

Petroleum System Observations and Interpretation in the Vicinity of the K2/K2-North, Genghis Khan, and Marco Polo Fields, Green Canyon, Gulf of Mexico

Van S. Mount¹, Arnold Rodriguez¹, Ahmed Chaouche¹, Steven G. Crews¹, Peter Gamwell¹, and Patricia Montoya²

¹Anadarko Petroleum Corp., P. O. Box 1330, Houston, TX 77251

²Jackson School of Geosciences, The University of Texas at Austin, Austin, TX 78712

ABSTRACT

The K2/K2-North (GC562/GC518) and Genghis Khan (GC652) fields lie 8 mi apart in similar positions on the flanks of contracted salt stocks beneath a thick (10-15,000 ft) salt canopy in water depths of approximately 4,000 ft. Both fields produce from middle/lower Miocene reservoirs. The Marco Polo Field (GC608) is located in a mini-basin developed within the salt canopy that overlies the K2/K2-North and Genghis Khan fields and produces from Pliocene-age reservoirs. Detailed geochemical analyses of oils from the K2/K2-North, Genghis Khan, and Marco Polo fields, and from sea-floor seeps along the periphery of the Marco Polo mini-basin, suggest that the oils were sourced from Upper Jurassic source rocks. 3-D structural interpretation of depth migrated 3-D seismic from the K2/K2-North, Genghis Khan, Marco Polo vicinity, and basin modeling suggest a complex migration pathway in which hydrocarbons generated from deep Mesozoic source rocks migrate through 30,000 ft of stratigraphic section through windows in the salt canopy, to the sea floor, charging the subsalt sands at K2 and Genghis Khan, and the supersalt mini-basin sands of Marco Polo along the way. Important components of the proposed migration scenario are: 1) a welded base of the Marco Polo mini-basin which provides a window for hydrocarbons generated subsalt to migrate through the salt canopy into the mini-basin, and 2) a concave downward geometry of the base of the salt canopy in the region underlying the Marco Polo mini-basin, interpreted to have focused migration along the base of the salt canopy into the weld area at the base of the Marco Polo mini-basin.