COMMENTS:

David Robert Brown ScD.

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Review and Analysis of the

“Assessment of risks from unconventional gas well development in
the Marcellus Shale of Western Maryland”

prepared by the Maryland Department of the Environment and the
Maryland Department of Natural Resources, October 2014

These comments were prepared at the request of
Chesapeake Physicians for Social Responsibility
Table of Contents

I. Introduction: ........................................................................................................3
II. Scope of risks........................................................................................................3
III. Analysis of the Conclusions in the Risk Assessment Report.........................4
IV. Omission of a major hazard from the Risk Assessment.....................................5
V. The Risk Assessment does not document the limitations in the available data, the analytical approach or the conclusions of the report............................................6
VI. Limitations in the assessment............................................................................6
VII. Need for Public Health experience and expertise.............................................8
VIII. Documentation of the limitations of the report is essential. Examination of limitations shows the important weakness of the “Risk Assessment” ....................8
IX General and Specific Comments..........................................................................8
   A. Strong points in the report
   B. Weak Points that need improvement
   C. Major limitations in the report:
   D. Recommendations necessary to strengthen the report:
X. Specific Comments on Each Section of the “Risk Assessment” .......................10
   A. Executive Summary:
   B. Risk Assessment sections: This is the body of the report.
XI. Implications of the failure to address the incomplete data and limitations in the risk assessment: Three examples.................................................................14

- Appendix B - Air Emission Risk Assessment ranks the health and environmental damage induced by the mixture of chemicals
- Appendix D - Drill fluids and Cuttings report ranks all Environmental Impacts as minor based on low Probability ranks. All consequences are rated as moderate.
- Appendix C - Road and Traffic ranks the probabilities in four of the seven Risk
I. Introduction:

The Maryland Safe Drilling Initiative is attempting to determine whether gas production in Western Maryland can be accomplished without unacceptable risks to public health, safety, the environment and natural resources. The “Assessment of Risks” document was prepared by the Maryland Department of the Environment and the Maryland Department of Natural Resources to inform that determination.

This review, which was requested by Chesapeake Physicians for Social Responsibility, considers the strengths and limitations of the “Assessment of Risks” in informing deliberations on health, safety and the environment. There are three important questions that are addressed in a Risk Assessment of health and environmental concerns.

1) What is known with certainty about the plausible hazards?
2) What are the hazards present and potential for human or environmental exposures that could damage health and the environment?
3) What are the limitations in the information available and the impact on conclusions in the Risk Assessment?

The “Risk Assessment” establishes that human health and environmental risks are present but does not analyze the risks sufficiently to determine the level of hazard to public health or the environment. This failure is due in part to limited data, but also it is the result of an untried novel, and limited approach used in the assessment.

II. Scope of risks

In order to determine the impact unconventional natural gas development on the two counties it is important to understand the scope of the proposed gas extraction project in Western Maryland. The following paragraph taken from the European Parliament analysis June 2011 Report, “Environment, Public Health and Food Safety with Gas Drilling” provides overall perspective on the likely impact of Gas Development. (http://www.europarl.europa.eu/activities/committees/studies.do?language=EN)

“One of the unavoidable impacts is huge land consumption and major landscape changes as the well density must be very high in order to fracture the source rocks at large scale for access to the stored gas. The individual well pads – in the USA up to 6 well pads per km or even more are reported – must be prepared developed and connected by roads which are accessible for heavy duty transport. Producing wells must be connected by gathering lines with low throughput, but also with purging units to separate waste water and chemicals, heavy metals or radioactive ingredients from the produced gas before it is pumped into the existing gas grid.”
Although the European Union paragraph does not mention the health and welfare impacts, it is because the health hazards have only recently been documented in the peer reviewed literature. Reports of health effects are found at all shale development sites and the scope of health risks is a cause for public health concern. The Maryland Risk Assessment Report had a formidable task from a public health perspective.

