EARTHWORKS

April 6, 2017

Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

RE: Docket Nos. CP15-554-000, -001; CP15-555-000; and CP15-556-000. Comments on the Draft Environmental Impact Statement, Atlantic Coast Pipeline and Supply Header Project.

Dear Deputy Secretary Davis:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) prepared by the Federal Energy Regulatory Commission (FERC) on the Atlantic Coast Pipeline (ACP) and related Supply Header Project (SHP).

Please accept these comments on behalf of Earthworks, a national nonprofit organization committed to protecting communities and the environment from the impacts of mining and energy development while seeking sustainable solutions. For more than 25 years, we have fulfilled our mission by working with communities and grassroots groups to reform government policies, improve corporate practices, influence investment decisions and encourage responsible materials sourcing and consumption.

Earthworks' comments focus both on the general approach and scope of the DEIS and on specific air quality considerations related to ACP and SHP. Since 2015, we have conducted over 650 individual investigations into air emissions from oil and gas facilities in 16 states using an Optical Gas Imaging camera (specifically a Forward Looking Infrared GF320). This includes three facilities in Virginia owned and operated by Dominion Energy, the videos of which we are submitting along with these comments.

Earthworks is also submitting along with these comments our 2017 report *Permitted to Pollute: how oil & gas operators and regulators exploit clean air protections and put the public at risk.*[1] To conduct this in-depth investigation, we researched the permits, plan approvals, operators' estimated and reported emissions, and conducted air pollution sampling at three natural gas facilities in southwestern Pennsylvania. Some of our key findings are directly related to the gaps in the DEIS for ACP and SHP.

1. The DEIS is incomplete

The current DEIS was prepared and released to the public for comment on December 30, 2016. However, throughout January and February 2017, Dominion Transmission, Inc. (Dominion) filed dozens of new documents supplementing the information that is reviewed in the current DEIS.

These new submissions to FERC contain important information on environmental issues and are integral to any conclusions contained in an Environmental Impact Statement. Yet none of these documents were available at the time that FERC issued the DEIS, and therefore not subject to the current public review within the current comment period.

The omission of several documents and analyses in the DEIS implies a "just trust us" stance by FERC that is inappropriate for a public agency. By allowing submission of documents after issuance of the DEIS, FERC is effectively depriving the public of their legal right to full information related to the proposed projects. The public is also deprived of the opportunity to contribute information on any and all aspects of the project, which FERC is required to consider before issuing a final Environmental Impact Statement (EIS).

Earthworks agrees with the motion filed with FERC by Wild Virginia, Friends of Nelson, and Heartwood on March 3, 2017.[2] The DEIS currently under review lacks complete information and as a result, FERC, other agencies, and the public can not fully analyze the environmental impacts of the proposed projects.

Given this fact, FERC should withdraw the DEIS, revise it, and release a revised DEIS or supplemental DEIS for public comment. FERC should not proceed with the development and issuance of a final EIS until a complete DEIS reflecting all documents submitted to FERC by Atlantic Coast Pipeline, LLC (Atlantic) and Dominion is issued and subject to full public review, in accordance with the National Environmental Policy Act (NEPA).

2. FERC has not fully analyzed and considered the no-action alternative

FERC has failed to properly consider the no-action alternative in the DEIS for the Atlantic Coast Pipeline, instead providing only a cursory mention based on a faulty premise.

Under NEPA, the purpose of analyzing alternatives, including no action, is to "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public."[3] Unfortunately, in the current DEIS, FERC has abrogated its responsibility to fully assess environmental costs and to weigh them against the purported benefits of the project discussed throughout the remainder of the DEIS.

Instead, FERC briefly states (on p. ES-13) that because the no-action alternative "would not be able to meet the purpose of ACP and SHP, we conclude it is not preferable to the proposed action. We also conclude alternative energy sources, energy conservation, and efficiency are not within the scope of this analysis because the purpose of ACP and SHP is to transport natural gas."

This conclusion is based on the effect that the no-action alternative would have on the goal of the proposed projects (i.e., to deliver natural gas), rather than its effect on the environment and public health as required under NEPA. FERC should therefore supplement this DEIS with a comprehensive

no action alternative analysis accounting for the environmental and public health harms that would be avoided by not permitting the ACP and SHP projects.

