

Archived: Monday, April 12, 2021 8:01:20 AM
From: [Evan Johns](#)
Sent: Friday, April 9, 2021 10:01:52 PM
To: [Walthall, Anita](#)
Cc: [Taylor Lilley](#); [Ariel Solaski](#)
Subject: Reg. No. 21652 - Appalmad / CBF Comments
Importance: Normal
Attachments:
[Appalmad CBF Comments.pdf](#);

Good evening Ms. Walthall,

Please find enclosed comments on behalf of the Chesapeake Bay Foundation, the Sierra Club, and Elizabeth & Anderson Jones on Draft Permit Reg. No. 21652 for the proposed Lambert Compressor Station.

I have uploaded all exhibits to these comments in a SharePoint folder, which I will send to you via another e-mail. In the alternative, you can access those exhibits in a OneDrive folder at https://appalmad-my.sharepoint.com/:f/g/personal/ejohns_appalmad_org/EjvlbH1o8XRHrenS6tGZ2HQB_9faO64wA6_-oFBLhuJMcw?e=eO6gAh or in a Box folder at <https://app.box.com/s/5g6nf5q2e374zmb6znrt1fq9ngyrmv>

Please let me know if you have any questions or any difficulty accessing the exhibits.

Thank you,

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Appalachian
Mountain
Advocates

April 9, 2021

BY ELECTRONIC MAIL

Ms. Anita Walthall

DEPARTMENT OF ENVIRONMENTAL QUALITY
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RE: Mountain Valley Pipeline LLC, Registration No. 21652

Dear Ms. Walthall,

Please accept these comments on behalf of the Sierra Club, Chesapeake Bay Foundation, Inc., and Elizabeth & Anderson Jones opposing the recommendation of the Department of Environmental Quality (the Department) that the Virginia State Air Pollution Control Board (the Board) issue a pre-construction air quality permit to Mountain Valley Pipeline LLC (the Pipeline) for its proposed Lambert Compressor Station (the Station).

These comments are based on the Department's Draft Engineering Analysis (Engineering Analysis), Draft Stationary Source Permit to Construct and Operate (Draft Permit), and Public Notice Extension, as well as the Pipeline's Article 6 Air Permit Application and appendices thereto, as most recently revised on June 30, 2020 (the Application); Updated Community Impact Assessment, prepared by Land and Heritage Consulting LLC and most recently updated on February 25, 2021 (LHC Report); and Public Health Assessment of Expected Airborne Emissions, prepared by Green Toxicology LLC and most recently updated on February 25, 2021 (Green Toxicology Assessment). The comments are prepared in coordination with Dr. Ranajit Sahu, Ph.D., QEP, CEM (Nevada), an expert in environmental and mechanical engineering with over twenty-eight years of experience in those fields,¹ and George D. Thurston, Doctor of Science and Director of the Program in Exposure Assessment and Human Health Effects at the NYU School of Medicine.²

1 A copy of Dr. Sahu's resumé is enclosed as Exhibit No. 1 to these Comments.

2 A copy of Dr. Thurston's curriculum vitae is enclosed as Exhibit No. 2 to these Comments.

TABLE OF CONTENTS

REGULATORY FRAMEWORK	4
COMMENTS	7
I. THE PIPELINE’S POLLUTANT DISPERSION MODELING FAILS TO DEMONSTRATE COMPLIANCE WITH AMBIENT AIR QUALITY STANDARDS.	7
Comment No. 1: The dispersion model estimates pollutant concentrations close enough to NAAQS as to warrant further scrutiny.	7
Comment No. 2: The record lacks credible evidence that the Pipeline’s meteorological inputs are representative.	9
Comment No. 3: Other shortcomings in the dispersion model compound its unreliability.	12
II. PROPOSED EMISSION LIMITATIONS DO NOT REPRESENT THE BEST AVAILABLE CONTROL TECHNOLOGY.	14
Comment No. 4: Virginia’s NSR program requires a full, top-down BACT analysis for minor source pollutants that meet the applicable thresholds.	14
Comment No. 5: Electric compressors represent the best available control technology for NO _x , PM, and formaldehyde emissions from the proposed facility.	17
Comment No. 6: The proposed NO _x limits do not represent BACT even for SCR-paired natural gas combustion turbines.	30
III. THE DEPARTMENT’S RECOMMENDATION IS NOT SUPPORTED BY A THOROUGH REGULATORY ANALYSIS.	31
Comment No. 7: The permitting record does not support exempting additional air toxics from review and control.	31
Comment No. 8: The Department and Pipeline improperly rely on poorly rated AP-42 emission factors and decades-old fugitive emission averages.	32
Comment No. 9: The permitting record lacks the guarantees that the Department claims formed the basis for calculating Station emissions.	33
IV. THE DRAFT PERMIT IS WEAKENED BY MULTIPLE TECHNICAL ERRORS, AMBIGUOUS LANGUAGE, AND OTHER DEFICIENCIES.	34
Comment No. 10: The permitting record does not support the Draft Permit’s delineation of startup, shutdown, and normal operations.	34
Comment No. 11: The Draft Permit’s provisions regarding oxidation catalyst operations are unclear and create perverse incentives.	34

Comment No. 12:	The Draft Permit wholly ignores ammonia emissions from selective catalytic reaction.	35
Comment No. 13:	Biennial performance testing is inadequate to ensure compliance with CO, VOC, and PM emission limitations.	36
Comment No. 14:	The Draft Permit fails to ensure continuous compliance with formaldehyde emission limitations.	36
Comment No. 15:	The Draft Permit incorrectly labels equipment specifications as merely informational.	38
Comment No. 16:	The Draft Permit includes multiple conditions too vague to be enforceable as a practical matter.	39
Comment No. 17:	The Draft Permit does not address condensable particulate matter emissions.	40
Comment No. 18:	The Department has failed to explain the basis behind its venting requirement.	41
Comment No. 19:	The Draft Permit's allowance for pigging-related VOC and air toxics emissions is inconsistent with anticipated operations.	41
Comment No. 20:	Proper fugitive emissions monitoring requires monthly optical gas imaging surveys.	42
Comment No. 21:	The Draft Permit lacks an adequate means of determining compliance with the fuel sulfur content limit.	42
Comment No. 22:	The Draft Permit fails to ensure hexane emissions are in fact exempt from regulation.	43
Comment No. 23:	The Draft Permit's opacity monitoring requirements are facially inadequate.	43
Comment No. 24:	The initial stack test should encompass SO ₂ and NO _x emissions.	44
Comment No. 25:	The Draft Permit fails to specify how missing or invalid CEMS data will be accounted for in compliance determinations.	44
Comment No. 26:	Submissions required under the Permit should be affirmatively disclosed to the public.	44
V.	THE PERMITTING RECORD DOES NOT ADEQUATELY ASSESS ENVIRONMENTAL JUSTICE	45
Comment No. 27:	The Board must independently consider the presence of environmental justice communities in the surrounding area and how they will be impacted by the proposed Project.	46
Comment No. 28:	The Board must reject the conclusions of the Pipeline's EJ supplement and explicitly recognize the existence of environmental justice communities.	48

Comment No. 29:	The Board must consider the human health risks to the particular communities affected by the proposed Station.	50
Comment No. 30:	The Board should reject the Pipeline’s imposition of a restrictive one-mile radius and consider the potential impacts from air emissions on communities beyond a one-mile radius.	52
Comment No. 31:	The Department must clarify how it is interpreting the Air Pollution Control Board Law.	54
Comment No. 32:	Compliance with the National Ambient Air Quality Standards (NAAQS) is not conclusive evidence that there will be no negative health impact to local communities, and the Board must reject the Pipeline and Department’s suggestions to the contrary.	55
Comment No. 33:	The Board cannot rely on the Pipeline’s conclusory and unsupported Public Health Assessment.	63
Comment No. 34:	The Department should require the Pipeline provide more reliable data for evaluating risks to human health.	65
CONCLUSION		66
REQUEST FOR DIRECT CONSIDERATION		66



REGULATORY FRAMEWORK

The Clean Air Act aims to “protect and enhance the quality of the Nation’s air resources.”³ To that end, the Act authorizes the Environmental Protection Agency (EPA) to establish national ambient air quality standards (NAAQS) protective of public health and welfare.⁴ The Act then employs a variety of programs designed to ensure that NAAQS are met nationwide and that air quality does not deteriorate in NAAQS-compliant areas. One of those programs is the New Source Review (NSR) permitting program, which governs air pollution from so-called “minor sources” that emit air pollution at levels below thresholds for treatment as a “major source.”

Virginia’s NSR program is codified in Chapter 80, Part II, Article 6 of the Board’s Regulations for the Control and Abatement of Air Pollution (the Regulations).⁵ The program generally prohibits construction of a facility that will emit significant air pollution until the operator of that facility obtains a Board-issued permit.⁶ In order to qualify for an Article 6 permit, an applicant

3 42 U.S.C. § 7401.

4 *Id.*

5 9 VAC §§ 5-80-1100—5-80-1300.

6 *Id.* § 5-80-1120(A).

must, among other things, “show[] to the satisfaction of the [B]oard” that its proposed source will:

- ☞ “operate without preventing or interfering with the attainment or maintenance of any applicable [NAAQS] and without causing or exacerbating a violation of any applicable [NAAQS],”⁷ and
- ☞ “be designed, built and equipped to comply with standards of performance prescribed” under Chapter 50 of the Regulations.⁸

Chapter 50, in turn, requires that stationary sources limit significant emissions of any pollutant to a rate commensurate with the “best available control technology for each [such] pollutant.”⁹ Best available control technology (BACT) is a term of art that, despite its usage in several distinct air permitting programs,¹⁰ is consistently defined as:

an emissions limitation (including a visible emission standard) based on the maximum degree of emission reduction for any pollutant which would be emitted from a new stationary source or project which the board, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for the new stationary source or project through the application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.¹¹

The Board has traditionally followed the five-step “top down” BACT review process propounded by the EPA, further developed by its Environmental Appeals Board (EAB),¹² and

7 *Id.* § 5-80-1180(A)(3).

8 *Id.* § 5-80-1180(A)(1).

9 *Id.* § 5-50-260(B).

10 *See, e.g., id.* § 5-80-1705(B) (requiring BACT for major stationary sources).

11 9 VAC § 5-50-250(C). As explained further below, this definition substantively identical to the definition used in connection with major source permitting under the Prevention of Significant Deterioration (PSD) program. *See infra* notes 65–71 & accompanying text.

12 In adjudicating appeals from federally-issued air pollution permits (including those issued by state authorities under a federal delegation), the EAB has developed a body of case law refining the EPA’s top-down BACT review process. Even when a state permitting authority performs a BACT analysis under its own state-specific program, the permitting authority may depart from the EPA’s analytical framework only where it clearly articulates (and provides a statutory foundation for) its alternative approach. *Cash Creek Generation*, EPA Title V Petition No. IV-2008-1, Order Denying in Part and Granting in Part Requests for Objection at 9 (December 15, 2009), available at <https://bit.ly/3cUhKIG> (enclosed as Exhibit No. 3).

upheld by the federal courts.¹³ Regardless of the exact process followed, however, the law requires “a robust presentation of evidence in the record” related to any circumstance “central to the BACT analysis.”¹⁴ Failing to conduct a complete BACT analysis—including a failure to consider all potentially applicable control alternatives—is an abuse of a permitting authority’s discretion.¹⁵

In addition to a BACT analysis, Virginia law requires the Board to undertake a site suitability analysis under Section 10.1-1307(E) of the Virginia Air Pollution Control Law. That provision—which applies to all permits and regulations issued by the Board—demands the Board to consider

1. The character and degree of injury to, or interference with, safety, health, or the reasonable use of property which is caused or threatened to be caused;
2. The social and economic value of the activity involved;
3. The suitability of the activity to the area in which it is located; and
4. The scientific and economic practicality of reducing or eliminating the discharge resulting from such activity.¹⁶

The Fourth Circuit Court of Appeals recently held that Section 10.1-1307(e) must be read in tandem with the Board’s separate duty to “act in a matter consistent with” the Commonwealth’s general policy of “[e]nsur[ing] development of new, or expansion of existing, energy resources or facilities does not have a disproportionate adverse impact on economically disadvantaged or minority communities.” The court held that, taken together, the two statutes require the Board to meaningfully consider environmental justice as part of its site suitability analysis.¹⁷

Article 6 requires that any minor NSR permit with “the potential for public interest concerning air quality issues” must “be subject to a public comment period of at least 30 days.”¹⁸ During that period, interested parties may submit substantive comments on the draft permit and request

13 See generally, e.g., *Sierra Club v. Environmental Protection Agency*, 499 F.3d 653 (7th Cir. 2007); *Helping Hand Tools v. Environmental Protection Agency*, 848 F.3d 1185 (9th Cir. 2016); *United States v. Ameren Missouri*, 421 F. Supp. 3d 729 (E.D. Mo. 2019).

14 See *Northern Michigan University*, 14 E.A.D. 283, 299 (E.A.B. 2009) (enclosed as Exhibit No. 4); see also *Virginia Retirement System v. Cirillo*, 54 Va. App. 193, 199–204 (2009) (noting that the Virginia Administrative Process Act, Virginia Code §§ 2.2-4019—2.2-4031, requires all agency findings be supported by substantial evidence).

15 See *Louisville Gas & Electric*, EPA Title V Petition No. IV-2008-3, Order Denying in Part and Granting in Part Requests for Objection at 13 (August 12, 2009), available at <https://bit.ly/3cNBhKA> (enclosed as Exhibit No. 5).

16 Virginia Code § 10.1-1307(E).

17 *Friends of Buckingham v. State Air Pollution Control Board*, 947 F.3d 68 (2020).

18 9 VAC § 5-80-1170(D).

“direct consideration of the minor NSR permit application by the [B]oard.”¹⁹ Regardless of whether the Department or the Board ultimately acts on the permit application, the law requires a reasoned response to “all significant comments” on the draft permit.²⁰ Ultimately, all facts critical to the Board’s decision must be borne by substantial evidence in the permitting record.²¹ Stated otherwise, the Board’s decision must be supported by “the kind of evidence on which responsible persons are accustomed to rely in serious affairs.”²²

COMMENTS

I. THE PIPELINE’S POLLUTANT DISPERSON MODELING FAILS TO DEMONSTRATE COMPLIANCE WITH AMBIENT AIR QUALITY STANDARDS.

Comment No. 1: The dispersion model estimates pollutant concentrations close enough to NAAQS as to warrant further scrutiny.

The Board may issue an Article 6 permit only if an applicant demonstrates its proposed facility will “operate without preventing or interfering with the attainment or maintenance”—and “without causing or exacerbating a violation”—of applicable NAAQS.²³ That demonstration generally requires sophisticated modeling of how pollution from the facility will disperse given the surrounding topography and prevailing meteorological conditions.²⁴

19 *Id.* § 5-80-1170(F). The Board has delegated to the Department general authority to grant or deny permit applications that the Board does not directly consider itself. *See id.* § 5-170-30(D).

20 40 C.F.R. §§ 124.17, 124.1; *see also United States Steel*, EPA Title V Petition No. V-2009-03, Order Granting in Part and Denying in Part Petition for Objection at 7 (January 31, 2011), available at <https://bit.ly/3m3wol9> (enclosed as Exhibit No. 6) (“It is a general principle of administrative law that an inherent component of any meaningful notice and opportunity for comment is a response by the regulatory authority to significant comments.”); *Mississippi Lime*, 15 E.A.D. 349, 365 (E.A.B. 2011) (enclosed as Exhibit No. 7) (“The Board has repeatedly held that the permit issuer must provide a reasoned basis for its decision, which must include an adequate response to comments raised during the public comment period.”); *Home Box Office v. Federal Communications Commission*, 567 F.2d 9, 35 (D.C. Cir. 1977) (“[T]he opportunity to comment is meaningless unless the agency responds to significant points raised by the public.”).

21 *Friends of Buckingham v. State Air Pollution Control Board*, 947 F.3d 68, 90 (2020).

22 *Sprint Spectrum v. Willoth*, 176 F.3d 630, 646 (2d Cir. 1999) (quoting *WEOK Broadcasting v. Town of Lloyd Planning Board*, 592 N.E. 2d 778, 783 (N.Y. 1992)).

23 9 VAC § 5-80-1180(A)(3).

24 *See* 40 C.F.R. Part 51 Appendix W § 9.2.2(a); *see also* Environmental Protection Agency, *New Source Review Workshop Manual: Prevention of Significant Deterioration and*

Accompanying the Pipeline’s Application is an *Air Quality Dispersion Modeling Report* (the Modeling Report) describing its modeling efforts to support the claim that its Station will “not cause or contribute to any exceedance of [applicable] NAAQS . . . [or] significant air toxics concentrations for formaldehyde and hexane.”²⁵ The Department’s Engineering Analysis includes a table reflecting the results of the Pipeline’s modeling alongside the applicable NAAQS.²⁶ For ease of reference, we include that table, with added highlighting, below.

Pollutant (averaging period)	Total Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Ambient Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
NO ₂ (1-hr)	178.8	--- ⁽¹⁾	178.8	188
NO ₂ (annual)	21.8	13.2	35.0	100
CO (1-hr)	2,151	1,955	4,106	40,000
CO (8-hr)	1,106	1,495	2,601	10,000
PM _{2.5} (24-hr)	5.8	17	23.0 ⁽²⁾	35
PM _{2.5} (annual)	1.0	6.9	7.9 ⁽²⁾	12
PM ₁₀ (24-hr)	9.1	22	31.1	150

⁽¹⁾ Season and hour of day varying.

⁽²⁾ Total concentration includes the contribution from secondary PM_{2.5} formation.

The highlighted cells indicate that total one-hour NO₂ concentrations, annual PM_{2.5} concentrations, and twenty-four-hour PM_{2.5} concentrations are precariously close to the applicable NAAQS. One-hour NO₂ concentrations, for example, are estimated at more than 95% of the NAAQS.

Nonattainment Area Permitting at C.24 (October 1990), available at <https://bit.ly/3fG1NZw> (NSR Workshop Manual) (enclosed as Exhibit No. 8) (“Dispersion models are the primary tools used [to] . . . estimate the ambient concentrations that will result from [an] applicant’s proposed emissions in combination with emissions from existing sources” and “to demonstrate compliance with any applicable NAAQS or PSD increments.”).

25 See generally Mountain Valley Pipeline, *MVP Southgate Project Lambert Compressor Station: Air Quality Dispersion Modeling Report* at 4-4 (June 2020) (Modeling Report).

26 See Engineering Analysis at 14. Note that this table includes impacts from all sources, and not just the proposed Station.

Given the proximity between projected concentrations and the applicable NAAQS, even modest errors in modeling inputs or methodology could push air quality into NAAQS non-compliance. Under these circumstances, the Board must be vigilant in ensuring the dispersion modeling is not understating pollutant concentrations. This is true even if, as the Department states in its Engineering Analysis, “the contribution from the proposed [Station] is relatively small when compared to the adjacent Transco Compressor Station 165.”²⁷ The relevant inquiry is whether the proposed Station will add new pollution to the ambient air without “interfering with the attainment” or “exacerbating a violation of” the applicable NAAQS.²⁸ The fact that other sources also contribute to concentrations in excess of NAAQS—or, even, are responsible for a larger share of that pollution—is irrelevant.

Here, the Pipeline’s own dispersion model projects that the Station’s emissions will further push pollutant concentrations to the brink of the applicable NAAQS. Those results require the Department and the Board to carefully scrutinize the Pipeline’s assumptions and methodology. And as detailed in the next two comments below, the modeling simply cannot withstand that scrutiny.

Comment No. 2: The record lacks credible evidence that the Pipeline’s meteorological inputs are representative.

In reviewing dispersion modeling, the permitting agency’s “primary role is to determine whether the applicant selected the appropriate model(s), used appropriate input data, and followed recommended procedures to complete the air quality analysis.”²⁹ As to that first consideration, the Pipeline has employed the EPA-approved AERMOD model—a generally acceptable model when directed by “competent individuals with a broad range of experience and knowledge in air quality meteorology.”³⁰ Even a sound model, however, is only as good as the data that goes into it. Board-adopted modeling guidelines³¹ emphasize that “all meteorological data used as input to AERMOD should be adequately representative” of conditions at the emissions site,³² and

27 Engineering Analysis Attachment 2 at 5; *see also, generally*, Virginia Department of Environmental Quality, Stationary Source Permit for Transcontinental Gas Pipe Line, Registration No. 30864 (January 28, 2020).

28 9 VAC § 5-80-1180(A)(3) (“No minor NSR permit will be granted unless . . . [t]he source [is] designed, built and equipped to operate without preventing or interfering with the attainment or maintenance of any applicable ambient air quality standard and without causing or exacerbating a violation of any applicable ambient air quality standard.”).

29 NSR Workshop Manual at C.25.

30 40 C.F.R. Part 51 Appendix W § A.1(b)(2)(i).

31 *See* 9 VAC § 5-20-21(E)(2)(c) (incorporating 40 C.F.R. Part 51 Appendix W by reference into the Board’s Regulations).

32 40 C.F.R. Part 51 Appendix W § 8.4.2(b).

reviewed to “ensure that the wind, temperature and turbulence profiles derived by AERMOD are both laterally and vertically representative of the source impact area.”³³

Nowhere in the Engineering Analysis or attached memoranda does the Department purport to review whether the Pipeline’s inputs into the AERMOD model meet this standard of “representativeness.” The only discussion of those inputs is in the Pipeline’s Modeling Report. The entirety of that discussion reads:

Guidance for air quality modeling recommends the use of one year of onsite meteorological data or five years of representative off-site meteorological data. Since onsite data are not available for the Project, meteorological data available from the National Weather Service was used in this analysis. Surface meteorological data collected at the NWS station at the Lynchburg Regional Airport (LYH) and upper air data from the Piedmont Triad International Airport in Greensboro, NC (GSO) for the period 2012-2016; generated using the most recent version of AERMET^[34] (v19191) (US EPA 2019b) was acquired from VA DEQ and used in the modeling analyses.³⁵

While the Department accepted this data as appropriate without discussion, nothing in the permitting record supports using data so facially unrepresentative on several key dimensions:

❧ *Proximity.* Obviously, on-site data is the *most* representative indicator of meteorological conditions that affect dispersion of proposed pollutants.³⁶ But as the Pipeline admits, it did not collect that information.³⁷ Thus, in evaluating the representativeness of its chosen dataset, the “proximity of the meteorological monitoring site to the area under consideration” is a primary factor.³⁸ This requirement of “spatial representativeness” becomes increasingly strained with “large[r] distances between the source and receptors of interest.”³⁹ Although the permitting record does not disclose the exact distance between the Lynchburg Regional Airport and the Project site, public GIS resources seem to indicate the Airport is some 40 miles to the northeast.

33 *Id.* § 1.0(c).

34 AERMET is a meteorological data processor used in conjunction with the AERMOD dispersion model. 40 C.F.R. Part 51 Appendix W § 4.2.2.1(a).

35 Modeling Report at 3-2.

36 40 C.F.R. Part 51 Appendix W § 8.4.4.1(a) (“Site-specific measured data are, therefore, preferred as model input, provided that appropriate instrumentation and quality assurance procedures are followed, and that the data collected are adequately representative . . . and compatible with the input requirements of the model to be used.”).

37 Modeling Report at 3-2 (“[O]n-site data are not available for the Project.”).

38 40 C.F.R. Part 51 Appendix W § 8.4.1(b).

39 *Id.*

❧ *Topography.* In addition to raw proximity, spatial representativeness also depends on “the complex topographic characteristics of the area.”⁴⁰ Sites separated only by flat, open terrain are more likely to share representative conditions than sites located on or separated by complex terrain.⁴¹ The only information in the permitting record relevant to this inquiry the Pipeline’s description of terrain within a 20-kilometer radius of the Project site:

The Project is situated at approximately 670 feet elevation above mean sea level. Within about 20 km surrounding the Project, the terrain is characterized by rolling hills, with approximate elevations between 450 to 950 feet above mean sea level.⁴²

Notably, this description does not even extend to the Lynchburg Airport, which, as discussed above, is located more than 50 kilometers from the Project site. But more importantly, the discussion demonstrates that at least half of that distance is characterized by complex topography. And although the relative elevation of the two sites is also absent from the record, public datasets indicate that portions of the Lynchburg Airport sit at over 950 feet above sea level.

❧ *Airport Data.* While airport meteorological data were important in early dispersion modeling exercises, EPA guidance now disfavors their use in regulatory modeling.⁴³ This is in part due to the fact that airports are characterized by—and, in fact, are designed to maintain—low levels of surface roughness.⁴⁴ As such, relying on meteorological data from airports can “result[] in large under-predictions of maximum ground level concentrations when compared to AERMOD results using onsite meteorological data”⁴⁵—especially for lower-stack sources in complex terrain, like the Station.⁴⁶

40 *Id.*

41 Environmental Protection Agency, *Meteorological Monitoring Guidance for Regulatory Modeling Applications* 9-21 (February 2000), available at <https://bit.ly/2PMBNkt> (enclosed as Exhibit No. 9) (Meteorological Monitoring Guidance).

42 Modeling Report at 3-3.

43 Meteorological Monitoring Guidance, *supra* note 41, at 6-30.

44 Brian Holland *et al.*, *Representative Meteorological Data for AERMOD: A Case Study of WRF-Extracted Data Versus Nearby Airport Data* 3 (October 2017), available at <https://bit.ly/31CwkiQ> (enclosed as Exhibit No. 10).

45 *Id.* at 6.

46 *Id.* at 4-5. Stack heights for the Station will be closer to ground-level than the 35-meter “tall stack” scenario modeled in this study. See Mountain Valley Pipeline, *MVP Southgate Project Lambert Compressor Station: Air Quality Dispersion Modeling Protocol* Appendix B at Table B.1 (January 2020).

If the Lynchburg Airport truly represents the most representative site for which meteorological data are available, further analysis using on-site data is necessary. While one year of on-site data is standard,⁴⁷ comparing shorter periods of on-site data to corresponding Lynchburg data may provide some assurance that general reliance on the latter is appropriate. Temporary monitoring masts in support of such an effort are available at modest cost.

We note that other permitting authorities are far more vigilant in requiring permit applicants to adequately model the impact of their facilities on affected communities. The Department's Arizona counterpart, for example, describes a more thorough procedure for vetting off-site data:

If on-site meteorological data is unavailable for a given facility and the applicant wishes to model using meteorological data available from another location, the applicant must submit a detailed meteorological analysis to ADEQ for review. The meteorological analysis should explain how meteorological data from an offsite location is representative of the meteorological patterns around the facility. The applicant should discuss the differences / similarities in topography, climatology (especially wind patterns and mixing heights), and surface characteristics (surface roughness length, albedo, and Bowen ratio) between the two locations. The applicant should also explain why the utilization of offsite meteorological data would provide conservative modeling results.⁴⁸

No discussion of that caliber appears anywhere in the permitting record. Until it does, there is no basis for the Department's tacit assumption that modeling inputs are sufficiently representative.

Comment No. 3: Other shortcomings in the dispersion model compound its unreliability.

Several additional flaws in the dispersion modeling, while perhaps not fatal in their own right, become more serious in light of the more critical flaws discussed above in Comment No 2. Taken in conjunction with those flaws, the discrete issues below further undermine the Department's assumption that the Pipeline has adequately estimated the impacts to surrounding communities.

❧ *Background PM_{2.5} Concentrations.* The Pipeline's Modeling Report suggests that its cumulative air quality modeling analysis relied on "conservatively representative" air quality monitoring data.⁴⁹ That statement, however, does not accord with its use of PM_{2.5} annual background concentration from Salem in Roanoke County, Virginia,⁵⁰ where PM_{2.5} emissions (732 tons per year) are less than half that of Pittsylvania County (1475 tons per

47 40 C.F.R. Part 51 Appendix W § 8.4.2(e).

48 Arizona Department of Environmental Quality, *Air Dispersion Modeling Guidelines for Arizona Air Quality Permits* 28 (September 23, 2013), available at <https://bit.ly/3dlOieW> (enclosed as Exhibit No. 11).

49 Modeling Report at 3–5.

50 *Id.* at Table 3-7.

year). While the Report is candid in acknowledging that the modeled PM₁₀ background may not be conservative,⁵¹ the Pipeline’s use of the Roanoke County background data indicates the same is true for PM_{2.5}. The permitting record therefore suggests an underestimation of total PM_{2.5} impacts

- ❧ *Background NO₂ Concentrations.* For one-hour NO₂ modeling, the model concentration and cumulative concentration—including background, which is variable by time and season—are both shown as 178.8 µg/m³.⁵² It is unclear whether the background concentration is included in the model concentration figure. If it is, the Pipeline should also show the actual modeled concentration separately—without background. Further, Tables 4.2 and 4.3 show the model results for different load scenarios (including startup and shutdown), all of which were *identical* for all pollutants. Here too, it is unclear why the resulting concentrations are the same for each load scenario and for startup and shutdown. Presumably, those concentrations should differ in light of the differing emission rates and stack parameters shown in Appendix B. Until the Pipeline explains this discrepancy, its modeling results remain suspect.
- ❧ *NO_x Conversion Rate.* The Pipeline’s Modeling Report describes the use of EPA’s default Ambient Ratio Method 2 to account for the formation of NO₂ from NO_x emissions.⁵³ As the Report notes, however, that Method estimates the conversion ratio of NO₂ to NO_x between 50–90%.⁵⁴ A genuine attempt at conservative modeling, then, would have assumed 100% conversion of NO_x to NO₂.
- ❧ *Assumed Emission Factors.* As explained in greater detail below,⁵⁵ the emission factors the Pipeline uses for certain pollutants—particularly PM₁₀ and PM_{2.5}—appear inaccurate, further undermining any certainty in the modeling outputs.
- ❧ *Missing Data on Nearby Sources.* Finally, the Modeling Report describes cumulative modeling that includes emissions from nearby sources.⁵⁶ Table 3-9 lists these nearby sources, but instead of listing the emissions from each, the Pipeline claims that “the complete set of model inputs is provided with the electronic modeling files.”⁵⁷ Even

51 *Id.* at 3–5 (“[A]ny air quality monitoring data (*other than PM₁₀*) used from these surrounding counties would be inherently conservative.”) (emphasis added).

52 *Id.* at Table 4-2.

53 *Id.* at 3-8.

54 *Id.*

55 *See infra* Comment No. 8.

56 *Id.* at 3-11.

57 *Id.*

assuming that those values are included in native-format modeling files, providing the data in the table would provide useful context and more transparency for public review.⁵⁸

Taken together with concerns about the Pipeline’s meteorological data, these errors undermine the Department’s prediction that air quality will remain below—and for NO₂ in particular, only *just* below—the applicable NAAQS thresholds. Without more substantial evidence that the Station will not cause or contribute to an exceedance of NAAQS, the Board cannot issue a permit under Article 6.⁵⁹

II. PROPOSED EMISSION LIMITATIONS DO NOT REPRESENT THE BEST AVAILABLE CONTROL TECHNOLOGY.

Comment No. 4: Virginia’s NSR program requires a full, top-down BACT analysis for minor source pollutants that meet the applicable thresholds.

Without citing to any legal authority, the Department’s Engineering Analysis claims “a ‘top-down’ BACT review is not required for minor NSR permits.”⁶⁰ Not even the Pipeline endorses that view.⁶¹ And for good reason: the only plausible reading of the Board’s Regulations requires BACT be treated no differently in the Article 6 context than in the other forms of NSR review. This is because Virginia law requires regulatory language be interpreted according to the same “principles of construction courts normally employ” in statutory construction.⁶² Two of those principles are particularly relevant here:

✎ First, Virginia law requires that technical terms and terms of art be given their understood meaning in the disciplines in which they are used.⁶³

58 See *infra* Comment No. 26.

59 9 VAC § 5-80-1180(A)(3).

60 Engineering Analysis at 10.

61 See Application at 29 (“BACT analysis for the proposed Project was conducted consistent with the USEPA’s five-step ‘top-down’ BACT process as discussed in the USEPA’s October 1990 draft New Source Review Workshop Manual.”).

62 See *MPS Healthcare v. Department of Medical Assistance Services*, 70 Va. App. 624, 631 (2019) (holding that courts will “accept only . . . agency interpretations that are reasonable in light of the principles of construction courts normally employ”) (quoting *Avante at Roanoke v. Finnerty*, 56 Va. App. 190, 197 (2010)).

63 Cf. *Amherst County Board of Supervisors v. Boaz*, 176 Va. 126, 130 (1940) (“Non-technical words in statutes are taken to have been used in their ordinary sense and acceptance.”); *Dawson v. Commonwealth*, 63 Va. App. 429, 435 n.3 (2014) (“It is a basic rule of statutory construction that a word in a statute is to be given its everyday ordinary meaning unless the word is a word of art.”) (quoting *Stein v. Commonwealth*, 12 Va. App. 65, 69 (1991)).

- ✧ Second, the Supreme Court of Virginia has held that, when language “is used in different sections of a statute and its meaning is clear in all but one instance, ‘the same meaning will be attributed to it elsewhere unless there [is] something in the context which clearly indicates that the legislature intended some other and different meaning.’”⁶⁴

It is significant, then, that the Board’s Regulations include two regulatory definitions of “best available control technology.” In the context of pre-construction permits under the Prevention of Significant Deterioration program, 9 VAC § 5-80-1615 defines “best available control technology” as, in relevant part:

[A]n emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant that would be emitted from any proposed major stationary source or major modification that the board, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.⁶⁵

In implementing this definition, the Department and Board have expressly adopted the five-step, top-down method outlined in the EPA’s *New Source Review Workshop Manual*.⁶⁶ Board guidance specifically instructs permit writers to consult the EPA’s *Workshop Manual* when performing a BACT analysis.⁶⁷

Meanwhile, 9 VAC § 5-50-250 defines BACT for purposes of the minor NSR program as, in relevant part:

[A]n emissions limitation (including a visible emission standard) based on the maximum degree of emission reduction for any pollutant which would be emitted from a new stationary source or project which the board, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for the new stationary source or project through the application of production processes or available methods, systems and techniques, including fuel

64 *Albemarle County Board of Supervisors v. Marshall*, 215 Va. 756, 761–62 (1975) (quoting *Postal Telegraph Cable v. Farmville & Powhatan Railroad*, 96 Va. 661, 664 (1899)) (internal alterations omitted).

65 9 VAC § 5-80-1615(C).

66 See Virginia Air Pollution Control Board, *Air Permitting Guidelines – New and Modified PSD Sources*, Doc. No. APG-309, 4-1—4-5 (November 2, 2015) (PSD Permitting Guidelines).

67 *Id.* at 4-1 (“EPA’s draft New Source Review Workshop Manual (October 1990) provides detail information on performing the BACT analysis.”).

cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.⁶⁸

Neither the Board nor the Department has articulated a basis for interpreting these virtually identical definitions differently.⁶⁹ Nor is it credible that the Board would employ a term as precise and technical as “best available control technology”—a term that has been extensively, even “painstakingly,”⁷⁰ developed through a body of administrative guidance and judicial precedent—in both Article 6⁷¹ and Article 8, expecting that the term would be interpreted or even applied differently in each context, despite substantively identical definitional provisions.

Nor, even, is there a significant textual difference in the regulatory directives to apply BACT. The directive language in 9 VAC § 5-50-260 requires that a minor “stationary source shall apply the best available control technology for each regulated pollutant for which there would be [a significant] uncontrolled emission rate.”⁷² For PSD sources, the directive language requires that a “major stationary source shall apply best available control technology for each regulated NSR pollutant that it would have the potential to emit in significant amounts.”⁷³ In both cases, the

68 9 VAC § 5-50-250.

69 Both 9 VAC 5-50-260(C) and 9 VAC 5-80-1615(C) include additional elements to the definition of BACT. The only significant distinction in those elements, however, is that 9 VAC § 5-50-260(C) includes the following language:

In determining best available control technology for stationary sources subject to Article 6 . . . , consideration shall be given to the nature and amount of the emissions, emission control efficiencies achieved in the industry for the source type, total cost effectiveness, and where appropriate, the cost effectiveness of the incremental emissions reduction achieved between control alternatives.

While 9 VAC § 5-80-1615(C) does not include that language, it is presumably applicable in the context of PSD permitting as well, as major stationary sources are also “subject to Article 6.” See 9 VAC § 5-80-1100(H)(1). In any case, it merely parrots principles already articulated in the *NSR Workshop Manual*. Thus, this additional language provides no basis for distinguishing between BACT review in PSD permitting and BACT review in minor NSR permitting.

70 *Desert Rock Energy*, 14 E.A.D. 484, 527 (2009), available at <https://bit.ly/3wJ8C2F> (enclosed as Exhibit No. 47).

71 Strictly speaking, Article 6 does not define “best available control technology.” Cf. 9 VAC § 5-80-1110(C). It does, however, require minor NSR sources comply with “standards of performance prescribed under 9VAC5-50,” *id.* § 5-80-1180(A)(1), which in turn define BACT in accordance with § 5-50-250, the provision cited above.

72 9 VAC § 5-50-260(B).

73 *Id.* § 5-80-1705(B).

mandate is the same: the “stationary source shall apply the best available control technology” for the control of each pollutant subject to the program.

In overruling a state permit based on an insufficient BACT analysis, the EPA has acknowledged that a permitting agency is “not necessarily required to follow the analytical framework used by EPA to assess whether an option may be excluded from a BACT analysis.”⁷⁴ But if the state agency wants to “employ a different approach,” it “*must* articulate its intent to do so and *provide a statutory foundation* for any alternative approach.”⁷⁵ The permitting record here contains no such foundation. Until it does, the Board must follow the five-step, top-down BACT analysis used, uncontroversially, by “[a]lmost all Clean Air Act permitting agencies.”⁷⁶

Comment No. 5: Electric compressors represent the best available control technology for NO_x, PM, and formaldehyde emissions from the proposed facility.

The Station would emit virtually no pollution if it employed electric-driven compressors instead of natural-gas-fired turbines.⁷⁷ Electric compression is a textbook example of a “production process” capable of achieving the same end as the proposed turbines—compression—with far fewer emissions and less noise than natural gas combustion.⁷⁸ And unlike most control technology trade-offs, this is not a question of achieving an incremental reduction in pollution; it is a matter of altogether *eliminating* pollution from the Station—along with the administrative burdens associated with monitoring, compliance demonstration, and enforcement. Given those stakes, the Department should have ensured that the BACT determination was “well documented in the administrative record.”⁷⁹

Although the Department provides three generalized reasons why it believes electric compression does not represent BACT for the Station,⁸⁰ it makes no attempt to place these justifications in the framework of the five-step, top-down BACT analysis. And because the Department has failed to articulate an alternate, legally defensible approach to BACT review, the Department’s conclusions are by definition arbitrary—that is, they are “made without

74 *Cash Creek Generation*, *supra* note 12, at 9.

75 *Id.* (emphasis added).

76 *United States v. Ameren Missouri*, 421 F. Supp. 3d 729, 753 (E.D. Mo. 2019).

77 Although the Application claims “total onsite *and* offsite emissions from electric generation are higher than emissions from natural gas compression,” Application at 60 (emphasis added), it provides no account of how electric compression could increase *onsite* emissions.

78 *See generally* Environmental Protection Agency, *Install Electric Compressors* (2011), available at <https://bit.ly/3dHo7zm> (enclosed as Exhibit No. 12).

79 *Mississippi Lime*, 15 E.A.D. at 361.

80 Engineering Analysis at 10; *see also infra* notes 98 & 118 and accompanying text.

consideration of or regard for . . . fixed rules, or procedures.”⁸¹ The Department cannot merely provide a string of conclusory findings without explaining the principles that guide its analysis.

Nonetheless, we address each of the Department’s grounds below, placing them in the context of a full, five-step BACT analysis. We note however, that most of this analysis is academic given the Pipeline’s acknowledgment that “electric compression has been used to meet Lowest Available Emission Rate requirements”⁸² under the Clean Air Act’s Nonattainment New Source Review program.⁸³ Given that fact, the Step-Four economic impacts analysis is the only relevant inquiry, because the only substantive distinction between BACT and LAER is the treatment of cost.⁸⁴ Even the “redefining the source” doctrine applies with equal force in both BACT and LAER determinations.⁸⁵ But given the importance of a full BACT analysis,⁸⁶ we address each step in turn.

Step One: Redefining the Source

The first step in a top-down BACT analysis is to identify all “available” options for controlling emissions.⁸⁷ Importantly, Step One involves identifying not only technologies that can be added

81 BLACK’S LAW DICTIONARY, *Arbitrary* (11th ed. 2019).

82 Application Appendix D at 1.

83 The Nonattainment New Source Review program is a subset of the broader New Source Review permitting program and is applicable to major stationary sources of pollution located in areas where air quality falls below applicable NAAQS. *See generally* 42 U.S.C. § 7503.

84 *Wisconsin Electric Power*, Wisconsin Division of Hearings & Appeals Case No. IH-04-03, Findings of Fact, Conclusions of Law, and Order at 10 (February 3, 2005), available at <https://bit.ly/3ltXZeR> (enclosed as Exhibit No. 13) (“The principal difference in BACT and LAER analysis is that LAER analysis does not consider economic factors, except to the extent that LAER is not considered ‘achievable’ if the cost of the control is determined to be prohibitive.”).

85 *See id.* at 14 (“The range of control options evaluated under LAER is generally the same as those evaluated under a BACT analysis.”); *id.* at 22 (“An applicant for an air pollution control construction permit is not required to redefine the design of the proposed source in selecting control technologies or production processes for inclusion in the BACT or LAER analysis.”); *Woodland Pulp*, Maine Department of Environmental Protection Permit No. A-215-77-15-A, Findings of Fact at 18 (July 27, 2018), available at <https://bit.ly/30TTcKc> (enclosed as Exhibit No. 14) (explaining that neither BACT *nor* LAER “require source redefinition[,] as their intent is not to regulate the applicant’s purpose or objective for the proposed facility”).

86 *See Mississippi Lime*, 15 E.A.D. at 361 (“BACT determinations are one of the most critical elements in the PSD permitting process, must reflect the considered judgment on the part of the permit issuer, and must be well documented in the administrative record.”).

87 NSR Workshop Manual at B.5.

on to the equipment proposed by the applicant, but also—consistent with the regulatory definition of BACT⁸⁸—any “inherently lower-polluting processes” that can perform the same role as proposed equipment.⁸⁹ The EPA has recognized that these alternative “production processes” may “have a profound effect on the viability of the proposed facility as conceived by the applicant.”⁹⁰

Nonetheless, the EPA acknowledges that permitting agencies may establish an outer limit to the BACT analysis by eliminating alternatives that unreasonably “regulate the applicant’s purpose or objective for the proposed facility.”⁹¹ Stated otherwise, agencies generally should not use BACT as a means to fundamentally “redefine the source.”⁹² The “redefining the source” doctrine, though, has limits of its own. The EPA has explained the “proper test” for invoking the doctrine:

[T]he permit applicant initially “defines the proposed facility’s end, object, aim, or purpose—that is the facility’s basic design,” although the applicant’s definition must be “for reasons independent of air permitting.” The inquiry, however, does not end there. The permit issuer . . . should take a “hard look” at the applicant’s determination in order to discern which design elements are inherent for the applicant’s purpose and which design elements “may be changed to achieve pollutant emissions reductions without disrupting the applicant’s basic business purpose for the proposed facility.”⁹³

In approving this approach, the Seventh Circuit Court of Appeals cautioned that the doctrine cannot be applied so broadly as to read elements out of the definition of BACT.⁹⁴ Because BACT encompasses “clean fuels” and “production processes,” the court explained that “[s]ome adjustment in the design of the plant w[ill] be necessary.”⁹⁵ For example, a cleaner fuel constitutes a “control technology” rather than “redefinition of the source” when it requires a change no greater “than would be necessary whenever a plant switched from a dirtier to a cleaner fuel.”⁹⁶

88 See 9 VAC § 5-50-250(C) (defining BACT to include “production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of [a] pollutant”).

89 NSR Workshop Manual at B.10.

90 *Desert Rock Energy*, 14 E.A.D. at 527.

91 *Id.* at 484.

92 NSR Workshop Manual at B.13.

93 *Desert Rock Energy*, 14 E.A.D. at 530 (internal citations omitted).

94 *Sierra Club v. Environmental Protection Agency*, 499 F.3d 653, 656 (7th Cir. 2007).

95 *Id.*

96 *Id.*

Although the Pipeline cites to the Seventh Circuit’s decision in invoking the “redefining the source” doctrine here,⁹⁷ the Department’s position is less clear. The Engineering Analysis claims that requiring electric turbines would “fundamentally redefine the BACT approach” for the Station⁹⁸—not, notably, redefine the Station, the source, itself—but provides no indication of which element of the “BACT approach” the Department believes disallows electric compression. Even assuming, however, that the Department is intending to invoke the doctrine here, installing electric compressors would in no way “redefine the source,” as that doctrine has been interpreted and applied.

The operative question is whether substituting electric compression for gas combustion would “disrupt[] the basic business purpose for the proposed facility.” The Station has only one purpose: to pressurize natural gas in the pipeline. That purpose is achieved using either combustion turbines or electrical motors. Solar Turbines, the vendor the Pipeline has selected for the Station, expressly advertises that its compressors can be driven either using combustion turbines or electric motors.⁹⁹ The technologies are merely two different means of achieving the same business purpose of driving the compressor. And when the difference between a fossil-fueled technology and an electric-powered technology is this slight, permitting agencies have required both be considered in the BACT analysis.¹⁰⁰

In citing to the Seventh Circuit’s decision in *Sierra Club v. Environmental Protection Agency* as supportive of its theory,¹⁰¹ the Pipeline ignores the central test articulated in that case for determining “where control technology ends and a redesign of the ‘proposed facility’ begins.”¹⁰² According to the Seventh Circuit, even when “[s]ome adjustment in the design of the plant would be necessary” in order to employ an alternative technology, that alternative is a “control technology” rather than a “redefinition of the source” when the requisite adjustment is “no more than would be necessary whenever a plant switched from a dirtier to a cleaner fuel.”¹⁰³ As the Pipeline itself admits, there are presently gas compressor stations that employ electric compression.¹⁰⁴ Until the Pipeline can explain why doing the same would necessitate a greater

97 Application at 51; Application Appendix D at 2–3.

98 Engineering Analysis at 10.

99 See SOLAR TURBINES, *Oil & Gas: Electric Motor Drive (EMD)*, https://www.solarturbines.com/en_US/solutions/oil-and-gas/emd.html (last accessed April 8, 2021).

100 NORTHEAST STATES FOR COORDINATED AIR USE MANAGEMENT, *NESCAUM BACT Guideline* at 4 (June 1991), available at <https://bit.ly/31vhKcO> (enclosed as Exhibit No. 15) (“A reviewing agency should seriously consider requiring the use of . . . electric boost or all-electric glass furnaces vs. fossil fuel fired” where “the BACT analysis justifies their use based on environmental, economic, and energy factors.”).

101 Application Appendix D at 3.

102 499 F.3d at 655.

103 *Id.* at 656.

104 Application Appendix D at 1.

“adjustment in the design of [its] plant” than would be the case any time a compressor station switches to electric compression, the “redefining the source” doctrine does not apply.¹⁰⁵

Although the Department does not adopt this view in the permitting record, the Pipeline also claims that the BACT analysis is limited here by the regulatory language of 9 VAC § 550260(B).¹⁰⁶ That subsection requires permits include “such terms and conditions as may be necessary to implement a best available control technology determination for any regulated air pollutant that may be emitted from any affected emissions unit.”¹⁰⁷ The recognition that emissions come from “emissions units” and that those units are “affected” by a best available control technology determination, the Pipeline appears to argue, means that the analysis must focus merely on selecting the cleanest available form of an ambiguous (but apparently narrow) category of technology that the Pipeline itself proposes.

The more logical reading of that language, however, is that it reflects the unremarkable fact that, once a “stationary source . . . appl[ies] the best available control technology,”¹⁰⁸ all of that source’s emissions will, by definition, come from an emission unit.¹⁰⁹ The Pipeline’s more idiosyncratic reading is undermined by the fact that subsection (A) focuses on the collective emissions “from any affected *facility*,”¹¹⁰ and the following subsection requires that a “*stationary*

105 We also note that the “redefining the source” doctrine is a discretionary one. Federal guidance is clear that “a permitting authority retains the discretion to conduct a broader BACT analysis and to consider changes in the primary fuel in Step 1 of the analysis.” *La Paloma Energy Center*, 16 E.A.D. 267, 285–86 (2014), available at <https://bit.ly/39WL9kC> (enclosed as Exhibit No. 16) (quoting Environmental Protection Agency, *PSD & Title V Permitting Guidance for Greenhouse Gases* 17 (March 2011)). Virginia law requires that the Board exercise its discretionary authority consistent with the Commonwealth’s policy of protecting minority and other disadvantaged communities from disproportionate air quality impacts. *See Friends of Buckingham*, 947 F.3d at 87. It would therefore be inappropriate for the Board to use the “redefining the source” doctrine as an “automatic BACT off-ramp” when the law gives it discretion to consider all options in the interest of environmental justice. *La Paloma*, 16 E.A.D. at 287.

106 Application Appendix D at 1.

107 9 VAC § 5-50-260(B).

108 *Id.*

109 *Id.* § 5-80-1110(C) (“‘Emissions unit’ means any part of a stationary source that emits or would have the potential to emit any regulated air pollutant.”).

110 The Pipeline’s attempt to equate the terms “facility” with “emissions unit” is easily dismissed. *See* Application Appendix D at 1. The definitional section of Article 6 confirms that the Board’s Regulations use the term “facility” in its everyday sense, and that emission units are discrete pieces of equipment that are located *at* facilities. *See* 9 VAC § 5-80-1110(C) (defining “undeveloped site” as “any site or facility at which no emissions units are located at the time”); *see also id.* (defining “stationary source” to include a “facility,” and “emissions unit” as “*part of a stationary source*”) (emphasis added).

source . . . apply best available control technology for each regulated pollutant.”¹¹¹ In light of that broader language, the Pipeline’s heavy emphasis on the term “emissions unit” in subsection (B) is unwarranted. But more importantly, the Pipeline’s narrow reading would completely eliminate “production processes” as a form of control technology.¹¹² Adopting the Pipeline’s interpretation, then, would be to rewrite the regulatory definition of BACT, which plainly includes those more fundamental alterations to the process. Neither the Department nor the Board has that power.¹¹³

Step Two: Technical Feasibility

At Step Two, control technologies are reviewed for their technical feasibility. The *Workshop Manual* explains that technical feasibility has two elements: availability and applicability.¹¹⁴ A control technique is “available” when “it has reached the licensing and commercial sales stage of development” and thus “can be obtained by commercial channels ‘or is otherwise available within the common sense meaning of the term.’”¹¹⁵ A technology is “applicable” if it “can reasonably be installed and operated on the source type under consideration.”¹¹⁶ Regardless of which element is at issue, a “demonstration of technical infeasibility should be clearly documented” in the permitting record.¹¹⁷

- a. *Available Infrastructure.* The Department’s Engineering Analysis contends that “electrical transmission infrastructure required for the use of [electric compression] at the proposed Station does not exist.”¹¹⁸ The Department does not cite the basis for that determination, but it is plainly a finding of technical—not economic—infeasibility. As the Environmental Appeals Board has recognized, referring to a technology as “not available” is usage “typically associated with the step 2 consideration of whether a control option is technically feasible.”¹¹⁹ But more importantly, the Department’s Engineering Analysis does not discuss the cost of accessing electrical infrastructure.¹²⁰

111 9 VAC § 5-50-260(A)–(B).

112 *Id.* § 5-50-250(C).

113 *Avante at Roanoke*, 56 Va. App. at 201–02 (“[T]he administrative power to interpret a regulation does not include the power to rewrite it.”).

114 NSR Workshop Manual at B.17.

115 *Mississippi Lime*, 15 E.A.D. at 360 (quoting NSR Workshop Manual at B.17).

116 *Id.*

117 NSR Workshop Manual at B.7.

118 Engineering Analysis at 10.

119 *Mississippi Lime*, 15 E.A.D. at 359.

