See Environmental Protection Agency, *New Source Review Workshop Manual*, B-56 (1990).

209 See Texas Commission on Environmental Quality, Preconstruction Permit for Sandy Creek Energy Station, Permit No. 70861 / PSD-TX-1039 at ¶ 10A (July 24, 2006), available at <http://bit.ly/25va7yv> (enclosed as Attachment 61) (requiring CEMS monitoring of ammonia slip); San Joaquin Valley Air Pollution Control District, Title V Permit for Pastoria Energy Facility, Permit No. S-3636-1-4, ¶ 4 (January 18, 2012), available at <http://bit.ly/1UsK3R1> (enclosed as Attachment 63) (same). See also *Camden Cogeneration Plant*, 2006 WL 6672994 (E.P.A. 2006) (enclosed as Attachment 111) (remarking that a “CEMS, installed under the [combined cycle] facility’s pre-construction requirements serves to monitor emissions of ammonia [and] provide[s] for effective monitoring of facility emissions”).

210 9 VAC 5-80-1615; 42 U.S.C. § 7479(3).

211 See *Cargill Inc.*, 2004 WL 5919948 (E.P.A. October 19, 2004) (enclosed as Attachment 112).

212 Environmental Protection Agency, Energy Star, *Boiler Tune-ups improve efficiency, reduce pollution, and save money*, (2014), available at <http://1.usa.gov/1nJZKET> (enclosed as Attachment 64).

213 Environmental Protection Agency, *Interim Phase I Report of the Climate Change Work Group*, 15 (2010) (enclosed as Attachment 49).

for the auxiliary boiler in order to bring the Draft Permit in line with other similar permits.<sup>214</sup>

#### **IV. NUMERIC LIMITATIONS IN THE DRAFT PERMIT DO NOT REFLECT THE BEST AVAILABLE CONTROL TECHNOLOGY.**

It is “a fundamental tenet of the BACT requirement that, ‘[i]n determining the most stringent control option, the proposed source is required to look at other recently permitted sources.’”<sup>215</sup> While it’s true that each BACT analysis is a case-by-case determination, “when a technology has been considered a ‘potentially available control technology’ at otherwise seemingly similar facilities in previous permitting actions,” the applicant or permitting authority must proffer “some explanation as to why the previously ‘potentially available control technology’ is no longer potentially available at the latest facility.”<sup>216</sup> In other words, “the existence of a similar facility with a lower emissions level creates an obligation for the permit applicant to consider or document whether that same emissions limit can be achieved at [the] proposed facility.”<sup>217</sup> While there may be a source-specific distinction that justifies the different outcomes, “such distinction [must be] articulated in the record.”<sup>218</sup> As detailed below, the record here lacks multiple source-specific justifications needed to legitimize BACT limits higher than those required of comparable facilities.

##### **A. NATURAL GAS TURBINES**

#### **Comment No. 14: Numeric limitations for NO<sub>x</sub> from the gas turbines do not reflect the best available control technology.**

On its face, the choice of 2 ppm NO<sub>x</sub> at 15% oxygen from the power block on a 1-hour average, as proposed by the Applicant (and accepted by the Department) would appear to be BACT. However, this merely reflects a *status quo* and erroneous static analysis, without any data other than limits that have been accepted by other projects in the United

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214 See, e.g., Environmental Protection Agency Region I, PSD Permit for Pioneer Valley Energy Center, Permit No. 052-042-MA14, 9 (April 12, 2012), available at <http://1.usa.gov/1Pum23Z> (enclosed as Attachment 65); Environmental Protection Agency Region IX, PSD Permit for Palmdale Hybrid Power Project, Permit No. SE 09-01, ¶ X.E.1 (October 18, 2011), available at <http://1.usa.gov/1UkBLUj> (enclosed as Attachment 26).

215 *American Electric Power*, 2009 WL 7698416 (E.P.A. 2009) (enclosed as Attachment 113) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 135 (1994)).

216 *Desert Rock Energy Co.*, 2009 WL 5326323, \*39, slip op. at 70 (E.A.B. 2009) (enclosed as Attachment 102).

217 *Indeck-Elwood LLC*, 13 E.A.D. at 183 (E.A.B. 2006) (enclosed as Attachment 103) (internal alterations omitted).

218 *Id.* See also *Steel Dynamics*, 9 E.A.D. 165, 244 (E.A.B. 2000) (enclosed as Attachment 114) (requiring a greater degree of explanation, clearly documented in the record, where limits proposed to be imposed on a facility differ from fifteen other comparative facilities).

States. The cursory examination of Clearinghouse data in Table C-1 of the Application (Table C-1) shows that the 2.0 ppm 1-hour average, with duct firing, has been deemed to be BACT since at least mid-2002<sup>219</sup>—almost 14 years ago. While numerous other projects have adopted this same level as BACT for NO<sub>x</sub>, this does not mean that the BACT analysis or this BACT emission level is correctly derived.

What is missing in the Application and Engineering Analysis is *actual* performance data. As noted earlier, there are at least sixteen 501J units operating today (and likely more)—and actual performance data (including NO<sub>x</sub> levels and variability) should be available from these units. A proper BACT level should rely on this actual performance data, including appropriate allowance for variability and a compliance margin, to propose and set the BACT level. This type of analysis is an inherent part of BACT analyses, especially for sources that have available data. The application contains no such operating data.

One of the key objectives of the BACT process is that the BACT determinations, made over time, reflect *achievable* emissions levels which are often lower with advances in technology. Plainly, using adopted permit levels that are decades old, without any reliance on actual performance data, defeats the purpose of BACT.

**Comment No. 15: Numeric limitations for carbon monoxide from the gas turbines do not reflect the best available control technology.**

Dominion admits that its proposed CO emission rates of 2.4 and 1.5 ppmvd @ 15% O<sub>2</sub> (with and without duct firing, respectively) are not the lowest achievable.<sup>220</sup> The Application acknowledges that the Kleen Energy project's limit is 0.9 ppmvd,<sup>221</sup> but it states “higher CO emission rates generally account for the higher emissions associated with duct burning.”<sup>222</sup> This does little to explain why its proposed 1.5 ppmvd rate without duct firing exceeds Kleen Energy's counterpart by more than 50%. And though Dominion does not include this figure in its BACT appendix, Kleen Energy's permitted emission rate *with* duct firing is 1.7 ppmvd—also well below Dominion's proposed rate of 2.4

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219 See RACT/BACT/LAER Clearinghouse, Gila Bend Power Generating Station, RBLC ID No. AZ-0038 (November 10, 2003) (enclosed as Attachment 66).

220 See Application at 5-8.

221 The New Jersey Department of Environmental Protection similarly determined 0.9 ppmvd to represent BACT for the West Deptford Energy Station, a combined cycle plant in Gloucester County, New Jersey. See RACT/BACT/LAER Clearinghouse, RBLC ID No. NJ-0082 (March 12, 2015) (enclosed as Attachment 67).

222 See Application at 5-8.

ppmvd.<sup>223</sup> Dominion's proposed CO emission rate with duct firing is also considerably higher than a host of comparable facilities across the nation, including:

- Idaho's Langley Gulch Power Plant, at 2.0 ppmvd;<sup>224</sup>
- Massachusetts's Pioneer Valley Generation, at 2.0 ppmvd;<sup>225</sup>
- New Jersey's Hess Newark Energy Center, at 2.0 ppmvd,<sup>226</sup> and West Deptford Energy Station, at 1.5 ppmvd;<sup>227</sup>
- Ohio's Oregon Clean Energy Center and Carroll County Energy Center, both at 2.0 ppmvd;<sup>228</sup> and
- Michigan's Renaissance Power, at 2.0 ppmvd.<sup>229</sup>

Closer to home, the Department determined that a rate of 2.0 ppm with duct firing represented BACT for the Green Energy Partners / Stonewall combined cycle plant in Loudoun County, Virginia.<sup>230</sup>

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223 See Connecticut Department of Energy & Environmental Protection, Title V Permit for Kleen Energy Systems, Permit No. 104-0150-TV, 10 (November 16, 2012), available at <http://1.usa.gov/21Sjbch> (enclosed as Attachment 68).

