

# KU TORP

Tertiary Oil Recovery Project

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Today I am going to talk to you about Hydraulic Fracturing in Kansas from a technology transfer perspective. To do that I am going to briefly give you a little background about KU TORP Technology Transfer and highlight how we work with the Kansas independent oil and gas industry. Then I would like to talk about what I am seeing in the way of types of information the industry is interested in, and how our organization is responding to this increasing demand.

## *Background – TORP, PTTC, History*

Many of you may already be familiar with KU's Tertiary Oil Recovery Project or TORP but for those of you who aren't I want to briefly describe what we do related to the independent oil and gas industry. Founded in 1974, by the state of Kansas – we were charged with the task to acquaint producers with technical and economic potential of various enhanced oil recovery methods for Kansas oil and gas fields which include some tertiary methods.

We were founded by Distinguished KU Professors Don Green and Paul Willhite and some of our specific objectives were and continue to be:

- research and development of enhanced oil recovery processes applicable to Kansas oil and gas reservoirs
- investigation of reservoir engineering and geology to better characterize Kansas reservoirs
- dissemination of technical information to the regional oil industry
- production of a viable technology transfer program to help with this dissemination
- conduct field tests and demonstration projects and finally educate students and operators in enhanced recovery processes and efficient reservoir and operations management

Since its inception TORP has continued to develop and expand each of these objectives.

As you may have guessed, I am in charge of the technology transfer and dissemination of information portions of our project. For many years this was accomplished largely through the production of TORP's bi-annual Improved Oil Recovery conferences held in Wichita Kansas with a goal of highlighting current research, innovations, and demonstration projects. In fact we are gearing up for our twentieth IOR event next March representing 40 years of research and service to the independent oil and gas industry.

However it's been in the last 15 to 20 years that we really began to develop into what has become our current technology transfer model where we work with industry, monitor trends, and seek out

demonstration projects all in an effort to provide independent operators with access to emerging technology and education when and where they need it most.

Around this same time the Petroleum Technology Transfer Council or PTTC was formed and TORP played a key role in PTTC's early development. If you're not familiar with the PTTC, it was originally founded with a similar purpose to address the technology needs the oil and gas producing industry and to identify the best mechanisms for improving the transfer and communication of that technology to domestic producers.

PTTC was initially funded with money from the department of energy and a goal of becoming self sufficient within five years. Unfortunately over the years sustainable funding for this program never really transpired and PTTC has struggled to continue operating at the level it once did.

However over the same period of time TORP Technology Transfer has continued to grow and while we continue to contribute to PTTC's work we have begun expand our operations independently to continue to serve the midcontinent region in the event that PTTC's efforts come to an end.

Currently, the TORP Technology Transfer Division is putting on more than fifty hours annually of instruction in the region and will likely add more before the year is out. This time is divided primarily among four two day events held in Wichita Kansas seasonally in the Spring, Summer, Fall, and Winter. In addition we hold a single day event in conjunction with the annual Eastern Kansas Oil and Gas Association yearly meeting and are working on two additional workshops one in southwestern Kansas and another in southeastern Kansas. Finally we are in the process of developing a single day field trip to study Mississippian outcrops and discuss drilling and completions in these types of formations.

You might note that we don't spend a lot of time in Lawrence – and this is by design – I believe we should take the topic to where the need is. In Kansas Wichita is sort of the hub for oil and gas in the western part of the state where the EKOGA event brings in folks from the eastern part. Operations are pretty different in these two areas so we tailor our work to fit the needs of the industry in that area.

All of our topics are industry driven. I work with an industry advisory board made up of operators and service companies from the region. Additionally, I spend a great deal of time attending industry and association shows to find out more about the needs of independent operators, and finally I jump at any chance I have to get out in the field and see different operations function and overcome problems.

This last year we conducted courses on:

- getting the most out of 3-D seismic data
- technologies for a more efficient operation
- and horizontal drilling and completion in the Mississippi lime
- multistage fracturing in unconventional reservoirs to name a few

Our speakers included folks from academia, service companies, and actual operators themselves.

As I mentioned - our goal is to provide access to information and technology to the typical independent operator.

