

Geochemical Exploration in North Africa: Recent Successes from Algeria, Tunisia, and Egypt

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ABSTRACT

Geochemical exploration for petroleum is the search for chemically identifiable surface or near-surface occurrences of hydrocarbons, or hydrocarbon-induced changes, as clues to the presence of an active petroleum system and/or to the location of possible oil and gas accumulations. This search extends through a range of observations from clearly visible oil and gas seepage at one extreme, to the identification of minute traces of hydrocarbons determinable only by sophisticated analytical methods at the other.

Results of microbial and soil gas surveys in the deserts of North Africa establish the value of hydrocarbon microseepage data for high-grading basins, plays, and prospects. These surveys were conducted by Geo-Microbial Technologies in the Ghadames basin in Algeria and Tunisia, and in the Western Desert of Egypt. The Algeria survey documented hydrocarbon microseepage to the surface in spite of the presence of 200-400 meters of halite above Triassic reservoirs, and the composition of the migrating hydrocarbons correctly predicted the composition of the reservoired hydrocarbons. Results from the Algeria, Tunisia, and Egypt surveys successfully discriminated prospects on basis of hydrocarbon charge.

Geochemical exploration surveys such as these require close sample spacing and are most effective when results are integrated with subsurface data. The need for such integration cannot be overemphasized. Seismic data will remain unsurpassed for imaging trap and reservoir geometry, but only detailed geochemical surveys can reliably image hydrocarbon microseepage from those same reservoirs. High-resolution microseepage surveys offer a flexible, environmentally friendly, low risk and low cost technology that complements traditional geologic and seismic methods. Properly integrated with other exploration data, their use has led to discovery of new reserves and drilling of fewer dry or marginal wells.