224 Idaho Department of Environmental Quality, Permit to Construct for Langley Gulch Power Plant, Permit No. P-2009.0092, 16 (August 14, 2013), available at <http://bit.ly/1UCMqk7> (enclosed as Attachment 69).

225 Environmental Protection Agency Region I, Fact Sheet for Pioneer Valley Energy Center, Permit No. 052-042-MA14, 19 (November 5, 2010), <http://1.usa.gov/1VB1bTZ> (enclosed as Attachment 70).

226 New Jersey Department of Environmental Protection, Fact Sheet for Hess Newark Energy Center, Permit Activity No. BOP110001, 4 (November 1, 2012), available at <http://1.usa.gov/1UTs7yR> (enclosed as Attachment 71).

227 RACT/BACT/LAER Clearinghouse, RBLC ID No. NJ-0082 (March 12, 2015) (enclosed as Attachment 67).

228 Ohio Environmental Protection Agency, Permit Summary Review for Carroll County Energy, Permit No. P0113762, 2 (September 18, 2013), available at <http://1.usa.gov/1UC6cfY> (enclosed as Attachment 19); Ohio Environmental Protection Agency, Final Permit-to-Install for Oregon Clean Energy Center, Permit No. P0110840, 69 (June 18, 2013), available at <http://1.usa.gov/1RKuXQ3> (enclosed as Attachment 72).

229 See Michigan Department of Environmental Quality, Public Participation Documents for Renaissance Power, Permit Application No. 51-13, 16 (September 17, 2013), available at <http://bit.ly/1RxfJxT> (enclosed as Attachment 73).

230 See Virginia Department of Environmental Quality, Engineering Evaluation of Permit Application Submitted by Green Energy Partners / Stonewall LLC, Reg. No. 73826, 34 (April 30, 2013) (enclosed as Attachment 57).

Perhaps most perplexingly, Dominion acknowledges that “several Warren County permits at 1.2 . . . and 1.3 ppmvd at 15% O<sub>2</sub> [were] issued in the 2004 to 2008 time period.”<sup>231</sup> These projects include, of course, Dominion’s own Warren County facility—which, according to the appendix to the Greensville application, was most recently permitted in 2008 at 1.2 ppmvd *with duct burning*.<sup>232</sup> Dominion’s BACT analysis does nothing to explain why its proposed rate for Greensville is *double* that of the Warren County rate; it merely prompts the Department look to “more recent BACT emission limits.”<sup>233</sup> While it’s true that BACT involves “look[ing] at other recently permitted sources,”<sup>234</sup> this approach presumes advancements in control technology.<sup>235</sup> It is ultimately the “most stringent” limit that guides the analysis.<sup>236</sup> Dominion’s failure to articulate a reason why the Warren County limit is unachievable at Greensville is especially conspicuous given its presumed familiarity with the Warren County facility. Generally, “the existence of a similar facility with a lower emissions level creates an obligation for the permit applicant to consider or document whether that same emissions limit can be achieved at [the] proposed facility.”<sup>237</sup> Where, as here, the applicant is intimately familiar with the “similar facility,” this obligation is all the more important.

**Comment No. 16: Numeric limitations for greenhouse gases from the gas turbines do not reflect the best available control technology.**

**Heat Rate.** The EPA’s *PSD and Title V Permitting Guidance for Greenhouse Gases* repeatedly emphasizes the importance of energy efficiency review,<sup>238</sup> as does guidance from the State Advisory Board on Air Pollution.<sup>239</sup> This focus on efficiency is consistent

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231 See Application at 5-8.

232 See Application at C-7.

233 *Id.* at 5-8.

234 *American Electric Power*, 2009 WL 7698416 (E.P.A. 2009) (enclosed as Attachment 113) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 135 (1994)).

235 See *Desert Rock Energy Co.*, 2009 WL 5326323, \*39 n.73 (E.A.B. 2009) (enclosed as Attachment 102) (“[O]nce a technology qualifies as ‘a potentially applicable control option’ at a certain type of facility, it should remain ‘potentially applicable’ thereafter for similar facilities without some distinguishing rationale otherwise.”).

236 *Id.*

237 *Indeck-Elwood, LLC*, 13 E.A.D. 126 (E.A.B. 2006) (Enclosed as Attachment 103) (internal alterations omitted).

238 Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 21, 29 (2011).

239 See State Advisory Board on Air Pollution, “Energy Efficiency Measures as Best Available Control Technology for Greenhouse Gases,” 8 (November 2011), available at <http://bit.ly/1Spj8zF> (enclosed as Attachment 74).

with the statutory objectives of Virginia’s Commonwealth Energy Policy,<sup>240</sup> including “[u]sing energy resources more efficiently” and “avoiding...the emissions of greenhouse gases produced in connection with the generation of energy.”<sup>241</sup> The Department, then, must be especially vigilant in ensuring Dominion’s proposed heat rate of 7356 Btus per net kilowatt-hour on a high heating value (HHV) basis<sup>242</sup> reflects the “maximum degree” of achievable energy efficiency required by BACT.<sup>243</sup>

A good place to start is publicly available manufacturers’ data. Mitsubishi states that the heat rate for the 501J in 1x1 combined cycle mode is 5854 kJ/kWh (5548 Btu/kWh) and 5835 kJ/KWh (5530 Btu/kWh) in 2x1 combined cycle mode under ISO conditions.<sup>244</sup> Clearly, a 3x1 configuration, as proposed, would be even more efficient with an even-smaller heat rate—likely in the 5510 Btu/kWh range. Any corrections for non-ISO conditions should be made from this basis and the permitted heat rate should be based on this starting point. Otherwise, the claim that this project will use the most efficient technology with the lower greenhouse gas emissions is simply untrue. We note that the permitted heat rate of 7356 Btu/kWh is 33-34% more permissive than that the heat rate claimed by the manufacturer.

And, even considering other permitted facilities, the Project fails to require lower heat rates. Ohio’s Oregon Clean Energy Center is particularly instructive. Its PSD permit requires a net heat rate of 7280 Btus per net kilowatt-hour (HHV) for a 2x1 combined cycle configuration using Mitsubishi M501GAC turbines.<sup>245</sup> But according to materials prepared by Mitsubishi and submitted to the Department by Dominion, the M501J turbines proposed for Greensville perform more efficiently across the board.<sup>246</sup> Neither Dominion nor the Department has explained why a *more* efficient turbine in a presumably *more* efficient 3x1 configuration warrants a *less* efficient heat rate limitation.

**Mass/Output Rate.** Although Dominion proposes a greenhouse gas emission limit of 903 pounds CO<sub>2</sub>e per *net* megawatt-hour produced,<sup>247</sup> the Draft Permit inexplicably relaxes

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240 See Virginia Code §§ 67-100 – 67-103.

241 See Virginia Code § 67-101.

242 Application at 5-58; Draft Permit at ¶ 8.

243 42 U.S.C. § 7479(3).

244 Mitsubishi Hitachi Power Systems, Technical Brochure, *M501J/M701J* (February 18, 2016), available at <http://bit.ly/1qk6cEz> (enclosed as Attachment 75).

