

EXTENDED APPLICATION OF A PROVEN LOW COST WATER MITIGATION TREATMENT

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Secondary and tertiary recovery methods, primarily waterflooding, provide approximately 50% of the oil production in Oklahoma. Much of this secondary production is in the northeast, central and the southern areas of Oklahoma. Secondary and Tertiary Recovery methods also provide a significant amount of production in other mid-continent states, including Texas, Kansas, Arkansas, and Louisiana. These type operations typically handle large volumes of water, but small volumes of oil and gas. Water production also impacts gas well production in many areas. In addition, the Hunton, Bartlesville and Arbuckle/ Ellenberger formations also produce large amounts of water with smaller amounts of oil and gas under primary production.

One of the biggest cost and headaches of operators on many, many wells is the problem to lift, treat, process and re-inject or haul off and dispose of excess produced water. The bottom line problem is that water production is expensive to pump, lift, separate, treat, pump and reinject. Its cost is between \$0.12 to \$1.50 per barrel of produced water. Reducing the watercut in a field and on a well basis, under primary, waterflood or tertiary recovery methods, is important for efficient and economic operations. As the watercut increases, the profit margin on that well decreases reaching a point where the well is no longer economic and the well must be shut-in and plugged. Extending the life of the well or field by mitigating/reducing costly water production, will improve profitability and extend the productive life of these wells/ properties and increase ultimate oil recovery.

A non- polymer water shut off treatment was developed and field tested in Kansas by a major oil company in the 1970s. Continued field testing was performed by a Kansas independent through the 1990s, who improved the treatment process. A total of 12 injection wells and 1 production well have been treated in 10 properties in central Kansas. Average field improved recovery was 17,855 bbls of oil per treatment over 25 months.

The primary benefits of this process are that it is very low cost (about 50% of current gel polymers) for larger treatments, non-toxic, easy to handle/ mix and pump in the field, inorganic thus no problems with microbes, aqueous salt solutions that seek the path of the injected water, stable for a long life with a sufficient shear strength to remain in place for long term water shut-off with no back flow, non-corrosive, inert to most oilfield chemicals, works in either carbonates or sands, can be mixed and buffered with many high- saline / brackish reservoir waters, and will not set up in oil saturated zones.

This project will treat at least 23 wells with this treatment and will report the results. This proposal tests the applicability of extending this very low cost, non-polymer process in other mid-continent injection wells. It also tests the possibility of an improved single stage treatment process. These treatments can then be extended to other geographical areas and into production (oil and gas) wells. Once this water mitigation treatment is further proven to be low cost and reliable in an extended geographical area, the process can be made commercially available to the industry.