HGS LUNCHEON MEETING—NOVEMBER 28, 1990

WILLIAM G. BROWN—Biographical Sketch

William G. Brown will be speaking to HGS members as part of the 1990-1991 AAPG Distinguished Lecture series. Dr. Brown received his B.S. in geology at Baylor University in 1956, his M.S. in 1958 at the University of Kansas and his Ph.D. in geology at the University of Alaska - Fairbanks in 1987.

From 1958 to 1981, Dr. Brown was employed by Chevron USA, Inc., where he served as Division Geologist/Geological Consultant for the Mid-Continent Exploration Division and Coordinator of the Chevron Structural School.

The author of numerous papers on structural geology, Dr. Brown was honored as 1981 Scientist of the Year by the Rocky Mountain Association of Geologists and has received several other awards for his technical presentations. He is currently Professor of Geology at Baylor University, Waco, Texas.

1990-1991 AAPG Distinguished Lecture

STRUCTURAL STYLES:
ARKOMA AND ARDMORE BASINS
AND ARBUCKLE MOUNTAINS

Structural styles of southern Oklahoma have developed as a result of Late Paleozoic Wichita, Ouachita, and Arbuckle orogenies. However, location and trend of many structures were predetermined during the Late Precambrian-Early Cambrian by development of the southern Oklahoma aulacogen. The structural styles include compressional thin-skinned and compressional basement-involved structures, as well as basement-involved extensional features.

In the Ouachita thrust belt, thin-skinned deformation has telescoped the sedimentary section along major thrust systems. In the frontal Ouachitas, Ti Valley thrust places Ordovician and Devonian rocks over Pennsylvanian rocks. Exploration for hydrocarbons on this and older thrust sheets relies on fractured Bigfork Chert and Arkansas Novaculite for reservoirs. Imbricate thrusting associated with the Choctaw thrust has produced hydrocarbon traps in the allochthonous Spiro Formation, as at Wilburton field.

Thin-skinned Ouachita thrusting was superimposed over normal faults associated with early rifting, which probably localized the position of many Pennsylvanian faults. Due to northward-advancing thrust sheets, faults were reactivated by tectonic and sedimentary loading of the previously weakened foreland crust. Some of these faults may also have been reactivated as high-angle reverse faults by Ouachita compression. The discovery of commercial volumes of gas in the Pennsylvanian Spiro and Ordovician Arbuckle Group in these autochthonous subthrust fault blocks has initiated a major drilling program.

Basement-involved compressional structures occur in the Ardmore basin-Arbuckle Mountains area southwest of the Ouachita thrust belt. Controversy surrounds interpretation of major faults as wrench type, with various amounts of strike-slip, or as reverse dip-slip, with large amounts of shortening. Hydrocarbons are trapped in a variety of individual structures, and include (1) large, doubly-plunging anticlines exposed at the surface, (2) deep-basin structures having no surface expression, (3) large anticlines developed under, or immediately in front of, mountain overhangs, (4) faulted anticlines that subcrop the Pennsylvanian sediments on the hanging walls of buried mountain fronts, and (5) overturned beds in the footwalls of major reverse faults.