CHANNEL SEQUENCES AND BRAIDED-STREAM DEVELOPMENT IN SOUTH CANADIAN RIVER, HUTCHINSON, ROBERTS, AND HEMPHILL COUNTIES, TEXAS

The South Canadian River in the eastern Texas Panhandle and western Oklahoma has produced a complex anastomosing channel system. At least 8 aggradational channel sequences (including the present channel system) are present in this part of the Canadian River valley, and are distinguished on aerial photographs and in the field by vegetational changes and overlapping stratigraphic relations. Earlier channel sequences are represented by remnants of earlier active braided-channel systems.

Analysis of daily discharge data from 1938 to 1966 reveals that, though average flow in the Canadian River is quite low, a few large floods with a flow in excess of 20,000 cu ft/second have altered severely floodplain and channel morphology. These flash events eradicate parts of earlier channel sequences and set the stage for channel braiding under lower discharge rates.

Longitudinal and transverse bars are observed in the active and younger inactive channel sequences of the river. Average orientation of these bars is nearly parallel with the orientation of the active channel in a given reach. Despite the similar average direction, there is wide variation of bar orientation in all reaches studied.

Unvegetated areas of the Canadian River floodplain show widespread eolian-dune alteration. These dunes parallel the orientation of the river valley.

Channel-wall instability and variable discharge rate are the principal factors causing braiding in the Canadian River. Serious doubts are raised about the importance of stream gradient as cause of braiding in the Canadian River system.

ELBERT A. KING, JR., Dept. Geology, Univ. of Houston, Houston, Tex.

SAMPLES RETURNED BY APOLLO 11 AND 12 AND THEIR INTERPRETATION

Lunar samples returned by Apollo 11 and 12 from Tranquility Base and the Ocean of Storms can be classified into 3 major types: (1) mafic holocrystalline rocks, (2) breccias and microbreccias, and (3) particulate material. The mafic holocrystalline rocks mostly have familiar volcanic and/or shallow intrusive rock textures. These rocks mostly appear to be a closely related suite, but have a wide range of modal mineralogy. The major minerals are calcic plagioclase, clinopyroxene, olivine, and ilmenite. Breccias and microbreccias are predominantly lithified particulate material from the lunar regolith, but other types of breccias may also be present. The microbreccias and particulate material contain lithic fragments that have a much wider range of modal mineralogy than the large rocks.

Among the lithic fragments are a small percentage of "anorthosite" and other plagioclase-rich rock fragments that are not represented by the larger specimens. These fragments may have originated from the lunar highlands, and their chemistry is similar to the Surveyor 7 samples obtained in the lunar highlands near the crater Tycho. Petrographic evidence of shock metamorphism by meteoroid impact is abundant in the particulate material and common in the large rocks. Hypervelocity impact craters are present on the surfaces of most rocks and many small particles. These are commonly excellently preserved with a central approximately hemispherical glass-lined crater surrounded by a zone of spalling and abundant microfractures. Most glass particles in the lunar regolith appear to be impact produced from the underlying rock fragments or fine material. The ages of the lunar mare materials dated thus far are very old, and many analyses show cluster around values of 3.6 and 4.2 b.y. The major and minor element and isotopic chemistry of lunar samples have some striking differences from terrestrial rocks and chondritic meteorites. No lunar samples have been recognized that are similar to tektites in their chemistry or petrography. Planned Apollo 14 through 19 landing sites will offer the opportunity to sample different types of lunar features and should lead to conclusions about the genetic relations of the lunar mare and highlands, and the chemical heterogeneity of the Moon.

COLEMAN L. LOFTON, Clinton Oil Co., Wichita, Kans.

POSSIBLE FUTURE PETROLEUM PROVINCES OF UNITED STATES WESTERN GULF BASIN—EOCENE AND PALEOCENE

Two new important future petroleum provinces, gas in Texas and oil in Louisiana, are related to the Wilcox Group. The gas province in Texas covers 8,700 sq mi and has 12,000 cu mi of untested sedimentary rock. In Louisiana, the oil province covers 5,800 sq mi and contains, 3,800 cu mi of untested sedimentary rock. Another possible future oil province, which covers 8,000 sq mi in Texas and Louisiana and has 7,000 cu mi of untested sedimentary rock, is predicted for the Claiborne Group. No new province is foreseen for the Jackson and Midway Groups. New provinces for the Wilcox and Claiborne Groups more appropriately might be described as gulfland extensions of existing producing trends. This report, concerned with possible future Paleocene-Eocene provinces of the western Gulf basin, assumes that technologic advances will permit drilling and production of wells to depths of 30,000 ft.

Considerable quantities of both oil and gas have been found in the established Eocene trends. Currently, there are 501 gas, 1,048 oil, and 377 oil and gas fields which have produced from Eocene deposits. Cumulative production to January 1, 1969, totals in excess of 4.2 Tcf of gas and 2.8 billion bbl of oil. These figures do not include casinghead gas, natural gas liquids, and gas flared in past years.

Large structures are known to be present at shallower depths within the future prospective areas. Structurally, these areas will be similar to the established trends; regional growth faults will predominate. Fault-line and salt-related structural traps will be prevalent. To reduce economic risk, it will be important to use all available subsurface information for detection and definition of depositional trends which may project into the provinces.

The greatest attraction in the provinces will be from the Wilcox sandstone. Claiborne exploration will be a by-product of the Wilcox wells. It is not expected that the industry will rush into the provinces, but deep exploration will move gradually farther gulfward as more knowledge is accumulated. Three present fields have provided, and will continue to provide, encouragement for gradual movement into the future areas. In Texas, Northeast Thompsonville and North Milton fields, with reserves estimated at 500 Bcf to 1 Tcf of gas, are along the landward edge of the predicted Wilcox gas province. Fordoche field, with Wilcox oil reserves estimated at 70-120 million bbl, also lies on the landward edge of