White Paper on SPE Summit on Hydraulic Fracturing

Editor's note: *This white paper was written as a result of discussions held at the first SPE Technical Summit, which addressed the topic "Hydraulic Fracturing: Ensuring Ground Water Protection." This white paper summarizes the discussions held at the Summit, which took place on 27 January 2011 in The Woodlands, Texas. This paper is presented for informational purposes only and is not intended to represent the opinion of SPE or the policy of its leadership.*

SPE Summits are intended to be held only occasionally. An SPE Summit is typically an invitation-only event that has specific, pre-defined objectives. Summits are intended to result in useful deliverables that benefit industry in some manner and may lead to further initiatives either by SPE or other organizations.

Chapter 1 - Introduction

This white paper describes the first-ever SPE Summit, held on January 27, 2011 in the Woodlands, TX, USA. The title of the Summit was Hydraulic Fracturing: Ensuring Ground Water Protection.

What is a Summit?

During mid-2010, SPE decided to try a new format for holding focused meetings. The new type of meeting is called a Summit. A Summit is a new meeting format, designed as a fast-track response to emerging issues of broad significance to the industry. Typically these will be technical issues with regulatory overtones. The goal is to assess current best practices with an eye toward modifying or adapting these practices to meet changing circumstances, industry standards, or regulations.

SPE designed the Summits as invitation-only events with 60-80 participants already familiar with the topic. Rather than have numerous technical presentations supported by written papers that become part of the formal SPE library, Summits include a limited number of short presentations intended to stimulate discussion. Although closed to the public, all summits will produce a deliverable, such as this white paper. In the future, SPE expects Summits to last 2-3 days, but this pilot was limited to a single day.

What Is Hydraulic Fracturing?

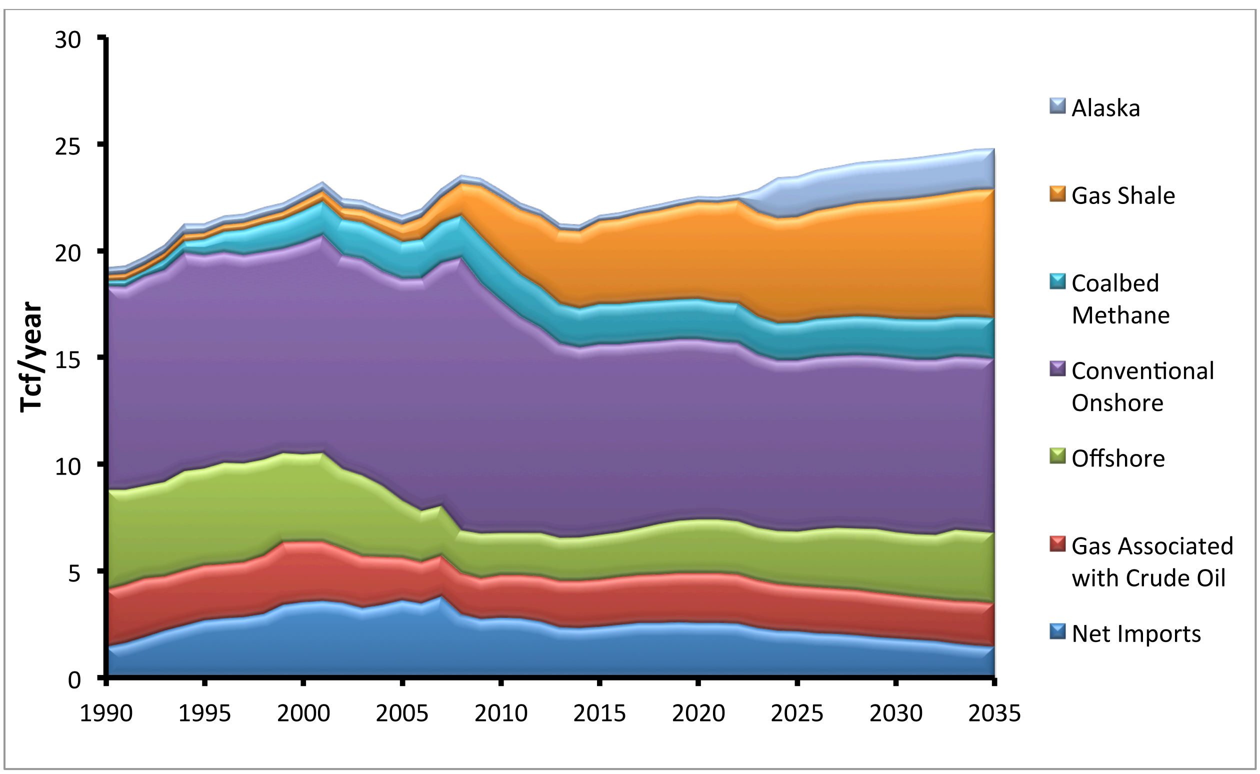
Hydraulic fracturing (also referred to by various writers as fracking, or fracing) is a step in the well completion process in which a mixture of water and other materials are pumped under very high pressure into a well to create a controlled network of fractures in a producing formation. The network of fractures forms a conduit for natural gas or crude oil to move more readily to the perforations of a producing well. The term “hydraulic fracturing” has been vilified over the past few years by members of the media and the film world. Rightly or wrongly, hydraulic fracturing is frequently portrayed as a dangerous process with various negative impacts. Much more information about hydraulic fracturing is provided in the next chapter.

