

**Geological Heterogeneity and Compartmentalization in the Wafra First Eocene Carbonate Reservoir, Partitioned Neutral Zone (PNZ), Saudi Arabia and Kuwait**

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The Paleocene/Eocene age First Eocene dolomite reservoir at Wafra Field in the PNZ (Saudi Arabia and Kuwait) is estimated to hold more than 10 billion barrels of 18-22 API, high sulfur oil. Production is from extensively dolomitized peloidal packstones and grainstones with interbedded evaporates deposited during arid to semi-arid conditions in a gently dipping, shallow, restricted ramp environment. Current estimates suggest that only 5-10% of the original oil in place may be produced during primary development. Consequently, steam flooding is being investigated as an appropriate secondary development option. An initial 1.25-acre, single pattern pilot (SST) and a later, larger scale, 40-acre, 16 pattern pilot (LSP) have been developed to better understand the reservoir response to steamflooding. The detailed data collected for both projects provides a unique opportunity to assess areal and vertical reservoir heterogeneity and compartmentalization in this carbonate reservoir as a function of both initial depositional controls and subsequent diagenetic overprint. The data that has been integrated in this assessment of reservoir heterogeneity includes an extensive suite of static data including well and image logs, six cored wells, micropermeameter data for five cores, and high resolution seismic data. In addition, dynamic data from producing wells, injection wells, and numerous temperature observation wells has also been integrated to better understand reservoir compartmentalization, one of several critical factors to the success of the steamflood project. The geological and stratigraphic assessments of heterogeneity and compartmentalization are supplemented by a history-matched thermal simulation model that suggests that the evaporite-rich zones may have acted only as short term baffles at the but that the "ultimate" vertical barrier to steam migration is coincident with an interval characterized by the abundant exposure surfaces or hardgrounds.