Minutes of April 14, 2014, meeting of the Marcellus Shale Safe Drilling Initiative Advisory Commission

Approved May 16, 2014.

The Commission held its 27th meeting at The Maryland Department of the Environment and at the office of the County Commissioners of Garrett County (via webinar hookup and conference line) on April 14, 2014 beginning at 10:00 am. In attendance at the MDE location were Chairman David Vanko and Commission members Steve Bunker, Cliff Mitchell, Dominick Murray, Paul Roberts, and Nick Weber. At the Garrett County location were Senator George Edwards, Commissioner James Raley, Mayor Peggy Jamison, Ann Bristow and Shawn Bender. Attending by conference call only were Commission members Harry Weiss and Jeff Kupfer. Staff of state agencies and members of the public were present at both locations.

Chairman Vanko called the meeting to order. The revised draft minutes of the February meeting were approved as revised. The draft minutes of the March meeting were approved.

The first agenda item was an update on the status of the health study. Commissioner Cliff Mitchell briefly described the new schedule and the identity of the outside reviewers. Commissioner Bristow asked if there would be a separate baseline assessment released for public comment, as was contemplated in the first draft Scoping Report. Dr. Mitchell said the baseline assessment will not be separately released, but will be incorporated into the final report on impacts and strategies. Commissioner Bristow then asked about the comment period for the final report. Dr. Mitchell said that the current plan is to prepare and release an essentially complete report. Public comments would be submitted to the Commission.

Members of the study team at the Maryland Institute for Applied Environmental Health, Doctors Donald Milton, Sacoby Wilson, Amir Sapkota and Thurka Sangaramoorthy, participated from a remote location. The slides from the presentation are available on MDE's website. Dr. Milton explained the steps of the Health study and said that the report would contain monitoring and assessment recommendations, public health response and mitigation strategies, and suggestions for health monitoring that might be done in the future. The study is modeled after a National Academy of Sciences framework for conducting health impact assessments.

Dr. Wilson then provided some results of the baseline assessment of Garrett and Allegany Counties, including environmental factors (locations of sensitive areas such as schools and hospitals, presence of EPA regulated facilities, etc.), demographic information (age, education, income, etc.), and health (mortality, infant mortality, obesity, etc.), in comparison with the rest of Maryland and sometimes wider regions. He also showed slides representing existing burdens on the population, such as hazardous waste facilities and Superfund sites. The team's website will allow citizens to create their own maps with a visualization tool. MIAEH is developing maps that show the setback distances recommended by Maryland from sensitive areas.

Dr. Sapkota noted that the team is collecting information, to the extent it is available, on pre- and post-fracing air, water and soil data, compiling lists of chemicals used during hydraulic fracturing, reviewing relevant literature for the health effects of those chemicals, and compiling and collecting data on other factors such as noise and traffic. The team was monitoring for noise in West Virginia near compressor stations.

During the question and answer period, the following points were made:

- Some secondary health impacts, such as traffic and migrant workers, will be considered.
- The MIAEH team is doing noise monitoring at homes that are different distances from noise sources, not air monitoring. Air monitoring is beyond their scope of work and is not in the budget. If funds were available, the team would want to do this, but it is not a simple undertaking.
- Citizens will be able to view maps with different setback distances. MIAEH is looking at the setbacks other states use and considering the vulnerability assessment.
- It was clarified that the maps would show what types of vulnerable populations and sensitive areas lie within different size buffers.
- The team is aware that there is a lack of data, and little data on possible long term health impacts. This is a concern, and may contribute to the uncertainty of the conclusions. They are constantly reviewing what is published on health impacts.
- The team will look at what is known now and consider the likely exposures. The data are insufficient to develop a quantitative risk assessment, but some of the individual chemicals and health risks associated with them are well known because the chemicals are used in other contexts. The aggregate exposure and cumulative impact may be of concern.
- The team will be very clear in the description of the strengths and weaknesses in the report.
- The team will probably present the results of their study to the community in a public meeting.

Commissioner Roberts asked why we would establish setbacks before the health study is done. Ms. Kenney explained that it would be an iterative process and that setbacks could be altered based on the results of the health study.

The next speaker was Avner Vengosh, Ph.D., a professor at Nicholas School of the Environment at Duke University. Dr. Vengosh said that his laboratory is working on a variety of issues relating to energy and their effects on human health. In regard to shale gas, he has done research on the contamination of drinking water wells and the consequences of disposal and leaks of wastewater.

- He emphasized that his lab makes extensive use of isotopic analysis of a variety of elements and compounds, including the noble gases, not just methane. He has done work in northeastern Pennsylvania, West Virginia, Texas, Arkansas, and North Carolina. In his talk, he highlighted his recent article on stray methane.