Why Is Hydraulic Fracturing Needed?

Natural gas is an important energy source for the United States. Shale formations represent a growing source of natural gas for the nation and are among the busiest oil and gas plays in the country. As an indication of their importance, in less than one year’s time, the U.S. Department of Energy’s (DOE’s) Energy Information Administration (EIA) dramatically increased its estimate of the proportion of future domestic gas production that is likely to come from shale formations.

Figure 1 shows a May 2010 EIA projection of the source of natural gas supplies through 2035. Shale gas supplies were anticipated to play an increasingly important role, increasing from 10% in 2009 to about 24% in 2035.

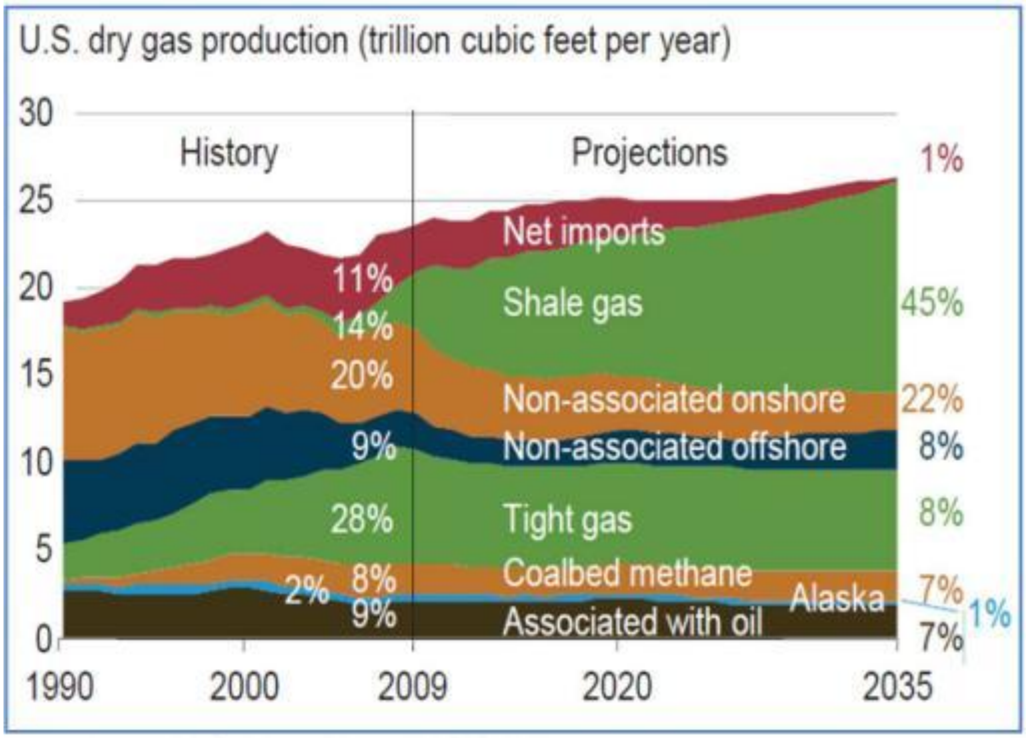
Figure 1 – U.S. Natural Gas Supply by Source – Projection Released May 2010



Source: DOE/EIA Annual Energy Outlook 2010, Report DOE/EIA-0383 (2010), May 11. Available at http://www.eia.doe.gov/oiaf/archive/aeo10/index.html. Note that Tcf refers to trillion cubic feet.

In contrast, Figure 2 shows an accelerated growth of shale gas over a similar period of time. The new EIA projections released in December 2010 now show that shale gas will increase from 14% of the national supply in 2009 to 45% in 2035.