120 Of course, the Pipeline includes a cost analysis, which we address below under Step Four. The Department’s Engineering Analysis, however, makes no attempt to evaluate or validate the Pipeline’s cost analysis.

Without any evaluation of the costs associated with connecting to the existing electrical grid, the Department’s finding of unavailability must withstand scrutiny under Step Two.

The Environmental Appeals Board’s decision in *Mississippi Lime* demonstrates that only in extreme circumstances is distance from energy infrastructure a valid consideration at Step Two. In that case, the permitting authority had determined natural gas was “not available” as an alternative fuel source “based on the proposed plant site’s distance from [an] existing natural gas pipeline.”¹²¹ Although the permitting authority did not specify the stage of the five-step process in which it made that determination, the Appeals Board noted that the language it used was most closely associated with the Step-Two technical feasibility analysis.¹²² Reviewing the issue under the rubric of Step Two, the Appeals Board concluded that connecting to the existing pipeline was a “matter of cost” —not an “unresolvable technical difficulty.”¹²³ In other words, the permitting authority had conflated Step-Two *technical* feasibility with Step-Four *economic* feasibility.¹²⁴

So too here. Like the applicant in *Mississippi Lime*, the Pipeline has itself demonstrated that connection to energy infrastructure is a matter of cost.¹²⁵ For reasons detailed below, the Pipeline’s cost analysis is fatally flawed.¹²⁶ But the very fact that the Pipeline was capable of calculating the cost of connecting to electric transmission infrastructure proves that installing electric compression is, at worst, a question of cost, not technical feasibility.

Moreover, there is reason to believe the Department’s finding of “unavailability” is, at best, overstated. As any project developer knows, it is rare that the site of a greenfield electro-industrial facility will come pre-packaged with the exact infrastructure the facility requires. In the case of the Station, at least, electrical transmission infrastructure appears close by. Data from the federal Energy Information Administration indicate that an electric transmission line runs just north of the proposed site, as illustrated in the map below:¹²⁷

121 15 E.A.D. at 360.

122 *Id.* at 359.

123 *Id.* at 360.

124 The NSR Workshop Manual similarly states that “[p]hysical modifications needed to resolve technical obstacles do not in and of themselves provide a justification for eliminating the control technique on the basis of technical infeasibility.” NSR Workshop Manual at B.20.

125 *See infra* notes 155–159 & accompanying text.

126 *See generally* Application at 58–61.

127 A high-quality version of this map is enclosed as Exhibit No. 45.



Source: UNITED STATES DEPARTMENT OF ENERGY, ENERGY INFORMATION ADMINISTRATION, *United States Energy Atlas: Electricity Energy Infrastructure & Resources* (accessed February 18, 2021), available at <https://atlas.eia.gov/app/895faaf79d744f2ab3b72f8bd5778e68>

Similarly, data from the Department of Homeland Security show at least one electrical substation to the northwest of the site:¹²⁸



Source: UNITED STATES DEPARTMENT OF HOMELAND SECURITY, *Homeland Infrastructure Foundation-Level Data: Electric Substations* (accessed February 18, 2021), available at https://hifld-geoplatform.opendata.arcgis.com/datasets/755e8c8ae15a4c9abfeca7b2e95fb9a_0?geometry=-79.492%2C36.812%2C-79.227%2C36.860

But even setting aside the availability *vel non* of electric infrastructure at the site the Pipeline has chosen to develop, the Board's BACT analysis—like all permitting analyses the Board conducts—must consider whether that site is in fact suitable for the proposed use.¹²⁹ It stands to reason, then, that a would-be-permittee cannot avoid a zero-emissions

¹²⁸ A high-quality version of this map is enclosed as Exhibit No. 46.

¹²⁹ Virginia Code § 10.1-1307(E)(3).

technology merely by siting its facility at a location where that technology may be difficult to implement. Interpreting a similar alternatives analysis under the Clean Water Act, the federal Court of Appeals for the Second Circuit has explained that a contrary approach

would remove the incentive for a developer to search for an alternative site at the time such an incentive is needed, *i.e.*, at the time it is making the decision to select a particular site. If the practicable alternatives analysis were applied to the time of the application for a permit, the developer would have little incentive to search for alternatives, especially if it were confident that alternatives soon would disappear.¹³⁰

- b. Reliability.* The Pipeline argues that electric compression should be eliminated because “electric power reliability for electric compression would be a concern.”¹³¹ This sort of bare-bones argument, however, does not provide substantial evidence upon which electric compression can be reasonably eliminated from the analysis. There are, of course, quantitative measures of electrical reliability,¹³² and the Pipeline makes no attempt to characterize exactly how serious the concerns here would be. Moreover, a fuel is “scarce” enough to eliminate from the BACT analysis only to the extent it “may not be *reasonably* available to the source”¹³³ —not, notably, *absolutely and unconditionally* available. While no one disputes that blackouts are an occasional annoyance for most sectors of the economy, it cannot be seriously argued that electricity is not “reasonably available” throughout the Commonwealth. Proving otherwise would require, at the very least, some quantitative measure of the Pipeline’s “concern.”
- c. Timing Constraints.* Although not strictly a matter of “technical feasibility,” the Pipeline also argues that electric compression can be eliminated because it “cannot be implemented in a timely manner to meet the project timelines and commitments.”¹³⁴ This is obviously not a relevant factor in a BACT analysis. If it were, a permit applicant wishing to avoid a more effective control technology could simply arrange the project timeline so as to make that technology impossible to implement.

130 *Bersani v. Environmental Protection Agency*, 850 F.2d 36, 44 (2d Cir. 1988).

131 Application at 53.

132 The reliability indices most commonly used by distribution utilities are the System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI).

133 NSR Workshop Manual at B.31 (emphasis added); *see also* PSD Permitting Guidelines, *supra* note 133, at 4-3 (“Locally scarce fuels are the fuels currently in short supply or may *reasonably* be shown to be in short supply in the near future.”) (emphasis added).

134 Application at 53.

Moreover, failing to meet its preferred construction schedule would be an inconvenience entirely of the Pipeline's own making. The Pipeline gives no explanation of why it could not have begun the process of implementing electric compression sooner. An applicant that sets an in-service date before knowing exactly what controls the law requires—and, importantly, the time needed to *implement* those controls—does so at its own risk. It is certainly not the Board's duty to ensure an applicant meets its preferred project schedule; to the contrary, it is beyond the Board's discretion to excuse strict compliance with the law merely to satisfy an impatient applicant.¹³⁵ Just as “owners or operators cannot expect that any site activities prior to permitting will alter or influence the BACT analyses for an emissions unit or other elements of a permitting decision,”¹³⁶ they can expect nothing more from the *failure* to prepare for compliance with the law.

Step Three: Ranking Available Control Technologies

Step Three requires “ranking all technically feasible control technologies . . . from the most to the least effective in terms of emission reduction potential.”¹³⁷ The key issue at Step Three, then, is how best “to compare emissions performance levels among options.”¹³⁸ Although Step Three usually involves comparing the “annual pollutant emissions that *the source or emissions unit will emit*” under various control regimes,¹³⁹ it also presents an opportunity to evaluate the Pipeline's

135 For similar reasons, it is irrelevant that the approved “natural gas rate” the Pipeline plans to charge its customers will not cover the retail electricity costs. *See* Application at 59 n.3. The Pipeline voluntarily agreed to those rates—or at the very least, had a chance to present evidence of those electricity costs to the Federal Energy Regulatory Commission for inclusion within approved shipping rates. The requirements of the law do not soften when dealing with a party that failed to include the costs of operating necessary control technology in proposing its rates.

136 Environmental Protection Agency, *Interpretation of ‘Begin Actual Construction’ Under the New Source Review Reconstruction Permitting Regulations* at 19 (March 25, 2020), available at <https://bit.ly/3whVJMS> (enclosed as Exhibit No. 17); *see also id.* at 12 (“A source cannot use the equity and resources expended to claim cost infeasibility or otherwise influence the [BACT] determination or the decision to grant the permit.”); *see also* Air Pollution Control Board, *Article 6 Minor New Source Review Permit Program Manual*, Doc. No. APG-350A, at 8-8 (Draft November 12, 2020), available at <https://bit.ly/3fvmwiC> (Minor NSR Manual) (acknowledging that Article 6 permits “must be ‘enforceable as a practical matter.’”) (“The BACT analysis and determination cannot consider any costs or technical issues that occur simply because the unit was constructed without getting a permit.”).

137 NSR Workshop Manual at B.22.

138 *Id.*

139 *Id.* at B.23 (emphasis added).

claim that “off-site electric generation could actually end up producing more emissions in powering on-site electric compression than using on-site natural gas compression.”¹⁴⁰

While the Pipeline’s attempt to compare on-site emissions to off-site impacts is an interesting thought experiment, there is no basis in the law for favoring known, localized pollution impacts over speculative and almost certainly diffuse impacts associated with off-site generation. In fact, a true, top-down BACT analysis “consider[s] only *direct* energy consumption”—that is “energy consumption at the source”—and “not *indirect* energy impacts,”¹⁴¹ primarily because the latter are so difficult to quantify and compare on an apples-to-apples basis. This is especially true where, as here, off-site generation will come from a vast, eleven-state interconnect with a diverse generation fleet.

The EPA warns permitting authorities that considering off-site impacts is a fraught endeavor; at the very least, it requires marshaling “[p]ertinent information about the public” affected by increased pollution and the specific “environmental consequences of releasing” that pollution into the atmosphere.¹⁴² Thus, even if the Board accepts the Pipeline’s premise that generating the electricity necessary to power electric compressors may result in emissions comparable to on-site combustion, the Board must consider, among other things, whether pollution emitted as a result of off-site electric generation:

- ☞ is likely to cause the same harm as on-site combustion—given its proximity to residents and any meteorological conditions that make pollution from those generators more or less likely to impact people, wildlife, or flora;
- ☞ is subject to stricter pollution control technologies;
- ☞ is likely to be emitted from a single facility or be dispersed over multiple facilities, thus reducing the average pollutant concentrations at any given point;
- ☞ is likely to have a similar impact on a comparably “economically disadvantaged or minority communit[y];”¹⁴³
- ☞ can remain within air quality increments already allocated at the generation site;
- ☞ will impact property values—particularly in areas where property values are already depressed as a result of proximity to a power plant;
- ☞ will be more or less consistent with “local energy, environmental, and economic conditions and local preferences” surrounding both the off-site generators and the on-site compressors;¹⁴⁴

140 Application at 51.

141 NSR Workshop Manual at B.30 (emphasis in original).

142 *Id.* at B.48.

143 See Virginia Code § 67-102(A)(8).

144 See Minor NSR Manual at 8-6 (“A critical decision in the BACT analysis is the relative weight assigned to the energy, environmental, and economic impacts, allowing some

- ✧ will avoid greenfield impacts associated with constructing a new facility;¹⁴⁵
- ✧ is likely to produce an increase in noise pollution comparable to that of the proposed Station.¹⁴⁶

To be sure, answering these questions will be exceedingly difficult. But to the extent it is impracticable for the Pipeline, the Department, or the Board to study those considerations, that is a strong reason why the Board should hesitate before approving *known* impacts to a *known* community—especially an “economically disadvantaged or minority” community¹⁴⁷—under the theory that it *may* result in an uncertain increase of emissions of an unknown character in an equally unknown area or areas. This is precisely why the EPA advises permitting agencies to disregard “indirect energy impacts” unless they “can be well quantified.”¹⁴⁸

If the Pipeline fails to provide the Board with the information it needs to carefully weigh the relative merits of alternate technologies, it fails to carry its burden of demonstrating that electric compression is not “an inherently lower emitting technology” or can otherwise be eliminated from the BACT analysis on account of its off-site environmental impacts. Moreover, given the Board’s statutory charge to “foster the comfort and convenience of the people of the Commonwealth and their enjoyment of life and property,”¹⁴⁹ it should err on the side of protecting a vulnerable community under its own jurisdiction rather than trying to limit speculative impacts on an unknowable set of people in any one of the several jurisdictions served by the PJM Interconnection.

Finally, the Pipeline’s comparative analysis does not fare well against “the inviolable law of data analysis, ‘garbage in; garbage out.’”¹⁵⁰ The most apparent flaw in the Pipeline’s inputs is the assumption that electric compressors would be powered by the same generation resources connected to PJM between 2007 and 2018.¹⁵¹ We know, however, that the average pollution-

flexibility in emission control requirements depending on local energy, environmental, and economic conditions and local preferences.”).

145 2021 VIRGINIA ACTS Chapter __ [S 1284] (March 18, 2021) (amending Commonwealth Energy Policy, Virginia Code § 67-102, to include “support[ing] the repurposing and development of clean energy resources on previously developed project sites”).

146 See NSR Workshop Manual at B.49 (“Significant differences in noise levels, radiant heat, or dissipated static electrical energy, or greenhouse gas emissions may be considered.”).

147 See Virginia Code § 67-102(A)(8).

148 NSR Workshop Manual at B.30.

149 Virginia Code § 10.1-1306.

150 *Mississippi v. Environmental Protection Agency*, 744 F.3d 1334, 1352 (D.C. Cir. 2013).

151 Application at 56.

intensity of PJM resources has fallen significantly since even 2018—let alone since 2007.¹⁵² And as the Board well knows, the recently enacted Virginia Clean Economy Act (VCEA) will greatly accelerate the replacement of older fossil-fuel-burning resources with new, clean energy.¹⁵³ And the effects of the VCEA will be in addition to the effects of other state programs designed to increase renewable generation among the PJM states—including, notably, the Regional Greenhouse Gas Initiative (RGGI), of which Virginia is now a member.

Step Four: Economic Impacts

Step Four analysis involves a “thorough and detailed” analysis of the economic impacts of available control technologies.¹⁵⁴ While the Pipeline offers an analysis of the relative costs of combustion turbines versus electric generators,¹⁵⁵ the Department does not address the issue at all. But even absent efforts by the Department to evaluate and validate the Pipeline’s cost analysis, the Pipeline fails to meet its burden of demonstrating that electric compression is economically infeasible.¹⁵⁶

While the Pipeline offers calculations of both average and incremental cost effectiveness, it fails to answer the ultimate question under Step Four. According to the Board’s own guidance, the proper inquiry is not the raw cost of an alternative measure, but whether those costs are “in the range of BACT costs being born [sic] by other similar sources.”¹⁵⁷ Thus, “[i]n order to eliminate a control option on the basis of economic feasibility, the applicant must demonstrate that the control technology is significantly more costly than the costs being born [sic] by other similar sources.”¹⁵⁸ Here, however, the record contains no data about the costs borne by those “other

152 See, e.g., PJM INTERCONNECTION, *2020 Regional Transmission Expansion Plan* at 2 (February 2021), available at <https://bit.ly/3t1poYp> (enclosed as Exhibit No. 18) (“Renewables in PJM’s interconnection queue now exceed other fuels with 88 percent wind, solar and storage Solar has more than doubled over 2019, now comprising 56% of PJM’s queue.”).

153 See generally 2020 VIRGINIA ACTS Chapters 1193 [H 1526], 1194 [S 851] (April 11, 2020).

154 *Mississippi Lime*, 15 E.A.D. at 361; NSR Workshop Manual at B.31. In addition to a cost impacts analysis, Step Four may also contain a collateral environmental impacts analysis. See *id.* at B.46–B.48. However, this analysis generally “concentrates on impacts *other* than impacts on air quality . . . such as solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts, or emissions of unregulated pollutants.” *Id.* at B.46. Thus, we address the Pipeline’s attempt to compare on-site emissions from combustion turbines to off-site electric generation above in Step Three.

155 Application at 58–61.

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

157 PSD Permitting Guidelines, *supra* note 133, at 4-4; NSR Workshop Manual at B.44.

158 *Id.*

similar sources.” That alone, then, renders the current permitting record inadequate to justify eliminating electric compression.¹⁵⁹

Step Five: Selecting BACT

Once the technology with the maximum potential for pollution reduction is selected, the final step in the analysis is to set emission limitations that reflect that technology’s capabilities. Establishing numeric BACT limits for an electric-driven Station would be fairly simple. Assuming that any fugitive emissions from Pipeline components would not rise to the level of significance, a BACT limit is superfluous. Emissions from the compression engines will be zero, and no limits—nor the need for monitoring, recordkeeping, or compliance demonstration by the Pipeline, the Department, or the Board—will be necessary.¹⁶⁰

Comment No. 6: The proposed NO_x limits do not represent BACT even for SCR-paired natural gas combustion turbines.

Even assuming that the Department’s BACT analysis arrives at the correct technology, it has failed to set a BACT limitation reflective of the “maximum degree of emission reduction” that the technology allows.¹⁶¹ Specifically, the Draft Permit includes a numerical NO_x emission limitation of 2.70 ppmv at 15% oxygen on a three-hour average basis¹⁶²—subject to several enumerated exclusions.¹⁶³ According to the Department’s Engineering Analysis, that limit is based on an assumed 70% NO_x reduction efficiency for the SCR.¹⁶⁴ Turbines similar to those proposed by the Pipeline, however, have achieved far greater rates of NO_x reduction when paired with SCR control. NO_x reduction of 90–95% is not uncommon, resulting in emission rates closer to 2 ppmv at 15% oxygen. Several gas turbines have been permitted at that rate, including at least three by the Board itself.¹⁶⁵ Moreover, that lower rate would presumably be even easier to achieve

159 It is also unclear whether the Pipeline’s analysis discusses and quantifies all “beneficial and adverse impacts.” *Id.* at B.8. For example, the administrative costs associated with applying for and maintaining compliance with an air quality permit does not appear in the analysis, even though those costs would be entirely avoided with the use of electric compression.

160 See *Install Electric Compressors*, *supra* note 78, at 2 (“The primary reasons for implementation of [electric compressors] are fuel gas savings and maintenance savings. An additional benefit is the faster permitting process as a result of lower noise output and no emissions.”).

161 *Cf.* 9 VAC § 5-50-250(C).

162 Draft Permit at ¶ 1.

163 *Id.* at ¶¶ 20–21.

164 Engineering Analysis at 3.

165 See RACT/BACT/LAER Clearinghouse, *Indeck Niles*, RBLC ID No. MI-0445 (December 22, 2020); RACT/BACT/LAER Clearinghouse, *Chickahominy Power*, RBLC ID No. VA-

for a simple-cycle configuration. Because a rate of 2 ppmv at 15% oxygen is some 25% lower than the rate the Pipeline proposes as BACT here, the latter rate is only proper if the record includes a full, reasoned explanation as to why greater NO_x reduction is unachievable—including, if necessary, an incremental cost analysis for achieving the NO_x reduction rates observed at similar facilities.

III. THE DEPARTMENT’S RECOMMENDATION IS NOT SUPPORTED BY A THOROUGH REGULATORY ANALYSIS.

Comment No. 7: The permitting record does not support exempting additional air toxics from review and control.

In its Engineering Analysis, the Department claims that, “[b]ased on the applicant’s calculations, the facility will emit two State Air Toxic pollutants of concern for compressor stations, namely hexane and formaldehyde.”¹⁶⁶ It is unclear what the Department means by “pollutants of concern.” The phrase does not appear to have technical significance in the Board’s Regulations,¹⁶⁷ and emissions of other known toxics are well-documented for combustion turbines like those proposed here. According to AP-42 Table 3.1-3, for example, benzene emissions can be expected with a relatively high degree of certainty, as reflected by an A-rated emission factor.¹⁶⁸ Poorly rated factors for other toxics are included in that Table as well. Therefore, to the extent the Department screened out other toxics based solely “on the applicant’s calculations” or on an *a priori* assumption about what toxics constitute “pollutants of concern” for facilities like the Station, it has failed to ensure that the Draft Permit is consistent with 9 VAC § 5-60-320. As such, the Board should exercise its authority under 9 VAC §§ 5-60-340 and 5-60-350 to request additional information and analysis “as may be needed to determine the applicability of, or compliance with,” Chapter 60, Article 5 of its Regulations.

0332 (August 7, 2019); RACT/BACT/LAER Clearinghouse, *Johnsonville Cogeneration*, RBLC ID No. TN-0164 (March 21, 2019); RACT/BACT/LAER Clearinghouse, *C4GT Power Station*, RBLC ID No. VA-0328 (May 9, 2018) RACT/BACT/LAER Clearinghouse, *Greensville Power Station*, RBLC ID No. VA-0325 (September 16, 2016) (collectively enclosed as Exhibit No. 19).

166 Engineering Analysis at 7.

167 The phrase appears only in provisions concerning the content of notices informing the public that a source suspected to be violating significant ambient air concentrations (SAACs) plans to conduct a test demonstrating compliance with those standards. See 9 VAC §§ 5-60-270(2), 5-60-370(2) (“The notice shall include a brief description of the pollutants of concern and their possible health impacts”).

168 AP-42 Compilation, *infra* note 170, at 3.1-13; see also *id.* at 3 (describing A-rated factors as “[e]xcellent,” having been developed from high quality data “taken from many random chosen facilities in [an] industry population . . . sufficiently specific to minimize variability”).

Comment No. 8: The Department and Pipeline improperly rely on poorly rated AP-42 emission factors and decades-old fugitive emission averages.

The Department’s Engineering Analysis states that calculations for the microturbines’ “[e]missions of PM, PM₁₀, PM_{2.5} and SO₂ are based on emission factors from AP-42 Table 3.1-2a.”¹⁶⁹ The AP-42 itself, however, warns that its emission factors should only be used “as a last resort.”¹⁷⁰ In fact, a recent EPA Enforcement Alert reiterates the Agency’s longstanding position that AP-42 factors—“even [those] with more highly rated AP-42 grades of ‘A’ or ‘B’”¹⁷¹—should not be used for “determining applicability, applying for a permit, or demonstrating compliance with permit limits.”¹⁷² Importantly, the factors on which the Pipeline and Department rely here are not even among the “more highly rated” factors in the AP-42. According to AP-42 Table 3.1-2a, the factors used for PM, PM₁₀, and PM_{2.5} all have a C rating,¹⁷³ meaning they cannot be trusted to represent a truly “random sample of the industry.”¹⁷⁴ If the Pipeline and Department are truly left with no viable option except a C-rated factor of “last resort,”¹⁷⁵ the permitting record should explain why more reliable data is unavailable and document any attempts at finding those data.

The same applies for the Department’s reliance on a 1995 EPA report on equipment leak emissions.¹⁷⁶ Like the AP-42 factors discussed above, the factors the Department cites are also

169 Engineering Analysis at 6.

170 Environmental Protection Agency, *AP-42: Compilation of Air Pollutant Emission Factors Volume I: Stationary Point & Area Sources* at 3 (5th ed. 1995), available at <https://bit.ly/3cFJOjV> (AP-42 Compilation).

171 As explained by the AP-42 Compilation itself:

Each AP-42 emission factor is given a rating from A through E, with A being the best. A factor’s rating is a general indication of the reliability, or robustness, of that factor. This rating is assigned based on the estimated reliability of the tests used to develop the factor and on both the amount and the representative characteristics of those data.

Id. at 8.

172 Environmental Protection Agency, *Enforcement Alert: EPA Reminder About Inappropriate Use of AP-42 Emission Factors*, Publication No. EPA 325-N-20-001 (November 2020), available at <https://bit.ly/3rD9wtB> (enclosed as Exhibit No. 20).

173 AP-42 Compilation, *supra* note 170, at 3.1-4—3.1-5.

174 *Id.* at 9.

175 *Id.* at 3.

176 Engineering Analysis at 6 (“Station Fugitives . . . [e]missions were based on EPA emission factors (Protocol for Equipment Leak Emission Estimates’ [sic] for oil and gas production operations, 11/95 (EPA-453 / R-95-017), Table 2-4, Page 2-15”).

industry-wide averages.¹⁷⁷ And unlike highly rated AP-42 factors, which correspond to a “source category population . . . sufficiently specific to minimize variability,”¹⁷⁸ the “industry” from which the 1995 factors are derived encompasses a broad swath of “light crude facilities, heavy crude facilities, gas plant, gas production facilities, and offshore facilities.”¹⁷⁹ While there may have been overlaps in certain equipment used throughout those categories in 1995, they hardly constitute a singular “industry.”¹⁸⁰

Comment No. 9: The permitting record lacks the guarantees that the Department claims formed the basis for calculating Station emissions.

According to the Department’s Engineering Analysis, the emission calculations underlying its recommendation are based on “[e]missions rates for NO_x, CO, and unburned hydrocarbons (UHC) [that] are guaranteed by the vendor.”¹⁸¹ Those guarantees, however, appear nowhere in the permitting record. There are several “Predicted Engine Performance” sheets from Solar attached to the Pipeline’s Application, but those sheets explicitly disclaim any guarantee in those numbers.¹⁸² To the extent the Department is referring to data contained in those Predicted Engine Performance Sheets, it is misrepresenting the authority and reliability of that data. To the extent that these Sheets are *not* the vendor guarantees cited by the Department, those guarantees must be included within the permitting record. While vendor guarantees may represent “the most reliable predictor of emissions” in certain circumstances,¹⁸³ the permitting record must still include “[r]eferences for the emission factors used.”¹⁸⁴

177 Environmental Protection Agency, *Protocol for Equipment Leak Emission Estimates*, Doc. No. EPA-453/R-95-017, at 2-15 (November 1995), available at <https://bit.ly/3fy1pwd>.

178 AP-42 Compilation, *supra* note 170, at 9.

179 *Protocol for Equipment Leak Emission Estimates*, *supra* note 177, at C-14.

180 Notably, Article 6 distinguishes between industries based on their classification in the Standard Industrial Classification (SIC) Manual. *See* 9 VAC § 5-80-1110(C) (defining “stationary source” with reference to “‘major group[s]’ (i.e., that have the same two-digit code) as described in the ‘Standard Industrial Classification Manual’”). Under the SIC Manual, the sources encompassed within the EPA’s 1995 “industry averages” straddle at least three separate “major group” industries. *See* Department of Commerce, *Standard Industrial Classification (SIC) Codes*, Doc. No. FIPS-PUB-66, at 8 (August 1979), available at <https://bit.ly/3upDnI4> (enclosed as Exhibit No. 21) (“13 Oil & Gas Extraction”); *id.* at 15 (“46 Pipe Lines, Except Natural Gas”); *id.* at 15-16 (“Electric, Gas, and Sanitary Services”).

181 Engineering Analysis at 5.

182 Application Appendix B at 22-39 (“Performance shown is ‘Expected’ performance at the pressure drops stated, *not guaranteed*.”) (emphasis added).

183 Minor NSR Manual at 7-5.

184 *Id.* at 7-2.

IV. THE DRAFT PERMIT IS WEAKENED BY MULTIPLE TECHNICAL ERRORS, AMBIGUOUS LANGUAGE, AND OTHER DEFICIENCIES.

Comment No. 10: The permitting record does not support the Draft Permit's delineation of startup, shutdown, and normal operations.

The definitions of “startup” and “shutdown” under the Draft Permit are significant: they determine when certain control technologies must be operating¹⁸⁵ and when certain numerical limits apply,¹⁸⁶ and the Draft Permit limits the amount of time the Station can be in startup and shutdown mode.¹⁸⁷ The Draft Permit currently defines startup and shutdown as the period beginning with first fuel feed to 50% load¹⁸⁸ and the period beginning when the turbine drops below 50% load for the purpose of ceasing operation until fuel feeding stops,¹⁸⁹ respectively.

We have been unable to find any technical basis in the permitting record for using 50% load as the demarcation between startup, shutdown, and “normal” operations. Because the distinction between these operating modes is most relevant for NO_x control by the SCR system, startup and shutdown should be defined with reference to the minimum operating temperature (MOT) of the SCR catalyst. Other provisions of the Draft Permit already require continuous monitoring of temperatures at the SCR inlet,¹⁹⁰ so defining startup and shutdown operations with reference to the SCR system MOT will not require any additional equipment. Any MOT selected as the demarcation point, however, should be supported by a technical analysis demonstrating it is the lowest possible temperature—and, therefore, represents the lowest necessary exception to the stricter emission limitations associated with “normal” operation.

Comment No. 11: The Draft Permit's provisions regarding oxidation catalyst operations are unclear and create perverse incentives.

Condition 2 requires the Pipeline use an oxidation catalyst system to control CO and VOC emissions from the combustion turbines. The Permit goes on to define the operating temperature for that system in Condition 4(c), which states that the catalyst “shall be considered in operation” when inlet gas temperature to the catalyst is either 600° F or the minimum “combustion chamber temperature” derived from the most recent performance test demonstrating compliance with the Permit. There are two significant problems with this condition:

- ❧ As an initial matter, it is unclear why operational status is dependent on the “combustion chamber temperature.” The only relevant temperature is the inlet gas

185 See, e.g., Draft Permit ¶¶ 1, 4(h).

186 See, e.g., *id.* ¶¶ 20–24

187 See, e.g., *id.* ¶ 4(f).

188 *Id.* ¶ 4(a).

189 *Id.* ¶ 4(b).

190 *Id.* ¶ 10.

temperature to the oxidation catalyst, as recognized in the monitoring provisions in Condition 12.

- ✎ In addition, allowing a permittee to define operational status according to the “minimum . . . temperature derived from the most recent performance test” might result in a temperature that is substantially higher than 600° F. This is because the permittee is now be incentivized to run the test at a high gas inlet temperature, as doing so would both demonstrate compliance due to lower emissions from complete combustion *and* establish a high threshold, below which the catalyst would be considered non-operational.

The Board should therefore revise Condition 4(c) to define operational status according to a threshold temperature—perhaps 600° F—which could be ratcheted down based on performance testing if necessary, but cannot be ratcheted up.

Comment No. 12: The Draft Permit wholly ignores ammonia emissions from selective catalytic reaction.

While selective catalytic reduction can be effective at controlling NOX emissions,¹⁹¹ its use of ammonia (NH₃) as a reagent results in emissions of excess, unreacted ammonia into the atmosphere. These “ammonia slip” emissions can contribute to condensable particulate, and excess ammonia emissions generally indicate poor SCR performance.¹⁹²

In explaining why ammonia storage tanks associated with the Station’s SCR system are exempt from permitting, the Department’s Engineering Analysis states that “ammonia is not a regulated air pollutant.”¹⁹³ While ammonia may not *itself* be regulated under Article 6, the Draft Permit should nonetheless include limits for ammonia slip from the SCR system. As the Department has recognized, ammonia slip can manifest as condensable particulate¹⁹⁴—which *is* an Article 6 pollutant. Accordingly, the Department has previously included “an ammonia emission limit of 5 ppmvd during operating conditions (as a one-hour average) for at least 95% of the time that the SCR is operating”—notwithstanding the recognition that “ammonia is not a regulated pollutant.”¹⁹⁵ Moreover, because excessive ammonia slip can indicate poor SCR performance, there is cause to at least monitor ammonia emissions in connection with the (inappropriately

191 Engineering Analysis at 3.

192 Virginia Department of Environmental Quality, Engineering Analysis for Green Energy Partners / Stonewall, Registration No. 73826, 58 (April 30, 2013) (enclosed as Exhibit No. 22) (Stonewall Engineering Analysis).

193 Engineering Analysis at 6.

194 See Stonewall Engineering Analysis, *supra* note 192, at 58.

195 *Id.*

vague)¹⁹⁶ requirement to operate SCR “in a manner consistent with good air pollution control practices for minimizing emissions.”¹⁹⁷

Comment No. 13: Biennial performance testing is inadequate to ensure compliance with CO, VOC, and PM emission limitations.

In addition to initial stack testing,¹⁹⁸ the Draft Permit requires biennial performance tests for CO, VOC, PM₁₀, and PM_{2.5} emissions from each combustion turbine.¹⁹⁹ As the emission limits for those pollutants are expressed as short-term limits with a three-hour averaging period, biennial stack testing cannot, by definition, demonstrate continuous compliance.²⁰⁰ Those limits can only be enforced as a practical matter with CEMS for CO, VOC, and filterable PM, supplemented by annual stack testing for condensable PM.²⁰¹ Those same requirements should also apply to the microturbines—which the Draft Permit inexplicably omits from the biennial testing requirement.²⁰²

Comment No. 14: The Draft Permit fails to ensure continuous compliance with formaldehyde emission limitations.

As the Station is subject to BACT for formaldehyde emissions,²⁰³ the numerical limits on formaldehyde emissions are a critical component of the Draft Permit. Those limits must, however, “be supported by appropriate monitoring and recordkeeping” requirements²⁰⁴ that are

196 See generally Comment No. 16.

197 Draft Permit ¶¶ 4, 46; see also Stonewall Engineering Analysis, *supra* note 192, at 58 (illustrating Department’s practice of requiring submission of “a plan for monitoring ammonia slip” from SCR systems).

198 *Id.* ¶¶ 30–31.

199 *Id.* ¶ 32.

200 See Minor NSR Manual at 11-11 (“The permit must require a level o[f] . . . monitoring sufficient to demonstrate compliance *on the same basis as the limits.*”) (emphasis added).

201 There is no CEMS available for condensable PM. However, monitoring visibility through COMS, as recommended in Comment No. 23, would provide a rough surrogate for continuous condensable PM monitoring.

202 Draft Permit ¶ 32 (requiring compliance tests for emission limits contained in Condition 20, but not Condition 18).

203 Engineering Analysis at 7.

204 Minor NSR Manual at 8-10. The Manual notes that 9 VAC § 5-50-260 does not itself address monitoring and recordkeeping. *Id.* (“appropriate monitoring and recordkeeping . . . supporting the BACT emissions limitation do not have 9VAC5-50-260 as a regulatory authority”); *cf.*, *e.g.*, 42 U.S.C. § 7661c(a) (requiring all Clean Air Act operating permits include “monitoring, compliance certification, and reporting requirements to assure

“sufficient to demonstrate compliance *on the same basis as the limits . . . both initially and periodically* thereafter.”²⁰⁵ Moreover, the rationale for the “selected periodic monitoring method must be clear and documented in the permit record.”²⁰⁶

Consistent with the legal requirement that “BACT emission limits or conditions must be met on a continual basis at all levels of operation,”²⁰⁷ the Draft Permit’s formaldehyde limits include short-term, pounds-per-hour limits;²⁰⁸ annual tons-per-year-limits;²⁰⁹ and startup and shutdown limits expressed on a per-event-basis.²¹⁰ Yet, the Draft Permit provides for monitoring only by way of a one-time turbine performance test. A one-time performance test, however, cannot be assumed to assure compliance over the entirety of a facility’s lifetime.²¹¹ To the contrary, when a single stack test is proposed as the only means of monitoring compliance with a substantive limitation, the permitting authority is under a strict obligation to explain in the permitting record how that test can actually “assure[] compliance with the emissions requirements.”²¹² While the

compliance with the permit terms and conditions”). However, 9 VAC § 5-80-1180(D) includes a general requirement that terms of an Article 6 permit be “enforceable as a practical matter.” And as the EPA has explained, “practical enforceability” necessarily entails at least one “method to determine compliance”—including “appropriate monitoring, record keeping and reporting.” Environmental Protection Agency, *Guidance on Enforceability Requirements for Limiting Potential to Emit* at 6 (January 25, 1995), available at <https://bit.ly/3swPnXw> (enclosed as Exhibit No. 23).

205 Minor NSR Manual at 11-11 (emphasis added).

206 Environmental Protection Agency, *Periodic Monitoring Guidance* at 8 (1998), available at <https://bit.ly/3m6xuML> (enclosed as Exhibit No. 24). Note that, although the D.C. Circuit set aside this guidance in *Appalachian Power v. Environmental Protection Agency*, 208 F.3d 1015 (D.C. Cir. 2000), the Circuit has since clarified that its decision was based purely on procedural grounds. *See Sierra Club v. Environmental Protection Agency*, 536 F.3d 673, 679 (D.C. Cir. 2008). After the Agency embodied the substance of the 1998 guidance in a formal notice-and-comment rulemaking, the D.C. Circuit upheld those rules. *Id.*

207 NSR Workshop Manual at B.56.

208 Draft Permit ¶ 52.

209 *Id.* ¶ 52.

210 *Id.* ¶¶ 53–54.

211 *Consolidated Environmental Management*, EPA Title V Petition No. VI-2010-05, Order Granting in Part & Denying in Part Petitions for Objection to Permits at 55–56 (January 30, 2014), available at <https://bit.ly/3czQbWb> (enclosed as Exhibit No. 25) (remanding operating permit that “require[d] only an initial stack test” for “seven emission units and eleven applicable permit conditions”).

212 *Id.* at 56 (directing state permitting agency to explain on remand how an initial stack test is “adequate to assure compliance with the numeric emission limits in the permit”).

EPA has declined to hold that a one-time stack test necessarily fails that standard,²¹³ the federal courts have observed that a “one-time test,” by definition, can never qualify as “periodic monitoring.”²¹⁴

Without any form of periodic monitoring, the substantive limitations on formaldehyde emissions become unenforceable as a practical matter the moment the stack test is completed. As such, the Department should either (a) provide an robust justification for why a one-time stack test is an effective means to monitor emissions of a carcinogenic gas like formaldehyde, or, more likely, (b) amend the Draft Permit to require more defensible monitoring requirements. In either case, the Department needs to explain how the Pipeline can meet its obligation under Condition 58²¹⁵ to demonstrate compliance with the startup and shutdown formaldehyde emission limits.²¹⁶

Comment No. 15: The Draft Permit incorrectly labels equipment specifications as merely informational.

After listing the relevant “[e]quipment included in the project”—equipment on which the Department’s entire permit review is based—the Draft Permit includes a disclaimer that those “[s]pecifications . . . are for informational purposes only and do not form enforceable terms or conditions of the permit.”²¹⁷ Presumably, the Department lifts this language from 9 VAC § 5-80-1180(D)(3), which requires minor NSR permits contain, as necessary to ensure practical enforcement, “[s]pecifications for permitted equipment, identified as thoroughly as possible,” including by “type, rated capacity, and size.”²¹⁸ While the regulation does state the general principle that “[s]pecifications . . . are for informational purposes only and do not form enforceable terms or conditions of the permit,” it includes an important caveat: equipment specifications *must* be enforceable to the extent they “form the basis for one or more of the other terms or conditions in the permit.”²¹⁹ As such, the Board’s Regulations accord with EPA guidance that “the technology upon which [a] BACT emission limit is based should be specified in the permit.”²²⁰

213 *Id.*

214 *Sierra Club v. Environmental Protection Agency*, 536 F.3d 673, 675 n.3 (D.C. Cir. 2008) (“An annual monitoring test would be periodic, but a one-time test would not.”).

215 Draft Permit ¶ 58 (“The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit.”).

216 *Id.* ¶¶ 53–54

217 Draft Permit at 2.

218 9 VAC § 5-50-80(D)(3). Note that the next subdivision (4) contains almost identical language for “air pollution control equipment installed or to be installed.” *Id.* § 5-50-80(D)(4).

219 *Id.*

220 NSR Workshop Manual at B.56.

Here, each piece of equipment specified in the Draft Permit forms the basis for one or more of the other, substantive terms or conditions in the permit. The specifications, which include the rated capacities of various components, form the basis for all emissions calculations—and consequently, all impact analyses—within the Application, the Engineering Analysis, and the Draft Permit. Labeling these specifications as “informational only” allows a permittee to change equipment without an assessment of its impact, thus rendering all engineering analyses and air quality modeling performed in connection with the Pipeline’s proposal as effectively meaningless. It also prevents inspectors from verifying that equipment *actually* installed is consistent with the equipment that the Department has *actually* studied under 9 VAC § 5-80-1190 and that the Board *actually* approved under 9 VAC § 5-80-1180.

Comment No. 16: The Draft Permit includes multiple conditions too vague to be enforceable as a practical matter.

In addition to numerical limitations, the Board’s Regulations allow NSR permits to include appropriate “[r]equirements for proper operation and maintenance of any pollution control equipment.”²²¹ Those permit conditions, however, are subject to the overarching rule that the Board “ensure [its] permits are enforceable as a practical matter.”²²² Several non-numeric conditions in the Draft Permit are framed in vague, undefined terms that render them unenforceable and, therefore, ultimately meaningless.²²³ Examples include:

- ✧ the requirement that the Pipeline operate combustion turbines, pollution controls, and monitoring equipment “in a manner consistent with good air pollution control practices for minimizing emissions;”²²⁴
- ✧ the requirement to observe “best engineering practices for minimizing emissions” during startup, shutdown, or while operating SoLoNo_x technology in sub-zero temperatures;²²⁵ and
- ✧ the requirement to ensure “proper operation” of the vent gas reduction system in evaluating leaks during a pressurized hold.²²⁶

221 9 VAC § 50-80-1180(D)(6).

222 *Id.* § 50-80-1180(D); *see also* Minor NSR Manual at 11-11 (acknowledging that Article 6 permits “must be ‘enforceable as a practical matter.’”).

223 *Id.* at 11-8—11-9 (“Permit conditions that are not ‘enforceable as a practical matter’ . . . are useless for demonstrating compliance.”).

224 Draft Permit ¶¶ 4, 46.

225 *Id.* ¶¶ 1(a), 4(e).

226 *Id.* ¶¶ 34, 46(d).

Unless each of these conditions is reframed in a manner that allows for practical enforcement, the Draft Permit fails to meet the requirements of Article 6.

In addition, Conditions 18–24 and 53–54 of the Draft Permit all contain an apparent disclaimer that the “emissions [therein] are derived from the estimated overall emission contribution from operating limits.”²²⁷ This language is effectively inscrutable. If the Department can find a clearer way to express the sentiment beneath this language, it should amend the Permit accordingly.²²⁸ As it stands, however, this language is too vague to be practically enforceable or of any help in clarifying other enforceable terms.

Comment No. 17: The Draft Permit does not address condensable particulate matter emissions.

Combustion turbines and microturbines emit two kinds of particulate matter: “filterable PM,” which “exists in the stack in either the solid or liquid state and can be measured on a EPA Method 5 filter,”²²⁹ and “condensable PM,” which originates “as a gas in the stack but condenses in the cooler ambient air to form particulate matter.”²³⁰ As a criteria pollutant, PM_{2.5} includes “all forms of particulate, *filterable and condensable*.”²³¹ And because “permits need to limit the entire pollutant,”²³² a PM_{2.5} limit that covers only filterable particulate must be accompanied by “a second limit that covers both the filterable *and* condensable” particulate.²³³

As the Engineering Analysis acknowledges, “condensable materials account[] for a significant portion of PM_{2.5} emissions,”²³⁴ but they are “unable to be captured with add-on filter controls.”²³⁵ Given that acknowledgment, it is unclear why the Draft Permit addresses only

227 Draft Permit at ¶¶ 18–24, 53–54.

228 Minor NSR Manual at 11-1 (“[T]o the maximum extent possible, permits will . . . [c]ontain conditions that are clear, concise and unambiguous.”).

229 AP-42 Compilation, *supra* note 170, at 3.1-4—3.1-5.

230 *Id.* at 3.1-5; *see also* Virginia Department of Environmental Quality, *Air Permit Guidance for Condensable Emissions in Particulate Pollutants*, Doc. No. APG-110 (August 28, 2020), available at <https://bit.ly/39rNYtE> (Condensable Particulate Guidance).

231 *Id.* at 2 n.4.

232 *Id.* at 2 (emphasis added); *see also id.* at 3 (“Any permits for PM₁₀ and PM_{2.5} that have been issued after January 1, 2011 *must* include both the filterable and condensable fractions.”) (emphasis in original).

233 *Id.* at 2.

234 In fact, Departmental guidance suggests that condensable particulate emissions are generally “assumed to be less than or equal to 2.5 µm.” *Id.* at 2.

235 Engineering Analysis at 11.

filterable particulate emissions. By merely requiring filters for inlet air,²³⁶ the Draft Permit addresses only the first class of “filterable PM.” The Department’s own guidance makes clear that the Draft Permit’s filter requirement must be accompanied by “a second limit that covers both the filterable *and* condensable” particulate emitted from the Station.²³⁷

Comment No. 18: The Department has failed to explain the basis behind its venting requirement.

Condition 6(f) of the Draft Permit allows the Pipeline to vent gas once “the combustion turbine case pressure is less than or equal to 44.7 psi (30 psig).”²³⁸ Nothing in the Department’s Engineering Analysis or the Pipeline’s Permit Application explains the basis for allowing venting at that level. While the Engineering Analysis does state that the required “VGRS is capable of reducing the system pressure to 30 psig prior to atmospheric depressurization,”²³⁹ there is no indication that this is the lowest pressure achievable, or any explanation as to why a lower pressure is infeasible. The permitting record should support the fact that the case pressure is the lowest achievable, as this will ensure no unnecessary periods of uncontrolled emissions during venting operations.

Comment No. 19: The Draft Permit’s allowance for pigging-related VOC and air toxics emissions is inconsistent with anticipated operations.

Inspection and cleaning of natural gas pipelines often requires “pigging”—launching a “pig” device toward a targeted area of the pipeline from one point and then receiving it at another point on the far side. The Engineering Analysis notes that pigging produces additional emissions of VOCs and air toxics as valves are opened to first depressurize the pipeline.²⁴⁰ According to that Analysis, however, pigging operations will occur only rarely at the proposed Station—only “once every five to seven years as part of normal inspection and equipment maintenance operations.”²⁴¹

The Draft Permit, however, allows emissions 10–14 times greater than those contemplated under the Department’s own projections for “normal inspection and equipment maintenance operations.” Specifically, Condition 6(c) permits uncontrolled VOC and air toxic emission events from pigging as often as twice per year.²⁴²

236 Draft Permit ¶ 3.

237 See Condensable Particulate Guidance, *supra* note 230, at 2.

238 Draft Permit ¶ 6(f).

239 Engineering Analysis at 12.

240 *Id.* at 4.

241 *Id.*

242 Draft Permit ¶ 6(c) (“Pig launching and recovery shall be limited to two events each per 12-month period.”).

While permit limits need not be set at a level that punishes necessary (albeit occasional) deviations from a “normal inspection and equipment maintenance” schedule,²⁴³ permitting agencies must “sufficiently articulate th[e] reasons” behind or “provide the necessary record support” for any compliance margins.²⁴⁴ The Board’s Minor NSR Permit Manual suggests “permit limits at 120 percent of predicted emissions” as an appropriate compliance margin.²⁴⁵ And even then, a cogent “justification should be provided” in the permitting record for any decision that “Predicted Emissions [will] not used as the Recommended Permit Emission Limits.”²⁴⁶

The Department has provided no justification for setting a permit limit at approximately 1000–1400% of anticipated emissions—a limit that puts the Board-endorsed 120% compliance margin to shame. It is difficult to imagine a rational “justification [can] be provided” in this case.²⁴⁷ But without one, the allowance for pigging-related emissions “cross[es] the line from permissible to impermissible” as a margin both “excessively large [and] not sufficiently documented and supported.”²⁴⁸

Comment No. 20: Proper fugitive emissions monitoring requires monthly optical gas imaging surveys.

Conditions 7(a) and 34 allow the Pipeline to choose either Method 21 or optical gas imaging for the quarterly leak detection surveys required under the Draft Permit.²⁴⁹ For both fugitive-prone components and the VGRS, those surveys should be conducted monthly, and primarily with optical gas imaging as supplemented, if needed by Method 21. Because optical gas imaging can be conducted relatively quickly, a monthly survey is appropriate to ensure that leaks are promptly identified and remediated.

Comment No. 21: The Draft Permit lacks an adequate means of determining compliance with the fuel sulfur content limit.

The Draft Permit provides two methods for demonstrating compliance with fuel sulfur limits: the Pipeline may either submit “fuel quality characteristics in a current, valid purchase contract, tariff sheet, or transportation contract for the fuel, specifying . . . the maximum total sulfur

243 See *Knauf Fiber Glass*, 9 E.A.D. 1, 15 (E.A.B. 2000) (enclosed as Exhibit No. 26) (“There is nothing inherently wrong with setting an emissions limitation that takes into account a *reasonable* safety factor.”) (emphasis added).

244 *Mississippi Lime*, 15 E.A.D. at 373.

245 Minor NSR Manual at 7-6.

246 *Id.*

247 *Cf. id.*

248 *Mississippi Lime*, 15 E.A.D. at 369.

249 Draft Permit ¶¶ 7(a), 34.

content,” or it may “perform annual fuel analysis of on-site natural gas.”²⁵⁰ The Draft Permit, however, fails to specify a test method for any such fuel analyses. Because the Permit fails to “specify how compliance is to be determined,” the substantive limits are not enforceable as a practical matter.²⁵¹

Comment No. 22: The Draft Permit fails to ensure hexane emissions are in fact exempt from regulation.

Although the Department claims that the Pipeline is exempt from hexane limitations,²⁵² the Draft Permit includes a requirement that the Pipeline submit evidence of “the maximum hexane content for the natural gas being fired at the” Station.²⁵³ We agree that the Permit should require provisions that ensure the Station is not, in fact, emitting hexane at levels above the applicable exemption rates. However, monitoring the characteristics of the fuel will not alone provide an accurate picture of the Station’s actual hexane emissions. As an initial matter, it is not clear how the Department will calculate actual hexane emissions based on fuel content. But more importantly, this requirement ignores the fact that hexane can be created in the combustion process. It is overly simplistic, then, to assume that evidence of fuel content will provide assurance that the Station is not circumventing hexane regulation. The Draft Permit should be amended to require corroboration of the Pipeline’s hexane calculations and to explain to the public the method by which the Department will do so.

Comment No. 23: The Draft Permit’s opacity monitoring requirements are facially inadequate.

The Draft Permit proposes once-weekly opacity readings using EPA Method 9²⁵⁴ as a means of monitoring visual emissions and ensuring that opacity does not exceed 5% from each turbine and microturbine.²⁵⁵ A subsequent provision suggests that those tests should “yield a six-minute average.”²⁵⁶ A single, random six-minute test performed once a week, however, is facially inadequate to assure continuous compliance with a 5% opacity limit. A continuous opacity monitoring system (COMS) system is the only means of ensuring that opacity limits are met on a continual basis—as the plain language of the Draft Permit requires.²⁵⁷

250 *Id.* ¶ 16.

251 Minor NSR Manual at 11-11.

252 Engineering Analysis at 7.

253 Draft Permit ¶ 57.

254 *See* 40 C.F.R. § 60 Appendix A.

255 Draft Permit ¶¶ 25–28.

256 *Id.* ¶ 33.

257 *Id.* ¶ 25–26.

Comment No. 24: The initial stack test should encompass SO₂ and NO_x emissions.

The Draft Permit requires an initial stack test for CO, VOC, PM₁₀, and PM_{2.5} emissions.²⁵⁸ That requirement should be expanded, however, to include SO₂. Including SO₂ emissions will allow the Department to confirm compliance with the fuel sulfur content limit expressed in the Draft Permit.²⁵⁹ The initial stack test can also be combined with a relative accuracy test audit (RATA) to validate the CEMS monitoring NO_x emissions.²⁶⁰ As further detailed in Comment No. 26 below, testing protocols and reports concerning the initial stack test should be available on the Department's website due to the significant public interest in the Station.

Comment No. 25: The Draft Permit fails to specify how missing or invalid CEMS data will be accounted for in compliance determinations.

Although the Draft Permit acknowledges the possibility for missing or invalid data from the CEMS,²⁶¹ it does not specify how data gaps will be accounted for. The Draft Permit should be amended to specify a proper data substitution algorithm.²⁶²

Comment No. 26: Submissions required under the Permit should be affirmatively disclosed to the public.

The Department appears to have already determined—correctly—that the proposed Station is a matter of significant concern for the surrounding community and for Virginians interested in the Commonwealth's energy policy and ongoing efforts toward environmental justice.²⁶³ We appreciate the Department's decision to make the entire permitting record available on its website. Like other records concerning the Board's oversight of Virginia polluters, those materials are subject to mandatory disclosure upon request.²⁶⁴ But affirmatively disclosing them

258 *Id.* ¶¶ 30–31.

259 *Id.* ¶ 15.

260 *Id.* ¶ 35.

261 *Id.* ¶ 38(b) (requiring the Pipeline report periods “in which the [CEMS] data . . . are either missing or invalid”).

262 *See generally* 40 C.F.R. §§ 75.30–75.37.

