



June 12, 2018

Dear Ms. Heafey:

I am submitting these comments on behalf of a group (Opponents) represented collectively by counsel, and listed here:

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AMP Creeks, a 501(c)(4), is dedicated to protecting the environment, and ensuring the sustainability of natural resources and the basic human right to clean air and water. Most of our membership lives in Charles County or Prince George's County. Opponents would be directly impacted by Dominion Energy Cove Point's (DECP's) proposed natural gas compressor station ("Charles Station") that is the subject of this case. Individual Opponents all live on property they own that is either directly adjacent to, or within 1.5 miles of, the proposed Charles Station.

We ask that the Maryland Department of the Environment (MDE) deny DECP's air quality permit application 24-16 for Charles Station. We incorporate by reference earlier comments submitted by Larry Silverman, esq. on our behalf. Additionally, we submit the following reasons that this permit should be denied:

1. DECP likely will not comply with all applicable requirements of the State air pollution control law.
2. MDE should not preempt the Charles County Board of Appeals' (BOA's) denial of DECP's zoning special exception, or the laws and regulations on which that decision is based, because they support the implementation of the Clean Air Act.
3. MDE is required to protect humans and wildlife from harmful noise and vibrations in order to adhere to the Clean Air Act.
4. MDE erred in issuing its tentative determination.
5. There is overwhelming technical uncertainty in the modeling and pollution data for this project.

These points are explained in greater detail on the following pages, which include comments from two air quality experts retained for this process by AMP Creeks.

On behalf of the Opponents, thank you for your kind consideration.

Kelly Canavan
President, AMP Creeks Council

A. DECP's permit should be denied because, based on DECP's past history, they cannot reasonably be expected to comply with all applicable requirements of the State air pollution control law.

“The Department may deny an application for a permit to construct, an approval, or a State permit to operate if...(2) Based on past history of the applicant or source, the Department determines that the source is not expected to comply with all applicable requirements of the State air pollution control law.” MD Code tit. 26 §11, 02-14.06 D.

DECP has applied to multiple Maryland government bodies for various permits and has consistently been less than forthcoming.

1. DECP was denied a special exception by the BOA, in large part because the BOA did not believe DECP was candid with the BOA.

In their deliberations on March 13, 2018, BOA members cited a lack of faith in DECP as a reason for denying their application. Board member James Martin stated:

The board asked for specific information on damage assessments, the reach of a fire or explosion, and of any pressure wave from a significant explosion or ignition of a catastrophic release of natural gas. All we received was a vague equation that did not satisfy our informational needs.

The lack of cooperation in this aspect of our questioning gives me pause to consider what the real damage would be. Having some experience with different types of blast from explosives to major rocket fuel plant, I personally know the blast wave alone can cause catastrophic damage for miles. In summary, **the inadequate information and responses by Dominion Cove Point to these concerns** forces me to rely on my own judgment and experience which tells me there is a significant threat to the local populace let alone the environment. Including the resource protection zone and forestation of the area. I, therefore, came to the conclusion that this specific area is inappropriate for a natural gas compression station.¹
(Emphasis added)

Board member Lynne Green echoed the sentiment.

I was really very concerned with the fire safety issue and the access to the road, access of the road getting there. I was, frankly shocked, I mean Dominion's been in the business for a long time and the fact that there's no emergency plan that we could really speak to or that we were addressed or anybody knew about, that should be available at a moment's notice. . . . I think the safety of the citizens, the fact that the gas could be shut off, but what are we going to do in those next five minutes? I don't think there was

¹ Video of Charles County Board of Appeals meeting, March 13, 2018, http://openstream.charlescounty.org/mediaVideoExternal.jsp?&file=/meetings/board_of_appeals/2018/BOA_031318.mp4&title=Charles%20County%20Board%20of%20Appeals.

any kind of plan there, we're just going to cross our fingers and hope. Again, **I don't think that Dominion's done its job[.]**² (Emphasis added)

BOA Chairman Brendan Moon also lamented Dominion's lack of responsiveness.

I'm left really to use some common sense and focus on the laws that we have. And the laws that we have here around special exceptions give us very specific criteria that we have to find if there is a preponderance of the evidence to satisfy...**I asked very direct questions of the applicant...and I did not get the answers to those questions. You [Mr. Martin] re-asked those questions in writing and they had a month to answer them, and again they did not answer those questions in any quantifiable way...I won't speculate on why they did not answer those questions, but the fact that they didn't is extremely concerning to me.**³ (Emphasis added)

It is clear from the statements made by the BOA, that the BOA members believed DECP was not being candid with the BOA, and that echoes DECP's previous conduct with other government bodies – explained in more detail below – in which DECP submitted information that turned out to be false, and failed to submit required information that may have weighed against granting DECP the permit it applied for.

DECP chooses the evidence it wants to submit in order to get permitted, and government agencies rely on that information at their peril.

2. The BOA did not trust DECP's representations regarding air quality issues.

i. Topography

During the BOA's March 13 deliberations, Chairman Moon said, "I think we also had very compelling evidence around air quality being uniquely bad due to the topography of this site. **The applicant certainly had an opportunity to provide rebuttal evidence and didn't provide any to refute that.**"⁴ Mr. Moon and the other BOA members are intimately familiar with the site because they live in the area and have studied and visited it, and their opinion is DECP had not provided complete evidence. DECP had three full hearings dedicated to providing expert witnesses and testimony, the opportunity to cross-examine and refute evidence provided by opposition, and most of a fourth hearing dedicated to their closing statement. DECP's decision to withhold information on this subject can only be construed as deliberate.

The BOA is a quasi-judicial agency working under a mandate not dissimilar from MDE's. As has been shown, DECP treated the BOA with flagrant disrespect during the initial special exception hearing process, when they thought they would get what they wanted. When that approach proved fruitless, DECP showed their true colors as an interloping corporate bully and slapped the BOA and Charles County Commissioners with a lawsuit⁵, an approach with which MDE is obviously familiar.

2 Ibid.

3 Ibid.

4 Ibid.

5 Opponents have filed a Motion to Intervene in *Dominion Energy v. Board of Appeals, et al.*, Case no. 8:18-cv-00873-PJM. (MD Dis. 2018).

3. DECP's repeated disregard for the authority of reviewing agencies is cause for concern.

MDE should take note of DECP's treatment of the BOA, the Maryland Public Service Commission (PSC), and MDE itself. DECP has consistently shown that it does not feel that it has to comply with local and state regulations, provide critical data when it is requested, or refrain from making a mockery of agency proceedings. Indeed, DECP's consistent failure to show even a modicum of respect for reviewing Boards demonstrates a stance that they need not be bothered with such trivial entities.

i. Maryland Public Service Commission

DECP applied to the PSC for a certificate of public convenience and necessity (CPCN) in 2013 for a 130MW generating station to serve their Cove Point liquefied natural gas export terminal. They showed up ill-prepared and, even when questioned by the PSC, decided not to bother submitting the numbers they were asked for. DECP provided information that eventually proved to be grossly inaccurate and at least one of the misrepresentations is hard to see as anything but a lie.

- a. DECP grossly underestimated emissions estimates for equipment that had been in use for years and for which accurate information was readily available.

As part of its application for a CPCN, DECP sought permission to use existing Frame 5 combustion turbines ("CTs"). These CTs had been in use for eight years. In 2017, DECP acknowledged that it had somehow gotten wrong the emissions estimates it submitted to the PSC for CTs that were in operation.

DECP acknowledged in 2017 that its initial estimate was off by approximately 400%.

"DECP provided updated calculations for the Frame 5 CTs and noted that they had miscalculated the million British thermal units per hour (MMBtu/hr) rate necessary for the Frame 5 CTs to generate the 25 MW of power in the original CPCN Application. The updated CPCN Application reflects that **the usage rate of 43 MMBtu/hr for each of the Frame 5 CTs was increased to 158 MMBtu/hr**, which is the correct usage rate necessary to generate the required 25 MW of power." PSC Case 9318, State Agencies Evaluations and Recommendations at 11 (Emphasis added).

DECP asserted that its turbines, turbines that were in use at the time of the estimate, would produce roughly one quarter of what they actually will. That was either an outright lie, or gross negligence by DECP.

- b. DECP represented it would generate approximately 10% of the Volatile Organic Compounds (VOCs) that it eventually acknowledged it would be emitting.

In 2017, DECP, in seeking further concessions from the PSC, acknowledged that it had grossly underestimated the emissions one main unit of its generating station would emit. DECP's excuse was that it did not understand how its own facility would be built. DECP provided an estimate of 15,000 components for its leak calculation. The correct count was 162,700. DECP Mot. to Amend at 5.

Again DECP made a huge mistake and, like the previously mentioned mistake, it worked in DECP's favor. Notably, nowhere did DECP overestimate emissions, but on two occasions it made serious mistakes that underestimated emissions by over 350%.

DECP then stated that emissions from the new components could not be measured, even though DECP had taken the opposite position in their initial application.

Even prior to DECP acknowledging these "mistakes", it failed to provide necessary information. In its Order granting a CPCN, the PSC upbraided DECP for its failures:

"DCP **failed to provide** either Maryland-specific or facility-specific economic impact analysis for the liquefaction facility, although it acknowledges that natural gas prices will increase at least to some degree for Maryland customers as a result of increased exports of LNG." Order at 62.

"That task is made more difficult by the fact that DCP, and to some extent other parties, have provided testimony that addresses the Project as a whole and have not seriously attempted to isolate information that applies uniquely to the Generating Station that we must review." Order at 60.

During the PSC hearings, under cross examination, DECP admitted it could have provided the information but chose not to.

DECP provides information and generates "estimates" with one purpose – to get their facilities licensed. If there is information that the public should have that would weigh against DECP, history shows us that DECP will obfuscate and possibly lie. In addition, DECP frequently "miscalculates" emissions and those miscalculations are always low.

The impression DECP has given – that they just didn't feel like they would be held accountable for their bad behavior – has been a constant throughout all DECP's dealings with the State of Maryland.

ii. Maryland Department of the Environment

MDE felt the brunt of DECP's bullying when MDE lawfully and correctly turned down DECP's permit application for a compressor station in Myersville. In the matter at hand, DECP's decision to sue the BOA and Charles County Commissioners is absolutely an attempt to undermine MDE's rights - as recognized by the Court in the Myersville cases - to decide whether or not local determinations are preempted, and whether or not the standards of the Clean Air Act are complied with.

In this case, DECP has continued its practice of submitting only what serves its interests. When DECP's modeling numbers for Charles Station were close to the threshold for a major stationary source, DECP did some "calculations" and came up with new building configurations to give to MDE. These differ from what DECP has provided to any other agency – FERC, Charles County – and to the United States District Court, and represent another example of DECP submitting information that suits its own purposes and that may not be accurate.

From DECP's Modeling Summary for the MDE published in March 2018 (emphasis added):

“The **modeling was revised again in February 2018** and was updated to reflect the revised building designs and layout....The Auxiliary Building was previously modeled as a single building and in the most recent modeling **the Auxiliary Building was split into Auxiliary Building 1 and Auxiliary Building 2**”⁶.

The buildings are different heights as well, further impacting air quality impact modeling results. In the original application (and as represented in all other applications), the auxiliary building was 17.5 feet high. Now one is 18.6 feet, and the second is 24 feet high. “The revised building layout and building heights required an update of the Building Profile Input Program (BPIP) run and subsequently update of model concentrations for all pollutants and all averaging periods.”⁷

However, when DECP filed its Complaint with the United States District Court of Maryland on March 26, 2018, it described the facilities this way (emphasis added):

“As reflected in the FERC certificate, the new interstate natural gas facilities to be constructed at the Charles Station site include...one compressor building; **one auxiliary building**; and one drum storage building”⁸.

To whom, if anyone, is DECP telling the truth? MDE must question the verity of the building designs presented to them since they appear to be specific only to them, and designed to decrease predicted NAAQS levels.

Further, DECP reported to FERC that their exhaust stacks would be 83 feet high. FERC writes that, “the compressor units at the Charles Station will discharge exhaust at a minimum speed of 15.84 meters per second from stacks reaching 83 feet above ground level. Discharge at this speed from this height will prevent the concentration of pollutants at ground level. We conclude that air emissions will not be trapped near Ms. Lazar's home.”⁹ In other words, FERC's determination that air quality would not be of concern was made on numbers that DECP has not used anywhere else, and numbers that were not submitted to MDE. The exhaust stacks are not shown or referenced at all in the Charles County building permit application, even though they were the subject of balloon tests conducted with the cooperation of Charles County and the Mount Vernon Ladies Association. During DECP's open house in October of 2016, DECP representatives told attendees that the stacks would be 50 feet high. Again, which numbers should MDE trust?

6 Dominion Cove Point Permit to Construct Natural Gas Compressor Station Modeling Summary Maryland Department of the Environment March 2018, p. 1.

7 Dominion Cove Point Permit to Construct Natural Gas Compressor Station Modeling Summary Maryland Department of the Environment March 2018, p. 2.

8 *Dominion Energy v. Board of Appeals, et al.*, Case no. 8:18-cv-00873-PJM. (MD Dis. 2018) at 12.

9 FERC Order Issuing Certificate, Jan. 23, 2018, p. 50 at 114.

There is also a discrepancy in the number of dekatherms DECP reports it will provide to customers each day. It is 294,000 to FERC¹⁰ and Charles County, but 290,000 to MDE¹¹, even though the documents were all filed in November 2016. In 2018 DECP represented to the United States District Court of Maryland that “[t]he Eastern Market Access Pipeline is necessary to provide up to 294,000 dekatherms per day...”¹²

DECP wrote in their Charles County building permit under “Relationship to the Provisions of Article XIII of the Zoning Ordinance” that

The 9,072-square foot (72-feet by 136-feet) compressor building; the 6,120-square foot office/auxiliary building; the 1,024-square foot (32-feet by 32-feet) drum storage building; and the 400-square foot storage building are all **below the maximum height limit of 36-feet or three stories**. (Emphasis added.)