Figure 2 – U.S. Natural Gas Supply by Source – Projection Released December 2010



Source: DOE/EIA Annual Energy Outlook 2011 – Early Release Overview, Report DOE/EIA-0383ER (2011), December 16. Available at http://www.eia.doe.gov/forecasts/aeo/index.cfm?featureclicked=1&.

Much of the U.S. shale gas along with other forms of unconventional gas would not be produced without the use of hydraulic fracturing. Unfractured tight shale rock generally does not transmit enough gas to a production well to justify the cost of the well. In order to bring large amounts of domestic natural gas to market, hydraulic fracturing is a necessity.

What Makes Hydraulic Fracturing Controversial?

As far back as the 1940s, oil and gas companies have used hydraulic fracturing to increase productivity of wells. Since then, more than 1 million wells have been fractured. For much of that time, the state oil and gas agencies have understood hydraulic fracturing to be part of the well completion process. Various levels of regulatory oversight were used. Few, if any, cases of environmental impact were attributed to the actual process of fracing.

From the late 1990s through about 2004, a series of legal challenges and lawsuits (LEAF vs. EPA) focused on whether hydraulic fracturing of coal bed methane wells should be regulated through the Safe Drinking Water Act's (SDWA's) Underground Injection Control (UIC) program. The outcome of these suits was not fully conclusive. Shortly thereafter, a provision in the Energy Policy Act of 2005 amended the SDWA to exclude hydraulic fracturing fluids (except diesel fuel) related to energy production from regulation under the UIC program.

A few years later, in response to some citizen complaints about impacts of natural gas production on their wells, several journalists wrote articles about shale gas drilling, fracing, and production. At the same time, shale gas production expanded from areas where residents had some familiarity with oil and gas activities to new regions where oil and gas development was mostly unknown to the local residents (e.g., northern Pennsylvania, upstate New York). The combination of negative media reports, lack of comfort with industry operations in rural environments, and several actual accidents at shale gas well sites caused by poor management practices and operations led to wider concern about natural gas development in general. Somewhere along the line, the term "hydraulic fracturing" was applied indiscriminately to many activities associated with drilling and completion of the wells. The heretofore industry term "frac" moved into the common vocabulary as opponents pursued "No Frack" policies.

These concerns were further amplified by national level movies (e.g., Gasland) and by an episode of a popular television program, both of which took some liberties with facts in order to tell a more compelling story. Legislation was introduced into both the U.S. House and Senate in 2009 that would have placed greater oversight and regulatory control over fracing, and would require greater disclosure of the chemicals used to make up frac fluids. During 2010, the U.S. Environmental Protection Agency (EPA) announced that it is embarking on a detailed study of hydraulic fracturing and its impacts on drinking water.

Many issues contribute to the controversy surrounding hydraulic fracturing, including:

- Each frac job requires from 1 to 5 million gallons of water (with the trend in new frac jobs to use even larger volumes)– typically that water must be obtained locally.
- The ingredients of the chemical compounds used for optimizing a frac job (e.g., biocides, corrosion and scale inhibitors, gels and gel breakers) have not been disclosed until very recently. Some of the chemical constituents do have toxic properties at high enough levels. The lack of information about which chemicals were actually used and what their concentrations were led to uncertainty and fear on the part of residents.
- Improper storage of chemicals and wastewater has the potential to contaminate soil, groundwater, and surface water.

- Lack of understanding of how fracing works and where the fracs actually move led residents to fear that their drinking water supplies would be disrupted or damaged.
- Some actual drinking water contamination in areas where gas development has occurred (whether caused by fracing activities or not) fanned the flames of concern.
- Inadequate treatment of wastewater (flowback and produced water) can contaminate local groundwater and surface water. Historically, much of the gas wastewater was sent to disposal wells located in or near the producing areas. However, production in the Marcellus was unable to rely on underground injection for disposing wastewater due to the lack of suitable geological formations into which the wastewater could be injected. This forced operators to use other wastewater management options, including treatment and discharge to surface water bodies, which in turn created more concern and opposition.

Other concerns cover a broader scope relating to all shale gas development activities:

- Conducting industrial activities in previously rural areas changes the lifestyle. Noise from drilling rigs and other heavy equipment can be disagreeable. Heavy truck traffic on local roadways contributes to noise, congestion, and the potential for vehicle accidents.
- Numerous out-of-town industry workers contribute to the local economy, but may drive prices higher and change the sociological dynamics of small communities.
- Air emissions from the heavy equipment used to drill and frac wells and the vehicles used to transport water, sand, chemicals, and wastewater can create air quality and greenhouse gas emission concerns.

