

Comments on MIAEH’s “Potential Public Health Impacts of Natural Gas Development and production in the Marcellus Shale in Western Maryland” Report

1. Data on particulate matter and National Ambient Air Quality Standards are erroneous and presented without context in a way that will be easily misunderstood.

The report includes the following statements:

- Currently, daily PM_{2.5} levels average around 13 µg/m³ for Allegany and Garrett Counties, which is slightly higher than daily average for the state of Maryland.¹ⁱ
- Annual average PM_{2.5} concentrations were ~13 µg/m³ in both Allegany and Garrett counties. These mean levels were higher than the mean concentrations for the state of Maryland as a whole.²

Although it is not clear from the wording, we assume that “daily PM_{2.5} levels average around 13 µg/m³” is actually referring to the annual average concentration of PM-2.5. It is stated on page 19 that criteria air pollution data was obtained from the United States Environmental Protection Agency; however, the number 13 µg/m³ is not consistent with EPA’s data. Moreover, an annual average concentration is not the appropriate concentration to compare to National Ambient Air Quality Standards (NAAQS), which are designed to provide public health protection, including protection of sensitive populations.³

There are two forms of the PM-2.5 NAAQS: an annual average concentration of 12 µg/m³ and a 24-hour concentration of 35 µg/m³. The relevant metric for comparison to the NAAQS is the design value (DV). The DV for the annual PM-2.5 NAAQS is expressed as the annual mean, averaged over three years. The DV for the 24-hour PM-2.5 NAAQS is expressed as the three year average of the annual 98th percentile 24-hour concentration.⁴

The only PM-2.5 monitor in Western Maryland with data eligible for comparison to the PM-2.5 NAAQS is the Piney Run monitor. The current annual PM-2.5 DV (2011-2013) for Piney Run is 8.9 µg/m³ (the standard, as noted above, is 12µg/m³). The highest annual PM-2.5 DV in the state is 10.5 µg/m³, measured at both the Oldtown monitor in Baltimore City and the Hagerstown monitor in Washington County. The current 24-hour PM-2.5 DV for Piney Run is 20 µg/m³ (the standard, as noted above, is 35 µg/m³) and the highest 24-hour PM-2.5 DV is 26 µg/m³, measured at both the Oldtown monitor and the Essex monitor in Baltimore County. All of these levels are well below the applicable public health standards. PM-2.5 levels in Maryland have been steadily declining since monitoring began in 2000.

¹ Page xvii, the carry over paragraph from the previous page.

² Page 9, paragraph 9.5.1

³ www.epa.gov/air/criteria.html.

⁴ Id.

Someone reading the language from the report that “Currently, daily PM2.5 levels average around 13 $\mu\text{g}/\text{m}^3$ for Allegany and Garrett Counties, which is slightly higher than daily average for the state of Maryland” would erroneously conclude that the PM2.5 NAAQS was not attained in Western Maryland and probably not attained in the rest of Maryland. As pointed out above, this is incorrect. It is also troubling that the health report presented this information without providing the relevant public health context by comparing it to the applicable NAAQS (i.e. health standards) using DV’s.

2. *The air quality data and Figure 10-4 are presented without context in a way that will be easily misunderstood.*

The report states that “MDE is collecting baseline air quality data for criteria air pollutants as well as selected VOCs at the Piney Run Reservoir. Additional monitoring data is available for Garrett County from the EPA Air Quality Data Mart. In general, monitoring data from 2013 suggest that air quality in Garrett County is better than Maryland as a whole, with noted exceptions for SO₂ concentrations (Figure 10-4).⁵

Figure 10-4 presents seasonal mean concentrations for SO₂, CO and PM-2.5 for 2013. No relevant public health context is provided for this information. The appropriate metric for SO₂ is the 1-hour DV. For CO there are both 1-hour and 8-hour NAAQS set at 9 ppm and 35 ppm respectively, both expressed as the second maximum concentration measured at an individual site in a given year (that is, the standard is not to be exceeded more than once per year to attain the NAAQS). The highest CO DV (2012-2013) in Maryland is 1.4 ppm, measured at the Essex monitor in Baltimore. Piney Run in Garrett County has a DV of 0.3 ppm.