III. Analysis of the Conclusions in the Risk Assessment Report:

The central question addressed in this Risk Assessment is whether the impact of unconventional natural gas development and production (UNGD) on public health, safety and the environment can be managed by the ability of Maryland state agencies to reduce the risk to acceptable levels using three tools; 1) best management practices (BMPs) 2) current state programs in environmental management, 3) legislation.

The overall Conclusions of the report, on Page 2 of the Executive Summary and Page 12 of the Risk Assessment, do not provide guidance to this core question. The Risk Assessment conclusions assert that:

1) “the utilization of proposed practices serve to reduce many of the risks to… citizens, economy and quality of water, air and natural resources’ and

2) further that if risks are found unacceptably high additional mitigation steps could be taken

3) or extraction can be deferred until risks are reduced by new technology or until data is obtained that are effective to reduce the risk.”

These conclusions are vague and general. The conclusions do not provide the information needed by decision makers. Further, although the conclusions are based on findings from information that is extremely limited both in scope and technical depth, those limitations are not listed anywhere in the Risk Assessment.

The conclusions in the Executive Summary are not compatible with the findings in the Appendices sections of the risk assessment. There is no discussion or determination of magnitude and scale of the known health risks in the Risk Assessment. There is not available in the reviewed literature any systematic evaluations of the human health impacts that have been conducted by reliable health scientists or any other group. The evaluations of the risks to the environment are also limited. When the extent of the risks is unknown there is no way to determine which risks would deemed to be acceptable or addressed by the BMPs and regulations.

Further, the Risk Ranking assessment methodology used to evaluate individual hazards lacks the quantitative information needed to support the risk rankings in terms of either the extent of the hazard or the potential for occurrence of any individual hazard at any gas site. The Summary Risk Chart (Appendix A), which assigns a qualitative rank to each of the multiple risks, is not a valid assessment of the health risks.
If one takes this Summary Risk Chart presentation at face value and follows the logic of the risk approach to the end, and finally uses it to predict the aggregate hazard, you reach a startling conclusion. Not that there are minor risks but that there will be a substantial number of accidents what would impact human health and the environment each year.

Notice that there are 66 entries in the risk ranking summary chart ranked ‘low’ or higher (only 7 risks are rated high and 33 of the 66 are ranked ‘moderate’). If one assumes that the occurrence of “low risks” has a chance of 1 in 1000 per year per well, one could infer a probability of 66 x 1/1000 events per year and next assume that there are 100 wells. There would be 6600/1000 or 6.6 events per year, AN EVENT EVERY 7 to 8 WEEKS). But the scenario model predicts up to 450 wells. That would be 29 events per year. That would be an event every 2 to 3 weeks. One out of ten of them would be severe giving high risks to human health and the environment. One half of the events would be moderate (producing short term damage to health and the environment according to the definitions in the risk assessment).

IV. Omission of a major hazard from the Risk Assessment:

Omissions and gaps in a risk assessment are serious. This risk assessment omits analysis of the scheduled and unscheduled venting (purging), which is routinely conducted in well development and gas production. It is the major source of all air emissions in gas development. Referral to the Pennsylvania inventory for 2012 will illustrate the seriousness of the problem.

The figures below, prepared from data taken from the Pennsylvania inventory, show the activities that are the source of all emissions (methane, carbon dioxide and nitrogen oxides are removed to highlight the health concerns). Proportions are shown for 1) the overall phases in development of UNGD sources (on the left) and 2) sources of emissions from producing wells on the right. It is obvious that the venting (purging) of equipment and tanks are important major emissions during both overall development of unconventional gas fields and the ongoing producing gas wells, compressors, gathering lines and storage.

The Maryland “Risk Assessment” completely omits evaluation of the majority of emissions from producing wells. Those emissions are an important component of the environmental and health hazards.
**Inventory of Reported Emissions**
except methane, carbon dioxide and nitrogen cpds.

