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VIA ELECTRONIC MAIL:
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Re: Comment on Synthetic Minor State-Only Operating Permit No. 63-00999 for EQM Gathering OPCO, LLC "Blue Moon" Compressor Station

To Whom It May Concern:

Clean Air Council, Protect PT, the Breath Project, and Environmental Integrity Project (collectively, "Commenters") respectfully submit the following comments on the above-referenced Synthetic Minor State-Only Operating Permit ("Draft Permit") for EQM Gathering OPCO's "Blue Moon" Compressor Station ("Blue Moon" or "the Facility") located at 334 McGirts Road, Daisytown, Washington County, Pennsylvania.

Commenters have identified several issues with the Draft Permit, and respectfully submit that DEP cannot finalize the Draft Permit until it addresses these defects.

ABOUT THE COMMENTERS

Clean Air Council is a nonprofit environmental health organization with offices in Philadelphia and Pittsburgh, Pennsylvania. The Council has worked to protect everyone's right to a clean and healthy environment since 1967. The Council has members throughout Pennsylvania and the Mid-Atlantic region who support its mission, including members in Washington County.

The Breathe Project is a coalition of citizens, environmental advocates, public health professionals and academics working to improve air quality, eliminate climate pollution and

make Southwestern Pennsylvania a healthy and prosperous place to live through science-based work and a community outreach platform.

Protect PT (Penn-Trafford) is a nonprofit organization dedicated to ensuring residents' safety, security, and quality of life by engaging in education and advocacy to protect the economic, environmental, and legal rights of the people in and around Westmoreland and Allegheny counties.

The Environmental Integrity Project is a 501(c)(3) nonpartisan, nonprofit watchdog organization that advocates for effective enforcement of environmental laws and is comprised of former EPA enforcement attorneys, public interest lawyers, analysts, investigators, and community organizers. EIP's mission is to use objective facts and figures to hold federal and state agencies, and corporations, accountable and to help local communities obtain the protections of environmental laws. The EIP team helps level the playing field by giving communities the legal and technical resources they need to claim their rights under environmental laws.

BACKGROUND

Blue Moon Compressor Station works in the aggregate with Full Moon Compressor, Station, where both facilities consist of ten (10) natural gas-fired reciprocating internal combustion engines, four (4) triethylene glycol (TEG) dehydration units, two (2) 1,200 HP diesel-fired emergency generators, nine (9) produced fluid tanks, and storage tanks. The facilities were first authorized for construction in October 2015 under a five-year general permit, GP5-63-00999A. The original permit allowed five (5) natural gas-fired compressor engines, two (2) triethylene glycol dehydrators ("TGD"), two (2) dehydrator regenerators controlled by a thermal oxidizer, four (4) water tanks, and associated piping and components.

The Department of Environmental Protection ("DEP") approved plan approval No. PA-63-00999A on April 11, 2017, which allowed the Facility to double its size and to install additional five (5) natural gas-fired compressor engines, two (2) dehydrators, three (3) pig receivers, and one (1) pig launcher, among other items. This addition became known as Full Moon Compressor Station, and is part-and-parcel to this Draft Permit. Initially, the Facility would have been a major source of regulated emissions that required a Title V operating permit. However, the Draft Permit sets conditions that qualify the Facility as a synthetic minor source.

As the EPA instructs:

> "Synthetic minor source" means a source that otherwise has the potential to emit regulated NSR pollutants in amounts that are at or above the thresholds for major sources in 40 CFR 49.167, 40 CFR

> 52.21 or 40 CFR 71.2, as applicable, but has taken a restriction so that its PTE is less than such amounts for major sources. Such restrictions must be enforceable as a practical matter (as defined in 40 CFR 49.152).

US EPA, *True Minor Source and Synthetic Minor Source Permits*, https://www.epa.gov/tribal-air/true-minor-source-and-synthetic-minor-source-permits (last visited March 3, 2025). Yet, as detailed below, the Facility's NOx emissions limits are not practically enforceable by conditions of the Draft Permit.

REQUEST FOR PUBLIC HEARING

Commenters request that DEP hold a public hearing for Blue Moon's Draft Permit due to numerous complaints from local residents of the Facility and how it disrupts their homelife and health. Since starting operations around 2017, residents around the Facility experience health symptoms that include burning eyes and trouble breathing. There is also concern among residents who are immuno-compromised of the impacts the Facility will have on their respiratory system or cardiac health. Most resoundingly are complaints of the noises and foul odors that emit from the Facility. Residents witness "loud, thumping" noises that occur–more often at night. For others, the "perm solution" odor forces people to retreat indoors and keep all windows and doors closed. Since the Facility disrupts local residents' lives and possibly impacts their health, DEP should hold a public hearing to hear and consider these pressing concerns.

