Application of Wireline Test Pressure Data in Managing a Large, Fault Compartmentilized Reservoir, Hibernia Field, Newfoundland

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ABSTRACT

Pressure maintenance is a critical priority and a continuing challenge for reservoir managers stewarding near-term production objectives and long-term reserve depletion of the giant Hibernia Field, offshore Newfoundland. Continuity and production performance in the primary Hibernia Formation reservoir has proven to be excellent, nevertheless, faulting and stratigraphy has isolated reservoir blocks and stratigraphic units in some areas of the field. From the initiation of development drilling in 1997, open-hole pressure data acquired with wireline test tools has provided critical data for directing completion efforts aimed at optimizing producer-injector pairs and for constraining geologic and reservoir models. In addition to confirming pressure communication between producer-injector pairs, the data have identified fault blocks that communicate in some sandstone horizons, but not in others. The data assist in pool designation and production allocation. The absolute pressure data provide fundamental constraints for simulation models and for block management practice. The pressure build-up responses have also been the best pre-completion tool for identifying tar at/near the field OWC in the northern section of the field.

This paper will review specific field examples where absolute pressure and pressure gradients are integrated with open-hole logs, geologic mapping and modeling, production data, and reservoir simulation to enhance Hibernia reservoir block management in both the gas and water injection segments of the resource. In addition, operational issues related to drill-pipe deployment of wireline tools to measured depths exceeding 9 kilometers will be summarized.

Although wireline hydrocarbon sampling has not been done as routinely as pressure data collection, the data from numerous sampling runs has provided key PVT input for field models. Based on field data, an algorithm has been developed to estimate oil-based filtrate contamination from downhole fluid analysis and therefore assist in the operational decision of how much filtrate to pump before sampling.