A full no-action alternative analysis is particularly important given the sheer size and complexity of the ACP. Stretching for over 600 miles and including 17 new or modified transmission and distribution facilities, ACP will have wide-ranging impacts on air, water, land, forests, and wild species in three states. FERC has recognized the potential for both temporary and permanent environmental impacts—it is therefore unacceptable to dismiss the no-action alternative because the project is designed to supply natural gas.

3. FERC should recognize current research on the need for ACP

The ACP is one of several pipeline projects proposed for the same region of West Virginia and Virginia. Yet FERC does not have a process in place to assess whether the build-out of a particular natural gas pipeline in a region is even necessary. If it is not, the severe environmental impacts of ACP cannot be justified by the need for additional natural gas transmission that would supposedly be met through the project.

Notably, a recent study by the Institute for Energy Economics and Financial Analysis (IEEFA) concluded that FERC is facilitating the overbuild of pipelines, in turn posing significant financial risks to ratepayers and project investors.[4]

Because pipeline and compressor station projects can take years to complete, the capacity proposed in applications is based not only on current conditions, but also on projections of future increases in gas production and demand.

A recent analysis of natural gas demand by Synapse Energy Economics, Inc. concluded that anticipated natural gas supply capacity on existing and upgraded infrastructure in Virginia, West Virginia, and North Carolina is sufficient to meet maximum natural gas demand from 2017 through 2030. In other words, there is no need for ACP (nor for the Mountain Valley Pipeline) to meet projected demand.[5]

Further, details on the source of actual demand for the gas transported by ACP are limited. However, it is clear that much of the reported demand is directly tied to contracts signed with subsidiaries of the pipeline owners (for example, Duke Energy companies have booked 59 percent and a Dominion subsidiary has booked 20 percent).[6]

4. Air emissions in the DEIS are likely underestimated

FERC's assertions of negligible impacts on air quality are based on the faulty premise that estimates in a proposal will not exceed actual emissions. This assumption has no real basis, since pollution sources in the oil and gas industry are not monitored continuously (e.g., a reading every several seconds or few minutes) or at fenceline (i.e., using monitors along the perimeter of a facility).

Yet this type of monitoring is the only way to capture actual emissions, rather than estimates by operators; emissions that do not originate from stacks; and emissions that may be omitted from routine reporting, for example from equipment malfunctions.[7]

A recent study of methane emissions from oil and gas operations in the Barnett Shale region of Texas found that actual measurements of emissions were 90 percent larger than the estimates

submitted by operators to the EPA's Greenhouse Gas Inventory.[8]

Another recent study measured methane emissions coming from 114 gas gathering and 16 gas processing plants in 13 states, concluding that the facilities lost methane at an average rate of nearly 0.50% (with wide variation across facilities) and that most emissions were attributable to normal operations.[9] Following direct measurements, researchers found that lost methane was much higher than figures that were based on estimates and reported to the EPA Greenhouse Gas Inventory.

For the purpose of obtaining permits, operators forecast levels of pollution, known as the Potential to Emit (PTE). Operators perform their own PTE calculations based on manufacturing specifications and emissions factors developed by the US Environmental Protection Agency (USEPA). Earthworks' recent analysis of compressor and processing facilities in Pennsylvania found that operators can "mix and match" emissions factors in order to calculate lower PTEs.

PTEs are generally expected to be higher than actual emissions since they are based on the assumption of operations occurring all day, all week, and all year (i.e., on a 24/7/365 basis). However, the emissions estimates included in the DEIS (Table 4.11.1-9) for the JB Tonkin station are *lower* than what Dominion reported to the Pennsylvania Department of Environmental Protection (PADEP) in 2015 for nitrogen oxide (NOx) and volatile organic compounds (VOCs), as well as half of actual emissions of carbon dioxide (CO_2). In addition, the estimated NOx emissions in the DEIS (Table 4.11.1-9) for the Crayne Compressor station are half the level reported by Dominion to the PADEP in 2015.

These higher emissions levels, included in PADEP's online database (eFACTs) reflect operations that are occurring prior to the significant expansions planned for the JB Tonkin and Crayne compressor stations as part of SHP. If these facilities are expanded with regard to capacity, number of engines, and gas throughput, it is almost certain that actual emissions will far exceed the projected emissions included in project applications and used as the basis for the DEIS.