245 See Ohio Environmental Protection Agency, Final Permit-to-Install for Oregon Clean Energy Center, Permit No. P0110840, 54 (June 18, 2013) (enclosed as Attachment 72).

246 See Mitsubishi Hitachi Power Systems, Comments on Proposed Standards of Performance for Greenhouse Gas Emissions for New Sources: Electric Utility Generating Units, 6-7 (April 14, 2014) (Mitsubishi Comments).

247 Application at 5-28.

the limit to 903 pounds CO<sub>2</sub>e per *gross* megawatt-hour.<sup>248</sup> We assume this to be a drafting error, given the Department’s reliance on a *net* heat rate in arriving at the permit limit.<sup>249</sup>

To the extent the Department actually intended to set the limit on the basis of gross output, it departs from the guidance of both the EPA and the State Advisory Board on Air Pollution.<sup>250</sup> It also rejects its own erstwhile position that a PSD permit should include *both* a net- and gross-based limit.<sup>251</sup> More importantly, this limit would be significantly higher than the gross output-based greenhouse gas limit at a host of similar facilities, including:

- Ohio’s Carroll County Energy Center, at 859 pounds CO<sub>2</sub>e per megawatt-hour with and without duct firing;<sup>252</sup>
- Florida’s Polk Power Station, at 877 pounds CO<sub>2</sub>e per megawatt-hour with and without duct firing;<sup>253</sup>
- Texas’s Colorado Bend Energy Station, at 879 pounds CO<sub>2</sub>e per megawatt-hour;<sup>254</sup>
- New Jersey’s Hess Newark Energy Center, at 887 pounds CO<sub>2</sub>e per megawatt-hour;<sup>255</sup> and

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248 Draft Permit at ¶ 39.

249 See Engineering Analysis at 15.

250 See Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 37, 45–46 (2011); State Advisory Board on Air Pollution, “Energy Efficiency Measures as Best Available Control Technology for Greenhouse Gases,” 10 (November 2011), available at <http://bit.ly/1Spj8zF> (enclosed as Attachment 74) (recommending that “net output-based standards should be used for GHGs . . . because such metrics capture the overall thermal efficiency of the facility”).

251 See Virginia Department of Environmental Quality, Reply to Applicant’s Response to Initial Letter of Determination for CPV Smyth Generation, Reg. No. 11750, 8 (July 16, 2014), available at <http://1.usa.gov/1nMzSbv> (enclosed as Attachment 76).

252 Ohio Environmental Protection Agency, Final Permit to Install for Carroll County Energy, Permit No. P0113762, 35 (November 5, 2013), available at <http://1.usa.gov/1odn7a3> (enclosed as Attachment 77). See also *id.* at \*3 (noting that “emissions values of 859 lb/MW-hr at ISO conditions without duct firing” should read “*with duct firing*”) (emphasis in original).

253 Environmental Protection Agency Region IV, PSD Permit for GHG from Polk Power Station, Permit No. PSD-EPA-R4014, 7 (December 18, 2013), available at <http://1.usa.gov/1q7VWPC> (enclosed as Attachment 78).

254 See RACT/BACT/LAER Clearinghouse, RBLC ID No. TX-0730 (April 2, 2015) (enclosed as Attachment 79).

255 See RACT/BACT/LAER Clearinghouse, RBLC ID No. NJ-0080 (April 4, 2014) (enclosed as Attachment 80).

- Texas’s FGE Texas Project, at 889 pounds CO<sub>2</sub> per megawatt-hour with and without duct firing.<sup>256</sup>

Finally, its notable that in 2014, the Department rejected a proposed BACT of 888 pounds CO<sub>2</sub>e per gross megawatt hour produced by a combined-cycle gas plant.<sup>257</sup>

BACT limits at Ohio’s Oregon Clean Energy Center are instructive here too. Oregon Clean Energy’s permit limits its Mitsubishi M501GAC turbines to 840 pounds CO<sub>2</sub>e per gross megawatt-hour with duct firing.<sup>258</sup> And again, materials prepared by Mitsubishi and submitted to the Department by Dominion claim that the M501J turbines proposed for Greensville perform more efficiently in every combined-cycle configuration measured.<sup>259</sup> Neither Dominion nor the Department has explained why a *more* efficient turbine in a presumably *more* efficient 3x1 configuration warrants a *less* efficient output-based greenhouse gas limit.

By all accounts, Dominion itself believes Mitsubishi’s emission projections are already inflated. The company testified before the State Corporation Commission that, as a rolling average, the plant would operate at “about 770” pounds CO<sub>2</sub>e per megawatt-hour produced, including duct firing and start-ups and shutdowns.<sup>260</sup> It’s unclear whether this projection reflects gross or net production, but applying a 2% adjustment to conservatively account for potential parasitic load<sup>261</sup> results in a maximum rate of 785.4 pounds of CO<sub>2</sub>e per *net* megawatt-hour. To then permit the facility at 903 pounds would be to afford it a

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256 Environmental Protection Agency Region VI, PSD Permit for GHG from FGE Texas Project, Permit No. PSD-TX-1364-GHG, 9 (March 2014), draft available at <http://1.usa.gov/1MrTM7x> (enclosed as Attachment 81).

257 See Virginia Department of Environmental Quality, Initial Letter of Determination for CPV Smyth Generation, Reg. No. 11750, 4 (March 5, 2014), available at <http://1.usa.gov/1QSVUnA> (enclosed as Attachment 58).

258 See Ohio Environmental Protection Agency, Final Permit-to-Install for Oregon Clean Energy Center, Permit No. P0110840, 48 (June 18, 2013), available at <http://1.usa.gov/1UC6cfY> (enclosed as Attachment 72).

259 See Mitsubishi Comments at 6–7.

260 Hearing Transcript, *Application of Virginia Electric and Power Company for approval and certification of the proposed Greensville County Power Station*, State Corporation Commission Case No. PUE-2015-00075, 374:2–374:17 (January 13, 2016) (testimony of Glenn A. Kelly), available at <http://1.usa.gov/1pUGCpI> (enclosed as Attachment 82).

261 According to the Electric Power Research Institute’s “evidenced-based analysis of auxiliary or parasitic loads (internal plant usage of power) in the U.S. fossil and nuclear generation fleet,” a 2% penalty represents the high end of parasitic load for combined-cycle plants. Electric Power Research Institute, “Program on Technology Innovation: Electricity Use in the Electric Sector,” 2-4, 2-12 (November 4, 2011), available at <http://bit.ly/1pUH9bj> (enclosed as Attachment 83).

compliance margin of 15%—a margin that dwarfs the 10.5% margin above net heat rate (including start-up and shutdown times) proposed by the Department.<sup>262</sup>

Even assuming that the Department meant to impose a limit of 903 pounds CO<sub>2</sub>e per *net* megawatt-hour, it must justify this limit as well. As discussed above in Comment No. 4, this rate is much higher than the 774 pound CO<sub>2</sub>e per net megawatt-hour determined to be BACT for the Palmdale Hybrid project.<sup>263</sup> But several modern projects firing natural gas alone have been permitted at lower rates as well. The Massachusetts Department of Environmental Protection's PSD permit for the Salem Harbor Redevelopment Program and the EPA's PSD permit for the Pioneer Valley Energy Center, for example, both incorporate a lower BACT of 895 pounds CO<sub>2</sub>e per net megawatt-hour.<sup>264</sup> The permit for Pioneer Valley is especially relevant, as that facility—like the Oregon Clean Energy Center discussed above—used less-efficient<sup>265</sup> Mitsubishi G-class turbines.<sup>266</sup>

And if the Department intended a net output-based standard, its whole-clothe adoption of Dominion's proposed rate is surprising given prior BACT determinations for greenhouse gases. Less than two years ago, the Department determined that the proposed CPV Smyth combined-cycle must satisfy a BACT limit of 891 pounds CO<sub>2</sub>e per megawatt-hour on a *net* basis.<sup>267</sup> Without any additional analysis or any discussion of source-specific impediments to achieving a similar rate, the record does not justify a perfunctory adoption of Dominion's proposed rate.

