TORP Conference Brings IOR Technology To Mid-Continent

Even during these uncertain times, improved oil recovery is an important issue for many independent operators. For more than 40 years, the University of Kansas Tertiary Oil Recovery Program has been providing operators and service companies with access to emerging technology and best practices aimed at the industry’s continued success in the Mid-Continent region.

TORP’s 21st biennial event, held in April in Wichita, Ks., featured some of the industry’s most cutting edge research as well as new perspectives on old technologies. Events began with keynote speaker Rodney Schulz, an independent oil and gas producer and graduate from the KU petroleum engineering department, who is an expert in the area of oil and gas economics. Schulz discussed identifying and addressing uncertainty in today’s market.

This year’s IOR event also featured Stan McCool and Mark Ballard discussing chemical flooding in the Trembley oil field in Reno County, Ks. McCool and Ballard discussed how chemical flooding could recover a significant amount of the oil left after waterflooding. A slug containing surfactants and polymer is injected and displaced through the reservoir by a polymer drive. The chemical slug mobilizes trapped oil, forming an oil bank that is pushed to the production wells.

For their project, a chemical slug was formulated specifically through laboratory work and a field test was designed for the Trembley Field. They reviewed the chemical formulation, injection equipment design, and field implementation plan.

In another presentation, TORP’s Jyun-Syung Tsau and Ballard discussed Tsau’s work on near-miscible carbon dioxide in the Arbuckle reservoir. Many reservoirs are not considered for CO₂ miscible flooding because the maximum reservoir pressure that can be attained is less than the minimum miscibility pressure (MMP). Near-miscible displacement refers to a process occurring at a pressure slightly below MMP, but between immiscible and miscible. Significant oil recovery was observed within that pressure range in slim-tube experiments, and to a lesser extent in the core tests.

Tsau discussed how KU TORP set out to determine the feasibility of using CO₂ displacement at near-miscible conditions to improve oil recovery with an injection pressure below minimum miscibility pressure. Additionally, he and Ballard highlighted how they developed and implemented a field test with the goal of showing that significant oil could be recovered by the CO₂ process operating at near-miscible conditions.

Next, Karen Peltier from TORP discussed her work on treating produced water. Peltier’s presentation showcased how produced water was a significant waste stream containing high concentrations of salts and organic components that severely limited options for reuse (because of scaling) or safe disposal. Practices for dealing with produced water include reinjecting it into the reservoir for additional recovery, discharging it into evaporation ponds, injecting it into disposal wells, or off-site commercial disposal.

Changes in disposal practices—made necessary by a rapidly changing regulatory environment—mean that treating produced water is a new area of concern for oil and gas producers. Peltier reviewed technologies currently in use and introduced new technologies being developed at TORP.

Lynn Watney with the Kansas Geological Survey discussed CO₂-enhanced oil recovery in the Wellington Field in south-central Kansas. His presentation focused on the Paleozoic-age Ozark Plateau Aquifer System in southern Kansas. OPAS is composed of the thick and deeply buried Arbuckle Group saline aquifer and the overlying Mississippian carbonates that contain large oil and gas reservoirs. The study was a collaboration among the KGS, the geology departments at Kansas State University and the University of Kansas, Berexco LLC, Bittersweet Energy Inc., Hedke-Saenger Geoscience Ltd., Improved Hydrocarbon Recovery, Anadarko Petroleum, Cimarex Energy, Merit Energy, Glori Energy, and Cisco Systems.

Watney provided an update on the progress of the three main areas of focus:
- A field-scale study at the Wellington Field in Sumner County;
- A 25,000-square-mile regional study of a 33-county area in southern Kansas; and
- Selecting and modeling a depleting oil field in the Chester/Morrow sandstone play in southwestern Kansas to evaluate the feasibility for CO₂ EOR and sequestration capacity in the underlying Arbuckle saline aquifer.

Finally, Reza Berati from the KU chemical and petroleum engineering department discussed his work with nanoparticle-stabilized CO₂ foam for EOR and hydraulic fracturing applications. KU researchers have designed a more stable foam system in the presence of crude oil. The improved foam stability and rheological properties observed are the result of modifying current CO₂ foam systems using nanoparticles. This system has the potential to improve CO₂ EOR recoveries from the heterogeneous carbonate reservoirs of Kansas.

KU’s improved oil recovery conference has a long history of providing industry access to technology and best practices, and the 2015 program continued this tradition in these uncertain times.

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