This is consistent with the building heights provided to MDE in 2017 (33 feet), although updated in 2018 to 45 feet¹³. However, Dominion explained during BOA hearings that their building heights were measured at the eaves and did not include the expansive peaked roof of the compressor building. That topped out at 50 feet. It is not clear from information and drawings DECP supplied to MDE whether they are including a roof in their current building height calculations or not, but it is obviously important to know since it affects the results of their air modeling. It is also unreasonable that whether or not a roof is included in a building height is even a question.

It is incumbent upon MDE to ask: Why has DECP repeatedly provided MDE with data that doesn't match the rest of their applications?

DECP misrepresented or lied about noise ordinances which are under the purview of MDE in their FERC application as well. “The State of Maryland has a noise standard that limits noise at any residential property line to no greater than 65 dBA during the day and 50 dBA at night. The properties surrounding the proposed station are all residential.¹⁴” In fact, Maryland mandates a noise pollution level of no greater than 55 dBA during the day and 45 dBA at night. (More detail on noise below in letter C.)

All facility changes being represented to MDE are despite a FERC condition that DECP accepted prohibiting such changes.

6. **Within 60 days of the acceptance of the Certificate** and before construction begins, Cove Point LNG shall file an Implementation Plan for the project with the Secretary for review and written approval by the Director of the OEP. Cove Point LNG must file revisions to their plan as schedules change. The plan shall identify:

10 Dominion Cove Point LNG, LP Eastern Market Access Project Resource Report 1 General Project Description, Nov. 2016, at 1.1.1.

11 Dominion Cove Point LNG, LP Charles Compressor Station Eastern Market Access Project Air Permit to Construct Application, Nov. 2016, at 1.1.

12 *Dominion Energy v. Board of Appeals, et al.*, Case no. 8:18-cv-00873-PJM. (MD Dis. 2018) at 10.

13 *Ibid* 5.

14 FERC docket CP17-15-000, DECP Application for Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-27: 9.2.2.2 State and Local Noise Regulations.

b. how Cove Point LNG will incorporate these requirements into the bid documents, construction contracts...and **construction drawings...**¹⁵ (Emphasis added.)

The Order was issued January 23, 2018, and Dominion agreed to it on January 26, 2018¹⁶, so Dominion should no longer be changing the dimensions or numbers of their buildings. Indeed there is no indication on the FERC docket that they have submitted revisions for consideration. Given DECP's abysmal track record, why should MDE believe that DECP will construct the physical plant that they are saying they will, which is necessary to meet air quality requirements? MDE should deny their permit.

4. BOA's unanswered concerns were related to air pollution.

i. Unprocessed gas is a far more potent air pollution than stack emissions.

The information BOA members requested from DECP, referenced above, is directly linked to air quality issues. BOA members asked DECP about how much gas could be released into the air in various situations without first going through catalytic devices and filters.

DECP declined to provide substantive answers that satisfied the BOA. DECP's omissions effectively asserted that DECP is above the law; that they did not have to comply with requests from permitting bodies or explain the effects their project might have. This is consistent with the ways that DECP has played fast and loose with permitting bodies in the past.

In fact, gas pouring from a ruptured 36" looped pipeline for five or more minutes would create a serious hazard to human and environmental health, as it would clearly contain many times the allowable limits of NAAQS and HAPs. It would also not be passing through an exhaust stack with emissions controls, but instead would be released at ground level where it would do more harm.

Gas released during startups, shutdowns, and emergency or maintenance blowdowns is unfiltered because the catalytic equipment designed to filter it takes time to warm up and kick in. Therefore, even if DECP's emissions averages do meet standards, on at least 100 days per year, the community would be subjected to concentrated bursts of toxic and carcinogenic chemicals. The **expected** two emergency events per year – the duration of which cannot be predicted – add to that tally.

ii. Air pollution from a fire at Charles Station would be extremely concentrated and possibly toxic.

The BOA consistently expressed concern – which DECP did not address - about the ability of local emergency services to contain a fire at the Charles Station site, should one occur. BOA member Melissa Cox summed it up during their March 13, 2018 deliberations:

[T]here is still concern about **the lack of evidence provided** that would show us that in the event of a catastrophic fire that the local fire departments would be adequately prepared. In reviewing hours and hours of public

15 Ibid 12, p. 68 – 69.

16 FERC docket CP17-15-000, https://elibrary.ferc.gov/idmws/docket_sheet.asp

testimony **I still cannot find that evidence** and that is definitely a concern of mine.¹⁷ (Emphasis added)

Every BOA member hammered this point. In the event of a fire either sparked in the surrounding area and reaching Charles Station, or originating at the facility such as the June 8, 2018, “massive pipeline explosion” in Marshall County, West Virginia, a great deal of polluting smoke would be released into the region, creating respiratory, cardiac, or other health impacts including possible death for residents in a wide area.

Compressor station and pipeline accidents are more common than represented by DECP. For example, according to Tessa DiTorro's June 8, 2018, article “Massive pipeline explosion seen across state lines” for 12WBOY, “The site of the 36-inch natural gas pipeline was under construction”, and **the eighth explosion in Marshall County alone since March of 2013**. The explosion caused “a crater and 10 acres of land burned and disturbed.” In the likely event of a wildfire, the air pollution caused could be extreme.

According to a November 2017 report by Climate Central, “One of the greatest concerns with wildfires is their impact on air quality and associated health consequences; PM_{2.5} is just one of the pollutants in wildfire smoke, but its small size makes it a well-known threat to people’s health.”¹⁸ Further, wildfire smoke is known to travel great distances without losing its potential for negative impacts. “In 2015, smoke from wildfires in central Canada resulted in multiple days of exceedances of EPA standards in Maryland.²⁰ In 2002, wildfire smoke from fires in Quebec impacted populations all along the East Coast of the United States, and a nearly 50 percent increase in hospital admissions for respiratory diagnoses for the elderly was associated with the smoke plume and concurrent PM_{2.5} in counties in states between New York and Washington, DC.²¹”¹⁹ (More on the threat of wildfires in section B below.)

B. MDE should not preempt the BOA's denial of DECP's zoning special exception, or the laws and regulations on which that decision is based, because they support the implementation of the Clean Air Act.

1. The Clean Air Act provides for deference to local or regional government, and mandates State support of local decisions. The BOA's decision is not preempted, nor are the regulations and ordinances upon which the decision is based.

17 Video of Charles County Board of Appeals meeting, March 13, 2018, http://openstream.charlescounty.org/mediaVideoExternal.jsp?&file=/meetings/board_of_appeals/2018/BOA_031318.mp4&title=Charles%20County%20Board%20of%20Appeals.

18 Julia Langer and Dr. Todd Sanford, Western Wildfires Undermining Progress on Air Pollution, Climate Central News Archive (Nov. 2017), <http://www.climatecentral.org/news/report-wildfires-undermining-air-pollution-progress-21753>.

19 Ibid, and 20. Dreessen, J., Sullivan, J., & Delgado, R. (2016). Observations and impacts of transported Canadian wildfire smoke on ozone and aerosol air quality in the Maryland region on June 9-12, 2015. *Journal of the Air & Waste Management Association*, 66(9), 842-862. Doi: 10.1080/10962247.2016.1161674.

21. Le, G. E., Breyse, P. N., McDermott, A., Eftim, S. E., Geyh, A., Berman, J. D., & Curriero, F. C. (2014). Canadian Forest Fires and the Effects of Long-Range Transboundary Air Pollution on Hospitalizations among the Elderly. *ISPRS International Journal of Geo-Information*, 3, 713-731. doi:10.3390/ijgi3020713.

Chapter 85 – AIR POLLUTION PREVENTION AND CONTROL,
Subchapter I – Programs and Activities

§7410. State implementation plans for national primary and secondary ambient air quality standards

(a) Adoption of plan by State; submission to Administrator; content of plan; revision; new sources; indirect source review programs; supplemental or intermittent control systems

(E) provide (I) necessary assurances that the State...will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plan...(ii)requirements that the State comply with the requirements respecting State boards under section 7428 of this title, and (iii) **necessary assurances that, where the State has relied on a local or regional government, agency, or instrumentality for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provision**
(emphasis added)

All counties in Maryland are instrumental in ensuring that Maryland's State Implementation Plan (SIP) is fully realized through the enactment of their laws, regulations, and ordinances. Local governmental bodies and their designated agencies, such as the BOA, are acting on behalf of the State in exercising their authority to approve or deny projects that could impair air quality.

For example, Charles County would not permit a project that they believed would cause harm to the health, safety, and welfare of residents by creating extreme air pollution directly or indirectly. To do so would fly in the face of the MDE, EPA, and the Clean Air Act. The relationship must be reciprocal. As Charles County agencies act in consideration of what is best for Maryland, so must Maryland act to support local governments.

2. Savings from the preemption clause for local and State governments under certain circumstances are applicable to the BOA's decision.

MD Env Code §2-404(b)(1) is particularly relevant in this case. It is provided here for reference.

(b) Acceptance of application. --

(1) Before accepting an application for a permit subject to subsection (c) of this section, the Department shall require the applicant to submit documentation:

- (i) That demonstrates that the proposal has been approved by the local jurisdiction for all zoning and land use requirements; or
- (ii) That the source meets all applicable zoning and land use requirements.

Judge Griffith, in *Dominion v. Summers*, stated that “When EPA approves a state SIP, it incorporates the relevant state law into the Code of Federal Regulations by reference. The Code of Federal Regulations lists provisions of the Code of Maryland Regulations (COMAR), and two of the regulations, in turn, quite clearly incorporate §2-404(b)(1). Incorporation by reference makes §2-404(b)(1) part of Maryland's SIP. The provision is therefore saved from preemption by the NGA.” (Internal citations omitted.) *Dominion Transmission, Inc. v. Summers*, 723 F.3d 23877 ERC 1040406 U.S. App. D.C.

In a subsequent case, *Myersville Citizens v. FERC*, Judge Pillard allows that “the Commission's [FERC's] power to preempt state and local law is circumscribed by the Natural Gas Act's savings clause, which saves from preemption the “rights of States” under the Clean Air Act and two other statutes.” (Internal citations omitted.) *Myersville Citizens v. FERC*, 783 F.3d 1301, 80 ERC 1649, 414 U.S. App. D.C. 438.

MDE must not preempt the BOA's decision or its foundation in local law because they are preserved by the above cited law.

Subchapter I of Chapter 85 – Air Pollution Prevention and Control provides some guidance in understanding the intent of the Clean Air Act, and insight into how the BOA's decision-making supports it. Here are a few excerpts. (Emphasis added.)

(3) that air pollution prevention (that is, the reduction or elimination, through any measures, of the amount of pollutants produced or created at the source) and **air pollution control at its source is the primary responsibility of States and local governments**²⁰

The purposes of this subchapter are –

(1) to protect and enhance the quality of the Nation's air resources so as to **promote the public health and welfare** and the productive capacity of its populations;²¹

A primary goal of this chapter is to encourage or otherwise **promote reasonable Federal, State, and local governmental actions**, consistent with the provisions of this chapter, for pollution prevention.²²

It is worth noting that it is not up to MDE to decide whether or not they agree with the BOA's decision, only that it was made in accordance with the SIP and the Clean Air Act, and thus is not preemptable.

3. Charles County Board of Appeals is required to protect, through its decisions, the well-being of the public and workers on any given project.

20 Chapter 85 – Air Pollution Prevention and Control, Subchapter 1 §7401. Congressional Findings and declarations of purpose, (a) Findings.

21 Chapter 85 – Air Pollution Prevention and Control, Subchapter 1 §7401. Congressional Findings and declarations of purpose, (b) Declaration.

22 Chapter 85 – Air Pollution Prevention and Control, Subchapter 1 §7401. Congressional Findings and declarations of purpose, (c) Pollution Prevention.

The BOA is required by 297-415(H)(1) of the Zoning Regulations to find that, by a preponderance of the evidence, the proposed use “Will not be detrimental or endanger the public health, safety, and general welfare.” Further, 297-425(H)(4) requires the BOA to find that, by a preponderance of the evidence, pursuant to 297-210.4.06.200(A)(2), “The proposed building or structure at the location will not endanger the health and safety of workers and residents in the community and will not substantially impair or be detrimental to neighboring properties.”

These mandates are directly in line with the Clean Air Act's declaration of purpose.

4. The Charles County code upon which the BOA based its decision is not preempted because it relates to air pollution control under the Clean Air Act.

The BOA studied this subject exhaustively over nearly a year and cited this concern again and again during public hearings as a primary reason for denying the permit. (See quotes above.) A fire could originate from the area surrounding Charles Station or at the facility itself as the result of a pipeline rupture, mechanical failure, other unforeseen circumstance, or terrorism or vandalism.

- i. The BOA found that the risk of a fire at Charles Station was significant enough to warrant denying DECP's special exception permit application based heavily on that threat.
- a. A fire or explosion at Charles Station would cause dangerous concentrations of air pollution.

According to the United States Centers for Disease Control (CDC),

Dry conditions in parts of the United States increase the potential for wildfires in or near wilderness areas. Stay alert for wildfire warnings and take action to protect yourself and your family from wildfire smoke. When wildfires burn in your area, they produce smoke that may reach your community. Wildfire smoke is a mixture of gases and fine particles from burning trees and other plant materials. This smoke can hurt your eyes, irritate your respiratory system, and worsen chronic heart and lung diseases.²³

CDC goes on to advise that people most at risk from wildfire smoke inhalation are

- **People who have heart or lung diseases**, like heart disease, chest pain, lung disease, or asthma, are at higher risk from wildfire smoke.
- **Older adults are more likely to be affected by smoke.** This may be due to their increased risk of heart and lung diseases.
- **Children are more likely to be affected by health threats from smoke.** Children's airways are still developing and they breathe more air per pound of body weight than adults. Also, children often spend more time outdoors engaged in activity and play.²⁴

²³ Centers for Disease Control and Prevention, Protect Yourself From Wildfire Smoke, (Aug. 7, 2017), <https://www.cdc.gov/features/wildfires/index.html>

²⁴ Ibid.