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262 See Engineering Analysis at 15. This reflects the Department's proposed 3.4% performance and 7.1% degradation margins for the steam turbine system. Since the 770 rate already includes start-up and shutdown operations and the 785.4 rate already accounts for parasitic load (indeed, more conservatively than the Department's auxiliary degradation margin), the Department's proposed 1.2% auxiliary margin and 3% start-up/shutdown margin are omitted.

263 See Environmental Protection Agency Region IX, PSD Permit for Palmdale Hybrid Power Project, Permit No. SE 09-01, ¶ X.C.1 (October 18, 2011), available at <http://1.usa.gov/1UkBLuj> (enclosed as Attachment 26).

264 Environmental Protection Agency Region I, PSD Permit for Pioneer Valley Energy Center, Permit No. 052-042-MA14, 6 (April 12, 2012), available at <http://1.usa.gov/1Pum23Z> (enclosed as Attachment 65); Massachusetts Department of Environmental Protection, PSD Permit for Salem Harbor Redevelopment Project, Permit Application No. NE-12-022, 15 (January 30, 2014), available at <http://1.usa.gov/1MoKYPz> (enclosed as Attachment 84).

265 Mitsubishi Comments at 6–7.

266 See Environmental Protection Agency Region I, PSD Permit Fact Sheet for Pioneer Valley Energy Center, Permit No. 052-042-MA14, 5 (December 2011), available at <http://1.usa.gov/1VB1bTZ> (enclosed as Attachment 65).

267 See Virginia Department of Environmental Quality, Reply to Applicant's Response to Initial Letter of Determination for CPV Smyth Generation, Reg. No. 11750, 8 (July 16, 2014), available at <http://1.usa.gov/1nMzSbv> (enclosed as Attachment 76).

Finally, although BACT analysis requires “look[ing] at other recently permitted sources,”<sup>268</sup> the Department cautions that other permits express greenhouse gas limits according to gross, rather than net, energy output.<sup>269</sup> Although we do not object to a permit limit based on net energy output (as proposed in Dominion’s Application), Dominion should disclose its assumptions on parasitic load informing this proposed emission limit. The Department’s prior policy of including equally-enforceable net and gross output-based limits is a testament to the value of assessing *both* figures.<sup>270</sup>

**Comment No. 17: Numeric limitations for fuel sulfur content do not reflect the best available control technology.**

The draft permit proposes to restrict the sulfur content of the plant’s fuel to 0.4 grains per 100 square cubic feet.<sup>271</sup> Other natural gas-fired facilities, however, require far cleaner fuel. Dominion identifies two in its application: Michigan’s Midland Cogeneration Venture and South Shore Power, both limited to 0.2 grains per 100 square cubic feet.<sup>272</sup> The PSD permits for the Palmdale Hybrid Power Project and the Victorville II Hybrid Power Project similarly require that “pipeline natural gas shall not exceed a sulfur content of 0.20 grains per 100 dry standard cubic feet on a 12-month rolling average basis.”<sup>273</sup> More recently, the Iowa Department of Natural Resources permitted Marshalltown Heat & Power’s natural gas-fired turbine and duct burner at 0.1 grains per 100 dry standard cubic feet.<sup>274</sup>

Closer to home, the Department restricted sulfur content for the Wolf Hills natural gas-fired plant to 0.064 grains per 100 square cubic feet—a limitation that it consistently

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268 *American Electric Power*, 2009 WL 7698416 (E.P.A. 2009) (enclosed as Attachment 113) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 135 (1994)).

269 Engineering Analysis at 14.

270 See Virginia Department of Environmental Quality, Reply to Applicant’s Response to Initial Letter of Determination for CPV Smyth Generation, Reg. No. 11750, 8 (July 16, 2014), available at <http://1.usa.gov/1nMzSbv> (enclosed as Attachment 76).

271 See Draft Permit at 10.

272 See Application at C-35.

273 See Environmental Protection Agency Region IX, PSD Permit for Palmdale Hybrid Power Project, Permit No. SE 09-01, 7 (October 18, 2011), available at <http://1.usa.gov/1UkBLuj> (enclosed as Attachment 26); Environmental Protection Agency Region IX, PSD Permit for Victorville II Hybrid Power Project, Permit No. SE 07-02, 6 (March 11, 2010), available at <http://1.usa.gov/1UkBsQl> (enclosed as Attachment 28).

274 See Iowa Department of Natural Resources, Construction Permit for Marshalltown Heat & Power, Permit No. 14-A-294, 6 (May 21, 2014), available through Permit No. Search at <http://bit.ly/1UjakRS> (enclosed as Attachment 52).

met.<sup>275</sup> Although the Department later raised the limit to 0.3 grains—a limit still 25% lower than Dominion’s proposal—it notes that the facility’s actual “annual average sulfur content is significantly below this value.”<sup>276</sup> And more recently, the Department determined that the Green Energy Partners / Stonewall combined cycle plant could achieve a limit of 0.1 grains.<sup>277</sup>

The Environmental Appeals Board has recognized time and again that “[i]n its brief list of BACT production processes, methods, systems, and techniques, Congress sounds one prominent note: fuels . . . Congressional direction to permitting applicants and public officials is emphatic. In making BACT determinations, they are to give prominent consideration to fuels.”<sup>278</sup> As such, any BACT analysis “*must* include consideration of cleaner forms of the fuel proposed by the source.”<sup>279</sup> This requirement is particularly critical when cleaner fuels are required of “otherwise seemingly similar facilities in previous permitting actions.”<sup>280</sup> In these cases, BACT requires an affirmative “explanation as to why [a] previously ‘potentially available control technology’ is no longer potentially available at the latest facility.”<sup>281</sup>

Consistent with this approach, the Department has elsewhere determined that a proposed “maximum natural gas sulfur content of 0.5 grains per 100 standard cubic feet (gr/100 scf) . . . did not represent BACT in Virginia.”<sup>282</sup> In that instance, the Department

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275 See Virginia Department of Environmental Quality, Initial Letter of Determination for CPV Smyth Generation Company, Reg. No. 11750, 3 (March 5, 2014) (enclosed as Attachment 58).

276 *Id.* See also Virginia Department of Environmental Quality, Statement of Basis for Wolf Hills Energy LLC, Permit No. SWRO11348, 4 (December 2, 2014), available at <http://1.usa.gov/1X0647z> (enclosed as Attachment 85) (limiting fuel sulfur content to “0.3 grains per 100 dry standard cubic feet”).

277 See Virginia Department of Environmental Quality, PSD/NSR Permit for Green Energy Partners / Stonewall, Reg. No. 73826, ¶ 11 (April 30, 2013) (enclosed as Attachment 60).

278 *Northern Michigan University*, 14 E.A.D. 283, 295 (E.A.B. 2009) (enclosed as Attachment 109).

279 *Prairie State Generating Co.*, 13 E.A.D. 1, 14 (EAB 2006) (enclosed as Attachment 107), *aff’d sub. nom Sierra Club v. EPA*, 499 F.3d 653 (7th Cir. 2007) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 145 (E.A.B. 1994)) (emphasis added).