<table>
<thead>
<tr>
<th>Overall Phases in Development of UNGD (PA data)</th>
<th>Sources of Emissions from Producing Wells (PA data)</th>
</tr>
</thead>
</table>

V. **The Risk Assessment does not document the limitations in the available data, the analytical approach or the conclusions of the report.**

Clear statements on the “limitations” of a risk analysis are important. Risk Assessment requires that the limitations of both the available information and analysis be clearly documented in each separate section of the report. The absence of a clear statement of the limitations is a major flaw in the overall report. Were such a section provided, it would be clear to the readers that the conclusions are not and cannot be supported by the information available presently on UNGD.

**VI. Limitations in the assessment**

The following illustrates the seriousness of the problem with the overall conclusions:

- Three of the conclusions on Section B cite a serious risk to air for all phases of the UNGD activity and note that because the emissions are from multiple sources, they are difficult to reduce with BMPs.
- Further it is concluded that there is insufficient information to evaluate the differences between the low and high activity scenarios.
The concerns documented in Appendix B are consistent with current reports that further study is needed and that there are minimal direct emissions measurements. But they are not compatible with the Conclusions in the Executive Summary and the Risk Assessment sections.

- Moreover assessment of the rates and efficiencies of BMPs are based on voluntary industry reporting and a single narrowly limited ‘on site’ study. That study report emphasized extreme uncertainty between sites as well as a selection bias for measurement allowed by the industry between sites. Even so overall high probability for air emissions was determined.
- That information is extremely limited and thus insufficient to determine whether BMP combustion efficiencies and set backs will protect health and safety.
- Had the Risk Assessment considered the available Pennsylvania data on number of reported accidents for different drillers and contactors, the preparers would have seen extreme differences in reported accident rates between companies that ranged from 0 to 5 to rates that exceed 50 for the same time periods. This demonstrates a wide span in industry’s attention to safe practices by different drillers and their contractors and an endemic industry failure to report accidents by drillers and sub contractors.

Given the above uncertainty, it is difficult to accept the interpretation of ranking of risks reported in the detailed analysis section of the Risks Assessment section of the report. Further risks are reported as high to moderate (Appendix A) but then characterized as low to moderate for all processes. In fact on closer reading it is clear that there is minimal information available on which to draw any conclusion with respect to public health and safety. Only the Road and Traffic Appendix appear to support assumptions with adequate data.

**Sections of the report that draw no conclusions:**

Some sections of the report offer no conclusions. Instead of conclusions, Appendix C, D, E, F, G and H give general summaries of the section. In contrast Appendix I, Waste Disposal, gives a brief conclusion in three sentences, stating that: “the probability of harm is low, consequence of harm is moderate and overall risk ranking is low.”

This raises an important question: If the consequence of harm is “Moderate,” which is defined on page 7 as “considerable adverse impact on people or the environment: could affect the health of persons in the immediate vicinity: localized or temporary environmental damage”. How can the overall risk be rated as “Low” which is defined on page 6 as “Rarely happens under ordinary conditions; not forecast to be encountered under foreseeable future circumstances in view of current knowledge and existing controls on extraction”.

The conclusion of Low Risk is not possible from the perspective of public health and human welfare.
The implication of this type of thinking is: ‘that some health effects are acceptable in certain nearby persons if the effects are moderate and seen only in some people’. But what is considered moderate? Effects on birth rate, fetal viability and development have been reported in the published-peer reviewed literature. Effects on respiratory function and dermatitis have also been reported in the peer-reviewed literature. Further, more serious health conditions are reported from residents near gas drilling and waste sites. From the perspective of public health, these health hazards are not moderate health effects that can be dismissed merely because they are only induced in a small number of people.

VII. Need for Public Health experience and expertise:

The above observation reveals a structural flaw in the overall preparation of the Assessment project: That flaw is the absence of involvement of a health agency or health professionals.

VIII. Documentation of the limitations of the report is essential. An examination of limitations shows the important weakness of the “Risk Assessment”.

Any decision maker reading a Risk Assessment needs a clear statement of limitations of the risk analysis, especially the impact of limited data on the conclusions about health. That information is critical to any risk assessment. A section that clearly documents the limits of the report is important to understanding and making decisions based on the findings. In this report there is no discussion of limitations in either the body of the report or in any of the appendices. There is a clear lack of information to support the discussions and conclusions in all sections of the report.

