

Enhanced Oil Recovery from Shallow Depths Through the Use of Tight Radius Lateral Drilling

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Abstract: There are many heavy oil fields in the world where the oil does not easily flow to the well and conventional production is thereby limited, or currently not economically viable. Missouri alone has billions of barrels of oil along its western edge, that lie just too deep for conventional surface mining (similar to that of the tar sands of Alberta) and yet have an oil that is too heavy to be easily recovered by normal oil well production. Where this oil can be extracted it will add significantly to the reserves of the country.

Missouri S&T pioneered the use of high-pressure waterjets as a means of drilling long horizontal holes underground - a technology validated in field tests with Sandia National Laboratories. The technique allows the turning of a drill from an existing vertical well in a radius of less than 9 inches, whereas conventional tools require 20 ft. Once the turn has been made, the drill can then penetrate out horizontally. Once the horizontal wells have been established then one of two different approaches can be taken. The wells may be hydrofraced, as is conventionally done, for example in shale gas recovery, or the sand might be mined.

Once the well has been drilled to the edge of a defined area, the drilling head can be reconfigured into a reaming mode in which the jets cut into and mine the oil bearing rock (which in Missouri is up to 30 ft thick). By disintegrating the rock and pumping it to the surface, (in the same way as in Alberta) using a hot water solution, the oil can be removed from the sand, which can then be mixed with a small amount of a binder and re-pumped back into the reamed cavity to provide support for adjacent mining of the material so that all the rock can be mined, and all the oil is recovered. In this way the oil can be recovered without the environmental impacts of the open pit tar sand operations.

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