263 *See* Engineering Analysis at 18 (“[M]inor NSR permit applications that have the potential for public interest concerning air quality, as determined by the board, shall be subject to a public comment period of at least 30 days.”).

264 *See generally* Virginia Code § 2.2-3704(A) (“Except as otherwise specifically provided by law, all public records shall be open to citizens of the Commonwealth, representatives of newspapers and magazines with circulation in the Commonwealth, and representatives of radio and television stations broadcasting in or into the Commonwealth during the regular office hours of the custodian of such records.”); *id.* § 2.2-3701 (defining “public records” so as to include, among other things, “all writings and recordings . . . in the possession of a public body or its officers, employees or agents in the transaction of public business”).

to the interested public is consistent with the Board’s commitment to transparency and with its Regulations ensuring maximal public access to air quality information.²⁶⁵

Given the significant public interest in the Pipeline’s proposal, the Department and the Board should extend that practice to information that the Pipeline must submit under the terms of the Draft Permit. Examples include:

- ✧ the fugitive emission component monitoring and repair plan;²⁶⁶
- ✧ the monitoring plan for monitoring devices described in Conditions 8–12 and 16;²⁶⁷
- ✧ test protocols and reports related to annual fuel analyses;²⁶⁸
- ✧ test protocols and reports related to the initial and biennial stack tests²⁶⁹ and visible emissions evaluations;²⁷⁰ and
- ✧ the initial and annual VGRS evaluation reports.²⁷¹

The Draft Permit should be amended to provide for mandatory public disclosure of these documents on the Department’s website, subject to any redactions appropriate under 9 VAC § 5-170-60(B)–(C).

V. THE PERMITTING RECORD DOES NOT ADEQUATELY ASSESS ENVIRONMENTAL JUSTICE.

In recent years, the Commonwealth has taken significant strides to articulate the role of environmental justice (EJ) in the regulatory process. The Board and Department, as the agencies tasked with reviewing the proposed Station, are required to incorporate environmental justice into their decision-making processes. The requirements and guidelines applicable to the Department’s analysis and the Board’s review of the proposed permit are provided by the Virginia Environmental Justice Act, the Commonwealth’s 2020 Energy Plan, and the requirements of Virginia Code § 10.1-1307 as recently construed by the Fourth Circuit in *Friends of Buckingham v. State Air Pollution Control Board*.²⁷²

265 See generally 9 VAC § 5-170-60.

266 Draft Permit ¶ 7(c).

267 *Id.* ¶ 13.

268 *Id.* ¶ 16.

269 *Id.* ¶¶ 31–32.

270 *Id.* ¶ 33.

271 *Id.* ¶ 34.

272 947 F.3d 68 (4th Cir. 2020).

The Virginia Environmental Justice Act (VEJA) sets the promotion of environmental justice²⁷³ as the policy of the Commonwealth, “with a focus on environmental justice communities and fenceline communities.”²⁷⁴ This mandate is extended to agencies and political subdivisions of the Commonwealth through the Commonwealth’s Energy Plan. The recently enacted 2020 Energy Plan establishes the goals of the Commonwealth with respect to the development and continued operation of its energy goals. Among those goals is ensuring “that development of new, or expansion of existing energy resources or facilities does not have a disproportionate adverse impact on economically disadvantaged or minority communities.”²⁷⁵ To carry out these goals, the Energy Plan provides that “all agencies and political subdivisions of the Commonwealth, in taking discretionary action with regard to energy issues *shall* recognize the elements of the Commonwealth Energy Policy.”²⁷⁶ Together, the VEJA and the Energy Plan create the opportunity and the imperative for integrating environmental justice principles into regulatory processes, while providing a crucial lens through which to view the requirements of Section 10.1-1307.

In light of the concerns raised by the surrounding community and the principles enacted by the General Assembly, we ask that the Board (1) explicitly recognize the existence of environmental justice communities within the area surrounding the proposed Project, consider the health impacts to those particular communities and reject the Pipeline’s imposition of a 1-mile radius for assessing air quality impacts to those communities; and (2) ensure that the terms of the proposed permit are sufficiently protective of human health by, at a minimum, rejecting reliance on the NAAQS as conclusive evidence that there will be no negative health impacts to surrounding communities.

Comment No. 27: The Board must independently consider the presence of environmental justice communities in the surrounding area and how they will be impacted by the proposed Project.

With its recent decision in *Friends of Buckingham v. State Air Pollution Control Board*, the Fourth Circuit provided much-needed clarity on the air permit review process. The Fourth Circuit concluded that the Board’s erstwhile approach, one it perpetuates here, failed to fulfill its duty under Section 10.1-1307(E) of the Air Pollution Control Act, which requires the Board to consider:

- (1) the character and degree of injury to, or interference with, safety, health, or the reasonable use of property which is caused or threatened to be caused;

273 The VEJA defines environmental justice as the “fair treatment and meaningful involvement of every person regardless of race, color, national origin, income, faith or disability, regarding the development, implementation, or enforcement of any environmental law, regulation, or policy.” Virginia Code §§ 2.2-234—2.2-235.

274 *Id.* § 2.2-235.

275 *Id.* § 67-102.

276 *Id.* (emphasis added).

- (2) the social and economic value of the activity involved;
- (3) the suitability of the activity to the area in which it is located;
- (4) the scientific and economic practicality of reducing or elimination the discharge resulting from such activity.²⁷⁷

In contemplating the role of environmental justice, the Court focused on subsections 10.1-1307(E)(1) and (E)(3). The Court held that the Board’s environmental justice review was insufficient due to: (1) the failure “to make any findings regarding the character of the local population”; (2) the failure to “individually consider the potential degree of injury to the local population independent of NAAQS and state emission standards”; and (3) its adoption and reliance “on evidence in the record that was incomplete or discounted by subsequent evidence.”²⁷⁸ As a result, the Court vacated the permit and remanded it back to the Board for further consideration consistent with the Court’s decision. The Fourth Circuit’s analysis explicitly identified the Board’s methods as invalid and insufficient to comply with Section 10.1-1307(E) and its mandate. The Board should not repeat those mistakes here.

The Fourth Circuit’s holding is particularly relevant when considering the information that the Pipeline has provided thus far. In addition to the Green Toxicology Assessment and Supplemental Information on Environmental Justice (Sep. 2020) (“EJ Supplement”) , the Pipeline has included a Community Impact Assessment (LHC Study), developed by Dr. Alexa Sutton Lawrence, Ph.D., as part of its Application.²⁷⁹ The development and production of this information, the Pipeline asserts, “satisfies the applicable requirements” and “exceeds what the statutes require.”²⁸⁰ This is simply not true. In making sweeping statements regarding the impact of this proposed Project on surrounding communities, the Pipeline’s EJ Supplement mischaracterizes its own supporting documentation, misconstrues existing legal precedent, and as a result reaches flawed conclusions. And, as discussed in further detail below, the Pipeline’s EJ Supplement and supporting documentation fail to (i) meaningfully consider the presence of environmental justice communities; (ii) assess the character and degree of injury from the Project’s air emissions; (iii) comply with Section 10.11307E and the Fourth Circuit’s interpretation of those regulations; and (iv) comply with the VEJA.

277 *Id.* § 10.1-1307(E).

278 *Friends of Buckingham*, 947 F.3d at 86.

279 MVP initially included the *Community Impact Assessment of Lambert Compressor Station*, listed as “Appendix A,” as part of its September 2020 application update. On February 25, 2021 MVP provided an “Updated Community Impact Assessment of Lambert Compressor Station.” References to the LHC study reflect the Updated Community Impact Assessment.

280 Mountain Valley Pipeline, Supplemental Information on Environmental Justice at 3 (September 2020) (the EJ Supplement).

Comment No. 28: The Board must reject the conclusions of the Pipeline’s EJ supplement and explicitly recognize the existence of environmental justice communities.

The Pipeline has repeatedly held out its Application as a comprehensive foray into environmental justice and has in turn encouraged the Board to adopt its assertion that “no environmental justice community . . . bears a disproportionate share of any negative environmental consequences.”²⁸¹ To reach this conclusion, however, the Pipeline disregards and mischaracterizes the findings of the LHC study and relies heavily on the Federal Energy Regulatory Commission’s (FERC) environmental justice analysis. By erasing environmental justice communities from its analysis and overstating its outreach efforts, the Pipeline is in direct conflict with the VEJA and its goal of promoting environmental justice.

Residents of Chatham, the proposed home of the Project, describe the surrounding area as one with strong connections to African American and Native American history. In the wake of the proposed Project, locals have voiced concerns about potential health impacts from air pollution and what the increased infrastructure means for the character of the surrounding area. Anderson and Elizabeth Jones, local residents, own a 57-acre farm and a 35-acre farm in Chatham, Virginia. Their property has been in the family for 97 years and serves as a home and a source of income. The Joneses originally opposed the Transco Compressor Station (where the Station would be co-located) and now fear the potential health impacts from the addition of a new source of air pollutants. Mr. Jones suffers from asthma and his mother died of the disease. The Jones, like many, are shocked and saddened to see the character of their community, and their land, threatened by natural gas infrastructure.

The Station also poses a significant threat to cultural resources in the area. Many residents have raised concerns about an unmarked gravesite located near the proposed site. Residents believe that the cemetery contains the remains of Native Americans and unnamed slaves. Prior to the proposed Project, Anderson and Elizabeth Jones and others in the community had often visited the gravesite to pay their respects. Unfortunately, that area is now closed to the public. Community members believe the closure is associated with the proposed Project and the Pipeline’s preparations. The loss of this site, and other artifacts, would only compound the harm done by the proposed projects. The protection of these communities and their resources must be a central component of the Board’s review of this permit.

While the Pipeline has sought to limit the Board’s review of air quality impacts to the one-mile radius surrounding the site, its own Community Impact Assessment recognizes the presence of four communities that fall within “[t]he ‘environmental justice community’ parameters as defined in the Virginia Environmental Justice Act.”²⁸² Because of the geography of the census tracts in the area, these findings also extend to the area within a 5-mile radius of the proposed Station. The report further identifies six additional “environmental justice communities within a

281 *Id.* at 2.

282 Land and Heritage Consulting, LLC, Updated Community Impact Assessment of Lambert Compressor Station, 16 (February 23, 2021) (LHC Study)

10-mile radius of the proposed site.²⁸³ The Board must formally recognize the existence of these environmental justice communities threatened by the proposed Lambert Compressor Station and consider the impacts to their health and safety as part of its review.

The Pipeline again fails to accurately present the information contained in the LHC study when discussing community outreach. The Pipeline describes the Community Impact Assessment as a “far-reaching analysis of environmental justice principles” and credits Dr. Lawrence with expanding “on the community outreach that Mountain Valley has conducted and its continuing to conduct.”²⁸⁴ Though the Pipeline holds the LHC Study out as expanding community outreach, Dr. Lawrence explicitly notes the limitations of her report in this regard.

The LHC Study makes it clear that researchers were only able to conduct a limited inventory of the surrounding community. Land & Heritage Consulting attempted to conduct interviews over a 3-month period (June 22 – August 31, 2020).²⁸⁵ Outreach to indigenous communities and non-indigenous persons within a 10-mile radius of the proposed facility during this period resulted in a response rate of 4.9% and a completion rate 2.3%.²⁸⁶ The Assessment reports a 67% response rate from individuals reached via Facebook Messenger, but that effort only reached 12 individuals.²⁸⁷ LHC conducted additional targeted outreach to the African American Community in Blairs, resulting in one additional interview.²⁸⁸ The Assessment itself recognizes its limited applicability in this context. In its recommendations regarding African-American Freedmen Descendants, the Assessment notes that researchers were only able to interview one member of that community and “strongly recommend[s] that outreach continue until the need and concerns of that community are better understood.”

In addition to its mistreatment of the LHC Study, the Pipeline also leans heavily on FERC’s environmental justice analysis, suggesting that the agency’s conclusions “support a finding that environmental justice principles have been satisfied.”²⁸⁹ However, following its environmental justice analysis of the Pipeline’s proposed Station, FERC has made clear that it no longer stands by the approach to environmental justice it adopted in that proceeding. After issuing all of the necessary approvals and permits for the now-operational Algonquin Gas Transmission pipeline in New England, FERC recently decided to review its decision approving a similar compressor station in Weymouth, Massachusetts, citing internal concerns that its own environmental justice

283 *Id.* at 17.

284 EJ Supplement at 2.

285 *Id.*

286 LHC Study at 38

287 *Id.*

288 *Id.*

289 EJ Supplement at 7.

process was insufficient.²⁹⁰ In February, FERC established a paper briefing “to further examine public safety concerns associated with the operation of th[at] Station,”²⁹¹ and specifically requested input on how it should examine changes in the Project’s air emissions and how those changes might affect environmental justice communities.²⁹² This unprecedented order, and the 3-2 decision that precedes it, suggests that FERC is uncomfortable allowing that project to rests on its previous findings and the considerations that led to them. Thus, the Board should give FERC’s environmental justice review of the Lambert Compressor Station more weight than its authors would.

In any case, the Fourth Circuit in *Friends of Buckingham* concluded that the Board erred anytime it relied solely on evidence that “was incomplete or discounted by subsequent evidence.”²⁹³ The Pipeline’s assertion that no environmental justice communities will be impacted by this facility conflicts with CI’s identification of four environmental justice communities as contemplated by the VEJA and with additional public health studies discussed below. Further, the Community Impact Assessment is by any estimation—including its own—“incomplete” with regard to its assessment of community concerns and outreach.²⁹⁴ The supplement itself is also incomplete to the extent that it relies on FERC’s approval.

Comment No. 29: The Board must consider the human health risks to the particular communities affected by the proposed Station.

In *Friends of Buckingham*, the Court stated that the “minority EJ community designation” is important because of its effect on supporting evidence.²⁹⁵ If such communities are present, then

290 See generally *Algonquin Gas Transmission*, FERC Docket No. CP16-9-012, Order Establishing Briefing (February 18, 2021), available at <https://bit.ly/3wtZyOQ> (enclosed as Exhibit No. 27).

291 *Id.* at 1.

292 *Id.*

293 *Id.*

294 See LHC Study at 3, (“Our outreach was impacted by (1) the timeline (April – August) to complete this assessment; (2) restrictions on travel and in-person outreach imposed by the emergent coronavirus pandemic (beginning in March 2020, and ongoing); and (3) restrictions on in-person outreach imposed by the acute period of community protests against racial injustice following the killing of George Floyd (May – July 2020). A follow-up phase of outreach attempted from October to December 2020 coincided with both a surge of coronavirus cases across multiple states that more severely limited contact, as well as with the widely-celebrated Thanksgiving and Christmas holidays. As a result of these restrictions, this report presents findings based on a finite number of community interviews.”).

295 947 F.3d at 88.

information about particular threats to their health becomes an integral part of the environmental justice analysis.²⁹⁶

The combustion turbines, ancillary equipment, and processes at the proposed Project will emit harmful air pollutants including, but not limited to, particulate matter (PM_{2.5} and PM₁₀), nitrogen oxides (NO_x), volatile organic compounds (VOCs), sulfur dioxide, carbon monoxide (CO), and hazardous air pollutants, including hexane and formaldehyde. The negative health risks from exposure to these pollutants are serious and well-documented. Nitrogen oxides (NO_x)—which pose health risks on their own²⁹⁷—contribute to the formation of ground-level ozone, a pollutant known to cause a well-documented range of acute and chronic health effects, and PM pollution.²⁹⁸ In particular, breathing fine particulate matter, or PM_{2.5}, poses short- and long-term health risks including: cardiovascular harm (e.g., heart attacks, strokes, heart disease, congestive heart failure), respiratory harm (e.g., inflammation and irritation of airways, worsened asthma, worsened chronic obstructive pulmonary disease (COPD), early death, cancer, harm to the nervous system, and may cause reproductive and developmental harm.²⁹⁹ Low-income communities and communities of color, particularly African Americans, are disproportionately exposed to PM_{2.5} pollution and suffer increased numbers of related health effects.³⁰⁰

The attached report by expert George Thurston, Doctor of Science (the Thurston Report), attached as an Appendix to these comments, summarizes the state of the science regarding PM_{2.5} and its health effects. Dr. Thurston’s analysis and conclusions are similar to those he has conducted for other recent air permitting processes in Virginia—including the compressor station at issue in *Friends of Buckingham*—because each of the fossil fuel-fired facilities proposed to emit similar pollutants—including particulate matter and nitrogen oxides—and the health risks those pollutants pose, as supported by the scientific literature and evidence, have not changed. As Dr. Thurston notes, “[a]ir pollutants associated with fossil fuel combustion (e.g., from oil, coal and natural gas fired fossil fuel combustion sources) have well-documented adverse human health effects.”³⁰¹

The Thurston Report also identifies populations that are especially susceptible to the effects of air pollution. Among these populations are “the very young, the poor, the very old, and persons

296 *Id.*

297 See Environmental Protection Agency, *Integrated Science Assessment for Oxides of Nitrogen*, Doc. No. EPA/600/R-15/068 (January 2016), available at <https://bit.ly/2OkGPsG>.

298 Thurston Report at 21–33; Environmental Protection Agency, *Integrated Science Assessment for Ozone & Related Photochemical Oxidants*, Doc. No. EPA-600/R-10/076F, at §§ 8.3.1.1, 8.3.1.2, 8.2.2, 8.2.3 (2013), available at <https://bit.ly/3sSMwIB>.

299 Environmental Protection Agency, *Integrated Science Assessment for Particulate Matter*, Doc. No. EPA/600/R-19/188 (2019), available at <https://bit.ly/3wrbyAG>.

300 *Id.*, at 12.5.3, 12.5.4 (2019).

301 Thurston Report at 17.

with pre-existing health conditions, such as heart disease and asthma.”³⁰² Evidence also suggests that ethnicity plays “a role in determining whether adverse health impacts are the predictable result of exposure to increased PM_{2.5} emissions.”³⁰³ In considering the potential impacts from the proposed Lambert Compressor Station, Dr. Thurston concludes that, “because no threshold of air pollution effects has yet been found, any incremental air pollution exposures add an incremental adverse health risk to residents near a source of fossil fuel combustion air pollution.”³⁰⁴

Critically, the Pipeline urges the Board to rely on the National Ambient Air Quality Standards as a comprehensive metric for evaluating the potential harm to surrounding communities. This reliance is both factually and legally flawed, as discussed below in Comment No. 32.

In its review of the Department’s and Board’s site suitability analysis, the *Buckingham* court contemplated the potential health impacts from the proposed facility and characteristics of the community that might exacerbate those impacts. Here, the demographic evidence provided by the Pipeline—which shows low-income and communities of color in the surrounding area³⁰⁵—suggests an increased risk of negative health impacts.³⁰⁶ Indeed, for purposes of implementing the public participation regulations, the Department found that “Pittsylvania County has been determined to be a locality particularly affected by the proposed facility because the locality bears an identified disproportionate material air quality impact that would not be experienced by other localities.”³⁰⁷ The available evidence, including the Thurston Report and demographic information regarding the makeup of the communities in the surrounding area, are crucial to the Board’s analysis of the character and degree of injury the Station threatens to cause—and, by extension, the suitability of this Project to the proposed site.

Comment No. 30: The Board should reject the Pipeline’s imposition of a restrictive one-mile radius and consider the potential impacts from air emissions on communities beyond a one-mile radius.

There is no legal or factual basis for limiting the review of impacted communities to a 1-mile radius around the facility. Despite this, the Pipeline has imposed this arbitrary and restrictive one-mile boundary with inadequate justification. In its supplemental environmental justice analysis, the Pipeline states that a one-mile radius “encompasses the population most likely to be

302 *Id.* at 40.

303 *Id.*

304 *Id.* at 41.

305 LHC Study at 16–22.

306 See Thurston Report at 40–41; NGO Comment Letter, *infra* note 353, at 74, 112–113; AMERICAN LUNG ASSOCIATION, *Disparities in the Impact of Air Pollution*, <https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities> (April 20, 2020).

307 Engineering Analysis at 18–19.

impacted, if at all, by this minor source of air emissions.”³⁰⁸ For this broad and consequential conclusion, the Pipeline suggests that the VEJA supports, and “[a]ir modeling confirms that use of a 1-mile radius is reasonable and appropriate.”³⁰⁹ In fact, neither the VEJA nor the Pipeline’s modeling provides any support for this conservative conclusion. The potential impacts from the Station, like air pollutants themselves, cannot be constrained to an arbitrary, one-mile radius.

The VEJA defines an *environmental justice community* as “any low-income community or community of color.”³¹⁰ *Fenceline communities* are further described as “an area that contains all or part of a low-income community or community of color and that presents an increased health risk to its residents due to its proximity to a major source of pollution.”³¹¹ Notably, the VEJA does not include distinct geographical bounds in its definition of environmental justice communities *or* fenceline communities. Instead, the legislature provides guidance by defining “low-income community” and “community of color.” A *community of color* exists “where the population of color expressed as a percentage of the total population of such area, is higher than the population of color in the Commonwealth, *expressed as a percentage of the total population of the Commonwealth.*”³¹² Similarly, a *low-income community* is “any census block group in which 30 percent or more of the population is composed of people with low income.”³¹³ The Act then further defines “low income.” Despite carefully defining these community-describing terms, the VEJA declined to make similar efforts with regard to “proximity.” This suggests that a proximity analysis is not a function of precision—like the identification of low-income communities and communities of color – but rather one of discretion.

The Pipeline’s reliance on the air modeling to delineate the bounds of its review is similarly misplaced. As discussed in greater detail above, the air quality modeling itself relies on misrepresentative data that may not adequately show the impacts to even those individuals living within the curtailed 1-mile radius.³¹⁴ While a variety of factors impact the distance traveled by air pollutants, a recent study from the University at Albany Institute for Health and the Environment notes that “air pollution from a compressor station can easily travel 10 miles or more before returning to ground level.”³¹⁵ In place of actual meteorological data from the area immediately surrounding the proposed site, the Pipeline instead provides data from the

308 EJ Supplement at 9.

309 *Id.*

310 Virginia Code § 2.2-234.

311 *Id.*

312 *Id.* (emphasis added).

313 *Id.* (emphasis added).

314 EJ Supplement at 9.

315 P.N. Russo & D.O. Carpenter, INSTITUTE FOR HEALTH & ENVIRONMENT, *Health Effects Associated with Stack Chemical Emissions from NYS Natural Gas Compressor Stations: 2008-2014* at 23 (2017), available at <https://bit.ly/3dxxsay9> (enclosed as Exhibit No. 28).

Lynchburg Regional Airport more than 40 miles away from the proposed site of the project.³¹⁶ In other words, the Pipeline suggests that air modeling based on data from 46 miles away should be used to ignore potential impacts to anyone living more than 1-mile from the proposed compressor station. The Pipeline’s exclusive reliance on misrepresentative data to justify a restrictive evaluation of the potential air quality impacts from the proposed Project is arbitrary. By aggressively limiting the scope of environmental justice review for this permit, the Pipeline deprives potentially affected individuals of the safeguards the General Assembly sought to provide.

Comment No. 31: The Department must clarify how it is interpreting the Air Pollution Control Board Law.

In 2020, the Virginia General Assembly added subsection (B) to Section 10.1-1307.01 of the Air Pollution Control Law, detailing certain duties of the Board regarding communities affected by fossil fuel-fired facilities.³¹⁷ Specifically, new subsection (B) requires the Board to take specific public notice and engagement actions prior to granting a permit for fossil fuel-fired facilities, including “compressor station facilit[ies] used to transport natural gas, if the Board finds that there is a locality particularly affected by such variance or permit.”³¹⁸ The Code clarifies that “‘locality particularly affected’ means any locality that bears any identified disproportionate material air quality impact that would not be experienced by other localities.”³¹⁹

The Department acknowledges that the Lambert Compressor Station satisfies the criteria in subsection (B) and thus requires the heightened public engagement requirements added by the 2020 General Assembly: “Pittsylvania County has been determined to be a locality particularly affected by the proposed facility because the locality bears an identified disproportionate material air quality impact that would not be experienced by other localities.”³²⁰ In this way, the Department makes the finding that the Lambert Compressor Station will result in an “identified disproportionate material air quality impact” for purposes of procedural, public participation requirements, but fails to grapple with the fact that this finding directly contradicts the Department’s statement concluding “that no environmental justice community bears a disproportionate share of any such impacts.”³²¹

316 See Comment No. 2, *supra*.

317 See 2020 VIRGINIA ACTS Chapter 110 [S1075] (April 10, 2020), available at <https://bit.ly/31L6GZ9> (“An Act to amend and reenact § 10.1-1307.01 of the Code of Virginia, relating to Department of Environmental Quality; public comment”).

318 Virginia Code § 10.1-1307.01(B).

319 *Id.* at § 10.1-1307.01(C).

320 Engineering Analysis at 18–19.

321 *Id.* at 16.

In its Engineering Analysis, the Department states: “For purposes of applicability of this regulation, DEQ is conservatively assuming that an increase in emissions greater than 1.0 µg/m³ is considered an ‘identified disproportionate material air quality impact.’”³²² However, the Department provides no explanation or justification as to how it reached or applied the 1.0 µg/m³ “assumption” or why it considers the assumption “conservative.” The Department does not specify whether the threshold of 1.0 µg/m³ refers to an increase in any one pollutant alone or some other calculation.³²³ The Department does not explain whether this assumption will be used to interpret subsection (B) in all applicable air permitting processes moving forward or whether this assumption is particular to this air permit.

We request that the Department provide further explanation and justification for the assumption defining “identified disproportionate material air quality impact.” Without more information, the public cannot understand how the Department is interpreting the requirements of subsection (B) and its relationship to other aspects of the environmental justice analysis conducted pursuant to Virginia law.³²⁴

Comment No. 32: Compliance with the National Ambient Air Quality Standards (NAAQS) is not conclusive evidence that there will be no negative health impact to local communities, and the Board must reject the Pipeline and Department’s suggestions to the contrary.

The Pipeline relies on the NAAQS to suggest that the proposed Station will pose no risk to human health³²⁵, and the Department accepts the Pipeline’s conclusions.³²⁶ This approach is legally and factually flawed. As the Fourth Circuit held in *Friends of Buckingham*, the Air Board’s “blind[] rel[iance] on ambient air quality standards is not a sufficiently searching analysis of air

322 *Id.* at 19.

323 The NAAQS modeling for the proposed project shows increases greater than 1.0 µg/m³ for nitrogen dioxide (NO₂), carbon monoxide (CO), and PM₁₀. Engineering Analysis at 6, Att. 2, Table 3. Alternatively, Table 4-1 in the Modeling Report also shows levels exceeding the 1.0 µg/m³ threshold for nitrogen dioxide and carbon monoxide.

324 See Virginia Code §§ 2.2-234, 10.1-1183, 10.1-1307E, 67-102(8); see also *Friends of Buckingham*, 947 F.3d 68 (4th Cir. 2020).

325 See EJ Supplement at 14-20, 18 (“Since the NAAQS are set to protect even the most sensitive populations with an adequate margin of safety, modeled concentrations below the NAAQS further support that the low-income environmental justice community is protected.”).

326 Engineering Analysis at 2 (“[T]he new source complies with all applicable requirements and National Ambient Air Quality Standards (NAAQS).”); Engineering Analysis at 16 (noting that the Pipeline “concludes that no environmental justice community bears a disproportionate share of any such impacts”); Public Notice Extension (“The estimated effect on air quality near the facility from the proposed project is compliance with all air quality standards.”).

quality standards for an EJ community,” otherwise, the site suitability provision in Section 10.1-1307(E) is “rendered meaningless.”³²⁷

Indeed, the Fourth Circuit found the Air Board’s environmental justice analysis was inadequate because it relied solely on compliance with the NAAQS and state air toxic standards as proof of no disproportionate impact. The Court explained that the Board “failed to individually consider the potential degree of injury to the local population *independent of NAAQS and state emission standards*.”³²⁸ Contrary to the Pipeline’s suggestion that the Fourth Circuit “had no record on which to determine whether reliance on the NAAQS was arbitrary and capricious,”³²⁹ the Fourth Circuit specifically discussed the record evidence when considering this issue:

A report in the record from George Thurston, a Doctor of Science and Director of the Program in Exposure Assessment and Human Health Effects at the NYU School of Medicine, explains that even short-term exposures to PM_{2.5} are causally connected to heart trouble and “increased risk of mortality.” *See* J.A. 1454. A comment from Dr. Larysa Dyrszka stated that PM_{2.5} is one of the deadliest air pollutants in part due to its ability to “lodge deep in the lungs” and “pass easily into the blood stream.” *Id.* at 1407. Indeed, any amount of PM_{2.5} in the system is harmful. *See Am. Trucking Ass’n v. EPA*, 283 F.3d 355, 360, 350 U.S. App. D.C. 254 (D.C. Cir. 2002) (recognizing the “lack of a threshold concentration below which [particulate matter is] known to be harmless”). Thus, even when NAAQS are not violated as to this particulate matter, the record reflects that exposure to PM_{2.5} will increase the risk of asthma, heart attacks, and death. *See, e.g.,* J.A. 1454-62.³³⁰

The Court further reviewed specific statements made by Board members and Departmental staff at Board meetings, finding that “the Board merely falls back on NAAQS and state air quality standards not tailored to this specific EJ community. *The [Buckingham] record is replete with such reliance*.”³³¹ In fact, it was the Board’s reliance on these factors that led it to dismiss environmental justice concerns raised by commenters. There can be no misinterpreting the Court’s stance in this instance: NAAQS cannot and should not act as a definitive metric for determining whether air pollution poses a threat to the health and safety of impacted communities.

The Pipeline suggests that “[c]ourts have also upheld the use of NAAQS as reasonable when evaluating environmental justice impacts,” and cites to a single unpublished, trial court decision

327 947 F.3d at 93.

328 *Id.* at 86 (emphasis added).

329 EJ Supplement at 15 n.43.

330 947 F.3d at 92.

331 *Id.* at 90 (emphasis added).

for support.³³² But the Fourth Circuit decision in *Friends of Buckingham* squarely disagreed with reliance on NAAQS as conclusive evidence that disproportionate local impacts will not occur.³³³ The Pipeline’s reference to a footnote in a single, unreported, New York district court case does not counsel otherwise. Furthermore, the trial court in that case reviewed an environmental justice analysis conducted pursuant to the federal National Environmental Policy Act (NEPA).³³⁴ Here, the Department and Board’s review of the proposed Project must comply with state law—specifically, the VEJA,³³⁵ Commonwealth Energy Plan,³³⁶ and site suitability regulations³³⁷—as well as the holding in *Friends of Buckingham*.

Substantial evidence demonstrates the current PM_{2.5} NAAQS is not conclusively protective of human health.

In the case of the proposed Lambert Compressor Station, the record reflects that exposure to PM_{2.5} will increase the risks of negative health outcomes. For example, Dr. Thurston’s Report discusses the substantial body of scientific research showing that exposure to PM_{2.5} at levels below the current federal air quality standards poses serious health risks.³³⁸ He notes: “just as

332 EJ Supplement at 18 (citing *Coalition for Healthy Ports v. United States Coast Guard*, 2015 U.S. Dist. LEXIS 159090, No. 13-CV-5347, *25 n.33 (November 24, 2015)).

333 See also *United States v. Ameren Missouri*, 421 F. Supp. 3d 729, 778 (E.D. Mo. 2019) (noting that defendant facility “argued throughout trial that the NAAQS are protective of human health, and that any PM_{2.5} concentration below the NAAQS would not pose a meaningful risk of harm to human health”, but finding that the “structure of the Clean Air Act, the EPA’s statements concerning the NAAQS, and the scientific consensus concerning PM_{2.5} refute this argument”).

334 *Coalition for Healthy Ports*, 2015 U.S. Dist. LEXIS 159090 at, *92.

335 Virginia Code § 2.2-235 (“It is the policy of the Commonwealth to promote environmental justice and ensure that it is carried out throughout the Commonwealth, with a focus on environmental justice communities and fenceline communities.”).

336 *Id.* § 67-102(8) (“[e]nsure that development of new, or expansion of existing, energy resources or facilities does not have a disproportionate adverse impact on economically disadvantaged or minority communities.”).

337 *Id.* § 10.1-1307E.

338 Thurston Report at 34-40; see also Liuhua Shi *et. al.*, *Low-Concentration PM_{2.5} and Mortality: Estimating Acute & Chronic Effects in a Population-Based Study*, 124 ENVIRONMENTAL HEALTH PERSPECTIVES 46 (2015), available at <https://bit.ly/31L8Vvt> (enclosed as Exhibit No. 29); Joel Schwartz *et al.*, *Estimating Causal Effects of Local Air Pollution on Daily Deaths: Effect of Low Levels*, 125 ENVIRONMENTAL HEALTH PERSPECTIVES 23 (2017), available at <https://bit.ly/3fHpXTm> (enclosed as Exhibit No. 30); Qian Di *et al.*, *Association of Short-Term Exposure to Air Pollution with Mortality in Older Adults*, 318 JOURNAL OF AMERICAN MEDICAL ASSOCIATION 2446 (2017), available at <https://bit.ly/3dxJxif> (enclosed as Exhibit No. 31); George D. Thurston *et al.*, *Ambient Particulate Matter Air Pollution Exposure & Mortality in the NIHAARP Diet and Health Cohort*, 124

cleaning the air below the standards would avoid more of those deaths, any increase in pollution will increase the risk of adverse effects at all levels of prevailing air pollution, even when the NAAQS standards are not violated.”³³⁹

[T]he NAAQS standards do not represent a resolute threshold for adverse health effects to human health. The goals of the NAAQS are to minimize adverse risk of health effects, similar to the way a driving speed limit on our roads are intended to make driving safer, but cannot guarantee that no accidents or deaths will occur when driving within the speed limit. So, while the air quality in locations that meet or are below the NAAQS may pose a smaller risk to human health than at locations that are above the NAAQS, it may nonetheless cause significant adverse human health impacts, and a change in air pollution concentration has a similar effect on health, irrespective of the prevailing ambient level.³⁴⁰

He concludes:

[T]o the extent that the proposed facility will emit additional levels of PM_{2.5}, it will cause an increase in the risk of adverse health effects among those who breathe that pollution, even at concentrations below the prevailing NAAQS air quality standards, and especially for socio-economically disadvantaged populations living within the most affected areas surrounding the facility.”³⁴¹

Dr. Thurston is particularly qualified to speak on the nature and limitations of the federal NAAQS.³⁴² As a published expert on the nature and health effects of particulate matter, EPA has cited and included Dr. Thurston’s research and expertise in multiple NAAQS review processes. For example, Dr. Thurston was a contributing author to the 1996, 2004, and 2009 documents that EPA used as scientific bases for its decisions in setting the PM NAAQS.³⁴³ Dr. Thurston’s research was also cited as a “key study” in promulgating both the 1997 PM and ozone

ENVIRONMENTAL HEALTH PERSPECTIVES 484 (2015), available at <https://bit.ly/39G3fHJ> (enclosed as Exhibit 32); Johanna Lepeule *et al.*, *Chronic Exposure to Fine Particles & Mortality: An Extended Follow-Up of the Harvard Six Cities Study from 1974 to 2009*, 120 ENVIRONMENTAL HEALTH PERSPECTIVES 965 (2012), available at <https://bit.ly/3wpbQIp> (enclosed as Exhibit No. 33).

339 Thurston Report at 36–37.

340 *Id.* at 40.

341 *Id.* at 42.

342 *See id.* at 1–2 (summarizing qualifications). Dr. Thurston’s full *curriculum vitae* is attached as Exhibit No. 2; *see also*, NEW YORK UNIVERSITY, *George D. Thurston*, <https://med.nyu.edu/faculty/george-d-thurston> (last accessed April 8, 2021).

343 Thurston Report at 2.

NAAQS.³⁴⁴ Dr. Thurston also served on a Clean Air Scientific Advisory Committee Primary Review Panel formed to advise EPA during the 2007–2010 NAAQS review process for the nitrogen oxides and sulfur oxides standards.³⁴⁵

We acknowledge that NAAQS can be informative in some situations for certain pollutants, and are a critical tool in the regulation of air pollution nationwide. We also recognize the statutory language of the Clean Air Act, including that NAAQS should be designed to protect public health and provide an adequate margin of safety, 42 U.S.C. § 7409(b)(1), and must protect vulnerable populations.³⁴⁶ However, even as the Act and NAAQS were in the early stages of development in the 1970s, various members of Congress acknowledged that certain NAAQS pollutants were “non-threshold” and thus “[e]ven at the national primary standard level, which is the health standard, there are health effects that are not protected against.”³⁴⁷

More recently, EPA has reaffirmed its understanding that negative health impacts occur due to exposures to PM_{2.5} at levels *below* the NAAQS threshold. The current annual NAAQS for PM_{2.5} is 12 µg/m³, which was initially set in 2012.³⁴⁸ During the 2012 review, an EPA document “included a figure summarizing the then most current science regarding PM_{2.5} health effects, which clearly illustrate[d] that air pollution deaths occur below the existing PM_{2.5} NAAQS.”³⁴⁹

344 See *National Ambient Air Quality Standards for Particulate Matter*, 62 Fed. Reg. 38652, 38657 (July 18, 1997); *National Ambient Air Quality Standards for Ozone*, 62 Fed. Reg. 38856, 38860 (July 18, 1997).

345 See Memorandum from Fred Butterfield, Designated Federal Officer, Clean Air Scientific Advisory Committee to Vanessa Vu, Ph.D., Staff Director, EPA Science Advisory Board, Re: Formation of Clean Air Scientific Advisory Committee (CASAC) NO_x and SO_x Primary Review Panel, at 6 (March 26, 2007), available at <https://bit.ly/3ufZvEu> (enclosed as Exhibit No. 34).

346 See, e.g., *American Lung Association v. Environmental Protection Agency*, 134 F.3d 388, 390 (D.C. Cir. 1998).

347 See Thurston Report at 34 (quoting Kimberly M. Castle & Richard L. Revesz, *Environmental Standards, Thresholds, and the next Battleground of Climate Change Regulations*, 103 MINNESOTA LAW REVIEW 1349, 1381–82 (2019) (reviewing Senator Muskie’s statements at floor debates leading up to the 1977 Clean Air Act Amendments)).

348 *National Ambient Air Quality Standards for Particulate Matter*, 78 Fed. Reg. 3086 (January 15, 2013).

349 Thurston Report at 36 (citing Environmental Protection Agency, *Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter*, Doc. No. EPA-452/R-12-003, at 5-85, (June 2012)); see also Thurston Report at 38 (quoting the findings of Brauer *et al.* (2019): “In several large population-based cohorts exposed to low levels of air pollution, consistent associations were observed between PM_{2.5} and nonaccidental mortality for concentrations as low as 5 µg/m³.”)).

During the most recent review process for the PM_{2.5} NAAQS (which concluded in 2020),³⁵⁰ numerous parties—including EPA career staff—recommended strengthening the standard to lower than the current level of 12 µg/m³ annually. This recommendation was based on a significant body of scientific evidence showing that the current standard is *not* protective of public health with a margin of safety. For example:

- ✎ In the Policy Assessment (PA) document for the most recent review process, EPA career staff explained: “When taken together, we reach the conclusion that the available scientific evidence, air quality analyses, and the risk assessment, as summarized above, can reasonably be viewed as calling into question the adequacy of the public health protection afforded by the combination of the current annual and 24-hour primary PM_{2.5} standards.”³⁵¹
- ✎ The Independent Particulate Matter Review Panel (IPMRP)—a body of experts originally formed by EPA to advise on the PM_{2.5} review process, but disbanded without explanation by the Trump Administration’s EPA midway through the most recent NAAQS review—concluded: “Based on scientific evidence...the Panel finds that the current suite of primary fine particle (PM_{2.5}) annual and 24-hour standards are not protective of public health. Both of these standards should be revised to new levels . . . [t]he annual standard should be revised to a range of 10 µg/m³ to 8 µg/m³. The 24-hour standard should be revised to a range of 30 µg/m³ to 25 µg/m³. These scientific findings are based on consistent epidemiological evidence from multiple multi-city studies, augmented with evidence from single-city studies, at policy-relevant ambient concentrations in areas with design values at and below the levels of the current standards, and are supported by research from experimental models in animals and humans and by accountability studies.”³⁵²
- ✎ A coalition of public health and environmental organizations (including CBF) agreed: “Given the evidence, NGO Commenters recommend an annual primary standard of 8 µg/m³ and tightening the 24-hour standard to provide adequate protection.”³⁵³ The American Lung Association added:

350 *Review of the National Ambient Air Quality Standards for Particulate Matter*, 85 Fed. Reg. 82684 (December 18, 2020).

351 Environmental Protection Agency, *Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter*, Doc. No. EPA-452/R-20-002, at 3-106 (January 2020), available at <https://bit.ly/3rQIfE8> (enclosed as Exhibit No. 35).

352 Independent Particulate Matter Review Panel (IPMRP), *Advice from the IPMRP on EPA’s Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter* (External Review Draft September 2019) (October 22, 2019), available at <https://bit.ly/3mi6Lgi> (enclosed as Exhibit No. 36).

353 NGO Comment Letter re: Review of the National Ambient Air Quality Standards for Particulate Matter, Docket ID No. EPA-HQ-OAR-2015-0072-0973, at 2 (June 29, 2020), available at <https://bit.ly/2OBTfYf> (enclosed as Exhibit No. 37).

One of the key findings in this Draft PA is overwhelming evidence that the current annual fine particulate (PM_{2.5}) standard fails to protect public health. The Lung Association strongly supports that conclusion Today, more robust evidence than ever before supports the increased risk of premature death from levels below the current standards. No evidence exists of a threshold to that risk, as EPA has acknowledged. Recent U.S. studies that restrict the analysis to long-term exposures below 10 µg/m³ and Canadian studies that find evidence down to and below 8 µg/m³ all found premature deaths at those lower levels. A large study looking at short-term exposures also added evidence of harm below the current annual standard.³⁵⁴

Despite this substantial and persuasive evidence, the Trump Administration's EPA maintained the PM_{2.5} standard at the levels set back in 2012.³⁵⁵ There are numerous substantive and procedural flaws inherent in the most recent review process and the final decision, many of which are the subject of pending litigation at the D.C. Circuit³⁵⁶ and are described in detail by multiple comments to EPA, including the NGO coalition comment letter.³⁵⁷ In other words, there is legitimate doubt as to whether the current PM_{2.5} NAAQS is adequate as a national standard, which reinforces that it is also not definitively protective of the *particular* communities who will be impacted by the proposed Project in this case.

The international scientific community also supports a PM_{2.5} standard lower than the current U.S. NAAQS: Canada's current ambient air quality standard for PM_{2.5} on an annual basis is 8.8 µg/m³ and requires "active air management" at levels between 6.5 and 8.8 µg/m³.³⁵⁸ The World Health Organization's annual air quality guideline for PM_{2.5}, set in 2005, is 10 µg/m³.³⁵⁹

354 American Lung Association, Comments on Docket ID No. EPA-HQ-OAR-2015-0072, at 3 (November 12, 2019) (internal citations omitted), available at <https://bit.ly/3rKNeGF> (enclosed as Exhibit No. 37).

355 See generally 85 Fed. Reg. 82684.

356 See *State of California v. Environmental Protection Agency*, D.C. Cir. Case No. 21-1014 (filed January 13, 2021).

357 NGO Comment Letter, *supra* note 353, at 2; see also, Joe Goffman & Laura Bloomer, *The Legal Consequences of EPA's Disruption of the NAAQS Process*, HARVARD ENVIRONMENTAL & ENERGY LAW PROGRAM (September 30, 2019), available at <https://bit.ly/3fH6HFC> (enclosed as Exhibit No. 38).

358 See GOVERNMENT OF ALBERTA, *Canadian Ambient Air Quality Standards* (last visited April 7, 2021), available at <https://bit.ly/39TZKxf> (enclosed as Exhibit No. 39).

359 *Ambient (Outdoor) Air Pollution*, WORLD HEALTH ORGANIZATION (May 2, 2018), available at <https://bit.ly/3dEEo8q> (enclosed as Exhibit No. 40) ("[T]he WHO Air quality guidelines are currently under revision with an expected publication date in 2020.").

In the case of the proposed Station, when considering the scientific evidence and support for an annual PM_{2.5} standard of 8 µg/m³, the Pipeline’s NAAQS modeling is even less definitive as a valid metric to dismiss health concerns. The Pipeline’s cumulative NAAQS modeling shows the projected annual PM level at 8.2 µg/m³³⁶⁰—far closer to levels recognized as more protective than the current U.S. annual standard for PM_{2.5} (12 µg/m³). And even if reliance on the NAAQS were legally and factually justifiable here (it is not, see above), the error of that reliance is further compounded by the fact that the Pipeline’s pollutant dispersion modeling for NAAQS is unreliable for evaluating the potential risks to the surrounding communities.³⁶¹

In short, the statutory intent of the NAAQS is not conclusive evidence that particular communities in the country—and specifically those who will be impacted by the proposed Project—are adequately protected from health risks if the current NAAQS standard is not violated.³⁶² Indeed, there is substantial evidence to show that the current PM_{2.5} annual NAAQS is not adequate to protect public health with a margin of safety. *See above.* The Pipeline and Department’s suggestions to the contrary conflict with the scientific record—including statements from EPA, the Independent Particulate Matter Review Panel, Dr. Thurston’s expert report, and the scientific evidence cited by these experts—and with the relevant case law. We therefore ask the Board to make an explicit finding that compliance with the NAAQS is *not* conclusive evidence that the proposed Project will have no adverse health effect on local communities and individuals, particularly vulnerable populations.

Similarly, compliance with the State Significant Ambient Air Concentrations (SAAC) for toxic air pollutants is not conclusive evidence that there will be no negative health impact to local communities.³⁶³ As an initial matter, and as explained above, the Department’s decision to limit its toxics analysis to only hexane and formaldehyde lacks support in the record.³⁶⁴ But even as to those two toxics, modeled emissions are compared to state SAAC standards that are not necessarily protective of human health. As one comparison, Texas has lower short-term and long-term air toxics effects screening levels than the Virginia SAACs for hexane and lower short-term values for formaldehyde.³⁶⁵ It is also unclear how often the Department updates the toxic

360 Modeling Report at Table 4-2.

361 *See supra* Comment Nos. 1–3.

362 *See Friends of Buckingham*, 947 F.3d at 92 (finding that the “the Board accepts without deciding that this area may be an EJ minority community with a high risk for asthma complications, and then does not properly recognize the localized risk of the *very particulate matter* that exacerbates asthma”).

363 *Friends of Buckingham*, 947 F.3d at 90–91 (finding fault in the Board’s reasoning for “merely fall[ing] back on NAAQS and state air quality standards not tailored to this specific EJ community”).

364 *See supra* Comment No. 7.

365 *See* Texas Commission on Environmental Quality, *Download Effects Screening Levels (ESLs) Used in the Review of Air Permitting Data*, https://www.tceq.texas.gov/toxicology/esl/list_main.html/#esl_2 (last accessed April 8, 2021) (“Download Previous ESL Lists” >

limits or whether these standards are protective of vulnerable communities.³⁶⁶ The standards are based on occupational worker safety levels, a population which is generally made up of healthy adults and is not necessarily representative of the communities who will be impacted by the proposed Station.³⁶⁷ In sum, neither the Department nor the Pipeline have justified how reliance on the state air toxics standards is an adequate measure of the potential health risks to the particular communities surrounding the proposed Station.

Comment No. 33: The Board cannot rely on the Pipeline’s conclusory and unsupported Public Health Assessment.

To the extent the Pipeline or the Department point to the Public Health Assessment provided by Green Toxicology (the Green Toxicology Assessment)³⁶⁸ as sufficient analysis of potential health impacts, the Assessment is similarly flawed in its reliance on compliance with NAAQS as conclusive evidence.³⁶⁹ The Green Toxicology Assessment notes that “gaseous pollutants, nitrogen dioxide (NO₂) and sulfur dioxide (SO₂), each of which can, at and above *threshold concentrations* in inhaled air, provoke bronchoconstriction and associated symptoms in some people who have asthma.”³⁷⁰ However, the Green Toxicology Assessment fails to acknowledge that no threshold has been identified for NO₂ or SO₂.³⁷¹

Furthermore, the Green Toxicology Assessment makes broad conclusions about air pollution without *any*, much less scientific, support. For example, regarding the impacts of PM_{2.5}, the Green Toxicology Assessment states that “particles from combustion of natural gas are primarily incompletely combusted hydrocarbons that are not known or expected to aggravate asthma” and, regarding the proposed emissions from the Project, “[c]oncentrations of this type, and

“November 2016” > listing short-term and long-term toxic screening levels for pollutants, including n-hexane and formaldehyde).

366 See, e.g., Juleen Lam *et al.*, *Exposure to Formaldehyde and Asthma Outcomes: A Systematic Review, Meta-Analysis, and Economic Assessment* (February 2021), available at <https://bit.ly/3dLFIGm> (enclosed as Exhibit No. 41).

367 See 9 VAC § 5-60-230.

368 See generally Laura C. Green, *Public Health Assessment of Expected Airborne Emissions from the Proposed Lambert Compressor Station* (February 25, 2021) (Green Toxicology Assessment). All references to the Green Toxicology Assessment use the PDF page (not the internal pagination provided by the author).

369 *Id.* at 2.

370 *Id.* (emphasis added).

371 Compare Environmental Protection Agency, *Integrated Science Assessment for Oxides of Nitrogen: Health Criteria*, Doc. No. EPA/600/R-15/068 (Final Report, January 2016), available at <https://bit.ly/2OkpPsG>; Environmental Protection Agency, *Integrated Science Assessment for Sulfur Oxides: Health Criteria*, Doc. No. EPA/600/R-17/451 (Final Report, December 2017), available at <https://bit.ly/3wqUCui>; Thurston Report at 39-40.

magnitude, of particulate matter are neither known nor reasonably expected to provoke asthma or to otherwise threaten health.”³⁷² But the Green Toxicology Assessment does not cite *a single source* for this conclusion, scientific or otherwise.³⁷³

Similarly, the Green Toxicology Assessment acknowledges that the “proposed compressor station...would emit some combustion gases that, if present at sufficiently high concentrations in inhaled air, can provoke symptoms of asthma,” but then suggests that “at sufficiently low concentrations, nobody will be adversely affected...there are some concentrations . . . in inhaled air that, based on clinical studies, are too low to provoke bronchoconstriction even in the most susceptible asthmatics.”³⁷⁴ Again, the Green Toxicology Assessment does not cite a single “clinical study” on which it relies for these conclusions.³⁷⁵ This is in stark contrast to the numerous scientific studies cited in the Thurston Report and documents referenced above demonstrating that PM_{2.5} is a non-threshold pollutant, meaning there is no level below which there are no adverse effects from added particle air pollution exposure.

There are two points in the Green Toxicology Assessment with which we agree. First, it acknowledges that “[e]arly childhood exposures affect people’s risks of developing asthma.”³⁷⁶ Indeed, exposure to air pollution—including the pollutants that will be emitted by the proposed Project—increases children’s risks of developing asthma.³⁷⁷

Second, it acknowledges that “traffic-related air pollution appears to trigger asthma” and, specifically, diesel engine exhaust particles “provoke airway inflammation in volunteers who have been examined in controlled studies.”³⁷⁸ Indeed, as the Thurston Report discusses, the proposed Project’s PM emissions will be similar to particles from the combustion of diesel (a

372 Green Toxicology Assessment at 7 (internal citations omitted).

373 Cf. 78 Fed. Reg. at 3098 (“[E]vidence- and risk-based approaches using information from epidemiological studies to inform decisions on PM_{2.5} standards are complicated by the recognition that *no population threshold, below which it can be concluded with confidence that PM_{2.5}-related effects do not occur, can be discerned from the available evidence.*”) (emphasis added).

374 Green Toxicology Assessment at 4, 5 n.5.

375 *Id.*

376 *Id.* at 3.

377 See, e.g., Erika Garcia *et al.*, *Association of Changes in Air Quality With Incident Asthma in Children in California, 1993-2014*, 321 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 1906 (2019), available at <https://bit.ly/3cMkuJh> (enclosed as Exhibit No. 42); George D. Thurston *et al.*, *Outdoor Air Pollution and New-Onset Airway Disease: An Official American Thoracic Society Workshop Report*, 17 ANNALS OF THE AMERICAN THORACIC SOCIETY 387 (2020), available at <https://bit.ly/3mjMJC5> (enclosed as Exhibit No. 43).

