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Circum-Pacific Minerals Maps

Maps portraying the mineral resources are being compiled as one of the series depicting the geology, tectonics, energy resources, and other features of the Circum-Pacific region at 1:10,000,000 on a quadrant-by-quadrant basis. The Minerals Map of the Northeast Quadrant is the first to be completed and will serve as the prototype for those to follow.

Land-based deposits are plotted over a simplified geologic/tectonic background that emphasizes the provenance of sedimentary rocks (oceanic, miogeoclinal, or continental) and the intrusive or extrusive nature of igneous rocks. Symbol shapes, colors, sizes, and ornamentation denote the metal/mineral content, relative importance, geologic class, and, for some, age of mineralization of the deposits. No distinction is made between active, exhausted, or unmined deposits.

The prevalence and transition-metal content of the ocean-floor manganese nodules are shown in relation to water depth and surficial-sediment character, the latter simplified from the Geologic map series. The rift and fracture-zone pattern reproduced from the Plate-Tectonic map serves to locate the sulfide deposits discovered by submersibles and deep drilling to the spreading centers where they are generated. Phosphate and other seabed resources are included.

When completed, the maps will provide an overview of the mineral resources of a region encompassing more than half the globe that should be useful not only for planning purposes, but also as stimuli for creative analysis of the relation of ores to major earth features and processes such as subduction, hot spots, and accreted terranes.

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Basins of the World and New Frontiers

Petroleum exploration in the coming decades must be concentrated toward discovering commercial supplies—large and small—of the oil and gas which lie untapped in both the known petroleum producing areas of the world and in the frontier regions. These frontier areas—the deserts, ice-covered lands, deep waters, and remote continental interiors—are estimated to hold vast hydrocarbon accumulations. It is in these sectors where future oil and gas discoveries could make the difference between energy survival and global catastrophe.

Explorationists must re-evaluate the mature and developing petroleum regions of the world; the vast ocean areas must be carefully and thoroughly investigated to ascertain their petroleum potential; the remote continental interiors must be properly assessed; and new and better uses of geology, geophysics, petroleum engineering, and technology must be employed in all aspects of petroleum exploration, development, and production. A unified exploration effort will result in greater success in finding the oil and gas supplies the world so vitally needs.

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Developing the Petroleum Resources of Bering Sea—Technology, Economics, and Geology

With estimated petroleum resources as high as 52 billion bbl of oil equivalent, the Bering Sea sedimentary basins together rank third in the nation's OCS (outer continental shelf) areas, behind only the Beaufort Sea and Gulf of Mexico in oil and gas potential.

For the first four Bering Sea OCS lease sales—Norton Sound (No. 57), St. George Basin (No. 70), North Aleutian Shelf (No. 75), and Navarin Basin (No. 83)—petroleum technology assessments have identified probable development (engineering) strategies (platform types, transportation options) and evaluated the economics of these engineering strategies and related geologic (reservoir), environmental, and locational parameters. The economic model has determined (1) the minimum field size needed to justify development under several oil and gas production strategies, (2) the minimum required price to justify development given field size and selected production technology, and (3) the unit costs of production and transportation.

The economics of petroleum development in the Bering Sea will be very sensitive (among other factors) to water depth and distance from shore (pipeline investment). For the more distant from land St. George and Navarin Basins, offshore loading may have to be seriously considered. Giant fields with favorable reservoir characteristics will have to be found to make development economically feasible.

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Oil Discovery in New Zealand Overthrusts

New Zealand's present hydrocarbon production is from two gas-condensate fields located onshore and offshore southern Taranaki, on the western side of the North Island, in a generally gas-prone area. In 1980, Petrocorp (Exploration) discovered the McKee oil field onshore in North Taranaki. The reservoir sequence of the McKee field comprises Kapuni Group lower coastal plain Eocene and early Oligocene sandstones, essentially similar to producing zones of the existing fields. McKee field is, however, structurally different in that it consists of a block of the Kapuni Group sequence thrust over lower Miocene marine mudstone and siltstone. The thrust, which is middle Miocene in age, is one of several similar structures in a zone immediately west of the eastern boundary fault of the Taranaki graben. Kapuni Group sandstones have been drilled in four of these structures and, in addition to the McKee production, significant gas shows were noted in two thrusts to the north of McKee. The potential for further oil and gas in these structures prompted revision of seismic techniques which resulted in delineation of further segments of the thrust system in the McKee area. Recent detailed seismic over the field shows the reservoir to consist of a complex series of small scale, fault-bound slices. The reserves of the field are estimated to be around 20 million bbl. The oil is wax based, with a pour point of 32°C, and a gas to oil ratio of around 150:1.

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Marine Geophysical Studies of Western Margins of Luzon, Philippines

Multichannel seismic reflection, gravity, and magnetic measurements were made during a reconnaissance study of the western margin of Luzon, between 15 and 19°N. Sixteen lines were run to investigate the along-strike variations in the nature of the accretionary prism and the style and intensity of deformation in the fore-arc region (West Luzon Trough).