

Title:

Advantages of In Situ Gas Extraction

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We are developing the in situ gas extraction (IGE) process for efficiently producing oil from oil shale. IGE has economic, environmental, and technical advantages over other proposed and demonstrated true in situ processes.

In the IGE process, natural gas is compressed and heated on the surface and injected at the bottom of the target oil shale layer through a dual-completed well. As the hot gas rises through the oil shale, it heats the shale and sweeps away volatile oil vapours produced by decomposition of the kerogen. The gases exit from the top of the oil shale layer through the second completion. At the surface, the oil vapours are condensed into liquid and separated from the natural gas stream, which is recirculated. Some of the natural gas is burned to heat the recirculating gas stream.

IGE single-well, single-phase recovery has several advantages. First, oil extraction is faster than competitive methods, since convective heating is faster than conductive heating. Second, natural gas is readily available throughout the Green River formation and it is produced by kerogen decomposition. Third, a dual-completed well is relatively inexpensive, making oil shale of almost all grades and depths economically feasible to process. Fourth, direct combustion of natural gas is the most efficient method to generate heat, reducing emissions. Fifth, the gas acts as a heat transfer fluid, which means heat from a depleted well can be recovered for an adjacent active well, reducing energy costs and emissions. Sixth, vapour recovery of the oil in a gas stream eliminates the problems of sanding and scaling common with liquid extraction and reduces capillary forces, increasing oil recovery.

We are actively working to determine the extent of oil recovery from oil shale by IGE. This is related in part to the solubility of natural gas in oil shale. In addition, experiments are being performed to optimize process flow rates, temperatures, and pressures for the most efficient and economic extraction of oil from oil shale.

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