The emissions estimates included in the DEIS are incomplete. Atlantic and Dominion have not provided projected emissions data for the 10 pig launcher/receiver sites and 37 valve sites planned for several points along the transmission route or to be co-located with compressor stations. However, these types of equipment can be considerable sources of fugitive and routine emissions.

Importantly, pig receivers and launchers located along pipelines are used to remove and separate liquids—a process that results in the venting of hydrocarbons into the air.[10] Notably, PADEP's proposed permit requirements for the control of methane and VOCs include pigging operations.[11]

5. The DEIS lacks enforceable monitoring and inspection standards

Inspection and monitoring of oil and gas facilities is essential to ensuring that air emission limits are followed. The only reference to this consideration is a cursory, general statement (Section 2.5.2) that, "Atlantic and DTI [Dominion] would employ EIs [Environmental Inspectors]" and that, "FERC would conduct its own independent monitoring and inspection of the projects." In addition, FERC states (Section 2.5.3) that, "Atlantic and DTI would fund a third-party contractor, to be selected and managed by FERC staff, to provide environmental compliance monitoring services for the projects."

In effect, Atlantic, Dominion, and FERC are taking a "just trust us" stance—an approach that is wholly inadequate for a DEIS issued by a federal agency. In turn, the lack of specific monitoring and

inspection and monitoring standards could result in air emissions beyond stated levels going unaddressed for long periods of time. This will place the environment and the public at risk of air quality impacts from the ACP and SHP that could be prevented through inspections and monitoring.

6. FERC's "minor source" presumption for compressor stations is questionable

As discussed above, there is significant reason to believe that the emission projections in the DEIS are underestimated. Given this, FERC should not presume that West Virginia, Virginia, and North Carolina will not have to contend with ACP facilities as major emission sources or issue Title V permits.

In the realm of air pollution regulation, "major" and "minor" source designations carry significant consequences. Minor source facilities are subject to less stringent recordkeeping and emissions tracking requirements than major sources. This means limited oversight by regulators, reduced documentation and transparency of operations, and weaker protections for the public—but lower costs and workloads for operators.

Because of this, oil and gas operators make a significant effort to avoid major source designation. Earthworks' research on compression and processing facilities in Pennsylvania identified a pattern in which operators seek multiple "minor modification" permits on a frequent basis.[12] This practice allows for considerable expansion of facility capacity and re-working of PTE calculations without ever having to apply for a Title V permit.

The DEIS indicates the potential for project applicants to change and recalculate their emissions to avoid major source designation. For example, in Resource Report 9 on Air and Noise Quality submitted with the project application, Atlantic and Dominion state (Table 9A-2-9) that Compressor Station #2 in Buckingham County, Virginia, which includes the co-located Woods Corner Metering and Regulation Station, would emit 57.6 tons per year (tpy) of VOCs. However, in the DEIS (table 4.11.1-7), the same facility is shown to have the potential to emit only 32.7 tpy of VOCs.

This downward projection in VOC levels occurred alongside an upward projection in the total volume of carbon dioxide equivalent (CO_2e) emissions, which is stated in the DEIS at more than 10 percent higher than what the project applicants claimed in Resource Report 9. This change likely reflects the projection of larger capacity at Compressor #2 than what was stated in the initial project application. Yet VOC levels were revised down. (In addition, Hazardous Air Pollutants, or HAPs, levels remain the same.)

In the DEIS (p. 4-442), FERC states that, "ACP's proposed new Compressor Stations 1, 2, and 3 would be subject to a PSD [Prevention of Significant Deterioration] major source threshold of 250 tons per year (tpy)." FERC's position that 250 tpy of criteria pollutants is a *threshold* runs counter to EPA's intent in establishing National Ambient Air Quality Standards (NAAQS). For the six NAAQS pollutants, the minor/major "default" threshold established by EPA is 100 tpy for areas in attainment, and lower for pollutants in non-attainment areas.[13]

FERC's position appears to be based on a narrow reading of the list of named "major stationary source" in federal law requiring a PSD analysis if they emit over 100 tpy of criteria pollutants, which does not specifically include oil and gas facilities.[14]

However, this approach is inconsistent with how states currently apply major source requirements to compressor stations, processing plants, and other oil and gas sector facilities. Pennsylvania, Ohio, New York, and other states have issued Title V permits for facilities based on the 100 tpy threshold, using 250 tpy as a "ceiling" rather than a "floor." FERC should do so as well.

