and igneous rocks are cut by granitic plutons of Cretaceous and Tertiary age.

The central and eastern parts of the upland are underlain by a metamorphic complex with rocks that range from lower greenschist to amphibolite facies. Fossils date the parent sediments of some green-schist facies rocks as Paleozoic. Radiometric dates from several localities in the metamorphic complex indicate that Precambrian, Ordovician, and Jurassic-Cretaceous thermal events are recorded in the metamorphic history. Mesozoic granodiorite and quartz monzonite batholiths and smaller granitic plutons of Mesozoic and Tertiary ages intrude the crystalline schists. Locally, unmetamorphosed Cretaceous and/or Tertiary sedimentary rocks are in unconformable or fault contact with the older rocks. Tertiary volcanic rocks which range in composition from rhyolite to basalt overlie the older rocks in small but significant parts of the eastern upland. Ultramafic intrusions, mostly small and serpentinized, also are present.

Work has progressed to the point where the sedimentary rocks in the upland can be correlated reasonably well with those in other parts of Alaska, but interregional correlation of the metamorphic terranes must await additional clarification of structural and petrologic relations.

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DEVONIAN ROCKS OF GREENLAND AND SVALBARD

In Greenland and Arctic Scandinavia, Devonian sedimentary rocks crop out in only two areas: (1) east Greenland between lat. 71½°N and 74½°N; and (2) Svalbard, between lat. 76½°N and 80°N in Vestspitsbergen. These strata are nonmarine clastics. Aggregate thicknesses are large, up to 7,000 m in Greenland and 5,000–6,500 m in Vestspitsbergen. In both areas, the successions are unconformable on deformed pre-Devonian, Caledonian rocks. Both areas are well known for their fossil vertebrates, on which the following age determinations depend.

In Greenland the successions can be assigned to 5 major units, each with a maximum thickness of 1,000–3,000 m: (1) A unit that includes the Vilddal Group, of red and gray siltstone, conglomerate, sandstone, volcanic rock, and granite intrusions; (2) a unit of conglomerates, and red and gray-green sandstone; (3) the Kap Kolthoff Formation of gray-green sandstone; (4) Kap Graah Group of red sandstone, siltstone, and volcanic rock; and (5) the Mt. Celsius Supergroup of red and gray-green siltstone with some sandstone. Units (1) and (2) are dated as Givetian (late Middle Devonian), and units (4) and (5) are dated as Famennian (late Upper Devonian). Unconformities between and within these units occur, particularly in the northeast part of the area, and the rocks were folded again before deposition of the nonmarine Carboniferous.

In Svalbard, the succession consists of 4 major units, each with a maximum thickness of 1,000–3,000 m: (1) the Siktefjellet Group of conglomerate and sandstone beds; (2) the Red Bay Group of conglomerates and sandstone beds; (3) the Wood Bay Formation of sandstone and red siltstone; and (4) a supergroup (Grey Hoek and Wijde Bay Formations, Mimer Valley Group) of gray conglomerate, sandstone, and siltstone. There is no fossil evidence for the date of (1) which was strongly folded before the deposition of (2). Unit (2) is dated as Gedinnian (early Lower Devonian), and the succession is continuous through (3) to (4), which ranges up to Givetian (late Middle Devonian) in age. These units were folded strongly before the deposition of Carboniferous sediments.

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AIRBORNE AND GROUND ELECTRICAL RESISTIVITY STUDIES ALONG PROPOSED TRANS-ALASKA PIPELINE SYSTEM (TAPS) ROUTE

Experimental surveys were made in two test areas using a recently developed airborne technique by which several parameters, including wave tilt, of very-low-frequency (VLF) radio waves from distant transmitters are measured. Ground measurements were made using direct-current resistivity sounding and horizontal profiling methods, the slingram method, and an electromagnetic depth sounding method in which variations in the coupling between 2 horizontal loops is measured as a function of frequency. In each test area—one near Glennallen in the Copper River basin and the other near the Yukon River—at least 1 ice-free locality was located using the airborne VLF data and was corroborated by resistivity measurements. The airborne data appear to reflect the presence of gravel deposits near some of the large rivers near Glennallen, but the data are complicated by topographic effects. In the Yukon River test area the airborne data indicate differences in resistivity between deeply weathered and relatively fresh bedrock.

Good quality resistivity depth soundings, which are not seriously affected by lateral effects, were obtained in both areas. Near Glennallen typical resistivities for fine-grained sediments are 40–80 ohm-meters in the active layer, greater than 2,000 ohm-meters in the frozen layer, and 150 ohm-meters in the underlying sediments except in localities where the presence of saline water reduces the resistivity to 10–20 ohm-meters. Resistivities of wet unfrozen gravel are about 200–500 ohm-meters. The depth to the top of the frozen layer can be determined quite accurately; determination of the depth to the bottom cannot be determined as closely. Similar resistivity data were obtained in the Yukon River test area except that the resistivity of the unfrozen material was found to be more variable. Where bedrock is near the surface, the resistivity appears to be inversely proportional to the degree of weathering. The electromagnetic depth soundings substantiate the resistivity results and for some geoelectric sections the electromagnetic data add supplementary information.

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CALEDONIAN GEOLOGY OF ARCTIC NORWAY

(No abstract submitted)

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INUVIK TEST LOOP—AN ARCTIC PROTOTYPE INVESTIGATION

In June of 1969, Mackenzie Valley Pipeline Research Ltd. retained Canadian Bechtel Ltd. to assist in researching the practicability of constructing a large-diameter crude oil pipeline from the North Slope of Alaska to Edmonton, Alberta. Part of the research