

AN INTEGRATED SUBSURFACE GEOLOGICAL AND ENGINEERING STUDY OF MEYAL FIELD, POTWAR PLATEAU, PAKISTAN

Syed Tariq Hasany and Umair Saleem

Pakistan Oilfields Limited, POL House, Morgah Rawalpindi, Pakistan

Telephone: 9251-5487598. Fax: 9251-5487598 tariqhasany@hotmail.com and umair_saleem@pakoil.com.pk

Meyal oil field is one of the major oil and gas producing fields in the Potwar Plateau Upper Indus basin, northern Punjab, Pakistan. The field was discovered by Pakistan Oilfields Limited (POL) in 1968 after the seismic data acquisition. The field includes 16 wells and has produced over 36 MMbbl oil and 250 BCF gas from fractured Paleocene and Eocene shallow marine shelf carbonate deposits of the Lockhart-Ranikot and Chorgali-Sakesar formations. Production has also been obtained from siliciclastic Jurassic Datta formation. Oil and gas are produced at depths of 11984 to 14084 ft, with the most prolific reservoirs existing in carbonates of Early Eocene age Chorgali-Sakesar formation. The underlying reservoirs of Paleocene age carbonates of Ranikot-Lockhart formations and sandstone of Jurassic age Datta formation has produced only about 18 percent oil and gas of the total field production.

Meyal-Kharpa surface structure is a east-west trending narrow steep faulted anticline with two major thrusts cutting the structure longitudinally. The subsurface structure does not lie directly underneath the surface structure. Previous exploratory attempts were mainly based on the surface geological mapping. Attock Oil Company (AOC) and Burmah Oil Company (BOC) drilled six unsuccessful wells during 1916 to 1948 in Meyal. Seismic data acquisition during 1965-66 had helped identify the subsurface structure configuration that led to drill Meyal-1 discovery well. At the Eocene level the sub-surface structure is defined as eastwest trending anticline bounded by thrust faults in the north and south. Most of the wells were drilled in the central part of the Eocene structure.

The primary drive mechanism is solution gas. The early field performance indicated the reservoir did not have significant natural pressure support, and pressure maintenance would be required to maintain high productivity and to improve recovery efficiency.

During 1992-93 gas and water injection program for pressure maintenance was initiated in Eocene section after twenty four years of field production. A positive effect of injection program was observed and declining reservoir pressure was maintained at around 2020 Psi. An early gas and water breakthrough was observed than anticipated. The injection was ceased in 1999 after producing approximately 3.5 million barrels additional oil which would not have been possible to produce under straight depletion mechanism. An additional recovery of 100 BCF gas and 1.2 MMBO could be recovered in this phase which enhanced the ultimate recovery to 39% and 84% for oil and gas respectively. If the field was discovered today, a lot would be changed for reservoir management and injection program. An earlier EOR program initiation would have been proven more useful.