Each of the Opponents either fits a category on that list, or has immediate family members who live with them who fit a category on that list.

- b. Weather conditions at the proposed Charles Station site are adverse both for fires and for stagnating air that will not disperse air pollution.

National Geographic explains how wildfires form and spread. (Emphasis added.)

There are three conditions that need to be present in order for a wildfire to burn...fuel, oxygen, and a heat source. Fuel is any flammable material surrounding a fire, including **trees, grasses, brush, even homes**. The greater an area's fuel load, the more intense the fire. Air supplies the oxygen a fire needs to burn. **Heat sources help spark the wildfire and bring fuel to temperatures hot enough to ignite.** Lightning, burning campfires or cigarettes, hot winds, and even the sun can all provide sufficient heat to spark a wildfire.

Although four out of five wildfires are started by people, nature is usually more than happy to help fan the flames. **Dry weather and drought convert green vegetation into bone-dry, flammable fuel....**all that's needed is a spark—in the form of lightning, arson, a downed power line, or a burning campfire or cigarette—to ignite a blaze that could last for weeks and consume tens of thousands of acres.²⁵

The conditions required for a wildfire to start and spread make the Charles Station site a perfect storm. A fire or explosion at the compressor facility is an obvious source of heat that would ignite the surrounding forest, full of fuel, and the weather conditions common to the area are often exactly what are needed for a wildfire to burn and spread, uncontrolled, very quickly, creating a great deal of air pollution harmful to residents in a wide radius.

According to DECP, the climate at the proposed project site is often just what is needed to foster a conflagration.

The climate at the Project is primarily continental in character, but is subject to modification by the Atlantic Ocean; the proper classification for the climate is “modified continental.” The mid-latitude site location and proximity to the Atlantic Ocean exposes the region to a variety of meteorological conditions and events. Almost any weather can occur at the Project, including blizzards, tropical storms, thunderstorms, and **droughts, and extreme occurrences of such events have been recorded.** The mid-latitude location exposes the area to large annual ranges in temperatures. Cold outbreaks originating from the northern latitudes contrast significantly with the heat and humidity that is often transported from the Gulf of Mexico. The primary interaction point between these mid-latitude regions results in

25 National Geographic, Learn More About Wildfires (Viewed June 11, 2018), <https://www.nationalgeographic.com/environment/natural-disasters/wildfires/>

weather characterized by frequent, sometimes powerful, change. At times, mesoscale influences alter this meteorological variety. **Stagnation in the weather pattern will expose the area to extended periods of a particular type of weather. When there is stagnation in the weather pattern, the weather experienced will depend on what local meteorological feature is trapped by the stagnation.**

High pressure stalled in the Atlantic Ocean in the summer often results in extended periods of heat, humidity and, at times, drought. Conversely, a stalled frontal boundary can result in extended periods of rain, ice or snow in the winter. Mid-latitude cyclones (i.e., nor'easters or coastal storms) are a frequent synoptic scale weather pattern occurring most often in the fall and winter months.²⁶ (Emphasis added.)

- c. Blowdowns would increase the risk of fire or explosion at Charles Station.

Gas released during blowdowns, as defined by FERC, is released into the air unfiltered.

A blowdown is an event at a natural gas facility that releases (through a vent) natural gas to the atmosphere. These events may be associated with routine operations and maintenance activities, construction projects, or during an actual emergency. Quantities of the release may vary depending on the activity. The main component of natural gas released during blowdowns is methane, but it also contains, in much lesser amounts, ethane, propane, butane, pentane, and hexane.²⁷

DECP has predicted that 102 blowdown events would occur at Charles Station each year. These include startups, shutdowns, maintenance events, and two predicted emergency events.²⁸

It only takes a small amount of static electricity to ignite methane.

Static electricity is of particular concern during dry winters common to the project site. "In addition to causing a painful shock, these sudden high-voltage discharges can provide a source of ignition for flammable substances, according to the Occupational Safety and Health Administration (OSHA)."²⁹

Here is a short, illustrative article about the dangers of methane being ignited by static electricity.

BERLIN — A herd of dairy cows nearly lifted the roof off their barn in central Germany when methane released by the animals caused an explosion.

26 FERC Docket CP17-15-000, DECP Application for the Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-5.

27 FERC Docket CP17-15-000, DECP Application for the Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-21.

28 Dominion Cove Point Permit to Construct Natural Gas Compressor Station Modeling Summary, Maryland Department of the Environment March 2018, p. 6 at 3a.

29 Jim Lucas, What Is Static Electricity?, Live Science (July 24, 2015), <https://www.livescience.com/51656-static-electricity.html>.

Police in Hesse state said in a statement that a static electric charge apparently triggered the detonation, and a spurt of flame, on Monday at a farm in Rasdorf. The roof was slightly damaged and one cow suffered light burns. No people were hurt.

Police say 90 cows are kept in the shed and it wasn't clear why quantities of methane had built up. Bovine belching and flatulence releases large quantities of the gas.³⁰

A second article, about ventilation in methane mines, explains why it is so critical that their work be done properly: “Control and monitoring of static electricity is particularly important in underground methane mines, in order to prevent the occurrence of electrostatic sparks, which could cause an explosion....This measurement method can greatly contribute to reducing the risk of occurrence of electrostatic sparks, which can cause an explosion in terms of explosive atmospheres.³¹”

102 estimated times each year, Charles Station would be at a heightened risk of explosion due to something as pervasive as static electricity.

- d. Fires and explosions are not uncommon at compressor stations, or the pipelines running through them.

Examples abound, but here are a few.

An enormous explosion rocked a major natural gas hub in Austria on Tuesday, killing an employee, injuring at least 18 people and raising concerns about tightening supplies across Europe....Gas Connect Austria, which operates the facility, said the cause appeared to be technical.³²

The Oct. 8 incident at the Williams Pipeline Company's natural gas compression plant on Bayou Black Drive resulted in the deaths of contract workers Michael Hill, Sam Brinlee, Casey Ordoyne and Jason Phillippe. Wayne Plaisance, another contractor, was critically injured....According to Christopher Stockton, a Williams spokesman, contractors from Danos and Furmanite were doing “routine maintenance” on a slug catcher, a series of horizontal pipes that separate waste elements from incoming natural gas as it heads toward the main conduits....The pipeline was shut in on Oct. 4 for maintenance, said Stockton, who maintained it was free of natural gas in interviews conducted within days of the incident....The Gibson plant is used for compression, the elimination of moisture and other impurities from

³⁰ Associated Press, Methane from cows, static electricity blamed for explosion at German farm, The Oregonian (June 28, 2014), http://www.oregonlive.com/today/index.ssf/2014/01/methane_from_cows_static_elect.html.

³¹ Fehim Velic & Alija Muharemovic, Testing the Quality of Ventilation Tube Connecting the Methane Mines in Operation Control Static Electricity, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 4, Issue 2 (Feb. 2015), ISSN (Print): 2320-3765, <http://www.rroj.com/open-access/testing-the-quality-of-ventilation-tubeconnecting-the-methane-mines-in-operationcontrol-static-electricity.php?aid=43179>.

³² Melissa Eddy, Austria Gas Explosion Leaves One Dead and 18 Injured, The New York Times (Dec. 12, 2017), <https://www.nytimes.com/2017/12/12/world/europe/austria-gas-explosion.html>.

natural gas flowing in from the Gulf of Mexico, which must travel dry in the main pipeline. The compressor itself was not damaged in the incident, which chiefly concerned a series of piping called the slug-catcher.³³

A gauge leaking methane most likely caused an explosion and fire in a Susquehanna County natural gas compressor station last week.³⁴

An Ohio worker has died from injuries suffered in an accident at a natural gas operation in Tyler County....Two other workers were injured in Thursday's accident at a Eureka Hunter Pipeline operation near Wick....Authorities have said the incident was an explosion at a compressor station. But Eureka's parent, Magnum Hunter Resources, says it was a flash fire at a "pig receiving station." Pigs are devices used to clean out or to inspect pipelines. Magnum says initial reports indicate that natural gas liquids ignited in tanks during "pigging" operations and fueled the fire.³⁵

Federal regulators said there have been 20 "significant" pipeline incidents involving deaths, injuries or major property damage in West Virginia in the last decade. The latest came Tuesday when a 20-inch Columbia Gas transmission line exploded, destroying four homes and cooking a section of Interstate 77, a major north-south commuting corridor that passes through the capital city....The damage from the blast and the inferno it sparked were breathtaking. Four homes burned and collapsed. Five others were damaged. On the highway, the heat burned utility poles and melted guardrails and pavement.... With many people at work or school at the time, no one died....From 2007 through 2011, pipeline accidents nationwide killed 21 workers and 47 other people, resulting in nearly \$2.6 billion in property damage, according to PHMSA.³⁶

One person was dead and two others injured in an explosion Monday at a BP natural gas compressor station in western Colorado, the company said on Tuesday.³⁷

33 John DeSantis, 1 year later at Williams; Feds blast company for deadly explosion, The Times Houma . Thibodaux (Sept. 28, 2016), https://www.houmatimes.com/news/year-later-at-williams-feds-blast-company-for-deadly-explosion/article_97c8262a-85a0-11e6-9e8d-9bfe4c321c6b.html.

34 Brendan Gibbons, Fire broke out in natural gas compressor station last week, The Times-Tribune (Dec. 9, 2014), <http://www.thetimes-tribune.com/news/fire-broke-out-in-natural-gas-compressor-station-last-week-1.1800355>.

35 Associated Press, Ohio worker killed after West Virginia natural gas explosion, The News-Herald (Apr. 14, 2013), <http://www.news-herald.com/general-news/20130414/ohio-worker-killed-after-west-virginia-natural-gas-explosion>.

36 John Raby, Vicki Smith, Associated Press, Gas Line Blast a Reminder of Widespread Risk, Cumberland Times-News (Dec. 12, 2012), http://www.times-news.com/news/local_news/gas-line-blast-a-reminder-of-widespread-risk/article_2a8b6146-5115-5a91-8f6c-618af372141e.html.

37 Eileen Houlihan, Janet McGurty and Edward McAllister, One dead, 2 hurt in BP natgas blast in Colorado, Reuters (Jun. 26, 2012), <https://www.reuters.com/article/us-explosion-bp/one-dead-2-hurt-in-bp-natgas-blast-in-colorado-idUSBRE85P0VF20120626?feedType=RSS&feedName=domesticNews>.

- e. Charles Station is a likely target of terrorism, which would lead to a fire or explosion and a dramatic increase in air pollution.

FERC notes that “the likelihood of future acts of terrorism or sabotage at the proposed facilities, or at any of the myriad natural gas pipeline or energy facilities throughout the U.S., is unpredictable.³⁸” In the case of Charles Station, one might hazard a guess that the likelihood is much higher than in other areas of the country due to the site's proximity to several important sites in and around our nation's capitol, some of which are noted in Appendix A.

Regardless of where the gas for the Eastern Market Access Project would be headed, gas going to several WGL taps, power plants, and DECP's liquefied natural gas (LNG) export terminal in Cove Point would still pass through Charles Station. Whether the gas traveling through Charles Station would feed local energy needs or the Cove Point export terminal, the interruption of service that destroying it would create could have repercussions far greater than another target.

- c. Local first responders could not effectively fight a fire at or around Charles Station.

The BOA's findings that local first responders could not handle a fire of the magnitude that would occur at Charles Station if there was one are significant. The physical safety of neighbors and their property, wildlife, and the environment put in peril by such a wildfire because of air pollution.

During the permitting process for this project, four fires occurred in a 1.5 mile radius of the site. In all cases, the structures involved were completely destroyed and, more importantly, in the case of the fire closest to the proposed site, just 2,900 feet away, a man and his dog were killed. Even those comparatively small fires created gigantic plumes of smoke that were visible in neighboring counties and caused difficulty breathing for people nearby. If a fire was to spread from Charles Station, first responders would not be able to control the resulting wildfire.

C. MDE is required to protect humans and wildlife from harmful noise and vibrations in order to adhere to the Clean Air Act.

Although §7641 Noise Abatement of the Clean Air Act has been approached differently as administrations have changed, it is clear that the Clean Air Act recognizes the harmful nature of noise pollution and intends to curtail it. In 1981, the EPA delegated much of the responsibility of prohibiting noise pollution to State and local governments.

Under the Clean Air Act, the EPA administrator established the Office of Noise Abatement and Control (ONAC) to carry out investigations and studies on noise and its effect on the public health and welfare. Through ONAC, the EPA coordinated all Federal noise control activities, but in 1981 the Administration concluded that noise issues were best handled at the State and local level. As a result, ONAC was closed and primary responsibility of addressing noise issues was transferred to State and local governments.³⁹

38 FERC Order Issuing Certificate, Jan. 23, 2018, p. 53 at 122.

39 EPA Clean Air Act Overview, Clean Air Act Title IV – Noise Pollution, The Role of EPA (April 3, 2018), <https://www.epa.gov/clean-air-act-overview/clean-air-act-title-iv-noise-pollution>.

1. The harmful effects of constant noise is well-documented, as is the importance of considering the tenor of the noise in evaluating the harm it does.

i. Maryland mandates that nighttime noise levels not exceed 45 dBA.

.01 Definitions.