- In Kansas that an organization that generally has less than fifty employees
- mostly operate mature reservoirs or stripper wells
- and generally operate in only on e state

These folks usually can't make it to a ton of AAPG or SPE type events so what we do is bring those same experts to them for a fraction of the cost.

We provide information to independent operators in several ways. I am not going to go through the details of each but I do want to highlight how we are reaching the industry.

Our standard workshop is divided each day into four sections – two in the morning and two in the afternoon. Then we invite a speaker to talk for about an hour in each section and field questions after their talk. This is your pretty standard conference format.

Next, we understand that not everyone can leave the field for two to three days to attend a seminar. To remedy this we began broadcasting our events online with the idea that an attendee could participate from anywhere with an internet connection - even a drilling rig. In June of last year we began doing just that. Using a system similar to Webex we now broadcast every event live to attendees from around the country.

Each of these broadcasts is hosted by a TORP staff member who helps monitor participant's activity and pass along questions to the speakers. This person also ensures that participants can see and hear each speaker as well as handles technical issues.

Another thing we know about the oil and gas industry, is that many times it's hard for folks to get away and think about attending a workshop during the day and in fact it's not until late at night that they can even begin thinking about learning about new technology. For these folks we have recorded each of our live workshop segments provide them online for purchase anytime day or night.

Finally we publish a quarterly newsletter that coincides with the production of each workshop - Spring, Sumer, Fall, and Winter. Each newsletter briefly highlights TORP's current events and each issue is themed for research, education, technology transfer, and at the end of the year we provide a year-end review.

Because of our working relationship with industry we have been hearing more and more about the "Mississippian" play in Kansas. We have seen tremendous growth in attendees at our technology transfer workshops over the last year. We believe that this growth is due in part to the leasing activity in the region in conjunction with increased horizontal drilling and completion activity. Through our conversations with industry our industry advisory board, attendance of industry events and our work in the field we have identified that there is great interest in using this technology to access Kansas oil reserves that were once thought to be uneconomical to produce.

At this time because of the price of natural gas operators are using this technology to access liquid resources. As this new technology gains acceptance it has become necessary to provide training to independent operators. In the last twelve months we have provided the following courses:

- Development of Unconventional Resources
- Fracturing Technology and Innovations
- Fracturing Case Studies and Considerations
- Technologies for a More Efficient Operation

- Fundamentals, Acquisition, and Processing of Seismic Data
- Interpretation, Using Seismic to Improve Success and Case Studies
- Kansas Next Step
- Kansas Oil and Gas Resource Fund
- RPSEA Onshore Production Technological Keys to Unlocking Additional Reserves
- Horizontal Drilling in The Mississippi Lime
- Horizontal Completions in The Mississippi Lime

Speakers have included but are not limited to:

- Salvatore Mazzullo – Wichita State University
- Lynn Watney – Kansas Geological Survey
- Stephen Trammel – IHS Global
- Rich Jones – Weatherford
- Dean Pattison – Woolsey
- Matt Grubb – SandRidge Energy
- Charles Wickstrom – Spyglass Energy
- Jeff Chestnut – Packers Plus
- Shari Dunn-Norman – Missouri S&T
- Brad Malone – Schlumberger
- Many Others

Talks have included but are not limited to:

- Economic Potential of Kansas Plays in 2011
- Enhancing Oil Recovery from Mature Reservoirs Using a Lateral Technology
- The Basics of Slickwater Fracturing Tight Mississippi Cherts
- Operational Overview of Horizontal Drilling Operations
- Targeting Low Cost Low Risk Oil Reservoirs
- Horizontal Logging in the Mississippian
- Rock Mechanics Fundamentals and its Implications on the Mississippian Play
- Many Others

Because of these offerings we have more than doubled our normal program attendance and are beginning to draw in multiple out of state operators and service companies from the midcontinent region. At our last event in December: Horizontal Drilling and Completion in the Mississippi Lime we completely sold out and had to schedule an additional course revisiting the same topic.

Additionally because of the increased interest in the use of this technology we have seen a resurgence interest in more standard technology topics – drill stem test analysis, and well logging - as well as

horizontal drilling interest in other parts of the state. Because our content is industry driven I anticipate continued growth in providing information related to hydraulic fracturing as we move forward in the coming years.