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A Case for Direct Thermogenic Hydrocarbon Detection and Exploration Risk Reduction

Key technological milestones in the past decade have led to a new acceptance of surface geochemical techniques in oil and gas exploration. Advances in soil gas sampler design, chemical analytical methods, and geochemical interpretation techniques, have demonstrated conclusively, that careful integration of geophysical, geological, and geochemical data, increase exploration success rates significantly. Employing innovative surface geochemical techniques allow the explorationist to detect active hydrocarbon micro-seepage directly, differentiate phase separation, and delineate the type, source and extent of the hydrocarbon emanation.

Sorbent-based, passive, time-integrated soil gas sampling provides a more sensitive and accurate method for direct detection of hydrocarbons migrating vertically from reservoir sources. By coupling this soil gas sampling approach with advanced chemical analysis techniques, direct detection and differentiation of organic compounds (up through C20) present in soil gas, is achieved. This data, rich with numerous organic compounds, lends itself to higher-level geochemical modeling than could be accomplished previously. The geochemical modeling can differentiate hydrocarbons indicative of deep reserves from those originating from other sources such as shallow pollution, vegetation, or source rock.

Passive, sorbent-based soil gas sampling techniques have a proven track record. Data from 196 wells indicated that wells drilled into a geochemical positive anomaly revealed the presence of hydrocarbons 92% of the time, while wells drilled into negative anomalies were dry holes 95% of the time. This presentation demonstrates the successful integration of traditional seismic data with surface geochemical data from an actual exploration program.