

Surface Geochemical and Aeromagnetism Surveys Integrated with Subsurface Geology and Seismic Data to Find Conventional Reservoirs in the Mid-Continent United States.

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ABSTRACT

Prior to shooting seismic but after areas have been defined by subsurface well data or no data for petroleum exploration, aeromagnetism and surface geochemistry provide a way to high grade exploration and target definition. Defining basement features and faulting by aeromagnetism allows the identification in a general sense of the areas favorable to formation of structural closures and potentially stratigraphic traps. This is followed by surface geochemistry to define further where the accumulation(s) may actually be present. The surface geochemical methods specifically used were micro- magnetism, iodine and soil gas. The concept of surface geochemistry as a petroleum exploration tool is based on the concept of vertical migration of hydrocarbons from the reservoir to the near surface. Petroleum migrates from an accumulation along micro-pores, micro-fractures and micro-unconformities. The petroleum compounds react with atmosphere and soil substrate to create various compounds. The light hydrocarbons tend to escape to the atmosphere or be trapped temporarily as inclusions within carbonate minerals. The heavier hydrocarbons are generally broken down by plant and bacterial action. The presence or absence of surface geochemical anomalies over a specific target area allows the explorationist to either proceed forward to define a prospect further with other methods or abandon it. Surface geochemistry and aeromagnetism has proven to be an excellent screening tool for potential target areas. Presented here will be surface geochemical and aeromagnetic surveys integrated with seismic and subsurface data from the Denver, Michigan, Forest City and Williston basins in the central part of the USA.