A possible exception in terms of detailed references of impact is on roads and traffic. It is noteworthy that Impact on Roads and Traffic is the only section, other than Noise, that rated any of the risks as High. In all other sections, all risks are rated as moderate or lower. The final discussion in this evaluation of the Risk Assessment report will demonstrate the damage incurred with omission of discussions of limitations.

IX General and Specific Comments

The following comments and suggestions address specific parts of the Risk Assessment from the perspective of:

1. What is known with certainty about the plausible hazards?
2. What are the hazards present and potential for human or environmental exposures that could damage health and the environment?
3. What are the limitations in the information available and the impact on conclusions in the Risk Assessment?
A. Strong points in the report:

- Use of public scoping.
- Selection criteria for literature (although key information was excluded)
- Use of agency expert groups (with the exception of public health)
- Analysis of road and traffic hazards
- Discussion of limits to Best Management Practices.

B. Weak Points that need improvement:

- Ranking system rationale
- Lack of available public health information
- Omission of discussion on exposure due to regular purging of equipment
- No discussion of social and societal impacts
- No discussion of uncertainty in specific data and limitations of the conclusions.
- Structure of the report does not provide coherent relationships between sections.
- Depth of analysis of water risks is limited
- Depth of discussion of air health risks is limited
- No discussion of impact on the local public health systems
- No discussion of barriers to quantitative assessment

C. Major limitations in the report:

- Insufficient information about the chemicals and time of exposures
- Determination of the variability in emissions between and within sources
- Lack of follow-up by Health Departments of reported health effects
- Time is insufficient to determine the presence of chronic health effects
- No assessment of the risk to susceptible populations and children
- Assessment of capacity of county ecosystems to absorb chemical stresses
- Discussion and identification of toxic materials brought to surface
- Lack of health and safety support for determination of set-back distances

D. Recommendations necessary to strengthen the report:

- The aggregate risks need to be determined and “bounded” for specific activities.
- Pennsylvania inventory reports for 2012 and 2014 should be used to characterize variability; well-to-well, compressor station to compressor station and processing plan to processing plant. PA data shows variability of orders of magnitude.
- Compounds present due to processing and drilling and due to flow back from fracked and producing wells need to be identified, categorized and ranked with respect to health actions and potency in air, water and food.
- All compounds need to be ranked with respect to UNGD sources and potential for human exposures.
- Report needs to be reorganized so that each section has clearly stated conclusions
and limitations and objectives.
• Discussion of actual exposures to and long term implications of radioactive materials. Discussions relative to general background are insufficient to determine potential health risks.
• Quantitative analysis of the effect of each BMP rule and proposed statute on the potential for human health outcomes.
• Discussion of other reports in the United States and international literature on the quantitative human health risks from current UNGD practices in the United States.
• A discussion of the quantitative impacts of major accidents and ongoing exposures at other sites and their relevance to the Maryland Counties.
• Identifications of resources available to inform physicians and health providers of health conditions expected to occur in persons residing near UNGD.
• Discussion plausible findings available with respect to human health and exposure that have been presented in publicly available forums but not yet published in the peer reviewed literature.

X. Specific Comments on Each Section of the “Risk Assessment”

A. Executive Summary:

The Executive Summary is a brief discussion of process in preparation of the assessment. It is the only mention the Comprehensive Gas Development Plan, which addressed the effect of gas drilling on forested landscapes and terrestrial and aquatic resources and the impacts of water withdrawal. That report asserts that Maryland’s drinking water resources are protected by the Water Appropriation Program. Other than the general thoughts that “risks are inherent in any types of mineral extraction” and that “existing and proposed practices serve to reduce many risks Maryland Citizens,” public health and safety are not mentioned, nor is impact on communities. However the report is addressing unacceptable risks to public health and the environment.

The absence of concerns for public health continues throughout the report.