Additionally, the highest SO₂ concentrations in Maryland are measured at the Essex monitor in Baltimore County with a 2010-2012 DV at 22 $\mu\text{g}/\text{m}^3$ compared to the 2010-2012 DV at Piney Run in Garrett County of 19 $\mu\text{g}/\text{m}^3$ (2011-2013 DV for Piney Run was incomplete due to instrument issues). The applicable NAAQS for SO₂ is a 1-hour value of 75 $\mu\text{g}/\text{m}^3$. The DV is expressed as the three year average of the 99th percentile 1-hour concentration.

As noted above, all criteria pollutants measured at Piney Run are **well below** the applicable NAAQS, with the exception of ozone which had a 2011-2013 DV of 70 ppb (still below the NAAQS of 75 ppb.)

The PM-2.5 information presented in Figure 10-4 contradicts the earlier statements (pages xvii and 9) that Garrett County has the highest concentrations in Maryland at approximately 13 $\mu\text{g}/\text{m}^3$ (which is erroneous in any event). Figure 10-4 indicates an annual average concentration of around 8 $\mu\text{g}/\text{m}^3$ for Garrett County for 2013 and around 9 $\mu\text{g}/\text{m}^3$ for Maryland as a whole. Finally, Figure 10-4 presents concentrations expressed to three decimal points as if these are meaningful significant figures. This is not correct.

Table 10-4 erroneously indicates that H₂S is associated with Site Development and Drilling Preparation (Traffic) and Fracturing and Completion (Traffic).

⁵ Page 27, last paragraph and page 28, Figure 10-4.

3. *The air monitoring recommendations are too vague to be meaningful and display a lack of understanding of the practical aspects of air monitoring.*

Recommendation 19 states: Conduct Air Quality Monitoring

- a. Initiate air monitoring to evaluate impact of all phases of UNGDP on local air quality (baseline, development and production).
- b. Conduct source apportionment that allows UNGDP signal to be separated from the local and regional sources.
- c. Conduct air monitoring with active input from community members in planning, execution, and evaluation of results.
- d. Conduct air monitoring in a manner to capture both acute and chronic exposures, particularly short-term peak exposures.
- e. Clearly communicate to community members expectations about what is achievable through air monitoring.

This recommendation fails to indicate:

- What pollutants should be monitored
- What methods at what detection limits should be used
- Where should the monitors be located with respect to well pads, setbacks, residences, communities, etc.
- What health benchmarks the results should be compared to.

These are important and difficult questions. Also, it is extremely difficult to conduct effective source apportionment without detailed source profile information that is specific to shale gas development and production activities. The available information is not reliable. It is likely that mobile and non-road combustion sources would dominate all source contributions. It is also likely that wood smoke emissions would dominate health risks in the winter months.

4. *Data collected in West Virginia are not particularly relevant to Maryland.*

Page 29, last paragraph states: “More relevant air pollution data for MD comes from a recent University of West Virginia study that collected various air quality and noise data associated with UNGDP processes in WV.”

We question whether the air quality data from West Virginia are relevant for Maryland when West Virginia has wet gas and Marcellus shale gas in Maryland is expected to be dry gas. Also, West Virginia allowed open containment ponds for fracking fluids and required few if any air pollution controls, while Maryland will not allow open containment ponds, and will require top-down BAT controls.

5. *Figure 15-10 is erroneous and misleading.*

Figure 15-10 on page 137 is a bar graph that shows Garrett and Allegany PM-2.5 concentrations at around 13 µg/m³, Regional concentration at about the same level and average concentrations for the whole of Maryland at around 12.5 µg/m³.

The information presented in this graph is erroneous. Also, there is no definition as what “Region” refers to and which PM-2.5 monitors are covered under that definition. This information is also contradictory to the information on PM-2.5 concentrations presented in Figure 10-4 on page 28.