It is possible that FERC has stated its position in error, since the DEIS (p. 4-444) also includes the statement that, "The major source threshold level for an air emission source is 100 tpy for criteria pollutants in attainment areas."

The three new compressor stations included in the ACP have the potential to emit CO_2e at levels that should result in major source designation for Greenhouse Gases (GHG), which is 100,000 tpy according to EPA's Greenhouse Gas Tailoring rule.[15] According to the DEIS (table 4.11.1-7), these levels are 283,000 tpy for Compressor #1; 324,000 tpy for Compressor #2; and 129,000 tpy for Compressor #3.

The designation of the stations as minor sources is therefore not based on their actual emissions levels or potential to impact air quality—but solely on a 2014 US Supreme Court ruling that a facility can't be considered a major source by virtue of its GHGs alone.[16] Because Atlantic and Dominion have not, for the purposes of the DEIS, projected emissions of any criteria pollutant above the major source threshold, they have been able to project GHG emission levels far higher than that threshold and still claim minor source designation.

7. The DEIS fails to consider localized air pollution impacts

Nationwide, there is a lack of localized "baseline" air quality data that show conditions prior to oil and gas activities, which makes it difficult to pinpoint the effects of new sources after they begin operating. A 2014 study concluded that in parts of the Marcellus Shale region with air monitors, emissions of some pollutants show an upward trend—but that a lack of monitors in many places obscures the picture and limits air quality management.[17]

There are no USEPA air monitors for the criteria pollutants in close proximity to where the ACP are slated to be constructed or expanded. In the DEIS, air modeling to determine impacts on regional air quality is based on monitoring stations located at considerable distances from the project compressor stations, from about 15 miles up to 230 miles away.

Across oil and gas operations, emissions vary depending on the phase of development and control technologies employed. Pollution can greatly increase during events such as flaring and venting, or due to equipment malfunctions. Industry recognizes the fluctuating nature of pollution from such events; for example, blowdowns can last for several hours but emissions may be most intense during the first 30-60 minutes.[18]

Emerging environmental health research confirms that episodic emission events can cause health impacts immediately or in as little as 1-2 hours, largely because toxicity is determined by the concentration of the chemical and intensity of exposure.[19] As a result, longer-term, average measurements of emissions—what is what the DEIS contains—do not provide a full picture of the types and patterns of pollution that result in the exposure of workers and residents to harmful pollutants.

In addition, *regional* air quality assessments and reporting limited to single facilities can not convey *local* health impacts, particularly in places where many emissions sources are clustered together.

For example, a 2013 RAND Corporation study showed that in Pennsylvania counties where oil and gas operations are concentrated, NOx emissions were 20-40 times higher than levels equivalent to thresholds for individual "major" emission sources.[20]

As discussed above, the absence of air monitoring by operators and regulators in close proximity to sources of emissions means that actual emissions may be underestimated. In other words, operators can be "in compliance" with air quality standards on the basis of estimated volumes alone, even if they are emitting pollutants at concentrations that harm health.

FERC should state in the DEIS that the West Virginia Department of Environmental Protection, Virginia Department of Environmental Quality, and North Carolina Department of Environmental Quality should require continuous air sampling at the compressor, Metering and Regulation, and pigging stations that are part of ACP and SHP.

Earthworks has long documented the environmental and health impacts of oil and gas development.[21] Research to investigate such connections is rapidly emerging. Physicians, Scientists, and Engineers for Healthy Energy (PSE) recently assessed peer-reviewed literature on the environmental and health impacts of shale gas development, finding that 80 percent of all papers (which total nearly 400) has been published since 2013.[22] In addition, the vast majority of scientific studies show a link between shale gas development and impacts related to health (84 percent); water quality (69 percent); and air quality (87 percent).[23]