He previewed his main points as follows:

- His research indicates that contamination of drinking water wells by stray gas is real, but that it does not occur everywhere. His research failed to find evidence of stray gas in Arkansas, for example.
- There was no evidence so far of contamination of drinking water by the migration of fracing fluid or flowback, nor evidence of saline contamination of drinking water that might be an early indication of migration.
- Disposal of shale gas wastewater has resulted in contamination and the accumulation of radioactivity at disposal sites. Dilution does not solve the problem, and he advocates a zero discharge policy. Deep well injection is not a sustainable way to dispose of fracing wastewater.

Dr. Vengosh published findings of increased stray gas (methane, propane and ethane) abundance in drinking water wells within a kilometer of active gas wells in papers in the Proceedings of the National Academy of Sciences. The fingerprint and the detection of propane and ethane in addition to methane indicate that it is thermogenic gas, not biogenic gas. The methane is probably migrating up along the annulus of the well from shale gas, intermediate gas-bearing formations, or both. He noted that Schlumberger has documented sustained casing pressure (SCP) in a significant percentage of wells; the percentage increases over time so that about 40% show SCP by year 15, and 60% by year 30.

He referred to a paper by Thomas H. Darrah et al. (in review) that he said contains new noble gas data showing direct evidence for free gas migration from leaking wells that has a geochemical fingerprint different from background natural gas flux to aquifers. He said that he thought the noble gas data could definitively show whether the source of the contamination was leakage associated with the gas well.

There is evidence of enriched barium and chloride in shallow saline aquifers, suggesting that Marcellus brine or something similar to Marcellus brine may be mixing with the shallow saline aquifer. This suggests a hydrogeological connection between the shallow and deeper aquifers.

Discharge of treated fracing wastewater to freshwater streams upstream of drinking water intakes can result in the production of toxic or carcinogenic disinfection byproducts and toxic metals in the finished drinking water.

Dr. Vengosh summarized his talk as follows:

- There is evidence for stray gas contamination in a subset of shallow wells near (less than 1 km) shale gas sites in northeastern Pennsylvania.
- There is no indication of groundwater salinization induced from stray gas leaking.
- There is evidence for surface water contamination downstream from a shale gas wastewater disposal site in western Pennsylvania.
- There is evidence of the accumulation of radioactivity in stream sediments in areas of disposal and spills.
- Marginal water (for example, acid mine drainage) can substitute for freshwater for shale gas development.

During the question and answer period, the following points were made.

- Dr. Vengosh rejects the proposition that the lack of data on background (pre-drilling) levels of contaminants should prevent scientists from reaching conclusions about contamination. Background can be established in other ways, and often is in environmental studies, such as studies of Superfund sites. Nevertheless, baseline data are valuable, and he is collecting some.
- Dr. Vengosh stated that stray gas movement seems to be controlled by fractures, not by hydrologic gradients. Methane would not form a contaminant plume that would move with the groundwater. Methane bubbles upward because it is buoyant.
- He did not know the locations of the laterals in his studies. This may have increased the noise. There is a need to do comprehensive monitoring using paired deep and shallow wells at different distances from the well.
- His papers identified key parameters that should be included in baseline monitoring, including some organic chemicals. He suggested all the constituents for which there are Safe Drinking Water Act Maximum Contaminant Levels, plus strontium and maybe boron. He does not think noble gases are suitable for routine monitoring because of the difficulty and expense.
- Dr. Vengosh stated that the source of barium and chloride in shallow groundwater in Pennsylvania could not be fossil water, because infiltration from precipitation would flush it away and it would not be detected. He thought there must be a continuous supply of ions from the deeper brines, indicating that there must be a hydraulic connection between shallow and deeper aquifers. This is localized but evident in West Virginia, Pennsylvania and New York and has nothing to do with shale gas development. There were salty springs in pre-colonial America.
- Dr. Vengosh does not know why methane is higher in drinking water wells near gas wells in Pennsylvania, but not in Arkansas. He said different companies are involved. In

Pennsylvania air drilling has been used instead of drilling with mud because it is faster; he speculated that mud drilling may result in better casing and cement. There are geological differences, but there is no strong evidence to say whether the difference lies in practices or geology. In the absence of data, he urged use of the precautionary principle.

- Studies are ongoing at many academic centers, and every year there are more data.
- Groundwater moves very slowly, but gas can move very fast underground. Focused hydrogeologic studies are needed.

Staff then presented a revised timeline for completing the studies required under the Executive Order. Dr. Mitchell clarified that he would take the comments of the expert reviewers and the public on the final health report and summarize them for the Commission. We will go back to having all the Commissioners at a single location for meetings, and hold the meetings in western Maryland.

Staff then summarized some of the changes to be made in the best practices report relating to the CGDP and setbacks. These and other changes had been outlined in a memorandum to the Commission circulated in advance. In discussion of the changes, it was noted that a limited number of exploratory wells would be allowed, but that these would have to meet all the setback and other requirements and collect background data. They could not become producing wells until the CGDP was completed. The Environmental Assessment will be required for the individual well permit, and the guidance for it will be updated.