B. Risk Assessment sections: This is the body of the report.

Although the Advisory Commission and the public participants requested a “formal Risk Assessment”, this report does not follow the format or content of a 4 step Risk Assessment which are: 1) Hazard identification 2) Dose response assessment, 3) Exposure assessment and 4) Risk characterization. Moreover, the four principles - Transparency, Clarity, Consistency, and Reasonableness – required in risk assessments are not present. There is also no clear discussion of limitations and conclusions.

Instead this risk assessment describes:

• Methodology and identification of risks for evaluation (Literature and information
The list of risks for evaluation is incomplete. A major risk leading to adverse health effects from human exposure, the regular purging and venting of wells, pipelines and equipment, is omitted from the list. This omission seriously reduces the value of the Risk Assessment for determining potential health risks.

Background sections of the RA.

- Literature and information sources are limited and do not include the information concerning human health exposures nor mention the extensive citizen reports of effects on children, nearby residents, farm animals and pets or wildlife. Gas horizontal drilling and hydraulic fracturing began in 2005. There is insufficient time for the observed human health impacts to have reached the peer reviewed literature. The few reports that have been published indicate a major health problem for nearby residents to nearly all UNGD activities. The decision to limit information when selecting information precludes a useful analysis of health hazards.
- Best Management Practices asserts where there is uncertainty about existing laws, regulations, permits, BMPs would be adequate to protect the respective resources. It also states those uncertainties are noted in the document. Instances citing conditions where the resources would not be protected by existing statutes and BMP are extremely difficult to find. Yet the policy maker is expected to take those into consideration. Such “failure to protect” uncertainties must be listed separately and discussed in detail.
- Development of scenarios: It is rare to see fewer than 6 wells at a site and there can be as many as 12 or more. The time of impact, disruption due to machinery and trucks could be twice the projected levels. Recycled water is discussed but there are limits to number of recycling times. It seems unlikely that scenario number 1 is economically feasible.

Summary of individual risks (page 6)

Individual Risk Assessments in the Risk Assessment are based on qualitative opinions on the probability and consequences of each risk assigned. A matrix was developed based on low medium and high risk factors and minor moderate and serious risk consequences. A consequences/risk ranking probability matrix table was developed to obtain overall risks.

- What is obtained from this exercise is not a probability of risk but a relative
estimate based on extremely limited quantitative information. *It is difficult to see how this provides meaningful data for assessing risk to public health. A minimal level of certainty is required when advising a person on the safety of themselves and their families. I recommend that the table should not be used to assess the hazard to the public and be carefully reviewed before advising on environmental risk.*

**Five Risk Assessment Phases**

A brief risk summary paragraph is provided for each of the five phases of unconventional gas development. Each finding is listed in a sentence together with an assessment of the level of risk for the individual risk. Judgmental phases such as, “high standards set for casing etc…are among the many best practices that reduce surface and ground water risks” are inserted from time to time.

*It is clear that human exposures are occurring. But this risk assessment approach lacks the power necessary to determine health and safety.*

- There is no evidence of quantitative support for the comments. The comment relative to production is especially noted where the assessor concludes “that stringent controls and setbacks from ecological and community feature are among the many best practices that reduce the risk of contamination for human consumption.” The author next follows with the observation that insufficient data were available to assess the health consequences from of air emissions because of uncertainties. In spite of this data gap a moderate risk was assigned based on methane.
- *The actual organics in the emissions have not been measured in the hourly time periods needed to evaluate human health effects.*
- *The content of the mixtures in water and air are only partially known.*
- *When human exposures have occurred, non-disclosure agreements put in place by industry and the courts have prevented the obtaining of health information on potential exposures.*
- *Given these limitations to the obtaining of human health information critical to assessment of health it is impossible to determine the safety of any person or facility near the gas drilling.*
- *Schools, hospitals, and daycare centers need to be considered high-risk locations but there is no mention of these populations.*

**Phase 1** Site identification summarizes the risks as low for vibration and visual impacts for communities and moderate for air emissions and ecological impact. The paragraph refers to appendix B, C and F, Air emissions, Road and Noise, respectively.