In a 2013 study combining air sampling and health symptom surveys in gas development areas across Pennsylvania, participants living near gas wells and compressor stations reported problems that are consistent with the scientifically established health effects of the chemicals detected at their homes.[24] Other recent studies confirm the connection between gas and oil wells and facilities and the health problems experienced by nearby residents, including dizziness, headaches, nausea, fatigue, and nosebleeds, as well as the potential for increased risk of developing cancer.[25]

In 2016, Earthworks sampled the air near Pennsylvania gas compression and processing facilities using Summa canisters that were provided and analyzed by a certified lab using standard EPA methods (TO-15 for Volatile Organic Compounds and TO-3 for methane) and additional analysis for Tentatively Identified Compounds (TICs). In all, more than 70 distinct chemicals were detected at least once.[26]

Earthworks' sampling at two compressor stations detected ten chemicals included in the federal Toxics Release Inventory, including Acetaldehyde, Dichlorodifluoromethane, Ethylbenzene, n-Hexane, Isoprene, Styrene, Toluene, Trichlorofluoromethane, 1,2,4- Trimethylbenzene, and Vinyl Acetate. At one compressor station, two chemicals were detected in higher concentrations than the respective effects screening level (ESL), or the level likely to trigger health symptoms.[27]

The release of health-harming chemicals from compressor stations has been confirmed in other studies as well. Some of the chemicals detected in Earthworks' 2016 sampling (most notably Toluene, Ethylbenzene, Propene, Dichlorodifluoromethane, and Trichlorofluoromethane) were also detected in our previous sampling near compressor stations in Pennsylvania.[28] A similar suite of VOCs was also detected in sampling by the Southwest Pennsylvania Environmental Health Project near a compressor station in New York[29] and by the Agency for Toxic Substances and Disease Registry (ATSDR) at a compressor station in Pennsylvania.[30]

8. The DEIS fails to include a meaningful analysis of the climate change impacts of greenhouse gas (GHG) emissions

It has long been settled that the assessment and disclosure of climate impacts falls squarely within NEPA. On August 1, 2016, the Council on Environmental Quality (CEQ) adopted their "Final Guidance on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews" (CEQ Guidance).[31] The CEQ Guidance provides clarity and certainty to permitting agencies and applicants in NEPA reviews that assess the climate change impacts of proposed federal projects.

On February 22, 2017, FERC published a manual formally adopting the CEQ Guidance.[32] Yet, in the current DEIS on the ACP and SHP, FERC applies neither the letter nor the spirit of the CEQ Guidance to its analysis. Instead, a number of the aspects that FERC outlines in this DEIS fly directly in the face of the CEQ Guidance. For this reason, the climate change analysis in the current DEIS fails in several important ways.

First, FERC improperly compares the GHG emissions of ACP to the overall GHG emissions from the states through which the pipeline would cross. For instance, the DEIS states (p. 4-511) that, "Although the GHG emissions from construction and operation of the projects appear large, the emissions are small in comparison to the GHG emissions for each state."

Yet this approach is unequivocally rejected by the CEQ Guidance, which states: "A statement that emissions from a proposed Federal action represent only a small fraction of global emissions is essentially a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether or to what extent to consider climate change impacts under NEPA."[33]

Second, in the current DEIS, FERC misinterprets the application of the CEQ Guidance to current or ongoing NEPA processes. CEQ clearly provided discretion to FERC when, as stated in the DEIS (p. 4-512), "considering whether to apply this guidance to the extent practicable to an on-going NEPA process."

The CEQ Guidance concludes that, "Agencies should consider applying this guidance to projects in the EIS or EA preparation stage if this would inform the consideration of differences between alternatives or address comments raised through the public comment process with sufficient scientific basis that suggest the environmental analysis would be incomplete without application of the guidance."[34]

FERC acknowledges in the DEIS (on p. 4-512) that public commenters have suggested that the GHG analysis for ACP and SHP is incomplete and have urged the agency to consider CEQ's Guidance. To ensure a thorough response to the commenters' concerns, FERC should supplement this DEIS with a meaningful climate change analysis that conforms to the processes and methods described in the CEQ Guidance.

Third, FERC fails to recognize the interconnectedness, especially the indirect climate change effects, of the upstream, midstream, and downstream GHG emissions from increased natural gas production, storage, transmission, and end-use. FERC should quantify the direct and indirect GHG emissions based on available information, including reasonable projections and assumptions. FERC should also consider and disclose the reasonably foreseeable direct and indirect GHG emissions when analyzing the direct and indirect effects of the proposed action.

