

Tuesday, December 15, 2015

Southwestern Energy Conference Center, 10000 Energy Drive, Spring, TX 77389  
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: Active/Associate Members - \$30, Emeritus/Life/Honorary - \$25  
Students who are members of HGS - \$10, Non-members - \$40

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.  
Pre-registration without payment will not be accepted.  
Walk-ups may pay at the door if extra seats are available.

## HGS Northsiders Luncheon Meeting

*Susan Smith Nash, PhD*  
American Association of Petroleum  
Geologists, Tulsa, OK

HGS Northsiders Luncheon Meeting

# U.S. Shale Plays: Evaluating Opportunities, Optimizing Your Own Operations

The ongoing downturn in oil and gas prices, combined with high costs and steep decline curves has dealt a death blow to many parts of what were once prospering shale plays. Companies have had to take write-downs, and many have put their properties on the selling block. The fact that there is a great deal of inventory turnover in today's U.S. shale plays means that there are significant opportunities for operators who know how to identify sweet spots and to utilize technologies to economically produce.

If you are an operator in a shale play that has converted itself into an uneconomic money sink, there is no doubt that you have already instituted cost-cutting / cost-postponing measures, such as drilling horizontals without completing. You've also gotten a lot more efficient with your frac jobs, and you're conducting geological fracs rather than geometrical fracs. In addition, you've improved your produced water efficiencies and are geosteering with better precision.

But it's not enough. Your costs are still high and your wells are not uniformly productive. So, what next? Do you put it all on the selling block and try to sell as quickly as possible to stop the hemorrhaging? If you do, you're in a "going out of business" mode, and you're not really going to get much for your "fire sale," unless you happen upon a miracle and are able to leverage what you clear in a highly efficient producing property that does not have any unwelcome surprises lurking in the leases. Or, do you keep drilling and completing, but utilizing new technologies to optimize your production, knowing that you're rolling the dice and it's quite possible that your gambles will not pay off, at least in this iteration, as you're still somewhere in the learning curve.

Alternatively, you may optimize your operations to the best of your ability, with a view to grooming your properties for a sale, or you may implement a strategy that will, over time, result in profitability.

Regardless of the strategy you employ, there are a few considerations to keep in mind.

1. **Heterogeneity comes in many different forms.** Know your reservoir and your lithologies. You may have fine-grained sand interbeds, or you may have more mudstone or marly facies. Understanding the nature of the heterogeneity (lithology, fracture density, pore architecture, diagenetic alteration / overgrowths) really does matter.
2. **Fluid migration pathways are more important than you may think.** While it's easy to believe that all shales as essentially self-sourcing ("my source rock is now my reservoir"), that's not actually the case in all shales, and depending on the fracture networks and the pore architecture, you may have differentially enriched sediments which constitute excellent sweet spots. Understanding the source, direction, and geochemistry of the reservoir fluids (including gases) will help you pinpoint the sweet spots.
3. **Connectivity, but for how long?** Knowing how long your induced fractures will stay open, and which proppants seem to live up to their promise can make the difference between a well you'd like to purchase, or one you'd like to run from.
4. **Frac interference, thief zones, and other signs of "over-muscling" the frac design.** Conventional wisdom suggests that the bigger the frac the better, and the more rock you "rubble-ize" the better. But some reservoirs exhibit behavior that deviates dramatically from conventional wisdom. Sometimes it is not easy to determine what exactly went on, but if there is frac interference or thief zones, it is an indication that there are ways to move the hydrocarbons, and that there is a certain level of responsiveness to stimulation. So, these areas bear reconsideration, particularly if there is high TOC. It's important to keep in mind that recovery rates can hover around 10%, which means that there's definitely oil in place.
5. **Geochemistry can give you an edge.** Whether you're looking at kerogen-typing or isotopes which can help you with gas / oil fingerprinting, the more geochemical information you have, the better you can determine where to drill, and also the kinds of fluids to use in drilling and completion.

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6. **Stress regimes and pore pressure are potential solutions to “cliff-dive” decline curves.** Understanding the stress regimes, pore pressure, and also the orientation of fractures, along with migration pathways, can help you fine-tune your completions in order to maintain flow and reduce the rapid declines. High IPs can be exhilarating, but it’s not so thrilling when the rates basically drive off a cliff and are flat all too soon. A more tempered approach may be the solution.

There are additional points to consider when evaluating acquisitions or grooming your properties for optimization or sale. Please review my other papers for additional information (forthcoming) or attend my talk at the HGS Northsider’s lunch meeting in December. ■

### **Biographical Sketch**

**DR. SUSAN SMITH NASH** has organized numerous workshops, forums, educational events and research conferences on the topic of unconventional resources in her capacity of Director of Education and Professional Development of the AAPG. In addition, she has worked with cross-disciplinary teams to work on knowledge transfer, understanding, and research initiatives in optimizing exploration and development of unconventional and mature reservoirs. Her current interests involve supporting new technologies for green development of unconventionals. - See more at: <http://www.aapg.org/career/training/instructors/details/articleid/3139/susan-nash-phd#sthash.A5HirKE7.dpuf>