378 Green Toxicology Assessment at 6.

fossil fuel), only smaller, allowing them to lodge deeper in the lung, and with higher percentages of some metal constituents, and will therefore have similar—and likely more damaging—impacts per amount of PM_{2.5} exposure.³⁷⁹ The Green Toxicology Assessment agrees that “the toxicity of any given set of particles depends not only on its size-range...but also on its specific chemical and biological make-up.”³⁸⁰ Again, the Thurston Report addresses these very two characteristics of natural gas-combusted PM to describe how the emissions from the proposed Project will be particularly harmful per unit of exposure.³⁸¹

Finally, the Green Toxicology Assessment notes that, “because of the air pollution control devices planned for the proposed compressor station, the inorganic fraction of the emitted PM will likely be dominated by ammonium sulfate.”³⁸² Ammonium sulfate is acidic,³⁸³ which increases the human health risk from the metals present in the emissions, as shown in Table 1 of the Thurston Report.³⁸⁴

Based on the significant competing evidence presented in the record and the complete lack of evidence and support for the broad conclusions made in the Green Toxicology Assessment, the Board cannot rely on the Pipeline’s Green Toxicology Assessment.

Comment No. 34: The Department should require the Pipeline provide more reliable data for evaluating risks to human health.

As discussed above, compliance with NAAQS alone is an inadequate measure of the actual human health risks and impacts that will be experienced by the communities surrounding the proposed Station, and reliance on such leads both the Department and the Pipeline to misleadingly state that the increase of pollution will have no negative human health impact.³⁸⁵ However, neither the Department nor the Pipeline can accurately determine whether an environmental justice community will bear a disproportionate share of the impacts—as required

379 See Thurston Report at 18-19.

380 Green Toxicology Assessment at 7 n.13.

381 Thurston Report at 17-21.

382 Green Toxicology Assessment at 7 n.12.

383 Thurston Report at 20-21.

384 Thurston Report at 19; see also Ting Fang *et al.*, *Highly Acidic Ambient Particles, Soluble Metals, and Oxidative Potential: A Link Between Sulfate and Aerosol Toxicity*, 51 ENVIRONMENTAL SCIENCE & TECHNOLOGY 2611 (2017), available at <https://bit.ly/2PT0dIY> (enclosed as Exhibit No. 44) (describing how sulfate increases the bioavailability of toxic metals present); see also *Ameren Missouri*, 421 F. Supp. 3d at 778 (finding that “sulfate PM_{2.5} is harmful and contributes to the negative human health impacts of PM_{2.5} noted above.”)

385 See EJ Supplement at 14-20; Engineering Analysis at 2, 16.

by Virginia law—when neither entity has conducted a meaningful analysis identifying the actual risks and impacts from the Station.

One tool that the Pipeline could have used to more accurately measure the expected human health impacts from emissions from the proposed Project is a risk assessment using, for example, the EPA-approved Environmental Benefits Mapping and Analysis Program – Community Edition (BenMAP). BenMAP is “an open-source computer program that calculates the number and economic value of air pollution-related deaths and illnesses.”³⁸⁶ For example, a BenMAP analysis can provide an estimate of the number of respiratory or cardiovascular hospital admissions, emergency room visits, work-days lost, and cases of acute or chronic bronchitis or exacerbation of asthma symptoms that will be caused by increased emissions from a particular facility or source.³⁸⁷ BenMAP can also provide an estimate of the total cost, in U.S. dollars, of those negative health impacts. Importantly, as a model, BenMAP is subject to multiple input decisions and assumptions by the user. For example, a useful BenMAP analysis would not set a threshold for impacts from pollutants that are considered non-threshold pollutants. Had the Pipeline provided a reliable and transparent analysis using BenMAP or similar risk assessment tool, it would have allowed for a more informed and transparent decisionmaking process.

CONCLUSION

The Board’s guidance is clear: “If a source fails to demonstrate through their permit application that the standards for granting a permit are met, then a permit cannot be issued.”³⁸⁸ Accordingly, we ask the Board to deny the Pipeline’s application until such time as it can provide substantial evidence that its proposal meets all legal requirements.

REQUEST FOR DIRECT CONSIDERATION

The substantial legal and factual issues set forth in the comments above warrant direct consideration by the State Air Pollution Control Board under 9 VAC § 5-80-25 and § 5-80-1170. In support of this request, the Sierra Club, the Chesapeake Bay Foundation, and Elizabeth and Anderson Jones state:

386 Environmental Protection Agency, *Environmental Benefits Mapping and Analysis Program — Community Edition*, <https://www.epa.gov/benmap> (last accessed April 4, 2021).

387 See Environmental Protection Agency, *How BenMAP-CE Estimates the Health & Economic Effects of Air Pollution*, <https://www.epa.gov/benmap/how-benmap-ce-estimates-health-and-economic-effects-air-pollution> (last visited April 8, 2021).

388 Minor NSR Manual at 11-5.

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3. The Sierra Club is a nonprofit conservation organization with more than 820,000 dues-paying members nationwide and 20,300 dues-paying members in Virginia. The Club is dedicated to exploring, enjoying, and protecting the wild places of the Earth; to practicing and promoting responsible use of the Earth's resources and ecosystems; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and using all lawful means to carry out those objectives. Through its Clean Power Solutions campaign, the Sierra Club's Virginia Chapter encourages investments in the Commonwealth's substantial renewable energy potential. The Sierra Club's members reside within proximity of the proposed compressor station, and they live within the airsheds and other areas potentially affected by its operations. As such, the Sierra Club and its members have immediate, pecuniary, and substantial interests in the outcome of

this permitting proceeding and would be adversely affected by the construction and operation of the facility.

4. The Chesapeake Bay Foundation, Inc. (CBF) is a non-profit, non-partisan organization whose mission is to “Save the Bay” and keep it saved. Recognizing the interconnection between healthy water and healthy communities, CBF works to make the watershed and its natural resources safe for those who earn a living from the Bay and who live and recreate in and around it. CBF has offices in Easton and Annapolis, Maryland; Richmond and Virginia Beach, Virginia; Harrisburg, Pennsylvania; and the District of Columbia. CBF represents more than 300,000 members, electronic subscribers, and volunteers nationwide, approximately 91,000 of whom reside in the Commonwealth of Virginia.
5. Elizabeth and Anderson Jones are residents of Chatham, Virginia who live in close proximity to the proposed Lambert Compressor Station. The Jones are active members of the National Association for the Advancement of Colored People (NAACP) Pittsylvania branch
6. All substantive comments set forth above are incorporated by reference. We maintain that these comments must be addressed in order to bring the proposed permit into conformance with the Clean Air Act, the Virginia Air Pollution Control Law, and Virginia’s State Implementation Plan. These comments raise substantial and (presumably) disputed issues relevant to the issuance of the permit in question. Furthermore, the actions requested in the above comments are not inconsistent with the Clean Air Act, the Virginia Air Pollution Control Law, or any regulations promulgated thereunder; the actions requested are in fact *necessary* in order to satisfy the requirements of the law.
7. Due to the substantial nature of the legal and factual issues raised in the comments above, we request that the Director submit the proposed permit action to the Board under 9 VAC § 5-80-25(C) and/or 9 VAC § 5-80-25(F), as appropriate, and that the Board grant consideration of this permitting action—either at the suggestion of the Director under 9 VAC § 5-80-25(C) or 9 VAC § 5-80-25(F), or acting independently under 9 VAC § 5-80-25(D) or 9 VAC § 5-80-1170(G).

Respectfully submitted,



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APPENDIX:

**Report of
George Thurston, Sc.D.
Chester, NY 10918**

April 9, 2021

Table of Contents

- A. Qualifications
- B. Introduction To The Human Health Effects Of Air Pollution
- C. Human Health Effects of Particulate Matter (PM) Air Pollution Exposure
- D. PM_{2.5} Health Effects from Fossil Fuel Combustion, including Natural Gas
- E. The Human Health Effects of Ozone (O₃) Air Pollution
- F. The Human Health Effects of Nitrogen Oxides (NO_x) Air Pollution
- G. Adverse Health Effects of Air Pollution at Concentrations Below the U.S. NAAQS
- H. Air Pollution Effects Among Especially Susceptible Populations
- I. Indoor Air Pollution Considerations
- J. Conclusions
- K. Literature Cited

Report of George Thurston, Sc.D.

A. Qualifications

I am George D. Thurston, Sc.D. (Doctor of Science). I am a Professor at the New York University School of Medicine in the Department of Environmental Medicine. My business address is: Three Catherine Ct., Chester, NY 10918. I am providing expert testimony that addresses the public health impacts of emissions of fine particulate matter (PM_{2.5}) generally and, specifically, the expected public health impacts of PM_{2.5} emissions from the proposed Lambert Compressor Station. My testimony will address the potential health effects of the facility, if approved. I conclude that the air pollution emissions from this facility can be expected to increase adverse health risks in the surrounding communities.

I received my undergraduate degree in Engineering from Brown University (with a Concentration in Environmental Engineering) in 1974, and my doctorate in Environmental Health Sciences from the Harvard University School of Public Health in 1983, including coursework in human biology, toxicology, epidemiology, and air pollution control, dispersion, and health effects. I am presently tenured Professor at the New York University School of Medicine, where I conduct research on the human health of air pollution, and teach courses on Environmental Health. I am an expert on the nature and health effects of particulate matter, including the teaching of a graduate level course entitled “Aerosol Science of Particulate Matter Air Pollution: Properties, Behavior and Measurement of Airborne Particles”, in which I teach all aspects of particulate matter, including the condensation, coagulation, deposition, and health effects of particles in the air. Before I initiated this class at NYU, I assisted Dr. William Hinds in the teaching of this same class at the Harvard School of Public Health when he was writing the textbook I use for the course, “Aerosol Technology: Properties, Behavior, and Measurement of Airborne Particles”, considered by many particulate matter researchers to be a key scientific reference.

I have served in many advisory capacities regarding the health effects of air pollution. I was Chairman of the Health and Environment Panel of the Canadian Joint Industry/Government Study of Sulfur in Gasoline and Diesel Fuels in 1997. I also served on the National Academy of Science’s Committee on the Health Effects of Incineration from January 1995 through November 1999, and recently served as the Chair of the Environmental Health Policy Committee of the American Thoracic Society. I am now the Chair of the Policy Committee of

Report of George Thurston, Sc.D.

the North American Chapter of the International Society for Environmental Epidemiology. I have been called upon by both the U.S. House of Representatives and the U.S. Senate on multiple occasions over the years to provide testimony before them regarding the human health effects of air pollution. In addition, I have also been a contributing author to both the 1996 and 2004 EPA Particulate Matter ("PM") Criteria Documents, as well as to the 2009 Particulate Matter Integrated Science Assessment, which the U.S. EPA uses as a scientific basis for its decisions regarding the setting of the nation's PM ambient air quality standards. More recently, I served on the U.S. EPA's Clean Air Science Advisory Committee (CASAC) on the human health effects of Nitrogen Oxides and Sulfur Oxides.

I have published extensively in the scientific and medical literature regarding the health effects of inhaled air pollutants on humans, particularly regarding particulate matter, as it relates to asthma attacks, hospital admissions, and mortality. I was a Principal Investigator of a study that has shown that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality in the U.S. *See* Pope, CA 3rd; Burnett, RT; Thun, MJ; Calle, EE; Krewski, D; Ito, K; and; Thurston, GD. (2002). Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution. *Journal of the American Medical Association (JAMA)* 2002; 287: 1132-1141. I have also conducted and published research in the field of pulmonology, including studies of air pollution's effects on the lungs of healthy children and those with asthma, and I am an expert in that field. The publications reviewed or relied upon for this testimony are listed at the end of this report as "Literature Cited."

In the past, I have provided testimony about the human health impacts of air pollution from fossil fuel combustion sources on numerous occasions, and on the health effects of natural gas combustion-related pollution specifically, including in the Issues Conference in Case 00-F-1256, in the Matter of the Application of Calpine Construction Finance Company, L.L.P. (2001), the application by TransGas Energy Systems LLC for a Certificate of Environmental Compatibility and Public Need to Construct and Operate a 1,100 Megawatt Combined Cycle Generating Facility (2003), and the application by Atlantic Coast Pipeline, L.L.C. for a Minor New Source Permit for the proposed Buckingham Compressor Station (2018).

Report of George Thurston, Sc.D.

B. Introduction To The Human Health Effects Of Air Pollution

The adverse health consequences of breathing air pollution that results from sources such as fossil fuel combustion facilities are well documented in the published medical and scientific literature. During the past decades, medical research examining air pollution and public health has shown that air pollution is associated with a host of serious adverse human health effects. This documentation includes impacts revealed by observational epidemiology, and confirmed by controlled chamber exposures, showing consistent associations between air pollution and adverse impacts across a wide range of human health outcomes. As summarized in Figure 1, while exposures begin in the lungs, the adverse effects of air pollution can reach systemically throughout the human body.

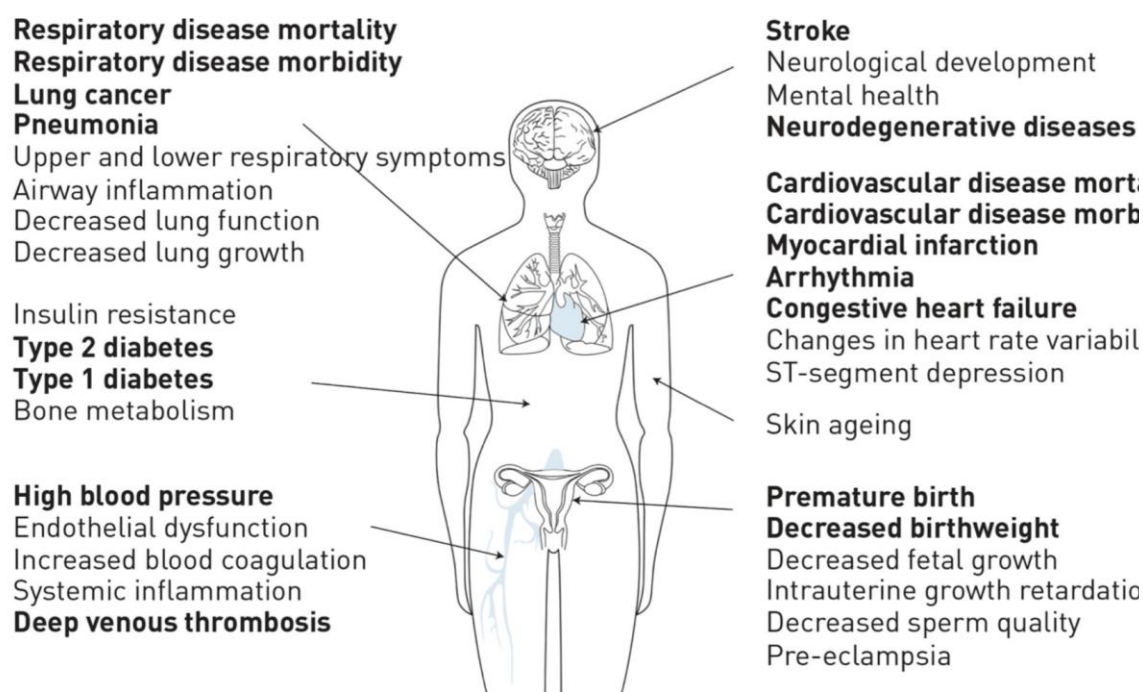


Figure 1. Overview of diseases, conditions and biomarkers affected by outdoor air pollution. Bold type indicates conditions currently included in the Global Burden of Disease (GBD) report (*Source: Thurston et al. 2017*)

While deaths from air pollution are the most severe outcome from air pollution exposures, Figure 2 below indicates that, for every death associated with air pollution, there is a pyramid of much greater numbers of morbidity effects, including hospital admissions, emergency department visits, doctor visits, missed work days, missed school days, asthma

Report of George Thurston, Sc.D.

symptoms days, etc. Clearly, when the whole scope of other adverse health effects associated with these air pollution deaths is considered, there is no doubt as to the significance of these adverse health effects.

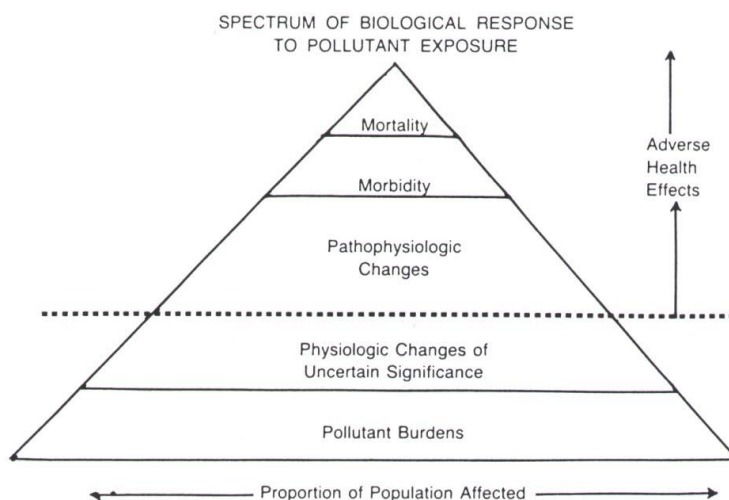


Figure 2. The Pyramid of Adverse Health Effects of Air Pollution on Health. (ATS, 1985)
(From: Guidelines as to what constitutes an adverse respiratory health effect, with special reference to epidemiologic studies of air pollution. *Am. Rev. Respir. Dis.* 1985 Apr;131(4):666-8.)

Observational epidemiology studies provide the most compelling and consistent evidence of the adverse effects of air pollution. “Epidemiology” is literally “the study of epidemics”, but includes all statistical investigations of human health and potentially causal factors of good or ill health. In the case of air pollution, such studies follow people as they undergo varying real-life exposures to pollution over time, or from one place to another, and then statistically inter-compare the health impacts that occur in these populations when higher (versus lower) exposures to pollution are experienced. In such studies, risks are often reported in terms of a Relative Risk (RR) of illness, wherein a $RR = 1.0$ is an indication of no change in risk after exposure, while a $RR > 1.0$ indicates an increase in health problems after pollution exposure, and that air pollution is damaging to health.

These epidemiological investigations are of two types: 1) population-based studies, in which an entire city's population might be considered in the analysis; and 2) cohort studies, in which selected individuals, such as a group of asthmatics, are considered. Both of these types of

Report of George Thurston, Sc.D.

epidemiologic studies have shown confirmatory associations between air pollution exposures and increasing numbers of adverse impacts, including:

- decreased lung function (a measure of our ability to breathe freely);
- more frequent asthma symptoms;
- increased numbers of asthma and heart attacks;
- more frequent emergency department visits;
- additional hospital admissions; and
- increased numbers of deaths.

The fact that the effects of air pollution have been shown so consistently for so many health endpoints and in so many locales indicates these associations to be causal.

C. Human Health Effects of Particulate Matter (PM) Air Pollution Exposure

The United States Environmental Protection Agency (U.S. EPA) is required under Sections 108 and 109 of the Clean Air Act to periodically evaluate the air quality criteria that reflect the latest scientific information relevant to review each of the regulated air pollutant's National Ambient Air Quality Standard (NAAQS). The EPA recognized the adverse health effects of small particulate matter (PM) air pollution as early as 1987 when, pursuant to its authority under the Clean Air Act, it promulgated a NAAQS for particulate matter that is 10 micrometers in diameter or smaller (PM₁₀). The NAAQS promulgated by EPA are required for certain air pollutants "that may reasonably be anticipated to endanger public health and welfare." The goal of the NAAQS air criteria is "to protect the public health" with an "adequate margin of safety." (although this has not been possible in practice: *see* Section G). Prior to 1987, EPA's particulate NAAQS had only regulated total suspended particulate matter. The focus in 1987 on smaller particles -- that is, 10 micrometers or less -- resulted from increasing scientific evidence that human inhalation of smaller particles had more serious respiratory effects than larger particles.

In 1994, EPA began the process of again reviewing its particulate matter standards. In 1996, EPA proposed a new NAAQS for even smaller particles -- those that are 2.5 micrometers in diameter or smaller ("PM_{2.5}"). In July 1997, upon determining that the PM₁₀ NAAQS was

Report of George Thurston, Sc.D.

not sufficiently protective of human health, 62 Fed. Reg. 38652, 38665 (July 18, 1997), EPA issued a final rule revising the NAAQS for PM to include two new NAAQS for PM_{2.5}. These consisted of: 1) a long-term annual standard of 15 $\mu\text{g}/\text{m}^3$, annual arithmetic mean, averaged over three years from single or multiple community-oriented monitors; and 2) a 24-hour standard that is met when the three-year average of the 98th percentile of 24-hour PM_{2.5} concentrations at each population-oriented monitor within an area does not exceed 65 $\mu\text{g}/\text{m}^3$. 62 Fed. Reg. 38652, 38679 (July 18, 1997). These new PM_{2.5} standards were based on an increasing scientific consensus that the current NAAQS for PM₁₀ was not sufficiently protective of human health. EPA's scientific review concluded that fine particles, in the 2.5 micrometer and smaller range, penetrate more deeply into the lungs, and may be more likely than coarse particles to contribute to the health effects (e.g., premature mortality and hospital admissions) found in a number of recently published community epidemiological studies at concentrations that extend well below those allowed by the then current PM₁₀ standards. As EPA stated in its rulemaking, a greatly expanded body of community epidemiological studies provide “evidence that serious health effects (mortality, exacerbation of chronic disease, increased hospital admissions, etc.) are associated with exposures to ambient levels of PM found in contemporary U.S. urban airsheds even at concentrations below current U.S. PM standard.” 62 Fed. Reg. 38652, 38655 (July 18, 1997). Since that time, the U.S. EPA has lowered the allowable limits of ambient concentration of PM_{2.5} to 35 $\mu\text{g}/\text{m}^3$ and 12 $\mu\text{g}/\text{m}^3$ for the daily and annual standards, respectively, in recognition of its effects at lower levels of exposure.

The EPA PM Staff Paper at the time of the setting of the PM_{2.5} standards in 1997 concluded that “fine and coarse particles can be differentiated by their sources and formation processes, chemical composition, solubility, acidity, atmospheric lifetime and behavior, and transport distances.” EPA also concludes that: “Primary fine particles are formed from condensation of high temperature vapors during combustion”; and that: “Fine mode PM is mainly composed of varying proportions of several major components: sulfates, nitrates, acids, ammonium, elemental carbon, organic carbon compounds, trace elements such as metals, and water.” (U.S. EPA, 1996b).

Particulate Matter is a classified Group 1 contaminant which is carcinogenic to human health. (IARC, 2014). Small quantities or short-term exposure to Particulate Matter can have

Report of George Thurston, Sc.D.

serious and significant health impact. As shown in Figure 3 below, extracted from the most recent U.S. EPA Particulate Matter Integrated Science Assessment (ISA), the U.S. EPA determined, based on the available toxicological and epidemiological evidence, that short-term exposures to PM_{2.5}, such as that which would be emitted by this proposed facility (and also formed in the atmosphere from the NO_x emissions considered here), is causally related to increased cardiovascular disease, respiratory disease, and death, with which I agree.

HUMAN HEALTH EFFECTS					
ISA			Final PM ISA		
Indicator			PM _{2.5}	PM _{10-2.5}	UFP
Health Effect Category	Respiratory	Short-term exposure			
		Long-term exposure			
	Cardiovascular	Short-term exposure			
		Long-term exposure		▲	
	Metabolic	Short-term exposure	*	*	*
		Long-term exposure	*	*	*
	Nervous System	Short-term exposure	▲		▲
		Long-term exposure		*	*
	Reproductive	Male/Female Reproduction and Fertility			
		Pregnancy and Birth Outcomes			
	Cancer	Long-term exposure	▲	▲	
	Mortality	Short-term exposure			
		Long-term exposure		▲	

■ Causal ■ Likely causal ■ Suggestive ■ Inadequate
 * = no evidence to evaluate in 2009 PM ISA
 ▲ = change in causality determination from 2009 PM ISA

PM = particulate matter; PM_{2.5} = particulate matter with a nominal mean aerodynamic diameter less than or equal to 2.5 µm; PM_{10-2.5} = particulate matter with a nominal mean aerodynamic diameter greater than 2.5 µm and less than or equal to 10 µm; UFP = ultrafine particles.

Note: Those health effect categories for specific exposure durations and size fractions where an asterisk is present indicate the first time studies were available to evaluate evidence and assess the causal nature of relationships between PM exposure and the health effect category of interest. Table P-2 provides a description of each of the five causality determinations and the types of scientific evidence that is considered for each category.

Figure 3. EPA Causality Determinations of the Human Health Effects Associated with Short-term and/or Long-Term Exposure to PM_{2.5} Air Pollution. (U.S. EPA, 2019)

Epidemiological and toxicological studies of PM_{2.5} air pollution have indeed indicated adverse effects on a systemic basis throughout the body, such as on the heart, including an increased risk of heart attacks. For example, when PM stresses the lung (*e.g.*, by inducing edema), it places extra burden on the heart, which can induce fatal complications for persons with cardiac problems. Indeed, for example, Peters *et al.* (2001) found that elevated concentrations of fine particles in the air can elevate the risk of Myocardial Infarctions (MI's)

Report of George Thurston, Sc.D.

within a few hours, and extending 1 day after PM exposure. The Harvard University team found that a 48 percent increase in the risk of MI was associated with an increase of 25 $\mu\text{g}/\text{m}^3$ PM_{2.5} during a 2-hour period before the onset of MI, and a 69 percent increase in risk to be related to an increase of 20 $\mu\text{g}/\text{m}^3$ PM_{2.5} in the 24-hour average 1 day before the MI onset (Peters *et al.*, 2001). Numerous other U.S. studies have also show qualitatively consistent acute cardiac effects, such as the Zanobetti and Schwartz (2006) study of hospital admissions through emergency department for myocardial infarction (ICD-9 code), and Zanobetti *et al.* (2009) that examined the relationship between daily PM_{2.5} concentrations and emergency hospital admissions for cardiovascular causes, myocardial infarction, and congestive heart failure in 26 U.S. communities during 2000-2003.

Cardiac effects at the biological level have also been documented in both animal and human studies. Animal experiments at Harvard University by Godleski *et al.* (1996, 2000) indicate that exposures to elevated concentrations of ambient particulate matter can result in cardiac related problems in dogs that had been pre-treated (in order to try to simulate sensitive individuals) to induce coronary occlusion (i.e., narrowed arteries in the heart) before exposing them to air pollution. The most biologically and clinically significant finding was that, in these dogs, the particulate affected one of the major electrocardiogram (ECG) markers of heart attacks (myocardial ischemia) in humans, known as elevation of the ST segment. Cardiac effects at the biological level have been found in human studies, as well. For example, Pope *et al.* (1999) and Gold *et al.* (2000) found that PM exposure is associated with changes in human heart rate variability. Such changes in heart rate variability (HRV) may reflect changes in cardiac autonomic function and risk of sudden cardiac death. In the Pope *et al.* study, repeated ambulatory ECG monitoring was conducted on 7 subjects for a total of 29 person-days before, during, and after episodes of elevated pollution. After controlling for differences across patients, elevated particulate levels were found to be associated with (1) increased mean heart rate, (2) decreased SDNN, a measure of overall HRV, (3) decreased SDANN, a measure that corresponds to ultra-low frequency variability, and (4) increased r-MSSD, a measure that corresponds to high-frequency variability. This confirms, at the individual level, that biological changes do occur in heart function as a result of PM exposure, supporting the biological plausibility of the epidemiological associations between PM exposure and cardiac illnesses.

Report of George Thurston, Sc.D.

Epidemiologic research conducted on U.S. residents has indicated that acute short-term exposures to PM air pollution, are associated with increased risk of mortality. For example, a nationwide time-series statistical analysis of daily death counts by the Health Effects Institute (HEI, 2003) examined mortality and PM₁₀ air pollution (a subset of particulate matter air pollution that is less than 10 μm in diameter, including PM_{2.5}) in 90 cities across the United States, finding that, for each increase of 10 $\mu\text{g}/\text{m}^3$ in daily PM₁₀ air pollution concentration, there is an associated increase of approximately 0.3% in the *daily* risk of death by the public. Indeed, and I concur, the 2009 U.S. EPA Particulate Matter Integrated Science Assessment (ISA) unequivocally stated that “Together, the collective evidence from epidemiologic, controlled human exposure, and toxicological studies is sufficient to conclude that *a causal relationship exists between short term exposures to PM_{2.5} and cardiovascular effects . . . and mortality.*” (U.S. EPA, 2009).

In my own research, I have found that acute (short-term) increases in PM air pollution are associated with increases in the number of daily asthma attacks, hospital admissions, and mortality. In particular, I have found that both ozone and particulate matter air pollution are associated with increased numbers of respiratory hospital admissions in New York City, Buffalo, NY, and Toronto, Ontario, as well as with mortality in cities such as Chicago, IL, and Los Angeles, CA (*see, e.g., Thurston et al. 1992*). My results have been confirmed by other researchers considering locales elsewhere in the U.S. and throughout the world (*see, e.g., Schwartz, J., 1997; and see U.S. EPA, 2001*). In addition to the acute health effects associated with daily PM pollution, long-term exposure to fine PM is also associated with increased lifetime risk of death of people living in more polluted cities, relative to those living in cleaner cities. For example, in the Six-Cities Study (that was a key basis for the setting of the original PM_{2.5} annual standard in 1997), Dockery *et al.* (1993) analyzed survival probabilities among 8,111 adults living in six cities in the central and eastern portions of the United States during the 1970's and 80's. The cities were: Portage, WI (P); Topeka, KS (T); a section of St. Louis, MO (L); Steubenville, OH (S); Watertown, MA (M); and Kingston-Harriman, TN (K). Air quality was averaged over the period of study in order to study long-term (chronic) effects. As shown in Figure 4, it was found that the long-term risk of death, relative to the cleanest city, increased with fine particle exposure, even after correcting for potentially confounding factors such as age, sex, race, smoking, etc.

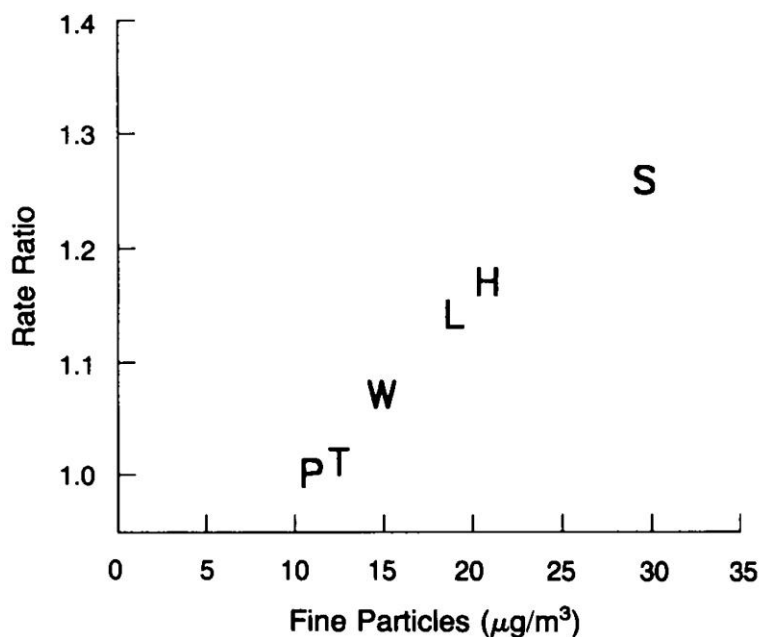


Figure 4. The Harvard Six-Cities Study showed that the lifetime risk of death increased across six U.S. cities as the average fine PM levels increased. (Source: Dockery *et al.*, 1993).

Long-term exposure to fine particles has also been estimated to take more than a year from the life expectancy of people living in the most polluted cities, relative to those living in cleaner cities. For example, Brunekreef (1997) reviewed the available evidence of the mortality effects of long-term exposure to PM air pollution and, using life table methods, derived an estimate of the reduction in life expectancy implied by those effect estimates. Based on the results of Pope *et al.* (1995) and Dockery *et al.* (1993), a relative risk of 1.1 per $10 \mu\text{g}/\text{m}^3$ exposure over 15 years was assumed for the effect of fine PM air pollution on men 25-75 years of age. A 1992 life table for men in the Netherlands was developed for 10 successive five-year categories that make up the 25-75 year old age range. Life expectancy of a 25 year old was then calculated for this base case and compared with the calculated life expectancy for the PM exposed case where the death rates were increased in each age group by a factor of 1.1. A difference of 1.11 years was found between the “exposed” and “clean air” cohorts’ overall life expectancy at age 25. A similar calculation by the authors for the 1969-71 life table for U.S. white males yielded an even larger reduction of 1.31 years for the entire population’s life expectancy at age 25. Thus, these calculations indicate that

Report of George Thurston, Sc.D.

differences in long-term exposure to ambient PM_{2.5} can have substantial effects on life expectancy.

The above discussed increases in mortality documented by these studies represents only the “tip of the iceberg” of effects that would result. As shown in Figure 2 above, for every death associated with air pollution, there is a pyramid of much greater numbers of morbidity effects, including hospital admissions, emergency department visits, doctor visits, missed work days, missed school days, asthma symptoms days, etc. Clearly, when the whole scope of other adverse health effects associated with these air pollution deaths are considered, there is no doubt as to the significance of these adverse effects.

D. PM_{2.5} Health Effects from Fossil Fuel Combustion, including Natural Gas

PM_{2.5} air pollution has been carefully studied in the past few decades. PM is composed of two major components: “primary” particles, or soot, emitted directly into the atmosphere by both stationary sources (e.g., fossil fuel combustion sources and other industrial sources) and mobile sources, such as diesel buses and trucks; and “secondary” particulate matter, formed in the atmosphere from gaseous pollutants, such as the sulfur oxides (SO_x) and nitrogen oxides (NO_x) also emitted by fossil fuel combustion sources. After formation in the atmosphere, this secondary PM largely condenses upon the smallest existing primary particles that, collectively, represent the greatest surface area for the secondary PM to condense upon. These particles are very small, commonly having an aerodynamic diameter of less than 1.0 micrometer (μm) – a fraction of the diameter of a human hair. For example, after it is released from a smokestack, gaseous SO_x is chemically converted in the atmosphere to become sulfate PM.

There is ever-growing scientific evidence indicating that particulate matter (PM) air pollution emitted by fossil fuel combustion is among the important contributors to the toxicity of PM. Evidence from historical pollution episodes, notably the London Fog episodes of the 1950's, indicate that extremely elevated daily particulate matter concentrations from fossil fuel combustion may be associated with excess acute human mortality (Ministry of Health of Great Britain, 1954).

Report of George Thurston, Sc.D.

Recent epidemiological and toxicological evidence also suggests that the particles resulting from fossil-fuel combustion air emissions are among the most toxic in our air. Indeed, my own published analysis of U.S. mortality and PM by source category found that combustion-related particles were more strongly associated with variations in annual mortality rates across U.S. cities than were other components of PM (Ozkaynak and Thurston, 1987). More recently, an analysis by Laden and co-authors (2000) at Harvard University of PM sources and daily pollution confirms that fossil fuel combustion particles were among the PM components that most affected daily variations in mortality. In addition, toxicological studies have indicated that particles resulting from fossil-fuel combustion that contain metals are very toxic to cells in the lung. Thus, both the toxicological and epidemiological evidence available indicate that pollution from fossil-fuel combustion are of great human health concern.

A study that I and colleagues published in the *Journal of the American Medical Association (JAMA)*, shows that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. Indeed, as shown in Figure 5, this study indicates that the increase in risk of lung cancer from long-term exposure to PM_{2.5} in a polluted city was of roughly the same size as the increase in lung cancer risk of a non-smoker who breathes passive smoke while living with a smoker, or about a 20% increase in lung cancer risk (*see Pope et al., 2002*). The study concluded: “Long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality.”

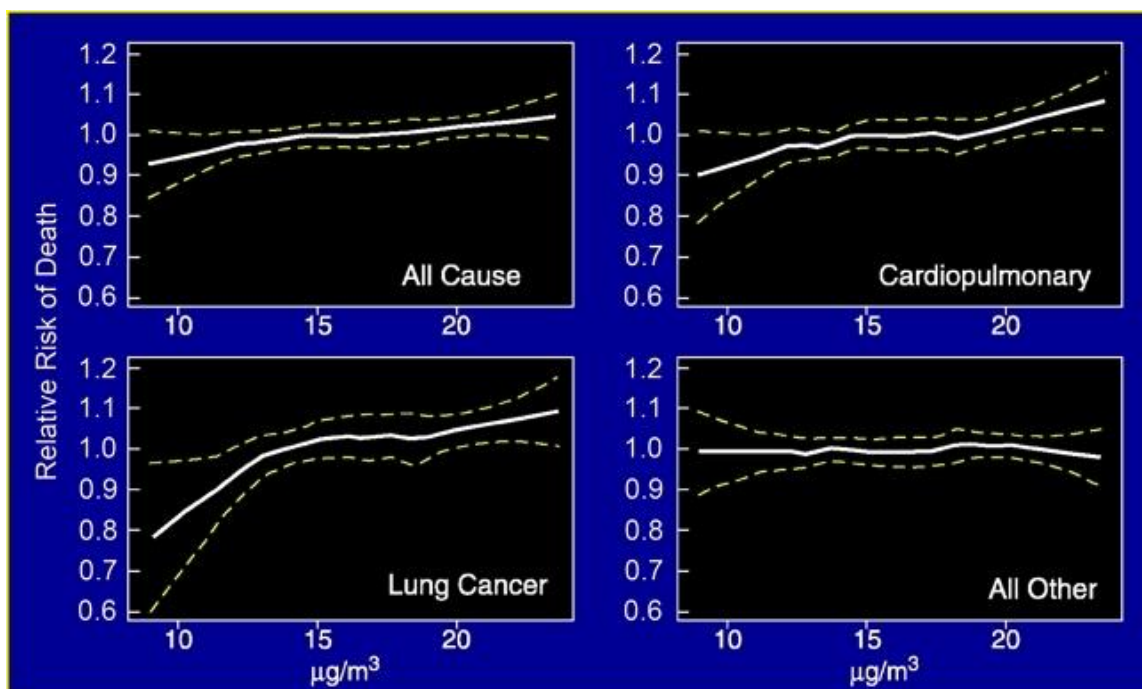


Figure 5. Cardiopulmonary and Lung Cancer Mortality Risks Increase Monotonically with Exposure to Long-Term Fine PM

(Adapted from: Pope, Burnett, Thun, Calle, Krewski, Ito, and Thurston, 2002)

The conclusion that combustion particle pollution, and especially that from the combustion of fossil fuels, represents one of the more toxic types of particles that we breathe is supported by the fact that such combustion particles have different sizes, physio-chemical characteristics, and deposit in different parts of the lung than other more “natural” particles, such as wind-blown soil.

In the past, I have testified that this is especially true of coal-fired power plant emissions, but since all fossil-fuel emissions particles share certain key characteristics, such as containing transition metals, this is also true of oil-fired and natural gas-fired emissions. Although the mass of particles emitted per unit energy is less for oil- and gas-fired units, there is no reason to believe that they are less toxic on a pound for pound basis, and good reason to expect they would be more toxic, since there are so many more ultrafine particles emitted by natural gas burning facilities, per pound of emission; and ultrafine (e.g., nanoparticles, having diameters less than $0.1 \mu\text{m}$) are thought to be far more toxic per unit mass than large particles, and because they can reach deep into the lung, even potentially passing across the lung’s membranes into the bloodstream to travel systemically throughout the body of a person who breathes them.

Report of George Thurston, Sc.D.

In addition, these fossil fuel combustion particles are enriched in toxic metals, such as arsenic and cadmium, as well as in transition metals, such as iron and vanadium, that can cause damaging oxidative stress in lung cells (*see, e.g., Costa et al., 1997; Dreher et al., 1997, and Lay et al., 1999*). This may also be especially true in the case of fossil fuel combustion particles because such PM is composed of very small particles that bypass the natural defenses of the lung, and therefore can penetrate deep into the lung where they are not easily cleared, and can therefore reside there for long times, potentially causing significant damage to the lung and to the human body. Thus, PM air pollution from the combustion of fossil fuels, including natural gas-fired units, is cause for special concern, and the health of persons in nearby populations can be adversely affected by this fossil fuel combustion related air pollution.

Epidemiological studies support the conclusion that sulfate containing particles (i.e., fossil fuel combustion products) are among the most toxic particles (e.g., Ozkaynak and Thurston, 1987; Dockery *et al.*, 1993; and Pope *et al.*, 1995, and 2002). In my own published research examining the associations of PM with human mortality, we have found that PM emitted from fossil-fuel combustion and from the metals industry are more strongly associated with mortality than particles from other sources, such as soil-derived and automobile emission-related particles (Ozkaynak, H. and Thurston, G.D., 1987, Associations between 1980 U.S. mortality rates and alternative measures of airborne particle concentration. *Risk Analysis* 7:449-460). An example of the relationship that has been found between sulfate fine particle pollution and mortality is shown in Figure 6.

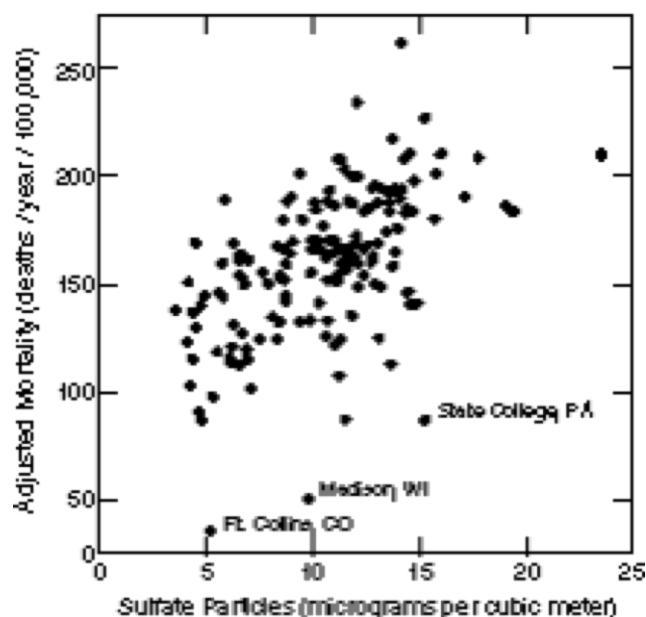


Figure 6. Age-, sex-, and race-adjusted population-based mortality rates for U.S. metropolitan areas in 1980 plotted versus mean sulfate fine particle air pollution levels. (Adapted from Pope, *et al.* 1995).

Lab studies also suggest that the presence of acidity in particles, which is usually the case for fossil fuel combustion emissions, increases the toxicity of PM (e.g., Chen, *et al.* 1990). This conclusion is supported by studies of human respiratory cells (e.g., Veronesi *et al.* 1999). The presence of acidity increases the solubility of toxic metals, thereby making them more biologically-available to damage the body. More recent toxicological evidence has confirmed this link between sulfate content and enhanced toxicity of particulate matter (e.g., Fang et al, 2017). Thus, this is apparently an important pathway by which acidic particles, such as those resulting from fossil fuel combustion, can have heightened toxicity versus other ambient particles, and provides a plausible physiological mechanism for the epidemiological associations found between acidic particle exposures and adverse human health effects.

Particulate matter from the combustion of different fossil fuels generally have shared characteristics. Fossil fuels have all undergone a similar process — they have a similar derivation, they have been underground and compressed, and they are combusted in relatively similar ways. Also, fossil fuel emissions consist of very fine particles, tiny particles, that have large surface areas available to interact with the lung. And the particles have transition metals in them. For example, the percentages of transition metals are similar for natural gas and residual oil.

Report of George Thurston, Sc.D.

In addition, because fossil fuel particles, especially those near a fossil fuel burning facility, are freshly combusted, they have more active sites on them by which to damage health. Work by Oberdorster (2000) has found that ultrafine PM concentrations at ambient levels can cause mortality in healthy rats. Thus, living near a major fossil fuel combustion facility is more impactful because both the concentrations breathed are higher than downwind, but also because they are more recently emitted, and likely more reactive than more aged particles downwind.

Since fossil fuel particles are all fresh aerosols when they are coming out of the facility, and they are combustion aerosols, they share many characteristics. Hence, even though we haven't directly studied natural gas particles, since they share many of the same characteristics as particles from oil and coal combustion, it is very likely that they would share the toxicity of their “sister” fuels, and potentially at a higher effect per pound of pollution breathed.

Freshly combusted particles will have sharp edges, and will be composed, in part, of unoxidized compounds that haven't been neutralized. The sharp edges are the active sites at which these particles irritate and interact with the lining of the lung. Natural gas particles from combustion turbines that use ammonia as part of an SCR system, also include ammonium bisulfate, which is strongly acidic. Unoxidized and acidic compounds would be more reactive, and therefore, be more likely to irritate and interact with the lining of the lung, and, in combination with the metallic components of fine particles, cause more damage than aged and neutralized particles.

Although the quantities, in terms of mass per unit Btu are lower, there is no evidence that, on a pound for pound basis, the particles from gas-fired facilities are any less toxic than PM_{2.5} from other fossil fuels. Indeed, as discussed below, because gas-fired sources can emit a much greater percentage of the particles as ultrafine particles, which have a much higher surface area per mass than larger particles, it is likely that there is a much *greater* effect per pound of PM_{2.5} emitted by gas-fired sources than for PM_{2.5} emitted by sources burning other fossil fuels. For this reason, the impacts of the proposed facility in terms of overall PM_{2.5} mass concentration (e.g., Table 4-1 of the Lambert “Air Quality Dispersion Modeling Report”) are an inadequate indication of the health risks associated with the proposed Lambert Compressor Station (AECOM Environment, 2020).

Report of George Thurston, Sc.D.

My recent studies, and those by others, have also found that long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. Air pollutants associated with fossil fuel combustion (e.g., from oil, coal and natural gas fired fossil fuel combustion sources) have well-documented adverse human health effects. The health impact is particularly high for particulate matter from fossil fuel-burning facilities, such as coal burning, which has been associated with an ischemic heart disease mortality risk that is roughly five times that of the average for PM_{2.5} particles in general (Thurston *et al.*, 2016), and more damaging per $\mu\text{g}/\text{m}^3$ than PM_{2.5} from other common sources (Figure 7).

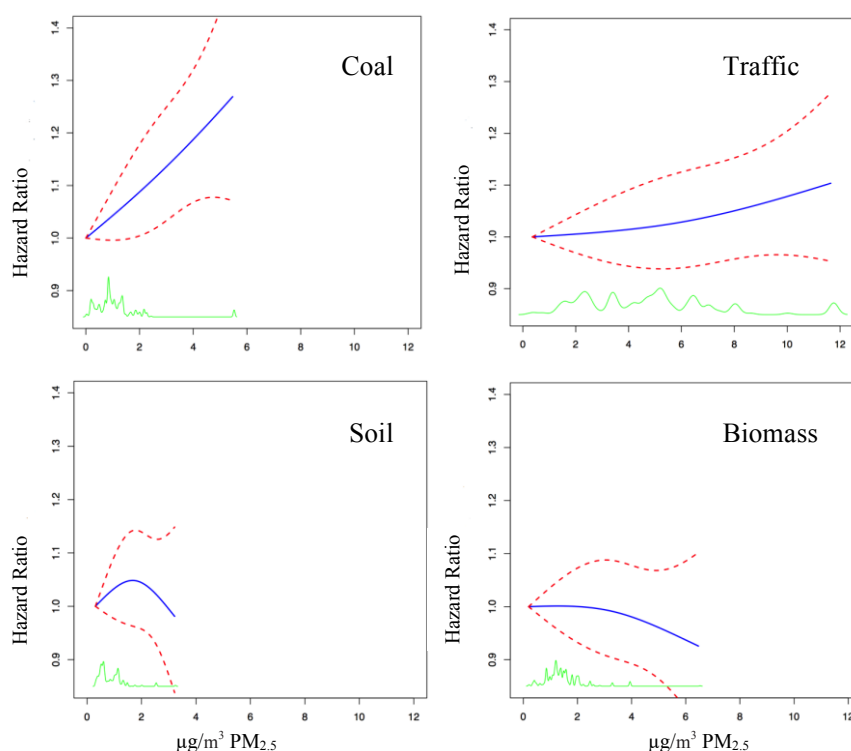


Figure 7. Concentration-response curve (solid lines) and 95% confidence intervals (dashed lines) for Source-Specific PM_{2.5} mass in the U.S. ACS Cohort. (Thurston *et al.*, 2016).

There are two known characteristics of natural gas combustion particles that make them likely to have especially high health effects, on a per pound basis, than most other types of PM_{2.5}: 1) they have a higher percentage of ultrafine particles, as compared with other fossil-fuel options (see Figure 8), and these ultrafine particles have very high surface areas, relative to other fossil-fuel emissions, which likely increase the health impacts of gas-fired PM

considerably; and 2) there are acidic sulfates associated with these emissions, especially as strongly acidic ammonium bisulfate. Both of these factors would tend to increase the "bio-availability" of the toxins for gas-fired PM, which would therefore likely increase the toxicity of gas-fired combustion particles, relative to other ambient particles. As discussed further below, while these particles aggregate and grow in size downwind, they remain submicron in size. This means the emitted particles from natural gas combustion still maintain an especially strong ability to reach deep into the lung, and have much larger surface areas per unit mass than particles in general, enhancing the bioavailability of their toxic constituents to adversely affect human health when breathed.

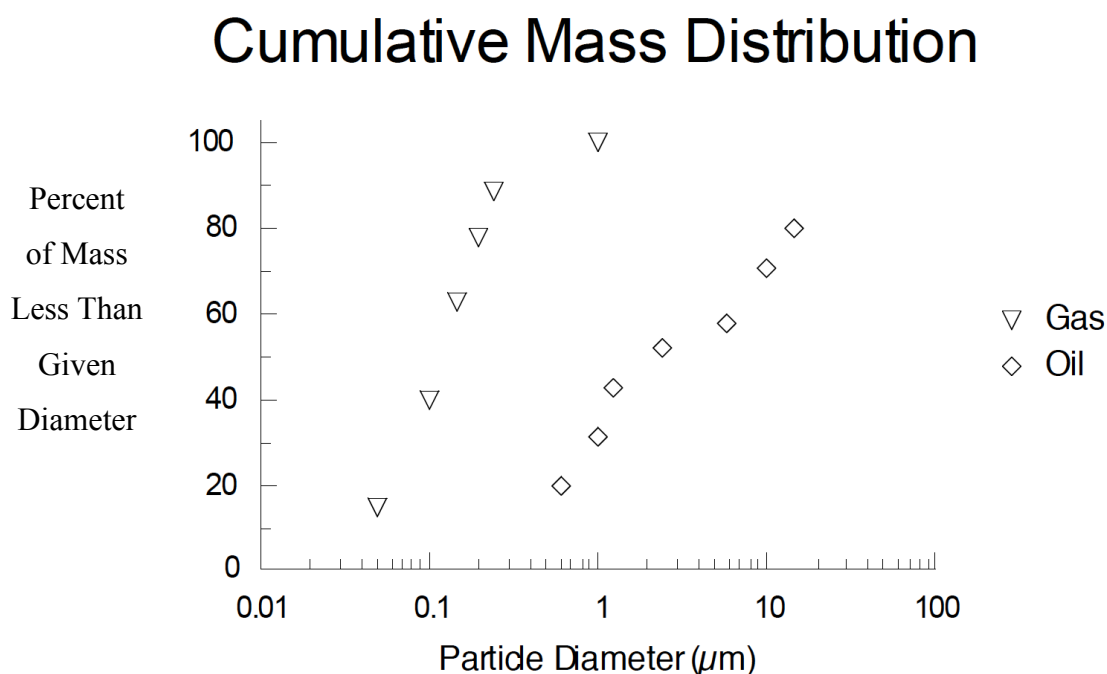


Figure 8. Comparison of Particle Mass Size Distribution for Natural Gas vs. Oil Combustion Emissions.

