

Application of Selected Processes for Improved Oil Recovery Techniques in Kuwait

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Abstract

Many analysts agree that around half the world's original **proven** oil reserves of around 2.2 trillion barrels of conventional oil have now been produced, with about 1 trillion remaining. Although estimates vary considerably, the fact is that producing the second half of the world's ultimate recovery of conventional oil will be more difficult than producing the first half. Oil production growth is forecast to decline within the next few years, as illustrated by Campbell-Laherrere; their predictions suggest that production will soon be unable to keep up with demand. Even in countries with currently high oil production rates, such as Kuwait, it may be difficult to sustain the current level of primary phase production for long because of depleting reservoir energy. In some cases, Improved Oil Recovery (IOR) may be a more cost-effective alternative to producing oil from new reservoirs, as the discovery and exploration of new oil fields has increasingly shifted to harsher conditions (remote, deep, offshore, HPHT...) resulting in increased costs.

Interest and investments in IOR have continued around the world, particularly in countries with aging fields. Various methods and processes have been developed and implemented in Canada and the USA because of rapidly declining oil production rates from their aging conventional oil fields and low average well productivity. In recent years, the continuous increase in oil prices has increased IOR activities to its highest level ever, both in terms of the field applications and research.

Kuwait has one of the largest recoverable oil reserves in the world, in excess of 95.5 billion barrels, and most if not all of its production is still due to primary reservoir energy. Primary and secondary drive mechanisms are expected to result in the recovery of ~45% of the reserve, leaving more than 50 billion barrels unrecoverable. This unrecoverable reserve portion is the target of IOR/EOR techniques.

This paper highlights the need for Kuwait to address and incorporate IOR technology as one of its strategic plans towards its goal of increasing oil production to 4 million barrels per day by the year 2020. In recent years, laboratory facilities and expertise have been developed in PRSC-KISR to investigate the potential of applications of IOR technology to Kuwaiti reservoirs. The aim of this project was to initiate and establish IOR/EOR research activities for application in Kuwait.

This paper presents a summary of ongoing research work, its findings and the challenges Kuwait oil industry faces in growing the world's oil reserves base and in sustaining production over the longer term. The selected options and requirements for implementation of IOR methods for Kuwaiti reservoirs will be presented.

Keywords:

EOR, IOR, recoverable oil reserve, well productivity, primary forces, secondary forces, tertiary, oil production rate, exploration, Kuwait strategic plan.

Speaker's Biography

Reza Oskui is a Research Scientist at KISR, Kuwait with over 27 years of international technical expertise in the area of PVT and reservoir fluid phase behavior, EOS modeling, Core and special core analysis and, multi-phase flow in porous media, enhanced oil recovery, black-oil and compositional reservoir simulation. He holds a Ph.D. in Chemical Engineering , Enhanced Oil Recovery from the University of Manchester, Uk. For several years he worked in Oil Industry in Aberdeen and Texas Managing a number of EOR studies for in EOR, PVT, SCAL and Thermodynamics of Reservoir Fluids, fluid flow in Porous Media . He has author/co-authored a number of technical papers.