Purpose of This White Paper

This white paper, prepared by the SPE Summit steering committee, is intended to capture the flavor of the Summit without attributing any specific remarks to individuals. All participants were encouraged to speak freely and explore disagreements. The white paper can serve as a foundation for future discussions held by SPE and other groups to better understand hydraulic fracturing and its potential impacts on ground water.

Chapter 2 – What Happened at the Summit?

Who Participated?

Approximately 80 persons representing industry (producers and service companies), consulting, academia, national laboratories, state and federal government, and NGOs participated. More than 90% of the attendees came from the United States. Based on a show of hands, more than half of the attendees were engineers.

Format and Agenda

The discussion focused on the impact of fracing on groundwater. The Summit began with a keynote presentation by a state regulatory official on how state oil and gas agencies are evaluating and regulating hydraulic fracturing. The rest of the Summit was organized into four sessions of 90 minutes each. Each session included two or three short presentations by selected experts who provided information that both informed the group and stimulated discussion for the remainder of each session. The themes of the four sessions were:

- What is Hydraulic Fracturing?
- What Are the Issues?
- Environmental Risks and Issues – Facts vs. Perception
- How to Move Forward

Each of these is summarized in the following section.

Keynote Presentation on State Regulations

The speaker reported on state involvement in hydraulic fracturing. States have the lead role in regulating most oil and gas activities, including hydraulic fracturing. Among the approximately 30 oil- and gas-producing states, there is a range of requirements and levels of detail regarding what type of hydraulic fracturing information must be reported to the agencies. Regardless of the differences, all oil and gas programs are designed to protect the environment while effectively extracting and conserving the petroleum resources.

The presentation introduced the collaborative efforts of a non-profit, multi-stakeholder group known as STRONGER (State Review of Oil and Natural Gas Environmental Regulations) that critically reviews state oil and gas programs and offers suggestions for improvement. STRONGER sends teams made up of members from states, industry, NGOs, and others to periodically conduct detailed reviews of state oil and gas regulatory programs. Typically those reviews are not limited to hydraulic fracturing requirements, but they do consider such requirements in the context of each state's overall program and recognize regional differences.

STRONGER envisions that teams will return to a state several years after the initial program review to determine the level of progress.

STRONGER developed hydraulic fracturing guidelines in January 2010. They are not detailed standards, but instead they set forth general principles such as:

- Wells should be properly designed and constructed.
- Water, wastewater, and waste management should be planned and conducted in a careful manner.
- Information on the chemicals used in hydraulic fracturing operations should be disclosed and reported.

STRONGER has already conducted focused reviews of state hydraulic fracturing requirements in Pennsylvania and Ohio, and has reviews of Oklahoma and Louisiana requirements in progress. STRONGER also is an advocate for sufficient funding and training for state agency staff to allow better oversight of oil and gas activities.

<u>What is Hydraulic Fracturing</u>?

This session focused on the history of hydraulic fracturing and its impact on the oil and natural gas industry both past and future. It laid a foundation of horizontal wellbore construction and described the principles of hydraulic fracturing and its integral role in recovering natural gas.

The first commercial frac job took place in 1949 in Velma, OK. The first fracing of gas shale formations began in the 1980s in the Barnett Shale in Texas. The experience gained in the Barnett Shale allowed for expansion to other major U.S. shale formations, such as the Fayetteville, Haynesville, Woodford, and Marcellus.

The first use of the combination of horizontal drilling and hydraulic fracturing began in the 1985 in the Austin Chalk. These efforts showed good results and were soon transferred to the Barnett Shale and later to other shale formations.

Hydraulic fracturing is a highly engineered process. Proper design of a frac job considers petrophysical rock properties, the fluid chemical and physical properties, and the characteristics of the proppant (usually sand) used. Frac jobs are closely monitored for volume, pressure, flow rate, temperature, and other parameters.

Careful construction of a well is an important precursor to fracing the well. Wells are drilled to below the lowest drinking water zone, surface casing is inserted, and the casing is cemented in place to ensure good bonding between the casing and the walls of the drilled hole. Various types of logging tools are used to assess whether the cement has formed a good bond and if any voids or small passageways exist in the cement. Additional drilling, including the horizontal leg of the well, is followed by cementing other layers of casing into place. When the well is completed, openings must be made in the casing and cement to allow gas to flow into the well. A perforation tool with explosive charges is used. Next the frac job begins.

