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## Insight on the New Exploration Potential in the Northern Ghawar Environs, Saudi Arabia: New Support from Technology and Structural Analysis

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**Mohammed A. Al-Duhailan**, Area Exploration, Saudi Aramco, Po Box 1410, Dhahran 31311, Saudi Arabia, phone: 00966-504834035, [mohammed.duhailan@aramco.com](mailto:mohammed.duhailan@aramco.com) and Mesbah Khalil, Area Exploration, Saudi Aramco, Saudi Arabia.

After 70 years of successful exploration and production from the Eastern Province of Saudi Arabia, new technologies supported by structural analysis led to identifying un-drilled gas potential areas at the environs of the Ghawar field.

The objective of this study is to investigate the remaining Paleozoic gas potential in the study area. Integrating new 3D seismic data with potential fields data provided reliable structural maps at the Devonian sandstone (Jauf fm) and the Permian carbonates (Khuff fm).

The study revealed the existence of un-drilled fault closure where Coherency Program (detect), dip and curvature seismic attributes indicate push-up fault related anticline. East-west compression during the Upper Cretaceous occurred at a major north-south trending fault located east from Shedgum anticline, which caused the pushing up of this fault closure. The northern and southern terminations of this closure are controlled by two left-stepping east-northeast striking faults that act as strain partitioning elements.

Seismic acoustic impedance inversion at the Khuff reservoir indicates the development of carbonate reservoir. On the other hand, analysis of the seismic amplitude map indicates the occurrence of potential hydrocarbon.

Mature Early Silurian Lower Qusaiba hot shale source rock is predicted to charge the closure.

Promising Paleozoic gas exploration opportunities are highly predicted along the eastern flank of the Ghawar field where the study area lies. Particularly, the hydrodynamic analysis indicates that the east-west to east-northeast faults constitute effective lateral sealing membrane between different compartments along that flank.

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