8:00AM F9.00001 The EPA’s Study on the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources

SUSAN SHARKEY, US Environmental Protection Agency — Natural gas plays a key role in our nation’s clean energy future. The United States has vast reserves of natural gas that are commercially viable as a result of advances in horizontal drilling and hydraulic fracturing technologies, which enable greater access to gas in rock formations deep underground. These advances have spurred a significant increase in the production of both natural gas and oil across the country. However, as the use of hydraulic fracturing has increased, so have concerns about its potential human health and environmental impacts, especially for drinking water. In response to public concern, the US Congress requested that the US Environmental Protection Agency (EPA) conduct scientific research to examine the relationship between hydraulic fracturing and drinking water resources. In 2011, the EPA began research to assess the potential impacts of hydraulic fracturing on drinking water resources, if any, and to identify the driving factors that may affect the severity and frequency of such impacts. The study is organized around the five stages of the hydraulic fracturing water cycle, from water acquisition through the mixing of chemicals and the injection of fracturing fluid to post-fracturing treatment and/or disposal of wastewater. EPA scientists are using a transdisciplinary research approach involving laboratory studies, computer modeling, toxicity assessments, and case studies to answer research questions associated with each stage of the water cycle. This talk will provide an overview of the EPA’s study, including a description of the hydraulic fracturing water cycle and a summary of the ongoing research projects.

8:36AM F9.00002 Induced Seismicity Potential of Energy Technologies

MURRAY HITZMAN, Colorado School of Mines — Earthquakes attributable to human activities—induced seismic events—have received heightened public attention in the United States over the past several years. Upon request from the U.S. Congress and the Department of Energy, the National Research Council was asked to assemble a committee of experts to examine the scale, scope, and consequences of seismicity induced during fluid injection and withdrawal associated with geothermal energy development, oil and gas development, and carbon capture and storage (CCS). The committee’s report, publicly released in June 2012, indicates that induced seismicity associated with fluid injection or withdrawal is caused in most cases by change in pore fluid pressure and/or change in stress in the subsurface in the presence of faults with specific properties and orientations and a critical state of stress in the rocks. The factor that appears to have the most direct consequence in regard to induced seismicity is the net fluid balance (total balance of fluid introduced into or removed from the subsurface). Energy technology projects that are designed to maintain a balance between the amount of fluid being injected and withdrawn, such as most oil and gas development projects, appear to produce fewer seismic events than projects that do not maintain fluid balance. Major findings from the study include: (1) as presently implemented, the process of hydraulic fracturing for shale gas recovery does not pose a high risk for inducingfelt seismic events; (2) injection for disposal of waste water derived from energy technologies does pose some risk for induced seismicity, but very few events have been documented over the past several decades relative to the large number of disposal wells in operation; and (3) CCS, due to the large net volumes of injected fluids suggested for future large-scale carbon storage projects, may have potential for inducing larger seismic events.

9:12AM F9.00003 Environmental Dimensions of Shale Gas Extraction and Stray Gas Migration

ROBERT JACKSON, Nichols School of the Environment, Duke University — Shale gas extraction is growing rapidly in the United States and elsewhere, developed in part through advances in technologies such as horizontal drilling and hydraulic fracturing. Concerns over potential environmental impacts have accompanied the boom in natural gas extraction. For several years we have studied drinking water quality, asking the question, “Is water quality different for homeowners living near natural gas wells?” We have sampled shallow groundwater systems of >300 homeowners, the majority of them in the Marcellus formation of Pennsylvania and New York, for brines, dissolved gases, and other attributes. We have also examined how much methane reaches the atmosphere during the extraction and distribution of natural gas. In a study published in May of 2011 (Osborn et al. 2011, PNAS 108:8172-8176), we found no evidence of increase salt concentrations or fracturing fluids with distance to gas wells for 68 sampled homes. However, dissolved methane concentrations were 17 times higher on average for water wells found within 1km distance of them. A subset of homeowners also had groundwater that indicated the presence of natural hydraulic connections to deeper formations, suggesting specific structural and hydrodynamic regimes where shallow drinking water resources might be at greater risk of contamination with fugitive gases during drilling and hydraulic fracturing of shale gas (Warner et al. 2012, PNAS 109:11961-11966). This presentation will discuss new results from shale gas sampling in 2011 and 2012.


MAXINE SAVITZ, NAE, PCAST —

1 American Science and America’s Future


12:27PM U10.00003 The APS Panel on Public Affairs and Federal Science Policy, ROBERT JAFFE, MIT — The Panel on Public Affairs (POPA) is the organ through which the APS seeks to provide high quality input to the Federal Government on issues with significant physics content, ranging from energy and environment to national security. I will describe POPA’s evolving mission, some recent efforts and successes, and look at the agenda for the next few years.

1:03PM U10.00004 The Role of Science at the State Department in the New Administration, E WILLIAM COLGLAZIER, US Department of State — No abstract available.