Overview of Mukhaizna Field, Steam Flood Project, In The Sultanate of Oman

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Mukhaizna field is a giant, 14-18° API heavy oil field developed in Permian-age fluvial sandstones of the Gharif Formation in south Oman and is presently under steamflood. Following a period of cold production development involving the drilling of 75 horizontal producers and production of about 3% of OOIP, a steamflood FDP was developed and is being executed. Based on this FDP, hundreds of horizontal producers and thousands of vertical injectors are planned to be drilled over 15 years. As of December 2009, significant progress has been shown as a result of executing the FDP; e.g., production has ramped-up rapidly and is expected to reach the plateau production target in 2012-13.

The project has aggressive targets, which include maintaining a multiple-year production plateau. To achieve these targets, Occidental Mukhaizna, LLC, the operator of the field, has applied an aggressive project schedule. The overall project development involves: determining the appropriate strategies for enhanced production, identifying the actions necessary to implement these strategies, managing risks, and implementing, interpreting and adapting strategies while maintaining the Excellent safety and environmental standards.

The development patterns in the Mukhaizna field are designed with horizontal producers and vertical injectors. Mukhaizna is the first large-scale commercial steam flood project to use horizontal producers and vertical injectors. The placement of producers is an important aspect of the project and critical for the short and longer term recovery of oil.

As wells heat up and production rates increase, it is necessary to adjust the artificial lift system to accommodate the conditions, because currently no single pumping system is able to cover the entire life cycle volume, temperature, and viscosity range. Three artificial lift systems are in place in Mukhaizna and each has a range of conditions within which it can operate successfully.

Steam is generated using a mix of once-through steam generators (OTSGs) and heat recovery steam generators (HRSGs) and is delivered to injection wells via a steam distribution network fed from the main interconnecting pipelines. Currently, boiler feed water for the steam generators is mainly delivered from a mechanical vapor compression (MVC) water plant together with water from a Reverse Osmosis (RO) plant.

Mukhaizna field surveillance is critical for managing the wells and the reservoir to optimize the recovery of the oil reserves. In most steam flood projects, the cost of generating steam composes about 50% of the total operating expense. Therefore, a reservoir heat-management program should be implemented that includes frequent checks of the reservoir through pattern reviews. The surveillance strategy is to collect any information that adds understanding to the project.