6. *The discussion of asthma and PM2.5 concentrations contains errors and is illogical.*

Section 15.4.2, second paragraph states: “While no direct asthma data was collected, the average daily PM2.5 concentrations were gathered (Figure 15-10). Studies have shown that PM2.5 levels are associated with asthma development and increased asthma admissions to hospital emergency departments [267], so PM2.5 concentrations may be an important issue for populations with persistent asthma. Across the groups, PM2.5 concentrations were very high, with Allegany and Garrett counties almost equal to each other and the region PM2.5 concentrations, all of which are higher than the PM2.5 concentrations across Maryland. This is in line with the national trend that indicates asthma incidence nationally is on the rise [268, 269].”

“Average daily PM2.5” is not an appropriate comparison to the PM2.5 NAAQS; Figure 15-10 uses incorrect numbers and is misleading. Also, the suggestion that the concentrations explain a “national trend that indicates asthma incidence nationally is on the rise” is illogical, because PM2.5 concentrations have been steadily declining since measurements first began in 2000.

7. *The warning system for earthquakes is not possible.*

R32 on page 95 recommends a “traffic-light system” for warning of seismic events. The USGS article that mentions the traffic-light system does so in connection with injection wells, where detection of small seismic events should cause the operator to consider reducing pressure. Is there a reason to recommend this apart from Class II injection wells? Research has been performed for advance warning systems for earthquakes, but so far no progress had been made. It is possible to monitor for quantity and magnitude of earthquakes; however, that is not indicative of a larger earthquake in the future.

8. *The report could easily be misinterpreted to mean that many of the potential adverse public health impacts are unavoidable.*

Despite a disclaimer in the Executive Summary that the authors are not predicting that adverse health impacts will necessarily occur in Maryland, language in the health report could easily be misinterpreted to mean that the adverse health impacts are certain to occur. The meaning of the assessments should have been more clear and stated in the body of report as well as the Executive Summary.

On page xv, the authors state “Our assessments of potential health impacts are not predictions that these effects will necessarily occur in Maryland, where regulation is likely to be stricter than in some states where UNGDP is already underway. Rather, we provide assessments of the impacts that could occur and that need to be addressed by preventive public health measures if and when drilling is allowed. Thus, the focus of our recommendations is on answering this question: Given the baseline population health, vulnerabilities, and potential impacts of UNGDP, how can Maryland best protect public health if and when UNGDP goes forward?” (page xv)

In discussing particular risks, however, the report uses language that implies that negative health impacts will occur, and that only the magnitude of those negative effects can be influenced. For example, on page xxi, this language appears: “Based on our evaluations of the limited but emerging epidemiological evidence from UNGDP impacted areas and air quality measurements as well as epidemiological evidence from other fields, we conclude that there is a High Likelihood UNGDP related changes in air quality will have a negative impact on public health in Garrett and Allegany Counties. The extent of the impact will be based on population vulnerability, proximity to the sites, and the success of public health prevention strategies implemented by the State and local communities and control measures taken by the industry to minimize exposures.” (emphasis added)(pages xxi and 91.)

Not surprisingly, stories about the health report do not qualify the findings. For example, an AP story on September 25 stated: “The study found a high likelihood that shale gas production would negatively affect air quality in the region.”

9. *Section 11, Regulatory Landscape*

This section is no doubt a good faith effort to cover an incredibly complex array of laws and regulations, but it is incomplete and inaccurate. It is not necessary to the report. .

10. *Use of unprocessed natural gas*

R15 includes the recommendation that the use of unprocessed natural gas to power equipment be forbidden. There is no support for this recommendation in the report; in fact, the report specifically acknowledges that any natural gas produced in Maryland is likely to be dry gas that could be safely used as fuel.

