June 5, 2017

Krishnan Ramamurthy
Acting Director, Bureau of Air Quality
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
Harrisburg, PA 17105-8468

RE: Draft General Plan Approval and/or General Operating Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (BAQ-GPA/GP-5A); and General Plan Approval and/or General Operating Permit for Natural Gas Compressor Stations, Processing Plants and Transmission Stations (BAQ-GPA/GP-5)

Dear Mr. Ramamurthy:

Thank you for the opportunity to comment on the draft General Permits for unconventional natural gas operations, GP-5 and GP5-A, recently issued by the Pennsylvania Department of Environmental Protection (DEP).

Earthworks greatly appreciates DEP's work in developing these permits, which are necessary to limit the methane pollution that harms air quality and health in the Commonwealth, as well as the global climate. It is encouraging to see Pennsylvania joining other states (in particular Ohio, California, and Colorado) in adopting methane control measures.

Requiring operators to find and repair methane leaks in their equipment is a common sense measure that would both reduce pollution and save energy resources. Currently, Pennsylvania operators waste more than $20 million worth of natural gas every year, enough to supply 65,000 homes.

At the same time, according to data from the DEP emissions inventory, methane emissions from the oil and gas industry rose an astonishing 28% between 2014 and 2015. This is more than double the rate of increase in production (12%).

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.

In addition to the following comments, Earthworks is a signatory to the technical comments

developed by the Clean Air Council, Clean Air Task Force, and Environmental Defense Fund, as well as the legal comments developed by the Environmental Integrity Project. We also support the views and recommendations contained therein.

1. Pennsylvania needs comprehensive emission controls

Since 2015, Earthworks' certified thermographers have conducted nearly 700 individual investigations into air emissions from oil and gas facilities in 16 states using Optical Gas Imaging (OGI) technology (specifically a Forward Looking Infrared, or FLIR, camera). This is the same technology used by regulators and operators nationwide, and one of the options for Leak Detection and Repair (LDAR) activities under the proposed GP-5 and GP-5A.

Taken together, Earthworks' library of OGI videos demonstrates the potential for pollution at every stage of shale gas development and from numerous sources at the same site and across local areas. Earthworks has documented emissions at well sites while drilling, fracturing, and production are underway; compressor stations of various sizes; gas processing plants; storage tanks; flaring and venting activities; and gas storage fields. The videos of emissions at Pennsylvania sites are posted online in the "Pennsylvania Community Empowerment Project" playlist: https://www.youtube.com/user/earthworksaction/playlists.

Given the range of emission sources in the oil gas industry, **Earthworks strongly supports DEP's proposed standards for detecting and repairing leaks from sources not covered in most states, including pigging operations and liquids unloading.** According to the US Environmental Protection Agency (EPA), pigging vents methane (and any other pollutants still contained in the gas at that point in transmission or distribution) directly into the air,[1] while liquids unloading releases methane and volatile organic compounds (VOCs).[2]

We also **strongly support the new requirement that operators must obtain air permits for well pads prior to drilling.** According to data in the 2015 DEP Emissions Inventory, well operations accounted for 60% of emissions of both methane and VOCs reported, as well as nearly all of the reported NOx, a precursor to ozone.

The entire state of Pennsylvania is in non-attainment for ozone and therefore part of the Ozone Transport Region. Across this 13-state area, the US Environmental Protection Agency (EPA) requires additional measures to control pollutants that create ozone.[3] LDAR activities by oil and gas operators would help reduce methane emissions, and along with it, would lower releases of VOC emissions that have forced Pennsylvania into non-attainment for years.

2. Natural gas pollution is increasing

The rise in methane emissions from the oil and gas industry makes abundantly clear that operators aren't adopting voluntary pollution control measures sufficiently or consistently across the industry. As a result, effective permit conditions and their enforcement—as well as regulations for existing operations—are clearly the only way to reduce oil and gas emissions. Since Pennsylvania operators are currently planning for a new surge in both gas production and processing, the GP-5 and GP-5A are necessary to ensure that new operations take steps to reduce emissions.

