MEETINGS

HGS/GSH JOINT DINNER MEETING—MARCH 8, 1993

Social Period, 5:30 p.m.
Dinner and Meeting, 6:30 p.m.
Post Oak Doubletree Inn

DAN M. WORRALL—Biographical Sketch

Dan M. Worrall is Chief Geologist for the Onshore Exploration Division of Shell Western E and P, Inc., and has worked for Shell since 1978. Previous assignments with Shell have included District Exploration Manager of the Deepwater Division in New Orleans, Manager of Geology Research, and a variety of assignments in exploration and research, principally involving structural geology of the Gulf of Mexico Basin and Alaska. He graduated from Rice University in 1972 with a B.A. in geology, and earned masters degrees from Northwestern University and the University of Wyoming before receiving a Ph.D. in geology from the University of Texas at Austin.

SEISMIC AND EXPLORATORY DRILLING EVALUATION OF STRIKE-SLIP BASINS OF THE SOUTHERN BERING SHELF, ALASKA AND THE RUSSIAN FAR EAST

In the early and middle 1980's, the basins of the southern Bering Shelf were covered by dense grids of high quality marine seismic data in preparation for U.S. Federal lease sales. These data cover large portions of a submarine wrench fault system that stretches some 1400 km from the Alaska Peninsula to the Russian Far East. Associated exploratory activity included the drilling of 20 wells in the U.S. sector of the Shelf. Although the economic results were disappointing, these data present the rare opportunity of detailed imaging of the deep structural geometry of strike-slip basins, and show the extreme structural and stratigraphic sensitivity of the basins of the northern Pacific region to changes in Pacific plate motion.

The southern edge of the Bering Shelf was an active margin until early Tertiary time, when the collision and obduction of an arc/trench complex in the Olyutorsky region of the Russian Far East caused the subduction zone to abruptly migrate southward to its present position in the Aleutian Trench. Drilling results show that regional strike-slip and related basin formation all along the southern Bering Shelf began at 43 Ma, concurrent with a change in Kula/Pacific plate motion. The first structures to form were a regionally extensive zone of subaerially exposed *en echelon* folds oriented 30° to an incipient right-lateral shear zone that formed parallel to and 200 km inboard of the old active margin. These early folds were in most places soon abruptly replaced by a network of right-lateral strike-slip faults. Basins (Navarin, Anadyr, St. George) and uplifts formed between various right- and left-stepping fault pairs. Basin subsidence was initially very rapid and led to local deep marine anoxic conditions (and local source rock deposition) by late Eocene time. Strike-slip activity continued, waning through Pliocene time, with a strong regional pulse in Late Oligocene - Early Miocene time. This pulse was responsible for renewed folding, uplift, local erosion and sand deposition throughout the region.

The deep geometry and kinematic evolution of these basins is unlike the hypothetical "rhomb graben" model commonly cited in the literature for strike-slip basins. Seismic data show that the floor of the 13 km-deep Navarin Basin is an undulating surface between two pairs of right-slip faults; large, basin-framing normal faults are not observed. Shallower basins (North Aleutian, Amak) have similar geometry but have formed adjacent to single strike-slip faults.

Numerous exploratory wells drilled in the 1980's were unsuccessful in finding economic hydrocarbons in the U.S. sector. Geologic reasons for the lack of success include inadequate reservoir development on structure and lack of oil charge in Navarin Basin and inadequate oil charge in traps in and around St. George Basin. Although oil and gas accumulations have been discovered in *en echelon* folds in Russia's Anadyr Basin, production has not been established.