C. "Day-night average sound level (Ldn)" means in decibels, the energy average sound level for a 24-hour day with a 10 decibel penalty applied to noise occurring during the nighttime period; i.e., noise levels occurring during the period from 10 p.m. one day until 7 a.m. the next are treated as though they were 10 dBA higher than they actually are.⁴⁰

According to DECP, 13 of 16 residences assessed for noise impacts scored predicted ratings between 39.8 dBA and 49.9 dBA.⁴¹

During construction, which is estimated to take most of a year, DECP predicts that noise levels will rise by 40 to 53 dBA at the surrounding homes⁴², making life unbearable for residents. Such a prolonged increase in noise levels will also have a dramatic impact on neighbors' livelihoods. Several are farmers with animals sensitive to such intense noise, including one beekeeper whose bees would not be able to use echolocation as necessary to thrive. The nearest neighbors are professional musicians who rehearse and also teach music lessons in their home. The 53 dBA increase they would experience would make that difficult if not impossible. The musicians, two farmers, and beekeeper are Opponents in this case.

ii. Maryland acknowledges the damaging effects of noise on residents in its controlling ordinance on noise pollution.

.02 Environmental Noise Standards.

A. Precepts.

(1) It is known that noise above certain levels is harmful to the health of human. **Although precise levels at which all adverse health effects occur have not definitely been ascertained** it is known that one's well-being can be affected by noise through loss of sleep, speech interference, hearing impairment, and a variety of other psychological and physiological factors. The establishment of ambient noise standards, or goals, must provide margins of safety in reaching conclusions based on available data which relate noise exposure to health and welfare effects, with due consideration to technical and economic factors. (Emphasis added.)

40 Title 26 DEPARTMENT OF THE ENVIRONMENT, Subtitle 02 OCCUPATIONAL, INDUSTRIAL, AND RESIDENTIAL HAZARDS. Chapter 03 Control of Noise Pollution. Authority Environment Article, §3-401, Annotated Code of Maryland.

41 FERC Docket CP17-15-000, DECP Application for the Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-32.

42 FERC Docket CP17-15-000, DECP Application for the Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-34.

A recent study funded by the Maryland Department of Health and Mental Hygiene examined the impacts of compressor stations in particular on people living nearby.

For example, long-term exposure to noise levels ranging from 32 to 75 A-weighted decibels (dBA) have been associated with sleep disruption, poor academic performance, and hypertension. Other adverse health effects reported include noise-induced hearing loss, oxidative stress, increased cardiovascular effects, endocrine disruption, and an increased risk of developing diabetes. There is also a growing concern that low frequency noise (10–250 Hz) can disrupt sleep, contribute to poorer performance (e.g., poor concentration and attention span), and cause annoyance. The adverse health effects from noise are dependent on several factors, including duration, frequency, and intensity of exposure as well as individual physical and personal characteristics (e.g., age, pre-existing medical conditions, and intake of medications that are ototoxic). Children, elderly, and hearing impaired individuals may be more susceptible to the adverse effects associated with environmental noise exposures.

[E]xposures associated with the production and delivery of natural gas can be prolonged, impacting communities for extended periods of time. For example, compressor stations are permanent fixtures in communities where the production is active, and noise resulting from such facilities will continue to have an impact in the communities for decades to come. Still, limited information exists regarding noise exposures associated with natural gas compressor stations and how they may impact nearby communities. (Internal citations omitted.)

DECP's dBA averages do not paint a true picture of the spikes in noise, the consistent 24/7 noise, and the vibrations that people and animals living near compressor stations have to deal with. 55 dBA is not an unreasonable level of noise for a brief period of time, or at a pleasant pitch, but living for the rest of your life with an increase in noise at a steady whine except for the times it gets worse is intolerable.

DECP is not even willing to commit to how they will keep noise levels legal.

Noise control measures utilized in the analysis are fairly significant, but are not unusual in order to comply with the FERC noise standard at nearby NSAs. It may be possible to achieve compliance through the use of noise control measures, other than those provided in the analyses, provided that the final design achieves compliance. **The final noise design for the station, therefore, may or may not include all of the measures provided in the analyses.**⁴³ (Emphasis added)

Given the fine point that they put on their noise level predictions at nearby homes – 39.8 dBA or 49.9 dBA, for example – and their track record of doing what is convenient for them once they have their permits in place, it is hard to have faith in Dominion's numbers. They would also be impacted by changes to building

⁴³ FERC Docket CP17-15-000, DECP Application for the Eastern Market Access Project, Resource Report 9, Nov. 2016, p. 9-32.

profiles and arrangements since the structures of the buildings themselves are one of the noise control measures discussed.

11. Maryland acknowledges the damaging effects of vibrations on residents in its controlling ordinance on noise pollution.

(4) A person may not cause or permit, beyond the property line of a source, vibration of such direct intensity to cause another person to be aware of the vibration by such direct means as sensation of touch or visual observation of moving objects. The observer shall be located at or within the property line of the receiving property when vibration determinations are made.⁴⁴

DECP has not submitted information about the potential levels of vibrations that would be caused by their facility, so MDE must look to studies and accounts of other compressor stations as a reasonable guide to assessing how probable it is that Charles Station will create vibrations that violate the standard above.

D. Maryland Department of the Environment (MDE) may not grant Dominion Energy Cove Point's (DECP's) air quality permit because MDE erred in issuing its tentative determination.

MDE issued its tentative determination on March 14, 2018, and held a public hearing to gather testimony on March 28, 2018. A copy of the tentative determination and supporting documents were placed at Potomac Library in Bryans Road ahead of the public hearing. However, Dominion continued to modify its application after the public hearing, and MDE also continued to modify its modeling after the public hearing. New and altered documentation was placed at the library, seemingly in reaction to public pressure and meetings with AMP Creeks representatives, right up until the end of May. This is in violation of Maryland Code, Subtitle 26, Chapter 02, §11 Procedures for Obtaining Permits to Construct Certain Significant Sources, part H (2).

H. Tentative Determination.

(1) The Department shall prepare a tentative determination regarding the application. The content of the tentative determination shall include:

- (a) A proposal to issue or deny the permit;
- (b) Any proposed permit terms and conditions;
- (c) A brief explanation of the Department's tentative determination;
- (d) Any proposed schedule of compliance;
- (e) If the tentative determination is to issue the permit, a draft permit, which shall be available to the public for inspection and copying.

(2) In addition to the content of the tentative determination, the following documents shall be made available to the public for inspection and copying no later than the date of issuance of the tentative determination:

- (a) The permit application and all supporting documents submitted with the application;

44 Title 26 DEPARTMENT OF THE ENVIRONMENT, Subtitle 02 OCCUPATIONAL, INDUSTRIAL, AND RESIDENTIAL HAZARDS. Chapter 03 Control of Noise Pollution. Authority Environment Article, §3-401, Annotated Code of Maryland.

(b) All nonprivileged documents the Department relied upon in making the tentative determination; and

(c) A privilege log that identifies all withheld documents and states the reasons for withholding each document.

The tentative determination was issued in a rush, without complete documentation as required by law. The public hearing was thus rendered effectively useless, as every single person commenting on the application was commenting on an application that is now different from the one that MDE is considering. Since MDE told those present that their oral comments would be given the same weight as written ones, many people did not send follow-up written comments. Even in the case of those who did, they were still commenting based on outdated information. The permit application process was handled improperly, denying the public due process, and should not be approved.



TO: Kelly Canavan – AMP Creeks Council

FROM: Howard Gebhart

SUBJECT: Technical Comments on Draft Air Quality Permit and Supporting Air Quality Dispersion Modeling for the Dominion Cove Point Compressor Station, Charles County MD

DATE: June 7, 2018

My technical comments are below. Please feel free to contact me at hgebhart@air-resource.com or via telephone at 970-484-7941 X231 with any questions or other concerns regarding my comments.

1. The Reagan National Airport (DCA) Meteorological Data is NOT Adequately Representative of the Dominion Plant Site in Rural Charles County, MD.

The adequacy and representativeness of the meteorological data inputs selected for the AERMOD dispersion model are critical. According to the EPA Guideline on Air Quality Models (40 CFR 51, Appendix W): *Data representativeness, in the case of AERMOD, means utilizing data of an appropriate type for constructing realistic boundary layer profiles. Of particular importance is the requirement that all meteorological data used as input to AERMOD should be adequately representative of the transport and dispersion within the analysis domain. Where surface conditions vary significantly over the analysis domain, the emphasis in assessing representativeness should be given to adequate characterization of transport and dispersion between the source(s) of concern and areas where the maximum design concentrations are expected to occur (40 CFR 51, Appendix W, Section 8.4.2.b).*

The proposed compressor station site is located in rural Charles County, MD. The nearby land use is characterized as rural, with significant vegetative cover (trees). This nearby vegetation dominates the surface roughness determination near the proposed compressor station site. On the other hand, DCA airport is located in the urban core of the greater Washington, DC metropolitan area. At the airfield itself, the land is open and without significant vegetation. Also, the airfield is adjacent to the Potomac River. As such, the characteristics of the DCA airport are dominated by surface features with much lower calculated surface roughness. The surface roughness is a key input to the other meteorological parameters used by AERMOD. Because the DCA airport is significantly different from the compressor station site where the maximum design concentrations occur, these errors introduce an unknown bias into the model results.

The DCA data were likely selected for the modeling based on the easy availability of these data without any consideration of whether the DCA data actually meet the representativeness criteria in

Appendix W. As the DCA data do not adequately represent the transport and dispersion characteristics of the compressor station site, MDE and the applicant should have instead looked for other available data which are better representative of the project location. I did conduct such research and found the following data which should have been considered in lieu of the DCA meteorological data: 1) Patuxent River Naval Air Station located near Lexington Park, MD, 2) St. Mary's County Regional Airport located near California, MD, and 3) Joint Base Andrews located in the southeastern suburbs of Washington, DC. Compared to DCA, all of the alternative data sets are located in closer proximity to the proposed compressor station site and as such would better represent general weather conditions affecting atmospheric transport and dispersion such as wind and temperature. With respect to ambient temperature, DCA data would be impacted by the urban "heat island" effect and likely exhibit warmer temperatures compared to surrounding rural areas where the compressor station site is located. Most importantly, the recommended data sites have surrounding land uses which are a closer match to the compressor station site compared to DCA. In addition, the Patuxent River station includes AERMINUTE data which helps reduce the occurrence of "calm" conditions when processing the meteorological data. Data for all three locations are available at <ftp://ftp.ncdc.noaa.gov/pub/data/noaa/>.

The dispersion modeling studies for the Cove Point Compressor Station should be reanalyzed using meteorological data from one of the monitoring stations recommended above instead of DCA. All of the recommended sites better fit the general weather conditions and local land use conditions of the compressor station site. Therefore, these data would also better represent the local transport and dispersion conditions in rural Charles County, MD compared to DCA which is located in the greater Washington, DC urban core. Data from any of these sites can be processed using the AERMET meteorological preprocessing program to create a meteorological data file compatible with AERMOD. My choice would be the Patuxent River Naval Air Station data because AERMINUTE data are also available.

2. The Worst-Case Compressor Station Turbine NOx Emissions Were Not Modeled.

Based on information in the permit application, the worst-case NOx emissions were not addressed in the AERMOD modeling. Turbine emissions are variable, and higher NOx emissions are known to occur when ambient temperatures are colder. The table below (derived from data in the permit application) illustrates this point.

Turbine NOx Emissions Variability with Temperature
(Emission Units lb/hr at 100% load)

Turbine	Below 0°F	0°F	59°F	100°F
Solar Taurus 70	3.7	1.3	1.2	1.1
Solar Mars 90	14.9	1.7	1.6	1.25

In the AERMOD modeling, the emission inputs were all derived from the 59 deg F case. However, as the National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO₂) is a 1-hour standard, the AERMOD modeling failed to address the worst-case hourly NOx emissions, which may at times exceed the modeled emissions based on the 59 deg F case. The modeling should have made use of features in AERMOD which allow for variability of emissions. For example, variable turbine emissions should have been input to AERMOD by month, with the higher (0 deg F) emissions occurring during the winter months.

Compliance with the NAAQS and applicable PSD increments should have also addressed the much higher turbine NOx emissions which are expected when ambient temperatures fall below 0 deg F. Although such conditions may be infrequent, these conditions do occur and needed to be modeled. At present, periods of elevated NOx emissions were ignored by the applicant and MDE. As a worst-case approach, the elevated NOx emissions should have been input to AERMOD using the monthly variable emissions option with the higher NOx emissions occurring during any month where temperatures below 0 deg F have been observed in the historical record.

Lastly, the draft permit itself exempts the turbines from any NOx emission limitations when ambient temperatures are below 0 deg F. It is unacceptable for the draft permit to have periods when no NOx emissions limit exists. The lack of any enforceable limit on emissions creates uncertainty regarding any modeled NOx emission impacts and also as to whether the proposed compressor station would operate as a minor source, as claimed in the permit application. The draft permit failed to require enforceable permit limits during ALL periods of operation and as such, there is no assurance that the compressor station would have adequately enforceable emission limits to maintain the claimed minor source status.

3. There are no Enforceable Emission Limits on the Boiler.

Other than visible emissions (opacity), the draft permit contains no enforceable limits on boiler emissions for NOx or any other pollutants. This is concerning because the modeling shows that virtually all of the local impact on maximum 1-hour average NO₂ concentrations is attributable to the boiler emissions.

If the boiler lacks an enforceable limitation on NOx emissions, then the applicant can legally exceed the boiler NOx emissions used in the modeling without risk of penalty or enforcement. As such, there is no confidence that the dispersion modeling results actually depict the expected maximum impacts to NO₂ on the local environment.

