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Outlook 2015: Q&A
State of the Industry

Editor's Note: In December, the U.S. Energy Information Administration released final 2013 statistics that showed proved reserves of crude oil and lease condensate had increased to 36.5 billion barrels–the highest since 1975 and the fifth consecutive year of growth. At the same time, proved natural gas reserves jumped to a record 354 trillion cubic feet. These numbers only reinforce the fact that U.S. oil and gas operators have revolutionized supply-side capacities, and in so doing, have transformed America's energy fortunes.

The numbers kept climbing in 2014, with crude oil production increasing an estimated 1.2 million barrels a day. However, as the clock ticked toward a new year, oil prices slid to the lowest level in five years and natural gas prices dipped to $3 an MMBtu on the New York Mercantile Exchange. As 2015 began, AOGR assembled a panel of industry leaders to assess the state of U.S. energy, and to identify key business strategies and technological trends on the near-term horizon.

Halliburton's contribution to this special Q&A feature played an integral role in providing insights on general market expectations as well as specific focal points of technology development in 2015 and beyond.

Q&A

The Way Forward

Jeff A. Miller, Halliburton Company

Q: There has been a lot of discussion about what lower oil prices could mean to U.S. tight oil plays. What are your expectations for general business conditions in the domestic market in 2015? How are those expectations impacted by the fact that many oil and gas companies maintain active hedge programs? Which particular oil plays or basins do you expect to be most active? How about gas shale activity?

MILLER: We recognize there is a concern about the decline in commodity prices. However, on a longer-term basis, we do not believe these lower price levels are sustainable.

In the past five years, U.S. shale gas production has increased by 700 percent and tight oil production has increased by 600 percent. Within a year, the United States is expected to become the world's largest oil producer, surpassing Saudi Arabia and Russia. While this means we may be in a situation where there is a slight oversupply at the moment, demand is growing also, and by 2020, we will have the capacity to be a net natural gas exporter.

While we expect activity levels to slow in 2015, Halliburton is well-positioned to handle market uncertainties. We will remain focused on cost management; executing on our strategies in unconventional resource plays, deep water and mature fields; and delivering on customer service. If you look at how far we have come in only five years, we have every reason to be optimistic about what the economic future holds.

We continue to expect the Permian Basin to be very active in 2015, but we are seeing larger completion volumes in almost every basin in North America and believe this trend will continue. Also, based on positive economic results of several large-scale, full-lateral pilot refracturing programs in 2014 utilizing new technologies that seal off existing perforations and stimulate bypassed and new intervals, we are seeing accelerating refracturing activity across mature fields, including the Haynesville, Marcellus and Eagle Ford.

Q: Halliburton performed the first commercial hydraulic fracturing treatment more than 65 years ago. Some 2 million frac jobs later, it has been said that fracturing has done more to increase reserves recovery than any other single technology. The science of pumping and evaluating frac treatments has advanced considerably over the past decade in support of resource play development. What is the next big step in fracturing to further increase recovery factors? How do you envision frac technology evolving over the next five to 10 years to improve completion performance, treatment efficiency, economics and safety while reducing the overall environmental impact?

MILLER: Hydraulic fracturing has changed quite a bit since Halliburton performed the world's first frac job in 1947, and we remain at the forefront of those changes. Our customers expect us to work hard to innovate in ways that lower the cost of production per barrel of oil equivalent through custom chemistry, surface efficiency, and subsurface insights. One way we are transforming the delivery of hydraulic fracturing services is a new approach to fracturing that improves productivity and optimizes the operator's return on investment.

This new approach includes an integrated package of hydraulic fracturing products, tools and systems designed to maximize productivity and minimize downtime and surface footprint for greater well completion efficiency. This includes the first new fracturing pump in two decades, which has been custom-designed to thrive during 24-hour operations while improving reliability by as much as 50 percent.

Halliburton's game-changer is subsurface insight. This insight is what led us to develop a new seismic-to-stimulation service, which links geoscience and engineering, and tells us where and how to drill, and where and how to fracture. More than 60 projects are running now that use the seismic-to-stimulation service, and we are seeing customers expand their use of the service to multiple basins. Early wells completed using the proprietary, collaborative workflow have seen more than a 35 percent increase in average production with lowered frac-finding costs, compared with offset wells. We will keep developing and expanding this holistic engineering service throughout 2015, and will continue to see it serve as an engine for commercializing new technologies.

From an environmental standpoint, since water is such an important part of the fracturing process, we are working continuously on ways to control the way we source water, use it, and recycle or dispose of it. We are able to treat and reuse produced water, and have developed salt-tolerant, high-performance fracturing fluid systems that enhance treatment effectiveness while enabling operators to use 100 percent produced or flowback water.

Q: Although crucial, fracturing is only one part of the high-tech operational processes required to develop unconventional assets. What trends are shaping technological capabilities across drilling, completion/stimulation, and production operations in tight oil and gas shale plays? Is the future all about more wells per pad, longer laterals and more fracs per stage, or is bigger proving not necessarily better in horizontal resource plays? In what areas do you anticipate seeing significant innovation?

MILLER: Halliburton has been focusing efforts on developing technology to improve the industry's understanding of unconventional resources, and one of our driving forces is multidisciplinary collaboration combined with science and engineering innovation to deliver customized well solutions. Ours is no longer a "one-size-fits all" business, especially as unconventional markets and mature fields become growing areas of focus, each with its own very unique sets of challenges.