COMMENTS

1. **DEP needs to make Blue Moon's ammonia slip emission test results and associated parametric monitoring data publicly available, establish additional work practice standards, and add an ammonia slip emission limit to the Draft Permit.**

Four of Blue Moon's ten engines employ selective catalytic reduction ("SCR") to control nitrous oxide ("NOx") emissions. Draft Permit at 5. A SCR system has a catalyst bed across which the NOx-containing gas flows. U.S. EPA, *Appendix B.15 Selective Catalytic Reduction Review Draft*, in *EPA Air Pollution Control Cost Manual 6th ed.* (2002), *available at:* https://www3.epa.gov/ttnchie1/mkb/documents/B_15a.pdf. Ammonia is injected into the system to mix with the inlet gas stream upstream of the catalyst bed. *Id.* When the catalyst bed is at the proper temperature, the ammonia (NH3) reacts with the NOx when it contacts the catalyst in the presence of oxygen (O2). *Id.* The reaction reduces the NOx, forming nitrogen (N2) and water

(H2O). *Id.* Any unreacted ammonia "slips" as ammonia emissions into the atmosphere, becoming a source of ammonia pollution. *Id.*

According to EPA, several factors influence both the NOx reduction efficiency and the quantity of ammonia slip, including the "ratio of NH3 injected to the amount of NOx in the gas stream (NH3/NOx), the catalyst material and condition, the space velocity, and the catalyst bed operating temperature…. In general, the outlet concentration of NH3 from the SCR should be held to less than 5 ppmv."

a. People living near EQM's facility endure foul odors and burning eyes, and become sick for which Blue Moon's ammonia emissions may be the cause.

Numerous residents living near Blue Moon, including members of Commenters' organizations, complain of foul odors preventing them from opening their windows or spending time outdoors. One resident said, "It almost smells like perming solution," then relaying that "some days it actually will burn your eyes." Several people expressed dismay at the rate at which the Facility appears to be growing, and worry about the potential consequences to their health and quality of life.

The major ingredient in permanent wave solution, or "perming solution," as the resident phrased it, is thioglycolic acid, included as ammonium salt. Daisuke Oikawa, et al., *Measurement of Concentrations of Thioglycolic Acid, Dithiodiglycolic Acid and Ammonia in Indoor Air of a Beauty Salon*, J. Occupational Health, Vol. 54(5), 370–75, (2013), *available at:* https://doi.org/10.1539/joh.12-0084-FS. A study by Daisuke Oikawa, *et al*. found that the use of permanent wave solution elevated ammonia concentrations in the air. *Id.* Since the smell of ammonia is associated with "perm solution," this is evidence that Blue Moon's ammonia emissions may be partly responsible for the foul odors and physical symptoms experienced in neighboring communities.

Although Commenters could not find data on levels of chronic ammonia exposure likely to cause various symptoms, the National Research Council (US) Committee on Acute Exposure Guideline Levels found that people do not typically detect any ammonia odor below a concentration of 5 ppm, and provided the following data regarding symptoms from acute exposures:

> The odor of ammonia can be detected by humans at concentrations >5 ppm; the odor is highly penetrating at 50 ppm (10 min). Human volunteers exposed to ammonia showed slight irritation at 30 ppm (10 min); moderate irritation to the eyes, nose, throat, and chest at 50 ppm (10 min to 2 h); moderate to highly intense irritation at 80

> ppm (30 min to 2 h); highly intense irritation at 110 ppm (30 min to 2 h); unbearable irritation at 140 ppm (30 min to 2 h), and excessive lacrimation and irritation at 500 ppm.

National Research Council (US) Committee on Acute Exposure Guideline Levels, *Ammonia Acute Exposure Guideline Levels*, in *Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 6* (2008), *available at:* https://www.ncbi.nlm.nih.gov/books/NBK207883/.

That data indicates that to experience the burning eyes reported by residents, they were likely exposed to at least 30 ppm, and perhaps as high as 50 ppm, of ammonia. Of course, for residents to experience such levels, the concentration directly at the source is almost definitely higher.

