

Reservoir Management a Key to Rejuvenation of Mature Fields

Shyamal Bhattacharya and N. S. Rao

Oil and Natural Gas Corporation Ltd., Mumbai, India

shyamalbhattacharya@hotmail.com, bhattacharya_sl@ongc.co.in

Reservoir Management begins with exploration leading to discovery followed by appraisal of the reservoir, development of the field under primary and secondary means, IOR and EOR, and finally to abandoned.

New discoveries of conventional oil fields are declining while demand for oil is estimated to increase approximately 1.5% per year. Development of Mature oil fields has been, and will increasingly be, a focused subject. Most of the world's oil production comes from mature fields, and increasing production from these fields is a major concern for the E & P companies.

Maximizing the hydrocarbon recovery over the field life is the primary objective and the biggest challenge of any organization. Seamless integration of the skill sets from all disciplines and the corresponding data sets can be a complex affair, but is essential for the optimum field development planning.

Boosting oil recovery from mature fields needs bold investment decision and induction of new technologies. A judicious mixture of classical and New technologies have created the opportunity for new life for the mature offshore reservoirs. Mature field development practices can be divided into two major groups, Surface / well engineering and Sub-surface / reservoir engineering. With increasing rig cost conventional perforations have been practically eliminated by exposing larger reservoir section for production / water injection and in the process increasing drainage area and reducing well spacing. This leads ultimately to higher recovery and cost saving through drilling less number of wells. Modern tools and technology have come in handy in achieving this goal and appropriate technology application to our need has paid rich dividends. A multi-disciplinary approach to describe the reservoir and review of production and injection performance led to identification of unexploited area in a matured field.

Detailed Geology & Geophysics work along with reservoir simulation studies were carried out to identify the undrained oil saturation areas. Exploitation of this bypassed oil arrested the field decline and stabilized the production rate.

Horizontal sidetracks offer a very viable technique for rejuvenating production. In brown fields, significant reserves exist as bypassed oil or locked in relatively stacked tight reservoirs. The exploitation of this oil with cost intensive new wells drilled through new platform will hardly satisfy the investment decision. The repositioning through short/medium radius drain-hole completions (SRDH/MRDH) of sub-optimally/high water cut wells that have drained the oil from their drainage area enhances production and maximizes the reserves portfolio. Technology has helped in drilling of ERD wells to far of places from existing platforms in complex subsurface architecture. Ideal drilling fluid technology has been adopted for high drift well stabilization in upper sections and non damaging fluid in reservoir section to minimize formation damage. Well placement technology with online monitoring at base has improved proper well steering through thin sweet zones. In the field of well completion also higher level multilateral technology has been adopted to control individual reservoir performance. Segmented completion was used to control water production.

Present paper will discuss mainly how induction of different technologies has helped in boosting production and also in recovery factors from the Offshore carbonate reservoir producing for last 20 to 30 years.