

Stimulating Arbuckle Production with New Technologies, Large Volume Polymer Gel Treatments and Solid Propellant GasGun Stimulation Treatments

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The application of new technologies in mature producing basins in many instances can result in improving marginal well economics, thus prolonging their life. Improving economics is accomplished by reducing lifting costs, recovering additional reserves or a combination of both. The Arbuckle formation in central Kansas is a good example of revitalizing mature marginal production through technology application.

The Arbuckle is predominately shallow-shelf fracture-controlled karstic dolomite reservoirs with porosity and permeability influenced by basement structural patterns and enhanced by prolonged subaerial exposure. Most of the oil and gas zones are contained in the top 25 feet. Arbuckle reservoirs are typically visualized as an oil column on top of a strong water aquifer. Common production characteristics are high initial water-free oil production rates, large cumulative oil production, followed by water encroachment, resulting in marginal oil producers that produce large volumes of water for a small percentage oil-cut.

Two technologies being successfully applied to Arbuckle production are production-side water shut-off treatments using gelled polymers and GasGunTM solid-propellant stimulation technology. Over 30 operators have applied primarily Marathon's MARCITSM gel technology in over 150 Arbuckle wells since early 2001. These treatments have resulted in substantially reducing water production rates, as well as, increasing oil production in almost every treatment. The GasGunTM is a solid propellant, used to create high pressure gas at a rapid rate, but not as rapidly as an explosion such as nitroglycerine. The process is used as a near-wellbore stimulation technique applied prior to, or in lieu of, acidizing or hydraulic fracturing. Since early 2002 over 50 operators have applied the process in nearly 150 separate wells in 10 different formations, with a large percentage of the applications being in the Arbuckle.