(Source: U.S. EPA, "Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Fifth Edition," AP-42. Table 1.3-4 (9/98), Table 3.1-1 (10/96))

The composition of gas combustion particles also makes them likely be more toxic than usual PM_{2.5}. As summarized in Table 1, a comparison of the metal content of gas-and oil-fired particles shows that gas-fired particles have just as high or higher a percentage of a number of metals as oil-fired particles, including barium, cadmium, chromium, molybdenum, and zinc. Moreover, even if one assumes that total metals content is generally lower in gas-fired particles,

Report of George Thurston, Sc.D.

a higher percentage of gas-fired particles are ultrafine particles, compared to particles from other combustion sources (e.g., vs. residual oil combustion particles). These Table 1 data also show that the combustion of distillate oil, which is similar to the diesel fuel combusted in trucks and diesel car traffic, also share these toxic metals composition characteristics, causing them to present similar health consequences as other fossil fuel combustion sources, such as the proposed facility. But the smaller size of natural gas combustion particles will increase the toxicity of these metals when breathed, relative to other fossil fuel combustion sources with a smaller percentage of ultrafines (e.g., residual oil combustion particles). Thus, there is a greater presence of ultrafine particles that are also high in transition metal content, making the fossil fuel combustion particles that would be emitted from this facility to be of especially high toxicity.

Table 1. Metal Content of Natural Gas vs. Residual Oil PM Emissions

Pollutant	PM Emissions (lb./MMBtu)			PM Emissions as % of PM Mass		
	Natural Gas	Distillate Oil	Residual Oil	Natural Gas	Distillate Oil	Residual Oil
Antimony			3.5E-05			0.070%
Arsenic	2.0E-07	4.0E-06	8.8E-06	0.003%	0.017%	0.018%
Barium	4.3E-06		1.7E-05	0.058%		0.034%
Beryllium	<1.2E-08	3.0E-06	1.9E-07		0.013%	0.001%
Cadmium	1.1E-06	3.0E-06	2.7E-06	0.014%	0.013%	0.005%
Chloride			2.3E-03			4.641%
Chromium	1.4E-06	3.0E-06	5.6E-06	0.018%	0.013%	0.011%
Cobalt	8.2E-08		4.0E-05	0.001%		0.081%
Copper	8.3E-07	6.0E-06	1.2E-05	0.011%	0.025%	0.024%
Fluoride			2.5E-04			0.499%
Lead	4.9E-07	9.0E-06	1.0E-05	0.007%	0.038%	0.020%
Manganese	3.7E-07	6.0E-06	2.0E-05	0.005%	0.025%	0.040%
Mercury	2.5E-07	3.0E-06	7.5E-07	0.003%	0.013%	0.002%
Molybdenum	1.1E-06		5.2E-06	0.014%		0.011%
Nickel	2.1E-06	3.0E-06	5.6E-04	0.028%	0.013%	1.130%
Phosphorus			6.3E-05			0.127%
Selenium	<2.4E-08	15.0E-06	4.6E-06		0.063%	0.009%
Vanadium	2.3E-06		2.1E-04	0.030%		0.425%
Zinc	2.8E-05	4.0E-06	1.9E-04	0.382%	0.017%	0.389%
Total PM	7.5E-03	2.4E-02	5.0E-02			

(Source: U.S. EPA, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. AP-42, Tables 1.3-1 (with S = 0.3), 1.3-2, 1.3-11, 1.4-2, 1.4-4.
<https://www.epa.gov/air-emissions-factors-and-quantification>)

Report of George Thurston, Sc.D.

While these ultrafine particles will coagulate and agglomerate into somewhat larger particles as they travel downwind, they will maintain their composition, and largely remain as submicron ($d_a < 1 \mu\text{m}$ in diameter) particles that are smaller than PM_{2.5} in general, maintaining their elevated toxicity. For example, as shown in Figure 9, ultrafine particles (UFP) emitted from traffic are diluted and agglomerated as they travel downwind, but largely remain much much less than $1 \mu\text{m}$ in diameter, with most still as nanoparticles even 100 meters downwind, and maintaining a high surface area to mass ratio (. In addition, these aged ultrafine combustion particles will still readily bypass the lung's defenses, and thereby be inhaled to the deepest recesses of the lung, where they can do the most damage.

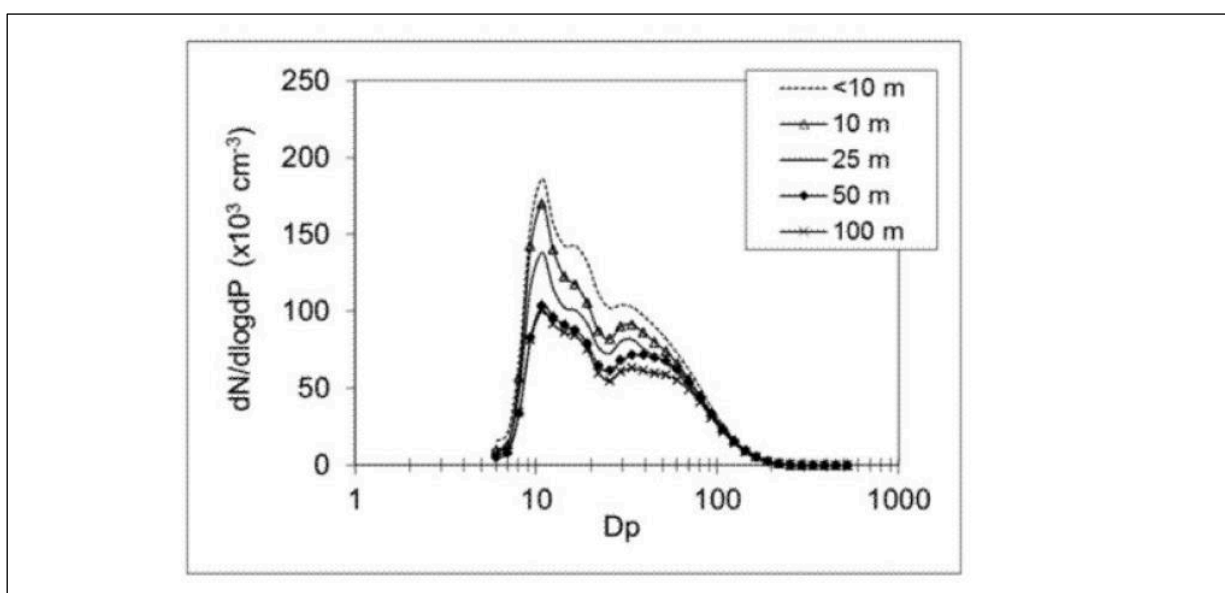


Figure 9. UFP size distributions measured near a freeway at varying distances downwind, with particle diameter (D_p) in units of nanometers (nm, where $1000 \text{ nm} = 1 \mu\text{m}$) (Source: Kozawa *et al.*, 1993)

Furthermore, the likely co-presence of acidic vapor in natural gas (such as would be burned at the Lambert Compressor Station) emissions will tend to further enhance the bio-availability, and hence the toxicity, of the metals that are present. Although there is less sulfur in natural gas than most coals, there is sulfur present in natural gas, resulting in ultrafine particles from its combustion that contain sulfur, as documented, for example, by Xue *et al.* (2018). Sulfuric acid, which is formed in the atmosphere following the combustion of fossil fuels containing sulfur, is the most strongly acidic form, with a pH of less than 1 at 50% Relative Humidity (RH), and ammonium bisulfate is also very strongly acidic, with a pH

Report of George Thurston, Sc.D.

of 1-2 at 50% RH, while ammonium sulfate is only weakly acidic, with a pH of 5-6 (vs. a pH of 7.0 for completely neutral conditions) (National Research Council, 1978). Although the applicant has provided no data indicating the breakdown of ammonium sulfates in its proposed facility's emissions, the facility emissions can be expected to be in an acidic, and therefore more toxic, form. Given their toxic characteristics, the potential adverse effects of exposure to these natural gas combustion metals cannot be dismissed, even at very low PM_{2.5} mass levels.

For all these reasons, the fossil fuel combustion PM_{2.5} emissions from the new facility cannot be dismissed. Indeed, because of their high ultrafine fraction, their composition, and the likely co-presence of acidic vapors, they will be even more toxic than their PM_{2.5} mass impacts would already indicate.

E. The Human Health Effects of Ozone (O₃) Air Pollution

Ozone (O₃) is an air pollutant, resulting from nitrogen oxide and hydrocarbon emissions from fossil fuel combustion, that adversely affects human health. Ozone is a highly irritating gas that is formed in the atmosphere in the presence of sunlight from other "precursor" air pollutants, including NO_x and hydrocarbons that are emitted by combustion sources such as fossil fuel burning facilities. The adverse health consequences of breathing ozone are serious and well documented. This documentation includes impacts demonstrated in controlled chamber exposures of humans and animals, and observational epidemiology showing consistent associations between ozone and adverse impacts across a wide range of human health outcomes.

The noxious nature of ozone is also evidenced by the way it visibly "eats away" at materials such as rubber, an elastic substance, sharing characteristics with human lungs. Indeed, in the early years of air pollution monitoring, the number of cracks in a stretched rubber band left outdoors for weeks was used as an index of the ozone concentration in the air (Renzetti, 1959). Similarly, ozone has been known to cause fading of certain colors in fabrics because they oxidize the dye, causing "O-fading." As a result, automobile manufacturers today utilize ozone-resistant rubbers, while carpet and drape manufacturers use ozone-resistant dyes (National Research Council, 1976). In addition, Cass *et al.* (1991) have discussed the importance of protecting works of art from damage due to O₃. Given this

Report of George Thurston, Sc.D.

evidence of ozone's devastating effects on solid materials, it comes as no surprise that ozone can also have serious adverse health effects on the more vulnerable human lung.

Ozone can irritate the human respiratory system, causing exposed people to cough, feel an irritation in the throat, and/or experience an uncomfortable sensation in the chest area. Ozone has also been shown to reduce the lung's ability to inhale and exhale, thereby making it more difficult for people to breathe as deeply and vigorously as they normally would (*e.g.*, *see* Bates, 1995). Research shows that ozone can also acutely aggravate asthma, and new evidence suggests that it may cause more children to get asthma. When ozone levels are high, people with asthma have more attacks that require a doctor's attention or the use of additional medication. One reason this happens is that ozone makes people more sensitive to allergens, which are the most common triggers for asthma attacks. Ozone can inflame and damage cells that line the human lung, and O₃ has been compared by some to "getting a sunburn on your lungs." Ozone may also aggravate chronic lung diseases, such as emphysema and bronchitis, and can reduce the immune system's ability to fight off bacterial infections in the respiratory system.

Among the important adverse effects associated with ozone exposure to asthmatics is the triggering of asthma attacks. The effects of ozone air pollution on children with asthma have been demonstrated in my own research following a group of children at an asthma summer camp located in Connecticut. This study of a group of about 55 moderate to severely asthmatic children showed that these children experienced statistically significant reductions in lung function, increases in asthma symptoms, and increases in the use of unscheduled asthma medications as ozone pollution levels rose. As shown in Figure 10, the risk of a child having an asthma attack was found to be approximately 40 percent higher on the highest ozone days than on an average study day (Thurston *et al.*, 1997). Consistent with other research in this area, there is no indication in this plot of a threshold concentration below which children with asthma are safe from the effects of ozone increases.

Report of George Thurston, Sc.D.

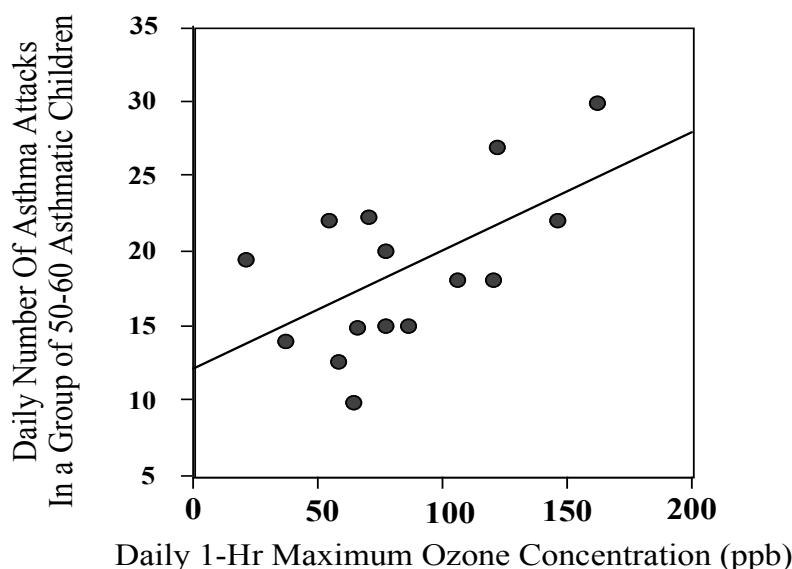


Figure 10. The number of asthma attacks among children at an “Asthma Camp” in Connecticut increase as the ozone levels rise (*Source: Thurston et al., 1997*)

These asthma camp results have been confirmed by a larger study published in the *Journal of the American Medical Association (JAMA)*. Gent *et al.* (2003) presented a cohort study of asthmatic children from the New Haven, CT area, including 130 children who used maintenance medications for asthma and 141 children who did not. The more severe asthmatics were identified as those using maintenance medication. For these severe asthmatics, the study found that the level of O₃ exposure was significantly associated with worsening of symptoms and an increase in the use of rescue medication. Each 50 parts per billion (ppb) increase in 1-hour average O₃ was associated with an increased likelihood of wheezing (by 35%) and chest tightness (by 47%). The findings indicate that asthmatic children are particularly vulnerable to ozone, even at pollution levels below the U.S. EPA air quality standards.

My own research has also shown ozone air pollution to be associated with diminished lung function in non-asthmatic healthy children at a YMCA summer camp in a pristine area in the Kittatinny Ridge, in the northwestern part of the state (Spektor *et al.*, 1988a). Similarly, in the summer of 1988, Berry *et al.* (1991) conducted a field health study at two summer day camps in suburban-central New Jersey. Thirty-four campers and counselors had daily lung function tests, and it was found that the campers had a statistically significant decrease in peak expiratory flow rate associated with increasing ozone concentrations, indicating an acute loss in the children’s ability to inhale and exhale after ozone exposure.

Report of George Thurston, Sc.D.

The adverse effects of exposure to ozone in ambient air on the lungs of individuals has been demonstrated in studies that I have conducted in the State of New York, as well. For example, respiratory function damage was demonstrated in a study I co-authored of 30 healthy adult non-smokers engaged in a regular daily program of outdoor exercise in Tuxedo, NY during the summer of 1985 (Spektor *et al.*, 1988b). All measured health indices showed statistically significant O₃-associated decreases in the lung function of the runners as ozone levels increased. More recently, using lung bronchoscopy (which allows a visualization of the main tubes of the lungs, by means of a flexible lighted instrument introduced through the vocal cords and windpipe) and broncho-alveolar lavage (BAL, or a washing of the lining of the lung), Kinney *et al.* (1996) examined some 19 normal volunteer joggers from Governors Island, NY. The joggers exercised in the afternoon during the 1992 summer season. These results indicate a significant inflammatory response in the lungs of recreational joggers in New York City exposed to regional ozone and associated co-pollutants during the summer months.

Airway inflammation in the lung is among the serious effects that have also been demonstrated by controlled human studies of ozone at levels typically experienced by most Americans. Airway inflammation is especially problematic for children and adults with asthma, as it makes them more susceptible to having asthma attacks, consistent with the asthma camp results discussed above. For example, controlled human studies have shown that prior exposure to ozone enhances the reactivity of asthmatics to aeroallergens, such as pollens, which can trigger asthma attacks (*e.g.*, see Molfino *et al.*, 1991).

The increased inflammation of the lung, and diminished immune system effects associated with ozone air pollution can also make the elderly more susceptible to pneumonia, a major cause of illness and death in this age group. Both *in vivo* and *in vitro* experimental studies have demonstrated that O₃ can affect the ability of the immune system to defend against infection. Increased susceptibility to bacterial infection has been reported in mice at below 80ppb ozone for a single 3-hr exposure (Ehrlich *et al.* 1977). Related alterations of the pulmonary defenses caused by short-term exposures to O₃ include impaired ability to inactivate bacteria in rabbits and mice (Coffin and Gardner 1972; Ehrlich *et al.* 1979) and impaired macrophage defense mechanisms in the lung (Dowell *et al.* 1970; Goldstein *et al.* 1971; McAllen *et al.* 1981; Amoruso *et al.* 1981). Thus, the biological plausibility of the

Report of George Thurston, Sc.D.

adverse air pollution health effects associations found by epidemiological studies is supported by a body of controlled exposure animal studies.

The O₃ - morbidity associations indicated by the above-presented epidemiological studies are also supported by a large body of data from controlled human exposure studies that give consistent and/or supportive results, and that have demonstrated pathways by which ozone can damage the human body when breathed. Clinical studies have demonstrated decreases in lung function, increased frequencies of respiratory symptoms, heightened airway hyper-responsiveness, and cellular and biochemical evidence of lung inflammation in healthy exercising adults. For example, in controlled exposure studies, McDonnell *et al.* (1991) and Devlin *et al.* (1991) found that prolonged controlled exposures of exercising men to levels of ozone common in present-day U.S. (only 80 ppb) resulted in significant decrements in lung function, induction of respiratory symptoms, increases in nonspecific airway reactivity, and cellular and biochemical changes in the lung.

Ozone exposure has also been shown to have adverse effects on athletic performance. Epidemiological evidence compiled more than three decades ago suggested that the percentage of high school track team members failing to improve performance increased with increasing oxidant concentrations the hour before a race (Wayne *et al.* 1967). Controlled exposure studies of heavily exercising competitive runners have demonstrated decreased function at 200 to 300 ppb (Savin and Adams 1979; Adams and Schelegle 1983). Other studies have shown reduced athletic performance at even lower O₃ concentrations. Schlegle and Adams (1986) exposed 10 young male adult endurance athletes to 120, 180, and 240 ppb O₃ while they exercised for 60 minutes. Although all 10 completed the protocol for filtered (clean) air exposure, 1, 5, and 7 of them could not complete it for the 120, 180 and 240 ppb O₃ exposures, respectively, indicating that higher O₃ concentrations made exercising more difficult.

Another study considers a broadly relevant case showing the benefits of cleaner air. During the Atlanta Summer Olympics of 1996, traffic-related ozone and PM declined significantly as a result of the alternative mass transportation strategy implemented to reduce road traffic during the Games (Friedman *et al.*, 2001). These improvements were correlated with changes in the rate of children's hospital admissions. Compared to a baseline period, traffic related ozone and PM₁₀ levels declined by 28% and 16%, respectively.

Report of George Thurston, Sc.D.

Concentrations of both PM and ozone also rose noticeably after the end of the Olympics. The study showed a significant reduction in asthma events associated with these pollution improvements. This study supports the hypothesis that improvements in acute air pollution can provide immediate health benefits.

Ozone may also cause permanent lung damage. For example, repeated short-term ozone damage to children's developing lungs may lead to reduced lung function in adulthood (*e.g., see Kunzli et al., 1997*). In adults, ozone exposure may accelerate the natural decline in lung function that occurs as part of the normal aging process (*e.g., see Detels, et al., 1987*). One important study suggests that long-term ozone exposure can increase the chances that children will develop asthma disease (McConnell *et al.*, 2002).

Ozone has also been shown to have long-term cumulative health effects in the State of New Jersey in a study that included cadets from the U.S. Military Academy at West Point who attended special summer training in Fort Dix, New Jersey. There was a statistically significant drop in forced expiratory volume in 1 sec of 44 ml ($p = .035$), and there were also significant increases in reports of cough, chest tightness, and sore throat at the follow-up clinic visit: a larger decline in long-term mean Forced Expiratory Volume lung function was observed in cadets at Fort Dix, where ozone exposures were the highest (Kinney and Lippmann, 2000).

Emergency Room Visits and Hospital Admissions are also increased by O₃ air pollution. Cody *et al.* (1992) analyzed data on New Jersey hospital emergency department (ED) visits for asthma, bronchitis, and finger wounds (a non-respiratory control) for the period May through August for 1988 and 1989, finding that, when temperature was controlled for in a multiple regression analysis, a highly significant relationship between asthma visits and ozone concentration was identified. In addition, a 5-year retrospective study by Weisel *et al.* (1995) of the association between ED visits for asthma with mean ambient ozone levels was conducted for hospitals located in central New Jersey. An association was identified in each of the years (1986-1990), and ED visits occurred 28% more frequently when the mean ozone levels were greater than 60 ppb O₃, as compared to when they were less than 60 ppb O₃.

Epidemiological evidence has accumulated over recent years indicating a role of O₃

Report of George Thurston, Sc.D.

in daily hospital admissions. As displayed in Figure 11, time-series studies conducted in the U.S. have shown increased risk of hospital admissions (Relative Risk > 1.0) at higher O₃ levels, even after accounting for the effects of PM (Schwartz, J. in *Health at the Crossroads*, 1997). This work has now been expanded to consider 36 cities across the U.S., finding that, during the warm season of the year, the 2-day cumulative effect of a 5-ppb increase in O₃ was an estimated 0.3% increase in the risk of chronic obstructive pulmonary disease admissions, and a 0.4% increase in the risk of pneumonia admissions (Medina-Ramon *et al.*, 2006).

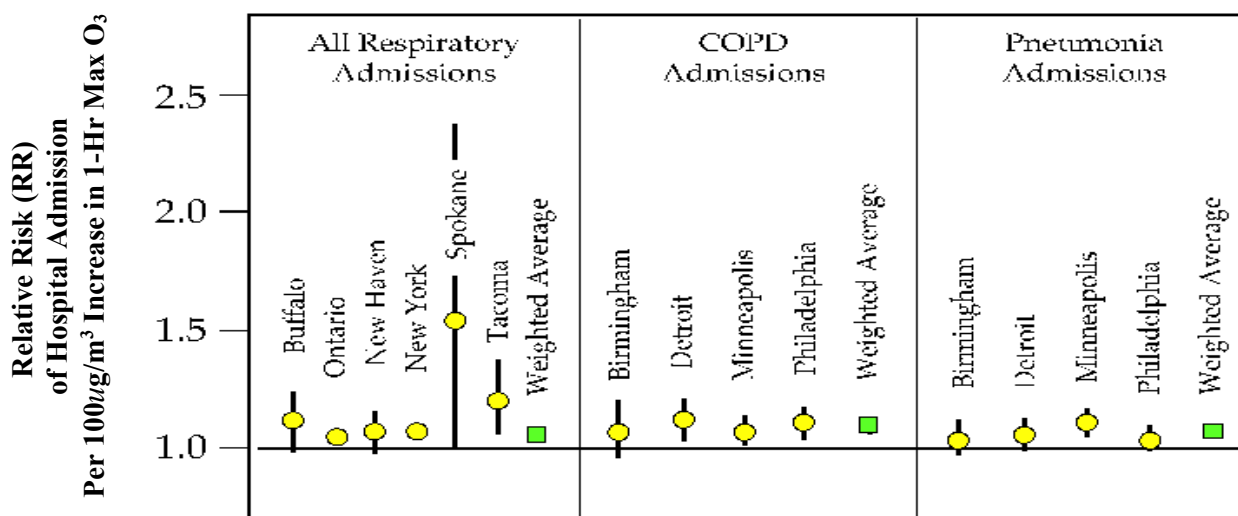


Figure 11. Studies of air pollution in many cities have shown increased risk of respiratory hospital admission (RR > 1.0) on days of high ozone air pollution
(Source: Schwartz, J. in *Health at the Crossroads*, 1997).

Epidemiological evidence has also accumulated over recent years indicating a role by ozone in daily human mortality. As shown in Figure 12, time-series studies conducted in cities around the world have shown increased mortality (Relative Risk > 1.0) at higher ozone concentrations, even after accounting for the mortality effects of PM (Thurston and Ito, 2001).

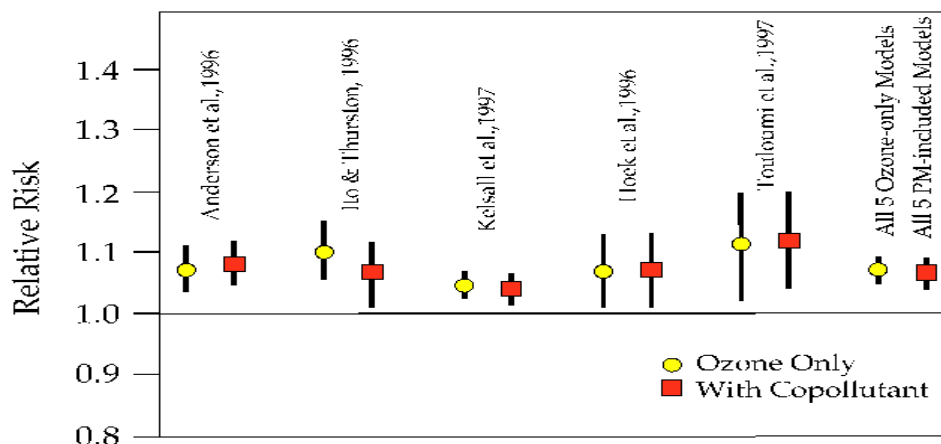


Figure 12. Studies indicate an increased risk of mortality (RR >1.0) at higher ozone concentrations, even after considering the effects of PM.
(Source: Thurston and Ito, 2001)

Multi-city analyses have confirmed the ozone-mortality relationship. These include meta-analyses of multiple past ozone studies that show consistent associations between ozone and increases in mortality (Levy *et al.*, 2005; Ito *et al.*, 2005; Bell *et al.*, 2005). In one analysis of some 95 U.S. cities over two decades published in *JAMA*, Bell *et al.* (2004) showed that, even after controlling for PM and weather, an increase of 10 parts-per-billion in daily ozone pollution was associated with approximately a 0.5% increase in daily risk of death. As discussed earlier, this size percent increase in daily admissions, though small, affects a huge portion of the population and accumulates day after day, week after week, and month after month, so that it accumulates to account for thousands of deaths each year in the U.S.

More recently, mortality effects from long-term exposure to ozone air pollution has now been confirmed in a major cohort study (Jerrett *et al.*, 2009; Turner *et al.*, 2016). In Jerrett *et al.*, data from the study cohort of the American Cancer Society Cancer Prevention Study II were correlated with air-pollution data from 96 metropolitan statistical areas in the United States. 448,850 subjects, with 118,777 deaths in an 18-year follow-up period were considered. Data on daily maximum ozone concentrations were obtained from April 1 to September 30 for the years 1977 through 2000. Data on concentrations of fine particulate matter (PM_{2.5}) were obtained for the years 1999 and 2000. Associations between ozone concentrations and the risk of death were evaluated with the use of standard and multilevel Cox regression models. In single-pollutant models, ozone was associated with the risk of

Report of George Thurston, Sc.D.

death from respiratory causes. The estimated relative risk of death from respiratory causes that was associated with an increment in ozone concentration of 10 ppb was 1.040 (95% confidence interval, 1.010 to 1.067). The association of ozone with the risk of death from respiratory causes was insensitive to adjustment for confounders and to the type of statistical model used. In a follow-up analysis of this same database, Turner *et al.* (2016) improved ozone exposure estimates by employing estimates of O₃ concentrations at the participant's residence, as derived from a hierarchical Bayesian space–time model. In two-pollutant models, adjusted for PM_{2.5}, significant positive associations remained between O₃ and all-cause (hazard ratio [HR] per 10 ppb, 1.02; 95% confidence interval [CI], 1.01–1.04), circulatory (HR, 1.03; 95% CI, 1.01–1.05), and respiratory mortality (HR, 1.12; 95% CI, 1.08–1.16) that were unchanged with further adjustment for NO₂.

F. The Human Health Effects of Nitrogen Oxides (NO_x) Air Pollution

Exposures to nitrogen oxides have also been associated with adverse human health effects, in addition to being a precursor of (i.e., leading to the formation of) secondary PM_{2.5} and ozone in the atmosphere, which also have adverse health effects (U.S. EPA, 2010).

Nitrogen Dioxide (NO₂) is one of a group of highly reactive gases containing both nitrogen and oxygen known as oxides of nitrogen or nitrogen oxides (NO_x). NO₂ primarily gets into the air we breathe from the combustion of fuels, including from diesel powered vehicles.

Short-term (acute) exposures to NO₂, for as briefly as 1-hour or less in length, are known to aggravate existing respiratory diseases, particularly asthma, leading to episodes of respiratory symptoms (e.g., coughing, wheezing or difficulty breathing), hospital admissions, and/or visits to emergency rooms. Indeed, the U.S. EPA's Integrated Science Assessment (ISA) for Oxides of Nitrogen (EPA/600/R-15/068) has concluded that research studies have provided scientific evidence that is sufficient to infer a relationship to exist between short-term NO₂ exposure and adverse effects on the respiratory system. These associations between ambient NO₂ were found in a broad array of respiratory effects, ranging "from subclinical increases in pulmonary inflammation to respiratory mortality". The likely mechanistic pathways of such respiratory effects are summarized in Figure 13. The EPA ISA report concludes, and I agree, the scientific evidence shows that: "The NO₂-induced increases in allergic inflammation and airway responsiveness in controlled human exposure studies of adults with asthma comprise the key evidence that NO₂ exposure can independently exacerbate asthma and support the epidemiologic evidence for asthma hospital admissions and ED visits, as well as symptoms, lung function decrements, and pulmonary inflammation in populations with asthma." (U.S. EPA, 2016).

Longer-term (e.g., annual average) exposures to elevated concentrations of NO₂ contributes to the development of asthma, and can potentially increase susceptibility to respiratory infections. People with asthma, children, older adults, and those with pre-existing disease are generally at greater risk for the health effects of air pollutants like NO₂.

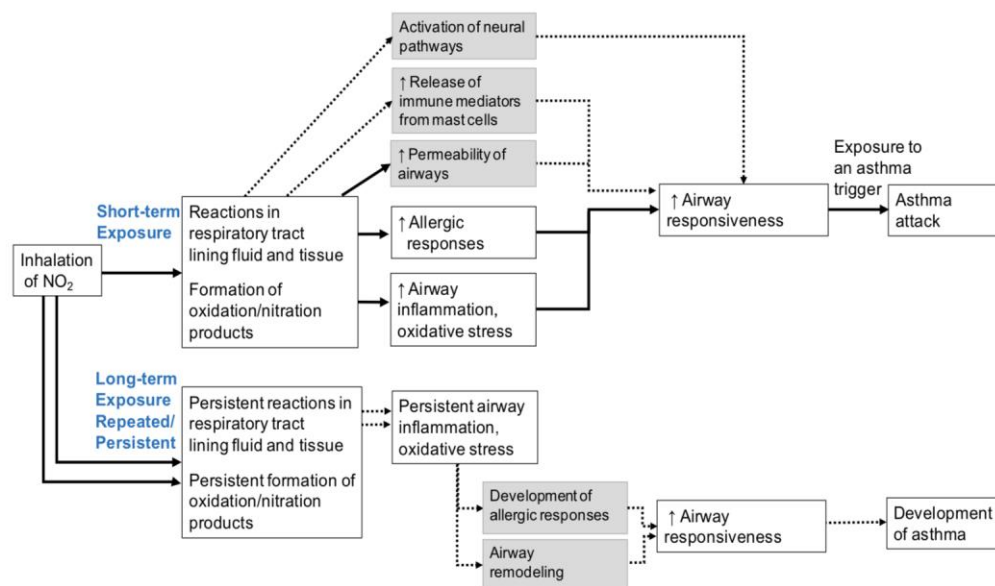


Figure 13. Biological Pathways of Nitrogen Dioxide (NO₂) Exposure Effects on the Lung (U.S. EPA, 2016)

(Note: White boxes and solid arrows describe pathways well supported by available evidence, while grey boxes and dotted lines are for pathways for which evidence is less certain.)

One of the most severe health impacts associated with exposure to NO₂ is the development of new onset childhood asthma. Traffic related air pollution (TRAP) exposures, including to NO₂ air pollution, were evaluated as a cause of childhood or adult-onset asthma in the Health Effects Institute (HEI) Special Report 17 (2010). This publication concluded living near busy roads was a risk factor for onset of childhood asthma, but data were insufficient to conclude causality at that time. However, several key studies on the topic have now been published since this report's release. For example, the Southern California Children's Health Study (CHS) found an increased risk of new-onset childhood asthma from TRAP at home residence (McConnell, 2010). Khreis and colleagues subsequently synthesized 41 studies that focused on children's TRAP exposures as a potential cause for asthma development, finding associations with TRAP metrics, especially NO₂. (Figure 14). A 2017 meta-analysis of 18 studies of prenatal air pollution exposures and childhood asthma similarly found associations between risk of wheezing and asthma development in childhood with air pollution exposure, including NO₂ (Hehua, 2017).

Report of George Thurston, Sc.D.

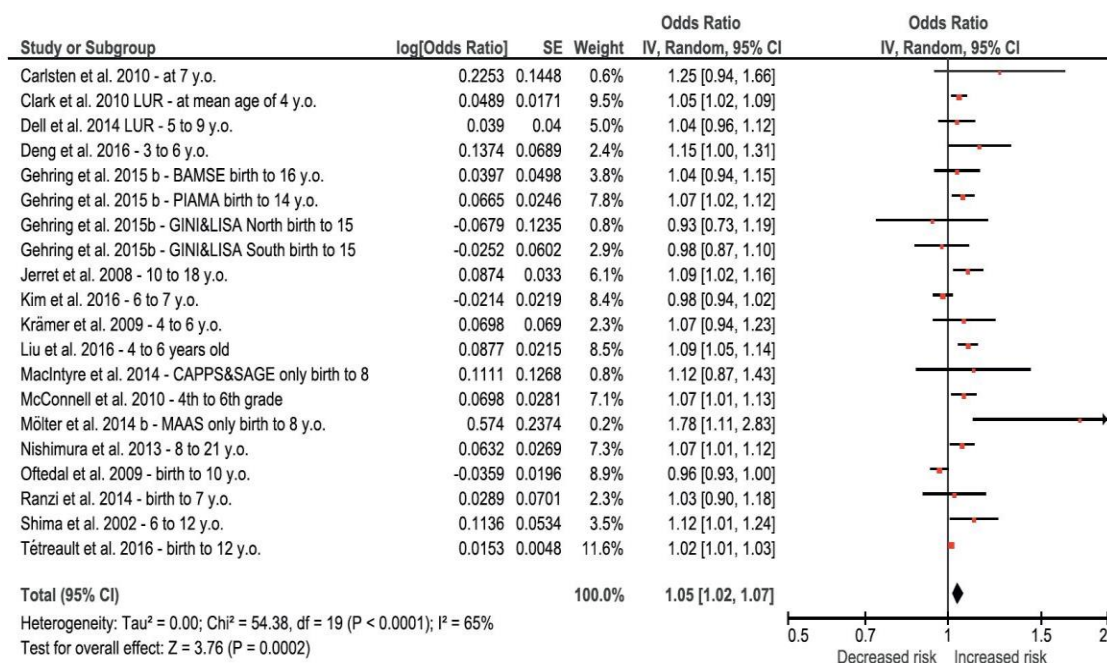
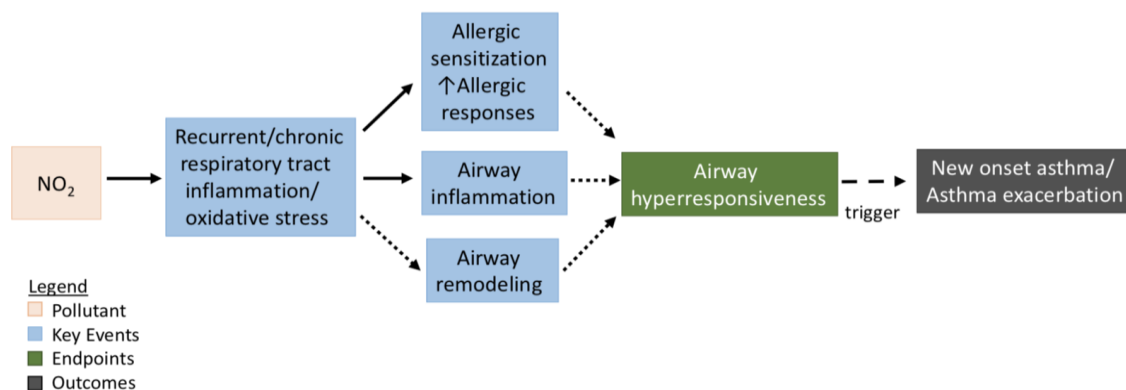


Figure 14. Meta-analysis of studies of NO₂ and new-onset asthma in children (Khreis, 2017)

Recently, a well-designed multi-level longitudinal study, drawn from three waves of CHS cohort recruitment during a decade of air pollution decline in Southern California, found that decreases in ambient NO₂ and PM_{2.5} between 1993 and 2014 were significantly associated with lower asthma incidence (Garcia *et al.*, 2019). This study is consistent with an inference of causality of the NO₂ air pollution-asthma incidence association, since an intervention to reduce exposure was followed by a reduction in disease incidence. A mechanistic biological pathway for the development of new onset asthma from NO₂ air pollution exposure is shown in Figure 15 (U.S. EPA, 2016).

Report of George Thurston, Sc.D.



Note: Pathways indicated by a dotted line are those for which evidence is limited to findings from experimental animal studies, while evidence from controlled human exposure studies is available for pathways indicated by a solid line. The dashed line indicates a proposed link to the outcome of new onset asthma/asthma exacerbation. Key events are subclinical effects, endpoints are effects that are generally measured in the clinic, and outcomes are health effects at the organism level. NO₂ = nitrogen dioxide.

Source: National Center for Environmental Assessment.

Figure 15. Mechanistic biological pathway of childhood asthma development from NO₂ exposures (Source: U.S. EPA, 2016).

Using the available science, Achakulwisut and colleagues (2019) have estimated the annual global number of new pediatric asthma cases attributable to NO₂. They found that, globally, 4.0 million new pediatric asthma cases could be attributed to NO₂ pollution annually, accounting for 13% of global incidence.

Overall, the U.S. EPA, in its most recent NO₂ Integrated Science Assessment listed the health effects identified, including both quantified and non-quantified for its cost-benefit analyses, as shown in Table 2.

Table 2. Human Health Effects of NO₂ Air Pollution Identified by the U.S. EPA (2010)

Pollutant / Effect	Quantified and Monetized in Primary Estimates ^a	Unquantified Effects ^{b, c} Changes in:
NO ₂ /Health	Asthma Hospital Admissions Chronic Lung Disease Hospital Admissions Asthma ER visits Asthma exacerbation Acute Respiratory symptoms	Premature mortality Pulmonary function Other respiratory emergency department visits Other respiratory hospital admissions

G. Adverse Health Effects of Air Pollution at Concentrations Below the U.S. NAAQS

The U.S. Clean Air Act (CAA) (42 U.S.C. § 7401, *et seq.*) is a comprehensive federal law, instituted in 1970, that regulates air emissions from stationary and mobile pollution sources. This law empowers EPA to establish National Ambient Air Quality Standards (NAAQS) aimed to protect public health and public welfare. The National primary NAAQS, “shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health.” 42 U.S.C. § 7409(b)(1).

While the goal of this legislation was clearly to protect public health from air pollution with a margin of safety, this was recognized from the Act’s beginnings to not be attainable in practice, as there is no known threshold below which no adverse effects of air pollution occur. As documented in Castle and Revesz (2019):

“In the floor debates leading up to 1977 Clean Air Act Amendments, various members of both chambers endorsed a non-threshold view of NAAQS contaminants. The bill’s chief author, Senator Edmund Muskie, emphasized a consistent theme throughout the deliberations: ‘There is no threshold health effect which can be used to say that above this threshold there is danger to health and below it there is not. The testimony before the committee is replete over 14 years to that effect.’ Only seven years into the Clean Air Act regime, Senator Muskie was unequivocal, stating that ‘there is no such thing as a threshold for health effects. Even at the national primary standard level, which is the health standard, there are health effects that are not protected against.’ There was evidence suggesting these pollutants were non-threshold before the 1970 Clean Air Act was passed, and at least some members of Congress were aware of that issue. But whatever Congress believed in 1970, by 1977 Congress had determined that a non-threshold approach was well-supported.”

Consistent with the above, there is no evidence in air pollution health effects research to date that there is any threshold below which the adverse effects of air pollution will not occur. For example, the incremental effects of sulfate containing fine particles, and the lack of a threshold of air pollution effects at ambient levels are indicated for sulfate and hospital admissions in Figure 16 below.

Report of George Thurston, Sc.D.

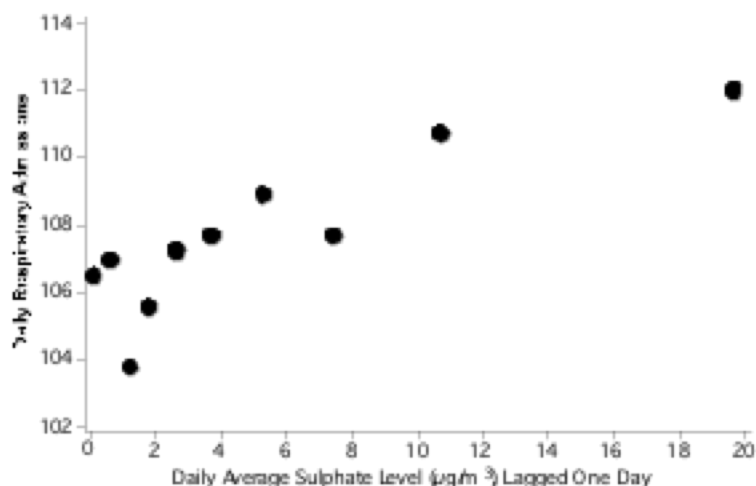


Figure 16. Average number of respiratory admissions among Ontario hospitals adjusted for other factors, by decile of the daily average sulfate fine particle concentration ($\mu\text{g}/\text{m}^3$). (Source: Burnett *et al.*, 1994).

In addition, as displayed in the Figure 17 below, my research has shown that increases in long-term exposure to PM_{2.5} particulate matter air pollution are associated with increases in the risk of cardiovascular death among those exposed, even well below the present 12 $\mu\text{g}/\text{m}^3$ annual PM_{2.5} air quality standard (Thurston *et al.*, 2016). This lack of a threshold of effects indicates that any reduction in air pollution can be expected to result in commensurate health benefits to the public at ambient levels, even below the legal ambient pollution standards.

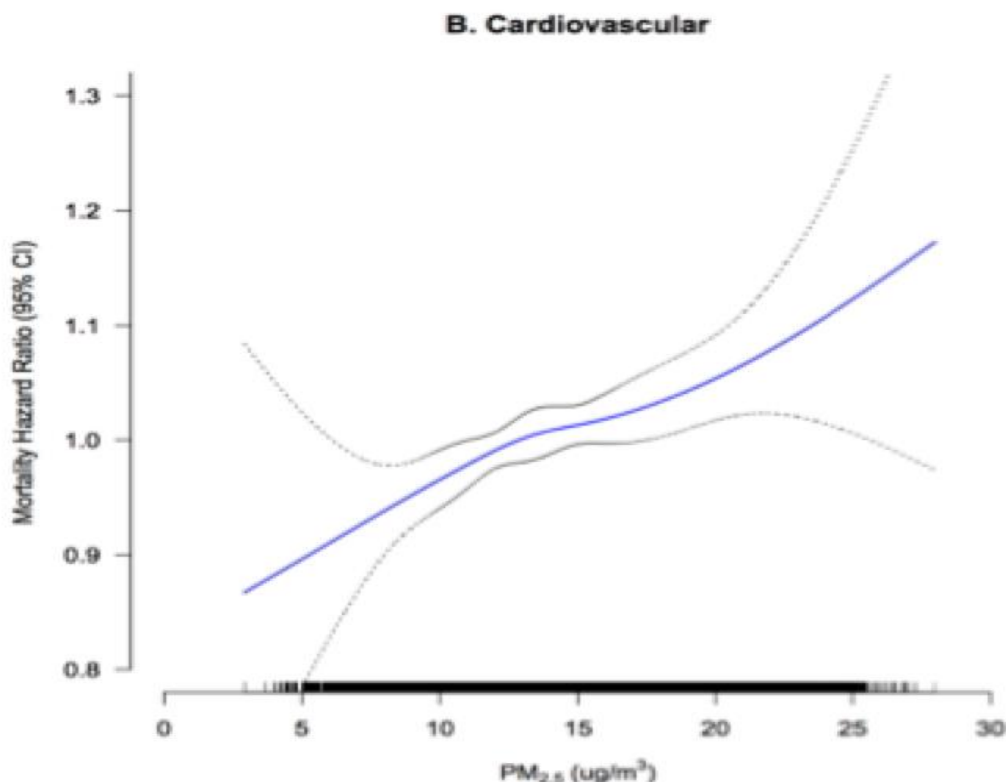


Figure 17. Mortality Risk from Cardiovascular Disease Increases with Rising PM_{2.5} Exposure, Even Well Below the Present US Ambient Air Quality Standard annual limit for PM_{2.5} (12 $\mu\text{g}/\text{m}^3$). (Source: Thurston *et al.*, 2016).

Furthermore, in its calculations of the benefits of potentially reducing the PM_{2.5} NAAQS, EPA has also implicitly acknowledged that there can be extant adverse health risks occurring below the NAAQS. For example, in a recent EPA Regulatory Impact Analysis for reducing the annual PM_{2.5} standard from 15 $\mu\text{g}/\text{m}^3$ to 12 $\mu\text{g}/\text{m}^3$ (U.S. EPA, 2012), EPA included a figure summarizing the then most current science regarding PM_{2.5} health effects, which clearly illustrates that air pollution deaths occur below the existing PM_{2.5} NAAQS (35 $\mu\text{g}/\text{m}^3$ for the daily standard, and 12 $\mu\text{g}/\text{m}^3$ for the annual standard). Figure 18 provides EPA's best estimate of the deaths that would be avoided by implementing the proposed more stringent standard, with roughly half of the avoided deaths occurring in places where the air would be cleaned to levels below (i.e., with air quality better than) the proposed air quality standard. While this particular EPA analysis is for the annual average concentrations, the same principle of effects occurring below the standard applies to the short-term PM_{2.5} standard, as well. Thus, just as cleaning the air below the standards would avoid more of

Report of George Thurston, Sc.D.

those deaths, any increase in pollution will increase the risk of adverse effects at all levels of prevailing air pollution, even when the NAAQS standards are not violated.

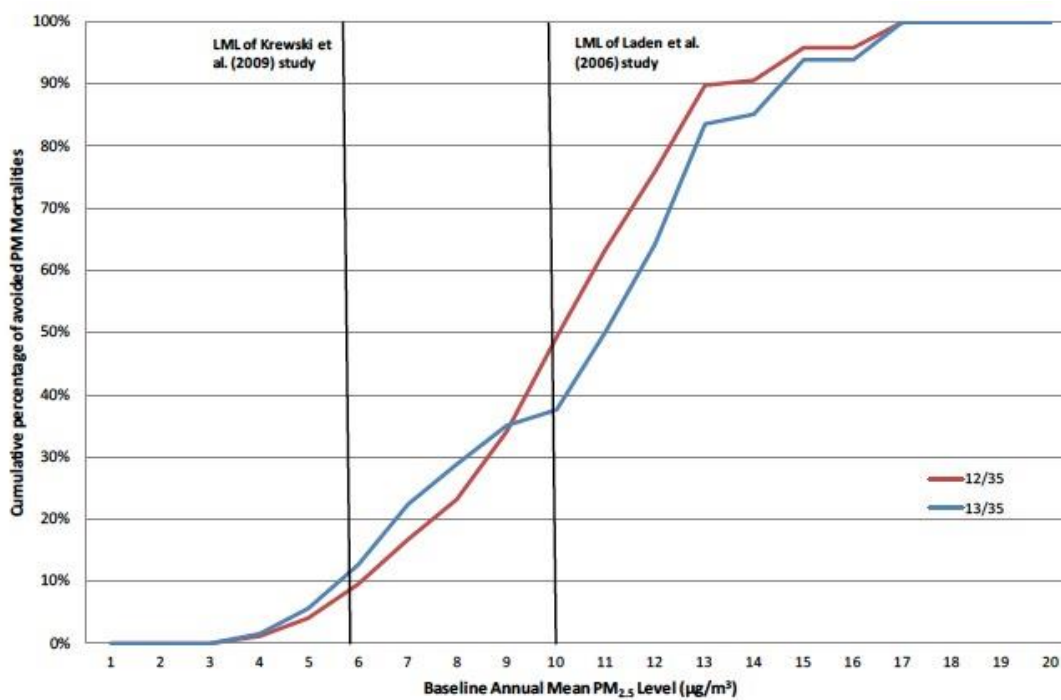


Figure 18. U.S. EPA Regulatory Impact Assessment of the Number of Premature PM_{2.5}-Related Deaths Avoided for 12/35 vs. 13/35 Ambient PM_{2.5} Air Quality Standards. (LML = Lowest Measured Level of PM_{2.5} in the study population) (Source: U.S. EPA 2012, Fig. 5-9)

It should be noted that the U.S. EPA agrees with me that meeting an air quality standard does not prevent significant adverse health effects from occurring in the exposed population. Indeed, in its 2013 rulemaking, adopting the revised annual particulate matter NAAQS standard, EPA explained that “evidence- and risk-based approaches using information from epidemiological studies to inform decisions on PM_{2.5} standards are complicated by the recognition that *no population threshold, below which it can be concluded with confidence that PM_{2.5}-related effects do not occur, can be discerned from the available evidence.*” (emphasis added) (U.S. EPA, 2013).

A recent report by the Health Effects Institute (HEI) similarly has found that there are health benefits to be achieved by lowering pollution below the air quality standards, consistent with a lack of a threshold of effects (Brauer *et al.*, 2019). As shown below from that report, the benefits of reducing PM_{2.5} air pollution continue well below the legal limit of

Report of George Thurston, Sc.D.

12 $\mu\text{g}/\text{m}^3$. The authors conclude: “In several large population-based cohorts exposed to low levels of air pollution, consistent associations were observed between PM_{2.5} and nonaccidental mortality for concentrations as low as 5 $\mu\text{g}/\text{m}^3$. This relationship was supra-linear *with no apparent threshold or sublinear association*.” (emphasis added). Clearly, this major new study confirms the fact that meeting the air quality standards does not prevent significant adverse human health effects below those legal limits and, in fact, confirms that such human health effect impacts do occur.

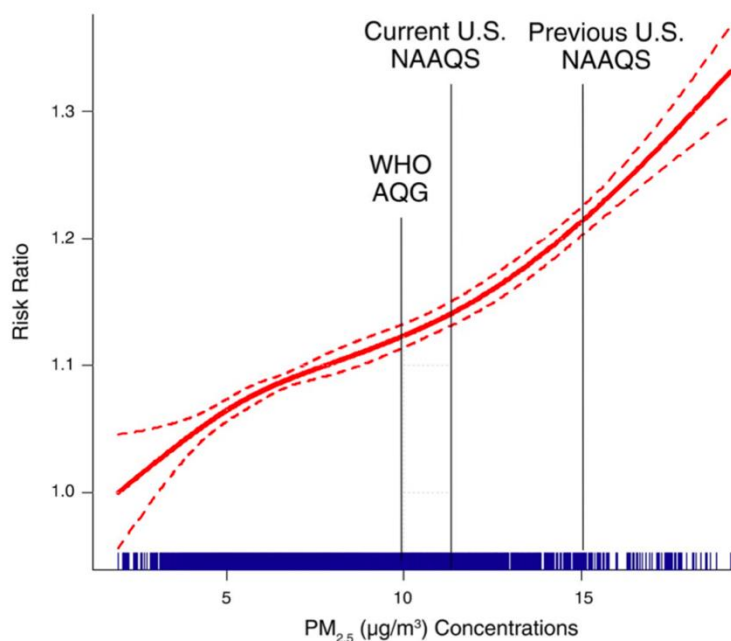


Figure 19. Shape of the concentration-response function for mortality associated with fine particulate matter in a Canadian Cohort (*Source: Brauer et al., 2019*).