280 See *Desert Rock Energy Co.*, 2009 WL 5326323, \*39 (E.A.B. 2009) (enclosed as Attachment 102).

281 *Id.*

282 See Virginia Department of Environmental Quality, Letter re CPV Smyth Generation, Reg. No. 11750, 2 (July 16, 2014), available at <http://1.usa.gov/1nMzSbv> (enclosed as Attachment 76).

ultimately determined that BACT was satisfied by a limit of 0.3 grains per 100 square cubic feet.<sup>283</sup>

As discussed above in Comment No. 2 above, Dominion justifies its proposed fuel sulfur content by alluding to “current analytical data for pipeline natural gas in Central Virginia and Northern North Carolina.”<sup>284</sup> But as the Department points out in its Engineering Analysis, the fuel’s sulfur content “is dependent on the location *from which the gas is piped*.”<sup>285</sup> Thus, to depart from the limits found to be BACT at other locations, the Department must provide a “detailed discussion” about the origin of gas proposed to supply Greensville and why it is expected to differ from the gas used elsewhere.<sup>286</sup> A proper BACT analysis would then typically consider the feasibility of accessing the same cleaner gas piped to these other facilities.<sup>287</sup> In this instance, it may also include a comparison of the gas actually transported by the “geographically diverse” pipelines.<sup>288</sup> After all, a permitting authority must consider limiting a permittee to any cleaner fuel already incorporated into the plant’s design.<sup>289</sup>

**Comment No. 18: Numeric limitations for sulfur dioxide and sulfuric acid mist from the gas turbines do not reflect the best available control technology.**

Revision of the sulfur fuel content standard addressed above in Comment No. 17 may require revision of the sulfur dioxide and sulfuric acid mist limitations as well. In revising its BACT analysis, however, Dominion must also consider sulfur dioxide and sulfuric acid mist limitations determined to be BACT for the project’s contemporaries. It is “a fundamental tenet of the BACT requirement that, ‘[i]n determining the most stringent control option, the proposed source is required to look at other *recently* permitted

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283 *Id.*

284 *See* Application at 5-11.

285 Engineering Analysis at 21 (emphasis added).

286 *Indeck-Elwood LLC*, 13 E.A.D. 126, \*38 (E.A.B. 2006) (enclosed as Attachment 103) (quoting *BP Cherry Point*, 12 E.A.D. 209, 232 (E.A.B. 2005)).

287 *See Prairie State*, 13 E.A.D. at 14 (enclosed as Attachment 107) (quoting *Inter-Power*, 5 E.A.D. at 145).

288 *See* Comment No. 2 above.

289 *See generally Cash Creek Generation*, Order on Petition Nos. IV-2008-1, IV-2008-2, 4-6 (E.P.A. December 15, 2009) (enclosed as Attachment 99) (*Cash Creek I*). *See also* Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 28 (2011) (“[A] permitting authority may consider that some types of coal can have lower emissions of GHG than other forms of coal, and they may insist that the lower emitting coal be evaluated in the BACT review.”).

sources.”<sup>290</sup> The most recent permit in Dominion’s sulfur dioxide BACT analysis, however, is nearly a decade old.<sup>291</sup>

**Comment No. 19: Numeric limitations for volatile organic compounds from the gas turbines do not reflect the best available control technology.**

Dominion proposes volatile organic compound limits for its gas turbines of 1.4 and 1.0 ppmvd at 15% O<sub>2</sub>—with and without duct burning, respectively.<sup>292</sup> In defense of this proposal, Dominion states that “[d]iscussions with combustion turbine vendors indicates [sic] that they will typically not guarantee VOC emission rates below 1.0 ppmvd at 15% O<sub>2</sub>.”<sup>293</sup> This is insufficient to justify a BACT determination, especially when similar facilities are permitted more stringently. While vendors commonly “provide both estimated ‘expected’ results and ‘guaranteed’ results,” guarantees merely reflect “a contract between the permit applicant and the vendor to establish the risk of non-performance the *vendor* is willing to accept.”<sup>294</sup> Vendors’ guarantees are thus relevant only inasmuch as they are corroborated with “chemical and engineering analyses.” Ultimately, the “lack of a vendor guarantee by itself does not present sufficient justification that . . . an emissions limit is technically infeasible.”<sup>295</sup>

Comparison to other recently permitted facilities of “the same or similar source type,” however, remains an important means of evaluating the proposed rates.<sup>296</sup> As with the proposed carbon monoxide emissions discussed above in Comment No. 15, Dominion fails to explain why the VOC rate at both its Brunswick and Warren County plants—0.7 ppm without duct firing<sup>297</sup>—is not achievable at its new facility. This is to say nothing of

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290 *American Electric Power*, 2009 WL 7698416 (E.P.A. 2009) (enclosed as Attachment 113) (quoting *Inter-Power of New York*, 5 E.A.D. 130, 135 (1994)) (emphasis added).

291 *See* Application at C-35.

292 *See* Application at 5-9.

293 *Id.*

294 Environmental Protection Agency, *PSD and Title V Permitting Guidance for Greenhouse Gases*, 32 (2011).

295 *See* Environmental Protection Agency, *New Source Review Workshop Manual*, B.20 (1990).

296 *See Desert Rock Energy Company*, 2009 WL 5326323, \*39 (E.A.B. 2009) (enclosed as Attachment 102) (“[T]he existence of a similar facility with a lower emissions level creates an obligation for the permit applicant to consider or document whether that same emissions limit can be achieved at [the] proposed facility.”) (quoting *Indeck-Elwood LLC*, 13 E.A.D. 126 (E.A.B. 2006)) (internal alterations omitted).

297 *See* Virginia Department of Environmental Quality, Engineering Analysis for Virginia Electric and Power Company – Brunswick Plant, Permit No. 52404-001, 21 (March 8, 2013) (enclosed as Attachment 86); Virginia Department of Environmental Quality, Amended PSD Permit for Warren County Power Station, Reg. No. 81391, ¶ 18 (June 17, 2014) (enclosed as Attachment 59).

the Chouteau Power Plant, a combined cycle plant in Mayes County, Oklahoma, permitted at 0.3 ppm VOC.<sup>298</sup>

#### B. AUXILIARY BOILER

**Comment No. 20: Numeric limitations for nitrogen oxides from the auxiliary boiler do not reflect the best available control technology.**

Auxiliary boilers at other combined-cycle plants are permitted at NO<sub>x</sub> emission rates significantly lower than Dominion's proposed rate of 0.011 lb/MMBtu—or 9 ppmvd at 3% O<sub>2</sub>.<sup>299</sup> Dominion identifies several in its Application, including Berks Hollow Energy (0.0058 lb/MMBtu) and the Corpus Christi Terminal Condensate Splitter (0.0060 lb/MMBtu).<sup>300</sup> Notably, of the boilers identified in Dominion's Application, the most similarly-sized to Dominion's proposal is the 178 MMBtu/hour boiler at the Stockton Cogeneration Facility, permitted at 0.0085 lb/MMBtu.<sup>301</sup> Nonetheless, Dominion justifies its proposed rate only by referring to the "typical BACT emission rates" it argues are "in the 0.035 lb/MMBtu to 0.060 lb/MMBtu range."<sup>302</sup> As discussed in Comment No. 15 above, this sort of analysis cannot support a BACT determination.

**Comment No. 21: Numeric limitations for carbon monoxide from the auxiliary boiler do not reflect the best available control technology.**

Dominion proposes a carbon monoxide limit of 0.037 lb/MMBtu, which is equivalent to 50 ppmvd at 3% O<sub>2</sub>.<sup>303</sup> Dominion states its "proposed emission rate appears to be the top level of control based on data from EPA's RACT/BACT/LAER Clearinghouse,"<sup>304</sup> but its own BACT review contradicts this statement. The Application identifies eight other boilers with lower limits, including at least six that appear to have the same or similar control technologies and operating conditions.<sup>305</sup> Other comparable facilities are permitted at lower rates—including multiple facilities in the Clearinghouse. CPV St. Charles, for example, includes a 93 MMBtu/hour natural gas-fired auxiliary boiler

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298 See RACT/BACT/LAER Clearinghouse, RBLC ID No. OK-0129 (November 20, 2009) (enclosed as Attachment 87). See also Application at C-10.