On a well with a long horizontal section in the hydrocarbon-bearing formation, the well is not perforated and fracced all at once. Rather it is done in a series of stages each being several hundred feet in length. The outermost stage is segregated from the rest of the well with a plug. A perforating tool creates the openings in that section of pipe, then the frac job is performed on the same stage. When that frac job is finished, another plug is set several hundred feet further back to create a second stage, and the perforation and fraccing are repeated. This process continues until the entire length of the well in the formation has been completed.

The hydraulic fracturing process involves high-rate, high pressure injection of water, a proppant material like sand, and various chemicals. Water makes up more than 90% of the total volume. Water must be available nearby. It can be trucked or piped to a well site. Finding and obtaining permission to use sufficient water presents a challenge to frac operators.

The frac fluids are injected through the perforations into the rock formation at a pressure high enough to promote fracturing (cracking) of the rock and to enlarge any natural micro-cracks. The fluids flow out into the fractures. When the pressure is subsequently reduced, some of the fluid returns to the main well bore and is removed from the well. The proppant materials are designed to keep the fractures open so that gas can flow to the well bore and be produced.

Discussion in this session focused on how important it was to make sure that the information considered by the EPA and other decision makers was scientifically accurate and not based on hype and hearsay. The industry has made improvements in areas like:

- Developing lower impact frac fluids,
- Using ultraviolet treatment for bacterial control in lieu of chemical biocides,
- Using treatment methods that allow for the wastewater to be reused in frac fluids for future wells, and
- Improved fracture mapping.

The industry has lots of data, but has not done a good job of sharing that information within and outside of the industry. A formidable challenge is that many members of the public and the media do not trust information released by the industry. The industry knows more about the subject than any other party, yet when the industry puts forth data, it may be dismissed as propaganda.

There was some discussion about the value of evaluation by a neutral third party to enhance its acceptability by other stakeholders. Universities were suggested as one entity that could fulfill that role. SPE can play a role, but must limit its efforts to provide technical information without trying to influence policy.

One of the participants recommended that industry actively review EPA's draft study plan for a new hydraulic fracturing study. [Note: that study plan was made available for public review and comment about a week following the Summit.]

What Are the Issues?

The session focused on wellbore design, integrity issues and what best practices should be considered for ground water protection. The presentations focused on casing selection, well design, and monitoring to show good wellbore integrity. There was also discussion on how to select chemicals with lower environmental impacts.

Criteria to ensure good casing performance and integrity are: dimensions, corrosion resistance, and mechanical properties. Well designers evaluate the collapse resistance, toughness, burst resistance, and stress corrosion cracking resistance of the casings that are used.

One commenter noted that this discussion may suggest that wells completed in shale gas need to use a special type of pipe. This is not necessarily true, but good quality materials do help to ensure a good well.

Another presentation reported on the industry committees that meet regularly to review and update recommended practices for well construction and integrity. Such practices are field-specific, performance-based, and build on lessons learned from past practices.

Although more than 1 million wells have been fracced, no accidents relating to well integrity during the fraccing process were identified. Wells may have sporadic, minor leaks, but they are not related to hydraulic fracturing. Further, no cases of harm to drinking water aquifers caused specifically by hydraulic fracturing have been found.

Wells should be periodically inspected and monitored to check for leaks. When leaks are found, the damaged areas should be repaired. One commenter noted that within the industry, some companies did an excellent job in well construction while others tended to do a less competent job. The commenter asked the group how the lower-performing companies can be brought up to a higher level of performance. Other commenters responded that the poor performers might not remain in business, and that they could learn from published industry standards and from the One Petro library (which includes SPE papers).

Additional information was presented relating to the selection of chemicals. There is widespread interest in chemicals that are "less toxic". Where possible, chemical suppliers and frac program designers can help by:

- selecting products that have been tested and verified with good scientific data to be safe while still accomplishing the technical goals of the frac,
- ensuring that any suppliers have sufficient expertise in providing chemicals, in safety, and in follow-up service to the users, and

- being open with regulators about the ingredients and concentrations of individual chemicals in their products;
- engaging in stewardship and outreach with communities and media to share technical data.

Several comments followed the presentation. One commenter wondered why "green chemicals" were needed if the industry had never had any incidents. This led to a recommendation that media relations training and experience would pay off. It is not just the message that is important – how the message is delivered is important too. A second commenter noted that it was important to understand how chemicals are applied and to consider a life cycle assessment for the impacts and fate of the chemicals.