Also, because there are no enforceable emission limits at the boiler, the draft permit lacks sufficient enforceability to assure that the planned compressor station will operate as a minor source. In the absence of comprehensive and federally-enforceable emission limits to assure that the source will operate at minor source levels, the only other option would be to impose the otherwise applicable major source non-attainment requirements such as LAER and offsets in the permit.

Any enforceable boiler emission limits also need to be accompanied by sufficient testing, monitoring, recordkeeping, and reporting to make such limits enforceable as a practical matter. The preferred option for compliance monitoring is a continuous emissions monitoring system (CEMS). CEMS is the only emissions monitoring approach that would provide reliable emissions information across all boiler operating conditions. In lieu of a CEMS, an alternative method would be periodic and repeated compliance emissions testing for NOx and the other non-attainment pollutants, coupled with establishment of enforceable boiler operating parameters. However, the periodic testing option is not preferred because this approach provides emissions data only for the boiler operating conditions which occur at the time of the testing. A CEMS is the only viable monitoring approach that assures continuous compliance over all modes of operation.

4. The Dispersion Modeling Results Appear to be Highly Dependent on the Building Configuration at the Compressor Station and the Final Permit Needs Assurances that the Emission Sources will be Constructed as per the Application.

The air modeling has been revised several times by MDE and the applicant, with the modeled concentrations decreasing significantly with the most recent modeling revision. The change in the modeled AERMOD impact was attributed to changes in the height and dimensions of the compressor station buildings inside the fenceline.

Because the modeling results appear to be highly sensitive to the building inputs and other physical characteristics of the compressor station, MDE should be assured that the data represented in the most recent modeling studies are the current and most accurate data. It is noted that data provided by the applicant in filings with the Federal Energy Regulatory Commission (FERC) appear to provide contradicting information for some plant information.

With respect to the plant buildings, drawings provided by the applicant show that the major plant buildings have slanted roofs. MDE should confirm whether the building heights input to the model are the “peak” for the roof. If the “peak” height was not used to characterize plant buildings, the modeling should be reanalyzed using the “peak” roof height for the BPIP modeling inputs.

MDE needs to confer with the applicant, obtain the most current and accurate information on the plant buildings, and rerun the AERMOD analysis as necessary. If any revised analysis is performed, this information needs to be shared with the public and interested stakeholders along with an opportunity for additional formal public comment. Furthermore, MDE should require that the applicant supply the agency with final drawings for the plant equipment and building to allow comparison with the data in the application. Again, any such data should be made available to the public and other interested stakeholders.

5. The Draft Permit Exempts Emissions Compliance under Start-up, Shutdown and Other Circumstances which in turn create Permit Enforceability Issues.

The draft permit allows for emission exemptions during period of startup, shutdown, and other circumstances. In the case of start-up and shutdown, an exemption exists given that the selective catalytic reduction (SCR) emission controls are not immediately operable when turbine operations are initiated. However, the number of turbine startups and their duration are an essential element of the applicant’s calculation of potential emissions for the claimed minor source status. A blanket exemption on emissions during periods of start-up, shutdown, and other circumstances creates permit enforceability concerns. There is nothing in the permit that would otherwise limit the number and duration of startup and shutdown events to the data provided by the applicant in the permit application. If the actual operation of the turbines during startup and shutdown are not consistent with the application, then the compressor station could actually operate as a major source without anyone’s knowledge or consent.

In the draft permit, there are no limits on the number and duration of start-up and shutdown events, for example limiting startup and shutdown to a set number of minutes over any rolling 12-month period. Also, the draft permit lacks caps on NOx emissions (and other non-attainment pollutants like VOCs) to limit emissions to below the major source threshold, nor does the draft permit require the applicant to account for emissions during any abnormal events like startup, shutdown, malfunctions, and emergency

blowdown as part of overall permit compliance. Because the draft permit does not address these issues, there is inadequate enforceability within the draft permit to assure that the compressor station will actually operate as a minor source.

With respect to emergency blowdown, it is realized that such events occur from time-to-time for safe operation of the plant and that the occurrence of blowdowns cannot be limited by the air permit without creating public safety concerns. However, MDE should consider that if the number of emergency blowdowns exceeds the applicant's assumptions as presented in the permit application, the associated emissions could push the emissions past the major source threshold. The draft permit as written basically ignores the excess emissions that might be present during a blowdown event.

6. The Minor Source Baseline Date has not been addressed, so it is unknown whether the MDE should also evaluate Compliance with the Class II PSD Increments.

MDE should provide the minor source baseline date for the Charles County compressor station location for each of the PSD pollutants (PM-2.5, PM-10, SO₂, and NO_x). This is important because any new source, even a minor source if constructed after the minor source baseline date, contributes to PSD increment consumption. So, if the minor source baseline date for this location occurred prior to Dominion's permit application date, then the new emission sources at Dominion would consume PSD increment and MDE should be looking at how the project complies with the Class II PSD increment and not just the NAAQS. MDE should either document that the minor source baseline date has not been triggered, or include an assessment of compliance with the Class II PSD increments.

7. The Draft Permit Does Not Include a CEMS for Monitoring of Turbine NO_x Emissions.

If written correctly by MDE, the draft permit would have included different NO_x limits covering different modes of turbine operation, such as operation at temperatures below 0 degrees F. These emission limits will vary based on the specific turbine operating condition. Because the NO_x emission limits will be variable, a single stack emissions compliance test (even if repeated periodically) will not address compliance with all possible operating conditions.

The only practical solution for obtaining reliable and accurate emission data for all operating conditions would be to utilize a continuous emissions monitoring system (CEMS) at each turbine. A CEMS would also provide emissions information for start-up and shutdown events and could therefore also be used as a tool for measuring emissions against a plantwide limit. A CEMS is the only viable compliance monitoring tool for measuring combustion turbine emissions in order to provide enforceability of turbine emission limits for all modes of operation. Periodic stack testing is inadequate as it will not provide accurate emissions data for all turbine operating conditions, such as operation at temperatures below 0 deg F and startup/shutdown.

8. Frequency of Emissions Testing

Under the draft permit, the frequency for emissions testing is derived from the New Source Performance Standards in 40 CFR 60 Subpart KKKK, and there is an allowance for decreased testing if the testing result is less than the emissions standard. However, for this permit, the turbine NO_x emissions limits have been set to be much more stringent than the underlying Subpart KKKK emission standard.

Given the more stringent NOx emission limits, an emission testing frequency copied from Subpart KKKK is not appropriate.

Comments of Henry S. Cole, Ph.D.

Charles Compressor Station Permit Application, MDE Docket 24-16

1.0 Purpose: Dominion submitted its final application on the Charles County Compressor Station to MDE in March 2018. In March of 2018 MDE issued a tentative determination to approve Dominion's application. In response to AMP Creeks' (AMP) experts' concerns (Meeting of April 13, 2018), MDE conducted a revised modeling assessment. The Dominion and MDE assessments used EPA's preferred regulatory air quality model, AERMOD. Although these model applications yielded varying results, all three reported concentration estimates for criteria pollutants below their applicable NAAQS standards. The purpose of this report is to determine whether the assessments conducted by the applicant and by MDE are sufficiently reliable and scientifically valid as the basis for issuing a permit to construct for this project.

2.0 Opinion: It is my opinion, based on a preponderance of evidence, that the Dominion and MDE modeling assessments listed above are seriously flawed in a manner and to an extent that MDE and Dominion modeling referenced above will substantially underestimate pollutant concentrations. Based on this finding and the record to date, I conclude that MDE cannot provide assurance that the Compressor Station's operation will not adversely affect the area's air quality. EPA has designated Charles County as a non-attainment area for the 1-hr ozone NAAQS. This designation indicates that the air quality in Charles County is already unhealthful. MDE cannot, based on Dominion's March 2018 application or on its own model assessments, conclude that the project will not further degrade the area's air quality and further adversely impact public health.

In my considered opinion the process followed by Dominion and by MDE draft permit provides insufficient support for the conclusion that the compression station will not endanger health and the environment and will not violate air quality standards.

There are a number of deficiencies in the work submitted by Dominion.

First, as Mr. Gebhardt points out, we really do not have a reliable understanding of the quantity of emissions from this proposed facility. There is a high likelihood that an accurate count, including start-ups, shutdowns, boilers, etc. would put this facility in the rank of major source, triggering New Source Review (NSR) and Prevention of Significant Deterioration (PSD) procedures. I believe that these more stringent review processes are required in this case, not just because of the likely higher emission rates, but because of the number of other areas on uncertainty, as set out below.

Second, Dominion's analysis, by ignoring recent natural gas developments such as new power plants, fails to provide a reliable analysis of the real air quality situations likely to occur in the future. The fact is that Southern Maryland is becoming a center for gas powered energy. Yet no comprehensive analysis has ever been performed of this major environmental change. Dominion's approach has been to pretend that this compressor is an isolated source with no connection to the many new sources which emit the same pollutants, in the same general area. There is no discussion by MDE about how this addition of ozone precursors fits into an overall strategy for bringing this non-attainment area into attainment for ozone.

Third, Dominion's analysis takes no account of the air quality issues associated with the national park. Typically air quality in parks requires special protection. It is not enough to say that the air quality in the park is within the NAAQS. Any significant deterioration in air quality in parks should trigger a PSD analysis, whether the cause of deterioration is a major source or a group of minor sources. On a related

issue, many people at the public hearing said they moved to this area because of health challenges and because the air quality here is better than most areas in the metro region.

Dominion's choice of background measurements is flawed, as are its meteorological base lines.

Finally every document submitted by Dominion has a different shape, size and configuration for the buildings on the site. The only thing we know for sure is that small differences here cause large differences in air quality. The lack of precision here is a disqualifier.

2.1 Recommendation: Based on this opinion, I strongly recommend that MDE deny Dominion's application for a permit to construct the Charles County Compressor Station.

2.2 Basis for the opinion and recommendation: My opinion and recommendation are based on my review of the MDE and Dominion reports and documents, additional information provided by MDE, applicable regulations, information on existing air quality conditions in the greater Charles County area and on published, scientific articles on subjects related to sources and their impacts on air quality. The sources of information are listed in Attachment 1. My opinion is also informed by my expertise and 40-years of experience in the fields of pollution meteorology, air quality modeling, source receptor relationships, and the impact of precursor emissions on photochemical oxidants including ozone. Section 3 and Attachment 1 include detailed information on my credentials.

Sections 4, 5 and 6 detail what I in conjunction with AMP's other experts have identified as serious scientific, technical problems that characterize the Dominion and MDE modeling assessments. Section 7 provides a detailed description of MDE's management of the permitting process which further erodes AMP experts' confidence in the Department's ability to issue a construction permit for the project.

3. Expert credentials: I am president of *Henry S. Cole & Associates, Incorporated*, an environmental and atmospheric earth scientist with 40 years of expertise and in-depth experience on issues related to emission sources, air pollution meteorology and air quality modeling. Previously, I served as a senior scientist and modeling application section chief with the U.S. Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards. Other work includes academic research related to air pollution meteorology and modeling and numerous published journal articles and reports to clients. Clients include government agencies, corporations, legal firms, environmental organizations and community-based groups. I have served as an expert witness in cases involving air quality impacts in the United States, Canada, and Europe. Cases include a variety of sources, e.g. mega-gas stations, uncontrolled hazardous waste sites, municipal waste landfills and incinerators, fossil fuel power plants, and industrial plants. My complete CV is attached.

4.0 Evidence for opinions and findings: Table 1 below provides MDE's estimates of total facility emissions for the of pollutants and pollutant classes and their major source thresholds; stricter regulations and requirements apply to major sources. Although none of the emissions categories exceed the thresholds, total NOx emissions amount to about 68% and VOCs 55% of their thresholds. As discussed below, NOx and VOCs are the major precursors for the photochemical formation of ozone; this is significant because EPA has designated Charles County as having a non-attainment status for ozone.

Pollutant	Total Facility Emissions (tons/year)	PSD/NNSR Major Source Threshold (tons/year)	Emissions Exceed PSD/NNSR Major Source Threshold	
			Yes	No
NO _x	16.95	25		✓
VOC	13.71	25		✓
CO	36.78	250		✓
SO ₂	5.60	250		✓
PM ₁₀ /PM _{2.5}	14.79	250		✓
Total HAP	1.4	25		✓

Table 1: Total Charles Compressor facility emissions and major threshold limits. Source: Dominion Cove Point, Permit to Construct Natural Gas Compressor Station, Modeling Summary, Maryland Department of the Environment, March 2018

4.1 Failure to consider the air quality impact of the areas' fossil fuel power plants on background concentration data. Neither the Dominion nor MDE modeling assessments incorporate emissions from major current and future sources in the airshed; these include 6 southern Maryland fossil fuel power plants which emit the same pollutants and pollutant classes emitted by the compressor station. Figure 1 shows locations of the compressor site and these power plants. The three nearest power plants are the Charles Energy Center (operational), the Keys Energy Center (construction complete, operational in 2018), and the Mattawoman Power Plant (has a PSC Certificate of Public Convenience and Necessity, CPCN, construction pending). All three qualify as major sources because their emissions exceed the thresholds for major source designation. (See Table 2.)



Figure 1: Location of Compressor Site and fossil fuel powerplants within a 25-mile radius.

In order to account for the emissions of the area’s additional sources, Dominion used background concentrations from a monitoring site in Arlington, VA. However, these background concentrations are for the years 2013, 2014, 2015, a period prior to the operation of the three nearest power plants, Charles Co. Energy Center, Keys Energy Center and the Mattawoman Power Plant, all located within 12 miles of the Compressor Station. Thus, the use of background concentrations from a much earlier period fails to include the impact of the nearest power plant projects. Table 2 provides potential emissions estimates for the three nearest power plants.⁴⁵

4.2 Secondary pollutants: photochemical processes, ozone formation, particulate matter: Neither Dominion’s applications nor MDE’s modeling assessments address the secondary pollutants which form once emissions from the Charles Compressor Station (in combination with other sources) enter the atmosphere. Figure 2 provides a conceptual diagram of chemistry which converts primary emissions into ozone, ultra-fine particulates (UFPs) and other secondary pollutants. Notice that all of the sources shown burn natural gas and generate the same pollutants and pollutant classes.