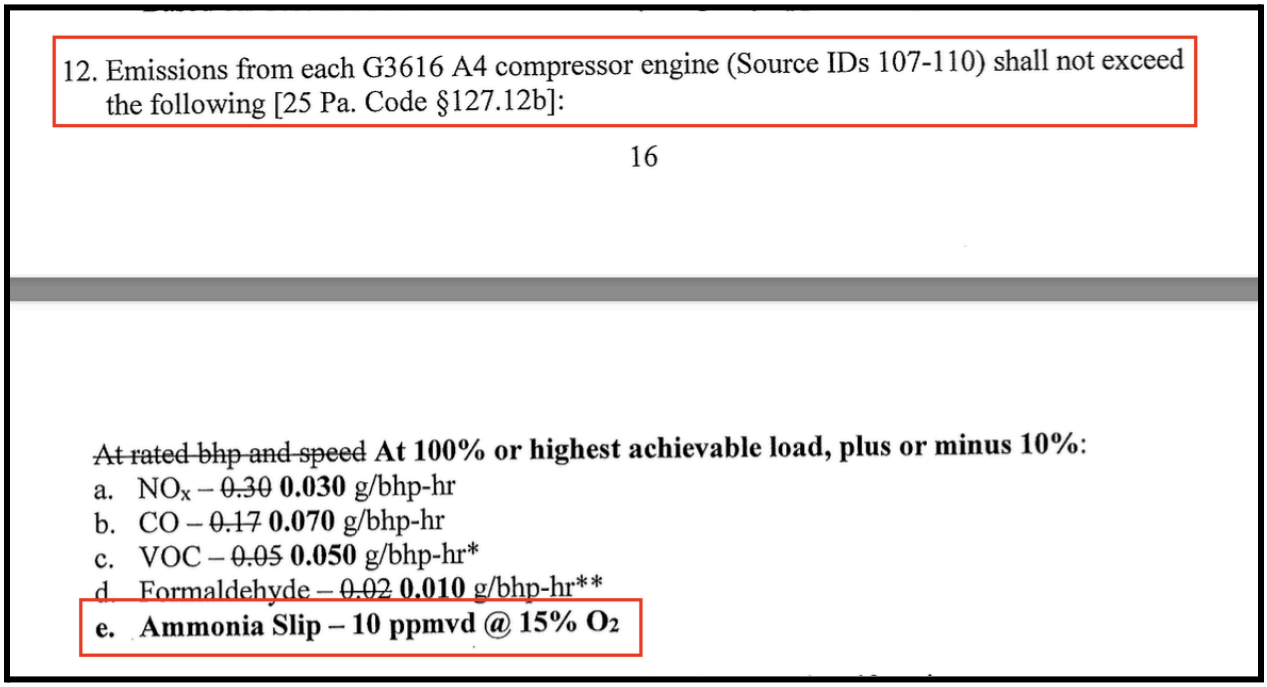
b. DEP and impacted community members need to know Blue Moon's data related to ammonia slip in order to best protect public health.

Blue Moon is required to perform stack tests for ammonia slip every five years and to continuously monitor the urea injection rate and inlet temperature for each catalyst bed. Draft Permit at 62. Although the Draft Permit requires EQM to monitor those parameters and keep records, it lacks a corresponding reporting requirement. *Id.*, at 63. Even if DEP were to increase the required stack testing frequency as Commenters recommend below, those tests are far too infrequent for DEP to ascertain whether Blue Moon is properly maintaining and operating the SCR equipment to ensure that ammonia slip levels are properly controlled. Particularly because residents are suffering from constant noxious odors and at times experiencing physical harm which excessive ammonia exposure could cause, DEP needs to regularly review EQM's parametric ammonia slip data as needed to protect the public. Thus, DEP must require EQM to more regularly report its raw urea injection rate and inlet temperature data.

Additionally, DEP should require EQM to make this data publicly available to aid residents in determining whether the foul odors and physical symptoms caused by the Facility are likely to be due, at least in part, to ammonia exposure. That data should be supplied along with general information about SCR functionality, such as the optimal operating temperature range to minimize ammonia slip. When properly informed, residents are better able to take the necessary actions to protect their health. Healthcare providers would likewise be more equipped to better diagnose and treat any adverse health effects.

c. The Department must add an ammonia slip limit of 10 ppmvd @ 15% O2 to the Draft Permit because such a limit is either in Plan Approval PA-63-00999A, or else omitted because of clerical error.

Commenters did not receive a copy of Plan Approval PA-63-00999A, which DEP issued on April 11, 2017. However, we do have a copy of the Department's corresponding Comment and Response Document which is also dated April 11, 2017. Alan A. Binder, *Comment and Response*, Blue Moon Compressor Station PA-63-00999A (Apr. 11, 2017). That document explains that the final permit was changed from the draft permit to reflect changes necessary to ensure that the Facility would qualify for synthetic minor status. *See id.* at 3. Included in the changes to the permit were conditions triggered by the revised plan's addition of SCR for four G3616 compressor engines. *Id.* Among those changes, as marked in the below image, is an ammonia slip limit of "10 ppmdv @15% O2." *Id.* at 16–17.