299 Application at 5-59.

300 Application at C-39.

301 *Id.* (calculated from 7 ppmvd @ 3% O<sub>2</sub>, as documented in RACT/BACT/LAER Clearinghouse, RBLC ID No. CA-1206 (November 11, 2012)).

302 Application at 5-59.

303 Application at 5-62.

304 Application at 5-62.

305 See Application at C-45.

permitted at 0.0200 pounds CO per MMBtu.<sup>306</sup> Even the Klamath Generation combined cycle, permitted some thirteen years ago, contains a BACT limit of 0.035 pounds CO per MMBtu for its 50,000 pound/hour natural gas-fired auxiliary boiler.<sup>307</sup> Even lower rates are BACT at newer facilities. As discussed above in Comment No. 10, BACT for the 60.1 MMBtu/hour auxiliary boiler at Interstate Power and Light's Marshalltown Generating Station is 0.0164 pounds carbon monoxide per MMBtu.<sup>308</sup>

**Comment No. 22: Numeric limitations for volatile organic compounds from the auxiliary boiler do not reflect the best available control technology.**

Dominion's proposed limit of 0.005 lb/MMBtu for volatile organic compound emissions from its auxiliary boiler is nearly three times the permitted BACT rate of 0.0017 lb/MMBtu for the auxiliary boiler at the Cheyenne Prairie Generation Station in Laramie County, Wyoming.<sup>309</sup> This imposes on Dominion an obligation to explain what source-specific facts make this limit unachievable at its own plant. Because it has failed to do so, the limit fails to satisfy the definition of BACT.

**V. ADDITIONAL ANALYSIS IS REQUIRED TO DETERMINE WHETHER THE PROJECT IS A MAJOR SOURCE OF HAZARDOUS AIR POLLUTANTS.**

A facility that has the potential to admit, in the aggregate, at least ten tons per year of a hazardous air pollutant (HAP) is a "major source" subject to a "maximum achievable control technology (MACT)" emission limitation.<sup>310</sup> Both Dominion and the Department conclude that the proposed facility's gas turbines are not subject to MACT based on Dominion's estimate that the turbines have a potential to emit 6.43 tons of formaldehyde per year, the HAP with the highest emissions.<sup>311</sup>

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306 See RACT/BACT/LAER Clearinghouse, RBLIC ID No. MD-0041 (July 31, 2015) (enclosed as Attachment 90).

307 See RACT/BACT/LAER Clearinghouse, RBLIC ID No. OR-0040 (March 15, 2004) (enclosed as Attachment 91).

308 See Iowa Department of Natural Resources, PSD Construction Permit for Marshalltown Generating Station, Permit No. 13-A-501-P, ¶ 10a (April 14, 2014), available through Permit No. Search at <http://bit.ly/1UjakRS> (enclosed as Attachment 52).

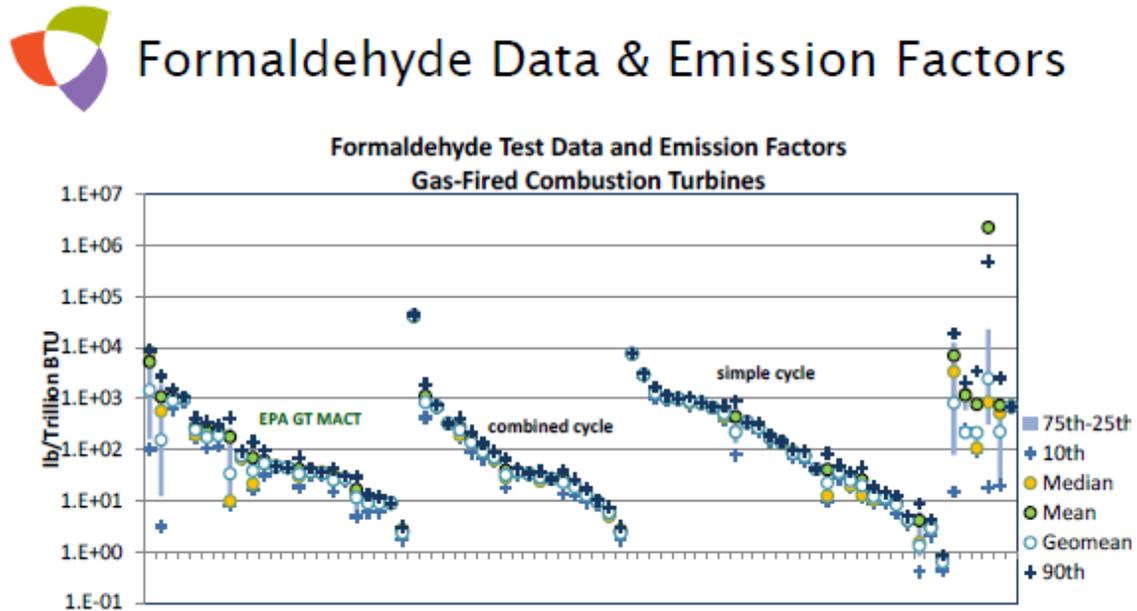
309 See RACT/BACT/LAER Clearinghouse, RBLIC ID No. WY-0075 (June 16, 2014) (enclosed as Attachment 92).

310 See generally 9 VAC 5-80-1400-1480.

311 Application at 3-8; Engineering Analysis at 11.

In arriving at the potential to emit of 6.43 tons per year for formaldehyde, Dominion used manufacturer's data to calculate the turbines' potential to emit formaldehyde.<sup>312</sup> No basis is provided for the manufacturer's data. It is clear that the emission factor of 2.2E-04 lb/MMBtu (220 lb/trillion Btu) used by Dominion based on the unsupported manufacturers data might be significantly low.

A recent analysis of formaldehyde emissions from gas-fired turbines is shown below.<sup>313</sup>



The middle section of data is for combined cycle units. The values range from a low of 1 lb/trillion Btu to a high of well over 1000 lb/trillion Btu, with the maximum shown as between 10,000 to 100,000 lb/trillion Btu. Even excluding the maximum, the upper range of data is well over 1000 lb/trillion Btu, which is around 5 times the emission factor assumed (220 lb/trillion Btu). Given that the question is the calculation of potential to emit emissions, it is entirely reasonable to use values even greater than 1000 lb/trillion Btu. But, even restricting to 1000 lb/trillion Btu, the PTE for formaldehyde is recalculated to be 29.2 tons/year. Based on these calculations, the proposed Project is a definitely a major source of HAP emissions. The Application, the Department's Engineering Analysis, and all applicable regulatory analyses should be revised accordingly and monitoring provisions in the permit strengthened to require CEMS for VOCs.

312 Application at B-18-B-19.

313 See Glenn C. England, *PM and Hazardous Air Pollutant Emission Factors For Gas-Fired Combustion Turbines* (July 17, 2014) available at <http://bit.ly/1VTYZXI> (enclosed as Attachment 93).

In addition to this severe underestimation in formaldehyde emissions from the turbines, there is no indication that the emission factor includes emissions during startups, shutdowns, malfunctions, and upset conditions—all times when formaldehyde emissions are highest.<sup>314</sup> The Administrator of the EPA recently reiterated that emissions during startups, shutdowns, malfunctions, and upset conditions must be considered in determining a facility’s potential to emit hazardous air pollutants.<sup>315</sup> Before exempting the turbines from 9 VAC 5-80-1470, the Department must determine their absolute, “maximum capacity” to emit formaldehyde under every conceivable scenario allowed by their “physical and operational design.”<sup>316</sup> Section 5-80-1480 prohibits issuance of a permit until such the Department makes this determination.

