HGS NORTH AMERICAN EXPLORATIONISTS GROUP DINNER MEETING—OCTOBER 20, 1992

Social Period,
Dinner and Meeting
Post Oak Doubletree Inn

J. L. SIEVERDING—Biographical Sketch

Jane Received her Bachelor's degree in Earth Science from St. Cloud State University, St. Cloud, Minnesota in 1979, and her Master's degree in Geology from Indiana University, Bloomington in 1981. In late 1981, she joined Chevron USA Inc. at their Denver office as an exploration geologist. From 1984 to 1987 she was Chevron's primary development geologist for Whitney Canyon-Carter Creek field. After being transferred to Houston in 1988, she worked various exploration projects in Oklahoma and the Rockies. Her present assignment is as Quality Improvement Coordinator for the Western Exploration Division of Chevron USA Production Company.

EXPLORATION AND DEVELOPMENT OF A CARBONATE RESERVOIR GAS GIANT: WHITNEY CANYON-CARTER CREEK FIELD, WESTERN WYOMING THRUST BELT

Located in the Fossil Basin area of the Wyoming thrust belt, giant Whitney Canyon-Carter Creek field has in place reserves of approximately 4.5 TCFG, 125 MMBO (condensate) and 24 MM long tons sulfur. It is the largest gas field in the U.S. Rocky Mountains.

Discovery of Whitney Canyon-Carter Creek field began by identifying a large, potentially productive area within the Fossil Basin. Initial concepts were based on regional structural cross sections from surface geology and sparse well control, aeromagnetic data, geochemical and palynological work, and a regional 100% seismic line. Individual prospects were identified from CDP stacked seismic data and structural models developed from other thrust belts.

Hydrocarbons are trapped in large, reverse faulted anticlinal closures that formed completely within the Absaroka thrust plate during Laramide deformation. These structures are ramp anticlines that developed when the Absaroka plate was thrust eastward over ramps in the underlying fault plane.

Production is sour natural gas and condensate mainly from Paleozoic reservoirs. The most significant are dolomitized carbonate reservoirs of the Mississippian Mission Canyon and Lodgepole Formations and the Ordovician Big Horn Dolomite. The Pennsylvanian Weber Sandstone and the Triassic Thaynes Formation have minor production. Source rocks are subthrust Cretaceous shales which were placed in the oil generation window after thrusting and subsidence.

The economically most important reservoir is the Mission Canyon Formation with 79% of the total gas in place. Intercrystalline and moldic porosity was created by dolomitization and subsequent partial solution of mud-supported sediments during early diagenesis. Structural deformation fractured the reservoir, but also created a diagenetic environment which allowed calcite, anhydrite and dolomite cements to sporadically plug all porosity types.

At the time of discovery, the field was thought to be simple and producible through conventional completion methods, but as development proceeded, it was realized that the reservoirs and structure were more complicated. Diagenetic and structural complications may control reservoir quality, drainage areas, fracture density, and hydrocarbon migration. These complications need to be understood to efficiently produce gas reserves from the Whitney Canyon-Carter Creek field.