**Phase 2 and 3** Drilling and Hydraulic fracturing/completion, summarize the risks as low for noise, impact on ground and surface water, releases from tanks or spills; moderate for
accidents and inconvenience, air emissions, aquatic systems: high for road repairs and emissions for 75% scenario. These paragraphs refer to Appendices B through I.

**Phase 4** Production summarizes the risks as low for truck traffic, low for compressors, drinking water contamination, except for methane, community features such as schools; moderate for gathering line and forest ecology, some compressors and human health. This paragraph refers to appendix B, C, F, G and I.

**Phase 5** Well Abandonment/Reclamation summarizes risks as low for soil contamination/subsurface leaks and minimal for truck traffic and ecology. This paragraph does not refer to any other section of the report.

**Conclusions**

The overall Conclusions of the report, on Page 2 of the Executive Summary and Page 12 of the Risk Assessments, assert that:

1) “the utilization of proposed practices serve to reduce many of the risks to… citizens, economy and quality of water, air and natural resources’ and
2) that if risks are found unacceptably high additional mitigation steps could be taken
3) or extraction can be deferred until risks are reduced by new technology or until data is obtained that the are effective to reduce the risk.”

(format added)

The Conclusions are vague and general. These are not acceptable conclusions for any Risk Assessment. The conclusions do not provide guidance or direction to decision makers. Further the conclusions are based on findings from information (reports) that are limited both in scope and technical depth. They are also incomplete and do not capture the information found in the analytical sections of the report.

*Careful reading of the information and the analysis in the Appendices leads to the opposite conclusion: There are major human health and ecological risks, but insufficient information is known about the mechanisms and sources of the hazards to address the mitigation of the hazard until more careful basic studies are completed at currently active sites.*

- Limitation discussions are an integral part of Risk Assessments. The limitations section should identify the gaps in information in report as well as the limitations of any process described. The impact of the data gaps should be included in a discussion of the actual conclusions.

There are three important questions addressed in a Risk Assessment of health and environmental concerns.

1) What is known with certainty about the plausible hazards?
2) What are the hazards present and potential for human or environmental exposures that could damage health and the environment?

3) What are the limitations in the information available and the impact on conclusions in the Risk Assessment?

This risk assessment section, which is the core of the report, fails to meet any of the above criteria. There is no detail or discussion in the risk assessment section. Each paragraph merely mentions the findings from each of the Appendices without critique. Even when the information in the appendices is considered, the analysis and the information is insufficient to assess the risks.

XI. Implications of the failure to address the incomplete data and limitations in the risk assessment:

The following are three case examples of the consequences when limitations in available information are not considered.

- Example 1 is the failure to identify the chemicals in the emissions and the health and environmental damage induced by the chemical mixture (Air Emission Risk Assessment Appendix B)
- Example 2 is the failure to accurately identify probabilities of release of toxic chemicals (Drilling fluids and cuttings, Appendix C)
- Example 3 is failure to recognize the limits of the remedial action available to the state and towns (Road and Traffic appendix C)

Example 1

The health and environmental damage induced by the chemical mixture, Air Emission Risk Assessment Appendix B.

The Air analysis reached the following conclusions:

1. The probability for air emissions is high but consequences cannot be determined due to insufficient information on BMP and set back efficiencies and other factors.
2. There is a ‘high’ probability of air pollution emissions from all phases even when BMPs are in place.
3. Most of the high probability emissions result from multiple overlapping sources. There is insufficient information to determine the consequences.
4. There is insufficient information to determine the differences between the low and high drilling scenarios.
5. The hydraulic fracturing/completion phase emissions projected for 60 to 80 percent of the year for high scenario and 20 to 27 percent for the low scenario yielding moderate consequences and low consequences respectively.

Thus the risks are determined to be high but the consequences are not determined because of lack of information on the identification and effects of the chemicals.
Some of the Limitations are:

1. No data to determine the consequences of the multiple sources.
2. Only one study has measured on site emissions and it is limited in scope.
3. EPA is unable to quantify the emissions.
4. Hydraulic fracturing phase risk differences are undeterminable.
5. RA is not unable to integrate peer reviewed health findings in the assessment of consequences.
6. RA does not quantitatively determine the benefits of BMPs and cumulative synergistic health risks.

