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THE COUNCIL OF THE CITY OF NEW YORK
COMMITTEE ON ENVIRONMENTAL PROTECTION

PUBLIC HEARING

DRAFT SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT RELATING TO DRILLING FOR NATURAL GAS IN NEW YORK STATE USING HORIZONTAL DRILLING AND HIGH-VOLUME HYDRAULIC FRACTURING

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Good morning. The U. S. Geological Survey appreciates the opportunity to provide comments here today. For those of you who may not be familiar with the USGS, we are a non-regulatory, scientific organization within the U. S. Department of the Interior. In New York State, we conduct a wide range of surface-water and groundwater quantity and quality investigations in cooperation with other Federal, State, and local agencies. We continuously monitor hydrologic conditions at about 300 surface-water sites and 150 observation wells across New York State. We also maintain the USGS National Water Information System (NWIS) data base that contains hydrogeologic information from over 50,000 wells in the State.

I have worked for the USGS for the past 29 years in Pennsylvania and New York. I am currently the Ground-Water Specialist for the USGS New York Water Science Center, responsible for technical oversight of the USGS ground-water data and investigation programs in New York State. I also coordinate a USGS-wide training and technology transfer program in borehole geophysics. My educational background includes a BA in Geology from Colgate University and a MS in Geoscience with specialization in hydrogeology from Penn State University.

Gas development in the Marcellus, Utica, and other organic-rich black shales in New York State will involve horizontal drilling and high-volume hydraulic fracturing. The

draft Supplemental Generic Environmental Impact Statement (dSGEIS) proposes many critical measures to help minimize the impact of shale-gas development on the water resources of the State. However, a number of these measures need to be more clearly defined or require further evaluation.

Onsite burial of drill cuttings at shale-gas development sites, which is allowable under the dSGEIS if oil-based drilling mud is not used, should be carefully considered. According to Lash and Engelder (2008), pyrite is abundant in the high-TOC basal intervals of the Marcellus Shale. Oxidation and leaching of pyritic shale produces an acidic, metals-rich discharge commonly referred to as AMD (Acid Mine Discharge). A multi-horizontal well site will generate 100 to 500 times the volume of AMD-producing pyritic shale cuttings than that generated at a single-vertical well site. If these pyritic shale drill cuttings are left onsite, the potential for future surface-water and groundwater contamination is significant – removal and disposal of all cuttings at an approved landfill would be the preferred approach.

Freshwater in the Marcellus Shale play area occurs in fractured shale and sandstone of upper Devonian age. A review by the USGS of gas-exploration well records suggests that freshwater circulates in fractured bedrock to a depth of nearly 800 feet in some upland settings. An assumed freshwater aquifer depth of 850 feet as proposed in the draft SGEIS appears reasonable for the Marcellus play area. Installation of surface casing and cementing this casing to land surface to protect freshwater aquifers of this depth is a sound approach. As proposed in the dSGEIS, also cementing the production casing to the land surface (where no intermediate casing is used) will provide needed additional protection. Requiring the collection of cement-bond logs for each casing string will help detect any uncemented annular spaces or gaps that may provide pathways for saltwater and (or) gas migration. Mill scale should be sand blasted from casings to ensure good quality cement-bond logs. The dGEIS indicates that surface casing should not extend into zones known to contain measurable quantities of shallow gas. Shallow saltwater and (or) gas has been penetrated in the upper Devonian bedrock in some areas. It is not clear from the draft SGEIS how casing, cementing, and venting requirements will be modified to deal with these conditions.

Completion records for most gas-exploration wells provide little or no information on aquifer conditions above the targeted gas horizon. This lack of reporting results in a huge loss of information that would be useful in understanding and protecting the State's groundwater resources. The dSGEIS does little to rectify this situation. Completion forms that require recording of water quality and quantity with depth would be beneficial. These forms could require field measurement of specific conductance of drilling discharge water, which would provide a quantitative evaluation of salinity with depth. Also, specific-conductance and temperature logging of the open borehole prior to surface-casing installation with a portable wireline logger commonly used in the ground-water industry would be an efficient means to delineate freshwater aquifers and saltwater zones.

Surface water and groundwater are a single resource. Groundwater discharge from bedrock and valley-fill aquifers is the source of stream baseflow. Induced river infiltration may supply up to 90 percent of the water to heavily pumped wellfields in the valley-fill aquifers of New York State. Natural infiltration of upland tributary streamflow and unchanneled runoff also is an important source of recharge to valley-fill aquifers (Randall, 1978 and Kontis and others, 2004). Upland tributaries are particularly susceptible to impacts from surface-water and groundwater withdrawals under low-flow conditions. Aquifer-testing procedures to evaluate impacts of groundwater withdrawals for frack-water supply in areas outside the Susquehanna River Basin are not clearly defined in the dSGEIS. The pass-by flow limitations of surface-water withdrawals based on drainage area proposed in the dSEGIS appear reasonable as a first cut method. A more rigorous method should be developed based on a regional systematic low-flow analysis with available streamflow data. The cumulative impact of multiple withdrawals along a stream course is not addressed, nor is how will these withdrawals be monitored, reported, and regulated as they are in the Susquehanna and Delaware River Basins.

The flowback water from hydraulic fracturing of Marcellus Shale wells has been shown to contain elevated dissolved solids, chlorides, barium and other heavy metals, and radioisotopes. Use of tanks rather than surface impoundments for containment of all fracking fluids and the flowback water will help to minimize release of fracking fluid chemicals and flowback contaminants at the site. The "treatment" and ultimate disposal of the flowback water continues to be an unresolved issue of concern. The potential use of public wastewater treatment plants as a treatment option for these fluids needs to thoroughly researched before it should be considered as an option.

Natural groundwater quality in the aquifers overlying the Marcellus and Utica play areas is highly variable. Concentrations of contaminants such as chlorides and radioisotopes vary by two orders of magnitude in water sampled from water wells. With such natural variability, documentation of water-quality impacts from gas drilling and hydraulic fracturing would be extremely difficult. Water-quality sampling of private water wells in the vicinity of gas-exploration wells prior to development and following drilling and hydraulic fracturing is proposed in the dSGEIS. This water-well sampling program is in the best interest of the private well owners and the gas-development companies, and it is a good approach to determine short-term, site-specific impacts on the existing groundwater use sites. However, the water-well testing program does not address any longer term cumulative impacts to the groundwater resources. Water-quality sampling is considered complete one year after the last well at a multi-well site is drilled and fracked if a problem is not detected. Also, if there are no water wells within a half-mile of a drilling site, or if permission to sample a well within this radius is not granted, it appears that no groundwater monitoring is undertaken at all. A multi-year program involving sampling of existing private wells and(or) newly installed monitoring wells would be needed to detect potential impacts such as a gradual regional increase of chlorides and methane in the groundwater. Surface water-quality monitoring is not considered in the

dSGEIS (other than stormwater runoff), but should be part of an encompassing water-resource monitoring program.

References

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