APGE EXPLORES THE OVERTHRUST BELT
Rice University, January 21, 1991

The January meeting of the Houston chapter of the Association of Petroleum Geochemical Explorationists (APGE) will be highlighted by a presentation by Dr. Matt Matthews entitled "**A Regional Microseep Survey of the Wyoming-Utah Overthrust Belt.**" This soil hydrocarbon survey clearly identified geochemical anomalies associated with Whitney Canyon, Ryckman Creek and other area oil fields. The technique used is one of the few tools that enables us to look directly at hydrocarbons and, as such, provides the explorationist unique information to help reduce risk in frontier areas. Matt joined Texaco Exploration and Production Research in 1984 as a Senior Research Consultant, and has been involved with predictive stratigraphy, dynamic modeling, fractures, and unconventional exploration techniques. He received his B.S. from Allegheny College, MS from West Virginia U., and Ph.D. from Northwestern. He has been co-director of the industry side of the Geosat-NASA Test Case Program and director of the Oil and Gas portion of that study.

A REGIONAL MICROSEEP SURVEY OF THE WYOMING-UTAH OVERTHRUST BELT

A regional microseep survey of 1280 square miles of the Wyoming-Utah Overthrust Belt clearly identified anomalously high surface occurrences of light hydrocarbons associated with Clear Creek, Ryckman Creek, and Whitney Canyon-Carter Creek fields. The ethane-to-propane ratios of these anomalies are very similar to those of the hydrocarbons produced from the associated fields.

Ethane, propane and butane were well correlated on a per-sample basis, suggesting that they came from a single subsurface source (Lower Cretaceous). The poor correlation of methane with the other light hydrocarbons suggests that multiple sources of methane exist (Upper Cretaceous, higher maturity Lower Cretaceous, Phosphoria, and perhaps recent biogenic activity).

Anomalies were identified by calculating the percentage of samples, within a moving window, that are above the median for the complete survey and stacking the percentages for each light hydrocarbon to create a composite map. The technique smooths the spatial information and transforms the data from an unknown distribution into a binomial distribution. This permits statistical tests of significance which have been substantiated with Monte-Carlo simulations. The anomalies are both stronger and spatially more extensive than would be expected on a random basis.

This use of microseep data emphasizes the identification of broad areas of interest, rather than the direct identification of drilling locations often associated with surface geochemical surveys. These broad surface patterns must then be combined with available subsurface data to develop play possibilities.

This technique is one of the few tools that looks directly at hydrocarbons. It provides the explorationist unique information to help reduce risk in frontier areas. An example of this occurs in the Crawford Thrust. Conventional wisdom is that this thrust is gas-prone, arising either from thermally supermature Lower Cretaceous source rocks or biogenically produced in the Tertiary at the surface. However, anomalous concentrations of ethane and propane in the surface microseep data suggests the presence of an unsuspected source of wetter hydrocarbon in the subsurface.