Although emissions can be expected to rise given the expansion of operations, DEP emissions inventory data indicate that between 2012-2015, pollutant volumes grew at much faster rates than did the number of well sites and midstream facilities reporting. This was the case for nitrogen

oxides (NOx) and VOCs, both precursors to ozone; sulfur oxides (SOx), a precursor to particulate matter, which harms vegetation and causes respiratory problems; and the greenhouse gases carbon dioxide (CO2) and nitrous oxide (N2O).

This trend suggests that either more pollution on average was emitted per site or facility in 2015 than in previous years, or that a number of wells and facilities coming online more recently have had particularly high levels of emissions. In fact, studies have shown that levels of emissions are widely variable across operations, and that some wells and facilities are "super emitters."[4]

This research finding is supported by 2015 DEP emissions inventory data, which show that more than 40% of all methane emissions and 30% of VOC emissions were generated by just the "Top 100" wells and facilities, or about 2% of the 5,880 operations for which emissions were reported.

3. Emission control requirements are necessary to protect health

Research is rapidly expanding on the connections between oil and gas activities and negative environmental and health impacts.[5] Earthworks has documented these risks in oil and gas fields nationwide.[6] 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, such as respiratory problems, dizziness, headaches, and fatigue.[7] These findings are supported by recent studies by other researchers.[8]

Along with these comments, Earthworks is submitting our 2017 report *Permitted to Pollute: how oil & gas operators and regulators exploit clean air protections and put the public at risk*.[9] To conduct this in-depth investigation, we researched the permits and plan approvals, filmed operations using OGI technology, and conducted air pollution sampling at two compressor stations and one gas processing plant in southwestern Pennsylvania.

Some of our key findings are directly related to the need for strong methane control measures. In particular, repeated OGI filming and air sampling over the course of a year (2016) demonstrate that natural gas operations generate emissions of gases on a continual basis from various sources at the same site.

Methane was detected in every sample we took, and more than 70 distinct chemicals were detected at least once.[10] On the dates that sampling occurred, Earthworks filmed emissions being released from stacks, flares, and other sources. On days when wind direction moved the emissions plumes toward the sampling location, more chemicals at higher concentrations were detected than at other times.

Earthworks' OGI investigations in Pennsylvania and other states have documented long, dense plumes of emissions from flares in many locations. Flaring is known to release methane, CO2, NOx, and VOCs.[11] **We therefore strongly support the requirements in both GP-5 and GP5A for enclosed flares to control VOC emissions** at glycol dehydration units (Section F) and pumps (Section M), pigging (Section O), as well as the general requirements for "leak-free" conditions from such equipment.

4. More frequent LDAR and timely reporting requirements are warranted

Given the disproportionate impact of large polluters (and as emphasized in the coalition technical comments), **DEP should change the LDAR frequency requirements in both GP-5 and GP-5A to monthly (rather than quarterly) for well sites and facilities that pollute above a certain threshold**. A model for this is Colorado, which requires monthly inspections using emissions monitors for well sites with storage tanks and compressor stations that emit more than 50 tons per year (tpy) of VOCs, and for well sites without storage tanks that emit more than 20 tpy of VOCs.

Earthworks acknowledges that a repair within 15 days may not be feasible without causing a blowdown or operational shutdown that could generate emissions. However, **DEP should not allow operators to delay a leak repair or replacement for up to two years** (Section 1(g)(ii) in both GP-5 and GP-5A). This is a remarkably long period of time for leaks to remain unaddressed, and for resulting emissions to impact air quality and health. DEP should eliminate this extended "grace period," particularly because the proposed permit conditions already allow operators to wait to make repairs until the next scheduled blowdown.

As emphasized in the coalition technical comments, **DEP should not give operators a "step-down" provision to conduct LDAR only semi-annually** if the percentage of leaking components at a site is below a certain threshold (Section K(1)(b)(iii) in both the GP-5 and GP-5A). Earthworks believes this provision runs counter to the essential goal of the new permits, that is, to repair leaks and reduce emissions.

Since the LDAR program is based on operator self-reporting, allowing operators who don't find leaks to not have look for them as frequently opens the door to simply not reporting them to begin with. Notably, neither Colorado nor California have step down provisions in those states' methane emissions control regulations.