12. Emissions from each G3616 A4 compressor engine (Source IDs 107-110) shall not exceed the following [25 Pa. Code §127.12b]:

16

~~At rated bhp and speed~~ **At 100% or highest achievable load, plus or minus 10%:**

a. NO_x – ~~0.30~~ **0.030** g/bhp-hr
b. CO – ~~0.17~~ **0.070** g/bhp-hr
c. VOC – ~~0.05~~ **0.050** g/bhp-hr*
d. Formaldehyde – ~~0.02~~ **0.010** g/bhp-hr**
e. Ammonia Slip – 10 ppmvd @ 15% O_2

Id. (red boxes added for emphasis).

The Draft State Only Operating Permit currently has no ammonia slip limit. However, since the Department's redlined version of plan approval PA-63-00999A was included in the Comment and Response Document released on the same day as the approved final plan approval PA-63-00999A, that ammonia slip limit should be in the final plan approval. If it was somehow omitted, then the omission was clearly a clerical error. In either case, the Department must incorporate the ammonia slip limit, along with conditions necessary to assure compliance with that limit, into the final State Only Operating Permit.

d. DEP should add work practice requirements necessary to maintain the functionality of the SCR catalyst, and require ammonia slip stack testing at least every two years.

EPA's *Air Pollution Control Cost Manual* explains the relationship between ammonia slip and SCR catalyst degradation as follows:

> Ammonia slip does not remain constant as the SCR system operates but increases as the catalyst activity decreases. Properly designed SCR systems…maintain low ammonia slip levels, approximately less than 2 ppm. While ammonia slip levels in operating permits are typically in the range of 2 to 10 ppm, in actual practice lower slip levels are achieved, and the **slip levels approach permitted levels only when the catalyst is near the end of its service life**. (Emphasis added.)

John L. Sorrels, *Chapter 2: Selective Catalytic Reduction*, in EPA, *Air Pollution Control Cost Manual*, 7th ed., PDF p. 24 (chapter updated June 2019), *available at:* https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf.

There are several common mechanisms of catalyst deactivation and the loss of reactive surface area. These include thermal sintering, which is "a permanent loss of catalyst activity due to a change in the pore structure of the catalyst" that may occur at temperatures as low as 450 degrees fahrenheit; blinding, plugging, and fouling by ammonia salts and other particulate matter that binds to the catalyst at sites that would otherwise be available for NOx reduction; erosion of the catalyst material; and simple aging. *Id.* at PDF p. 27–28. As shown in the graph below, catalyst activity also tends to decrease as the number of operational hours increases.

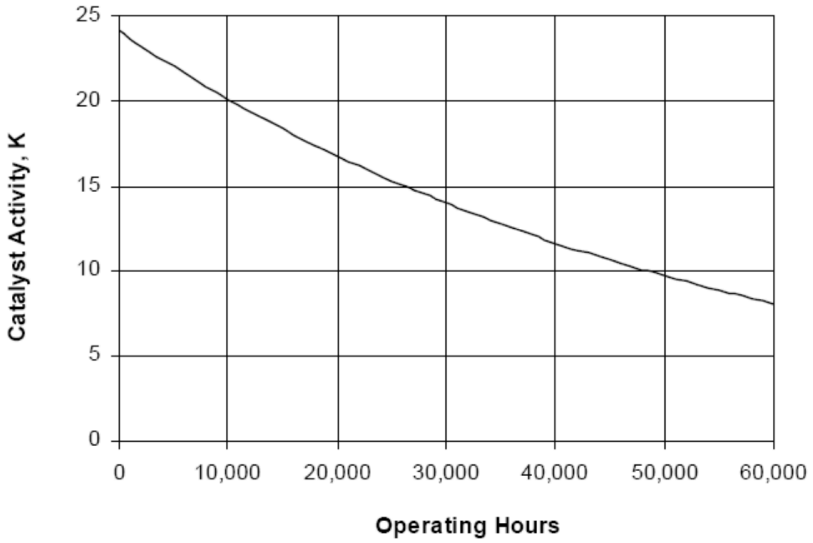


Figure 2.4: Typical Catalyst Deactivation per Equation 2.2 with $K_O = 24.12$; $\tau = 55,000$

Id. at PDF p. 25.

