Biological Oil Stimulation to enhance oil recovery

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World-wide recovery of crude oil typically averages only 30% of original oil in place. This low recovery frequently is caused by lack of natural energy in the reservoir, high interfacial tension between water and oil, and high capillary forces trapping the oil in reservoir rocks. A number of Microbial Enhanced Oil Recovery (MEOR) processes have been proposed which facilitate, increase or extend oil production from natural reservoir. However, most of the approaches have never been shown to be logistically and commercially inappropriate due to problems such as the lack of viability and metabolic predictability of introduced microorganisms, inability to provide nutrients in sufficient quantities and at optimal locations in petroleum reservoir and problems derived from microbial activities.

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Recent studies conducted by Prof. Alan Sheehy and co-workers (University of Canberra/Sunshine Coast University College, Australia) have developed microbial biotechnology to resolve problems such as microorganisms survival in extreme reservoir conditions and sweep inefficiency. The Biological Oil Stimulation (BOS) technology is a process for oil recovery that uses endogenous microorganisms in the petroleum reservoirs with surface active properties at a level sufficient to significantly increase the oil-water surface area and so decrease the interfacial tension of oil and water. The process does not inject foreign microorganisms into a well. This limits the potential for unforeseen adverse consequences such as hydrogen sulfide production. Since BOS microorganisms are endogenous to the reservoir, the effect of BOS technology can take place even in high temperature reservoir. The BOS nutrient added is compatible with the reservoir and their natural microbial population.

Field trials to determine and document the effectiveness of microbial processes were carried out in Alton oilfield (Australia) and Beatrice oilfield (North Sea). The application of BOS in these trials has resulted in a substantial and sustained increase in production compared to control areas on the same reservoirs. The production of hydrogen sulfide also was reduced significantly. BOS offers the potential to improve oil recovery without being capital intensive and with no drawbacks to reservoir management.