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Surface Expressions of Reservoir Hydrocarbons

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Despite significant development in theory and practice, the migration of reservoir hydrocarbons to the surface and the evaluation of surface hydrocarbon manifestations are still not well understood. Successful applications have been reported, with surface geochemical studies assisting in the discovery of reservoir-quality petroleum, indicating the potential of such methods. Even so, important questions are attached to the use of such data: How are thermogenic compounds expressed at the surface? What is the proper interpretation of such expressions? These questions are addressed in part with existing surface geochemical data.

Examination of control set geochemical samples can assist in the understanding of at least certain portions of the geochemical system. Thermogenic compound expression has been studied by comparison of samples taken from several petroleum production areas, with samples taken from known background (dry) areas. Increased levels of such saturated aliphatic compounds as pentadecane (C_{15}) through octadecane (C_{18}) were noted for samples located over reservoirs, with respect to samples located over downdip wet areas. Petroleum emanation signatures are noted near vertical well bore sites, and also over formation entry points of deviated wells.

The potential for stratigraphic control of surface signal was evaluated with samples from different basin settings. Petroleum emanations are observed through stratigraphic sequences presumably not conducive to extensive fracturing (massive anhydrite sequences). By inference, hydrocarbon seepage may be expected to occur readily in regimes with more favorable conditions for petroleum migration (such as thick sand sequences). Patterns and intensities of hydrocarbon compounds may however show considerable regional variance.

Theories of hydrocarbon microseepage need to account for the robust nature of vertical migration, even in areas not expected to include significant vertical fracturing of strata through to the surface. Such theories also should reflect the nearly vertical nature of this microseepage.