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Muhammad Wijdan Ismail Ibrahim¹ (1) Target Exploration, London, United Kingdom

Missed, Bypassed and Under-Estimated Hydrocarbon Traps: Analysis of Basic Exploration Records Reveals "Undiscovery Wells" in Northern Arabia

Cases of early "dry-holes" or "dry" anomalies becoming commercial hydrocarbon producers at later dates are known in many hydrocarbon-producing regions. Known examples of wells classified as 'dry-holes' then proved to be commercial hydrocarbon producers at later date are probably few of many "un-discovery wells" in the Middle East.

Hydrocarbon exploration in the Middle East began essentially as an exploration for giant oil fields, therefore, several exploration wells have been suspended, plugged and abandoned and declared "dry" under giant-prone early exploration strategies, and obsolete logistics, drilling technology, production methods, economical reserves limits, risk evaluation and/or political climate.

Geothermal gradient anomalies associated with hydrocarbon traps have been recognised since the early days of modern hydrocarbon exploration. This study of Northern Arabia (the area between Long. 39° E to 48° E and Lat. 29° N to 37° N) attempted to: (1) map the geothermal gradients, (2) delineate geothermal gradient fairways and anomalies of oil and gas traps, and (3) locate and review similar anomalies as they may be indicative of missed, by-passed, under-rated, or un-drilled hydrocarbon traps.

By Analysing and mapping the Compensated Geothermal Gradients and associated Extrapolated Surface Temperature Intercepts (CGG-ESTI) of 103 wells in Northern Arabia, this study (1) identified and delineated the regional geothermal fairways of oil and gas traps, (2) identified and isolated areas of dry and heavy oil closures; (3) recognised 30 proven geothermal gradient anomalies of hydrocarbon entrapment, and (4) used their model to identify and delineate 14 potential, probable and possible geothermal gradient anomalies of hydrocarbon entrapments.