

## **Finding New Oil Accumulation Between Two Giant Oil Fields of North Kuwait: From Evaluation to Development**

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### **ABSTRACT**

Raudhatain and Sabiriyah fields are the two giant oil fields of North Kuwait. These are domal anticlines with four way structural closure. Both the fields have stacked reservoirs of Jurassic and Cretaceous age and have their independent development plans. The area lying between the two structures, called saddle area, was over looked as this was thought to be the place below spill points of the reservoirs or have poorer rock quality to hold commercial oil.

An integrated study of the area brought commercial oil accumulation leading to a development plan. The 3D seismic data was relooked and a new calibrated velocity model was worked out. The resultant depth structure showed interesting structural closures and few low-lying areas. Considerable uncertainty existed over the fluid contacts in flank of the fields. A detailed analysis Oil water contacts in terms of oil down to and water up to brought out the minimum and maximum level of fluids in the area. Coupled with structure, areas were identified to be above the shallowest oil water contact which hold significant volume of oil.

Some of the reservoirs such as Upper and Lower Burgan Massive Sands were observed to have swept oil zone in the saddle area. Stratigraphic traps are inferred in other more argillaceous layers of Lower Burgan, Zubair and Ratawi. Main targets were found to be the Mauddud carbonate reservoir with oil column thickness varying from 10 to 40 ft.

Significant uncertainty was anticipated on oil quality. The chemical analysis of oil indicated variation in oil quality from crest to flank in Mauddud and Upper Burgan reservoirs: heavier and high viscous oil being towards the flank. The saddle area is heavily tilted towards Sabiriyah structure and, accordingly, fluid property variation was analyzed in detail. The western part of the structure was gentler and observed to have lighter oil compared to eastern flank. This was favorable for the Saddle area development.

Uncertainty over the structure, rock properties, and stratigraphy and fluid properties have been quantified and inplace oil in different scenarios have been estimated. Being commercially viable, the area was taken up for development with three producers and two injectors in first phase. Post model drilling results from 2 wells validates the study. The structural position, fluid contacts and reservoir quality are very close to prediction. The first well produced at significant rate on testing. Availability of drilling information from remaining wells and currently acquired high resolution 3D seismic would help in opening up more areas for exploitation.