Monday, January 28, 2002

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

Make your reservations now by calling 713-463-8920 **(5-0-4)** or by e-mail to Joan@hgs.org (include your name, meeting you are attending, phone number, and membership ID#).

North American Explorationists Dinner Meeting

by Jeffrey J. Dravis
Dravis Geological Services
Houston, Texas

The Ellenburger of West Texas and the Devonian Keg River of Western Canada:

Case Studies where Deep Burial Dissolution Controls Dolostone Reservoir Development

Case studies of Devonian dolostone reservoirs from Western Canada (Keg River, Swan Hills, Leduc, Blueridge, Wabamun) establish diagenetic/porosity relationships that bear on the timing of porosity evolution in Ellenburger dolostones from West Texas.

Deep-burial dissolution controls reservoir quality in many of these deeper Devonian reservoirs. Diffused plane-polarized light and fluorescence microscopy allow recognition of relict textures and diagenetic fabrics in these dolostones that were previously invisible with standard petrographic light. These enhanced petrographic techniques prove that replacive dolomites, and their subsequent dissolution, are deep burial in origin. Further, what often appears to be vuggy or intercrystalline porosity is, in fact, fabric-selective moldic porosity, demonstrating that reservoir quality in many of these dolostones is facies-controlled.

Detailed core studies of Keg River dolostone pools from the Rainbow Sub-Basin of Northwestern Alberta consistently reveal that dolomites replaced carbonate grains already sutured by pressure solution. Dolomitization, therefore, occurred coincident with, or after, incipient pressure solution. Since these grains were leached, their dissolution also occurred during burial. Deep-burial secondary porosity development is further evidenced by dissolution of dolomitized grains and matrix along stylolites, or along fractures that cut stylolites. Stylolites and fractures often terminate in secondary pores, implying that they were conduits for diagenetic fluids. Dissolution of late-forming saddle and other dolomite cements provide further evidence of burial dissolution. Brecciation, which is not uncommon in this sequence, is simply a grander expression of burial dissolution. Breccias formed under deep-burial conditions consisted of clasts containing stylolites that were rotated at different angles to each other and the horizon. Keg River diagenesis and porosity evolution, as well as pool entrapment, was controlled by reactivated basement faults related to a nearby master wrench fault, the Hay River Fault.

Ellenburger dolostone reservoirs on the Eastern Shelf of Texas, such as Suggs and Withers fields, underwent deep-burial replacement dolomitization and subsequent dissolution. Petrographic criteria noted above for the Keg River in Canada are replicated in cores and thin sections of these West Texas dolostones. These timing relationships, along with other diagenetic fabrics, imply that faults and fractures related to a master wrench fault, the Ft. Chadbourne, were the conduits for diagenetic fluids that promoted deep-burial dissolution of dolomites and secondary porosity development. Unconformity-related diagenesis was not responsible for reservoir quality in these dolostones.

Case studies of dolostone reservoirs from Canada and the Ellenburger demonstrate that the timing of dolostone reservoir development is more accurately resolved when enhanced petrographic techniques are rigorously applied. Failure to understand the timing of secondary porosity development in any carbonate reservoir severely limits one's ability to exploit it.

Biographical Sketch

JEFF DRAVIS is a carbonate geologist and owner of Dravis Geological Services, which conducts exploration and reservoir development projects in the U.S., Canada and overseas. A number of these projects involved studies of structurally altered sequences, explaining Jeff's interest in the influence of wrench faulting on carbonate diagenesis and porosity evolution. Jeff is also president of Dravis Interests, Inc., through which he conducts applied training seminars for industry. Since 1987, Jeff has taught nearly 100 in-house and field carbonate seminars. Jeff received his BS (geology) from St. Mary's University in San Antonio, his MS (marine geology) from the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences, and PhD (geology) from Rice University, Houston. He has been an adjunct professor at Rice University and the University of Miami (Florida) since 1987. □