11. *Use of 2009 emissions factors*

Section 10.3.1.3.2 contains this sentence: “We took the 2009 process level to calculate overall emissions. This was done because the likelihood of implementing stricter emission control policies (as described in Roy et al. 2014) in the next 6 years (2020) remains unclear.” In fact, it is clear that some reductions will be implemented. EPA promulgated significant new rules in 2012 that mandate Clean Completion or Reduced Emission Completion for gas wells. [EPA estimates](#) that the rules will yield a nearly 95 percent reduction in VOCs emitted from new hydraulically fractured gas wells. The compliance deadline is January 1, 2015.

12. *The implication that groundwater could be contaminated by fracturing fluids in the absence of spills is incorrect and not supported.*

This sentence appears at pp. 46-47, “Overall, new UNGDP activities could lead to exposure and health risks for populations on well water due to potential contamination of ground water and well water from fracking fluids, recharge, or spills including radionuclides, heavy metals, methane, and benzene among other contaminants.” There is no support in the report for the proposition that ground water and well water (is there a difference?) could be contaminated from fracking fluids in the absence of spills, which are separately mentioned. Also, how would “recharge” cause contamination in the absence of spills or a leaking pond?

13. *Statements about characteristics of the workers are inaccurate or not supported.*

In Section 10.4.2.3, when comparing migrant workers with oil field workers, this sentence appears: “Migrant workers tend to be desperate for obtaining and maintaining employment in order to provide basic necessities for their families [173].” While this is undoubtedly true of many migrant workers, it is unlikely to be true of gas field workers who travel, because they are highly paid.

This sentence appears on page 81: “Furthermore, a disproportionate number of the workers lack health insurance [174].” The cited reference (a newspaper article) contains some lurid statements, such as “Swamped by uninsured laborers flocking to dangerous jobs, medical facilities in the area are sinking under skyrocketing debt, a flood of gruesome injuries and bloated business costs from the inflated economy.” and “Many of the new patients are transient men without health insurance or a permanent address in the area.” This information, even if accepted, does not support a statement that a disproportionate number of workers lack health insurance.

14. *The report could easily be misinterpreted because the data are not presented in context.*

The report gathered available data, much of it from UNGDP in areas where government regulations were weak and where development was intensive. These data are obviously very valuable for assessing risks associated with UNGDP, but they may not be representative of the way shale gas development would proceed in Maryland, if it is permitted.

A specific instance of how the failure to identify the context for the data could lead to misinterpretation is the reliance on data from areas where UNGDP has been rapid and intensive. This is especially apparent in the sections on Social Determinants of Health.

Because the report uses data from areas with rapid and intensive gas development without acknowledging that the likely intensity of UNGDP in Western Maryland will likely be much less intense, the report could be misinterpreted to mean that high rates of violent crime, sexually transmitted diseases, mental health problems and substance abuse will be inevitable and severe in western Maryland if UNGDP is allowed.

The health report relied uncritically on *The Social Costs of Fracking*, a report from Food and Water Watch, a group that advocates banning fracking. The report classifies counties as “unfracked rural counties,” “fracked counties,” and “heavily fracked counties.” It is not clear, however, whether the Food and Water Watch report uses consistent characterizations for the extent of fracking in a county or its definition of “heavily fracked.” The report includes references to relatively heavy well density as meaning 15 wells per square mile (p. 7), 2 wells per square mile (p. 6), one well per square mile (pp. 2, 6), and one well per 15 square miles (pp. 5, 11).

Bradford County is the Pennsylvania county with the largest number of gas wells. Pennsylvania Department of Environmental Protection records indicate that 436 permits for unconventional gas wells were issued for Bradford County in 2009 and 832 in 2010. Thus, enough permits were issued for Bradford County in 2010 alone to exceed the highest total number of wells projected for Garrett County by either the Sage Policy or the RESI economic reports. The Food and Water Watch document also cites information from North Dakota and other states where the influx of migrant workers has overwhelmed towns. The intensity and pace of drilling is likely to be significantly less in Maryland. The distinction between “heavily fracked” areas and the likely intensity of development in Western Maryland should have been acknowledged in the report.

ⁱ Page xvii, the carry over paragraph from the previous page