Commissioner Kupfer said that these changes were improvements, but that he saw practical difficulties with the proposal for exploratory wells. One of the purposes of an exploratory well is to determine how productive the formation will be. It is therefore necessary to allow gas to flow for a time, even if the well is then shut in until after the CGDP is approved. Could the gas be collected and sold or must it be flared? If a transmission line were nearby, could the gas be sent to the transmission line via a gathering line? Could it be flared, since the best practices strictly limit flaring? Chairman Vanko indicated that we would need to discuss this further.

Senator Edwards asked that we clarify the new requirement for a water management plan in the CGDP process so that it would not be duplicative of the water appropriation permit process. It will be reworded.

One of the setbacks will be clarified to prohibit any surface disturbance on state-owned land. Commissioner Bunker asked what would happen if the State did not own the mineral rights? Dr. Conn said that DNR is pursuing whether it can regain rights under the dormant mineral rights law.

It was pointed out that the setback from drinking water sources does not include springs. Staff will review this.

Commissioner Roberts stated that the proposed setback from private drinking water wells is inadequate. He said the evidence shows that it is physically probable that contamination would reach a drinking water well within 1,000 feet of the gas well and physically possible if it were 5,000 feet away. Dr. Conn noted that setbacks are primarily intended to protect against surface spills and that private wells draw water from a small area compared to public wells. She disputed Commissioner Robert's statement that we were rejecting Dr. Vengosh's data and noted that we are not sure that a setback is the best way to protect against methane migration. Commissioner Weber said that, in the absence of data, we should be more protective.

Senator Edwards noted that there are many existing roads through state land, and that it is not clear whether they are State or County roads. The County has been maintaining many of those roads. Dr. Conn said that, generally, the state grants access for users. Senator Edwards said there might still be an issue of ownership.

Commissioner Bristow said that the thousand foot setback from structures may not adequately protect against air pollution. There was little discussion of air pollution in Dr. Eshleman's report. Air issues will be discussed at the next meeting. Ms. Kenney said that the setbacks could be reconsidered in light of the risk assessment before the final report is prepared. If new information comes to light before the regulations are adopted, the proposed regulations could be amended. Even finally adopted regulations can be amended.

Commissioner Bristow asked why the watershed of the Youghiogheny Lake isn't protected the way Savage Reservoir is. Ms. Kenney said that there were no drinking water intakes in the Maryland portion so it was not included. Commissioner Bristow suggested that we should protect the drinking water of people in Pennsylvania who use Youghiogheny Lake for source water.

The meeting was opened for public comment.

Eric Robeson of Citizen Shale said that the County does not have an adequate inventory of roads – how many miles, the type of surface, ownership, width of right of way, etc. He said the State should assist the County in conducting an inventory so that it could be used for the CGDP. He also noted that Patrick Hammond's delineation of the source water protection areas (SWPA) for Mountain Lake Park was not based on science. Mr. Robeson suggested that we shouldn't base setbacks on questionable SWPA delineations.

Patrick Hammond spoke next and clarified that he had not worked on the SWPA delineation for Mountain Lake Park. A consultant did that work. His work had been on the water appropriation permit.

Rebecca Ruggles, Director of the Maryland Environmental Health Network, asked whether the comments of the external reviewers on the health study would be available during the public comment period. Dr. Mitchell said that the reviewers will see an interim final report and send back comments by the end of June; thus those comments will be available to the public during

the public comment period. Ms. Ruggles also asked if the maps done by MIAEH could be combined with the setback maps. Dr. Conn said that DNR's shape files will be shared with MIAEH, but that the DNR's maps have not yet been placed on interactive map viewer.

Megan Jenny of Chesapeake Climate Action asked if there would be an opportunity for comment on the traffic study. She said that traffic and trucking was the biggest economic and safety issue in Pennsylvania related to Marcellus Shale gas development. Staff said that the findings would be presented at a Commission meeting and that comments could be made during the comment period on the draft final report. Ms. Jenny requested that the comment period on the final report be extended for an additional 30 days.

Dave Nard spoke about the use of depleted uranium in the charges used to perforate the casing before fracing. He suggested that testing should be done for uranium isotopes.

Patrick Hammond spoke again and said that he had reviewed the available data on methane and found that in a study of 1400 wells, 2 exceeded 28 mg/l, and that a study of 13,000 samples in Pennsylvania by Chesapeake Gas found that 0.5% exceeded 28 mg/l. In contrast, about 1/3 of the Duke samples were above 28 mg/l; some were from around Dimock.

Patrick Hammond recommended that we review an article by Baldessare and look at reports of clusters of drinking water wells with high methane in Tioga Junction, Pennsylvania related to a leaking gas field and in the southern West Virginia coal fields. He stressed that surrounding areas can be used for comparison if background data are lacking and that one should look for clusters.

The meeting adjourned about 2:00 pm.