While there is information available to identify the chemical agents released from UNGD and the toxic hazards to human health and the environment, the Risk Assessment did not acquire or use it.

- The Pennsylvania Inventory Reports documents the release of 14 chemicals released by site and location for 2011 and 2012. Monitoring data has been published in Peer reviewed sources from Colorado, Texas, Pennsylvania, West Virginia and Wyoming. A landmark report was released from Dish, Texas that measures chemical releases from overall sites and as precise as specific valves and tanks.

- A cursory examinations of these data show the presence of diesel particulate, formaldehyde, a spectrum of 1 to 3 carbon compounds containing chlorine, fluorine and bromine, aldehydes, biocides, hydrogen sulfide, toxic silica as well as benzene, toluene, ethyl benzene and xylenes, radium and other radioactive materials. The toxic actions of most of these compounds are well understood. But there are also chemicals produced in the shale itself which have never been studied and the toxic actions are unknown.

- What is clear from the risk assessment is that these compounds will be released into the air at high amounts during drilling, fracking, purging of equipment, waste disposal and accidents.

The Maryland “Risk Assessment” report acknowledges, on Page 33 paragraph 3 that blow–backs are a hazard to workers but because they are rare (1 in 1000) and the workers are not considered in this report, blow-backs are ranked as a minor hazard. The report further asserts that a 1000 to 2000 foot setback would remove the hazard to the public health.

- Table 14 page 21 shows blowout rates for offshore gas wells which are not the type of wells proposed for the Maryland counties, even so when all categories of blow outs are counted, occurrences are not 1 in 1000 but 4 in 1000.
- Further, when it is considered that in the mountains of Western Maryland about ¼ of the days experience hours of low wind speeds, 1 to 2 miles per hour, onsite releases will move off site, past the 1000 and 2000 foot setbacks, in minutes.
At 1 mile per hour wind speed air will travel 1000 feet in 6 minutes and 2000 feet in 12 minutes, insufficient time to dilute the chemicals released by blow-backs or silica used in during fracking to safe levels.

- Finally on page 43 first paragraph comment # 4 states that, “impacts from leakage is not large enough to out weight natural gas benefits over coal.” While that discussion involved global climate change and energy it reflects the quality of the judgments relative to hazards made throughout the Appendix. A choice is being made between health and the environment and the need for the technology. Thus the consequences of the projected exposures are ruled as minor with respect to human health and the environment in contrast to development rights.

This analysis fails to meet any of the following criteria:
1) What is known with certainty about the plausible hazards?
2) What are the hazards present and potential for human or environmental exposures that could damage health and the environment?
3) What are the limitations in the information available and the impact on conclusions in the Risk Assessment?

Example 2

Appendix D - Drilling fluids and Cuttings, ranks all Environmental Impacts as minor based on low Probability. All consequences are rated as moderate. But are the probabilities actually low?

All of the low ranks are based on one of two reports,
- The first report, described on page 5 & 6 under “Transport of Drilling Fluid Additives to the Well Pad,” are based on the 2004 to 2013 tabulation of incidents by the Pipeline and Hazardous Materials Safety Administration. On road incidents (14,074 annual average incidents over 10 years PHMSA 10 year incident summary report.) was divided by the total number of shipments of hazardous materials of 800,000 reported in Craft 2004. The probability of a release is calculated to be less than 0.005% This factor is used to calculate all of the transportation risks!
  - Shipment data collected before 2004 is compared to accident data collected after 2004 to 2013.
  - Accidents for all hazardous materials is used to evaluate UNGD transport accidents.
  - The source of these files need to be validated.
  - How representative is all of the hazardous materials accidents vs. all of the transportation all hazardous materials in the United States of the accidents that would occur in two western Maryland counties impacted by gas transportation of hazardous materials on country roads? It is not. But more
troubling is that no data was found relevant to the key questions in the Risk Assessment.

