AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Victor T. Jones[1], Dennis D. Coleman[2], David F. Becker[3], Thomas H. Anderson[4], Paul A. Witherspoon[5], Gary A. Robbins[6] (1) Exploration Technologies, Inc, Houston, TX (2) Isotech Laboratories, Inc, Champaign, IL (3) Geophysical Consultant, Houston, TX (4) Department of Geology and Planetary Science, University of Pittsburgh, Pittsburgh, PA (5) University of California, Berkeley, CA (6) University of Connecticut, Storrs, CT

Surface and Near-Subsurface Hydrocarbon Migration Patterns Associated with a Macroseep

Gas bubbles rising from an adjacent creek that crosses a planned development area initially indicated the presence of methane gas emissions. A natural gas storage reservoir lies within 3000 feet of the area where the methane seeps occur, causing concern regarding a possible linkage. A soil gas survey, consisting of over 800 sites placed on a 100-foot grid spacing defined an area of anomalous seepage. Soil gases from a four-foot depth were collected and analyzed for methane through butanes. Selected soil gas samples were also analyzed for carbon and hydrogen isotopes. The soil gas seepage was confirmed by installing 42 50-foot deep monitor wells in an underlying gravel aquifer. An excellent correlation between both composition and isotopic ratios was found between the soil gas seeps at four feet and the dissolved and free gases in the gravel aquifer at 50 feet. Direct comparison of chemical and isotopic data from the gas storage wells indicated that the surface gas seeps and 50-foot gravel aquifer gases are not related to the gases injected into the adjacent gas storage field, however, comparison of the shallow gases to production gases from a field about 4.5 miles to the southeast was found to provide a good fit. This field produced over 23 BCF of dry gas from shallow reservoirs in the Pliocene Formation. A non-productive well drilled adjacent to the seepage anomaly blew out in 1930 while drilling at 1830 feet in the Pliocene Formation and initially flowed at the rate of 5 MMcfpd. A 3-D seismic study conducted to evaluate the shallow gas seepage indicates the presence of disrupted strata, possibly associated with a fractured slump block that appears to provide vertical pathways for the observed macroseeps. This combination of geochemical and seismic data has defined an excellent shallow gas prospect.