Tuesday, January 20, 2009

Crowne Plaza Hotel - Greenspoint (former Sofitel)
425 North Sam Houston Pkwy E

Social 11:15 AM, Luncheon 11:30 AM

Cost: $31 pre-registered members; $35 for non-members & walk-ups; Emeritus/Life/Honorary: $14; Students: FREE

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

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Reservoir Quality and Pore-Type Evolution in Tertiary Wilcox Sandstones of the Northern Texas Gulf of Mexico Coast During Burial

As the search for gas in the Gulf of Mexico focuses increasingly on reservoirs at depths more than 4.5 kilometers (14,750 feet), the most critical yet unknown risk factor is reservoir quality. Petrographic analysis of Wilcox sandstones on the upper Texas coastal plain provides insight into the evolution of porosity and permeability during burial that is useful in the exploration for deep reservoirs both onshore and in the Gulf of Mexico.

Average permeability decreases from 976 millidarcies at a depth of 1,300 feet to 0.2 millidarcies at a depth of 14,750 feet.

Wilcox sandstones are mainly lithic arkoses and feldspathic litharenites that have an average composition of Q59F22R19 (quartz-feldspar-rock fragment). Provenance did not change significantly during Wilcox deposition in this area, nor does average sandstone composition vary among lower, middle, and upper Wilcox sandstones. However, lowstand slope-fan deposits contain more rock fragments (mainly metamorphic and volcanic) than do deposits from highstand or transgressive systems tracts. Wilcox sandstones deposited in deepwater environments in the Gulf of Mexico are likely to contain more rock fragments than do their linked highstand equivalents.

With increasing burial depth, total volume of porosity decreases and the proportion of different pore types changes. Average core-analysis porosity declines from 35% at a depth of 0.4 kilometers (1,300 feet) to 10.7% at a depth of 4.5 kilometers (14,750 feet). Pores types change from a mix of primary, secondary, and micropores ($P_{35}S_{38}M_{27}$) at shallower depths to predominantly secondary pores and micropores in deeper sandstones ($P_7S_{35}M_{58}$). At a burial depth of 3.5 kilometers (11,500 feet), most primary pores have been lost by physical compaction or occluded by quartz cementation, and secondary pores generated by feldspar dissolution compose the majority of macropores. Average permeability decreases from 976 millidarcies at a depth of 0.4 kilometers (1,300 feet) to 0.2 millidarcies at a depth of 4.5 kilometers (14,750 feet). Because most deep sandstones are dominated by secondary pores and micropores, the porosity-permeability transforms for deep and ultradeep sandstones will have lower slopes than those for shallower sandstones. ■

Biographical Sketch

Shirley P. Dutton is a Senior Research Scientist at the Bureau of Economic Geology, The University of Texas at Austin. Her technical expertise is in clastic sedimentology and reservoir characterization, and her main area of research is sandstone diagenesis. She received a bachelor's degree from the University of Rochester and Masters and PhD degrees from The University of Texas at Austin, all in geology. Dr. Dutton has been with the Bureau since 1977. She is currently the principal investigator of the Bureau's Deep Shelf Gas project which is focused on structural/stratigraphic architecture and reservoir quality of deep Gulf of Mexico reservoirs.