Power Plant	NOx	CO	VOCs	PM2.5	Current Status
Units are in tons per year					
Charles Energy Center	124.4	145.2	44.0	98.7	Operating since (2017
Keys Energy Center	152.8	187.8	43.4	93	Construction complete
Mattawoman PP	242.1	568.8	149.5	161.3	Permitted
Totals	519	902	237	353	
Major Source Thresholds	25	250	25	250	
Sources: TBC					
Charles Energy Center: <u>Maryland Public Service Commission, Exhibit A, Final Recommended Licensing Conditions, PSC Case No. 9129, CPV Maryland, LLC – St. Charles Project</u>					
Keys Energy Center: Maryland, Power Plant Research Program (PPRP) Environmental Review of the Proposed Keys Energy Center Project, Draft, July 3, 2015 Mattawoman PP: Maryland, Power Plant Research Program (PPRP) Environmental Review of the Proposed Mattawoman Energy Center Project, Draft, July 10, 2015					
Table 2: Potential Emission for area gas-fired power plants.					

⁴⁵ The potential emissions total are approximate and subject to change; we used tables from readily available regulatory documents; however, the overall magnitude of potential emissions from the area’s gas fired power plants are very large and likely have a significant impact on primary and secondary pollutant concentrations. The totals presume that the Mattawoman Power Plant will come on line.

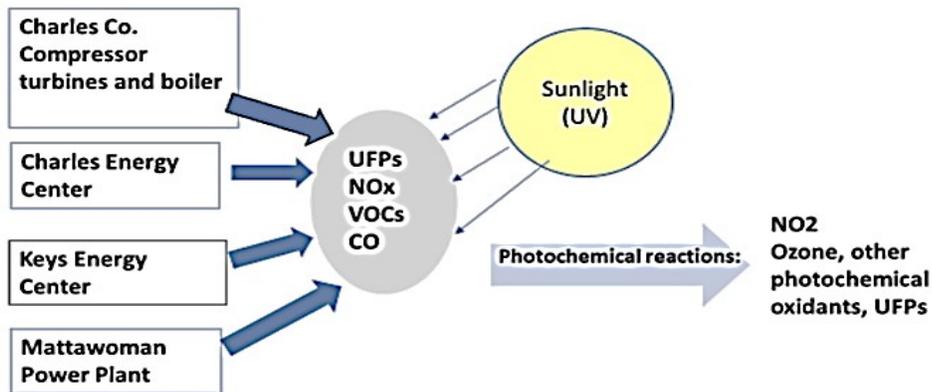


Figure 2: Combined / Cumulative Impact of Compressor and major power plant sources.

Figure 2: Conceptual diagram showing the conversion of primary to secondary pollutants.

4.3 Ozone: Emissions from these sources will add NO_x (oxides of nitrogen), CO (carbon monoxide), and reactive volatile organic compounds (VOCs) that form ozone through photochemical reactions. I conclude that the Compressor emissions will lead to further degradation to the air quality of an area already classified as in non-attainment for ozone. Box 1 summarizes EPA's findings with regard to health impacts of exposure to ozone.

Box 1: EPA summary of ozone's health effects:
 Ozone can cause the muscles in the airways to constrict, trapping air in the alveoli. This leads to wheezing and shortness of breath.
 Ozone can:

- Make it more difficult to breathe deeply and vigorously.
- Cause shortness of breath, and pain when taking a deep breath.
- Cause coughing and sore or scratchy throat.
- Inflammate and damage the airways.
- Aggravate lung diseases such as asthma, emphysema, and chronic bronchitis.
- Increase the frequency of asthma attacks.
- Make the lungs more susceptible to infection.
- Continue to damage the lungs even when the symptoms have disappeared.
- Cause chronic obstructive pulmonary disease (COPD).

These effects have been found even in healthy people but can be more serious in people with lung diseases such as asthma. They may lead to increased school absences, medication use, visits to doctors and emergency rooms, and hospital admissions.
 Long-term exposure to ozone is linked to aggravation of asthma and is likely to be one of many causes of asthma development. Long-term exposures to higher concentrations of ozone may also be linked to permanent lung damage, such as abnormal lung development in children.
 People most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. In addition, people with certain genetic characteristics, and people with reduced intake of certain nutrients, such as vitamins C and E, are at greater risk from ozone exposure.
 Children are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure. Children are also more likely than adults to have asthma.
Source: U.S. EPA website: *Health Effects of Ozone Pollution*, <https://www.epa.gov/ozone-pollution/health-effects-ozone-pollution>

Threshold levels: EPA documents indicate that the adverse effects of ozone can occur below the NAAQS 8-hour standard for ozone of 0.70 ppm (70 ppb). Consider the following quotation:

The evidence for these health effects indicates that the relationship between concentration and response is linear along the range of O₃ concentrations observed in the U.S., with no indication of a threshold. However, there is less certainty in the shape of the concentration-response curve at O₃ concentrations generally below 20 ppb. The populations identified as having increased risk of O₃-related 22 health effects are individuals with asthma, younger and older age groups, individuals with certain dietary deficiencies, and outdoor workers. (Emphasis added).⁴⁶

In other words, ozone can adversely affect sensitive individuals at concentrations lower than the NAAQS of 70 ppb. Additional research confirms this finding. A more recent study concluded:

For ozone, the linear exposure-response curve with no threshold described in this study is consistent with earlier research. An almost linear exposure-response curve for ozone was previously reported with no threshold or a threshold at very low concentrations. A study from the Netherlands also concluded that if an ozone threshold exists, it does so at very low levels.⁴⁷

The same study showed the mortality dose response curve to increasing ozone exposures. Figure 3 shows that increases in mortality occur at concentrations well below the NAAQS level of 70 ppb.

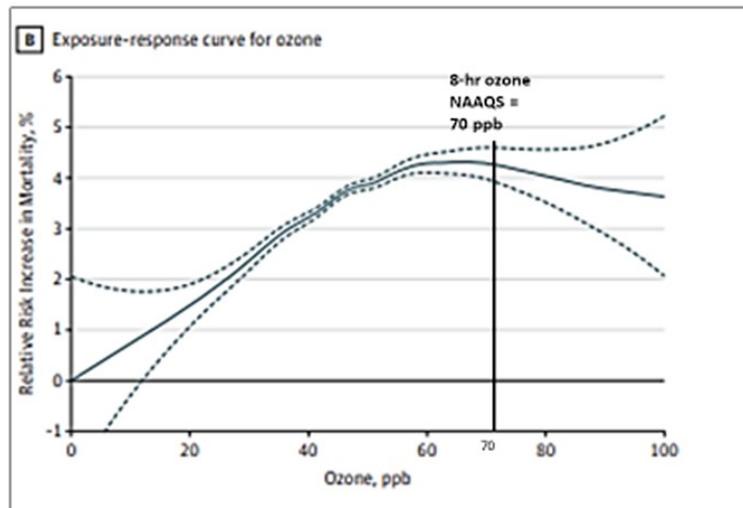


Figure 3: Ozone dose response curve for mortality. Vertical axis: relative risk increase in mortality (%), Horizontal exposure equals ozone exposure during day of death or day prior.

4.4 Ultrafine particulates (UFPs): Figure 2, the Charles County Compressor Station and the area’s power plants directly emit UFPs, but also primary pollutants that react in the atmosphere to form UFPs. Studies, including those quoted below, show that gas-fired turbines are a s This finding is underscored by a

⁴⁶ U.S. EPA, “Integrated Science Assessment for Ozone and Related Photochemical Oxidants (Third External Review Draft) National Center for Environmental Assessment-RTP Division Office of Research and Development, June 2012, EPA/600/R-10/076C

⁴⁷ Di Q, Dai L, Wang Y, Zanobetti A, Choirat C, Schwartz JD, Dominici F. Association of Short-Term Exposure to Air Pollution with Mortality in Older Adults. JAMA. 2017. 318: 2446-2456. <http://www.scientificintegrityinstitute.org/JAMADi122617.pdf>.

2017 report on natural gas turbines which found: “At all measurement campaigns catalysts were found to decrease the emissions of particulate matter total mass. However, nanoparticle number concentrations were increased by a catalyst combined with high exhaust temperatures.”⁴⁸

A second journal article found that UFP concentrations in gas-fired turbine exhaust were from two to four orders of magnitude higher than in ambient air.⁴⁹

EPA classifies particulate matter as PM10 (<10 micrometers) and PM2.5 (<2.5); the standards for these classes and their NAAQS limits are based on mass per unit volume (e.g. micrograms per cubic meter) but do not consider the importance of particulate size distribution, i.e. the numbers of particles in a volume as a function of particle diameter.

The scientific literature includes many studies that describe the unique properties of UFPs including their size, numbers and surface area. The following excerpt is from a journal article by Sioutas et al. which also summarize numerous studies on the physical and toxicological properties of UFPs.⁵⁰

“There is sufficient reason to believe that ultrafine particles < 0.1 μm (UFPs) are important because when compared with larger particles, they have order of magnitudes higher particle number concentration and surface area, and larger concentrations of adsorbed or condensed toxic air pollutants (oxidant gases, organic compounds, transition metals) per unit mass. This is supported by evidence of significantly higher in vitro redox activity by UFPs than by larger PM.”

The following diagram illustrates the point. The larger particulates account for most of the mass as shown in Figure 4.

48 K. Lehtoranta, et al., VTT Technical Center of Finland, 2017, “Controlling emissions of natural gas engines – Final report.” <https://www.vtt.fi/inf/julkaisut/muut/2017/VTT-R-02327-17.pdf>

49 E. Brewer et al. PM2.5 and ultrafine particulate matter emissions from natural gas-fired turbine for power generation,” *Atmospheric Environment*, Volume 131, April 2016, Pages 141-149

50 C. Sioutas et al., “Exposure Assessment for Atmospheric Ultrafine Particles (UFPs) and Implications in Epidemiologic Research,” *Environ Health Perspect.* 2005 Aug; 113(8): 947–955. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1280332/>

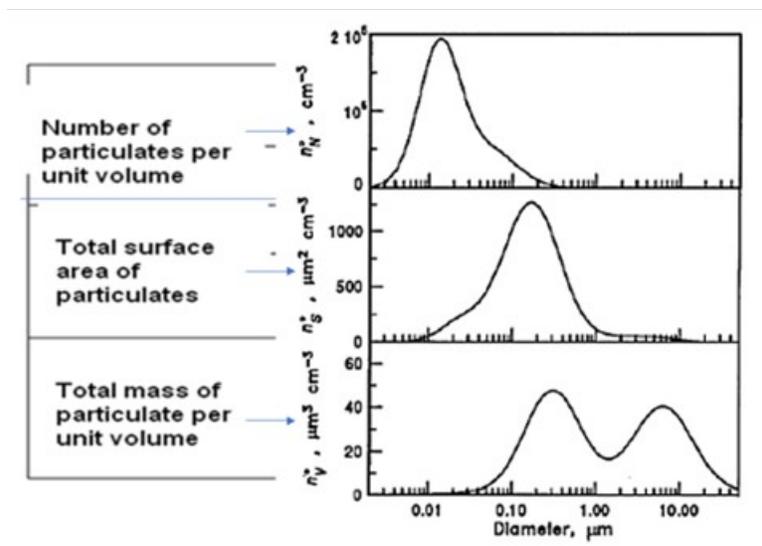


Figure 4: Particle number, surface area and mass as a function of particle diameter.

Both Dominion and MDE relied on comparisons between their model estimates of PM_{2.5} concentrations to the PM_{2.5} NAAQS standards. Such comparisons, based on particle mass, fail to weigh the properties and toxicity of UFPS which are largely a function of particle size and particle numbers.

4.4.1 Toxic effects of UFPs: Numerous studies have found strong evidence that small particle diameters enable UFPs to cross biological membranes with toxic effects beyond the lung (Figure 5). “Ultrafine particles are one of the components of traffic pollution suspected of causing serious health effects but no regulatory standard yet exists.”⁵¹ The author cites numerous studies in this comprehensive review.

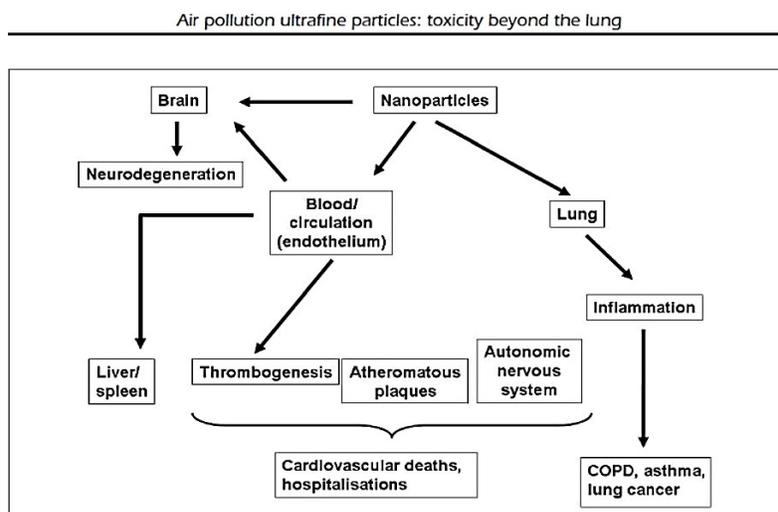


Figure 5: Diagram showing the migration of small UFPs (nanoparticles) through the respiratory system and blood circulation and adverse impacts.⁵²

51 C. Terzano, et al. “Air pollution ultrafine particles: toxicity beyond the lung.” *European Review for Medical and Pharmacological Sciences*, 2010.