Although the above evidence used PM_{2.5} as the pollutant to test for the presence of significant adverse human health effects at concentrations below the legal standard's concentration limit, the same principle applies to other air pollutants and their adverse health effects. For example, the recent HEI report by Dominici *et al.* (2019) found similar monotonic decreases in mortality for ozone air pollution. *See* Figure 20. The report summary concludes: “*The investigators report positive associations between nonaccidental, all-cause mortality and PM_{2.5} and O₃ at low concentrations, including below the U.S. National Ambient Air Quality Standards (annual 12 $\mu\text{g}/\text{m}^3$ for PM_{2.5} and 8-hour 70 ppb for O₃).*” (emphasis added).

Report of George Thurston, Sc.D.

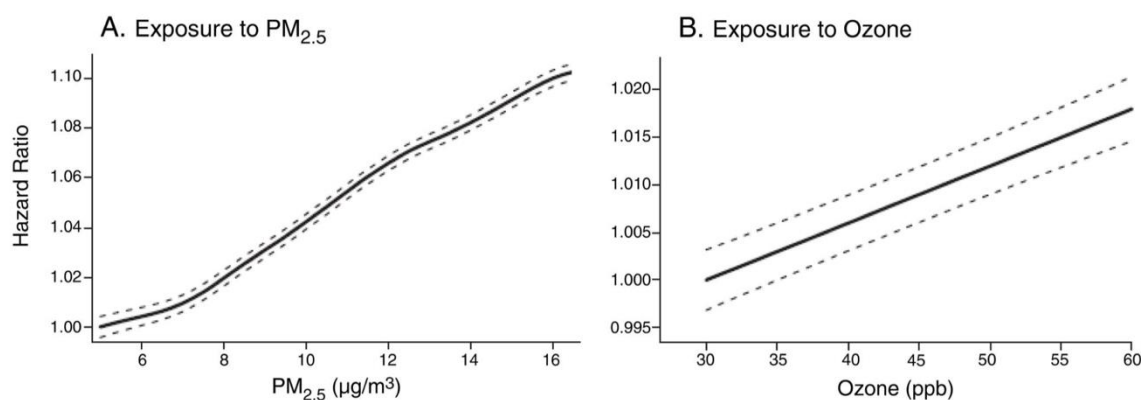


Figure 20. Nationwide U.S. analysis showing the monotonic increase in mortality associated with increasing pollution exposures at levels below the current U.S. EPA standards for PM_{2.5} (12 µg/m³) and ozone (70 ppb)
(Source: Dominici *et al.* 2019).

Similarly, an analysis of NO₂ exposures in Canada, where the ambient pollutant concentrations are much lower than in the U.S., found a similar monotonic increase in mortality impacts from increasing long-term average NO₂, even at concentration levels below the U.S. legal limit of 53 ppb (study NO₂ mean = 11.5 ppb, NO₂ maximum = 51.5 ppb) (Crouse, *et al.*, 2015). The plot of mortality vs. NO₂ concentration is shown below in Figure 21 (with Hazard Ratio, relative to the mean exposure, where HR=1.0), showing deaths rising as exposure rises, even at concentrations below the U.S. annual NAAQS = 53 ppb. Indeed, even after adjusting for the effects of PM_{2.5} and O₃, the NO₂ relative risk for total non-accidental mortality effect was statistically significant (HR = 1.045 per 8.1 ppb NO₂ [95% confidence interval = 1.037 to 1.052]). Thus, this real-world epidemiological evidence is consistent with the presence of increased significant adverse human health effects from NO₂ exposure increases that occur below the prevailing air quality standards.

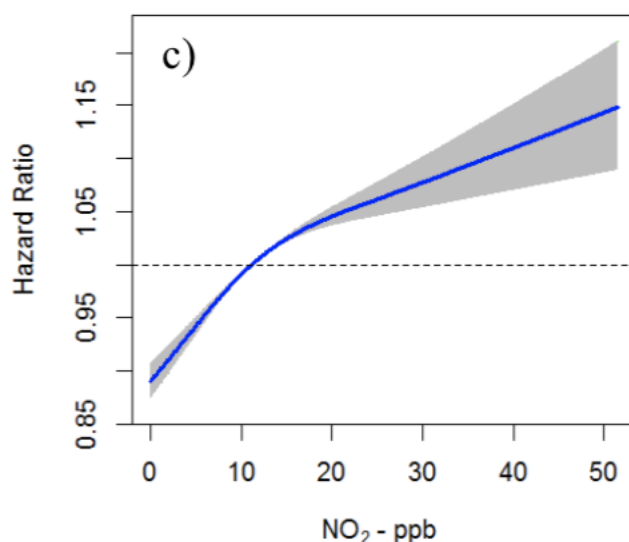


Figure 21. NO₂ concentration-mortality response plot (*Source: Crouse et al., 2015*).

Thus, the NAAQS standards do not represent a resolute threshold for adverse health effects to human health. The goals of the NAAQS are to minimize adverse risk of health effects, similar to the way a driving speed limit on our roads are intended to make driving safer, but cannot guarantee that no accidents or deaths will occur when driving within the speed limit. So, while the air quality in locations that meet or are below the NAAQS may pose a smaller risk to human health than at locations that are above the NAAQS, it may nonetheless cause significant adverse human health impacts, and a change in air pollution concentration has a similar effect on health, irrespective of the prevailing ambient level.

H. Air Pollution Effects Among Especially Susceptible Populations

Among the groups of persons found in scientific research to be especially affected by environmental insults, including particulate matter air pollution, are: the very young, the poor, the very old, and persons with pre-existing health conditions, such as heart disease and asthma. (*see, e.g., U.S. EPA, 1996*). Ethnicity, age and pre-existing medical conditions play a role in determining whether adverse health impacts are the predictable result of exposure to increased PM_{2.5} emissions. Analyses by me and by others in the field of air pollution health effects indicate that the poor are especially at risk from air pollution (*e.g., Gwynn and Thurston, 2001*). Similarly, older adults are at greater risk of severe adverse outcomes from air pollution. Also,

Report of George Thurston, Sc.D.

children, a population known to be especially susceptible to the effects of air pollution because their bodies are developing (and because they spend larger amounts of time exercising outside) are an especially affected sub-population that is represented in the communities surrounding the facility. Thus, any subpopulation of children living in the vicinity can be expected to be among those most strongly affected by any increases in PM_{2.5} concentrations from the proposed facility.

I. Indoor Air Pollution Considerations

It is reasonable to assume that nearby residents will be exposed to these emissions even while inside their homes and apartments. Outdoor air pollution, and especially fine particle pollution, is known to infiltrate into buildings with high efficiency as exchanges between outdoor and indoor air occur (via transfer through windows, doors, ventilation systems, etc.). As the levels of air pollution in the air outside a building increase, the exposures of residents inside the building to particulate matter of outdoor origins will therefore also rise.

While other PM_{2.5} exposures, such as indoor air pollution, may have health effects, they are independent of the impacts of increases of exposures to PM_{2.5} of outdoor origins in general and of the proposed facility in particular. If the levels of outdoor PM_{2.5} impinging the living areas of residents increase, then it can be expected that their personal exposures to PM_{2.5} of outdoor origins, and their associated health risks, will also increase.

J. Conclusions

It is my judgement that additional emissions from the proposed facility will add to the prevailing levels of PM_{2.5} and nitrogen oxides in the vicinity of the facility (as confirmed by the Applicant's EJ Report's Tables 4 and 5), and, because no threshold of air pollution effects has yet been found, any incremental air pollution exposures add an incremental adverse health risk to residents near a source of fossil fuel combustion air pollution. Also, such an increased population risk of health effects constitutes an individual adverse health effect, as has been confirmed by the American Thoracic Society (American Thoracic Society. "What constitutes an adverse health effect of air pollution?" Official statement of the American Thoracic Society. *Am. J. Respir. Crit. Care Med.* 2000 Feb;161(2 Pt 1):665-73.). Therefore, any action that increases ambient concentration of PM_{2.5} and other air pollutants in this area will have an adverse impact on human health in the exposed population. These incremental health effects

Report of George Thurston, Sc.D.

risks would in no way be mitigated or negated by other respiratory health effects risks, such as indoor air pollution exposures, which would represent independent health risks of their own.

I therefore conclude that, to the extent that the proposed facility will emit additional levels of PM_{2.5}, it will cause an increase in the risk of adverse health effects among those who breathe that pollution, even at concentrations below the prevailing NAAQS air quality standards, and especially for socio-economically disadvantaged populations living within the most affected areas surrounding the facility. Furthermore, in addition to the effects of PM_{2.5}, the proposed facility's emissions of nitrogen oxides will also contribute to the increases in health risks from added local air pollution, as well as to the downwind formation of, and exposures to, ozone air pollution, and to associated downwind increases in adverse human health effects caused by those incremental O₃ exposures. Finally, it must be remembered, when considering the air quality impacts of this proposal, that the estimated impacts of this facility cannot be evaluated in isolation, as they are added to the insults of prevailing air pollution. Thus, while such adverse effects of air pollution exposures from this facility will be experienced even when well within the government's prevailing health-based limits, it must be noted that the applicant's own report (Applicant's EJ Report, pp. 22-23) acknowledges that: "We identified two communities (census tract 108.02, 114) within a 10-mile radius with preexisting exposure rates greater than the national average for PM 2.5." Overall, I conclude that this proposed facility will have both local and downwind adverse human health consequences.

In particular, I disagree with the applicant's statement (on page 18 of the MVP EJ Report Supplement, 2020) that "Since the NAAQS are set to protect even the most sensitive populations with an adequate margin of safety, modeled concentrations below the NAAQS further support that the low-income environmental justice community is protected", as this does not mean there are no health impacts, since there are no known thresholds of effects below which there are no adverse effects, as documented in this report. In addition, as discussed in this report, the type of PM_{2.5} from the proposed fossil fuel combustion source has even greater health impacts than most other types of PM_{2.5} mass, on a per $\mu\text{g}/\text{m}^3$ basis. And the reason that these increases in impacts pose a risk even at this facility area's prevailing pollution concentrations is that, although the goal of the NAAQS standards is to protect even the most sensitive populations, this has not been achieved by those standards, since there is no known concentration threshold below which the adverse effects of air pollution exposure

Report of George Thurston, Sc.D.

suddenly no longer occur, as I have documented in Part G of this report. Thus, the adverse health risks of air pollution from the proposed facility are real, and cannot be dismissed as asserted by the applicant.

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From: smscerbo11@everyactioncustom.com

Sent: Friday, April 9, 2021 9:44:17 PM

To: anita.walthall@deq.virginia.gov

Subject: Support the Pittsylvania County NAACP and Their Fight for Clean Air

Importance: Normal

Dear Anita Walthall,

I am writing to urge you to fully support the request of the Pittsylvania County NAACP branch for the Mountain Valley Pipeline Minor New Source Review Permit be denied and referred to the Air Pollution Control Board.

The current permitting process did not: (1) consider toxic cumulative direct and indirect impacts, (2) conduct a robust and inclusive community engagement program, or (3) perform an accurate air quality modeling analysis. Furthermore, the Air Quality Control Board should also request that the applicant provide information about any alternate sites that were considered and why they were removed from further evaluation.

A 27,756-horsepower compressor station, Lambert Compressor Station, is being proposed in Pittsylvania, VA. This compressor station will be located adjacent to two existing compressor stations and would increase air pollutant and particulate matter levels such as nitrogen oxides, formaldehyde, and carbon monoxide (to name a few), into the air. The new compressor station would add to the cumulative harm done to people in the minority-majority Banister voting district and the Chatham-Blairs Voting District, who have been burdened by pollution from two other Transco compressor facilities for sixty years.

Virginian residents deserve to know that the air they breathe in is safe and clean. Take action and support the Pittsylvania County NAACP! Thank you for considering my views.

Sincerely,

Ms. Susan Scerbo

1424 Waterside Dr S Chesapeake, VA 23320-2714

smscerbo11@gmail.com

Archived: Monday, April 12, 2021 8:01:20 AM

From: [Maury Johnson](#)

Sent: Friday, April 9, 2021 9:04:20 PM

To: anita.walthall@deq.virginia.gov

Subject: Lambert Compressor Station

Importance: Normal

To the Virginia Air Pollution Control Board;

I write this letter to request that the Clean Air Permit for the MVP Lambert Compressor station being consider to be build in/near Chatham VA be referred to the VA Air Board.

I am a Virginia native living nearby in WV. I have friends in Chatham who live near the proposed site for this Compressor station. Some of them are elderly and have illnesses you might expect the elderly to have. There are also other people in the area whose health could be adversely affected by another compressor station in the area.

This brings me to another issue. Why are so many of these projects being build near communities of color and low income people? That is an issue that needs to be fully vetted.

Sincerely,

Maury Johnson
Greenville, WV 24945

Archived: Monday, April 12, 2021 8:01:20 AM

From: nicholas.polys@everyactioncustom.com

Sent: Friday, April 9, 2021 8:55:46 PM

To: anita.walthall@deq.virginia.gov

Subject: Support the Pittsylvania County NAACP and Their Fight for Clean Air

Importance: Normal

Dear Anita Walthall,

I am writing to urge you to fully support the request of the Pittsylvania County NAACP branch for the Mountain Valley Pipeline Minor New Source Review Permit be denied and referred to the Air Pollution Control Board.

The current permitting process did not: (1) consider toxic cumulative direct and indirect impacts, (2) conduct a robust and inclusive community engagement program, or (3) perform an accurate air quality modeling analysis. Furthermore, the Air Quality Control Board should also request that the applicant provide information about any alternate sites that were considered and why they were removed from further evaluation.

A 27,756-horsepower compressor station, Lambert Compressor Station, is being proposed in Pittsylvania, VA. This compressor station will be located adjacent to two existing compressor stations and would increase air pollutant and particulate matter levels such as nitrogen oxides, formaldehyde, and carbon monoxide (to name a few), into the air. The new compressor station would add to the cumulative harm done to people in the minority-majority Banister voting district and the Chatham-Blairs Voting District, who have been burdened by pollution from two other Transco compressor facilities for sixty years.

Virginian residents deserve to know that the air they breathe in is safe and clean. Take action and support the Pittsylvania County NAACP! Thank you for considering my views.

Sincerely,

Dr. Nicholas Polys

200 Hemlock Dr SE Blacksburg, VA 24060-5228

nicholas.polys@gmail.com

Archived: Monday, April 12, 2021 8:01:21 AM

From: [Emily Satterwhite](#)

Sent: Friday, April 9, 2021 8:05:07 PM

To: anita.walthall@deq.virginia.gov

Cc: [Elle De La Cance](#)

Subject: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit

Importance: Normal

Dear Virginia DEQ,

I write to request a public hearing before the full Air Pollution Control Board for Mountain Valley Pipeline's proposed Lambert Compressor Station permit. The Board must assess the environmental justice impacts of the compressor station and in particular must hear data regarding cumulative public health effects. I am not immediately affected by impacts in Pittsylvania County but as a scholar of Appalachia I am committed to environmental justice in rural Virginia.

In its February 2021 environmental justice assessment, Land and Heritage Consulting, LLC, notes that its study "is not a formal public health assessment. Such an assessment is recommended." Indeed, the permit application must not advance until a formal public health assessment is conducted. The proposed Lambert station would increase the emissions of particulate matter by almost 30% in an area already impacted by emissions from Transco stations. Furthermore, the current permit application does not adequately assess leaks and fugitive emissions that may affect residents' health. Land and Heritage identified four EJ communities within a three mile radius of the proposed station. The cumulative health effects on those communities must be assessed and MVP should be required to identify alternative sites that have fewer EJ implications.

Sincerely,

Emily Satterwhite

she/her/hers

506 Southgate Drive

Blacksburg, Virginia

(540) 553-5430

Archived: Monday, April 12, 2021 8:01:21 AM
From: [Irene Leech](#)
Sent: Friday, April 9, 2021 7:03:29 PM
To: anita.walthall@deq.virginia.gov
Subject: MVP Lambert Compressor Station Draft Air Permit
Importance: Normal
Attachments:
[Lambert Compressor Station MVP Draft Air Permit.docx](#) ;

MEMO TO: VA DEQ

FROM: Irene E. Leech
4220 North Fork Rd.
Elliston, VA 24087
540 268 5373

SUBJECT: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit

DATE: 9 April 2021

I join those requesting a public hearing before the Virginia Air Pollution Control Board on the draft air permit for the Lambert Compressor Station. I am worried that the concerns of the community have not been addressed, especially since there is already pipeline infrastructure in the immediate area. I understand that the combined impact of all infrastructure is not being considered but this ignores the true impact on the landowners and community.

While it has not been practice to collect comprehensive baseline land, air, water, and community health status information prior to construction, this should be done. The data should be public and updated information should be provided upon request and on at least a quarterly basis. All potential hazardous pollutants including benzene, toluene, xylenes, particulate matter, and methane should be measured. There must be a detailed plan with enforcement required to immediately notify the community whenever levels reach dangerous levels or accidental releases occur.

The proposed location of the facility is definitely an environmental justice site. It clearly affects the property of a multi-generational Black and indigenous landowner and his family.

I live in the evacuation zone of the Mountain Valley Pipeline in Montgomery County. The portion of the MVP mainline that the company claims is complete cannot be accurate and cannot be depended on in your decision making process. Completion is no greater than 50%, if that, and the most difficult areas, including all water crossings, remain incomplete. Neither I81 nor US460 have been crossed. When the company attempted to put the pipe under 460, water from a spring was so uncontrollable that they ultimately refilled the holes and gave up. Certifications for construction are missing, the company is having trouble with finances, global demand for natural gas is down, environmental penalties continue to pile up, and it is very unclear whether the pipeline will ever be completed.

Please do not allow ANY construction or preparation on the Lambert Compressor Station to be conducted until the main line is complete. Review the need for the infrastructure and do not provide certification until it is transparently evident that it is needed and will be needed for the lifecycle of the infrastructure.

MEMO TO: VA DEQ

FROM: Irene E. Leech
4220 North Fork Rd.
Elliston, VA 24087
540 268 5373

SUBJECT: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit

DATE: 9 April 2021

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Please do not allow ANY construction or preparation on the Lambert Compressor Station to be conducted until the main line is complete. Review the need for the infrastructure and do not provide certification until it is transparently evident that it is needed and will be needed for the lifecycle of the infrastructure.

Archived: Monday, April 12, 2021 8:01:21 AM

From: [Christopher Lund](#)

Sent: Friday, April 9, 2021 5:52:57 PM

To: Anita.Walthall@DEQ.virginia.gov

Subject: Mountain Valley Pipeline (MVP Southgate)-Lambert Compressor Station Public Hearing

Importance: Normal

Attachments:

[support of MVP Southgate air permit.pdf](#);

Dear Ms. Walthall,

Please see attached public comment.

Sincerely,

Chris Lund

Sent from [Outlook](#)

support of MVP Southgate air permit.pdf

*Resident
Sandy Level, Pittsylvania County
Christopher Lund, P.E.*

Anita Walthall
Department of Environmental Quality – Blue Ridge Regional Office
901 Russell Drive
Salem, VA 24153

VIA Email: No Hardcopy to follow

Subject: Proposed Permit for the MVP Southgate Compressor Station

Attn: Ms. Anita Walthall

My name is Christopher Lund and I am a resident of the Sandy Level in the Gretna-Callands District of Pittsylvania County. I am writing to you in support of MVP Southgate's Lambert Compressor Station and its draft air permit.

This letter is in support of MVP Southgate's right to obtain an air permit for the Lambert Compressor Station provided they comply with all conditions stipulated in said Draft permit from DEQ. As a resident in Pittsylvania County, Virginia, I fully support the pipeline project. We need more natural gas because it's less expansive than other fossil fuels and currently many green fuels and we have a lot of it in the U.S., If this pipeline is not built we will continue to have increased serious safety issues with tanker traffic on our roadways and increased GHG emissions of Natural Gas transferred through a pipeline. Pipelines are the safest and most efficient way to bring it to homes and businesses.

The Lambert Compressor Station will also be built in an area that is appropriate for such a use and where existing facilities exist. The station will include stringent controls in accordance with the conditions of the permit that will mitigate any adverse impacts on air quality in the area. It is reasonable and appropriate to grant the permit and allow MVP Southgate to build this compressor station. It will also be DEQ's responsibility to be vigilant on the systems operations and reporting.

The DEQ has reviewed the project application and concluded that it will result in no adverse impacts on air quality in the area surrounding the proposed station. This project will generate new tax revenue and economic opportunity without the added population increase and traffic a housing development would have for example. Please approve the permit.

Sincerely,

A handwritten signature in blue ink, appearing to read 'C. Lund', with a stylized flourish at the end.

Christopher Lund, P.E.

Christopher Lund, P.E.
7661 Grassland Drive
Sandy Level, Virginia 24161
(703) 853-7806

Archived: Monday, April 12, 2021 8:01:21 AM
From: [Georgianne Stinnett](#)
Sent: Friday, April 9, 2021 5:33:57 PM
To: anita.walthall@deq.virginia.gov
Subject: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit
Importance: Normal

Georgianne Stinnett
1226 Stanhope Avenue
Richmond, VA. 23227
804.615.4242

To Whom It May Concern:

I am writing to request a full hearing in front of the Virginia Air Pollution Control Board regarding the draft permit for the MVP Lambert Compressor Station. It is imperative that the DEQ take input from affected parties seriously when evaluating the propriety of a permit and a hearing with the Air Pollution Control Board is a vital step in this process.

I have a bachelor's degree in environmental science and I have a home in Buckingham County, the location of the DEQ approved Atlantic Coast Pipeline compressor station. As an educated and active resistor to that project, I have first-hand experience observing how ignoring the affected community, which presented an unimpeachable science and social justice-based objection to that air permit, violated the regulatory structure designed to protect our physical and social environments for the sake of corporate profit. Had the DEQ denied that permit, they would have helped restore efficacy and public confidence in the Department to guard the environment, human health, and the viability of the social justice community of Union Hill. A fair hearing - one in which the APCB has legal counsel outside that of David Paylor's attorney and is not corrupted mid-hearing by politics, where data and impacts on those who stand to have their lives upended factor into the decision, will enable the DEQ to conclude correctly that the Lambert compressor station is untenable.

Since the 4th Circuit Court of Appeals rejected the DEQ's air quality permit for ACP's Union Hill Compressor on the grounds that the facility would disproportionately harm members of an environmental justice community, these concerns should be paramount in the analysis of input from the community which would be facilitated through a hearing by the APCB. The decision blasted the DEQ for treating environmental justice concerns as a box to be checked based on claims of the applicant. The MVP hired a consultant to examine the environmental justice concerns presented by the project and the information that they supplied in their permit application is inconsistent with this report. It downplays the impacts that their **own** consultant identified. In February of 2021, Governor Northam's Commission to Examine Racial Inequity in Virginia Law concluded in a report issued that Virginia needs to improve how it incorporates input from minority communities and their advocates before issuing permits that could have consequences in their neighborhoods. A public hearing for the Lambert compressor station is essential if this mandate is to be met.

The Lambert Compressor station will serve the Mountain Valley Pipeline which is years behind schedule and billions of dollars over budget while the threats to our climate from the methane gas that it could carry becomes more and more dire as our fragile planet continues to warm. Severely anemic prices for MVP's stock reflect the market's lack of confidence in the viability of the pipeline. Air permits for the compressor station should be delayed until the MVP has all other necessary permits in place as it could be a stranded asset before it is ever used at a time when we must invest in infrastructure for renewable fuels.

There are many other concerns presented by this facility that are falsely portrayed as inconsequential including: only formaldehyde is considered as hazardous; health effects and noise pollution are downplayed; procedural mistakes, such as the use of old census data when newer numbers exist, should have stopped the permit process but persist; irrefutable evidence that fossil fuel use poses an existential threat to life on earth.

Thank you for the opportunity to submit this comment.

Sincerely,
Georgianne Stinnett

Archived: Monday, April 12, 2021 8:01:21 AM

From: [Lakshmi Fjord](#)

Sent: Friday, April 9, 2021 5:02:57 PM

To: anita.walthall@deq.virginia.gov; [lakshmi Fjord](#); [Mark Sabath](#)

Subject: Re: Lakshmi Fjord Comment: MVP Lambert CS air permit

Importance: Normal

Attachments:

[Fjord_Lambert CS Air Permit comment \(2\).pdf](#);

Please accept this pdf of my comment, in order to be more easily shared.

Thank you,

Lakshmi

Lakshmi Fjord, Ph.D.

cell: 510.684.1403

On Fri, Apr 9, 2021 at 5:00 PM Lakshmi Fjord <lakshmi.fjord@gmail.com> wrote:

Dear Ms. Walthall,

Thank you for accepting my attached MVP Lambert CS air permit comment by email.

Sincerely,

Lakshmi

Fjord

Lakshmi Fjord, Ph.D.

cell: 510.684.1403

Dept. of Environmental Quality
Anita Walthall
Sent to: anita.walthall@deq.virginia.gov

Lakshmi Fjord, Ph.D.
420 Altamont St.
Charlottesville, VA 22902
Lakshmi.fjord@gmail.com

April 9, 2021

Mountain Valley Pipeline-MVP – Southgate Extender Lambert Compressor Station Draft Air Permit - Technical Comment

I request that the MVP Southgate Extender Pipeline's Lambert Compressor Station air permit be denied outright on the bases described below. If not, then this air permit must be elevated to a full Virginia State Air Pollution Control Board-SAPCB hearing and permit review process. The substantive issues with this air permit for which I have technical expertise are the following:

I. A longtime natural gas now fracked gas transmission company, Transcontinental Pipeline-Transco, has entered into a lawsuit against the Mountain Valley Pipeline-MVP and the individual landowners whose private land Transco first seized by eminent domain, and now MVP has done so. Transco's evidentiary bases for their lawsuit against these two classes of defendants maintains that co-locating two pipelines and 2 compressor stations on the same section of easements is far too dangerous to go forward.

Because Transco's and MVP's evidence is in large part "proprietary" – not available to the public – the court papers of these two opposing transmission pipeline companies, this lawsuit's hearing transcript, and the final Opinion of the Court offer unprecedented access to vital technical information that must be included in DEQ's required revisions of MVP's air permit. This information must be made available to the SAPCB-"Air Board" and to the public -- before DEQ starts the Lambert air permit review and public comment process.

This lawsuit offers a rare window into never disclosed exact construction details and accurate rather than highly diluted information about pipe degradation over time, the actual likelihood of leaks and/or explosions when co-located; and, existing site-specific risks and hazards such as hydro-geological and soil conditions and past erosion faced by the existing Transco pipeline and compressor station.

Please note this "hidden" leak not discovered until 2 boys rode their bikes [illegally] on the Colonial Pipeline easement:

["Largest U.S. Gas Spill in 20 Years](#) 1.2 Million Gallons – Happened at a Cracked Pipeline in North Carolina Last Summer."

What new information will be disclosed about site-specific disproportionate risks to the health of those living nearest to these co-located fracked gas compressor stations? Who, if this permit is approved, would be forced to live nearest to routine and accidental blow-downs. Geometrically elevating their individual exposures to toxic pollutants including benzene -- for which no level is considered safe. Also, to PM2.5 emissions from now 2 fracked gas-fired turbines. And, the cocktail of emissions identified by Dr. Curt Nordgaard in his technical comment submitted to DEQ about the composition of the fracked gas contents most likely to be transmitted by the MVP: hexane, BTEX (benzene, toluene, ethylbenzene, and xylenes), and iso-octane. Yet, MVP does not correctly account for these emissions in this air permit (see Nordgaard's air modeling critiques of MVP's air permit attached below).

Taken together, the factual details that will emerge in this lawsuit are vital information to decision-makers, environmental experts, and frontline families not ever disclosed by fracked gas corporations in permit processes. Indeed quite the opposite has been uniformly true: under-assessing

risks and hazards to persons living close by, including the direct health impacts of the activities and daily operations of compressor stations especially.

II. The Air Board's statutory responsibilities for site suitability review, including site-specific environmental justice data about who exactly will bear the greatest health and economic losses by this facility's activities, were adjudicated under the 4th Circuit Court's decision on Jan. 7, 2020 overturning the Atlantic Coast Pipeline's Virginia compressor station's air permit.

Each statutory responsibility is later related to environmental justice research methodology and data, environmental health impacts, and disproportionate economic losses to minority majority Bannister District in Pittsylvania County:

1. The character and degree of injury to, or interference with, safety, health, or the reasonable use of property which is caused or threatened to be caused;
2. The social and economic value of the activity involved;
3. The suitability of the activity to the area in which it is located; and
4. The scientific and economic practicality of reducing or eliminating the discharge resulting from such activity.

III. The prevention of disproportionate health, economic, cultural, and historic losses to historically and continuously discriminated peoples is the sole intended purpose for undertaking the identification of environmental justice communities. ***MVP must not therefore be authorized to impose a 1-mile radius from the Lambert compressor station as a boundary-line to identify environmental justice communities*** and the EJ-related health impacts of the operations of this facility. To give this corporation that authority, they would first need to prove there is any peer-reviewed medical or environmental science research data to ascribe a fixed boundary-line against air and water environmental health hazards caused by fracked gas compressor stations. Which, they will not be able to do.

The air and water impacts of aboveground and underground fracked gas infrastructure can never be universally applied. Which is why the Board's statute requires **site-specific review** of each new toxic polluting facility site location. Each site has specific most-impacted populations by race, income, density, and other EJ vulnerabilities. Each site has specific conditions, including prevailing winds that may seasonal change, hydro-geological, topographic, and soil conditions that impact how far and how polluting, how often, and how cumulative are water contamination within shared aquifers by leaks and/or degradation of air quality by accidental or routine blow-downs and explosions.

IV. To date, Virginia state public health assessments of compressor station site locations cannot be relied upon because they use applicant-generated data on the one hand; and, on the other, derogate the testimony of nationally recognized environmental health experts, some of whom use local health data (Dr. George Thurston for Union Hill and Lambert compressor stations; Dr. Larysa Dyrska for Union Hill) to ground their own research evidence in the realities of the people most impacted by a particular compressor station.

The lack of site-based public health data becomes deeply problematic in rural, low-income Virginia public health districts – such as where the Lambert compressor station is sited in the Bannister District of Pittsylvania County. Bannister is rural, average low-income, and majority African American. The health districts in which these rural, EJ political districts are enfolded have very little if any existing public health data that is site-specific.

Where there are no doctors, people travel out of district (as Buckingham County residents did, which meant the county's assignment to the Piedmont Health District had very little geographic/census based health data for the ACP air permit in Union Hill). Rural county residents' medical data is then

collected where they receive services (Charlottesville’s Blue Ridge Health District or Farmville in the Buckingham case) – not by their mailing addresses where they reside. Yet, it is where they reside that is in question when looking at public health impacts of a toxic polluting site on current nearby residents.

The state of Virginia must do more to ensure that public health records then do not become another discriminatory means to allow toxic polluting infrastructure to disproportionately harm those already least medically served and least politically represented.

My technical expertise and interest to make these comments:

I am an intervenor in the Mountain Valley Pipeline and the anthropologist that designed, implemented, analyzed, and received peer-review for the findings from the Union Hill Community Research project at the site of the Atlantic Coast Pipeline Virginia compressor station. This comprehensive community household data, including race, ages, numbers of residents, pre-existing health conditions, and family heritage at this site –we collectively presented as site specific compressor station environmental justice impacts’ evidence in every Atlantic Coast Pipeline-ACP permit at the local, federal and state levels. To counter Dominion Energy’s, FERC’s and DEQ’s misuses of census tract data and then EJ Screen to “make invisible” or “hide clusters of minority majority populations” (NEPA Guidelines, 2015, 2017).

The use of the “Fjord Study” methodology and evidence within the unanimous judgment of the U.S. Court of Appeals for the 4th Circuit to overturn the ACP compressor station in Union Hill is now front and center in the MVP EJ Supplement (Sept. 2020), and revised MVP EJ Consultant report (attachment A, Feb. 2020) for the air permit for the Lambert compressor station. MVP staff writers cite this air permit Opinion in their EJ supplement, stating this permit is in compliance with this Opinion and subsequent Virginia EJ Act:

“This Supplemental Information demonstrates compliance with environmental justice requirements and principles, and it provides information to make necessary findings under Va. Code 10.1-1307.E. and VEJA (VA Environmental Justice Act.” It includes ...

3) Identification of environmental justice communities as defined in VEJA within a radius of 1-mile from the proposed Station” (MVP EJ Suppl, p.2).

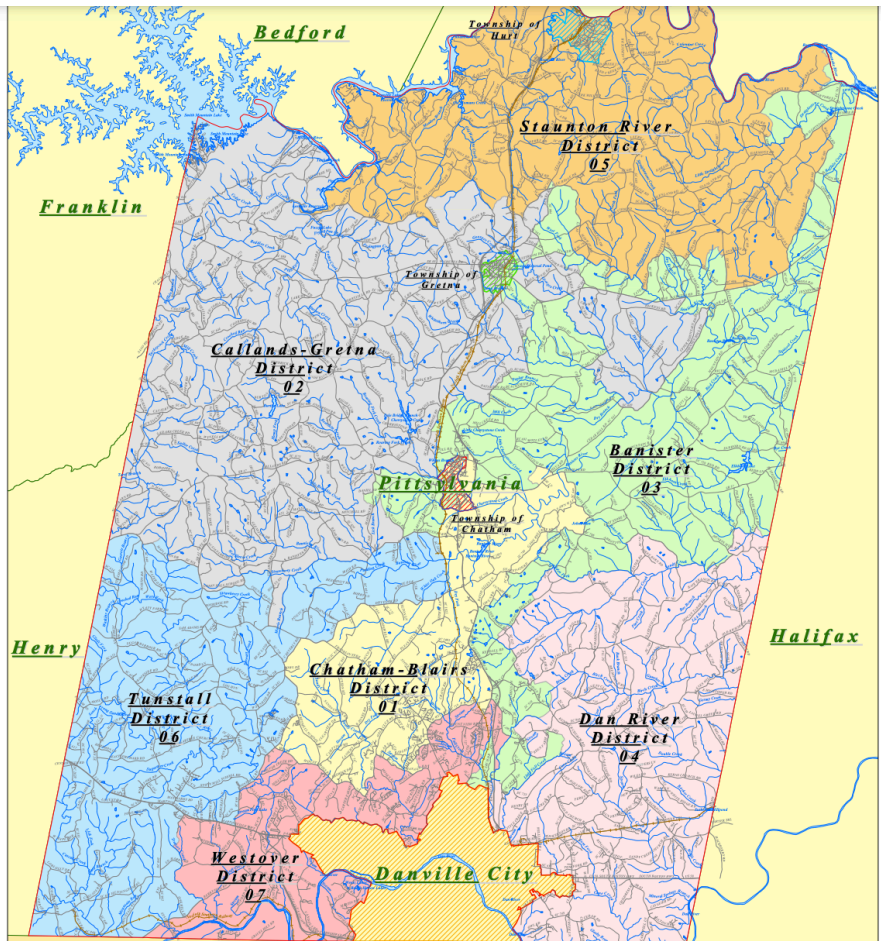
Regarding historic preservation issues, I was the lead researcher and author of the Union Hill Rural Historic District that received eligibility (Dec. 10, 2020) for historic district nomination. For the first time in Virginia history, a Freedmen-built community whose significance is based entirely on the continuous presence, habitation and uses of their land in traditional ways received this recognition as an ethnographic, cultural landscape.

.....

II. The Air Board’s statutory duties toward Site Suitability Issues and Environmental Injustice

Evidence for why the people living closest to 2 existing Transco compressor stations living in the minority majority Bannister District must not be burdened with further fracked gas pollution.

The Bannister District (Green) is a minority majority district created by gerrymandering to limit the Pittsylvania County-level political representation of African American and Native American descendant families and individuals. Please compare this district with the rest of its district counterparts, where minorities are swept together in all directions, as if by a broom.



This dilution of the minority vote is a prime identifier of racial injustice. Its intended consequences are to dilute the voices of historically discriminated peoples through active practices of political marginalization. The result is found in the continued practices of environmental injustice that led to the siting of 2 compressor stations in one place. Environmental racism is the root driver of rapid climate change in the U.S. because fewer politicians of both parties must answer to their needs and offer protections to them as constituents.

1. losses of landowners' uses of their land for their own economic benefit:

Thus, we find Anderson and Elizabeth Jones' farm torn apart already by MVP trenching in easements this historic family was required to accept. Anderson Jones, who has many generations of ancestors in this area, is biracial, of Native American and African American descent. He inherited this property purchased by his uncle in 1923. He has been farming these lands for decades and noticed how plowing turned over immense numbers of Indian artifacts. He is concerned that with the trenching that has already occurred on his and all MVP seized easement properties, no artifacts were turned over to the families or notice given if they were given to any entity at all. Mr. Jones has been growing loblolly pines and other trees for timber sales. The MVP easement went straight through and destroyed good timber stands on their property.

2. Losses of property value of Indigenous and African American rural heritage lands:

Transco seized the easement in the 1960s, when Indigenous people were still, after many generations, still not allowed by law to be identified as Indian in Virginia, which provided only the choices of Colored or White as race at birth. Mr. Jones is a descendant of Cherokee Indians who stayed despite the Trail of Tears displacement campaign in the Southeast. Now, the couple knows that this second infringement on their property rights has basically destroyed the value of their 57-acres and home once valued at over \$330,000. No farm equipment can cross the easement, no cows can graze it, no building can be built on its 170-ft wide swath.

The siting of toxic polluting infrastructure on Black and Indian heritage lands is one of several root causes of the widespread loss of Native and Black inter-generational heritage and wealth passing in the South. This intergenerational wealth passing racial disparity continues to grow apace in Virginia.

3. Native American and African American Burial sites:

Rural Freedmen-built communities in Virginia were built by ancestors that were biracial and multi-racial: of African, Indigenous and White colonial descents. The role of Indigenous and African heritage burial sites has been thoroughly downplayed by white politicians and corporations seeking to locate the least wanted waste dumps and fossil fuel infrastructure. Native American and African descendant burials are derogated as “everywhere” in these rural historic places. So numerous as to impede Progress writ large. Progress that brings only regress to their land uses in traditional ways.

These are peoples who share strong ideas about the sacred nature of the “bones of their ancestors.” The burials almost always lie with heads to the East for African descendants. Yearly Homecomings bring dispersed family members by the hundreds to the forests and back-roads of Virginia places where they annually gather to honor their dead in family gravesites, quite often unmarked and unfenced, which requires the continuity of family and group oral traditions. These are real ties to people and places that are being destroyed at a very fast pace in Virginia, with protections.

4. No Economic need for the MVP, no economic benefit to any impacted peoples, only to investors:

The MVP persists in its push to build this pipeline despite the fact that they cannot demonstrate need for it to the market, and its investors are divesting of their holdings in MVP. At the same time, the Biden Administration seeks an end to fossil fuel investment. The Transco Pipeline and compressor station reveal the redundancy of the Southgate extender and its Lambert compressor station. Indeed, the Transco writ large renders the MVP entirely unneeded:

A new analysis by a clean energy think tank says changes to the natural gas market since the Mountain Valley Pipeline was announced in 2014 have [undercut the economic case](#) for building the long-delayed project. (*Gazette-Mail*)

Yet, if this permit is granted, DEQ will be forcing a minority majority community to bear the burden of truly the last gasps of corporate profit making at the expense of Indigenous and African descendant peoples.

5. Need to examine “alternate energy sources” to eliminate PM2.5:

As with the Union Hill compressor station case, DEQ has not required the MVP Lambert air permit to consider the long-term cost benefits of using electric turbines. Which were a core part of the 4th Circuit Court’s decision, so their absence by DEQ is rather shocking. Since electric turbines would eliminate most of the PM2.5 fine particulate matter emitted at this compressor station.

In fact, if the Transco is truly going to upgrade its existing compressor station, they too must be required to use electric turbines rather than fracked gas driven. As the 4th Court Opinion strongly states, using our request for electric turbines coupled with our data on pre-existing pre-existing health

conditions in the proximal households, conditions data for the community, and the expertise of Dr. George Thurston. As prescribed in their ACP air permit loss, DEQ must follow through with suggesting the use of electric turbines at this site.

Site Suitability Conclusion:

MVP's Lambert compressor station will force into the air breathed and water drunk, the well-documented, indisputable public health findings about fracked gas health impacts, loss of uses of heritage land for farming and the Jones' economic benefit, and loss of heritage property values by proximity to now over 48,000 hp gas turbine emissions 24/7/365.

III. Nowhere does the Virginia EJ Act or the 4th Circuit Court opine that “a radius of 1-mile” is part of EJ review rules or [no longer existing NEPA guidelines]. MVP must account for the bases in science, law or even custom of constant use of this radius in their EJ Supplement when assessing the health risks of constant exposure to fracked gas emissions' disproportionate impacts on nearest residents. Is MVP misappropriating the 1-mile radius cited in the 4th Circuit's hearing and final decision, related to my Union Hill study reports and statistics?

If so, to borrow the language used by Southern Environmental Law Center-SELC and Chesapeake Bay Foundation in our lawsuit to overturn the Union Hill air permit -- MVP has “arbitrarily and capriciously” misappropriated the significance and meaning of a Union Hill community-specific cultural mapping reference. By applying it as a **requirement** for assessing the uniquely different site choice for the Lambert compressor station's disproportionate impacts on proximal residents and their relevance to environmental justice indicators.

What is true is that in the lawsuit we brought against the ACP air permit, Chief Judge Gregory cited the 1.1-mile radius of the “Fjord” or “Friends of Buckingham Study.”¹ Which is my then pre-GIS-in-Buckingham County approximation of distances from the emissions stack site,² using my car's odometer, to the community homes surrounding the ACP compressor station. Homes on all sides that are linked by shared historic cultural attributes -- the inter-related families, churches, cemeteries and family burial sites built on 3 historic roads that existed unchanged since plantation times.

No medical science supports this use of a 1-mile radius by MVP, which must be considered an invented boundary.³ The opposite holds true, as was acknowledged in both versions of MVP's EJ consultant's “Community Impacts” findings when using 3-, 5-, and 10-mile radii to identify EJ communities impacted by the higher cumulative impacts of citing the Lambert CS where two Transco compressor stations already emit fracked gas toxic pollution.

Air emissions do not respect “fence-lines.” Making the “fence-line” misnomer into a means to cherry-pick non-applicable data from the 4th Circuit findings into a rule does not relieve MVP of the responsibility to assess disproportionate impacts on EJ communities at the 3-, 5- and 10-mile radii.

¹ U.S. Court of Appeals for the 4th Circuit hearing transcript.

² Since we did not receive, as requested, FERC “consulting party status,” we did not receive stack emissions site data, as “proprietary information.”

³ Please note: The 7th edition (Dec. 14, 2020): Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) compiled by Physicians for Social Responsibility and NY Concerned Scientists. It is a collection of nearly 2,000 abstracts of medical, scientific and investigative reports about the consequences of oil and gas drilling, fracking, and associated infrastructure.

Applied by MVP's EJ consultant to identify EJ communities impacted by this siting choice. Largely, the changes in her two community impact study versions reflect her inclusion in the second, the first's lack of a 1-mile radius used by MVP -- when brought to her attention by our inquiries.

This cherry-picking of data to include or exclude unwanted factual information in this permit must be identified as a key problem. Industry-generated data is characterized by these deliberate omissions and manipulations to support preferred outcomes. The medical and social costs to directly impacted individuals, families and whole communities of industry-generated data are well-known in examples from both the Tobacco and Opioid industries. Which for decades caused immense levels of mortality and chronic illness before being made liable for their actions.

Evidence of Cherry-Picking Data Provided by Lawrence's Updated Community Impact-A, Feb. 26, 2021

It is possible that MVP relied on FERC's ACP and MVP FEIS's (July 2017) that used a 1-mile radius to declare that "no environmental justice communities were impacted within a 1-mile radius" along the entire 600-mile route of the Atlantic Coast Pipeline and 300-mile route of the Mountain Valley Pipeline. For their 1-mile radius designation, FERC made then no descriptive bases in scientific fact.

Since the demographic data on which FERC made this statement was solely that of the two applicants, Dominion Energy and EQT partners, we must refer back to the methodological problems in both the FERC and DEQ data when not using census tract data properly. FERC and DEQ only privileged Dominion Energy and EQT partner data and denied the methods and findings of community-based research.

No matter that prior history, in April 2019, FERC offered additional EJ guidance to MVP that: highlighted concerns that "effects can be amplified in EJ communities due to factors such as cumulative impacts in the community, unique cultural practices and social determinants of health."³² [Footnote 32: Correspondence between the Federal Energy Regulatory Council and Mountain Valley, LLC (February 2019)].

To which MVP responded in this EJ Supplement that:

"We addressed this by looking at two additional parameters: one assessing cumulative impacts on unique cultural practices, and another assessing potential amplification of impact due to social determinants of health -- which we added to those in the Virginia Environmental Justice Act to address overall health status, health inequality, and environmental health metrics" (P.9).

Yet, what we find when examining what they actually did -- is that seeming compliance with VEJA and the 4th Circuit's Opinion leads to corporate applicants fracturing the very meaning of the concept of "community."

Since the 4th Circuit Court's decision, first the Atlantic Coast Pipeline in its revised air permit for the Union Hill compressor station and now MVP's EJ supplement appear to be complying with the finding that applicants, FERC, and DEQ must account for environmental justice as part of site suitability review. However, in Dominion's post-lawsuit overturning of their air permit, they submitted the exact same air permit as was overturned, and then accounted for the needed EJ review by once more using census tract to fracture the community into different clusters of households as separate EJ and non-EJ "communities" by income level or race. Once more using census tract data to chop up historic minority majority

communities by creating false bifurcations of these into separate categories of “EJ community.” Thus, in effect destroying the entire concept and lived experience of “community.”

Further, there is another completely false binary within Dr. Lawrence’s analysis that does not fit the EJ communities she identified using only census tract data. This concerns her definitive line drawn between Indigenous and Non-Indigenous peoples in an historic context where interrelated kinship has been the norm for centuries. This is yet another issue about using census tract information instead of methods that account for the specifics of households, family and cultural histories within long time spans that encompass pre-colonial times, through first English colonial corporate ventures, and first place of the English Atlantic Slave Trade in what is now the U.S.

As we found in Union Hill, where the majority are descendants of enslaved people at nearby plantations, most of the families identified as both African American and Native American, it is not accurate to make false binaries about EJ communities as if distinctively different sorts in the Bannister District context. Where religious, kinship, farming and other cultural traditions have intertwined over long times, those original Indigenous communities with African traditions into what is now present.

SUMMARY CONCLUSION:

With the mounting evidence of the health impacts in higher mortality and chronic illness caused by fracked gas infrastructure, we ask this permit to be denied on the bases of cherry-picking data. Including but not limited to EJ community data, air modeling, lack of alternate site analyses, non-inclusion of electric turbines that would remove most fine particulate matter given in evidence.

Respectfully submitted,
Lakshmi Fjord

Critical technical issues in MVP’s air modeling for the cumulative impacts of the Lambert Compressor station with existing Transco compressor station made by Dr. Curt Nordgaard:

Air Modeling Excludes Accurate Data on Hexane and Eliminates HAPS from Existing Transco Compressor Stations - Appearance of Cherry-Picking Data to Suit Applicant’s Narrative of No Impact

1. The hexane content of natural gas reported for the Mountain Valley Pipeline and the Southgate expansion is substantially different. This difference either needs to be rectified in the application or an appropriate justification for the difference provided.

The hexane content of natural gas in the Mountain Valley Pipeline is listed as 0.222% by weight, according to their FERC filing. On the other hand, the hexane content of natural gas in the Southgate expansion is listed as 0.04% by weight.

Mountain Valley Pipeline, FERC Docket 16-10:

Company Name: Mountain Valley Pipeline, LLC
Facility Name: Bradshaw Compressor Station
Project Description: Operational Emissions

TABLE 12. Site-Specific Gas Analysis

Sample Location: Multiple Locations
HHV (Btu/scf): 1,083

Constituent	Natural Gas Stream Speciation (Vol. %)	Natural Gas Stream Speciation (Wt. %)
N2	0.4949	0.788
METHANE	90.4241	82.411
CO2	0.2608	0.652
ETHANE	7.6812	13.124
PROPANE	0.6778	1.698
I-BUTANE	0.0754	0.249
N-BUTANE	0.1355	0.447
I-PENTANE	0.054	0.223
N-PENTANE	0.045	0.186
I-H EXAN ES	0.000	0.000
N-HEXANE	0.045	0.222
BENZENE	0.000	0.000
CYCLOHEXANE	0.000	0.000
HEPTANES	0.000	0.000
TOLUENE	0.000	0.000
2,2,4 Trimethylpentane	0.000	0.000
N-OCTANE	0.000	0.000
*E-BENZENE	0.000	0.000
*m,o,&p-XYLENE	0.000	0.000
I-NONANES	0.000	0.000
N-NONANE	0.000	0.000
I-DECANES	0.000	0.000
N-DECANE	0.000	0.000
I-UNDECANES +	0.000	0.000
Totals	99.895	100

*Gas Analysis showed no detectable compounds above hexane +, conservatively assumed all hexane + was n-he

TOC (Total)	99.14	98.56
VOC (Total)	1.03	3.03
HAP (Total)	0.05	0.22

Southgate Expansion, FERC Docket CP19-14:

**MVP Southgate Project
Lambert Compressor Station**

Table B-8. Fugitive Blowdowns Potential Emissions Summary

Natural Gas Specifications

Constituent	Mol Percent	Molecular Weight	Lb/Lb-Mol NG	Mass Percent	VOC
CO ₂	0.165	44.01	0.073	0.41%	No
Nitrogen	0.396	28.01	0.111	0.62%	No
Methane	87.823	16.04	14.089	79.08%	No
Ethane	11.303	30.07	3.399	19.08%	No
Propane	0.28	44.10	0.123	0.69%	Yes
i-Butane	0.009	58.12	0.005	0.03%	Yes
i-Pentane	0.003	72.15	0.002	0.01%	Yes
N-Pentane	0.003	72.15	0.002	0.01%	Yes
N-Hexane	0.008	86.18	0.007	0.04%	Yes
N-Butane	0.01	58.12	0.006	0.03%	Yes

Notes: Based upon representative gas analyses for Project.

Natural Gas Properties	
Molecular Weight	17.817
Specific Gravity	0.615
lb/Scf	0.047
Scf/lb	21.26

The hexane content of natural gas will likely influence hexane emissions from the Lambert compressor station when it is released as products of incomplete combustion, pipeline fugitives, flashing emissions, and storage tank working and breathing losses. Therefore, the hexane content of natural gas potentially impacts its air quality impacts and health risk.

MVP needs to explain why they used such a lower hexane content for an expansion of the same pipeline, with full details to account for any difference. Otherwise they must use the most accurate hexane content for typical and maximum emissions calculations, based upon an adequately representative sampling of natural gas entering the pipeline from the Equitrans gathering system that would supply it.

2. Natural gas from other relevant pipelines includes BTEX along with hexane. If MVP is to claim that the gas in their pipeline will not contain BTEX, then they must provide adequate data to support that claim.

EQM Midstream Partners, the largest owner of MVP and also its operator, will supply MVP with gas from its Weston facility. This is the same Equitrans facility that supplies natural gas to the Texas Eastern transmission pipeline.

Natural gas from the Texas Eastern pipeline contains the hazardous pollutants hexane, BTEX (benzene, toluene, ethylbenzene, and xylenes), and iso-octane. It consequently emits these compounds from flashing emissions, pipe fugitive emissions, and condensate tank emissions as part of its operations. One example is shown here for Texas Eastern Transmission Co., FERC Docket CP19-512.