Instead, FERC ignores the need for this analysis in the DEIS, stating instead (p. 4-512) that, "Even if we were to find a sufficient connected relationship between the proposed project and upstream development or downstream end-use, it would still be difficult to meaningfully consider these impacts, primarily because emission estimates would be largely influenced by assumptions rather than direct parameters about the project."

This statement is simply untrue. Nearly all GHG analyses are based in some measure on models, estimates, and reasonable assumptions. In addition, even if it were difficult to quantify emissions through these established methods, the CEQ Guidance provides for a qualitative approach: "When an agency determines that quantifying GHG emissions would not be warranted because tools, methodologies, or data inputs are not reasonably available, the agency should provide a qualitative analysis and its rationale for determining that the quantitative analysis is not warranted."[35]

Rather than providing any kind of qualitative analysis, FERC simply abdicates responsibility to provide meaningful climate change information to the public. Even worse, FERC denies the basic causal reality that more pipelines can result in more drilling and production, which in turn results in more GHG emissions. The DEIS states (p. 4-512) that "…the upstream production and downstream combustion of gas is not causally connected because the production and end-use would occur with or without the projects. Therefore, the circumstances in this case do not warrant the inclusion of production or end-use as an indirect effect of the projects."

This conclusion again directly contravenes CEQ's admonition that, "Activities that have a reasonably close causal relationship to the Federal action, such as those that may occur as a predicate for a proposed agency action or as a consequence of a proposed agency action, should be accounted for in the NEPA analysis."[36] Indeed, one of the CEQ's chief recommendations in the Guidance is, "…that agencies quantify a proposed agency action's projected direct and indirect GHG emissions."[37]

As discussed above (see comment 2), FERC's analysis of the no action alternative is wholly inadequate. A key omission is consideration of the CEQ Guidance. This is particularly important because the GHG estimates in the DEIS are based on outdated assumption that emissions from shale gas are less than other fossil fuel energy sources—ignoring life cycle analyses that show this is simply not true.

For example, a recent analysis of 200 studies shows that federal estimates of methane emissions from natural gas operations have been vastly underestimated.[38] Other studies show that the so-called climate benefits of natural gas disappear when emissions are assessed over a 20-year timeframe (rather than the 100-year timeframe preferred by the gas industry and many regulators and public officials)—in other words, closer to the window of time still available to avert climate disaster.[39] Another study concludes that increasing reliance on natural gas will have no effect on reducing GHG emissions (and may hinder the growth of renewable energy).[40]

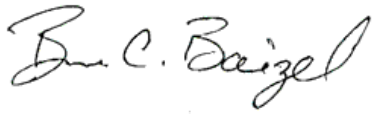
In addition, a new analysis by Oil Change International shows that, due to leakage throughout the ACP and SHP system, the US Environmental Protection Agency's (EPA) New Source Performance Standards (NSPS) adopted in 2016 would reduce methane emissions by 23 percent; in other words, the projects would still cause GHG pollution equivalent to 11 million passenger vehicles.[41] (Making matters worse, the new EPA Administrator has expressed intent to review and potentially rollback the NSPS methane regulation.)

In closing, Earthworks expresses strong disagreement with FERC's assertion in the DEIS (p. 1-20) that, "Because a natural gas transportation project is proposed before the FERC, it is not likely that it would lead to additional drilling and production." Based on this view, FERC neglects to consider the link between shale gas production in the Marcellus Shale region and the proposed ACP.

The "forcing affect" that a pipeline project has on drilling and production is an appropriate and important subject for analysis in the DEIS. The oil and gas industry is transparent about the need for pipeline capacity to expand in order to boost drilling and production, and has cited insufficient pipeline capacity as a reason why the rate of drilling has slowed in the Marcellus Shale region.[42] In addition, the gas industry has been clear that the regional gas boom's next phase will involve new pipelines to move more gas to market both domestically and internationally.[43] The ACP and SHP projects must be viewed in light of this broader context—FERC's denial of current oil and gas industry realities notwithstanding.

Thank you for your time and attention.