For SCRs that must operate continuously year-round, the EPA recommends operators develop a catalyst management plan ("CMP") that includes a schedule to replace aging catalysts, as well as management of other SCR equipment. *Id.* at PDF p. 29. To maximize efficiency, EPA recommends that facilities conduct an annual inspection of the SCR system, which includes inspecting "the catalyst, the reactor, and the complete NH3 storage and injection system." *Id.* at PDF p. 30. DEP should also require EQM to tune and optimize the ammonia injection grid annually. *See id.* This would ensure "uniform flow rate/velocity and uniform NH3/NOx molar distribution," without which NOx reduction across the catalyst would decrease, with a corresponding increase in ammonia slip. *Id.*

Additionally, the Draft Permit requires stack testing for ammonia slip only once every five years. Draft Permit at 62. Such infrequent testing risks missing excessive ammonia slip emissions for an extensive period of time, worsening the harm to the surrounding community members who already endure chronic foul odors and physical symptoms including burning eyes. First, there are causes of excessive ammonia slip that could be missed by monitoring only NOx emissions and the urea injection rate, such as incomplete mixing of NOx and ammonia or uneven degradation of the catalyst. Second, degradation of the catalyst is inevitable and progressive. Thus, if the ammonia slip measurement at one stack test is close to the limit, and then it continues to gradually rise as catalyst degradation proceeds, then waiting five years before the next stack test unacceptably and unreasonably risks missing permit violations for extended periods of time. Accordingly, the Department should require EQM to conduct ammonia slip stack tests at least every two years.

2. **Because the Facility's potential to emit ("PTE") NOx under the permitted conditions is barely under the major source threshold, DEP should require EQM to install continuous emissions monitoring systems ("CEMS") for NOx.**

The Draft Permit establishes a 12-month rolling emission limit for NOx of 97.9 tons per year ("tpy"). Draft Permit at 17. That is within 2.1% of the major source threshold of 100 tpy, and the Facility is remaining below that threshold only through a combination of additional control devices, more restrictive limits, and a limit on the hours of operation added to the final plan approval. PA-63-00999A Comment and Response Document at 3. Currently, the Draft Permit requires EQM to monitor NOx emissions every 2,500 hours of operation. Draft Permit at 59.

Because the margin by which Blue Moon remains under the major source threshold for NOx, and thereby avoiding the need for a Title V operating permit, is so narrow, the Department should require EQM to install NOx CEMs for the compressor engines. A snapshot of emissions approximately three times per year is insufficient to ensure that NOx emissions do not surpass permitted limits and above the major source threshold.

In addition to the proximity of the major source threshold to the permitted limit, which alone warrants the installation of NOx CEMs on the engines, several other factors increase the importance of adding that requirement. One of these factors is the variance in NOx emissions measured from the six G3612 compressor engines discussed in Comment #6 below. These seemingly identical engines are being run under substantially similar conditions, yet vary widely in their NOx emissions. That warrants monitoring the total NOx emissions for the Facility more closely.

Another factor is that the performance of the SCR catalysts that control NOx emissions from the four G3616 engines will vary by nature, as detailed in Comment #1 above. Additionally, if the Facility's ammonia slip becomes excessive, Blue Moon will need to balance that with NOx control, which could also push NOx emissions above the major source threshold. Moreover, any time one of the G3616 engines is shut down for maintenance or any other reason, the NOx emissions will be increased until the SCR heats to within the operational temperature range. Notwithstanding, the existing monitoring requirements would not capture those NOx increases.

Any of these factors alone should necessitate NOx CEMs for the compressor engines of a facility so close to the major source NOx threshold. Therefore, the Department should add the requirement for NOx CEMs to the Draft Permit.

3. **The Department should not allow EQM to average the NOx emission factors for the six G3612 compressor engines, likely reducing the accuracy of the emissions calculations, so that Blue Moon may artificially appear to be a natural minor source of NOx.**

The Department was correct to require Blue Moon to submit a plan approval application for their request to average currently unit-specific emissions limits for the six G3612 compressor engines. The limitations, as they currently are, were generated from source specific emissions testing. Thomas J. Joseph, *Review Memorandum of Synthetic Minor State-Only Operating Permit Application EQM Gathering OPCO, LLC (EQM)*, Table V, PDF page 18 (Jan. 28, 2025). These compressor engines have the potential to emit these levels of pollution, verified entirely by testing their exhaust gas composition. EPA guidance considers source specific emissions testing to be the second most accurate means by which to generate emissions factors after the use of CEMS data. EPA Region 5, *Best Practices for Estimating Emissions Using Emissions Factors for Clean Air Act Permitting, PDF page 3, available at:* https://www.epa.gov/system/files/documents/2022-02/emissions-factors-best-practices_0.pdf. However, this data is still just a snapshot of the emissions from each engine, and the resultant emission factors do not incorporate a margin for error.