TABLE B-1 Piping Components Hourly and Annual Emission Estimates						
Source			MO-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	236 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	194 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	170 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	58 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
Other	Count	30 components	Emissions			
	Emission Factor	8.80E-03 kg/hr/component				
Speciation	CO _{2-c}		2384.96% by weight	81.3440 lb/hr	356.2867 tpy	82.5712 lb/hr
	CO ₂		3.41% by weight	0.1162 lb/hr	0.5089 tpy	0.1622 lb/hr
	TOC (Total)		100.00% by weight	3.4107 lb/hr	14.9389 tpy	3.4107 lb/hr
	Methane		95.262% by weight	3.2491 lb/hr	14.2311 tpy	3.2964 lb/hr
	Ethane		12.751% by weight	0.4349 lb/hr	1.9049 tpy	0.6672 lb/hr
	VOC (Total)		2.198% by weight	0.0750 lb/hr	0.3284 tpy	0.3239 lb/hr
	VOC (non-HAP)		2.131% by weight	0.0727 lb/hr	0.3183 tpy	0.3163 lb/hr
	HAP (Total)		0.067% by weight	0.0023 lb/hr	0.0100 tpy	0.0076 lb/hr
	Benzene		0.018% by weight	6.26E-04 lb/hr	2.74E-03 tpy	2.72E-03 lb/hr
	Ethylbenzene		0.008% by weight	2.81E-04 lb/hr	1.23E-03 tpy	4.19E-04 lb/hr
	Hexane (n-)		0.039% by weight	1.33E-03 lb/hr	5.83E-03 tpy	7.61E-03 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.021% by weight	7.05E-04 lb/hr	3.09E-03 tpy	2.36E-03 lb/hr
	Trimethylpentane (2,2,4-)		0.007% by weight	2.35E-04 lb/hr	1.03E-03 tpy	2.36E-04 lb/hr
	Xylenes		0.025% by weight	8.55E-04 lb/hr	3.74E-03 tpy	3.56E-03 lb/hr
NOTES						
1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCMi w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.						
2. Piping component counts based on design drawings for the site.						
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.						
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1).						
Maximum hourly emissions are based on the worst-case short-term weight percents even though the values are NOT presented.						

EQMWESTON	73867	RAWHIDE	TEXAS EASTERN TRANSMISSION	Delivery	245000	229000	16000
EQMWESTON	73869	TOMBSTONE	TEXAS EASTERN TRANSMISSION	Delivery	1240800	659618	581182
EQMWESTON	73915	BAMBINO	TEXAS EASTERN TRANSMISSION	Delivery	643800	456000	187800
EQMWESTON	75111	BONNETHEAD NOMINATION POINT	TEXAS EASTERN TRANSMISSION	Delivery	915937	70000	845937
EQMWESTON	COLE_DEHY	Cole Farm Dehy	EQM GATHERING OPCO LLC	Delivery	200000	200000	0
EQMWESTON	A129103541	MAVERICK	DTE APPALACHIA GATHERING	Delivery	170000	0	170000
EQMWESTON	M5306625NP	GREAT HAMMERHEAD	MOUNTAIN VALLEY PIPELINE LLC	Delivery	0	0	0

However, in our experience Texas Eastern reports similar data for their other pipeline filings.

Since MVP will receive its gas from the same Equitrans Weston facility, it seems most likely that both pipelines will receive gas of the same composition. MVP needs to report a representative sampling of

gas composition from the existing Equitrans Weston facility that will supply it, with a clear description of the sampling procedure. Since Equitrans is both the operator of the Weston facility and the MVP, there are no technical barriers for them to provide these data.

As noted above for hexane, understanding the composition of natural gas is critical for understanding its air quality impacts when the gas is emitted (piping fugitives, blowdowns) or processed (flashing emissions, pipeline liquids storage tank fugitives). The natural gas composition data are therefore necessary to adequately evaluate the pipeline's air quality impacts for the affected communities.

3. The air emissions modeling and EJ report omit substantial hazardous pollutant emissions from the Transco facility that currently overburden the affected communities.

Section VI.3 (cumulative exposures) of the MVP EJ report asserts that “The environmental justice communities are also not overburdened by other sources of pollution.” MVP asserts this is true in part because the criteria pollutant modeling incorporated cumulative emissions from Transco Station 165. However, for hazardous air pollutants (HAPs), MVP only states that most of the emissions at that facility will decrease substantially after the Station 165 compressor engines are replaced under the Transco Southeast Trail project.

This is a qualitative statement that does not evaluate cumulative impact. MVP has not demonstrated that there is no cumulative impact of the HAP emissions from either the existing Transco compressor engines, Transco or MVP construction emissions, nor the new compressor engines at Transco Station 165 in addition to the MVP Lambert facility. *Demonstrating no cumulative impact would require modeling of background + cumulative emissions, as was done for the criteria pollutants.*

4. The omission of important hazardous pollutant emissions sources in the EJ report constitutes an ongoing and systematic injustice perpetrated against EJ communities.

Section VI of the EJ report reads “...no community will face any appreciable health risk as a result of the facility's emissions...” and that “...the Station will cause no cumulative overburdening effect in combination with other sources of pollution.”

The US EPA defines environmental justice as “*the fair treatment* and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” (emphasis added).

The MVP Sept 2020 Supplemental Environmental Justice report admits that the community in the study area of its EJ analysis qualifies as an EJ community. Conforming with the principles of environmental justice, as summarized by the US EPA definition, would require the *fair treatment* of the EJ community that will be affected by the MVP facility.

Contrary to EJ principles, MVP is not providing fair treatment of the EJ community affected by its proposed facility. As noted above, MVP appears to have omitted important emissions sources (namely, hazardous air pollutant fugitives). Additionally, the air pollution impact analysis includes the cumulative impact of criterion pollutants but disregards the cumulative impact of hazardous air pollutants (HAPs).

The air pollution report and modeling, and EJ report, therefore fall far short of demonstrating no significant impact nor do they demonstrate **no impact upon the EJ community** that would be subject to

the facility's emissions. On the contrary, emissions from the MVP Lambert facility have been evaluated with a partiality that undermines fair treatment of the affected EJ community.

The air toxics analysis evaluated health risks to local populations, including EJ populations, by modeling hexane and formaldehyde emissions from the MVP Lambert station only. The report does not determine whether the background concentrations of formaldehyde and hexane are already a significant health risk or burden for local residents. In fact, the most recently available EPA National Emissions Inventory (2017) shows that the Transco compressor station 165 (next to the planned site) released 415 pounds of hexane and a highly concerning 30,036 pounds of formaldehyde in that year. These background concentrations of air toxics are frequently ignored in permitting analyses of pipeline facilities. This is a systemic disregard for the health of EJ populations and typifies EJ problems of discrimination inherent in the partial application of environmental regulations. When an adjacent facility releases 15 tons of formaldehyde per year, those emissions are having a real impact on nearby residents and the additional formaldehyde emissions from the MVP Lambert station need to be understood in that context.

Archived: Monday, April 12, 2021 8:01:21 AM

From: simpat@everyactioncustom.com

Sent: Friday, April 9, 2021 5:01:38 PM

To: anita.walthall@deq.virginia.gov

Subject: Support the Pittsylvania County NAACP and Their Fight for Clean Air

Importance: Normal

Dear Anita Walthall,

I am writing to urge you to fully support the request of the Pittsylvania County NAACP branch for the Mountain Valley Pipeline Minor New Source Review Permit be denied and referred to the Air Pollution Control Board.

The current permitting process did not: (1) consider toxic cumulative direct and indirect impacts, (2) conduct a robust and inclusive community engagement program, or (3) perform an accurate air quality modeling analysis. Furthermore, the Air Quality Control Board should also request that the applicant provide information about any alternate sites that were considered and why they were removed from further evaluation.

A 27,756-horsepower compressor station, Lambert Compressor Station, is being proposed in Pittsylvania, VA. This compressor station will be located adjacent to two existing compressor stations and would increase air pollutant and particulate matter levels such as nitrogen oxides, formaldehyde, and carbon monoxide (to name a few), into the air. The new compressor station would add to the cumulative harm done to people in the minority-majority Banister voting district and the Chatham-Blairs Voting District, who have been burdened by pollution from two other Transco compressor facilities for sixty years.

Virginian residents deserve to know that the air they breathe in is safe and clean. Take action and support the Pittsylvania County NAACP! Thank you for considering my views.

Sincerely,

Dr. Simone Paterson

3973 Carterdell Rd Salem, VA 24153-8751

simpat@me.com

Archived: Monday, April 12, 2021 8:01:21 AM

From: [Lakshmi Fjord](#)

Sent: Friday, April 9, 2021 5:00:24 PM

To: anita.walthall@deq.virginia.gov; [lakshmi Fjord](#); [Mark Sabath](#)

Subject: Lakshmi Fjord Comment: MVP Lambert CS air permit

Importance: Normal

Attachments:

[Fjord_Lambert CS Air Permit comment.docx](#) ;

Dear Ms. Walthall,

Thank you for accepting my attached MVP Lambert CS air permit comment by email.

Sincerely,

Lakshmi

Fjord

Lakshmi Fjord, Ph.D.

cell: 510.684.1403

Dept. of Environmental Quality
Anita Walthall
Sent to: anita.walthall@deq.virginia.gov

Lakshmi Fjord, Ph.D.
420 Altamont St.
Charlottesville, VA 22902
Lakshmi.fjord@gmail.com

April 9, 2021

Mountain Valley Pipeline-MVP – Southgate Extender Lambert Compressor Station Draft Air Permit - Technical Comment

I request that the MVP Southgate Extender Pipeline’s Lambert Compressor Station air permit be denied outright on the bases described below. If not, then this air permit must be elevated to a full Virginia State Air Pollution Control Board-SAPCB hearing and permit review process. The substantive issues with this air permit for which I have technical expertise are the following:

I. A longtime natural gas now fracked gas transmission company, Transcontinental Pipeline-Transco, has entered into a lawsuit against the Mountain Valley Pipeline-MVP and the individual landowners whose private land Transco first seized by eminent domain, and now MVP has done so. Transco’s evidentiary bases for their lawsuit against these two classes of defendants maintains that co-locating two pipelines and 2 compressor stations on the same section of easements is far too dangerous to go forward.

Because Transco’s and MVP’s evidence is in large part “proprietary” – not available to the public – the court papers of these two opposing transmission pipeline companies, this lawsuit’s hearing transcript, and the final Opinion of the Court offer unprecedented access to vital technical information that must be included in DEQ’s required revisions of MVP’s air permit. This information must be made available to the SAPCB-“Air Board” and to the public -- before DEQ starts the Lambert air permit review and public comment process.

This lawsuit offers a rare window into never disclosed exact construction details and accurate rather than highly diluted information about pipe degradation over time, the actual likelihood of leaks and/or explosions when co-located; and, existing site-specific risks and hazards such as hydro-geological and soil conditions and past erosion faced by the existing Transco pipeline and compressor station.

Please note this “hidden” leak not discovered until 2 boys rode their bikes [illegally] on the Colonial Pipeline easement:

[“Largest U.S. Gas Spill in 20 Years](#) 1.2 Million Gallons – Happened at a Cracked Pipeline in North Carolina Last Summer.”

What new information will be disclosed about site-specific disproportionate risks to the health of those living nearest to these co-located fracked gas compressor stations? Who, if this permit is approved, would be forced to live nearest to routine and accidental blow-downs. Geometrically elevating their individual exposures to toxic pollutants including benzene -- for which no level is considered safe. Also, to PM2.5 emissions from now 2 fracked gas-fired turbines. And, the cocktail of emissions identified by Dr. Curt Nordgaard in his technical comment submitted to DEQ about the composition of the fracked gas contents most likely to be transmitted by the MVP: hexane, BTEX (benzene, toluene, ethylbenzene, and xylenes), and iso-octane. Yet, MVP does not correctly account for these emissions in this air permit (see Nordgaard’s air modeling critiques of MVP’s air permit attached below).

Taken together, the factual details that will emerge in this lawsuit are vital information to decision-makers, environmental experts, and frontline families not ever disclosed by fracked gas corporations in permit processes. Indeed quite the opposite has been uniformly true: under-assessing

risks and hazards to persons living close by, including the direct health impacts of the activities and daily operations of compressor stations especially.

II. The Air Board's statutory responsibilities for site suitability review, including site-specific environmental justice data about who exactly will bear the greatest health and economic losses by this facility's activities, were adjudicated under the 4th Circuit Court's decision on Jan. 7, 2020 overturning the Atlantic Coast Pipeline's Virginia compressor station's air permit.

Each statutory responsibility is later related to environmental justice research methodology and data, environmental health impacts, and disproportionate economic losses to minority majority Bannister District in Pittsylvania County:

1. The character and degree of injury to, or interference with, safety, health, or the reasonable use of property which is caused or threatened to be caused;
2. The social and economic value of the activity involved;
3. The suitability of the activity to the area in which it is located; and
4. The scientific and economic practicality of reducing or eliminating the discharge resulting from such activity.

III. The prevention of disproportionate health, economic, cultural, and historic losses to historically and continuously discriminated peoples is the sole intended purpose for undertaking the identification of environmental justice communities. ***MVP must not therefore be authorized to impose a 1-mile radius from the Lambert compressor station as a boundary-line to identify environmental justice communities*** and the EJ-related health impacts of the operations of this facility. To give this corporation that authority, they would first need to prove there is any peer-reviewed medical or environmental science research data to ascribe a fixed boundary-line against air and water environmental health hazards caused by fracked gas compressor stations. Which, they will not be able to do.

The air and water impacts of aboveground and underground fracked gas infrastructure can never be universally applied. Which is why the Board's statute requires **site-specific review** of each new toxic polluting facility site location. Each site has specific most-impacted populations by race, income, density, and other EJ vulnerabilities. Each site has specific conditions, including prevailing winds that may seasonal change, hydro-geological, topographic, and soil conditions that impact how far and how polluting, how often, and how cumulative are water contamination within shared aquifers by leaks and/or degradation of air quality by accidental or routine blow-downs and explosions.

IV. To date, Virginia state public health assessments of compressor station site locations cannot be relied upon because they use applicant-generated data on the one hand; and, on the other, derogate the testimony of nationally recognized environmental health experts, some of whom use local health data (Dr. George Thurston for Union Hill and Lambert compressor stations; Dr. Larysa Dyrska for Union Hill) to ground their own research evidence in the realities of the people most impacted by a particular compressor station.

The lack of site-based public health data becomes deeply problematic in rural, low-income Virginia public health districts – such as where the Lambert compressor station is sited in the Bannister District of Pittsylvania County. Bannister is rural, average low-income, and majority African American. The health districts in which these rural, EJ political districts are enfolded have very little if any existing public health data that is site-specific.

Where there are no doctors, people travel out of district (as Buckingham County residents did, which meant the county's assignment to the Piedmont Health District had very little geographic/census based health data for the ACP air permit in Union Hill). Rural county residents' medical data is then

collected where they receive services (Charlottesville’s Blue Ridge Health District or Farmville in the Buckingham case) – not by their mailing addresses where they reside. Yet, it is where they reside that is in question when looking at public health impacts of a toxic polluting site on current nearby residents.

The state of Virginia must do more to ensure that public health records then do not become another discriminatory means to allow toxic polluting infrastructure to disproportionately harm those already least medically served and least politically represented.

My technical expertise and interest to make these comments:

I am an intervenor in the Mountain Valley Pipeline and the anthropologist that designed, implemented, analyzed, and received peer-review for the findings from the Union Hill Community Research project at the site of the Atlantic Coast Pipeline Virginia compressor station. This comprehensive community household data, including race, ages, numbers of residents, pre-existing health conditions, and family heritage at this site –we collectively presented as site specific compressor station environmental justice impacts’ evidence in every Atlantic Coast Pipeline-ACP permit at the local, federal and state levels. To counter Dominion Energy’s, FERC’s and DEQ’s misuses of census tract data and then EJ Screen to “make invisible” or “hide clusters of minority majority populations” (NEPA Guidelines, 2015, 2017).

The use of the “Fjord Study” methodology and evidence within the unanimous judgment of the U.S. Court of Appeals for the 4th Circuit to overturn the ACP compressor station in Union Hill is now front and center in the MVP EJ Supplement (Sept. 2020), and revised MVP EJ Consultant report (attachment A, Feb. 2020) for the air permit for the Lambert compressor station. MVP staff writers cite this air permit Opinion in their EJ supplement, stating this permit is in compliance with this Opinion and subsequent Virginia EJ Act:

“This Supplemental Information demonstrates compliance with environmental justice requirements and principles, and it provides information to make necessary findings under Va. Code 10.1-1307.E. and VEJA (VA Environmental Justice Act.” It includes ...

3) Identification of environmental justice communities as defined in VEJA within a radius of 1-mile from the proposed Station” (MVP EJ Suppl, p.2).

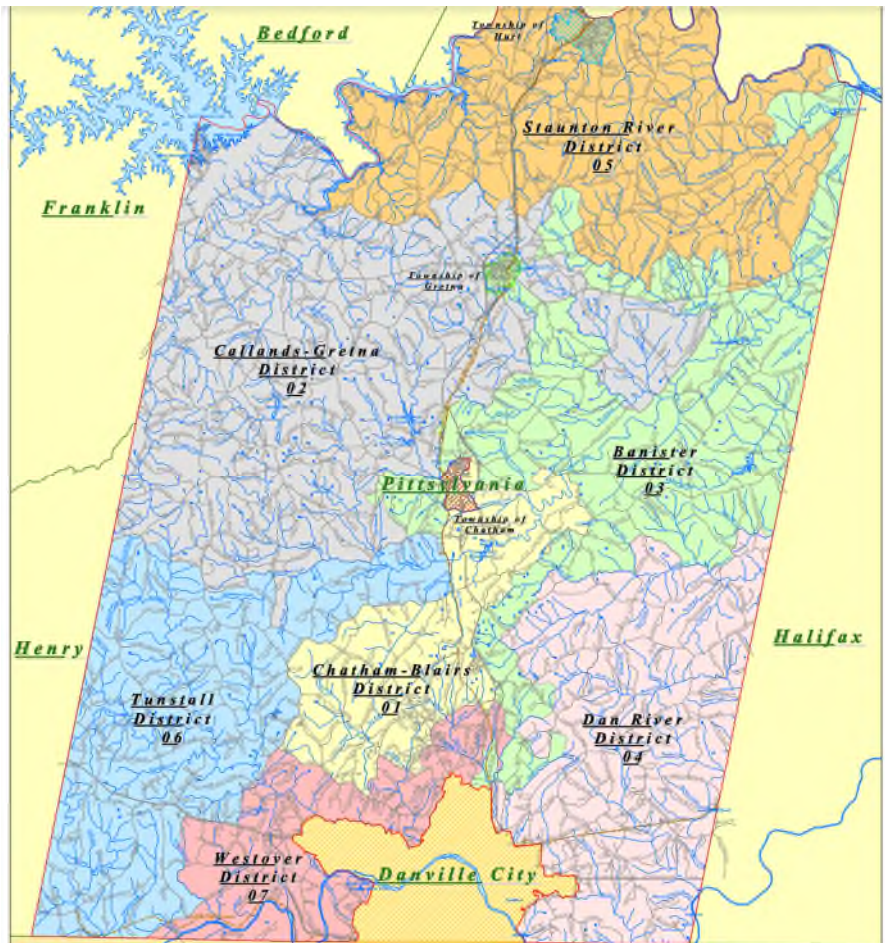
Regarding historic preservation issues, I was the lead researcher and author of the Union Hill Rural Historic District that received eligibility (Dec. 10, 2020) for historic district nomination. For the first time in Virginia history, a Freedmen-built community whose significance is based entirely on the continuous presence, habitation and uses of their land in traditional ways received this recognition as an ethnographic, cultural landscape.

.....

II. The Air Board’s statutory duties toward Site Suitability Issues and Environmental Injustice

Evidence for why the people living closest to 2 existing Transco compressor stations living in the minority majority Bannister District must not be burdened with further fracked gas pollution.

The Bannister District (Green) is a minority majority district created by gerrymandering to limit the Pittsylvania County-level political representation of African American and Native American descendant families and individuals. Please compare this district with the rest of its district counterparts, where minorities are swept together in all directions, as if by a broom.



This dilution of the minority vote is a prime identifier of racial injustice. Its intended consequences are to dilute the voices of historically discriminated peoples through active practices of political marginalization. The result is found in the continued practices of environmental injustice that led to the siting of 2 compressor stations in one place. Environmental racism is the root driver of rapid climate change in the U.S. because fewer politicians of both parties must answer to their needs and offer protections to them as constituents.

1. losses of landowners' uses of their land for their own economic benefit:

Thus, we find Anderson and Elizabeth Jones' farm torn apart already by MVP trenching in easements this historic family was required to accept. Anderson Jones, who has many generations of ancestors in this area, is biracial, of Native American and African American descent. He inherited this property purchased by his uncle in 1923. He has been farming these lands for decades and noticed how plowing turned over immense numbers of Indian artifacts. He is concerned that with the trenching that has already occurred on his and all MVP seized easement properties, no artifacts were turned over to the families or notice given if they were given to any entity at all. Mr. Jones has been growing loblolly pines and other trees for timber sales. The MVP easement went straight through and destroyed good timber stands on their property.

2. Losses of property value of Indigenous and African American rural heritage lands:

Transco seized the easement in the 1960s, when Indigenous people were still, after many generations, still not allowed by law to be identified as Indian in Virginia, which provided only the choices of Colored or White as race at birth. Mr. Jones is a descendant of Cherokee Indians who stayed despite the Trail of Tears displacement campaign in the Southeast. Now, the couple knows that this second infringement on their property rights has basically destroyed the value of their 57-acres and home once valued at over \$330,000. No farm equipment can cross the easement, no cows can graze it, no building can be built on its 170-ft wide swath.

The siting of toxic polluting infrastructure on Black and Indian heritage lands is one of several root causes of the widespread loss of Native and Black inter-generational heritage and wealth passing in the South. This intergenerational wealth passing racial disparity continues to grow apace in Virginia.

3. Native American and African American Burial sites:

Rural Freedmen-built communities in Virginia were built by ancestors that were biracial and multi-racial: of African, Indigenous and White colonial descents. The role of Indigenous and African heritage burial sites has been thoroughly downplayed by white politicians and corporations seeking to locate the least wanted waste dumps and fossil fuel infrastructure. Native American and African descendant burials are derogated as “everywhere” in these rural historic places. So numerous as to impede Progress writ large. Progress that brings only regress to their land uses in traditional ways.

These are peoples who share strong ideas about the sacred nature of the “bones of their ancestors.” The burials almost always lie with heads to the East for African descendants. Yearly Homecomings bring dispersed family members by the hundreds to the forests and back-roads of Virginia places where they annually gather to honor their dead in family gravesites, quite often unmarked and unfenced, which requires the continuity of family and group oral traditions. These are real ties to people and places that are being destroyed at a very fast pace in Virginia, with protections.

4. No Economic need for the MVP, no economic benefit to any impacted peoples, only to investors:

The MVP persists in its push to build this pipeline despite the fact that they cannot demonstrate need for it to the market, and its investors are divesting of their holdings in MVP. At the same time, the Biden Administration seeks an end to fossil fuel investment. The Transco Pipeline and compressor station reveal the redundancy of the Southgate extender and its Lambert compressor station. Indeed, the Transco writ large renders the MVP entirely unneeded:

A new analysis by a clean energy think tank says changes to the natural gas market since the Mountain Valley Pipeline was announced in 2014 have [undercut the economic case](#) for building the long-delayed project. (*Gazette-Mail*)

Yet, if this permit is granted, DEQ will be forcing a minority majority community to bear the burden of truly the last gasps of corporate profit making at the expense of Indigenous and African descendant peoples.

5. Need to examine “alternate energy sources” to eliminate PM2.5:

As with the Union Hill compressor station case, DEQ has not required the MVP Lambert air permit to consider the long-term cost benefits of using electric turbines. Which were a core part of the 4th Circuit Court’s decision, so their absence by DEQ is rather shocking. Since electric turbines would eliminate most of the PM2.5 fine particulate matter emitted at this compressor station.

In fact, if the Transco is truly going to upgrade its existing compressor station, they too must be required to use electric turbines rather than fracked gas driven. As the 4th Court Opinion strongly states, using our request for electric turbines coupled with our data on pre-existing pre-existing health

conditions in the proximal households, conditions data for the community, and the expertise of Dr. George Thurston. As prescribed in their ACP air permit loss, DEQ must follow through with suggesting the use of electric turbines at this site.

Site Suitability Conclusion:

MVP's Lambert compressor station will force into the air breathed and water drunk, the well-documented, indisputable public health findings about fracked gas health impacts, loss of uses of heritage land for farming and the Jones' economic benefit, and loss of heritage property values by proximity to now over 48,000 hp gas turbine emissions 24/7/365.

III. Nowhere does the Virginia EJ Act or the 4th Circuit Court opine that “a radius of 1-mile” is part of EJ review rules or [no longer existing NEPA guidelines]. MVP must account for the bases in science, law or even custom of constant use of this radius in their EJ Supplement when assessing the health risks of constant exposure to fracked gas emissions' disproportionate impacts on nearest residents. Is MVP misappropriating the 1-mile radius cited in the 4th Circuit's hearing and final decision, related to my Union Hill study reports and statistics?

If so, to borrow the language used by Southern Environmental Law Center-SELC and Chesapeake Bay Foundation in our lawsuit to overturn the Union Hill air permit -- MVP has “arbitrarily and capriciously” misappropriated the significance and meaning of a Union Hill community-specific cultural mapping reference. By applying it as a **requirement** for assessing the uniquely different site choice for the Lambert compressor station's disproportionate impacts on proximal residents and their relevance to environmental justice indicators.

What is true is that in the lawsuit we brought against the ACP air permit, Chief Judge Gregory cited the 1.1-mile radius of the “Fjord” or “Friends of Buckingham Study.”¹ Which is my then pre-GIS-in-Buckingham County approximation of distances from the emissions stack site,² using my car's odometer, to the community homes surrounding the ACP compressor station. Homes on all sides that are linked by shared historic cultural attributes -- the inter-related families, churches, cemeteries and family burial sites built on 3 historic roads that existed unchanged since plantation times.

No medical science supports this use of a 1-mile radius by MVP, which must be considered an invented boundary.³ The opposite holds true, as was acknowledged in both versions of MVP's EJ consultant's “Community Impacts” findings when using 3-, 5-, and 10-mile radii to identify EJ communities impacted by the higher cumulative impacts of citing the Lambert CS where two Transco compressor stations already emit fracked gas toxic pollution.

Air emissions do not respect “fence-lines.” Making the “fence-line” misnomer into a means to cherry-pick non-applicable data from the 4th Circuit findings into a rule does not relieve MVP of the responsibility to assess disproportionate impacts on EJ communities at the 3-, 5- and 10-mile radii.

¹ U.S. Court of Appeals for the 4th Circuit hearing transcript.

² Since we did not receive, as requested, FERC “consulting party status,” we did not receive stack emissions site data, as “proprietary information.”

³ Please note: The 7th edition (Dec. 14, 2020): Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) compiled by Physicians for Social Responsibility and NY Concerned Scientists. It is a collection of nearly 2,000 abstracts of medical, scientific and investigative reports about the consequences of oil and gas drilling, fracking, and associated infrastructure.

Applied by MVP's EJ consultant to identify EJ communities impacted by this siting choice. Largely, the changes in her two community impact study versions reflect her inclusion in the second, the first's lack of a 1-mile radius used by MVP -- when brought to her attention by our inquiries.

This cherry-picking of data to include or exclude unwanted factual information in this permit must be identified as a key problem. Industry-generated data is characterized by these deliberate omissions and manipulations to support preferred outcomes. The medical and social costs to directly impacted individuals, families and whole communities of industry-generated data are well-known in examples from both the Tobacco and Opioid industries. Which for decades caused immense levels of mortality and chronic illness before being made liable for their actions.

Evidence of Cherry-Picking Data Provided by Lawrence's Updated Community Impact-A, Feb. 26, 2021

It is possible that MVP relied on FERC's ACP and MVP FEIS's (July 2017) that used a 1-mile radius to declare that "no environmental justice communities were impacted within a 1-mile radius" along the entire 600-mile route of the Atlantic Coast Pipeline and 300-mile route of the Mountain Valley Pipeline. For their 1-mile radius designation, FERC made then no descriptive bases in scientific fact.

Since the demographic data on which FERC made this statement was solely that of the two applicants, Dominion Energy and EQT partners, we must refer back to the methodological problems in both the FERC and DEQ data when not using census tract data properly. FERC and DEQ only privileged Dominion Energy and EQT partner data and denied the methods and findings of community-based research.

No matter that prior history, in April 2019, FERC offered additional EJ guidance to MVP that: highlighted concerns that "effects can be amplified in EJ communities due to factors such as cumulative impacts in the community, unique cultural practices and social determinants of health."³² [Footnote 32: Correspondence between the Federal Energy Regulatory Council and Mountain Valley, LLC (February 2019)].

To which MVP responded in this EJ Supplement that:

"We addressed this by looking at two additional parameters: one assessing cumulative impacts on unique cultural practices, and another assessing potential amplification of impact due to social determinants of health -- which we added to those in the Virginia Environmental Justice Act to address overall health status, health inequality, and environmental health metrics" (P.9).

Yet, what we find when examining what they actually did -- is that seeming compliance with VEJA and the 4th Circuit's Opinion leads to corporate applicants fracturing the very meaning of the concept of "community."

Since the 4th Circuit Court's decision, first the Atlantic Coast Pipeline in its revised air permit for the Union Hill compressor station and now MVP's EJ supplement appear to be complying with the finding that applicants, FERC, and DEQ must account for environmental justice as part of site suitability review. However, in Dominion's post-lawsuit overturning of their air permit, they submitted the exact same air permit as was overturned, and then accounted for the needed EJ review by once more using census tract to fracture the community into different clusters of households as separate EJ and non-EJ "communities" by income level or race. Once more using census tract data to chop up historic minority majority

communities by creating false bifurcations of these into separate categories of “EJ community.” Thus, in effect destroying the entire concept and lived experience of “community.”

Further, there is another completely false binary within Dr. Lawrence’s analysis that does not fit the EJ communities she identified using only census tract data. This concerns her definitive line drawn between Indigenous and Non-Indigenous peoples in an historic context where interrelated kinship has been the norm for centuries. This is yet another issue about using census tract information instead of methods that account for the specifics of households, family and cultural histories within long time spans that encompass pre-colonial times, through first English colonial corporate ventures, and first place of the English Atlantic Slave Trade in what is now the U.S.

As we found in Union Hill, where the majority are descendants of enslaved people at nearby plantations, most of the families identified as both African American and Native American, it is not accurate to make false binaries about EJ communities as if distinctively different sorts in the Bannister District context. Where religious, kinship, farming and other cultural traditions have intertwined over long times, those original Indigenous communities with African traditions into what is now present.

SUMMARY CONCLUSION:

With the mounting evidence of the health impacts in higher mortality and chronic illness caused by fracked gas infrastructure, we ask this permit to be denied on the bases of cherry-picking data. Including but not limited to EJ community data, air modeling, lack of alternate site analyses, non-inclusion of electric turbines that would remove most fine particulate matter given in evidence.

Respectfully submitted,
Lakshmi Fjord

Critical technical issues in MVP’s air modeling for the cumulative impacts of the Lambert Compressor station with existing Transco compressor station made by Dr. Curt Nordgaard:

Air Modeling Excludes Accurate Data on Hexane and Eliminates HAPS from Existing Transco Compressor Stations - Appearance of Cherry-Picking Data to Suit Applicant’s Narrative of No Impact

1. The hexane content of natural gas reported for the Mountain Valley Pipeline and the Southgate expansion is substantially different. This difference either needs to be rectified in the application or an appropriate justification for the difference provided.

The hexane content of natural gas in the Mountain Valley Pipeline is listed as 0.222% by weight, according to their FERC filing. On the other hand, the hexane content of natural gas in the Southgate expansion is listed as 0.04% by weight.

Mountain Valley Pipeline, FERC Docket 16-10:

Company Name: Mountain Valley Pipeline, LLC
Facility Name: Bradshaw Compressor Station
Project Description: Operational Emissions

TABLE 12. Site-Specific Gas Analysis

Sample Location: Multiple Locations
HHV (Btu/scf): 1,083

Constituent	Natural Gas Stream Speciation (Vol. %)	Natural Gas Stream Speciation (Wt. %)
N2	0.4949	0.788
METHANE	90.4241	82.411
CO2	0.2608	0.652
ETHANE	7.6812	13.124
PROPANE	0.6778	1.698
I-BUTANE	0.0754	0.249
N-BUTANE	0.1355	0.447
I-PENTANE	0.054	0.223
N-PENTANE	0.045	0.186
I-H EXAN ES	0.000	0.000
N-HEXANE	0.045	0.222
BENZENE	0.000	0.000
CYCLOHEXANE	0.000	0.000
HEPTANES	0.000	0.000
TOLUENE	0.000	0.000
2,2,4 Trimethylpentane	0.000	0.000
N-OCTANE	0.000	0.000
*E-BENZENE	0.000	0.000
*m,o,&p-XYLENE	0.000	0.000
I-NONANES	0.000	0.000
N-NONANE	0.000	0.000
I-DECANES	0.000	0.000
N-DECANE	0.000	0.000
I-UNDECANES +	0.000	0.000
Totals	99.895	100

*Gas Analysis showed no detectable compounds above hexane +, conservatively assumed all hexane + was n-he

TOC (Total)	99.14	98.56
VOC (Total)	1.03	3.03
HAP (Total)	0.05	0.22

Southgate Expansion, FERC Docket CP19-14:

**MVP Southgate Project
Lambert Compressor Station**

Table B-8. Fugitive Blowdowns Potential Emissions Summary

Natural Gas Specifications

Constituent	Mol Percent	Molecular Weight	Lb/Lb-Mol NG	Mass Percent	VOC
CO2	0.165	44.01	0.073	0.41%	No
Nitrogen	0.396	28.01	0.111	0.62%	No
Methane	87.823	16.04	14.089	79.08%	No
Ethane	11.303	30.07	3.399	19.08%	No
Propane	0.28	44.10	0.123	0.69%	Yes
i-Butane	0.009	58.12	0.005	0.03%	Yes
i-Pentane	0.003	72.15	0.002	0.01%	Yes
N-Pentane	0.003	72.15	0.002	0.01%	Yes
N-Hexane	0.008	86.18	0.007	0.04%	Yes
N-Butane	0.01	58.12	0.006	0.03%	Yes

Notes: Based upon representative gas analyses for Project.

Natural Gas Properties	
Molecular Weight	17.817
Specific Gravity	0.615
lb/Scf	0.047
Scf/lb	21.26

The hexane content of natural gas will likely influence hexane emissions from the Lambert compressor station when it is released as products of incomplete combustion, pipeline fugitives, flashing emissions, and storage tank working and breathing losses. Therefore, the hexane content of natural gas potentially impacts its air quality impacts and health risk.

MVP needs to explain why they used such a lower hexane content for an expansion of the same pipeline, with full details to account for any difference. Otherwise they must use the most accurate hexane content for typical and maximum emissions calculations, based upon an adequately representative sampling of natural gas entering the pipeline from the Equitrans gathering system that would supply it.

2. Natural gas from other relevant pipelines includes BTEX along with hexane. If MVP is to claim that the gas in their pipeline will not contain BTEX, then they must provide adequate data to support that claim.

EQM Midstream Partners, the largest owner of MVP and also its operator, will supply MVP with gas from its Weston facility. This is the same Equitrans facility that supplies natural gas to the Texas Eastern transmission pipeline.

Natural gas from the Texas Eastern pipeline contains the hazardous pollutants hexane, BTEX (benzene, toluene, ethylbenzene, and xylenes), and iso-octane. It consequently emits these compounds from flashing emissions, pipe fugitive emissions, and condensate tank emissions as part of its operations. One example is shown here for Texas Eastern Transmission Co., FERC Docket CP19-512.

TABLE B-1 Piping Components Hourly and Annual Emission Estimates						
Source			MO-PC-NG			
Service			Gas			
			Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	236 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	194 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	170 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	58 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
Other	Count	30 components	Emissions			
	Emission Factor	8.80E-03 kg/hr/component	Avg. Hourly	Max. Annual	Max. Hourly	
Speciation	CO _{2,c}	2384.96% by weight	81.3440 lb/hr	356.2867 tpy	82.5712 lb/hr	
	CO ₂	3.41% by weight	0.1162 lb/hr	0.5089 tpy	0.1622 lb/hr	
	TOC (Total)	100.00% by weight	3.4107 lb/hr	14.9389 tpy	3.4107 lb/hr	
	Methane	95.262% by weight	3.2491 lb/hr	14.2311 tpy	3.2964 lb/hr	
	Ethane	12.751% by weight	0.4349 lb/hr	1.9049 tpy	0.6672 lb/hr	
	VOC (Total)	2.198% by weight	0.0750 lb/hr	0.3284 tpy	0.3239 lb/hr	
	VOC (non-HAP)	2.131% by weight	0.0727 lb/hr	0.3183 tpy	0.3163 lb/hr	
	HAP (Total)	0.067% by weight	0.0023 lb/hr	0.0100 tpy	0.0076 lb/hr	
	Benzene	0.018% by weight	6.26E-04 lb/hr	2.74E-03 tpy	2.72E-03 lb/hr	
	Ethylbenzene	0.008% by weight	2.81E-04 lb/hr	1.23E-03 tpy	4.19E-04 lb/hr	
	Hexane (n-)	0.039% by weight	1.33E-03 lb/hr	5.83E-03 tpy	7.61E-03 lb/hr	
	Methanol					
	Naphthalene					
	Toluene	0.021% by weight	7.05E-04 lb/hr	3.09E-03 tpy	2.36E-03 lb/hr	
	Trimethylpentane (2,2,4-)	0.007% by weight	2.35E-04 lb/hr	1.03E-03 tpy	2.36E-04 lb/hr	
Xylenes	0.025% by weight	8.55E-04 lb/hr	3.74E-03 tpy	3.56E-03 lb/hr		
NOTES						
1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCM1 w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.						
2. Piping component counts based on design drawings for the site.						
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.						
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1). Maximum hourly emissions are based on the worst-case short-term weight percents even though the values are NOT presented.						

EQMWESTON	73867	RAWHIDE	TEXAS EASTERN TRANSMISSION	Delivery	245000	229000	16000
EQMWESTON	73869	TOMBSTONE	TEXAS EASTERN TRANSMISSION	Delivery	1240800	659618	581182
EQMWESTON	73915	BAMBINO	TEXAS EASTERN TRANSMISSION	Delivery	643800	456000	187800
EQMWESTON	75111	BONNETHEAD NOMINATION POINT	TEXAS EASTERN TRANSMISSION	Delivery	915937	70000	845937
EQMWESTON	COLE_DEHY	Cole Farm Dehy	EQM GATHERING OPCO LLC	Delivery	200000	200000	0
EQMWESTON	A129103541	MAVERICK	DTE APPALACHIA GATHERING	Delivery	170000	0	170000
EQMWESTON	M5306625NP	GREAT HAMMERHEAD	MOUNTAIN VALLEY PIPELINE LLC	Delivery	0	0	0

However, in our experience Texas Eastern reports similar data for their other pipeline filings.

Since MVP will receive its gas from the same Equitrans Weston facility, it seems most likely that both pipelines will receive gas of the same composition. MVP needs to report a representative sampling of

gas composition from the existing Equitrans Weston facility that will supply it, with a clear description of the sampling procedure. Since Equitrans is both the operator of the Weston facility and the MVP, there are no technical barriers for them to provide these data.

As noted above for hexane, understanding the composition of natural gas is critical for understanding its air quality impacts when the gas is emitted (piping fugitives, blowdowns) or processed (flashing emissions, pipeline liquids storage tank fugitives). The natural gas composition data are therefore necessary to adequately evaluate the pipeline's air quality impacts for the affected communities.

3. The air emissions modeling and EJ report omit substantial hazardous pollutant emissions from the Transco facility that currently overburden the affected communities.

Section VI.3 (cumulative exposures) of the MVP EJ report asserts that “The environmental justice communities are also not overburdened by other sources of pollution.” MVP asserts this is true in part because the criteria pollutant modeling incorporated cumulative emissions from Transco Station 165. However, for hazardous air pollutants (HAPs), MVP only states that most of the emissions at that facility will decrease substantially after the Station 165 compressor engines are replaced under the Transco Southeast Trail project.

This is a qualitative statement that does not evaluate cumulative impact. MVP has not demonstrated that there is no cumulative impact of the HAP emissions from either the existing Transco compressor engines, Transco or MVP construction emissions, nor the new compressor engines at Transco Station 165 in addition to the MVP Lambert facility. *Demonstrating no cumulative impact would require modeling of background + cumulative emissions, as was done for the criteria pollutants.*

4. The omission of important hazardous pollutant emissions sources in the EJ report constitutes an ongoing and systematic injustice perpetrated against EJ communities.

Section VI of the EJ report reads “...no community will face any appreciable health risk as a result of the facility's emissions...” and that “...the Station will cause no cumulative overburdening effect in combination with other sources of pollution.”

The US EPA defines environmental justice as “*the fair treatment* and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” (emphasis added).

The MVP Sept 2020 Supplemental Environmental Justice report admits that the community in the study area of its EJ analysis qualifies as an EJ community. Conforming with the principles of environmental justice, as summarized by the US EPA definition, would require the *fair treatment* of the EJ community that will be affected by the MVP facility.

Contrary to EJ principles, MVP is not providing fair treatment of the EJ community affected by its proposed facility. As noted above, MVP appears to have omitted important emissions sources (namely, hazardous air pollutant fugitives). Additionally, the air pollution impact analysis includes the cumulative impact of criterion pollutants but disregards the cumulative impact of hazardous air pollutants (HAPs).

The air pollution report and modeling, and EJ report, therefore fall far short of demonstrating no significant impact nor do they demonstrate **no impact upon the EJ community** that would be subject to

the facility's emissions. On the contrary, emissions from the MVP Lambert facility have been evaluated with a partiality that undermines fair treatment of the affected EJ community.

The air toxics analysis evaluated health risks to local populations, including EJ populations, by modeling hexane and formaldehyde emissions from the MVP Lambert station only. The report does not determine whether the background concentrations of formaldehyde and hexane are already a significant health risk or burden for local residents. In fact, the most recently available EPA National Emissions Inventory (2017) shows that the Transco compressor station 165 (next to the planned site) released 415 pounds of hexane and a highly concerning 30,036 pounds of formaldehyde in that year. These background concentrations of air toxics are frequently ignored in permitting analyses of pipeline facilities. This is a systemic disregard for the health of EJ populations and typifies EJ problems of discrimination inherent in the partial application of environmental regulations. When an adjacent facility releases 15 tons of formaldehyde per year, those emissions are having a real impact on nearby residents and the additional formaldehyde emissions from the MVP Lambert station need to be understood in that context.

Archived: Monday, April 12, 2021 8:01:21 AM

From: Sharon Wilson

Sent: Friday, April 9, 2021 4:43:00 PM

To: anita.walthall@deq.virginia.gov

Subject: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit

Importance: Normal

Dear Anita Walthall, of VA DEQ,

I am writing today to ask that you, please, deny the permit for the Lambert Compressor Station in Pittsylvania, VA.

This will add more toxic particulates and more air pollution to a minority area that has already been overly burdened with two Transco Compressor facilities for the past sixty years.

Thanking you, for your time,

Sharon Wilson

Archived: Monday, April 12, 2021 8:01:21 AM
From: [Jessica Sims](#)
Sent: Friday, April 9, 2021 4:10:35 PM
To: anita.walthall@deq.virginia.gov
Subject: Comment on MVP's Lambert Compressor Station Air permit
Importance: Normal

Good afternoon Ms. Walthall,

I'd participated at the Feb 8 Public Hearing, but wanted to submit my comments from that evening in writing also. Thank you!

Jessica Sims
4309 Longleaf Dr, Richmond, VA 23294
804.356.1228 jessicaleesims@gmail.com

Good Evening, my name is Jessica Sims and I reside in Henrico County and I am speaking in my personal capacity, as someone who has friends and loved ones in Pittsylvania County. I have serious concerns about the emission impacts from the proposed Lambert Compressor station, specifically owing to its proposed location adjacent to existing stations, and the process and timing of this application. I ask that you please bring this permit in front of the full Air Pollution Control Board and reconsider the timeline of reviewing what may be an incomplete application. The permitting process for MVP Southgate cannot exist in a silo, separate from the mainline. MVP's ongoing machinations are in pursuit of a ruinous, destructive project which remains mired in litigation over federal authorizations, is \$3 billion over budget, and is barely halfway complete to full restoration after three years, and even less complete if only considering the VA portion of the route. *I will mention too that NextEra just took a \$1B loss on MVP mainline.* The completion rates of construction in the permit are inflated and inaccurate. At the January 7th info session, it was acknowledged by a DEQ staff member that maybe this permit process should not be moving forward. This was in response to a question regarding the uncertainty of the mainline and North Carolina's recent denial of a water permit.

I disagree with the County Board member's assertion that all stakeholders have been involved in the process, or that MVP is acting in a transparent member. MVP's investments in local emergency services should not entitle MVP to pollute the county. Claiming that air quality will not be impacted and that there would be no noise impact does not comport with the **reality** of how a fracked-gas compressor station works. It is not DEQ's responsibility to consider the economic impacts of a project, or an inaccurate, revisionist version of which communities would be impacted. DEQ is to consider the AIR permit and the impacts of potential emissions.

We are considering impacts from what is more appropriately called fracked gas, not natural, it's not natural to emit toxic chemicals into the air. Emissions are NOT environmentally preferable. AND - this is about **methane** emissions, not carbon. So claiming something is safe bc it emits less carbon, while spewing a different and dangerous greenhouse gas doesn't cut it. Investment in a county and it's residents should not come at the cost of the health and environment of the county.

I ask that **with** the ongoing uncertainty of the mainline, and **with** the reality that sufficient outreach to impacted communities from DEQ did not occur early enough in the process, or broadly enough, as communicated today, and **with** the potential health impacts of the station that at the very least this come before a full Air Pollution Control Board.

More appropriately, I ask that the process should be paused as some of the information presented is not accurate, nor is it fully forthcoming and does not constitute a complete application. Please listen to the wisdom of those negatively impacted by MVP, consider the cumulative destruction the project has already inflicted, which is a clear predictor of the quality of work that Pittsylvania County will see, **and** listen to community members that have expressed they have not received sufficient information about the project, ahead of it reaching this point in the process.

Please bring this to the full Board, pause the application process or deny the permit.

Archived: Monday, April 12, 2021 8:01:21 AM

From: Akly, Christina

Sent: Friday, April 9, 2021 4:06:03 PM

To: Walthall, Anita; Jenkins, Paul R

Cc: Johnson, Harry M. Pete; Shamblin, Penny; Miller, Alex

Subject: MVP Southgate comments on Draft Permit for Lambert Compressor Station - Complete version

Importance: Normal

Attachments:

[MVP Southgate comments on Draft Permit_4_9_21 \(complete\).pdf](#);

Good afternoon Ms. Walthall,

I recently sent you an email at 2:21pm with comments from MVP on the Draft permit. However, the attachment included an incomplete comment file. Please disregard my previous email, and accept the attached comments as the correct/complete file in support of the air permit for the Lambert Compressor Station.

I apologize for the inconvenience.

Please let me know if you have any questions.

Thank you,

Christina Akly, Ph.D., P.E.

Project Manager

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image001.jpg



MVP Southgate comments on Draft Permit_4_9_21 (complete).pdf

MVP SOUTHGATE COMMENTS ON DRAFT PERMIT

Mr. Jenkins:

On behalf of Mountain Valley Pipeline, LLC (“Mountain Valley”), please accept the following comments in support of the air permit for the Lambert Compressor Station.

Comment 1: The previously submitted public health assessment demonstrates that the proposed Lambert Compressor Station will not have a negative impact on the health of any environmental justice communities identified by Mountain Valley, its consultant, or the Department of Environmental Quality.

On February 26, 2021, Mountain Valley submitted an update to the *Community Impact Assessment of Lambert Compressor Station* prepared by Dr. Lawrence from Land & Heritage Consulting, LLC (“Updated Assessment”). In the Updated Assessment, Dr. Lawrence identified potential environmental justice communities and “areas for closer attention and analysis,” including the potential for health impacts. Updated Assessment at 2 & n.4. The Updated Assessment noted that it is not a public health assessment and recommended such an assessment. *Id.* at 2 n.4.

In accordance with Dr. Lawrence’s recommendation, Mountain Valley sponsored a Public Health Assessment by Green Toxicology, LLC. Mountain Valley submitted this *Public Health Assessment of Expected Airborne Emissions from the Proposed Lambert Compressor Station* (“Public Health Assessment”) on February 26, 2021. The purpose of the Public Health Assessment was to assess any adverse impacts of airborne emissions from the Lambert Compressor Station on public health. The Public Health Assessment concluded that “the health of people living near the proposed Lambert Compressor Station is not currently being compromised by the quality of outdoor air; and if the proposed station were to be built and operating, this situation would not change.” Public Health Assessment at 15.

Comment 2: On the issue of environmental justice, some commenters at the public hearing suggested that the siting of the proposed Lambert Compressor Station will have a disproportionate impact on minority communities. As attested by the lone African-American member of the Pittsylvania County Board of Supervisors, Dr. Charles H. Miller, Jr., the proposed station is not located in a more heavily minority or historically disadvantaged area than Pittsylvania County generally. Dr. Miller represents the Bannister District where the station is proposed.

In addition to explaining the significant public outreach and numerous benefits of the MVP Southgate Project, Dr. Miller noted that the proposed compressor station site is a “good fit” because it is near the Transco Compressor Station and it is a reasonable distance from any homes. Public Hearing Transcript at 52-53. Dr. Miller further confirmed that the compressor station “is a good example of a project that actually considers environmental justice.” *Id.* at 53-54. As a lifelong resident of the area, he pointed out that “[t]his station is in an area of the county that has a relatively low minority population and there is no targeting of historically

disadvantaged groups.” Indeed, the proportion of African-Americans is higher in other areas such as Chatham to the west or Danville to the south.

The historic Blairs community is dispersed (i.e., the community is not a distinct geographic area). The community’s ancestral connections are not to the immediate vicinity of the proposed site, but rather to Blairs, Virginia, which is approximately 14 miles away. Likewise, no pockets of Hispanic populations have been identified near the proposed compressor station.

Comment 3: Mountain Valley provides the attached comments by Dr. Laura Green of Green Toxicology, LLC about various studies referenced during the public hearing.

Additionally, Dr. Green considered the concerns raised about the impact of particulate matter on older people, especially with increased rates of cardiorespiratory mortality and hospitalization, and provided the following response:

As explained in the Public Health Assessment (February 25, 2021), the risks to health posed by inhaling particulate matter (PM) depend on the (i) chemical-type and (ii) airborne concentration of that PM. For example, PM generated from the burning of wood and other biomass (such as during wildfires) is disproportionately (relative to other PM-types) toxic and pathogenic to the lungs when tested in laboratory rodents (Matthew *et al.*, 2001; Migliaccio *et al.*, 2013; Kim *et al.*, 2018; Hargrove *et al.*, 2019). Moreover, increases in ambient concentrations of wildfire-generated PM appear to be disproportionately associated with increased rates of hospitalization due to respiratory disease-symptoms, especially among older populations (Liu *et al.*, 2017; Aguilera *et al.*, 2021).

In contrast, the types and amounts of PM emitted from the proposed compressor station are neither known nor reasonably expected to harm health, including the health of older people.

References:

- Aguilera R, Corringham T, Gershunov A, Benmarhnia T. *Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from Southern California*. Nat Commun. 2021 Mar 5;12(1):1493.
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- Matthew E, Warden G, Dedman J. *A murine model of smoke inhalation*. Am J Physiol Lung Cell Mol Physiol. 2001 Apr;280(4):L716-23.

Migliaccio CT, Kobos E, King QO, Porter V, Jessop F, Ward T. *Adverse effects of wood smoke PM(2.5) exposure on macrophage functions*. Inhal Toxicol. 2013 Feb;25(2):67-76.

Comment 4: A large supermarket near the proposed compressor station minimizes the potential impact of the finding that some census tracts within 3-, 5-, and 10-miles satisfy the U.S. Department of Agriculture’s definition of “food desert.”