Sincerely,



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[1] Nadia Steinzor, *Permitted to Pollute: how oil & gas operators and regulators exploit clean air protections and put the public at risk.* Earthworks, 2017. http://earthworksaction.org/permittedtopollute

[2] Motion to FERC to rescind and revise DEIS, filed March 3, 2017. http://appvoices.org/images/uploads/2017/03/WildVa-et-al-Motion-to-Rescind-ACP-DEIS-March3-2017.pdf

[3] 40 Code of Federal Regulations, §1502.14, Alternatives including the proposed action.

[4] Cathy Kunkel and Tom Sanzillo, *Risks Associated with Natural Gas Pipeline Expansion in Appalachia: Proposed Atlantic Coast and Mountain Valley Pipeline Need Greater Scrutiny.* IEEFA, 2016.

[5] Synapse Energy Economics, *Are the Atlantic Coast Pipeline and the Mountain Valley Pipeline Necessary? An examination of the need for additional pipeline capacity into Virginia and Carolinas.* Report prepared for Southern Environmental Law Center and Appalachian Mountain Advocates, 2016.

[6] Ibid.

[7] Some facilities regulated under the New Source Performance Standard (NSPS), National Emissions Standards for Hazardous Air Pollutants (NESHAP), Title V, and other CAA programs are required to use continuous emissions monitoring systems (CEMS). However, CEMS are designed primarily for emissions from stacks and don't monitor for all sources, including leaks and fugitive emissions.

[8] Daniel Zavala-Araiza, David R. Lyon, Ramon A. Alvarez, et al. "Reconciling divergent estimates of oil and gas methane emissions," *Proceedings of the National Academy of Sciences,* December 2015.

[9] Anthony J. Marchese, Timothy L. Vaughn, Daniel J. Zimmerle et. al., "Methane Emissions from Natural Gas Gathering and Processing," *Environmental Science and Technology,* August 2015.

[10] "Recover gas from pipeline pigging operations," PRO fact sheet number 505, USEPA. https://www.epa.gov/sites/production/files/2016-06/documents/pigging.pdf

[11] PADEP, framework for methane reductions from the oil and gas sector, General Permit 5A, http://www.dep.pa.gov/business/air/pages/methane-reduction-strategy.aspx

[12] Nadia Steinzor, *Permitted to Pollute: how oil & gas operators and regulators exploit clean air protections and put the public at risk.* Earthworks, 2017. http://earthworksaction.org/permittedtopollute

[13] 42 US Code, § 7479(1).

[14] 40 US Code of Federal Regulations § 52.21, Prevention of significant deterioration of air quality.

[15] 75 Fed. Reg. 31514 (2010), https://www.gpo.gov/fdsys/pkg/FR-2010-06-03/pdf/2010-11974.pdf.

[16] *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014).

[17] Carlton, A. G.; Little, E.; Moeller, M.; Odoyo, S.; Shepson, P. B. "The data gap: Can a lack of monitors obscure loss of Clean Air Act benefits in fracking areas?" *Environmental Science and Technology,* 2014.

[18] TransCanada. "Blowdown notification." http://www.transcanada.com/docs/Our_Responsibility/Blowdown_Notification_Factsheet.pdf

[19] David Brown, Beth Weinberger, Celia Lewis, and Heather Bonaparte. "Understanding exposure from natural gas drilling puts current air standards to the test." *Reviews on Environmental Health,* 2014.

[20] Ibid.

[21] See "Community Health Survey of Current and Former Residents of DISH, Texas,", 2009. http://earthworksaction.org/publications.cfm?pubID=438; "Community Health Survey Results of Pavillion, Wyoming," 2010, http://earthworksaction.org/PR_PavillionHealthSurvey.cfm; *Gas Patch Roulette: How Shale Gas Development Risks Public Health in Pennsylvania,* 2012, http://health.earthworksaction.org; and *Californians at Risk: An Analysis of Health Threats from Oil and Gas Pollution in Two Communities,* 2015, https://www.earthworksaction.org/files/publications/CaliforniansAtRiskFINAL.pdf.

[22] Physicians, Scientists, and Engineers for Healthy Energy, *Toward and understanding of the environmental and health impacts of shale gas development: an analysis of peer reviewed scientific literature, 2009-2015.* Science summary, April 2016. For a complete overview of the scientific literature, see PSE's citation database at https://www.zotero.org/groups/pse_study_citation_database/items

[23] Ibid.