Industry has acknowledged that emissions can greatly increase during events such as blowdowns, which can last for several hours but be most intense during the first 30-60 minutes.[12] 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.[13]

Earthworks therefore supports the requirements for operators to notify DEP when malfunctions occur (Section in both GP-5 and GP-5A). However, if the notification requirements are truly intended to protect air quality and health, DEP should strengthen 10(d)(ii) and (iii) by aligning it with 10(d)(i). Specifically, **notification of any malfunction should be reported within one hour—not 24 hours with an allowance for delays due to weekends and holidays.**

DEP should not leave it up to an operator to judge whether the malfunction and resulting emissions event poses "imminent danger" to health and safety. Personnel on site do not have the information and expertise necessary to make that determination, nor do operators conduct immediate air sampling when malfunctions occur to identify the gases and chemicals being released and their potential impact on nearby residents.

In addition, a notification "grace period" opens the door for operators to not report malfunctions to DEP in a timely manner, regardless of the potential health and safety risks. Reporting delays will inevitably result in response delays by DEP—delays that could make the difference between repairing the malfunction quickly or allowing it to continue for hours, days, or even longer.

For example, in March 2016, Earthworks used OGI technology to film an accidental release following an equipment malfunction at the National Fuel compressor station in Mercer, Pennsylvania. The large, dense plume of emissions traveled far beyond the station fenceline over a residential neighborhood (see the infrared video of this emissions release at https://www.youtube.com/watch?v=nbe6tMxJdaw&index=8&list=PL9BS7nDf-8trQ91EHSnuL7Gtzrv9S0be6&t=17s).

During the event, Earthworks staff experienced strong chlorine odors and burning in their eyes and noses. Earthworks submitted a formal complaint and the OGI video about this emissions event to the DEP Northwest Regional office, which responded quickly and contacted the operator. However, it became clear that at the time we submitted the complaint online—about ten days after the malfunction occurred—the operator had still not reported the event to DEP. It became clear that without Earthworks' complaint, DEP would not have learned of the emissions event nor investigated this violation by National Fuel.

In closing, Earthworks strongly encourages DEP to stand firm in its commitment to regulating methane pollution from the oil and gas industry and for the Wolf Administration to keep its promise to the public to do so. This can be done through swift adoption of strong permit requirements for new pollution sources, followed by the development of strong regulations for *existing sources*—which are needed to reduce emissions from the 100,000 Pennsylvania gas wells and facilities that wouldn't be covered by the GP-5 and GP-5A permits for new sources.

On the federal level, the Trump Administration has proposed a plan to slash the staff and budget of government agencies, including the EPA, and to rollback the New Source Performance Standards for methane and VOC emission controls in the oil and gas sector. Going forward, it will be the responsibility of states to make progress on methane pollution reductions. Fortunately, states will also reap the benefits, in the form of saved natural gas, improved air quality and health, and job creation in the methane mitigation industry. If ever there was a time for Pennsylvania to safeguard health and the environment from oil and gas pollution, it is now.

Thank you for your time and attention.

Sincerely,

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[1] US EPA, "Recover gas from pipeline pigging operations," PRO Fact Sheet No. 505, https://www.epa.gov/sites/production/files/2016-06/documents/pigging.pdf

[2] US EPA Office of Air Quality Planning and Standards, *Oil and Natural Gas Sector Liquids Unloading Processes,* 2014.

[3] Regulations for Ozone Transport Regions are in CAA §184. See also EPA, Nonattainment and Ozone Transport Region (OTR) SIP Requirements," https://www.epa.gov/ozone-pollution/nonattainment-and-ozone-transport-region-otr-sip-requirements

[4] Allen, D.T., et al., "Measurements of methane emissions at natural gas production sites in the United States," *Proceedings of the National Academy of* Sciences, 2013; ERG and Sage Environmental Consulting, LP, "City of Fort Worth Natural Gas Air Quality Study, Final Report, 2011; Zavala-Araiza, et al., "Toward a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites, *Environmental Science and Technology*, 49, 2015.

[5] Ibid.

[6] 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.

[7] 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.

[8] 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.

[9] 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

[10] 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

[11] US EPA Air Pollution Control Cost Manual, Section 3, VOC controls (https://www3.epa.gov/ttncatc1/dir1/cs3-2ch1.pdf); C. Li, N.C. Hsu, A.M. Sayer et al., "Satellite observation of pollutant emissions from gas flaring activities near the Arctic," *Atmospheric Environment* Vol. 133, May 2016.

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

[13] 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.