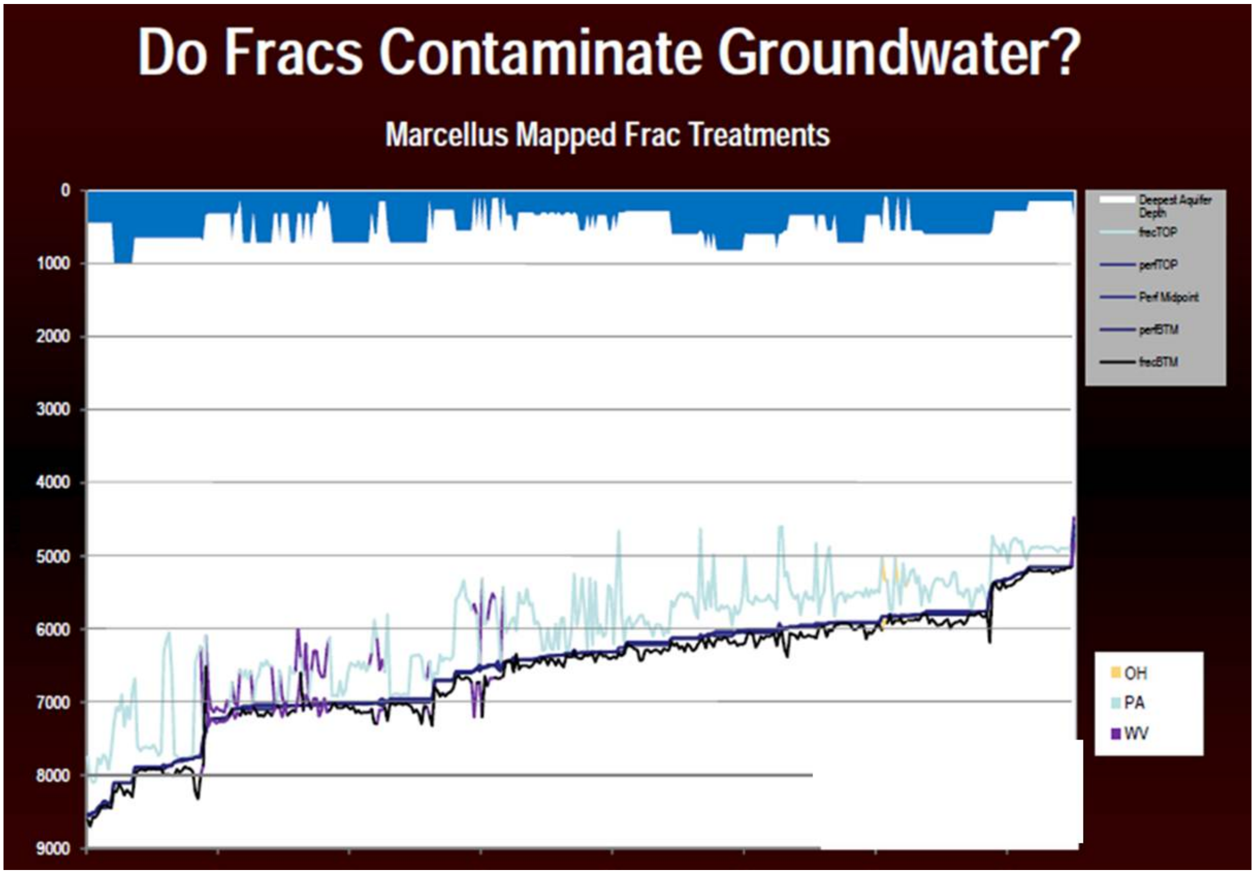
Environmental Risks and Issues – Facts vs. Perception

This session explored the range of perceived groundwater risks and offered some data that can help to better frame future discussions. This session also provided some evidence of how persons outside of the industry actually perceive hydraulic fracturing.

One of the biggest concerns is that individual fractures could continue upward until they reach a drinking water zone or could encounter a natural fault or crack that could allow movement to a drinking water zone. One speaker directly addressed this point by describing how fractures actually move in the subsurface. The height of fractures is a function of rock properties like stress contrast, the Young's modulus, layering and tip effects, and the complexity of the fracture (whether the fracture remains as a single straight opening or splits into multiple smaller intertwining pathways). Upward propagation of fractures stops at a weak interface. This is particularly important at shallow depths or overpressured zones where frictional forces will be low.

