Abstract Title: Tapping Shale Resources: An Emerging Exploration Concept in Kuwait

Abstract: The state of Kuwait is endowed with prolific hydrocarbon resources occurring over a wide range of stratigraphic spectrum. While conventional exploration for oil and gas in the country has kept pace with the global efforts, unconventional resources, particularly shale gas and oil are yet to find a place in the country’s energy basket. The paper details the shale resource potential of Kuwait and unconventional workflows to identify sweet spots for future exploration. Sixteen possible shale Resource plays ranging in age from Silurian Qusaiba Shale to Albian Burgan Shale exist in Kuwait. Prospectivity analysis based on total organic carbon, net thickness, maturity, depositional environments & facies, mineralogy and pore pressure data has led to prioritization of three plays for shale resource exploration. These plays are the Basal Makhul and Lower Najmah shale resource systems and Kra Almaru shale-tight gas hybrid system. Makhul Shale oil play is characterized by an average Total Organic Carbon (TOC) of 5% and is in Middle to Late Maturity oil window in western Kuwait. Najmah Shale gas and oil play is characterized by average TOC of 13% and it is Late Maturity, oil-condensate window. Average TOC for Kra Almaru Shale gas and condensate play is 2% and it is in wet-dry gas window in western Kuwait. Western part of onshore Kuwait is identified as potential thrust area. Key exploration challenges include paucity of data for these unconventional reservoirs, seismic imaging capability, deeper reservoir depths, drilling of customized horizontal multilateral wells, hydro-frack stimulation of calcareous shales, testing and well completions. Establishing the shale gas potentiality by collecting focused exploration data, evolving area- and play-specific workflows, acquisition of high resolution seismic data, fracture modeling for identification of naturally fractured fairways, in-situ stress mapping to determine critically-stressed fractured areas are vital for mapping of sweet spots, establishment of the threshold reservoir quality and delineation of the productive pay intervals. Additionally use of state of the art technology in drilling of horizontal multilateral wells, testing and well completions are required for commercial exploitation. In brief technology intensive multi-
disciplinary work flows are crucial for commercial production of these unconventional reservoirs.

No full paper available