In her Updated Assessment, Dr. Lawrence identified census tracts within 3-, 5-, and 10-miles that qualify as “food deserts” under the U.S. Department of Agriculture’s definition. Updated Assessment at 31-32 (in rural areas qualifying as low-income, at least 500 people or 33% of the population are located at least 10 miles from the nearest large grocery store or large supermarket). While neither the Virginia Environmental Justice Act, Va. Code § 2.2-234, *et seq.*, nor any other applicable statutes and regulations include “food deserts” within the definitions of environmental justice communities, Dr. Lawrence noted that food deserts can be indicative of a population’s vulnerability due to lack of access to food or grocery items. Updated Assessment at 10.

For those individuals residing near the proposed site, a large Food Lion supermarket is located approximately 4.5 miles away at 13701 U.S. Hwy. #29, Chatham, Virginia 24531.

Comment 5: Some commenters during the public hearing argued that the air permit for the Lambert Compressor Station should not be considered until the MVP mainline project is completed. This objection is not based on a proper reading of Virginia’s air regulations. Moreover, the Certificate issued by the Federal Energy Regulatory Commission (“FERC”) for the MVP Southgate Project has a specific condition regarding when Mountain Valley can proceed with construction.

Since the inception of the project, the MVP Southgate team has worked diligently with stakeholders, including landowners, tribes, non-governmental organizations, local officials, and state and federal agencies, to identify the best possible route for the proposed 75-mile underground pipeline for the MVP Southgate Project. Approximately half of the route is collocated along existing utility corridors. The MVP Southgate project team is committed to continuing to cooperate with federal, state, and local officials as we work toward satisfying all remaining permitting requirements.

Construction is targeted to start after all necessary permits are obtained, and per the conditions in the FERC’s order granting the certificate. Construction is expected to create approximately 1,700 jobs and generate more than \$10 million in state and local tax revenues in North Carolina and Virginia. After entering service, the MVP Southgate Project is expected to generate more than \$4.5 million in new annual ad valorem tax revenues to local communities along the route and provide the region with the additional supply needed to meet residential and business demand for affordable, clean-burning natural gas. Local distribution company Dominion Energy North Carolina has signed a long-term agreement for 80 percent of MVP Southgate’s capacity.

The FERC Certificate includes a condition that states: “While we are authorizing the Southgate Project with this order, we are directing the Office of Energy Projects to not issue any notice to proceed with construction of the Southgate Project until Mountain Valley receives the necessary federal permits for the Mainline System, and the Director of the Office of Energy Projects, or the Director’s designee, lifts the stop-work order and authorizes Mountain Valley to continue constructing the Mainline System.” Mountain Valley is working diligently with the Federal agencies and fully expects to resolve all mainline permitting issues in a timeframe that is not expected to materially delay the planned commencement of construction for the MVP Southgate Project.

Comment 6: Mountain Valley has continued its outreach since the submittal of its Supplemental Information on Environmental Justice in September 2020. These efforts supplement the public engagement and public participation activities of the Department of Environmental Quality.

In addition to engagement noted in the Updated Assessment, representatives of Mountain Valley have (1) continued to engage residents of homes closest to the site; (2) reached out to the pastor and members of the congregation of White Oak Community Church; (3) continued discussions with the local chapter of the NAACP; (4) complied with notice requirements for landowners, local administrative officers, elected officials, libraries, and schools; and (5) maintained and updated the MVP Southgate website with fact sheets, newsletters, and other information about the project. In addition, the proposed compressor station has been the subject of a 30-minute radio show on WKBY, an African-American, Christian, gospel station in Pittsylvania County. Since mid-January 2021, Mountain Valley has been running a 60-second informational advertisement every two hours on the same radio station. The advertisement describes the project and advises listeners where additional information can be found.

With respect to the Chatham NAACP, a representative of Mountain Valley met with the President on Friday, March 4, 2021, to discuss the MVP Southgate project. During a follow-up phone call that day, Mountain Valley’s representative was advised that the Chatham NAACP Environmental Justice Committee was unwilling to meet with MVP Southgate to discuss the project and committee members’ concerns. Mountain Valley responded that it remains willing to meet to understand any issues, as well as to provide factual information about the project.

Consistent with what one would expect, the response rate from residents far from the proposed facility (3-, 5-, 10-miles or more) has not been as high as those in the immediate vicinity.

Comment 7: DEQ has correctly determined that Lambert and Transco compressor stations should not be considered a single source for permitting purposes such that Lambert would qualify as a major source. Virginia has specific criteria for determining whether separate facilities should be considered a single stationary source for permit applicability determinations. *See, e.g.,* 9 VAC 5-80-1100 (Article 6 applies to new stationary sources); 9 VAC 5-80-1110 (defining stationary source). The Lambert and Transco compressor stations do not satisfy those criteria.

Per 9 VAC 5-80-1110, a single stationary source is defined as “any building, structure, facility, or installation that emits or may emit any regulated air pollutant. A stationary source shall include all of the pollutant-emitting activities that belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person or of persons under common control except the activities of any watercraft or any nonroad engine. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same ‘major group’ (i.e., that have the same two-digit code) as described in the ‘Standard Industrial Classification Manual.’” Thus, to be a single source for permitting purposes three criteria must be met: (1) the activities belong to the same SIC code; (2) they are contiguous or adjacent to each other; **and** (3) they are under common control. While the Lambert and Transco compressor stations satisfy the first two, they are not under common control. Thus, the Department of Environmental Quality is correct not to consider them a single source for air permitting.

In any event, although Lambert is not a major source and triggered air permitting only for PM_{2.5} and formaldehyde, it will have the same controls as a major source subject to PSD for PM_{2.5} and for NO_x, VOC and SO₂ as well. As explained in DEQ’s Engineering Analysis, MVP Southgate voluntarily proposed to control those pollutants.

Comment 8: Several commenters during the public hearing requested an analysis of the cumulative impacts from Lambert and Transco emissions.

As an initial matter, as a result of a recent project at the Transco 165 Station, the ambient air quality in the area should improve even with the inclusion of the proposed Lambert compressor station. As authorized by the January 2020 permit for the Transco 165 Station, Transco is in the process of replacing ten of its decades-old engines with two new turbines, significantly reducing the potential emissions from its stations. As shown in the following table, potential emissions in the area will decrease overall as a result of Transco’s plans even with the addition of Lambert, other than SO₂; and for SO₂, the cumulative emissions are less than a quarter of the permitting threshold of 40 tpy.

Pollutant	Transco 165/166 Pre-2020 Permit PTE (tpy)	Transco 165/166 Post-2020 Permit PTE (tpy)	MVP Southgate Lambert PTE (tpy)	Combined PTE (tpy)	Comparison to Pre-2020 PTE (tpy)
NO _x	3,746.10	548.81	12.37	561.18	-3,184.92
CO	1,026.40	372.58	17.28	389.86	-636.54
VOC	251.2	100.65	3.33	103.98	-147.22
PM	60.3	35.94	10.36	46.3	-14.00
PM ₁₀	60.3	35.94	10.36	46.3	-14.00
PM _{2.5}	60.3	35.94	10.36	46.3	-14.00
SO ₂	10.1	13.87	5.39	19.26	9.16
Total HAPs	73.49	24.05	1.09	25.14	-48.35

Additionally, the potential cumulative impacts have been addressed in the materials already submitted. The NAAQS cumulative ambient air impact modeling conducted for Lambert included emissions from Transco, as well as other sources in the area. *See Public Health Assessment* for how cumulative impacts were addressed for the toxic air pollutants (e.g., formaldehyde).

As further provided by Drs. Green and Crouch, because of the federal Clean Air Act of 1970 (and its amendments), and industries' responses thereto, concentrations of pollutants in ambient air in Virginia and elsewhere in the U.S. have been decreasing over many decades. Figure 1 illustrates this decrease for federally regulated air pollutants, showing trends from 1980 through 2020 in annual average concentrations¹ near the proposed Lambert compressor station (1980 is the earliest year with good available records). Moreover, both the proposed Lambert compressor station, and the Transco stations, are subject to both federal and state-level regulations, so that overall exposures to air pollution for residents near the proposed site are expected to continue to decline.

As for the impact on the health of residents who have been exposed for decades, the regulations for specific air pollutants are designed to account for all individuals in the population (all of whom of course have their own histories of exposures to air pollutants), and the *Public Health Assessment* similarly evaluated other potential emissions from the proposed Lambert station against benchmarks designed as protective for all members of the population, including the elderly. For short-term effects, all the estimated concentrations, including the addition of background values representative of current ambient conditions (which may be expected to decline in future) are well within benchmarks that are believed to be protective of everybody's health. For long-term effects the same is true for persons exposed their entire lives.

¹ These graphs show the inverse-distance-weighted average of annual averages of hourly measurements at the five nearest monitors to the site with data meeting EPA completeness requirements, except for lead (a component of TSP) where the three nearest monitors, daily averages, and a completeness of 40% were used. Some of the variability from year-to-year is due to different monitors potentially being selected each year as they were brought into service, retired, or based on completeness of sampling (e.g. see carbon monoxide from 1993-1996).

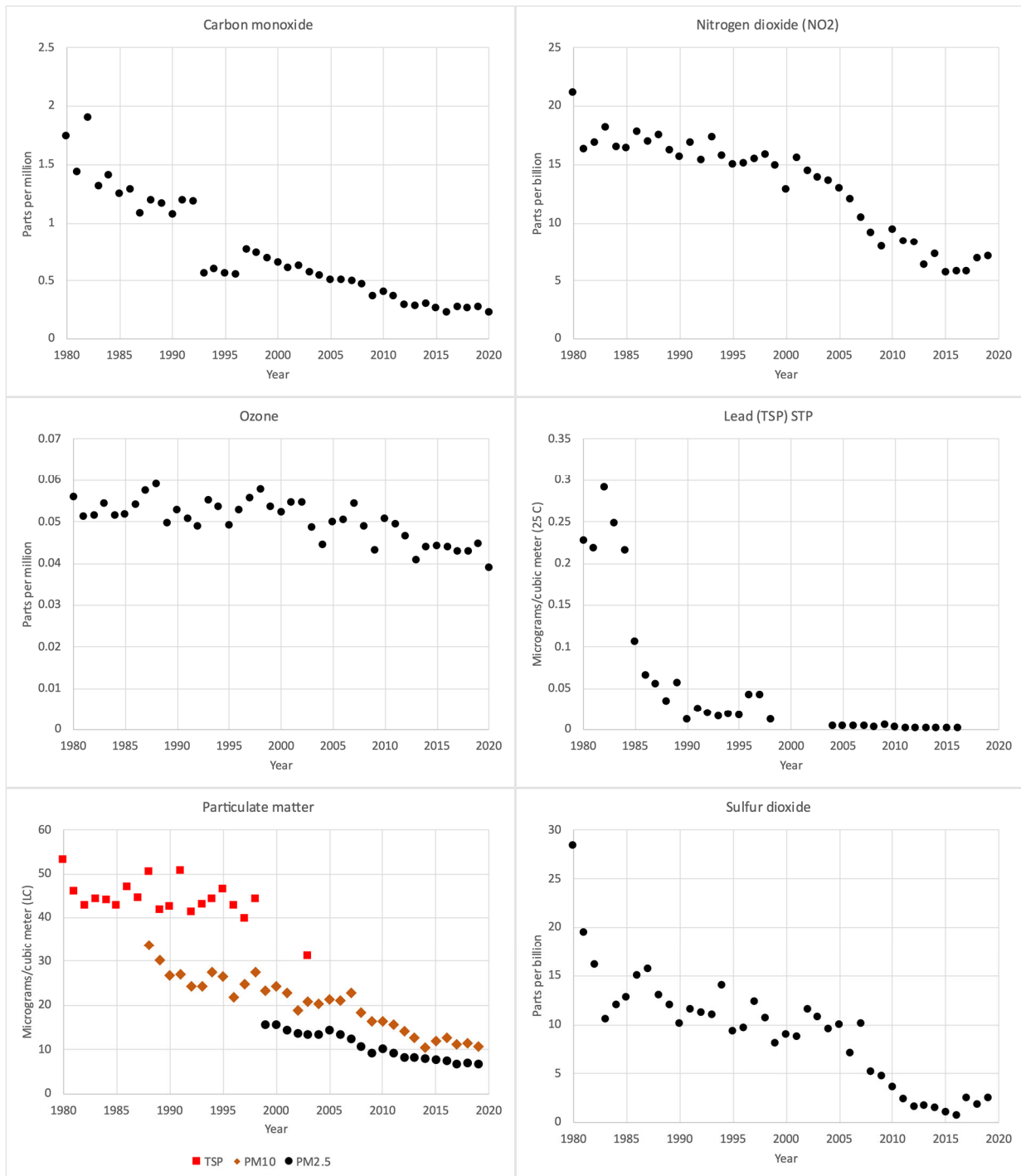


Figure 1. Annual average concentrations of regulated pollutants near the proposed site in Pittsylvania County, VA (see text). TSP = total suspended particulates; PM10 = particulate matter sized 10 microns aerodynamic diameter and smaller; PM2.5 = particulate matter sized 2.5 microns aerodynamic diameter and smaller.

Comment 9: Please correct the HAP PTE presented in Table 3 of the Draft Engineering Analysis. The PTE of 4.53 tpy represents the uncontrolled HAP emissions, while the PTE for the other pollutants are the controlled emissions. As shown in the 8/12/2020 update to the application, the controlled HAP PTE is 1.09 tpy.

Comment 10: Some commenters at the public hearing expressed concerns regarding benzene emissions. As shown in the application, the benzene emissions from Lambert are a tiny fraction of Virginia's regulatory exemption thresholds under 9VAC5-60-300 (4.64 tons/year and 2.112 lb/hr.). They are 0.15% of the annual and 1.1% of the hourly, respectively. Even when considered in combination with the Transco benzene emissions, the cumulative annual emissions are still far below the threshold at 1.2%. Moreover, commenters have offered no information or data that would suggest the cumulative hourly emissions would approach or exceed the regulatory threshold.

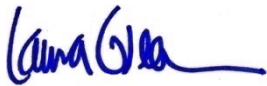
Comment 11: Some commenters at the public hearing questioned the natural gas hexane concentration used in the application because it was different from that used in the MVP Mainline assessment. MVP Southgate acknowledges that the hexane concentrations are different, but the differences are insignificant and immaterial. To estimate hexane emissions, MVP Southgate used a combination of natural gas analyses from various stations servicing nearby wellfields that would be most representative of what is expected to flow through the Lambert Compressor Station. The expected hexane concentration was doubled from what the representative gas analyses showed to provide a very conservative estimate of hexane emissions.

Comment 12: Some commenters during the public hearing contended that the emissions from leaking components were underestimated. As indicated in the Application, Mountain Valley used emissions factors from 40 CFR Part 98, Table W-1A, to estimate component leakage. These factors are the latest available and are newer than the EPA Protocol, Table 2-4 factors previously used for the Mainline.

Comment 13: One commenter at the public hearing claimed that an ongoing federal criminal investigation in connection with the MVP mainline is a reason to deny the air permit for the proposed Lambert compressor station. This comment is not germane to the air permit under consideration, but in any event the commenter is mistaken. On March 3, 2021, the Department of Justice advised Mountain Valley that DOJ and EPA closed their criminal investigation without charges.

Memorandum

To: Anita.Walthall@deq.virginia.gov



From: Laura C. Green, Ph.D., D.A.B.T. and Edmund A.C. Crouch, Ph.D.

Date: March 29, 2021

Re: Review of February 9, 2021 memorandum from Michael James-Deramo regarding the proposed Lambert Compressor Station

We have been asked to review a February 9, 2021 memorandum to you from Michael James-Deramo regarding the proposed Lambert Compressor Station. Therein, Mr. James-Deramo notes that he is opposed to the permitting of this proposed facility; and therewith, he submits six reports or publications that he claims illustrate “the danger of compressor stations, a pattern of violating regulations, and the findings that danger has often been understated.”

In what follows, we review each of these reports and publications. So doing, we find that none of these papers substantiates Mr. James-Deramo’s claims, or otherwise provides evidence that the expected emissions from the proposed compressor station would have an adverse impact on human health.

Hendryx and Luo (2020)

One of the cited papers is by Michael Hendryx and Juhua Luo (2020). Professor Hendryx, formerly at West Virginia University, appears to be a statistician who has focused primarily on the adverse effects of mountain top removal (MTR) for coal-mining in Appalachia (see, for example, Hendryx & Ahern, 2008; Hendryx et al., 2020; and his TED talk, at https://www.ted.com/talks/michael_hendryx_the_shocking_danger_of_mountaintop_removal_and_why_it_must_end).

Now at Indiana University, Professor Hendryx has focused more broadly on air pollution and statistical associations with morbidity and/or mortality. In the paper of interest here (Hendryx & Luo, 2020), he presents a data-dredging exercise, with no probative value, and no relevance to the proposed Lambert compressor station. Its methods are inadequate to draw any meaningful conclusions about public health impacts from the proposed station, or to otherwise support Mr. James-Deramo’s contentions.

Briefly, Hendryx and Luo (2020) make use of existing databases (primarily one including compressor station-emissions, and another on death-rates, with secondary databases on population characteristics) to probe whether county-level emissions of total volatile organic compounds (VOCs) or more than 30 individual VOCs from gas compressor stations, into 100 or more counties in the U.S., do or do not correlate with adjusted rates of mortality in those counties. They claim to find that emissions of 12 of these VOCs do correlate significantly, while the other VOCs do not (as shown in their Table 4). Such correlations have minimal probative value, and are contradicted by the known toxicology of the VOCs.

Among other problems, the authors fail entirely to adjust their analysis for the known or expected potency of any of these VOCs as causes of mortality. Why, for example, do emissions of, say, propylene dichloride correlate with county-wide mortality, while emissions of, say, propylene oxide do not? Ditto for tetrachloroethane, which correlates, and benzene, which does not? If any correlation discovered by these authors were causal, then necessarily the effect sizes would be (approximately) proportional to the toxic potency of each VOC examined. They clearly are not.

Along similar lines, the authors fail to “adjust” for known geographic correlates (possibly non-linear) of mortality, such as weather-related phenomena (*e.g.* temperature fluctuations), or for other known causes of mortality that may correlate with compressor station emissions (*e.g.* other measures of industry or occupation, or traffic density).

Run an analysis like this for enough chemicals and you are bound to find correlations. However, it is a fundamental principle of toxicology (and statistics) that correlation does not necessarily equate to causation. See, for example, <https://www.tylervigen.com/spurious-correlations>.

Hendryx & Luo claim that “additional research that examines individual level exposures in relationship to health are needed.” Such research has indeed been performed for the VOCs they list, and has been used in our Public Health Analysis to evaluate the public health effects of the proposed Lambert Compressor station.

Russo and Carpenter (2017 & 2019)

Two other cited works are by Pasquale Russo and David Carpenter (2017 & 2019). Drs. Pasquale Russo and David Carpenter (at SUNY, Albany) note, correctly that natural gas compressor stations release air pollutants. No one disputes that, and MVP, its consultants, and the VA DEQ have all modeled the potential effects of these airborne releases.

However, Drs. Russo and Carpenter present only incomplete material, from which reliable conclusions cannot be drawn. They provide only lists of emissions and their quantities (in at least one case, formaldehyde and benzene in the 2019 publication, apparently switching the quantities associated with each), and in the case of the 2017 paper also providing a long list of diseases that may have been associated with the chemicals in the emissions at any level of

exposure. But there is no analysis of any connection between the two, so that no meaningful information is in fact provided.

With regard to emissions, they focus on ducted, stack-emissions, but fail to include fugitive emissions. MVP, its consultants, and the VA DEQ have included fugitive emissions in their analyses.

With regard to diseases, since Russo and Carpenter fail to translate emissions into ambient air impacts — and then to theoretical risks of health-harm attributable to those impacts — their analyses fall far short of providing useable information for decision-makers.

It is as if they noted (correctly) that benzene is released from automobiles; and

- (i) that emissions from the totality of (non-electric) automobiles on the road amounts to substantial airborne emissions of benzene (also correct); and
- (ii) that benzene can (at sufficient concentrations) significantly increase our risk of developing (some forms of) cancer (also correct); but
- (iii) then stopped short of estimating **how much** benzene a person stuck in traffic might inhale -- not to mention the types and **magnitudes** of health-risks such inhalation might entail.
- (iv) (Of course, automotive sources of benzene in Virginia, for example, swamp compressor stations in Virginia in terms of total atmospheric emissions and impacts).

In toxicology, evaluation of the level of exposure is essential because that (along with other factors) is what determines both the types and the extents of potential health effects. The irrelevance of their listing is emphasized by noting that Table 2 of Russo & Carpenter's paper (2019) lists formaldehyde emissions at 21,240 pounds in New York State over seven years, and benzene at 1,309,335. Their 2017 paper has these the other way round (Table 2.5a.1), and, of course, is more likely to be correct (though the specificity of their numeric estimates misleadingly suggests precision).

From a toxicological perspective, is either of these formaldehyde quantities a lot? A little? Significant? If so, in what way? From a public health standpoint, these questions must be addressed, but the paper does not do so.

To begin to answer such questions, we can estimate (based on Fuchs et al., 2010)¹ that, during the same time-period, the population of New York State exhaled some 70,000 pounds more formaldehyde than they inhaled! So, in what sense could formaldehyde emissions of less than

¹ Formaldehyde, besides being an industrial chemical and a combustion product, is also a byproduct of human metabolism. Fuchs et al. (2010; Table 2) measured a median excess over intake of 2 nmol/L (60 ng/L) formaldehyde in the breath of their control subjects. Using a standard estimate of 11,000 L/day breathing rate, and a New York State population of 19,340,000, gives 4,660 kg/yr emissions, or 10,300 lb/yr, or 72,000 lb in seven years.

25,000 pounds matter? Even if all of this emitted formaldehyde were somehow inhaled by everyone in New York State, as opposed to atmospherically dispersing and otherwise drifting farther afield? But now the question is whether the more accurate value of 1,300,000 or so pounds emissions in New York (over seven years) is a problem. That requires the sort of analysis that has been done for this proposed facility by others, based on actual expected emissions, the resultant human exposures, and the potential health effects of such exposures.

Russo & Carpenter (2017) is an unpublished report that is considerably longer than their published 2019 paper, but like the published version provides no quantitative or relevant analysis for the task at hand. Nothing offered by these authors' papers (2017 & 2019) bears on the question of whether the proposed Lambert Compressor Station is or is not a risk to public health.

Macey et al. (2014)

Macey and colleagues (2014) write that "potentially dangerous compounds and chemical mixtures are frequently present near oil and gas production sites." This is undoubtedly true. However, these authors present no quantitative analysis of air quality impacts — nor of potential risks to health therefrom — from compressor stations in general, let alone from the proposed compressor station in particular. As such, this paper is uninformative as to the public health impact of the proposed Lambert Compressor Station.

McKenzie et al. (2014)

McKenzie and colleagues (2014) note, correctly, that "U.S. production of natural gas is expanding;" and they speculate that "maternal residential proximity" to natural gas wells in Colorado might be associated, statistically, with adverse outcomes of pregnancy. These authors did not examine proximity to compressor stations (whether in Colorado or elsewhere), or otherwise factor such stations into their admittedly preliminary study. While the authors included potential maternal covariates (e.g. age, education) of the adverse outcomes they examined, they omitted at least one known correlate (pregestational diabetes) with likely high prevalence in the population examined (e.g. Simeone et al., 2015 is a meta-analysis of pre-2013 studies). A follow-up study (McKenzie et al., 2019) provides a stronger evaluation of proximity to both oil and gas development sites. That also found weak associations, but notes its limitations (e.g. "Data on covariates were limited to information on the birth certificates and thus we were not able to adjust for maternal health and nutrition..."), and points out that offspring of mothers with pre-pregnancy diabetes are at higher risk.

Moreover, even without considering all the key contributors to maternal risk, their results were mixed: the authors report that their "study suggests a positive association between greater density and proximity of natural gas wells within a 10-mile radius of maternal residence and greater prevalence of CHDs [congenital heart defects] and possibly NTDs [neural tube defects], but not oral clefts, preterm birth, or reduced fetal growth." Such inconsistent results caution

against drawing conclusions that natural gas wells (which are not even at issue with regard to the proposed compressor station) are a causal factor.

For many reasons, but primarily because it did not examine any relevant question, this paper does not bear on the potential health risks associated with the proposed Lambert Compressor Station.

Tran et al. (2020)

Tran and coauthors (2020) also seek to associated “residential proximity” to “oil and gas development” with a limited set of four “birth outcomes,” this time in California. Their results differ from those obtained by McKenzie et al. (2014; reviewed above), in that they find no associations in “urban areas” and some associations in “rural areas,” although where the outcomes overlap with those of McKenzie et al. (2014), the studies contradict each other. Again, the set of covariates was limited by availability from birth records. Regardless, these authors also did not examine proximity to compressor stations, and so cannot be said to bear on the question of whether emissions from the proposed Lambert Compressor Station present a risk to human health.

Overall, then, the papers provided by Mr. James-Deramo do not provide relevant and/or reliable evidence with regard to the expected impacts to the environment and/or to public health from the proposed Lambert Compressor Station.

Acknowledgement

Our review has been sponsored by Mountain Valley Pipeline, LLC. Our opinions are our own, and we take responsibility for errors.

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From: [senate district21](#)
Sent: Friday, April 9, 2021 3:59:54 PM
To: [David K. Paylor](#)
Cc: anita.walthall@deq.virginia.gov
Subject: 2021.04.09 Letter to DEQ re Air Permit Reg. No. 21652
Importance: Normal
Attachments:
[2021.04.09 Letter to DEQ re Air Permit Reg. No. 21652.pdf](#);

Director Paylor:

Please see the attached letter from Senator Edwards regarding Air Permit Registration No. 21652.

Additionally, Anita Walthall is copied on this email to receive this letter as public comment on the matter.

Sincerely,
Luke Priddy

Luke W. Priddy | Chief of Staff
Patrick J. Giallorenzo | Legislative Aide
Office of Senator John S. Edwards
district21@senate.virginia.gov | PO Box 1179, Roanoke, VA 24006
Richmond Office: 804.698.7521 | Roanoke Office: 540.985.8690
Priddy Mobile: 540.798.6531 | Giallorenzo Mobile: 732.672.3263

2021.04.09 Letter to DEQ re Air Permit Reg. No. 21652.pdf

SENATE OF VIRGINIA

JOHN S. EDWARDS

21ST SENATORIAL DISTRICT
ALL OF GILES COUNTY; ALL OF THE CITY OF ROANOKE;
AND PART OF MONTGOMERY AND ROANOKE COUNTIES
POST OFFICE BOX 1179
ROANOKE, VIRGINIA 24006-1179
ROANOKE: (540) 985-8690
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RICHMOND: (804) 698-7521
DISTRICT21@SENATE.VIRGINIA.GOV



COMMITTEE ASSIGNMENTS:
JUDICIARY, CHAIR
COMMERCE AND LABOR
EDUCATION AND HEALTH
FINANCE AND APPROPRIATIONS
RULES

April 9, 2021

David K. Paylor, Director
Department of Environmental Quality
Post Office Box 1105
Richmond, Virginia 23218

Re: Lambert Compressor Station Air Permit, Registration No. 21652
(Mountain Valley Pipeline)

Dear Director Paylor:

I write concerning the Mountain Valley Pipeline and the minor source permit application from MVP, LLC for a compressor station in Pittsylvania County, VA. MVP "mainline" has had multiple authorizations vacated by courts. North Carolina's DEQ specifically cited the uncertainty of the project in denying a certification under Clean Water Act §401 in 2020. It is unclear why expanding an incomplete, non-operational project should be a priority.

Construction of MVP is harming Virginia communities and water resources, most especially in the district I represent. MVP, LLC consistently fails to prevent sediment runoff from entering the waterways. Based on this history of construction performance, I have no confidence in MVP, LLC's pipeline or the additional infrastructure in Pittsylvania County.

The permit application for MVP, LLC's Lambert Compressor Station does not include sufficient review of cumulative impacts. A complete application would include the combined impacts of the existing pipeline facilities at this site. The March 30 chemical fire in Chatham reinforces the risk of locating several industrial pipelines a few short miles from each other. The site of the proposed compressor station is already degraded by significant toxic exposure.

In light of insufficient impact studies within MVP, LLC's application, the legal uncertainty of MVP's mainline permits, a new Virginia Water Protection permit review for the mainline, and a lack of certainty that the mainline project will ever be operational, I ask that you deny the requested air permit for the Lambert Compressor station and request a new, complete application from MVP, LLC at an appropriate future time.

The short- and long-term health and safety of our environment and communities is paramount.

Thank you for your time and attention to this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "John S. Edwards", with a stylized, flowing script.

John S. Edwards

JSE:lwj ,

cc: Anita Walthall, Air Permit Writer, Department of Environmental Quality
via email anita.walthall@deq.virginia.gov

Archived: Monday, April 12, 2021 8:01:22 AM
From: [Kay Ferguson](#)
Sent: Friday, April 9, 2021 3:58:50 PM
To: anita.walthall@deq.virginia.gov
Subject: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit
Importance: Normal

April 9, 2021

VA Air Pollution Control Board
VA DEQ

RE: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit at 987 Transco Rd., Chatham, Va. 24531

Dear Madames and Sirs:

The draft air permit for the Mountain Valley Lambert Compressor Station should be denied, at best, and taken forward to a full board and public hearing at least.

This is not the right time to grant or even consider an air permit for the proposed Lambert Compressor Station.

It is not the right time when the Mountain Valley Pipeline and Mountain Valley Southgate both lack key federal and state permits and are likely to never be completed. Permitting Lambert now would be like building a bridge from nowhere to nothing, a reality made manifest by DEQ's own recent recognition that the stream by stream analysis now finally required for MVP Mainline can not be done until next year and with the stark and long truth that the project could never rightly pass the test of such an analysis.

It is not the right time because once again the VA DEQ's process for public notification and public engagement has been inadequate as MVP Southgate's own private consultant noted in her report, a report which MVP Southgate then mis-represented.

It is not the right time because despite court rulings and private consultant studies which identified DEQ's normal process for public engagement as environmentally unjust, there has been no meaningful change or reform - a lack the very existence of this permit clearly demonstrates.

It is not the right time when public participation must now be entirely virtual for an impacted community with limited broad band therefore making a process already judged to be inadequate and unjust even more burdensome.

It is not the right time when, once again, an adequate demographic and health survey has not been done for the directly impacted community.

It is not the right time when rural and minority communities are facing disproportionate illness, death and joblessness due to covid 19 - a horror which an influx of out of state construction workers would only exacerbate.

It is not the right time when the applicant has not chosen, as the law demands, the least polluting technology to power their proposed station.

It is not the right time when granting of this permit would violate the new Environmental Justice legislation passed by the General Assembly in 2020.

It is not the right time when both investments in and markets for fracked gas are collapsing and any new fossil infrastructure is likely to create stranded assets, higher utility costs, and failed industry promises of local revenue, leaving a county like Pittsylvania without clean air or water and with reduced tax revenue from property values which have been destroyed because no one wants to live there.

And it is not the right time when the imperative facts of climate change insist that we must cease all use of fossil fuels as quickly as we can or perish.

There's an old saying, Pick your poison. But one thing must be true, we must cease to pick other people's poison and to believe for even one moment that continuing to try and place these horrible stations in rural, poor and minority communities is moral or even cruelly practical. We're all in this together now and every person's back yard is our own.

Kay Leigh Ferguson
1050 Broomley Road
Charlottesville, VA 22901

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Kay Leigh Ferguson
[Water Quilt Project](#)
[ARTivism Virginia](#)
[Water is life. Protect it.](#)

Archived: Monday, April 12, 2021 8:01:22 AM

From: [May, Luke](#)

Sent: Friday, April 9, 2021 3:55:21 PM

To: anita.walthall@deq.virginia.gov

Cc: [Giannetti, Gillian](#); [Mall, Amy](#)

Subject: NRDC Comments on MVP Lambert Compressor Station

Importance: Normal

Attachments:

[NRDC Comments on MVP Lambert Compressor Station 04.09.2021.pdf](#);

To Anita Walthall,

Please see attached comments on the MVP Lambert Compressor Station.

Thank you,

-Luke May

LUKE MAY

Climate and Clean Energy Legal Fellow

NATURAL RESOURCES DEFENSE COUNCIL

1152 15TH ST. NW

SUITE 300

WASHINGTON, DC 20005

T 202.289.2412 EXT 2412

LMAY@NRDC.ORG

NRDC.ORG



April 9, 2021

Via email to anita.walthall@deq.virginia.gov

Ms. Anita Walthall
Virginia Department of Environmental Quality
Blue Ridge Regional Office
901 Russell Drive
Salem, VA 24153

Re: Proposed Stationary Source Permit to Mountain Valley Pipeline, LLC to Construct and Operate Lambert Compressor Station (Registration No. 21652)

Dear Ms. Walthall:

Natural Resources Defense Council (NRDC) disputes the Virginia DEQ's (VADEQ) assessment of the Best Available Control Technology (BACT) statute. In its Final Draft Analysis, VADEQ states:

An electric compressor station may or may not be an inherently lower pollutant process than a natural gas-fired compressor station. This scenario is dependent upon the fuel source for electric generation on the grid from which electric compressor station receives its electricity. If the source of the electric compressor station's electricity comes from a coal-fired power plant, the overall air pollution impact of the electric compressor station is worse than that of a natural gas-fired compressor station. However, if the electricity comes from a natural gas-fired power plant, the overall air pollution impact of an electric compressor station is likely to be approximately equal to that of a natural gas-fired compressor station.¹

This is an incorrect characterization of the BACT program. BACT is a *source-specific* assessment, and the statute endeavors to minimize the emissions of locally harmful pollutants that could cause an exceedance of an ambient pollutant threshold. Section 169 of the Clean Air Act defines BACT as an "emission limitation based on the maximum degree of reduction ... emitted from or which results from any major emitting facility ... which the permitting authority ... determines is achievable for such facility."² An "emission limitation" is defined as a "requirement established by the State or Administrator which limits the quantity, rate, or concentration of emissions of air pollutants."³ Thus, a BACT analysis compares local emissions of control technologies. VADEQ speculates as to the amount of emissions associated with the electrical generation necessary to operate an electric compressor; this speculation incorrectly turns the BACT program on its head. VADEQ provides no legal precedent to substantiate its assertion that emissions from geographically distant coal facilities are a logical comparator to local emissions from a gas compressor station. To compare speculative and geographically distant emissions, from the electric grid, to local emissions from the gas compressor station, fails to meet the obligations of the NAAQS program.

¹ DEQ, Draft Engineering Analysis, MVP Southgate Project – Lambert Compressor Station 19, at 10.

² 42 U.S.C. 7479(3).

³ 42 U.S.C. 7602(k).



Signed,
/s/ Luke May
Luke May
Attorney Fellow
503.702.3655
lmay@nrdc.org
cc: ggiannetti@nrdc.org
amall@nrdc.org

Archived: Monday, April 12, 2021 8:01:22 AM

From: [Grace Tuttle](#)

Sent: Friday, April 9, 2021 3:26:49 PM

To: [Walthall, Anita](#)

Subject: Mountain Valley Pipeline Lambert Compressor Station Draft Air Permit

Importance: Normal

Attachments:

[Tuttle Lambert Comment .pdf](#);

Dear Ms. Walthall,

Please see my attached comments regarding the Lambert Compressor Station Draft Air Permit. Thank you.

Sincerely,

Grace Tuttle

Tuttle Lambert Comment .pdf

Anita Walthall
Blue Ridge Regional Office
901 Russell Drive
Salem, VA 24153

Introduction

I ask that the Virginia Department of Environmental Quality deny the permit for Mountain Valley Pipeline LLC to build the proposed Lambert Compressor Station in Pittsylvania County, Virginia. I ask that if the DEQ does not deny the permit outright, that the permit then be elevated to the full Air Pollution Control Board for their consideration. I am a resident of Virginia, and I care about this permit decision because I believe that there should be no sacrifice zones that are subject to disproportionate impacts from polluting infrastructure, that environmental *injustice* is perpetuated by DEQ's current permitting process, and that the future of the people and places I love are directly threatened by climate change.

I also have several questions for DEQ regarding the permitting process:

1. If the proposed Lambert Compressor Station's permit decision is elevated to the full Air Pollution Control Board, will the APCB have access to the full extent of all public comments submitted during the public comment period, not just the summaries and responses prepared by DEQ?
2. What weight do the concerns of the public, expressed during the public comment period have in this permitting decision?

Reasoning

- I. The agency should place the burden on the applicant to prove that they should be able to pollute, not on the public to prove why they should not be allowed to pollute, when DEQ's mission is outlined as below:

"DEQ's Mission is to protect and enhance Virginia's environment, and promote the health and well-being of all citizens in the Commonwealth. DEQ's Vision is that all Virginians enjoy cleaner water, better air quality and

the productive reuse of land that was once contaminated” ([DEQ Website](#), ‘About DEQ’).

- II. DEQ indicates in their ‘What is DEQ’s role in permitting?’ [fact sheet](#) that they review air permit applications for regulatory compliance including ‘Best Available Control Technology’.
 - A. DEQ must then explain why Mountain Valley Pipeline is not required to use electric compressor turbines beyond MVP’s claim that in the Draft Engineering Analysis that “the parameters in question, electric turbines with electric transmission, are believed to fundamentally redefine the BACT approach for the proposed combustion turbines and therefore BACT does not apply” and their claims of ‘cost effectiveness’ issues (Final Draft Analysis, p. 10).
 - B. If the regulatory criteria do not actually force the use of what could be commonly defined as “Best Available Control Technology,” then that terminology is not appropriate to list as one of DEQ’s roles in permitting. Additionally, why does DEQ in their own Fact Sheet refer to “Best Available Control Technology” on page 1 and “Best Achievable Control Technology” as BACT on page 2? These have different implications. The determination of BACT based on process based on “energy, environmental, economic and other impacts and costs” allows for interpretation and manipulation by the applicant.
 - C. One of the reasons that DEQ’s permit for the Buckingham Compressor Station was later revoked by the 4th Circuit Court of Appeals in January 2020, as described in a [2020 Virginia Mercury article](#) by Sarah Vogelsong, is that “the judges condemned the agency and the board for their failure both to consider the use of electric motors rather than gas-fired turbines at the proposed station and to evaluate the environmental justice impacts of the facility.”
- III. Environmental justice is inadequately considered within this permit. The Draft Engineering Analysis states that (using commonly accepted [‘fenceline’ community definitions](#) of living within three miles of a facility requiring a Risk Management Plan (RMP) under the EPA, which pipeline facilities fall under): “Land & Heritage Consulting identified *multiple communities throughout Pittsylvania County who meet the criteria for designation as*

Environmental Justice communities were identified” (Draft Analysis, p. 16). LHC’s report intends to both “(1) identify potential environmental justice communities and ways in which they anticipate impact and (2) identify actions that community members believe could be taken to ensure fair treatment and meaningful involvement in the impact and outcome of the proposed Station” (Draft Analysis, p. 16). There is no indication from LHC’s report or MVP’s Supplemental Information on Environmental Justice that those actions will be completed, or that these communities have been adequately engaged in shared dialogue or decision making in any manner, so this exercise appears to be about ‘checking a box.’ MVP goes even further in their Supplemental Information on Environmental Justice, reneges on the ‘fenceline’ community definition and claims “as explained below, the vast majority of the 1-mile study area is not a ‘community of color’ environmental justice community as defined by VEJA; the study area contains one very small part of a census block group that qualifies as a community of color under VEJA. The study area does qualify as a ‘low-income’ environmental justice community” (Supplemental Information on Environmental Justice, p. 11).

- A. In addition, both of LHC’s Community Impact Assessments indicated that LHC only spoke to one Black or African American person in their ‘ground-truthing’ efforts, and LHC indicates that MVP needs to continue the efforts of meaningful engagement of these communities. DEQ needs to provide evidence that this has been done before the permit can be decided. LHC indicated that non-Black, non-Indigenous respondents expressed ‘comfort’ with the Station’s location in a place where there is existing infrastructure, the land is already degraded, and MVP’s ‘use of existing corridors.’ The implications of this statement are that non-Black, non-Indigenous respondents are comfortable with the station because it is sited for a place that is already a sacrifice zone.
- B. Mountain Valley Pipeline MVP states: “these newsletters (1) apprise the community of the status of the Project and next steps; (2) list where community members can access documents from FERC and otherwise; (3) include a Frequently Asked Questions section; and (4) reiterate that public input is important, with ways to communicate comments about the Project to Mountain Valley” (Supplemental Information on Environmental Justice, p. 14). Because MVP LLC

directed public comments directly to *themselves*, they misrepresented the legitimate public comment processes, contained feedback to themselves, may have answered questions in a biased manner and put out inherently biased information about the project.

- IV. Virginia DEQ has an opportunity to follow the example of North Carolina's DEQ by denying this permit because it poses unnecessary harm and risk to communities and ecosystems. The MVP mainline's financial outlook and prospects of completion continue to fall, according to a [2021 report](#) by the Institute for Energy Economics and Financial Analysis (IEEFA), and it would directly contradict DEQ's Mission to approve a permit that causes unnecessary harm, on behalf of an unnecessary pipeline that may never be put into service or that may be left as a stranded asset. The project was approved under a flawed and industry-influenced determination of need at FERC. Virginia DEQ has a chance to protect the health of their own state by denying this permit and standing up to FERC's abuses of power.
- V. MVP reports that "as an initial matter, the environmental justice community will bear no adverse disproportionate health risks because no community will face any appreciable health risk as a result of the facility's emissions, notwithstanding any particular sensitivities or vulnerabilities in the environmental justice community" (Supplemental Information on Environmental Justice, p. 14). This, as well as DEQ's own website stating that "The facility would be classified as a minor source of air pollution pursuant to air permitting laws. If constructed, there would be no adverse impact on the air quality near the facility, and air quality would remain in compliance with all air quality standards," are misleading to the public. DEQ needs to be more specific, and explain that this particular Station alone would not appear to violate National Ambient Air Quality Standards (NAAQS) (which does not mean zero-risk), and delineate that this permit alone being within the NAAQS does not adequately account for the cumulative air quality of the area once the Station is in service due to its variable emissions, especially being that the area is already saddled with two compressor stations. The cumulative air quality analysis in the Draft Analysis does not appear to account for the variable emissions. Is the proposed Station allowed to pollute above the NAAQS limits at certain times?

- VI. There are significant concerns of radioactivity in and around the proposed Station that are not addressed by DEQ or MVP. According to [Pittsburgh Mineral & Environmental Technology, Inc.'s presentation](#) (PMET) by Alan McArthur and William Lemons, unknown, unregulated or undetected TENORM (Technologically Enhanced Naturally Occurring Radioactive Material) including Radon and Radium are: “personnel direct and inhalation exposure to dust or aerosols containing TENORM, environmental and equipment TENORM contamination, rejection of waste by disposal facilities, rejection of scrap by recycle facilities, penalties for non-compliant transport and shipping manifest errors, unbudgeted costs for remediation of facilities, equipment, pipeline inspection pigging, filters, well workover and waste disposal, and litigation costs subsequent to people exposure and environmental contamination with non-factual records” (PMET, Slide 2). This already astounding list of consequences is missing the potential health consequences on the impacted communities and ecosystems from TENORM, which must be considered by DEQ when considering Lambert’s permit. McArthur and Lemons outline that Radon Daughters Pb (lead), Bi (Bismuth) and Po 210 (Polonium 210) are deposited in pumps, pipelines, vessels, filters, storage reservoir equipment, and state that worker safety and waste management are enormous concerns. According to PMET, upon Polonium 210’s decay into lead, it emits high-energy alpha particles that can kill body cells, inhalation or ingestion of Po-210 can cause irradiation of internal organs, and alpha particles can be stopped by skin, but beta particles are able to penetrate up to one centimeter of body tissue (PMET Slide 21). The toxicity of Po-210 is much higher than that of cyanide, and Po-210 can “concentrate to very high concentrations in gas collecting on pipelines, all pig types and gas filters, separation and processing plants” (PMET Slide 22). PMET cites that “inhalation exposure in gas TENORM remediation projects has been measured at 47 times greater than the highest [maximum] external gamma exposure dose...inhalation/ingestion of Gas TENORM must be prevented...Respiratory air and public air monitoring is required on ALL Gas TENORM projects...high pressure gas pipelines can have 26,000 M Bq of concentrated TENORM” (PMET Slide 28). What is DEQ’s plan to address the radioactivity of the emissions, waste, worker safety, innocent civilian safety and hazardous waste disposal from contaminated items?

VII. DEQ must consider the implications of permitting another fossil fuel facility on the environment and health of Virginians and Virginia's ecosystems. If we are to avoid catastrophic climate collapse within the next ten years, we must effectively stop greenhouse gas emissions. If constructed and operated as planned, the MVP alone could be responsible for near 1% of GHG emissions for the entire US energy sector ([Zipper](#), 2021). It is unjust that the burden of stopping pollution is on the public. DEQ has the authority to stop permitting more sacrifice zones and polluting infrastructure, so they should use it.

Conclusion

The harms that this Station would cause are all avoidable. DEQ has a responsibility to protect all Virginians from harm, not just some. I request that DEQ deny the permit for the proposed Lambert Compressor Station based on the above justifications. I request that the permit be elevated to the full Air Pollution Control Board for consideration in the event it is not denied outright.

Signed,

A handwritten signature in black ink, appearing to read "grace tuttle", written in a cursive style.

Grace Tuttle
4530 Mill Creek Road
Millboro, VA 24460
(540) 416-2717



NAACP
Virginia
STATE CONFERENCE

Robert N. Barnette, Jr.
President

Da'Quan Marcell Love
Executive Director

March 8, 2021

Anita Walthall
Virginia DEQ
Blue Ridge Regional Office
901 Russell Drive
Salem, VA 24153
Phone: 540.562.6769
Email: anita.walthall@deq.virginia.gov



Delivered via Email

Re: Air Quality Permit Registration Number 21652, Mountain Valley Pipeline LLC, Lambert Compressor Station, 987 Transco Road, Chatham VA 24531

Dear Ms. Walthall,

The Virginia State Conference of the National Association for the Advancement of Colored People (Virginia NAACP) supports the Pittsylvania County NAACP's request that the Virginia Department of Environmental Quality deny the Minor New Source Review Permit (air permit) requested by the Mountain Valley Pipeline and elevate the permitting process to the Air Pollution Control Board for further evaluation. At the onset of the new permitting process, we also request that the Pittsylvania County NAACP be contacted early and made an active participant and local expert in the future consideration and assessment of the proposed siting and permitting review process of the Lambert Compressor Station.

The Virginia NAACP is disheartened by reports from the Pittsylvania County NAACP Branch that the current permitting process for the Lambert Compressor Station Air Permit Application process did not include involvement from the NAACP community until the end of the project when opportunities to collect influencing public feedback had passed. This was especially problematic for the individuals who own property, and a family business, directly adjacent to the proposed location site, who were not contacted.

Meaningful and intentional communications should have been made to individuals who would be directly impacted by the proposed compressor station (especially those located within the Blairs and Pittsylvania communities). Meaningful and intentional communication is to not only notify the public of any proposed project, but to educate them about the project's needs, impacts, or benefits, and solicit informed and active participation in the decision-making process.

The Community Impact Assessment report indicated that the “majority of the respondents were not familiar with the proposed Station”. The report further states, “...but of those who were familiar, a majority of non-indigenous respondents expressed comfort with the proposed location, citing its proximity to another existing Compressor Station and appreciation Mountain Valley’s use of existing corridors and already impacted landscapes.” These comments are not to be celebrated or a nod to an equitable location analysis and siting process, but to show not enough information about potential emissions and air pollutants was provided during the 30-minute interview session. For a project of this magnitude and longevity, at a minimum, two town meetings should have been held along with multiple contacts with key stakeholders, property owners, business, and community service providers.

Toxic cumulative and indirect impact considerations and existing levels of air pollution must also be considered. If this Compressor Station is built at the proposed site, which is within close proximity to two existing Transco compressor stations, the combined emissions will place the health and safety of the community at substantial risk. The proposed Lambert station would increase the emissions of particulate matter in the area by 30%. Air Quality was a major concern raised by the Virginia NAACP during the Union Hill/Buckingham County Atlantic Coast Pipeline, and is presented here again by the Pittsylvania County NAACP branch. This is an environmental injustice that is commonly performed when siting noxious facilities in communities of color.

“On January 7, 2020, the 4th Circuit Court of Appeals revoked an air permit issued to Dominion Energy for a compressor station in the predominantly African American community of Union Hill in Buckingham County despite stringent air quality requirements, stating “What matters is whether the (Air Pollution Control Board) has performed its statutory duty to determine whether this facility is suitable for this site, in light of [environmental justice] and potential health risks for the people of Union Hill. It has not.”

Excerpt from Pittsylvania County NAACP comments.

NAACP, in partnership with the Clean Air Task Force and the National Medical Association, released, “Fumes Across the Fence-Line: The Health Impacts of Air Pollution from Oil and Gas Facilities on African-American Communities.” The report quantified the elevated health risks that communities of color face due to pollution from nearby oil and gas facilities and found that African Americans are exposed to 38 percent more polluted air and are 75% more likely to live in fence-line communities. These burdens should be taken seriously and avoided.

“The life-threatening burdens placed on communities of color near oil and gas facilities are the result of systemic oppression perpetuated by the traditional energy industry, which exposes communities to health, economic, and social hazards.” NAACP, Fumes Across the Fenceline¹

¹ <https://www.naacp.org/climate-justice-resources/fumes-across-fence-line/>

While African-Americans endure most of the harmful impacts of traditional energy production, communities of color reap few, if any, of the benefits. We must do all we can to prevent the Pittsylvania community, and many others around the Commonwealth, from becoming Sacrifice Zones. Sacrifice Zones are hot spots of pollution where typically communities of color and low-income communities live, work, or, and play in areas directly adjacent to heavily polluted industries.

Yes, the environmental and energy justice issues are multilayered but the approach to tackling these issues must also be multilayered and well-planned with strong efforts to mitigate and reduce threats from adverse impacts, particularly in already burdened communities.

Conclusion

The Virginia NAACP stands behind all comments submitted by the Pittsylvania County NAACP branch on March 3, 2021 and support the branch's requests:

Request that DEQ Refer the Draft Permit to the Air Pollution Control Board

We, the Pittsylvania County Branch of NAACP request that DEQ deny the MVP Lambert Compressor Station air permit and elevate the permit review to the Air Pollution Control Board. We further ask that DEQ and the Air Board set a strong precedent for ensuring environmental justice by conducting a thorough and unbiased evaluation of environmental justice communities in Pittsylvania County and the cumulative and combined effects of existing and proposed compressor stations on these communities.

The Federal Energy Regulatory Commission (FERC) granted conditional approval for construction of MVP Southgate Project, including the Lambert Compressor Station, in June 2020, stating that no construction begin until MVP obtains essential federal permits for the MVP Mainline and receives permission to restart construction halted due to poor performance and numerous lawsuits. MVP has not met these conditions. There is tremendous uncertainty as to when, or even if, the MVP Mainline will be completed.

DEQ and the Air Board does not need to rush the air permit review for the Lambert Compressor Station, which has no purpose if the MVP Mainline is abandoned.

DEQ and the Air Board should:

- Identify environmental justice communities affected over the sixty years that Transco has operated here in Pittsylvania County, communities now at increased risk from an MVP compressor station;
- Bring these communities into the decision-making process; and
- Evaluate the cumulative and combined, past and future effects of the Transco and MVP compressor stations.

Ms. Anita Walthall, Virginia DEQ

March 8, 2021

Page 4 of 4

The DEQ and the Air Board does not need to patronize residents of Pittsylvania County with assurances that a new compressor station would not impact air quality.

Sincerely,

A handwritten signature in cursive script that reads "Robert Barnette".

Robert Barnette, President

Virginia NAACP

A handwritten signature in cursive script that reads "Karen Campblin".

Karen Campblin, Chair

Virginia NAACP

Environmental and Climate Justice