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Evaluation of the effects of Petroleum Geomechanical Studies on Enhancing Hydrocarbon Recovery

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***Abstract*—Appropriate utilization of hydrocarbon reserves is a crucial parameter that should be considered to improve lifespan of these valuable sources. Thus, due to the long-life of the Iranian oil reservoirs and reduction in their average production index, it is of utmost importance to keep the production rate high by appropriate reservoir management strategies. These methods are known as enhanced/improved oil recovery (EOR/IOR) approaches. Furthermore, stimulation methods like hydraulic fracturing and acidizing are also used for oil recovery. Regardless of the application of such methods for oil recovery, the geomechanical studies play a key role in optimization of the mentioned methods. Among them, gas injection and hydraulic fracturing, due to their efficiency and more implemented projects, are the most important and effective methods. In this paper, all the EOR and IOR methods, which are applicable in carbonate reservoir are investigated. Moreover, the geomechanical hazards associated with each EOR/IOR method were investigated.**

Keywords: Oil recovery, EOR, IOR, Gas injection, Geomechanical hazards, Caprock, Carbonate reservoir

I. INTRODUCTION

Appropriate utilization of hydrocarbon reserves is a crucial parameter that should be considered to improve lifespan of these valuable sources. The methods used for this purposes are known as secondary, tertiary, and/or advanced recovery methods in the oil industry. Usually, oil recovery process is classified into three stages, initially, secondary, and tertiary oil recovery methods, which are consistent with the reservoir lifetime. The initial recovery of a reservoir is due to the reservoir initial pressure, and the energy to maintain the recovery factor in the secondary phase is supplied by gas/water injection. However, the secondary methods are equivalent to the water flooding. The tertiary methods will be implemented when the secondary approaches are not economic. These methods are mainly constituted from the chemical and thermal methods. Some of the tertiary methods are independent from the initial and secondary methods, and can be applied from the early times of production. Therefore, tertiary methods are usually named as enhanced oil recovery (EOR) or improved oil recovery (IOR) techniques [1,2].

Based on the literature, almost 45 % of the initial oil in place (IOIP) is recoverable by the EOR methods, while only 30 % of the IOIP is recoverable through the initial and secondary oil recovery methods [1-3]. The oil recovery factor obtained