- The second report used to estimate the likelihood of a spill or leak is described on page 10 ‘Risk Identification’. A study of Wells in Bradford County identified that 8% of the wells had violations handed out to gas operators for spills and leaks on the well pad. (NYSWRI 2010). All subsequent calculations of risk are based on this 8% ‘spills and leaks’ report in spite of the fact that in the next three sentences the Risk Assessment says “THE INCIDENCE RATE IS LIKELY TO BE GREATER.” Further, the risk assessment states that there is no information of the spill rates at any of the individual stages evaluated but they may be fewer at individual stages.
  - This risk number has not been validated in any way that justified the assumed risk assessment application.
  - Pennsylvania does not regularly inspect any well pad but reacts to industry reported incidences. Thus the management at the drill sites decides what will be reported and the inspector has the option of issuing a citation.
  - The number used is meaningless with respect to the assessment of Drilling and Fluid Cutting Risks. Moreover, it cannot be used as a basis for determination of effectiveness of the Current regulations and Proposed BMPs. IT IS VERY LIKELY TO UNDER ESTIMATE THE HAZARD.
  - The Data in the Risk Assessment table showing low probability of risks is not supported by the cited references and is probably incorrect. But the calculations are used to support the risks listed in Table A and subsequently used to support the conclusion in the Risk Assessment and Executive Summary that “the utilization of proposed practices serve to reduce many of the risks to... citizens, economy and quality of water, air and natural resources”.

Example 3

Appendix C, Road and Traffic, ranks the probabilities of four of the seven Risk Categories as moderate or high. Only site identification, site preparation and production and site reclamation are rated low. Five of the seven consequences are rated as moderate to serious. This is based on a detailed and strongly supported analysis of the information with abundant pertinent references.

The assessment of the current regulations and the BMPs indicate steps that could be employed to reduce but not eliminate the risks.

- In the conclusion the report notes that driver fatigue and agreements with the
industry to ensure the performance of their agreed obligations is essential.

- Fatal accidents involving residents of these counties are likely to occur. There is no acceptable risk number for fatalities and disabilities.
- Driver fatigue is central to the safety question but is not under the statutory control of the State of Maryland or the local officials. Most of the activities that support the site are conducted by subcontractors that are not under the control of the well owners, leaving no oversight or control.
- There is no mechanism to reverse the habitat loss, fragmentation, increased sedimentation, storm water run off and recreation impacts.
- Page 26 is an example of the effect of oil field exemptions that applies to the oil and gas industry. These cannot be changed by local governments or the State of Maryland.
- Thus even when the hazards are well documented and assessed there is no assurance that current regulations and Best Management Practices can reduce them to levels that protect health and the environment.

XII. Summary:

1. The “Risk Assessment” establishes that human health and environmental risks are present but does not analyze the risks sufficiently to determine the level of hazard to Public Health or the Environment. This failure is due in part to limited data, but also it is the result of the untried novel, and limited approach used in the assessment.

2. The Conclusions are vague and general. They do not provide the information needed by decision makers. Further, although the Conclusions are based on findings from information that is extremely limited both in scope and technical depth, those limitations are not listed anywhere in the Risk Assessment.

3. The Conclusions in the executive summary are not compatible with the findings in the Appendices sections of the risk assessment. The Risk Ranking is not valid.

4. The Maryland “Risk Assessment” completely omits evaluation of the majority of emissions from producing wells. Those emissions are important components of the environmental and health hazards

5. The absence of involvement of a health agency or health professionals is a serious error in the organization of the risk assessment project.

6. There are major human health and ecological risks, but insufficient information is known about the mechanisms and sources of the hazards to address the mitigation of the hazard until more careful basic studies are completed at currently active sites.

7. The Risk Assessment’s most serious flaws are the failure to identify the limitations
of the available health and environmental data, the failure to clearly state the Conclusions and failure to discuss the limits of the BMP and regulatory options to protect Public Health and the Environment.