The Department should not allow Blue Moon to deliberately take a step backwards in the accuracy of their emissions limits by averaging them together. This is especially important when the facility is so close to the major source threshold for NOx and has no means of continuously verifying that each source is in compliance. Blue Moon may very well show that numerically that averaging would allow the facility to become a natural minor source on paper. However, as discussed in Comment #6, there are considerable, unexplained variations among the NOx emission measurements for these apparently identical engines. These variabilities increase the likelihood that unidentified variations in operation could swing the emissions for any individual engine. That would mean that the average would be misleading. Additionally, as discussed above, without CEMS there is no assurance that the NOx emissions would remain in practice below the major source threshold. Therefore the Department should reject any attempts by Blue Moon to employ less accurate means by which to estimate their emissions and instead should encourage them to pursue other, more verifiable means if it seeks to be reclassified as a natural minor source.

4. **DEP should require more robust monitoring for fugitive emissions by mandating Quarterly Inspections with Method 21, an OGI Camera inspection to be paired with each AVO Inspection, and Method 21-Analysis of all leaks found during any inspection.**

The Department may include in a state-only operating permit any "terms and conditions the Department deems necessary to assure the proper operation of the source." 25 Pa. Code § 127.441(a). Yet the Draft Permit's Leak Detection and Repair ("LDAR") requirements could allow readily detectable leaks to be missed and does not require sufficient analysis of leaks that are detected.

The Draft Permit lists fugitive emissions from component leaks as Source 301, and has the following monitoring requirements:

1. Quarterly LDAR inspections using either an EPA Method 21 compliant gas leak detector, an Optical Gas Imaging ("OGI") camera, or any "other leak detection methods approved by the Division of Source Testing and Monitoring"; and

2. Monthly auditory, visual, and olfactory inspections ("AVO"). Draft Permit at 47.

Each of these monitoring methods has unique strengths and weaknesses, and properly combining them is necessary to detect and characterize leaks effectively and efficiently. An OGI camera is more effective at finding leaks than an AVO inspection, which is inherently limited by the capacity of human senses and more susceptible to human error. Requiring the use of an OGI camera during each AVO inspection could significantly increase the accuracy of the inspection without adding significant time or effort to the inspection.

The Department should add this requirement to ensure that leaks that would otherwise be missed by an AVO inspection alone are caught so that they may be repaired more rapidly. Detecting the leaks before they are readily perceptible by human senses could have the additional benefit of preventing small leaks from growing over time and leading to greater emissions and potentially to more costly repairs.

Method 21, by contrast, uses a small probe that must be held close to a leak to detect it. 40 C.F.R. pt. 60, app. A-7, Method 21 (2024). One study found that unless an inspector passes the probe within a centimeter of a leak, there is up to a 57% chance that they could miss the leak entirely. Terence Trefiak, *LDAR Case Study Comparison of Conventional Method 21 vs Alternative Work Practice (Optical Gas Imaging)* (Dec. 14, 2015), available at: https://www.epa.gov/sites/default/files/2016-04/documents/20trefiak.pdf. That means that it is more prone to human error, which is perhaps more likely because it is a monotonous task. *See id.* However, the

technology is more established than OGI, and is by far the most reliable and effective way to quantify a leak once it is located.

OGI, on the other hand, is highly accurate in detecting a leak, although the detection accuracy is reduced at concentrations lower than 1,500 ppm. *Id.* However, the OGI cameras have the advantage of showing the exact source of the leak, avoiding the problem of "ghost leaks" or gas drift. Also, technicians can easily scan some components that are difficult to reach with a Method 21 probe. *Id.* The maximum reach of a Method 21 probe is three meters when using a probe extension, whereas an OGI camera with the appropriate lens may detect a leak up to 30 meters away. *Id.*

The Department should explicitly require EQM to conduct a quarterly Method 21 inspection rather than allow it to opt for a less sensitive method because, properly conducted, a Method 21 inspection can reliably detect leaks at concentrations as low as 500 ppm. *Id.* For monthly inspections, less time- and labor-intensive OGI and AVO methods are appropriate. The Department should require the monthly inspections to employ both methods, because it should not add significant time to pan the OGI camera over components during an AVO inspection.

Additionally, since Method 21 can measure the concentration of a leak, whereas OGI and AVO are limited to alerting the operator to the presence of the leak, the Department should require EQM to use Method 21 to analyze any leak detected by other means. When an inspector knows the precise location of a leak, then obtaining a reading using Method 21 should be a relatively quick and simple way to obtain valuable data regarding the nature of the leak.

