

Realtime Downhole-mixed Stimulation Fracturing Process

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ABSTRACT

An enhanced reservoir fracturing process has been developed and field-tested by Realltimezone and the National Energy Technology Laboratory (NETL). Gases, fluids and proppant are mixed downhole to generate a composite fracturing fluid that may be modified in real-time at the reservoir. This fracturing system provides numerous advantages over present industry fracturing practices that include reduced friction pressures and lower pumping treatment pressures. In addition, this “downhole-mixing” process improves well site safety, reduces equipment horsepower requirements, and enables the operator options to alter treatment mixture and proppant concentrations concurrent with the reservoir fracturing stimulation procedure, in real-time.

The first field application of this fracturing process occurred in November 2001 in an abandoned 12,300-foot Morrow gas well in the Sand Point field of Eddy County, New Mexico. The fracturing treatment consisted of methanol gel with 7,000 pounds of bauxite proppant that was pumped down the annulus and blended above the perforations with 40 tons of liquid CO₂, which was pumped down the tubing. A post-fracture tracer log showed that the treatment was placed in the objective reservoir as designed. Initial production from the well was approximately 250 Mcfd.

A common problem in industry during fracturing is high surface treating pressures, which may prevent the pumping of fracturing treatments in their entirety. Typically, surface-mixed fracturing treatments are pumped at pressures that may exceed 10,000 psi, whereby the stimulation treatment is aborted premature, unless extra-strength tubulars are deployed. However, during the first downhole-mixed treatment tubing pressure were observed at less than 6000 psi, and casing pressure less than 5000 psi.

A second field application of the downhole-mixed fracturing system is scheduled for March, 2002, in a Delaware formation stripper oil well. Gelled lease oil, proppant and CO₂ will be mixed downhole in an attempt to improve production from this well. The detailed results from both test wells will be presented for review.