The Permian–Triassic Khuff Formation is an important hydrocarbon exploratory target in view of its proven potential in countries adjoining Kuwait. The formation, divisible into A, B, C and D units, is comprised of dolomite and limestone (mudstone-wackestone with rare packstone and grainstone) with subordinate shale and anhydrite. The formation is interpreted to be deposited in sub-tidal to supra-tidal environment with development of shoal and lagoon under hyper-saline conditions in restricted setting. Diagenetic history is complex and sediments have undergone multiple diagenetic events that include micritization, dolomitization, anhydrite cementation, leaching, stylolitization, fracturing and fracture filling. In the north, the formation is over dolomitized and can be categorized as tight non-conventional reservoir. In the west the formation has shown development of grainstone in Khuff C with significant porosity preservation. Here, the formation has shown hydrocarbon potential on logs but the testing results did not match the conventional log interpretation. This has adversely impacted the hydrocarbon assessment of this formation. To analyze the inconsistency, petrophysical and testing data were re-evaluated.

A clear-cut workflow involving synergistic interpretation of different datasets has been evolved and lithological and flow properties and saturation models are prepared. The re-evaluation has been carried out integrating all the relevant data particularly well logs, core reports, well testing, mud log and drilling reports. The a, m, and n parameters generated afresh from the core plugs along with thin section petrography and the sigma measurements from the Accelerator Porosity Sonde (APS) were used to refine the model. Also SPAN analysis showed that the perforation reached to the virgin zones of the formation. The productivity index analysis suggests that the flow capacity is in agreement with the flow rates indicating that the test-produced water is coming from the formation itself. It is recommended to run LWD in exploratory wells, introduce Dielectric Scanner for continuous measurement of cementation factor, carry out core analysis at formation net confining stress and temperature and longer test durations to enable flow stabilization and removal of formation skin damage.