[24] Steinzor, N.; Subra, W.; Sumi, L. "Investigating links between shale gas development and health impacts through a commu-nity survey project in Pennsylvania." *New Solutions*, 2013.

[25] Colborn, T.; Schultz, K.; Herrick, L.; Kwiatkowski, C. "An exploratory study of air quality near natural gas operations." Human Ecol. Risk Assess. 2014; McKenzie, L.M.; Witter, R.Z.; Newman, L.S.; Adgate, J.L. "Human health risk assessment of air emissions from development of unconventional natural gas resources." Science of the Total Environment 2012; L. Blair Paulik, Carey E. Donald, Brian W. Smith, Lane G. Tidwell, Kevin A. Hobbie, Laurel Kincl, Erin N. Haynes, Kim A. Anderson. "Impact of Natural Gas Extraction on PAH Levels in Ambient Air." *Environmental Science & Technology*, 2015.

[26] Nadia Steinzor, *Permitted to Pollute: how oil & gas operators and regulators exploit clean air protections and put the public at risk.* Earthworks, 2017. http://earthworksaction.org/permittedtopollute

[27] Ibid.

[28] Case studies #1 (Judy) and #6 (Carr), *Blackout in the Gas Patch: How Pennsylvanians are Left in the Dark on Health and Enforcement,* Earthworks 2014.

[29] Southwest Pennsylvania Environmental Health Project, "Summary of Minisink Monitoring Results," 2015.

[30] Agency for Toxic Substances and Disease Registry, Health consultation/Exposure Investigation, Brigich Compressor Station, Washington County PA, 2016.

[31] 81 Federal Register §51866.

[32] GUIDANCE MANUAL FOR ENVIRONMENTAL REPORT PREPARATION For Applications Filed Under the Natural Gas Act (February 2017). The FERC manual (available at https://www.ferc.gov/industries/gas/enviro/guidelines/guidance-manual-volume-1.pdf) states:

P. 4-123: *You should provide estimated direct emissions of criteria pollutants, VOCs, total hazardous air pollutants (HAP), and GHGs in tons per year resulting from the construction of the proposed project. This includes pipelines greater than 5 miles in length (or any length in designated nonattainment/maintenance areas), compressor stations, LNG facilities, and other aboveground facilities.*

Footnote 41: *GHG emissions should include the emission categories and/or methodologies described in the* ***most current version of the CEQ's guidance*** *on GHG emissions and climate change, as applicable.* (Emphasis added.)

[33] CEQ Guidance, page 11.

[34] CEQ Guidance, page 34.

[35] CEQ Guidance, page 12 and 13.

[36] CEQ Guidance, page 13.

[37] CEQ Guidance, page 4.

[38] A. R. Brandt, G.A. Heath, E.A. Kort, et al. "Methane Leakage from North American Natural Gas Systems." *Science,* February 14, 2014.

[39] R.W. Howarth, R. Santoro, and A. Ingraffea. "Methane and the Greenhouse Gas Footprint of Natural Gas from Shale Formations." *Climatic Change Letters,* June 2011.

[40] Christine Shearer, John Bistline, Mason Inman, and Steven J. Davis. "The effect of natural gas supply on US renewable energy and CO2 emissions." *Environmental Research Letters,* September 2014.

[41] Oil Change International, "The Atlantic Coast Pipeline: Greenhouse Gas Emissions Briefing." 2017. http://priceofoil.org/content/uploads/2017/02/atlantic_coast_pipeline_web_final_v3.pdf

[42] Lynn Doan and Richard Stubbe, "Gas Rigs Slump as Pipeline Capacity Limits New Drilling." Bloomberg News, May 23, 2014. www.bloomberg.com/news/2014-05-23/u-s-energy-rigs-drop-by-4-to-1-857-baker-hughes-says.html.

[43] Laura Olson and Steve Esack, "More pipelines the next phase of Marcellus Shale drilling." The Morning Call, August 8, 2014. www.mcall.com/news/nationworld/pennsylvania/mc-pa-shale-pipelines-corbett-wolf-20140808-story.html.