

TENGIZ-CHALLENGES TO THE MANAGEMENT OF A LARGE CARBONATE RESERVOIR: II. RESERVOIR ENGINEERING

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A large carbonate reservoir, high initial reservoir pressure, sour oil production, complex hydrocarbon processing, and unusual transportation methods create a reservoir management challenge that is unique to the Tengiz Field. Many of the challenges facing Tengizchevroil are being met with rig activity, unique hydrocarbon transportation methods, and integrated geophysical, geologic and engineering studies.

Production, processing, and sale of Tengiz oil are a major challenge. At present, a workover rig and drilling rig add production from new completions, and remediate problems associated with casing pressure. Produced hydrocarbons pass through a large gathering systems and processing plant, where H₂S is removed from oil and gas. Finally, the oil is transported to world markets by pipeline, rail, and barge.

Effective reservoir management requires a comprehensive data acquisition program. Wells are surveyed periodically with pressure gauges, flow meters, PVT sampling equipment. Static bottom-hole pressures are recorded regularly to monitor pressure depletion and connectivity. Pressure transient tests and flow meters are recorded to identify damaged wells for acid-fracture stimulation. Extensive fluid sampling has shown that oil properties do not exhibit vertical or horizontal variations within Tengiz Field.

An integral part of Tengiz reservoir management is the reservoir simulation model. The Tengiz full-field reservoir model integrates pressure, flow meter, geologic, and petrophysical data to improve reservoir management decisions. Reservoir simulation provides predictions for competing field development strategies, such as pressure depletion and high-pressure, miscible gas reinjection.