A Successful Story of Integrating Geological Characterization, Reservoir Simulation, Assisted History Matching & EOR in Extremely Heterogeneous Reservoir

Dang, Cuong T.[1]; Nguyen, Ngoc [1]; Bae, Wisup [1]; Phung, Thuoc [2] (1) Energy Resources Department, Sejong University, Seoul, Korea, Republic of. (2) Research and Engineering Institute, Vung Tau, Viet Nam.

Near shore oil reservoirs have become significantly depleted, forcing oil companies to explore deep-sea reservoirs with huge investments and the latest technology. However these projects are often very risky. Thus, the optimal solution is to explore shallow sea oil fields before proceeding to deep, high - risk areas.

The Lower Miocene reservoir of White Tiger field is a sedimentary reservoir with high heterogeneity and complex geological characteristics. This reservoir was discovered twenty two years ago. There is an urgent need to study procedures for an increased and maximum oil recovery. A detailed geological understanding of the reservoir along with a reservoir simulation is needed to gain a detailed reservoir description and determine the optimal recovery method for this oil reservoir. These are essential to have successful operations as well as reducing uncertainties and improving the efficiency of oil field management. With a large database collected from initial production stages of over 50 wells, the authors developed an integrated static and dynamic workflow to forecast oil production under several production scenarios for this reservoir. The authors also proposed a successful assisted automatic history matching approach by combining global and local optimization to construct a reliable model for complex reservoirs. Finally, this paper provides a comparative evaluation of these effects of reservoir heterogeneity on a miscible-tertiary MP flood. A series of compositional reservoir model were performed and analyzed by CMGTM simulator. The results showed improved recovery efficiencies for diverse reservoir characteristic encountered in the high heterogeneous reservoir.

In additional, there are many phenomena that can decrease oil recovery efficiency and economic feasibility; however the most important are reduction of permeability and chemical agent losses from adsorption by the reservoir rock. The simulated results indicated that polymer-surfactant adsorption depend so much on concentration, shear rate and injected volume of chemical agent.An optimum range of important factors were determined to reduce the effect of chemical adsorption, it helps minimize mass of chemical loss and improve economic efficiency of MP processing.