

Marathon Oil Company
NDIC Petroleum Research Council
Surface Tiltmeter Study of a Bakken Fracture Stimulation
G-07-020
Final Summary Report

Marathon Oil Company is greatly appreciative of the support given to this project. The purpose of the project was to acquire surface tiltmeter data of a Bakken fracture stimulation so that a map of the affected area could be made and the understanding of the Bakken stimulation improves. More effective and economical Bakken stimulations are expected out of this improved understanding.

The tiltmeter study was performed on the Marathon Klatt 31-14H well in Dunn County, North Dakota. This well was drilled to a measured depth of 18,100' MD with a 7378' horizontal section in the Middle Bakken. Two fracture stimulations were performed on the well because the first stimulation performed on July 23, 2007 did not reach completion. The second stimulation was performed on September 6, 2007. Both stimulations were monitored with the tiltmeter array thus generating two different affected rock maps. Acquiring data on two stimulations was beyond the scope of the grant, but the data is supplied to provide additional understanding of the Bakken's response to fracture stimulation.

The data that was acquired in the two fracture stimulations is considered good for generating the maps that describe pattern with which the Bakken formation was affected. The well was broken down into three sections and the contractor, Pinnacle, Inc. interpreted the amount of the fracture stimulation that went into each section of the well. The interpretation indicates that the entire well length was stimulated in each fracture treatment. The second fracture treatment had a slightly different pattern at the end of the well indicating a change in the stresses on the rock.

The data and subsequent interpretations of the data are being applied to fracture stimulations performed by Marathon. These results confirm that the length of the well is getting affected by the fracture stimulation and that the pattern of the stimulation is more complex than previously understood both in area and time perspectives.