

**Delaware River Basin Commission (DRBC)**  
**Consolidated Administrative Hearing on**  
**Grandfathered Exploration Wells**

Report to:

**Delaware Riverkeeper Network**

And

**Damascus Citizens for Sustainability**

Prepared by:

**Daniel Thau Teitelbaum, M.D.,P.C.**

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As a toxicologist and physician specializing in environmental medicine and public health, I have been asked by the Delaware Riverkeeper Network and Damascus Citizens for Sustainability to provide my professional opinion on the potential toxicological effects that may result from exposure to chemicals and substances that may be released from natural gas wells, including certain “grandfathered” exploratory wells, that have been or may be drilled in the drainage area of the Special Protection Waters of the Delaware River Basin.

In my professional opinion, due to the multiple known risks to human health from exposure to such chemicals and substances, such exploratory well drilling should not be done until the consequences of such exposure are thoroughly examined in a comprehensive health effects study for the Delaware River Basin. The necessity for such a study, before drilling begins, has been established in our research and in that of others in the western United States, especially in the Battlement Mesa area of Garfield County, Colorado. In Garfield County we found in 2008 that there was a total lack of research into the health effects from gas development activities. As a result of this study, a comprehensive Health Impacts Assessment was commissioned by Garfield County and completed in September, 2010. It is imperative that a similar study be performed for the Delaware River Basin before any gas development – including the grandfathered wells – is allowed to proceed.

One of the most glaring omissions of the gas drilling process has been the exclusion of consideration of human health impacts. Only through anecdotal reports can impacts to human health in the Delaware River Basin be presumed as no epidemiological or environmental health studies have been done in the Basin. This is necessary before drilling proceeds in the Basin in part because the Delaware River supplies water to more than 15 million people. In addition to the potential toxicological effects from exposure to water contaminated by pollutants released from gas drilling activities, there are significant air pollution issues which also may become water pollution issues due to downwash. We have studied these potential water and air pollution issues in certain areas in the western United States, but such studies have not been done in the significantly more densely populated northeastern United States.

In preparation for our September 2010 Health Impact Assessment (HIA) report on Battlement Mesa in Garfield County, Colorado (<http://www.garfield->

[county.com/index.aspx?page=1408](http://county.com/index.aspx?page=1408) and copy attached), in 2008 my colleagues and I reviewed previously completed studies from the general area of Garfield County and concluded that there were major gaps in public health information. At the request of the Garfield County Board of Commissioners, the Colorado School of Public Health (working in conjunction with the Garfield County Health Department) undertook a public health impacts assessment of the gas development activities underway or planned for this area. We conducted a qualitative and quantitative analysis of existing environmental, exposure, health and safety data for the Battlement Mesa community. We offered specific recommendations and produced a Health Impact Assessment (HIA) which involved several defined steps. The HIA looked at health stressors specific to gas development and rated them. Our results are in the HIA report, a copy of which is being submitted with this report.

The health effects on the Battlement Mesa residents were based on a careful study of the area population and the locations of gas development activity. The general conclusions of this HIA can be extrapolated from the study of the Battlement Mesa area to other areas with similar gas development activity across the county, including the northeastern United States. However, it is necessary to additionally look at the unique characteristics of any particular area, such as the Delaware River Basin including its geology and subsurface faulting and jointing, radioactivity of the underlying layers, water resources in proximity and downstream or down gradient from gas development areas and, of course, the unique population of that area. Therefore a study similar to the HIA should be done for the Delaware River Basin before exploratory drilling and gas development occurs and in preparation for any issuance of regulations. This study must precede permits, not the other way around, including any “test” or “exploratory” wells. These wells will include all the stressors we found, and perhaps additional ones, to a greater or lesser degree, depending on the unique population and geology of the potentially affected areas of the Delaware River Basin. Therefore it is imperative to study these issues before allowing gas drilling and development to proceed.

As part of the 2008 preliminary review that led to the 2010 HIA, my colleagues and I undertook an extensive review of the professional literature on the toxicology of the types of chemicals being used by the gas development industry and the substances being brought to the surface by gas drilling activities. As part of this report and my professional opinion in this matter, I

am incorporating that 2008 literature review, entitled “Potential Exposure-Related Human Health Effects of Oil and Gas Development: A Literature Review (2003-2008),” into this report. The toxicology assessment in this literature review is just as relevant for the Delaware River Basin as it is for western Colorado. The same sorts of chemicals and substances are involved in gas drilling and development activities in the Delaware River Basin as are involved in such activities in western Colorado. Moreover, the toxicological effects of exposure to these various chemicals and substances do not change based on the location where the exposure occurs. For this same reason, references throughout the Literature Review to natural gas “exploration,” “extraction,” or “production” are essentially interchangeable as related to toxicity of chemicals and substances that may be released into the environment anywhere during these activities. The one exception to the applicability of the Literature Review to this hearing is that the portion of that Review related to chemicals used exclusively in fracking operations would not be relevant to this hearing related only to the drilling of exploratory wells. Everything else in the Literature Review is relevant to the issues involved in this hearing.

I have attached as appendices the 2008 White Paper and Literature Review Appendices listing all of the professional publications that were included in the literature review. I have also attached for completeness the 2010 report entitled, “Health Impact Assessment for Battlement Mesa, Garfield County Colorado.”

The opinions provided in this report are stated to a reasonable degree of scientific and professional certainty.

/s/ Daniel Thau Teitelbaum

Daniel Thau Teitelbaum, M.D., P.C.

Attachments:

Potential Exposure-Related Human Health Effects of Oil and Gas Development: A Literature Review (2003 – 2008)

Potential Exposure-Related Human Health Effects of Oil and Gas Development: A Literature Review Appendices

Potential Exposure-Related Human Health Effects of Oil and Gas Development:  
A White Paper

Health Impact Assessment for Battlement Mesa, Garfield County, Colorado