Ting Ma et al., J Pet Environ Biotechnol 2014, 5:4
http://dx.doi.org/10.4172/2157-7463.S1.008

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2nd World Congress on
Petrochemistry and Chemical Engineering
October 27-29, 2014 Embassy Suites Las Vegas, USA

Laboratory study and field trial of enhanced oil recovery by selectively stimulating indigenous microbial community in a low temperature oil reservoir, China

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The performance and dynamics of microbial community were investigated in a low-temperature (20°C) petroleum reservoir, China. Culture-dependent and culture-independent approaches were used to examine the response of microbial community to the nutrients, and the gas production, acid production and displacement of oil in core-flooding test, were studied in laboratory. Then field trials were proceeding with nutrients stimulation (0.04PV) from August 2010 to April 2012. The results of field trial indicated that, among the 7 production wells, 6 wells showed a positive response to the stimulation. Until December 2012, the cumulative incremental oil production over 4000 tons was obtained. Microbial community analysis revealed that the bacteria were mainly clustered within three phyla: Actinobacteria, Proteobacteria and Firmicutes. However, the microbial structure and the stimulated bacteria differed widely in different production wells. In T90 and T89 well, the Alcaligenaceae and Pseudomonadaceae were selectively activated and became dominant consortium, while in T95 well, Pseudomonadaceae decreased from 20.03% to 18.24% and 2%, and no alcaligenaceae were detected. The results showed the feasibility of IMEOR in low temperature reservoir.

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