52 Ibid.

4.5 Air quality and health impacts of NOx emissions: As shown in Figure 2 and Table 2, the compressor and power plants all emit large quantities of nitrogen oxide emissions. The criteria pollutant NO₂ (nitrogen dioxide) forms in the source from the combustion of natural gas. However, it is also formed in the atmosphere in combination with ozone and other byproducts via photochemical reactions. Thus, high NO₂ concentrations can occur near the source, but also at considerable distances downwind as the NOx emissions disperse, mix with, and react chemically with other pollutants in the ambient air. The NAAQS for NO₂ is 188 ug/m³ or 100 ppb for a one-hour period. The one-hour NAAQS indicate that even short-term concentrations can have significant health effects. Many of the health effects are similar to those associated with ozone, PM_{2.5} and UFPs.

According to EPA:

*“Breathing air with a high concentration of NO₂ can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms. Longer exposures to elevated concentrations of NO₂ may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO₂.”*⁵³

NO₂, along with other NOx, reacts with other chemicals in the air to form both particulate matter and ozone. Both of these are also harmful when inhaled due to effects on the respiratory system.

5.0 Additional Errors and omissions: While Dominion clearly has a vested interest in obtaining a permit, MDE has an obligation to ensure modeling data which the applicant submits is sufficiently detailed and reliable to support the applicant’s conclusions. MDE has to a large extent accepted Dominion’s assessments on face value and has done so without the scrutiny needed to ensure that the company’s modeling information including methods, assumptions, inputs, and results are reliable.⁵⁴ As described below, there are critical deficiencies in MDE’s oversight—ones which raise serious doubts over its modeling and therefore its basis for issuing Dominion its permit for the Compressor Station.

5.1 Variable emission rates: Neither the Dominion nor MDE analyses consider the substantial impact that seasonal (and diurnal) variation of ambient temperature has on fuel use and emissions from the compressor turbines and the boiler. This in turn affects concentrations of both primary and secondary pollutants. The model predictions of short-term pollutant concentrations may underestimate maximum values. MDE failed to examine the variable emissions and their impact on concentrations.

5.2 Modeling uncertainty: EPA guidance describes the substantial uncertainty contained in air quality modeling even when the modeler uses EPA’s recommended modeling programs such as AERMOD.⁵⁵ Sources of uncertainty include reducible errors (e.g. errors in emissions, background concentrations, building specifications, etc.) but also include “inherent errors” such as unknown or unmeasured conditions and their variations (e.g. model algorithms only approximate the highly complex effects of turbulence.) EPA’s modeling guidance recommends the following analysis:

⁵³ EPA: *Basic Information about NO₂*, www.epa.gov/no2-pollution/basic-information-about-no2#Effects

⁵⁴ There are a few exceptions: For example, MDE’s March 2018 “Permit to Construct Modeling Summary used a more recent version of AERMOD than that which Dominion used in its February 2018 Application. Secondly, MDE discovered an apparent error in the Emergency Generator’s stack height and used the corrected stack height in its revised modeling.

⁵⁵ ENVIRONMENTAL PROTECTION AGENCY, 40 CFR Part 51, November 9, 2005. Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions. Section 9.

*In all applications of models an effort is encouraged to identify the reliability of the model estimates for that particular area and to determine the magnitude and sources of error associated with the use of the model. The analyst is responsible for recognizing and quantifying limitations in the accuracy, precision and sensitivity of the procedure. Information that might be useful to the decision-maker in recognizing the seriousness of potential air quality violations includes such model accuracy estimates as accuracy of peak predictions, bias, noise, correlation, frequency distribution, spatial extent of high concentration, etc. Both space/ time pairing of estimates and measurements and unpaired comparisons are recommended. Emphasis should be on the highest concentrations and the averaging times of the standards or increments of concern.*⁵⁶

Neither of MDE’s recent modeling reports⁵⁷ contain EPA’s recommended analysis of uncertainties and errors. MDE’s failure to include such an analysis, undermines the Department’s assertions that its modeling results “demonstrate compliance with all applicable standards”.⁵⁸

There are compelling reasons for MDE to have conducted the recommended uncertainty analysis. MDE’s two recent modeling reports “Tentative Determination” and “Permit to Construct Modeling Summaries” (ibid 13) provide very different maximum concentrations. The former’s maximum 1-hr NO2 concentration is 181.5 ug/m³, in sharp contrast with the latter’s 129.5 ug/m³. The latter document explains the discrepancy as a result of changes in source configurations between Dominion’s 2017 and 2018 modeling assessments. The most significant changes concern the height and layout of the auxiliary building contained in Table 1 of MDE’s “Permit to Construct Modeling Guidance”) shown below:

2017			2018		
Building Name	UTM Coordinates	Height (m)	Building Name	UTM Coordinates	Height (m)
Auxiliary Building	319676.6 4281759.5	5.33	Auxiliary Building 1	319676.6 4281759.5	7.34
	319723.1 4281759.5			319709.4 4281759.5	
	319723.1 4281747.5			319709.4 4281747.5	
			Auxiliary Building 2	319709.4 4281759.5 319723.1 4281759.5 319723.1 4281747.5 319709.4 4281747.5	5.66

The details of building dimensions have a critical bearing on the building downwash algorithms and their effect on concentrations.⁵⁹ Boiler emissions are especially critical because they results in the highest predicted offsite 1-hr NO2 concentrations. Although not specifically stated in the “Permit to Construct Modeling Summary,” we assume that the major change is the increase in Auxiliary Building 1 height from

⁵⁶ Ibid., ENVIRONMENTAL PROTECTION AGENCY, 40 CFR Part 51, Section 9.1.3b.

⁵⁷ “Tentative Determination and “Permit to Construct Modeling Summary “

⁵⁸ Permit to Construct Modeling Summary, March 2018, p. 9.

⁵⁹ Note that Table 1 fails to state which Auxiliary Building contains the boiler stack. Secondly a detailed site construction plan which MDE sent to me on May 31, 2018 shows only a single auxiliary building.

5.33 to 7.34 meters. This increase appears to explain why MDE's maximum predicted NO₂ concentration decreased from 181.5 µg/m³ (just below the NAAQS of 188 µg/m³) to 129.5 µg/m³. Thus, an apparent change of 2 m in building height resulted in a 52 µg/m³ reduction in maximum NO₂ concentration. The emergency engine and the boiler are virtually at the same location. The estimated distance from the boiler stack to the closest property boundary lies about 50 meters to the north where MDE's revised AERMOD analysis predicts a maximum NO₂ source impact of 40.5 µg/m³.

5.2.1 Near-source concentration gradient: I conducted a *Screen 3* analysis to estimate the boiler emissions impact on the 1-hr NO₂ concentration gradient close to the boiler source. Figure 6 graphs the result. Screen 3 is conservative and the concentrations shown may be biased high.⁶⁰ But what is important is the very steep concentration gradient in the immediate vicinity of the boiler stack. This means that a small shift in building specs or other inputs can make a significant difference in the location of maximum predicted concentrations, i.e. whether they occur on or beyond the property line. Only offsite concentrations are used to determine compliance with NAAQS standards.

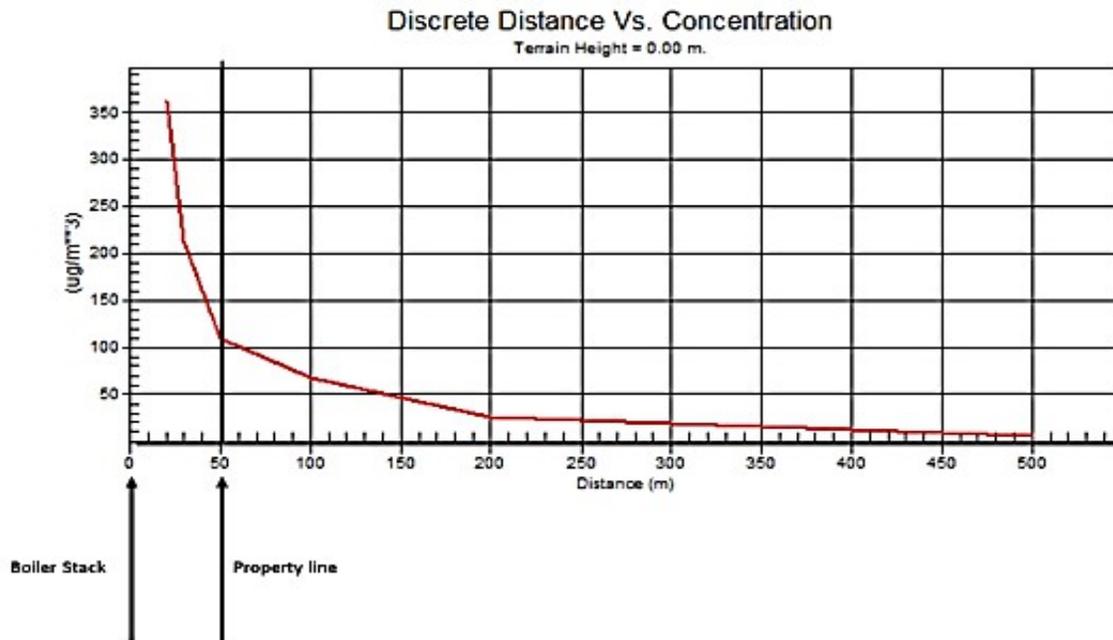


Figure 6: Screen 3 Application showing estimated 1-hr NO₂ concentration gradient.

5.3 Representativeness of Meteorological Data: Dominion and MDE compressor modeling applications used meteorological data from a weather station at Reagan National Airport (DCA) located in Alexandria, VA. The meteorological inputs to AERMOD includes 5-years of hourly wind direction and speed, temperature, and additional readings which affect the model's predicted concentrations.

Surface roughness: The DCA site was also used to generate critical land characteristics that affect dispersion and concentrations. These include (a) surface roughness, (b) the ratio of heating/evaporative cooling (Bowen Ratio) and (c) reflectivity of solar radiation (albedo).

⁶⁰ I used the Lakes Screen View version of Screen 3 including the building downwash option. The case shown in Figure 5, uses wind speed of 5 m/sec and stability class of 4, conditions that maximize near-site concentrations. The plume height ranged from about 4m to 12m from the property line to 300m.

At AMP's May 22 meeting among experts, Mr. Gebhart acknowledged that that Dominion's use of DCA land characteristics complies with applicable EPA regulations. I concur with his opinion⁶¹ that the estimated surface roughness obtained from the DCA area is not representative of the compressor station site's location and may affect AERMODs predictions.

Given the high model NO₂ concentrations and near source concentration gradient described in Section 5.2.1, the significant difference in surface roughness between the DCA and the Compressor site areas could affect the maximum concentration and its location, i.e. on- or offsite. Despite the unique condition of the compressor site, Dominion chose not to use methods to derive surface roughness estimates that more accurately represent the forested location of the compressor site, nor did MDE require such measures.

Examples of alternative methods to obtain more representative surface roughness values:

- Dominion, long aware of the unique characteristics of the site, could have installed on-site meteorological instrumentation. The company decided to use the site for a compressor station for the first time in the seventies, and then again at least three years ago according to page three of the Federal Energy Regulatory Commission's (FERC's) January 23, 2018 Order Issuing Certificate .
- Dominion could have selected one or more met stations with surface characteristics more representative of the forested compressor site.
- Finally, a new modeling approach recently approved by EPA allows use of prognostic meteorological data from WRF and similar global-scale models that use met data on a grid across the entire US. To apply this particular approach, one would select the data associated with the grid point closest to the project site and use the local land use data to develop the surface roughness and other inputs.

6.0 No public health assessment: The conclusion of MDE's "Permit to Construct Modeling Summaries" (p.9) reads as follows:

"Based on the modeling results, the maximum predicted criteria pollutant concentrations demonstrate compliance with applicable standards and the ammonia maximum predicted modeling results demonstrate compliance with all applicable MDE air toxics screening levels. Thus, from the modeling analysis it can be concluded that the proposed Charles Compressor Station will not adversely affect public health."

The last (underlined sentence) is without foundation. MDE has made no attempt to assess the potential health effects of the Charles County Compressor station. The greater Charles County area has air that is already unhealthful as evident by its non-attainment designation for its exceedances of the 8-hour ozone NAAQS. MDE made no attempt to examine the combined impact of the compressor's emissions combined with the major power plant sources which emit the same pollutants and pollutant classes as the compressor. Three of these plants are located within a 12-mile radius of the compressor site.

In addition, MDE made no attempt to examine sensitive populations including children, older residents, and those currently affected by asthma, other respiratory and cardiovascular diseases linked to exposure to NO₂, PM_{2.5}, UFPs, and ozone, all pollutants that will be emitted or formed in the atmosphere by reactions including photochemistry.

61 Refer to Gebhart submittal

In short, in the absence of a public health study, MDE's statement is irresponsible, misleading to the public and demonstrates the Department's predisposition to issue a construction permit for the Charles County Compressor Station.

7.0 MDE's permitting process: This section evaluates MDE's permitting process for the Charles County Compressor Station.

MDE's permitting process encompasses modeling results from 3 successive Dominion applications and at least two model assessments conducted by the Department. These assessments used differing source specifications resulting in major changes in estimated maximum concentrations. As stated below, it is unclear whether MDE will use its own modeling or Dominion's as the basis for its permit decision. In short, the Department's public involvement process resulted in considerable confusion. In addition, the different versions caused experts to spend far more time than anticipated wading through this application. The following is my chronological summary on which I base this conclusion.