## **VI. THE DRAFT PERMIT’S MONITORING REQUIREMENTS ARE INSUFFICIENT TO ENSURE COMPLIANCE WITH THE CLEAN AIR ACT.**

### **A. THE DRAFT PERMIT DOES NOT INCORPORATE MONITORING REQUIREMENTS PRESCRIBED BY APPLICABLE NEW SOURCE PERFORMANCE STANDARDS.**

A PSD permit must incorporate all “applicable emission standard[s] or standard[s] of performance” under the Clean Air Act.<sup>317</sup> This includes, notably, any applicable new source performance standard (NSPS).<sup>318</sup>

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314 See Environmental Protection Agency, AP-42 *Compilation of Air Pollutant Emission Factors*, 3.1-5 (5th ed. 2000) (enclosed as Attachment 94) (“For natural gas turbines, formaldehyde accounts for about two thirds of the total HAP emissions,” which “increase with reduced operating loads.”).

315 *Hu Honua Bioenergy*, 2014 WL 4292227, \*14–17 (E.P.A. 2014) (enclosed as Attachment 115). See also EPA Region 8, Objections to Proposed Title V Renewal Operating Permit for Big Stone Power Plant, 11 (January 22, 2009), available at <http://bit.ly/1RpKKrZ> (enclosed as Attachment 95) (“The State must explain how it established the potential to emit HAP . . . includ[ing] a discussion of how emissions during periods of startup, shutdown or malfunctions were considered in establishing the potential to emit”).

316 See 9 VAC 5-80-1410 (definition of “[p]otential to emit”).

317 42 U.S.C. § 7475(a)(3).

318 40 C.F.R. § 52.21(j) (requiring that PSD program ensure that all “major stationary source[s] . . . meet each . . . applicable emissions standard and standard of performance under 40 CFR parts 60 and 61”). See also *Northern Plains Resource Council v. Environmental Protection Agency*, 645 F.2d 1349, 1352–53 (9th Cir. 1981) (A permitting authority “would clearly be acting contrary to the statutory PSD program in issuing a PSD permit to a facility which would produce emissions in excess of an applicable new source performance standard.”).

**Comment No. 23: The draft permit fails to incorporate applicable monitoring standards under the NSPS for greenhouse gas emissions from electric utility generating units.**

The Draft Permit requires Dominion “demonstrate compliance with the applicable CO<sub>2</sub> emission standard by following the procedures in 40 CFR 60.5520(d)(1),” a provision of the recently-finalized New Source Performance Standards (NSPS) for greenhouse gas emissions from fossil-fueled generating units<sup>319</sup>—which, as the permit points out, requires only “maintaining fuel purchase records.”<sup>320</sup> The Department’s Engineering Analysis similarly states that “[t]here are no monitoring or reporting requirements for units that burn natural gas as a fuel, except to maintain fuel purchase records.”<sup>321</sup>

The Department misinterprets the NSPS monitoring requirements. While 40 C.F.R. § 60.5520(d)(1) does state that certain units “are only required to maintain purchase records for permitted fuels,” the opening clause of paragraph (d) indicates that this exemption applies only to “combustion turbines subject to a heat input-based standard in Table 2” of Subpart TTTT (Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units). But Table 2 does *not* subject so-called “base load units” in NSPS parlance<sup>322</sup> to a heat input-based standard. Instead, it requires that base load units meet an output-based standard expressed as pounds of CO<sub>2</sub> per megawatt hour. And consistent with this standard, Subpart TTTT requires that base load units, *inter alia*, “implement the applicable procedures in [40 C.F.R. § 75 App. G] to determine hourly EGU heat input rates”<sup>323</sup> and “install, calibrate, maintain, and operate a sufficient number of watt meters to continuously measure and record the hourly . . . electric output.”<sup>324</sup>

Though the Draft Permit’s similar output-based CO<sub>2</sub> standard is derived from BACT rather than the “floor” established by the NSPS program, the Department’s Engineering Analysis acknowledges that the output-based rather than the input-based NSPS applies to the gas turbines.<sup>325</sup> Accordingly, subsections (b) and (c)—directed at units with a “gross

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319 *Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units*, 80 Fed. Reg. 64510 (October 23, 2015) (enclosed as Attachment 96).

320 Draft Permit at ¶ 69.

321 *See* Engineering Analysis at 10.

322 *See* 80 Fed. Reg. 64514 (“We use the term base load natural gas-fired units to refer to stationary combustion turbines that (1) burn over 90 percent natural gas and (2) sell electricity in excess of their design efficiency (not to exceed 50 percent) multiplied by their potential electric output”).

323 *See* 40 C.F.R. § 60.5535(c)(1).

324 *See* 40 C.F.R. § 60.5535(d)(1).

325 *See* Engineering Analysis at 10 (“Expected emissions of CO<sub>2</sub> from the facility . . . will be able to meet the 1,000 lb/MW-hr CO<sub>2</sub> gross standard.”).

energy output” or “net energy output” emission standard, respectively—are applicable to this facility.

**Comment No. 24: The draft permit fails to incorporate applicable monitoring standards under the NSPS for sulfur dioxide emissions from stationary combustion turbines.**

The Department and Dominion agree that the proposed facility’s turbines would be subject to the requirements of Subpart KKKK<sup>326</sup> of Part 60.<sup>327</sup> But while Subpart KKKK requires that “the sulfur content value of . . . gaseous fuel must be determined and recorded once per unit operating day”<sup>328</sup> (or that the applicant affirmatively provide certain alternative certifications of fuel sulfur content),<sup>329</sup> the Draft Permit requires only that Dominion “determine and record the total sulfur content of the natural gas each month.”<sup>330</sup> As daily monitoring (or a valid alternative) under § 40 C.F.R. § 4370(b) is an “applicable . . . standard of performance,” the draft permit fails to meet the requirements of 42 U.S.C. § 7475(a).<sup>331</sup>

**B. THE DRAFT PERMIT’S PERIODIC MONITORING REQUIREMENTS ARE TOO INFREQUENT TO ENSURE COMPLIANCE WITH THE ACT.**

All Clean Air Act permits must “include enforceable emission limitations and standards.”<sup>332</sup> Accordingly, the PSD program requires all BACT emission limits be “enforceable as a practical matter.”<sup>333</sup> To that end, a PSD permit must “be able to show compliance or noncompliance (i.e., through monitoring times of operation, fuel input, or other indices of operating conditions and practices)” and “provide for adequate reporting and recordkeeping so that the permitting agency can determine the compliance status of

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326 40 C.F.R. § 60.4300–4420.

327 See Application at 4-12; Engineering Analysis at 9.

328 See 40 C.F.R. § 4370(b).

329 See 40 C.F.R. § 60.4365; 40 C.F.R. § 60.4370(c).

330 See Draft Permit at ¶ 26.

331 There is no evidence in the record that Dominion satisfies the exemption criteria of 40 C.F.R. § 60.4365, and, accordingly, paragraph 26(b) of the draft permit assumes that any deviation from the daily monitoring requirement of § 60.4370(b) must proceed under § 60.4370(c), governing “custom schedules for determination of the total sulfur content of gaseous fuels.” See Draft Permit at ¶ 26(b) (citing to § 60.4370(c) for development of custom schedules of fuel sulfur monitoring).

