2013 Technical Workshop Series on Hydraulic Fracturing

How Workshops Informed the EPA Study

The Roundtables and Technical Workshops are meant to ensure that EPA obtains timely and constructive feedback on data and analysis developed in the study, and to assure that EPA is current on changes in industry practices and technologies. Examples of how these have been met are below.

Analytical Chemical Methods

- Established collaborations with other laboratories to participate in analytical methods verification studies

Well Construction and Operation

- In conducting the well file review and literature synthesis, EPA will consider these things that we heard at the workshop as we move forward in our research:
    - Possible self-healing of cement
    - There may be a higher rate of development of sustained annulus pressure in deviated and horizontal wells than in vertical wells.
    - Full cementing of annular spaces can be a means to enhance barrier functioning, but that cement displaced to the surface eliminates the potential to monitor annular pressure for insights into well condition during operations.
    - Some newer cements are resin-based and can get into small cracks and may not be affected by water, acid or base.
    - Cementing effectiveness can be compromised by wellbore holes having significant washout zones.
    - Subsurface drinking water supplies are often not fully identified or characterized.
    - The presence of cement and the quality of the cement bond are not direct measurements of a lack of fluid movement.
    - The use of foamed or lightweight cements may make a quantified interpretation of cement bond logs difficult.
    - It is important to understand and characterize the condition of older existing wells before hydraulically fracturing them or near them.

Subsurface Modeling

- Improved conceptual models of scenarios being modeled for subsurface modeling that give details of well construction and heterogeneous geology
- Incorporated additional data on deep well injection identified in the subsurface modeling workshop concerning a joint DoE and industry study in Colorado

Wastewater Treatment and Related Modeling

- Industry noted that wastewater treatment has evolved from treatment largely at POTWs to treatment at commercial wastewater and package plants. EPA will focus on understanding wastewater treatment at commercial and package plants too.
- Attendees assisted the EPA in obtaining state spill data from Texas and Wyoming.

Water Acquisition Modeling

- Incorporating ground water models (gflow and modflow) mentioned in the water acquisition workshop to be used in conjunction with HSPF and SWAT
- Explicitly addressing water availability and its use at multiple spatial scales ranging from small to large watersheds
- Increasing temporal resolution in water acquisition modeling to address seasonal and low flow impacts
- Representing different water management strategies including regulatory constraints and hydraulic fracturing operator practices in water acquisition scenario analyses
- Meeting with a variety of stakeholders in the study areas to ensure water management practices are understood at the local level

Case Studies

- The importance of understanding site-specific geochemistry, including using statistical techniques and other appropriate techniques to analyze geochemistry, in order to understand the sources of ground water contamination was discussed.
- EPA received the underlying data to Appendix B, "Water Quality Data" of Battelle's *Characterization Reports for Retrospective Case Study Areas* in November 2013.