Shale is about the learning curve. Rather than simply looking at it as bigger is always better, Halliburton's solution has been the synergistic integration of completion technologies designed to achieve the highest production output. To that end, the complete intracycle stimulation design service helps us deliver more efficient stimulation to a well. This advanced service provides optimized pumping schedules and engineered diversion spacers to segment multiple proppant cycles placed over a zone. In the Eagle Ford and Bakken, this technology has enhanced compartmentalization by up to 300 percent, and has reduced overall completion time and cost in both plug-and-perforate and openhole, sliding-sleeve, multizone completions.

We also are addressing historically steep production declines in shale wells by meshing advanced stimulation service with patented custom coating chemistry to generate targeted fracture geometries with conditioned stimulation materials to achieve the greatest drainage potential from each well through long-term fracture conductivity and effective surface area.

In two trials, our stimulation technologies delivered wells that are number one in production in their respective geographic locations, in both target formations (Bakken and Three Forks). Now, more than ever, our customers are relying on us to provide technology differentiators to further enhance the economics of their assets.

In terms of particular areas for future innovation, fiber optics comes to mind. Halliburton has exceled in delivering fiber optics solutions to unconventional development. Fiber optics is a life-of-the-well solution that can give us information about well integrity, stimulation effectiveness and production efficiency in real time. By utilizing fiber optics, we can generate a well production log to help understand the true effective fracture geometry at every producing interval. This level of discrete understanding for effective fracture placement is unparalleled in the industry.

Q: On the other end of the spectrum, what are your expectations for the Gulf of Mexico and other offshore basins in 2015? What key technical lessons have been learned in developing reserves in ultrademanding plays in ultradeep water, and how is that learning being incorporated in new technology development? What specific technologies and services are on the drawing board to enhance operational success, reliability and safety in offshore projects in the Gulf and elsewhere around the globe?

MILLER: The integrated delivery of services in deep water is critical to helping operators lower costs. Halliburton will continue to reduce uncertainty and increase its reliability in deepwater operations, and will remain focused on technologies that help us to do so, such as a new sampling-while-drilling tool that reduces uncertainty and saves rig time by allowing customers to take multiple fluid samples at once.

Another new technology is a high-performance, invert emulsion drilling fluid system that stabilizes circulating density in order to drill more complex wells more reliably. The system's rheological profile is designed to provide low, controlled equivalent circulating density in wells with narrow pore-pressure/fracture-pressure gradients, reducing the risk of drilling-induced fractures.

We rely on a strong geomechanical foundation to improve well design for customers. Predrill pressure and stress predictions drive estimates of a prospect's viability, and we are increasingly using more 3-D seismic to construct field-scale models that can improve production predictions. At the same time, real-time solutions can reduce dramatically the common problems associated with drilling, such as kicks, losses and hole-stability issues that account for more than 40 percent of nonproductive time in deep water.

From a safety perspective, Halliburton is pleased to be the first company to achieve API Specification Q2 certification for our Baroid drilling fluids and waste management services in the Gulf of Mexico. Spec Q2 is a risk-based quality management system that involves extensive audits of safety practices and service quality, and we worked very hard to help API develop and implement the standard around the globe. We are committed to reliability and safety offshore. Our Indonesian facilities also have achieved Q2 certification.

Q: Finally, the industry has undertaken concentrated efforts to recruit and train a new generation of oil and gas professionals. How do you evaluate the manpower situation with respect to technical professions? Realizing there is no substitute for experience, are technologies and strategies available to help operators and service companies minimize the learning curves associated with new hires, particularly recent college graduates? Are there additional measures the industry can take in partnership with academia to further improve the technical proficiencies and "job readiness" of new industry entrants?

MILLER: Helping to train and develop the next generation of Halliburton's workforce is very important to us, and we believe this should start before students reach college. We are involved actively in creating and supporting K-12 education programs within the industry in conjunction with the Offshore Energy Center and the Independent Petroleum Association of America/Petroleum Equipment Suppliers Association petroleum academies. Both promote energy education and understanding before students make their college decisions. Hands-on experiences and high school internships within these programs expose students to our company and employees, so they can experience first-hand the exciting opportunities in the oil and gas industry.

At the college level, Halliburton's University Advisory Board–part of the Halliburton Foundation–reviews proposals from universities and makes grants to those partner schools. We have university partnerships with more than 40 core schools and make numerous technology grants to these schools each year. Many of these grants have technical components where our company partners with the schools to teach, mentor and train students.

Diversity is also an important element in building a strong workforce. When it comes to additional measures the industry can take, I would note that, within the science, technology, engineering and math professions, we still see shortages in the number of women entering the industry. We partner with universities and professional organizations to ensure we play a part in shaping the future of this demographic, with the goal of getting more women interested in this field. ❒

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Jeff A. Miller is president and chief health, safety and environment officer at Halliburton Company. He was appointed to Halliburton's board in August 2014. Miller joined the company in 1997 and has held various positions of increasing responsibility. Before assuming his current position, he was executive vice president, chief operating officer and chief HS&E officer. Miller also has served Halliburton as senior vice president for global business development and marketing, senior vice president of the Gulf of Mexico region, vice president of the Baroid product service line, and as country vice president for Indonesia. He holds a B.S. from McNeese State University and an M.B.A. from Texas A&M University.