ABSTRACT

Hydraulic fracturing is essentially a fracture-generating technique performed through injecting fluid into formation and keeping the created fractures open using high conductivity material called proppant. The establishment of this high permeability channel increases the productivity of the well.

In lower permeability sand like Well X (9.6 mD), transport of fracturing material is more important to obtain a useful hydraulic fracture. This paper investigates the effect of different fracturing fluids, proppant, proppant size and injection rate on hydraulic fracturing:

- Fracturing fluids: YF130.1HTD and YF125.1HTD,
- Proppants: Brady sand, C-Lite Ceramic, and Acfrac CR,
- Proppant size: 12/20, 16/30 and 20/40
- Injection rate: 10 bpm, 20 bpm and 25 bpm.

The simulation has shown that even though YF130.1HTD, C-Lite 12/18 and 25 bpm produces the smallest fracture size it yields the highest dimensionless fracture conductivity (FCD). Furthermore, high pumping rate and proppant concentration improve the fracture parameters, whereas larger pumping stages tend to produce the reverse. The best design produced a FCD of 11.2 and fracture length of 198.9 ft.

Keywords: Hydraulic Fracturing, Low Permeability, Hydraulic Fracturing Design, Hydraulic Fracturing Optimum.

INTRODUCTION

Productivity of oil/gas wells and field economics depends of reservoir permeability. Wells producing from zones of low original permeability are candidates for hydraulic fracturing. This production enhancing method is accomplished by pumping fluids at high injection pressure exceeding the formation pressure, causing formation fracturing; to keep the new fractures open, a high conductivity material called proppant is used.

Well X produces from a sandstone that has low formation permeability of 10 mD, while reservoir pressure is still relatively high at 712 psi. These factors were key considerations for hydraulic fracturing of Well X.

Planning and designing of hydraulic fracturing depends on reservoir factors. Hydraulic fracturing design includes the selection of fracturing fluid, proppant and pumping rate. Correct design will ensure successful fracturing and increased hydrocarbon production.

Design is assisted by a computer simulator to see the effect of variations of proppant types, fracturing fluid and pumping rate into the formation.

A. Writing Purpose

- Designing of hydraulic fracturing job by selection of fracturing fluids, proppant type, proppant size and pumping rate.
- Understand the effect of hydraulic fracturing design parameters.
- Determine the hydraulic fracturing results such as improved IPR curves.
- Determine the most optimal design and model of hydraulic fracturing to be performed in Well X.

B. Basic Theory of Hydraulic Fracturing

Considerations before hydraulic fracturing are:

a. Hydraulic fracturing purpose is enlarging