

## **Shale Gas Opportunities in Saudi Arabia: Initial Screening of the Mazalij Area, Eastern Province**

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The Silurian Qusaiba Member of the Qalibah Formation is emerging as a promising target for shale gas resources in the Kingdom of Saudi Arabia. Organic-rich shales of the Lower Qusaiba constitute the main source rock for Saudi Arabia's prolific Paleozoic petroleum system. Exploration efforts to date have focused on conventional traps in which the main clastic reservoirs are units such as the Unayzah, Jauf, Sarah, and Qasim formations. Recently, however, the Qusaiba shale is receiving attention as a potential shale gas play in the Kingdom.

The Qusaiba is primarily composed of organic-rich mudstones with minor interstratified siltstones and sandstones at millimeter to decimeter scale. Interbedded sandstones and siltstones, which typically exhibit ripple lamination, normal gradation, and varying degrees of bioturbation, are interpreted as sediment gravity flow deposits. The Qusaiba is typically characterized by a series of regressive successions arranged in a progradational stacking pattern that starts at the bottom with the so-called "hot shale" and grades upward into increasingly proximal parasequences. The Qusaiba is widely distributed across Saudi Arabia, with large areas currently in the gas generation window. It constitutes a major gas exploration opportunity.

In the Mazalij area in eastern Saudi Arabia, vitrinite reflectance values ranging from 1.4 to 1.6 place the Qusaiba in the gas generation window. This section, which exceeds 1000 feet in thickness, thins and onlaps onto the pre-Qusaiba unconformity towards the north. The basal hot shale, typically defined by a 150-API gamma-ray cutoff, is up to 70 feet thick. Thickness of the Qusaiba section exceeding an overall residual TOC value of 2% varies from 100 to 800 feet. These organic-rich intervals are considered to be the potential target for shale gas. High resistivities in the hot shale and other parts of the Qusaiba section typically correspond to high gas readings where penetrated by wells. Initial screening of the Mazalij opportunity suggests a multi-TCF potential for this area alone.