The speaker showed compilations of hundreds of data points in which the height of fractures had been accurately mapped by microseismic data. The data for many fracture stages in the Marcellus Shale are shown below in Figure 3. The blue areas near the top of the chart show the depth of the lowest drinking water zone. No drinking water is found below 1,000 ft depth. The lines at the bottom of the graph show the depth of the well (dark blue), the highest vertical extent of the fracture (mostly light blue, with a few points in purple or yellow), and the lowest vertical extent of the fracture (black). Although a few of the fractures approached 1,000 ft in height above the wellbore, the fracture tops rarely rose above 5,000 ft depth, and never above 4,600 ft depth. This shows that even if an individual fracture grows high above the wellbore depth, it is always thousands of feet below the drinking water zone. This is the most compelling evidence available to date that the fractures created during hydraulic fracturing operation in shale gas formations are highly unlikely to contaminate potable groundwater.

Figure 3 – Plot Showing Heights of Numerous Fractures and Depths of Lowest Groundwater



Source: Pinnacle

Another speaker talked about water management issues. Technology is available to produce shale gas and other unconventional gas resources, but it will be the environmental issues that slow the development of these resources. The flowback water and produced water from gas wells tends to be very salty. It can be treated to different levels depending on the disposal or reuse option selected. The type of treatment technology and the concomitant costs and energy inputs are a function of the total dissolved solids and other constituents in the wastewater.

This session also included some thoughts from a representative of an NGO. While many NGOs have opposed hydraulic fracturing, others recognize it is a necessary step in producing natural gas. As such, it supports a more desirable fuel with lower overall environmental impacts. Hydraulic fracturing in itself does not pose large risks to groundwater. Rather, improper well construction is a much more likely source of risk. Other gas development activities that pose risks include:

- transportation,
- surface discharge of treated or untreated wastewater,

- land fragmentation,
- stormwater runoff,
- noise, and
- dust

State regulators must be provided with sufficient budgets and training to be effective. Most of industry does a respectable job. However, occasional accidents and carelessness send a strong negative signal to the public.

Some NGOs are interested in working collaboratively with industry to develop approaches for producing natural gas. However, not all NGOs think this is a good policy. One of the key elements of a collaborative industry/NGO strategy is a transparent frac chemical disclosure policy. Some degree of confidentiality may be needed to allow companies to protect their proprietary inventions; however, CAS number should be disclosed. Although this NGO is supportive of the recent chemical registry efforts put forth by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission, they may not go far enough. National regulations on chemical disclosure are preferable to different state regulations.

Concerns relating to the greenhouse gas releases from natural gas operations (not only CO_2 emissions from vehicles and equipment, but also CH_4 releases from pipeline and valve leakage) should be studied and mitigated as much as possible.

The speaker admonished the group in some of its choices of terminology. For example, if industry talks about "public education", the term may sound demeaning. A better way to express the point is to say "public engagement". The speaker also noted that it is useful to try to understand what the public is worried about to better address their concerns.

How to Move Forward

This session provided insight into the challenges of identifying key constituents, creating the right message points and delivering those messages. It also covered some of the new tools that are evolving to disseminate information.

The first presentation highlighted the immense economic benefits offered by shale gas. It further outlined some key principles supported by an industry association. These include:

- Provide the safest possible workplace for employees, contractors, and in the host communities
- Implement state-of-the-art environmental protection across operations;
- Continuously improve practices and seek transparency in operations;
- Strive to attract and retain a talented and engaged local workforce;
- Be responsible members of the host communities;

- Encourage spirited public dialogue and fact-based education about responsible shale gas development; and
- Conduct business in a manner that will provide sustainable and broad-based economic and energy-security benefits for all.

Another speaker recommended that industry representatives be prepared to provide a concise and understandable explanation about hydraulic fracturing (i.e., an elevator speech). This would include items like:

- methods of groundwater protection,
- understanding fluids: sources, handling, usage, treatment, reuse/recycle, and disposal,
- additives and ingredients, and
- protective regulations.

The speaker also described the new chemical registry that is being developed by the Ground Water Protection Council and the Interstate Oil and Gas Compact Commission. The registry has several functions. It includes an educational site to provide the public with more information (www.fracfocus.org). It offers a web interface where operators can voluntarily register fracture information (www.hydraulicfracturingdisclosure.org). It also contains a centralized well-specific search tool that allows the public to search for frac chemical data at individual wells.

Chapter 3 - Final Discussion Items and Key Take Home Points

Open Discussion

Following the four sessions, all the presenters were invited to the front of the room for an open discussion session. Some of the comments made in that discussion session are listed below. It is important to recognize that each of these reflects the comment of one individual, but does not necessarily represent a consensus opinion of the group. Some of the comments may have been supported by many participants, while others may not have been.

