Crystal River Oil and Gas L.L.C. - "Additional Reserve Recovery Using New Polymer Treatment on High Water Oil Ratio Wells in Alameda Field, Kansas"

The subsurface of the earth consists of layers of rock which were deposited one on top of another over millions of years of geologic time, each with differing rock properties such as thickness, mineral composition, sizes of the particles which were deposited in the layer, compaction and spacing of the deposited particles, etc. All of the properties of a layer combine to determine the amount of fluids (oil and/or gas and/or water) which can be contained or stored in the layer and the ability of those fluids to flow through the layer. Most oil bearing formations (reservoirs) consists of such layers of rock each of which have some amount of void space between the deposited particles (porosity) which allow for the storage of fluids, interconnected by minute openings which allow those fluids to flow from one void space to another (permeability) through the layer. Tighter layers, consisting of finer deposited particles and/or more cement like mineralology, will usually contain less fluids and be more restrictive to fluid flow than layers which consist of larger deposited particles with larger interconnections. As an oil well is produced, both oil and water flow into the well from the layers of rock in the formation and those fluids flow through the more permeable layers much easier than through the less permeable layers. If the permeability of the layers of rock which make up the oil bearing formation vary considerably from low to high permeability, the fluids will flow preferentially (channel) through the higher permeability layers. If those higher permeability layers are in contact with a water source, such as an underlying aquifer, quite often that water will channel into the well, bypassing the lower permeability rock layers where both oil and water exist, and the well will produce mostly or only water. Excess water production accompanied by low oil production will result in the well becoming unprofitable to operate.

Crystal Oil & Gas LLC of Encinitas, California, will apply a chemical flooding process called a polymer treatment to restrict the production of water through a high permeability layer in the Viola-Simpson formation in the Alameda Field in Kingman County, Kansas. Their Alameda Field wells which produce from that formation produce large amounts of water and very little oil, indicating that water from the underlying aquifer is channeling into the well through a high permeability layer. The new polymer treatment will apply a new modified gel, which is comprised two chemicals: a powdered polyacrylamide polymer which will be mixed in water and cross-linked with chromic acetate. This will form a high strength thickened gel which will be pumped under pressure into each well and out into the high permeability layer. Each well will be left idle for a period of 3-4 days to allow the polymer solution to reach maximum gel strength after which the wells will be returned to production.

The thickened gel polymer will serve to block or restrict the flow of water through the high permeability layer, reducing the effective permeability of the layer, and thus reducing the permeability variation or contrast between that layer and the other layers. The more evenly distributed permeability contrast between the layers will allow fluids to flow more evenly through all of the layers, especially those containing oil and water. Restricting the flow of water channeling through the higher permeability layer will increase oil production while reducing water production and will reduce the operating costs associated with producing excess water. Water channeling is a common oil field production problem in many producing areas and successful demonstration of the technology can provide a cost effective solution applicable to a very large number of wells across the country.

Total Project Cost: $ 180,000
DOE Share: $ 90,000
Crystal River Oil and Gas L.L.C.: $ 90,000 (Cost share 50 %)
Length of Project: 12 months.
Point of Contact: Saundra L. Palmer, 169 Saxony Road, Suite 212, Encinitas, CA 92024; Phone: (760) 753-3330, Email: spalmer@crytalsriveroil.com