least 95% of the uranium reserves in Wyoming. Wyoming reserves were estimated by the AEC at 53,270 tons of U_3O_8 as of January 1, 1967. Distribution of reserves in tons of U_3O_8 together with production to January 1, 1967 are estimated as follows: Gas Hills, 19,560± tons reserve, 17,300 tons produced; Shirley basin, 27,000± tons reserve, 3,450 tons produced; Crooks Gap, 4,000± tons reserve, 2,400 tons produced; other Tertiary basins including Powder River, 1,000± tons reserve, 1,100 tons produced.

Wind River and equivalent rocks crop out in broad areas within the intermontane Tertiary basins of central Wyoming. The sediments that comprise these lower Eocene beds were derived from mountain ranges that were uplifted during Late Cretaceous through earliest Eocene times. Two facies predominate within the major basins. A coarse arkosic sandstone and conglomerate facies with interbedded siltstone dominates near the mountain fronts. Major uranium deposits occur in this facies. Farther out in the basins the coarse-grained sediments grade into or interfinger with a variegated fine-grained facies.

Economic concentrations of uranium occur near the margins of tongues of altered sandstone within the coarse-grained facies and are classified as roll-type deposits. Character of alteration differs from basin to basin but has been recognized to some degree in all basins. Alteration consists of the oxidation products produced by mineralized ground water passing through a transmissive sandstone bed. Geometrically the deposits are tongue-shape in plan and crescent-shape in vertical section with the concave side toward the altered sandstone.

Deposition of uranium occurred at the front of an advancing aqueous chemical system which moved through the host sandstone bed. The oxygenated water rich in uranium, selenium, and other trace elements moved along the hydrologic gradient and oxidized and leached various minerals, including uranium, as it progressed. Precipitation of the uranium and associated elements occurred at a point within the aquifer where the pH and Eh of the system dropped sharply. The change in chemical environment was the result of the presence of H_2S, probably produced by anaerobic bacteria.

AN ASTRONAUT

(No abstract submitted)

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Future Role of Rocky Mountain Coal

(No abstract submitted)

THOMAS D. BARROW, Humble Oil Co., Houston, Texas

Keynote Address

(No abstract submitted)

GORDON BASSETT, Shell Oil Co. of Canada, Ltd., Edmonton, Alberta, and JOHN STOUT, Chevron Oil Co., Denver, Colorado

Devonian Geology of Canada, Montana, and Wyoming

(No abstract submitted)

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Triassic-Jurassic of Alberta, Saskatchewan, Manitoba, Montana, and North Dakota

Of the Triassic-Jurassic Systems, only Lower Triassic was deposited in southern Saskatchewan, North Dakota, and southern Montana. Thicknesses in excess of 700 ft are present in western North Dakota reflecting the depocenter of restricted salt basins. On the basis of lithologic correlation, the lower Watrous Formation in Saskatchewan is considered to be equivalent to the upper part of the Spearfish Formation in North Dakota. Lower Middle and Upper Triassic rocks in western Alberta are of marine origin, attain thicknesses in excess of 4,000 ft, and produce oil and gas.

Jurassic rocks are widespread throughout the map area as a result of Jurassic seas transgressing from the northwest along the Eastern Cordillera, then spreading east across Montana into the Williston basin. Lower Jurassic formations in the map area are restricted to southwestern Alberta. Middle Jurassic formations are the most widespread, and are thicker than 500 ft in a depocenter in southeast Saskatchewan and northwest North Dakota. Similar thicknesses are present in the Alberta trough. Upper Jurassic sediments also are widespread, reaching thicknesses of 7,000 ft in the Eastern Cordillera of Alberta and more than 700 ft in eastern Montana.

Economic deposits of coal, gypsum, oil, and gas occur in Middle and Upper Jurassic formations. Oil is the most significant, particularly in southwestern Saskatchewan where 20 fields are estimated to have ultimate production of 347 million bbl. These fields produce in stratigraphic traps, primarily from sandstone associated with shoreline facies.

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Geology of the Moon

At present, most knowledge of detailed geologic conditions on the moon is limited geographically to the photographic missions of the Lunar Orbiter program which has primarily covered the Apollo Zone. Complications caused by albedo, high sun elevations, and electronic imagery distortion hamper photo interpretation.

The lunar stratigraphy is divided into four systems: pre-Imbrian-highlands ringing the oldest mare; Imbrian—the oldest lowland mare; Eratosthenian—"eroded" crater material; and Copernicus-recent crater material.

Ubiquitous craters appear to be formed by both impact of meteors and volcanic activity. Faults, slump or creep, flowage—all appear to be present on the lunar surface.

Synoptic orbital photography of the earth is a logical outgrowth of the lunar program. Use of synoptic photography will improve exploration geologists' understanding of their individual areas of interest as they relate to the regional geologic setting.

Geologic processes and theories developed on earth will aid the interpretation of morphological and structural conditions on the moon. Likewise, technologies developed from the lunar and planetary program will aid exploration on the earth.

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Use of Nuclear Explosives in Oil and Gas Production