Thus, to assure the proper operation of the source and avoid unnecessary emissions from missed or poorly understood leaks, the Department should modify the LDAR requirements in the Draft Permit to mandate: (1) quarterly Method 21 inspections; (2) inspections with an OGI camera during the monthly AVO inspections; and (3) precise leak quantification with Method 21 for any leak detected by any means. *See* 25 Pa. Code § 127.441(a).

The Department should also require EQM to conduct quarterly OGI inspections of otherwise hard-to-reach or dangerous to inspect components that are readily viewed through an OGI camera. Differentiating between whether components are difficult or unsafe to evaluate overall or only when employing a probe or AVO is important. Otherwise, EQM may unnecessarily miss leaks for up to a year by developing a generic plan for all components that are difficult or unsafe to get near enough to probe when some of those components could be readily inspected from a distance with an OGI device.

5. **<u>The significant dangers of BTEX compounds and benzene to public health and the environment demand higher monitoring requirements in the Draft Permit.</u>**

The well known dangers and presence of benzene in methane, particularly throughout oil and gas extraction, processing, and end-use, merit accurate monitoring and recordkeeping that present either real-time or on-point data. BTEX, which stands for benzene, toluene, ethylbenzene, and xylene, are highly toxic and potent emissions that cause cancer and can even lead to death. Due to the seriousness of benzene's effects on public health and the environment, this Draft Permit for such a large facility should not permit "actual average[s]", especially when such averages are calculated using a predictor software. Blue Moon Compressor Station, which includes Full Moon Compressor Station, is nearly a major source facility that would require a Title V operating permit based on its emissions. Even though EQM asserts this qualifies for a state-only permit, this Facility calls for more careful monitoring and recordkeeping of all emissions, including of BTEX compounds. Therefore, monitoring that exceeds typical state-only permit requirements is most appropriate, especially for BTEX emissions.

a. **Benzene's presence in methane, combined with its high toxicity on human health, calls for more accurate benzene data collection.**

Both the scientific community and governmental agencies recognize benzene and BTEX compounds as dangerous to public health and the environment. The National Library of Biotechnology Information, who also maintains the National Library of Medicine, directly link benzene as a cancer-causing compound, and reports:

> People who breathe in high levels of benzene may develop drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, unconsciousness, death…Long-term (a year or more) exposure to benzene causes harmful effects on the bone marrow, resulting in anemia and excessive bleeding. It can also affect the immune system, increasing the chance for infection. Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. Acute deaths from benzene exposure at high concentrations have been due to ventricular fibrillation caused by exertion and release of epinephrine.

National Library of Biotechnology Information, "Benzene: Compound Summary", *available at:* https://pubchem.ncbi.nlm.nih.gov/compound/Benzene#section=Toxicity-Summary. The EPA also confirmed the particularly harmful effects of benzene on children and infants. In its assessment entitled "Carcinogenic Effects of Benzene: An Update", they state:

> [Benzene] could entail a greater risk of leukemia and other toxic effects to children if they are exposed to benzene at similar levels as adults. Infants and children may be more vulnerable to leukemogenesis because their hematopoietic cell populations are differentiating and undergoing maturation.

US EPA, "Carcinogenic Effects of Benzene: An Update", *available at*: https://www.epa.gov/iris/supporting-documents-benzene-cancer. There is little doubt that benzene exposure substantially risks human health, and with such serious impacts like leukemia in children and infants this Draft Permit needs strict and accurate monitoring.

Despite the data shared by EQM, the presence of benzene and BTEX compounds is highly likely in the Facility's emissions, which DEP recognizes in requiring BTEX monitoring in the Draft Permit. However, the toxicity of BTEX and the years-long exposure local residents will endure with the Blue Moon Facility situated near them, the Draft Permit must include more stringent monitoring requirements. Albeit the scientific community is bereft of research into the amount of benzene and BTEX compounds at compressor stations like Blue Moon facility, this is largely due to infrastructure security measures that prevent researchers from accessing these facilities. Curtis L. Nordgaard, *et al.*, "Hazardous air pollutants in transmission pipeline natural gas: an analytic assessment," 2022 *Environ. Res. Lett.* 17, *available at:* https://iopscience.iop.org/article/10.1088/1748-9326/ac9295/pdf. What research is available is based on facility owners' voluntarily submitted gas composition data to either the Federal Energy Regulatory Commission or on their publicly-available websites. *Id*. at 2.

