The Evaluation of EOR Methods for a Heavy-oil Reservoir With the AHP Method: The Case of Ferdowsi Reservoir

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Enhanced oil recovery (EOR) strategies for development of heavy oil reservoirs is a very complex process because it involves a great amount of money and parameters and it is necessary to consider the risk associated with geological, economical, and technological uncertainties. On the other hand, the wrong strategies risk time and national capital, especially in Iran. Therefore, it is very important to choose the proper strategy to improve the quality of the results and to accelerate the process. The authors applied the analytic hierarchy process to evaluate five alternatives for EOR of a heavy oil reservoir in one Iran’s heavy oil fields. This method helps reservoir management team to structure the fundamental hierarchy model, which is suited for the Ferdowsi reservoir in Iran’s situation.

Keywords: AHP method, EOR methods, gas injection, heavy reservoir oil, polymer, reservoir management team, thermal and surfactant, water flooding

INTRODUCTION

With today’s increasing demand for energy resources, and when heavy oil reservoirs are one of the most important parts of reservoirs in Iran, heavy oil recovery is under great attention. Effective management of heavy oil reservoirs in Iran with the multiple objectives can be a complex affair and as we know, enhanced oil recovery (EOR) is typically characterized by multiple disciplines that are required to manage them. This disciplines are vary from technical to commercial and in some cases even political. So reservoir management teams have authority for managing these disciplines. The analytical hierarchy process (AHP) has been applied extensively in many diverse cases with complex decision and evaluation alternatives with multiple objectives. In this study, we applied the AHP method to evaluate five strategies for EOR of heavy oil reservoir in Iran. We first elicited the objectives deemed and expected to be achieve in EOR project for heavy oil reservoir by using a questionnaire survey, followed by another questionnaire to elicit judgments from all of the individuals involved in the decision-making process of EOR strategies. In this case reservoir management team investigated the previous studies from the literature; it was expected to provide valuable data and expertise for structuring the decision model on EOR heavy oil selection. Everyone in the team discussed on one of the aspect of reservoir on his skill point of view. EOR methods in general and engineering aspects for heavy oil reservoir have been discussed.

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