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Geochemical Exploration in Northern South America: Recent Successes from Venezuela and Colombia

Detailed geochemical and research studies document that hydrocarbon microseepage from petroleum accumulations is common, is predominantly vertical (with obvious exceptions in some geologic settings), and is dynamic (responds quickly to changes in reservoir conditions). Since microseepage is nearly vertical, the extent of an anomaly at the surface can approximate the productive limits of the reservoir at depth. Furthermore, the detailed pattern of seepage can reflect reservoir heterogeneity, discriminate between charged and uncharged compartments, and identify areas of bypassed pay.

Results of recent microbial and soil gas surveys in Venezuela and Colombia establish the value of hydrocarbon microseepage data for high-grading prospects and aiding field development projects. These surveys were conducted by Geo-Microbial Technologies in the Eastern Venezuela basin, the Maracaibo-Catatumba basin in western Venezuela, the Guajira and Cesar Rancheria basins in northern Colombia, and the Middle Magdalena Valley basin in central Colombia. The Guajira survey documented previously unrecognized oil potential in a basin known only for its dry gas. Results from eastern Venezuela and Cesar Rancheria successfully discriminated prospects on basis of probably hydrocarbon charge. Surveys over two old oil fields in western Venezuela and in the Middle Magdalena Valley identified bypassed pay and several new drilling opportunities.

High-resolution microseepage surveys offer a flexible, low-risk and low-cost environmentally friendly technology that complements traditional geologic and seismic data. Properly integrated with other exploration data, their use has led to discovery of new reserves and drilling of fewer dry or marginal wells.