- The industry should look for methods to share technical information that are not threatening.
- Microseismic arrays can detect very large fractures by adding more sensors to an array.
- When nearly everyone attending the Summit already believes that groundwater is not harmed by hydraulic fracturing, why did the Summit title talk about protecting groundwater"? This adds to the public perception that groundwater may be at risk.
- There is a strong need to deal with the public's emotional response to these issues.
- The industry message would benefit from a change in scope. The industry should admit that mistakes do happen, but that in many cases those mistakes have small risks. Such risks, when placed in context with other more familiar risks, may not seem so oppressive.
- When incidents do occur, it is important to look quickly for the root causes and explain them.
- SPE was challenged to improve and expedite the release of peer-reviewed literature that is relevant to hot topics like hydraulic fracturing. Someone suggested a new peer-reviewed publication focused on hydraulic fracturing.
- After viewing photos in the slides of one of the speakers that showed micro-channels in wellbore cement, it is difficult to say that drinking water zones have never been harmed or face no risk.

Key Take Home Points

The following is an attempt to capture the major points introduced during the day. These reflect the opinions of the steering committee and may not be universally agreed upon.

- Natural gas from shale and other unconventional gas formations represents a tremendous economic benefit to the areas above and near to the formations. Development of a domestic form of energy helps to reduce the U.S. dependence on foreign sources of oil.
- These tremendous resources will not be developed in an efficient or meaningful way unless each well is hydraulically fractured.
- As the number of shale gas wells grows in areas that have not had recent exposure to oil and gas development, cumulative issues and concerns increase to the point that more and more local and regional opposition arises.

- Opponents to fraccing, and to natural gas development in general, have portrayed the negative aspects and impacts of gas development. Some of their premises are valid, while others rely on exaggeration and fear-mongering. Most stakeholders would benefit from being able to separate facts from perception.
- Both qualitative (observations from state regulators) and quantitative (frac height data shown in Figure 3) evidence show that the likelihood of the hydraulic fracturing process impacting drinking water is very small.
- The industry has extensive knowledge and is good at stating facts. However, the overall message is not playing well with other stakeholders who frequently view the industry with mistrust.
- There is a strong need to develop new approaches to provide information in a less threatening and more palatable manner. Some options for this include:
  - using third-party organizations to help communicate information.
  - looking for innovative communication methods (e.g., the produced water cartoon video shown during the Summit).
  - attempting to get non-traditional allies on board to help with communication (i.e., alliances between NGOs and producers to develop guidelines and management practices).
- Learn to listen to your opponents to understand their concerns, and work toward common ground.
- Support strong but fair regulations and enforcement. States have nearly all the regulatory responsibility now. Programs like STRONGER and the new chemical registry are state-oriented products that help to improve programs and communication.
- Technologies and regulatory requirements are evolving rapidly to provide better performance and better environmental control. Because of the rapid increase in shale gas drilling and production, the technologies and regulations have often lagged behind increases in new wells. Nevertheless, progress is being made, and opponents generally do not acknowledge it.
- Be prepared to review EPA's hydraulic fracturing study plan and subsequent drafts of the report to correct inaccuracies and misconceptions with strong, science-based information.

Observations on the Summit Format

Since this was the first SPE Summit ever held, SPE was interested in how the participants reacted to the format of the event. The steering committee observed that nearly all of the 80 participants remained in the room until the official ending time of 5:00 pm. The discussion was lively and productive up until the end. Judging from positive body language and a lack of clock-watching late in the day, we had a sense of the group's strong interest and willingness to keep talking. More than 82% of the persons who submitted evaluations of the Summit rated the technical content as either excellent or good, and about 90% felt that the discussions were excellent or good. More than 96% of the respondents indicated that what they learned at the Summit would help them in their work.

This Summit was conducted in just a single day; we had the sense that more discussion would have taken place if more time had been available. SPE designed its model for Summits to last two or three days. This may allow the group to gel and open up a bit. Although many good comments were made throughout the day, there was very little controversy. Despite the initial instructions from the co-chairman to disagree civilly with other participants, there was not much controversy or back-and-forth exchanges of opinion. By having additional interaction time through an evening dinner and social event, followed by more discussion on a second day, so of the formality and reluctance to disagree or challenge ideas could be ameliorated.

All-in-all, the steering committee was pleased with the conduct and outcome of this Summit.