1. On March 27, MDE provided AMP experts with electronic AERMOD files labeled Dominion Cove Point LNG, LP, Charles Compressor Station Appendix C: Air Quality Modeling Files, Feb. 2018. The files were available on CD at the Potomac Library in Charles County and were included in Dominion's February 2018 application. As discussed below, Howard Gebhart, an AMP consultant with extensive expertise applying AERMOD in regulatory cases, obtained and reviewed the files at a later date.
2. A public hearing on the permit was held on March 28, 2018; prior to the hearing MDE issued a "Tentative Determination" to approve Dominion's application for the permit. The approval was based on a maximum 1-hr NO₂ concentration of 181.5 ug/m³, compared to the NAAQS standard of 188 ug/m³.
3. MDE's maximum was very close to the 177.5 ug/m³ value stated in Dominion's November 2016 and Dominion's May 2017 revised applications. However, yet a third revised Dominion application dated February 2018, gave the much lower value of 128.8 ug/m³.
4. On the morning of April 13, 2018, I met with MDE officials including Karen Irons (Permits Program Manager), Michael Woodman (MDE modeling expert) and Angelo Bianca, (Deputy Director, Air and Radiation Administration). Also present were Ms. Kelly Canavan (president of AMP Creeks Council), and AMP Creeks attorney Larry Silverman.
5. At the meeting MDE officials explained that its revised modeling predicted a maximum 1-hr NO₂ 129.5 mg/m³ based on the modeling assessment in Dominion's February 2018 report. (MDE's Tentative Determination document gave the NO₂ maximum as 181.5). Mr. Woodman explained that his revised modeling used revised information on building specifications contained in Dominion's February 2018 application. The AMP Creeks attendees, had assumed that MDE's "Tentative Determination" rather than Dominion's 2018 application was the basis for its permit decision and were Forced to start their assessment over from square one.
6. On the afternoon of April 13, MDE emailed me its revised modeling report entitled *Dominion Cove Point, Permit to Construct Natural Gas Compressor Station, Modeling Summary, Maryland Department of the Environment, March 2018*. This MDE document described Dominion's revised building specifications and showed its effect on maximum 1-hr NO₂ concentration. (See Section 5.2 of these comments.)

7. On May 31, AMP experts including Dr. Cole, Kathleen Moors and Howard Gebhart as well AMP President Kelly Canavan and AMP attorney Larry Silverman participated in a phone conference with MDE's Michael Woodman and Karen Irons.
8. Mr. Gebhart noted that the basis for AERMOD's February 2018 modeling MDE was an outdated version (EPA 15181) rather than the more current version (16216r). Mr. Woodman stated that MDE's modeling was based on EPA's more recent version of AERMOD (16216r). However, Mr. Woodman acknowledged that the files provided to AMP and the public were based on AERMOD version 15181.
9. During the phone conference, AMP asked whether MDE or Dominion had assessed the impact of the proposed compressor on ozone concentrations in an ozone non-attainment zone. Ms. Irons stated that this issue of degradation was handled under the State Implementation Plan (SIP) but declined to provide specific information as to whether the Compressor station potential emissions were included in the SIP analysis.
10. AMP also asked for more specific information on the building height of the auxiliary building (location of boiler and stack) that MDE used in its modeling. The issue is important since the roof apparently slopes and building height affects downwash. However, we received no answer.
11. Following the meeting, MDE sent Dr. Cole an enlarged, legible copy of Dominion's site plan and a printed copy of the modeled 1-Hour NO₂ concentrations based on MDE's revised modeling. MDE provided Mr. Gebhart the newer (version 16216r) of MDE's AERMOD files. However, the rapidly approaching June 12 deadline, left insufficient time to utilize the files.

CONCLUSION

Following the BOA's initial denial of DECP's zoning special exception, DECP simultaneously sued the BOA in an attempt to preempt their decision, and filed a Motion for Reconsideration with the BOA. However, after meeting and deliberating on the subject, the BOA decided that they felt so strongly that DECP had not satisfactorily met required standards, that the BOA voted not to even reconsider the case. MDE must hold DECP to the same level of standards.

For all of the foregoing reasons laid out in arguments A - D, the technical testimony incorporated into these comments, and the testimony filed by Larry Silverman, esq. on our behalf, we ask that MDE deny DECP's application for an air quality permit in case 24-16, Charles Station.

Appendices

Appendix A: Distance, in miles, from various sites to the site of the proposed Charles Station

Appendix B: Professional resume of Howard Gebhart

Appendix C: Professional resume of Dr. Henry S. Cole

Appendix A

Site	Distance
George Washington's Mount Vernon, Mt. Vernon, Va	2.78
United States Army Nuclear and Countering Weapons of Mass Destruction (USANCA), Fort Belvoir, VA	4.02
United States Naval Ordnance Station, Naval Warfare Ctr., Indian Head, MD	7.04
Bolling Air Force Base, Washington, DC	12.61
Pentagon, Arlington, VA	13.86
United States Capitol, Washington, DC	15.65
The White House, Washington, DC	16.04

Distance, in miles, from various sites to the site of the proposed Charles Station, as the crow flies, measured in Google. Maps.

Appendix B

D HOWARD GEBHART

Environmental Compliance Section Manager

EDUCATION

M.S. Meteorology, University of Utah 1979

B.S. Professional Meteorology, Saint Louis University 1976

MEMBERSHIPS

Air & Waste Management Association

National Weather Association

Colorado Mining Association

Nebraska Industrial Council on Environment

EXPERIENCE SUMMARY

Mr. Gebhart has over 35 years' experience in air quality permitting and compliance specializing in issues technical and regulatory affecting regulated industries. Howard manages the environmental compliance section at ARS, where he provides technical studies and evaluations; and prepares models, client permit applications, air emission calculations, and performs multi-discipline environmental audits. He is very experienced in working with the federal Clean Water Act, Clean Air Act, Resource Conservation and Recovery Act (RCRA), and similar programs enacted in states throughout the U.S.

Howard also acts as an Expert Witness in legal proceedings involving the Clean Air Act and is a recognized technical expert in air dispersion modeling.

PROJECT EXPERIENCE

- Manages the Environmental Compliance Section team.
- Produces and manages quality assurance documents including quality management plans and quality assurance project plans.
- Provides technical studies and evaluations, including air dispersion modeling, permit application preparation, emissions inventories, regulatory analysis and interpretation, and environmental audits.
- Prepares applications for new source permits under federal Prevention of Significant Deterioration (PSD) and state construction and operating permit programs.
- Provides technical studies supporting Environmental Impact Statements (EISs) and Environmental Assessments (EAs) under the National Environmental Policy Act (NEPA).
- Performs air pathway evaluations for releases of hazardous air pollutants from Superfund sites, hazardous waste sites, and incinerators. Models the potential consequences of accidental releases of hazardous materials.
- Performs multi-discipline environmental audits at regulated industrial facilities.
- Manages air quality and environmental permitting studies for biofuel (ethanol and biodiesel), oil & gas exploration and production, mining and minerals, general manufacturing, and a variety of other industries with experience representing both government and private-sector clients.

Appendix C

Professional Resumé of Henry S. Cole, Ph.D.

Henry S. Cole, Ph.D. is the President of Henry S. Cole & Associates, Incorporated, an environmental science consulting company.

- Dr. Cole is an environmental and atmospheric earth scientist with 40 years of in-depth experience and expertise on issues related to atmospheric emissions, air pollution meteorology and air quality modeling. Expertise includes academic research, and expert witness work. In addition, he served as a senior scientist with the U.S. Environmental Protection Agency's Office of Air Quality Planning and Standards. He has published numerous journal articles and reports in the field of air pollution meteorology and modeling.
- Henry S. Cole & Associates, Incorporated provides scientific support for governmental agencies, corporations, legal firms, environmental organizations and community-based groups located in the United States, Canada, and Europe.
- Dr. Cole serves as an expert witness for community, environmental organizations and tort lawyers in trials and regulatory matters and has testified on numerous occasions before Congressional committees.
- Dr. Cole's experience involves the environmental releases and impacts of pollutants from a variety of various sources, i.e., gas stations, uncontrolled hazardous waste sites, municipal waste landfills, municipal waste incinerators, coal-fired power plants, and industrial facilities.
- Dr. Cole was co-recipient of EPA's *Presidential Green Chemistry Challenge Award* (with Chemical Specialties, Inc.) for his work documenting the environmental advantages of ACQ, an arsenic-free alternative wood preservative

Education:

- Ph.D. University of Wisconsin (Madison) Department of Meteorology (1969). This training included atmospheric dynamics and thermodynamics, climatology, and micrometeorology. His thesis involved the reconstruction of North America's climate during the post-glacial period.
- BS. Rutgers University, College of Agriculture (1965). Joint major in soil science and meteorology. Graduated with high honors, Phi Beta Kappa.

Professional Experience:

Associate Professor at the University of Wisconsin-Parkside (1969-1977)

- Courses including: earth sciences, environmental sciences, meteorology and air pollution.
- Conducted EPA-funded research into air pollution problems and photochemical smog in the Chicago-Milwaukee corridor. Co-authored major studies on issues published in oft-referenced journal articles.
- Served as a member of the Wisconsin State Air Pollution Council. Advisor to Racine County Board of Supervisors, co-author County Air Pollution Ordinance.

Senior scientist and section chief at U.S. EPA's Office of Air Quality Planning and Standards (1977-1983)

- Applied and developed models to predict the impact of emission sources (e.g. power plants, factories, urban regions, area sources, waste sites) on pollutant concentrations in ambient air.
- Served as Chief of the Model Application Section – Responsible for staff and studies in support of regulatory decisions and policy development.

Science Director for Clean Water Fund a national 501(3) organization (1983-1992)

- Conducted extensive research into problems associated with hazardous wastes sites including landfills, municipal waste incinerators, and the impact of mercury air emissions on water and food webs.
- Dr. Cole testified numerous before U.S. House and Senate committees on issues pertaining to hazardous waste sites, Superfund remediation, RCRA/ solid waste disposal and management and mercury pollution.

Experience as an Expert Witness

- Expert testimony applications to fossil fuel power plants and coal ash disposal units in southern Prince George's County, Maryland.
- Qualified expert witness, semi-judicial hearing, for community organization opposed to mega-gas station in Montgomery Co., Maryland. Direct and Cross Examination Administrative Hearing Special Zoning Exception Application. 2012-2015. *Special Exception denied to applicants.*
 - Expert witness, for attorney representing Harlingen, Netherlands. Report and testimony before the Raad van State, Netherlands (supreme court for disputes between citizens against executive branch decisions). The case involved the licensing of a municipal waste incinerator. February 2011.
- Expert witness for class action attorneys in numerous cases involving odors from municipal landfills and composting facilities. Expert witness Braeside, Ontario community organization (MB-FACT) representing community organization opposed to hot mix asphalt plant abutting residential properties. *Ontario Municipal Board upholds township zoning prohibiting the asphalt plant.*
- Expert witness for Ecojustice, Public Interest Law Firm, Ontario Superior Court, representing members of the Aamjiwnaang First Nation, challenge to Ministry of Environment on Suncor (Sarnia) emissions permit; expert report, forthcoming deposition and trial.
- Expert witness for Ontario Waterkeeper; witness statements, site investigation; *successful opposition* to Lafarge Cement plant plan to use alternative fuels including tires, animal wastes, municipal waste, etc. 2008.
- Technical consultant to Montgomery and Berks Counties, PA (Site examination, independent reports, and advice concerning closure requirements for the Pottstown Municipal Waste Landfill) 2005. Testimony to County board members.
- Expert, Environmental Liaison, for Court of Common Pleas Franklin County, OH. Case involved Georgia-Pacific Resins plant for environmental compliance and community impact. Issue involved waste disposal into open aeration pond, plant emissions (2003-2005).

- Several projects with the Center for Disease Control and Prevention (CDC) involving stakeholder processes between CDC's Agency for Toxic Substances and Disease Registry (ATSDR) and communities impacted by Superfund Sites and other sources of environmental pollution.

Examples of additional clients and projects:

- *Chemical Specialties, Inc.* Conducted research on the environmental advantage of arsenic and chromium free pressure treated wood preservative (manufactured by CSI). Environmental Assessment Report, participated in numerous meetings with EPA, and state agency officials. (c. 2000-2009).
- *Philips Electronics:* Report, Written Testimony to California Department of Toxic Substance Control (DTSC); The benefits of incentivizing the lowest mercury fluorescent lamps; a better policy than requiring recycling of fluorescents. (2002)
- *Allstate Insurance Company:* Forensic investigation of dry cleaner release of PCE solvent, Report established date and causes of release of dry cleaning solvent.
- *Church & Dwight (Arm & Hammer Products):* An environmental assessment report demonstrating the advantages of concentrated detergents.
- *MiCell, Inc.* developed non-toxic CO2 based alternative to perchloroethylene based dry cleaning solvent. Testimony before the Subcommittee on Tax, Finance, and Exports of the Small Business Committee U.S. House of Representatives: In Support of the Dry Cleaning Environmental Tax Credit Act. Testimony focuses on risks and damages associated with perchloroethylene (dry cleaning solvent) and the need for tax incentives for investments on safe alternatives. (2000)
- *Technical Assistant (Superfund TAG Advisor)* for approximately 10 Superfund sites, including municipal and industrial landfills in which potential gas migration was an issue.

Professional Organizations: Member of American Meteorological Society (AMS) and the American Association for the Advancement of Science (AAAS), Board of Directors of Patuxent Riverkeeper.

Publications: Numerous journal articles on air pollution meteorology and articles and reports on environmental science, education and policy. For detailed list of publications, reports, and Congressional testimony, see: <https://drive.google.com/file/d/0BytVggj8wKqBOWIUMEhrcDF5X0E/view>.