332 See 42 U.S.C. § 7661c.

333 See Environmental Protection Agency, *New Source Review Workshop Manual*, B-56 (1990).

the source.”<sup>334</sup> Failure to include a “clear and documented” explanation of the rationale behind every monitoring requirement is fatal to the permit.<sup>335</sup>

**Comment No. 25: The draft permit’s one-time testing requirement for particulate matter is insufficient.**

For both course and fine particulate matter, the draft permit imposes limits expressed as a three-hour average.<sup>336</sup> Compliance with these limits, however, is demonstrated only by a single, initial stack test.<sup>337</sup> This method of determining compliance is entirely inadequate. Under the draft permit, any particulate matter limitations become unenforceable as a practical matter upon completion of the stack test. As the EPA has recognized, a one-time testing requirement “clearly” fails to “yield reliable data . . . representative of the source’s compliance with [a] permit.”<sup>338</sup>

**Comment No. 26: The draft permit’s quinquennial testing of heat rate is insufficient.**

The Draft Permit requires period testing of the power block heat rate only once every five years.<sup>339</sup> Although its true that heat rate may not warrant the continuous monitoring required of nitrogen oxides or carbon monoxide, the draft permit’s twice-a-decade approach is insufficient to demonstrate compliance with a limit that, by its own terms, “applies at all times.”<sup>340</sup> The Department must revise the permit to provide for annual testing. Doing so would bring the draft permit in step with similar PSD permits.<sup>341</sup>

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334 *Id.*

335 *Consolidated Environmental Management–Nucor Steel St. James Parish*, 2014 WL 4292232, \*46, slip op. at 47 (E.P.A. 2014) (enclosed as Attachment 116).

336 Draft Permit at ¶ 38.a.

337 *Id.* at ¶ 60.

338 *Id.* See also *Consolidated Environmental Management–Nucor Steel St. James Parish*, 2014 WL 4292232, \*54-55 (E.P.A. 2014) (enclosed as Attachment 116) (remanding operating permit that “require[d] only an initial stack test” for “seven emission units and eleven applicable permit conditions”).

339 Draft Permit at ¶ 68.

340 *Id.* at ¶ 8.

341 See Bay Area Air Quality Management District, Response to Public Comments on PSD Permit for Russell City Energy Center, Application No. 15487, 43 (February 2010), available at <http://bit.ly/1ROCsMk> (enclosed as Attachment 97).

**Comment No. 27: The draft permit omits continuous monitoring for greenhouse gas emissions.**

In its 2011 report on “Energy Efficiency Measures as Best Available Control Technology for Greenhouse Gases,” the State Advisory Board on Air Pollution includes several “key concepts that permit writers should keep in mind in conducting GHG BACT review.”<sup>342</sup> Among these “key concepts” is the recommendation that “BACT should include a specific limit and a method specifically designed to measure compliance continuously, like a CO<sub>2</sub> CEMS.”<sup>343</sup> The Department should amend the draft permit accordingly or explain why such a requirement is infeasible for this facility.

**Comment No. 28: The draft permit omits continuous monitoring for ammonia.**

As discussed in Comment No. 12 above, ammonia emissions will result from use of selective catalytic reduction. Compliance with this ammonia slip permit condition should be via an ammonia CEMS, which are widely available.<sup>344</sup>

**REQUEST FOR DIRECT CONSIDERATION AND PUBLIC HEARING  
BEFORE THE AIR POLLUTION CONTROL BOARD**

The substantial legal and factual issues set forth in the comments above warrant direct consideration by the State Air Pollution Control Board under 9 VAC 5-80-25. In support of this request for Board consideration, the Sierra Club and Appalachian Voices state:

1. The undersigned’s mailing address and telephone number are:

Evan D. Johns  
Appalachian Mountain Advocates  
415 Seventh Street Northeast  
Charlottesville, Virginia 22902  
(434) 738 - 1863

2. The undersigned is acting as a representative of the Virginia Chapter of the Sierra Club and Appalachian Voices, whose mailing address and telephone number are:

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342 See State Advisory Board on Air Pollution, “Energy Efficiency Measures as Best Available Control Technology for Greenhouse Gases,” 23 (November 2011).

343 *Id.* at 24.

344 See Institute of Clean Air Companies, *Buyers Guide* at <http://bit.ly/1UDj3Pf>. Various vendors provide ammonia CEMS, not just restricted to those that are members of ICAC.

Virginia Chapter—Sierra Club  
442 East Franklin Street, Suite 302  
Richmond, Virginia 23219  
(804) 225 - 9113

Appalachian Voices  
812 East High Street  
Charlottesville, Virginia 22902  
(434) 293 - 6373

3. The Sierra Club is a nonprofit conservation organization with more than 600,000 dues-paying members nationwide and 15,000 dues-paying members in Virginia. The Club is dedicated to exploring, enjoying, and protecting the wild places of the Earth; to practicing and promoting responsible use of the Earth's resources and ecosystems; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and using all lawful means to carry out those objectives. Through its Clean Power Solutions campaign, the Sierra Club's Virginia Chapter encourages investments in the Commonwealth's substantial renewable energy potential. The Sierra Club, in its individual capacity as an organization and in its representative capacity on behalf of its members, is a retail customer of the Virginia Electric and Power Company. The Sierra Club's members reside within proximity of the proposed plant, and they live within the airsheds and other areas potentially affected by its operations. As such, the Sierra Club and its members have immediate, pecuniary, and substantial interests in the outcome of this permitting proceeding and would be adversely affected by the construction and operation of the facility.
4. Appalachian Voices is a non-profit environmental organization dedicated to bringing people together to solve the environmental problems having the greatest impact on the central and southern Appalachian Mountains. Appalachian Voices works to tackle two of the biggest threats facing Virginia: air pollution from power plants and destructive mining practices. As part of its mission, Appalachian Voices advocates for investments in effective energy efficiency programs, conservation, and renewable energy resources as alternatives to fossil-fueled power. Appalachian Voices currently has approximately 900 dues-paying members nationally and 150 dues-paying members in Virginia.
5. All substantive comments set forth above are incorporated by reference. We maintain that these comments must be addressed in order to bring the proposed permit into conformance with the Clean Air Act, the Virginia Air Pollution Control Law, and Virginia's State Implementation Plan. These comments raise substantial and (presumably) disputed issues relevant to the issuance of the permit in question. Furthermore, the actions requested in the above comments are not inconsistent with the Virginia Air Pollution Control Law or any other federal law or regulation promulgated thereunder; the actions requested are in fact *necessary* in order to satisfy the requirements of the law.

6. Due to the substantial nature of the legal and factual issues raised in the comments above, the Director should submit the proposed permit action to the Board under either 9 VAC 5-80-25 C or 9 VAC 5-80-25 F, as appropriate, and the Board should grant consideration of this permitting action—either at the suggestion of the director under 9 VAC 5-80-25 C or 9 VAC 5-80-25 F, or acting independently under 9 VAC 5-80-25 D.

To the extent an evidentiary or other public hearing to contest this permit action is permitted under 9 VAC 5-80-35 or any other provision of Virginia law, the Sierra Club and Appalachian Voices request such a hearing to facilitate the presentation of additional evidence and legal argument concerning the proposed action. In support of this request, Paragraphs 1–5 above are incorporated by reference.

### CONCLUSION

Neither the Clean Air Act, the Virginia Air Pollution Control Law, nor Virginia’s state implementation plan permit the issuance of a pre-construction permit without a review of all pollutant-emitting components of the source, without a valid and fully-documented BACT analysis, or without conditions that incorporate all applicable requirements of the Act. The proposed action fails to satisfy these requirements. To issue the permit as proposed would be to violate the mandates of state and federal law and would constitute an improper exercise of the Department’s authority.

Thank you,



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