‘Mining’ Process May Be Way To Recover Remaining Oil

At the Eastern Kansas Oil & Gas Association’s 2016 annual meeting in September, the University of Kansas Tertiary Oil Recovery Program hosted a one-day workshop titled “Eastern Kansas Oil Field Essentials.” This workshop highlighted technology and innovations aimed at helping eastern Kansas operators continue to succeed. However, this technology isn’t limited to eastern Kansas. Several of the technologies discussed can be applied in many areas in the United States.

One technology, in particular, stood out this year. Phoenix Energy Resources of Andover, Ks., showcased what it is calling a “borehole extraction recovery system.” Phoenix claims its technology will enable producers to recover the remaining oil left in a reservoir after primary and secondary recovery.

Phoenix President and Chief Operating Officer Gregory Menas said the company’s near-term focus was oil, but noted that its proprietary system could and would be used also to recover other deep natural resources in future years. Menas contends that as much as 400 billion barrels of oil may be left in mature fields across the country, and that the Phoenix system can recover as much as 80 percent of that crude.

Phoenix uses a process called borehole mining to produce the oil that remains trapped in the reservoir. Borehole mining also is known as slurry mining, and utilizes a tool that incorporates a water-jet cutting system combined with a downhole slurry pumping system used to mine minerals through a single borehole at the surface. Water jets from the mining tool erode the ore to form a slurry. The slurry flows into the in-jet of a pump at the base of the tool. The material—in this case oil—then is lifted to the surface in a form suitable for production systems.

On Phoenix’s website there is a paper titled, *Borehole (Slurry) Mining of Coal, Uraniferous Sandstone, Oil Sands, and Phosphate Ore*, by George Savanick, which describes borehole mining as an established process that Phoenix intends to use to recover oil more efficiently. For Phoenix, the process offers a number of important advantages over conventional drilling and completion techniques.

The paper discusses the advances in borehole mining made in the late 1970s. The borehole mining tool was used originally to mine coal in Washington, sandstone in Wyoming, and oil sands in California. The paper describes the massive improvements made in the technology during these years. Most notable were including the hydrostatic head of a water-filled borehole for roof support, and developing methods to survey and backfill mined-out cavities.

Borehole mining, as defined by this paper, could have potential applications in certain fields to mine heavy oil. It offers a number of important advantages over conventional open-pit and underground mining methods, and can access mineral deposits not traditionally mined because of technical and economic difficulties. Using traditional mining methods, a typical return on investment can take up to five years.

One of the additional benefits of borehole mining technology is that it can be operated remotely from the surface by a two- to three-person crew. Additionally, unlike traditional mining, no overburden is removed, since it is pumped back into the cavity during the process, so subsidence can be avoided. Reservoir damage becomes a nonissue, since the rock is being effectively removed and put back in the formation after the oil has been separated.

Oil released by the water jet is brought in slurry form to the surface, where it can be separated and placed into production tanks. The technology was developed to mine selected deposits that were small and erratically mineralized, making this an interesting option for mature fields. Phoenix representatives visualize six tools per acre, working simultaneously, mining the materials below.

Phoenix is still in the early stages of development and deploying the technology, but is working aggressively to develop case studies using this tool. It remains to be seen whether borehole mining technology will revolutionize the U.S. oil and gas industry. However, this technology does offer a unique option for producing the remaining oil left behind after primary and secondary recovery operations are conducted. It will be interesting to watch as Phoenix continues to grow and impact the mature oil patch.

“**This technology offers an option for producing oil left behind after primary and secondary recovery.**”