In a peer-review journal, *Scientific Research Letters*, researchers reviewed what available data there was, and they concluded that "HAPs are ubiquitous throughout the transmission system".[1] *Id*. at PDF 10. The research also found that of the 49% of facilities that voluntarily reported the HAP compositions at their sites, 44% reported hexane emissions, 30% reported benzene, 25% reported toluene, 17% reported ethylbenzene, and 23% reported xylene. It follows that if this data shows a significant presence of BTEX compounds at transmission facilities, then the presence of BTEX compounds is highly likely to be at a sizable facility like Blue Moon. Therefore, accurate data of the BTEX, and particularly benzene, emissions is critical for both public health and environmental reasons. EQM currently compromises the accuracy of its reported data through averaging and the use of predictor software, as detailed below.

[1] The EPA categorizes benzene as a hazardous air pollutant. *See* US EPA "Initial List of Hazardous Air Pollutants with Modifications," available at *https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications*.

b. The Draft Permit should require direct measurements of benzene emissions, rather than predictor software like GRI-GLYCalc™.

The Draft Permit's monitoring requirements should be based on 40 CFR § 63.772(b)(1) because this demands *direct* readings of the natural gas flowrate to the glycol dehydration units. Currently, the Draft Permit uses 40 CFR § 63.772(b)(2); and pursuant to subsection (i), EQM fully relies on the software GRI-GLY Calc™ ("GRI-GLY") to monitor flowrate. Draft Permit at 80. But the GRI-GLY software is designed to only *estimate* and *predict* the emissions from dehydration units, not to take specific gas composition measurements. This is wholly insufficient to monitor the BTEX emissions from such a large facility like Blue Moon–especially considering the grave health and environmental impacts of these compounds. Alternatively, the Draft Permit allows EQM to rely on 40 CFR § 63.772(b)(2)(ii), which only requires "[t]he owner or operator [to] determine an average mass rate of benzene or BTEX emissions". *Id*. Again, the utilization of averages is insufficient to protect public health from the harrowing effects of benzene and BTEX compounds from a facility that nearly reaches Title V emission levels.

We advocate for the Draft Permit to require accurate, and preferably real-time, readings of the natural gas flowrate pursuant to 40 CFR 40 CFR § 63.772(b)(1). This regulation imposes on owners to "install and operate a monitoring instrument that directly measures natural gas flowrate to the glycol dehydration unit with an accuracy of plus or minus 2 percent or better." This could be in the form of real-time gas chromatography that reliably determines actual gas composition, rather than depending on estimates or predictions from models. There is, respectfully, little to justify foregoing actual data readings when actual data better assists both governmental and public oversight of a large compressor station. A gas chromatograph is not an unreasonable expense, especially for a large oil and gas producer like EQM, and would best ensure public safety through on-point readings of natural gas flowrate and benzene emissions. Thus, the strong connection between BTEX compounds and devastating diseases like leukemia and other cancers should compel the Department to enforce accurate gas composition readings rather than annual averages that use predictor model software. Also, the size and production level of Blue Moon Compressor Station compels more stringent benzene monitoring than what is currently in the Draft Permit.

6. <u>DEP should urge EQM to investigate whether the differences between NOx emissions from seemingly identical engines provides information that could lead to potentially significant NOx reductions.</u>

NOx emissions rates for the six Caterpillar G3612 compressor engines vary from 2.50 lb/hr to 3.68 lb/hr. Thomas J. Joseph, *Review Memorandum of Synthetic Minor State-Only Operating Permit Application EQM Gathering OPCO, LLC (EQM)*, Table V, PDF page 20 (Jan. 28, 2025). These emissions limits were set based on emissions tests for each individual

compressor engine. This level of variation strikes the Commenters as odd given that engines are all the same make and model, consume the same fuel, have the same emissions controls, and are all engaged in the same process. *Id.* at PDF 17. What leads to a variance of more than 1 lb/hr of NOx emissions across these six combustion engines? Commenters do not dispute the results of the testing that set these limits, just question what factors lead to such a large variation in emission factors.

This data perhaps provides a valuable opportunity. If EQM were to thoroughly investigate the root cause of this variation, it could unveil avenues by which they could ensure all six engines operate nearer to the lower end of the spectrum of emissions factors. This could potentially meaningfully reduce the amount of NOx generated by the facility. If the emissions reductions are large enough, this could potentially enable Blue Moon to operate as a natural minor source rather than as a synthetic minor, as it currently stands.

CONCLUSION

Commenters appreciate the opportunity to comment on the Draft State-Only Operating Permit for Blue Moon Compressor Station. We urge DEP to correct the deficiencies in the Draft Permit and otherwise strengthen it as detailed above. Doing so would better protect public health, particularly for the frontline residents who have long been injured by poor air quality.

Sincerely,

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