period (1890-1941), rehabilitation period (1950-1965), and the five-year development plan period (1969 to present).

The objectives of exploration of coal in the prewar period were to gather data for the development of the coal mines and their future expansion. During 1950 to 1965 these activities were influenced by a possible development of an iron and steel project.

Since 1969 coal exploration was conducted within the framework of the five-year development plan of the government. Studies were being made to utilize the coal from two major mines in Sumatra as fuel in electric power plants and in industry.

The pattern of the Indonesian coal market in the prewar period was for export and the use as fuel in industries, railroad, and shipping. Since 1950 these markets have been gradually declining because petroleum was considered to be more suitable as fuel than coal. The decline of these markets affects seriously the coal industry in Indonesia.

At present the coal industry will be revived due to the government policy to utilize coal as effectively as possible in any uses previously fueled by petroleum, mainly electric-generating power plants.

SOLOVGEV, V. V.

RING MEGA-STRUCTURES OF PACIFIC

No abstract available.

SUTHERLAND BROWN, A., Dept. of Mines and Petroleum Resources, Victoria, B.C., Canada

METALLIC MINERALS IN CANADIAN CORDILLERA

The Canadian cordillera, consisting principally of British Columbia and Yukon, is rich in minable deposits of copper, zinc, lead, and molybdenum, and has nickel, tungsten, gold, silver, mercury, and iron deposits.

The cordillera shows a pronounced regional zoning of metals in background abundances in rocks and an associated zoning in class of deposits and contained metals. Sequential changes occur across the strike of the five subparallel tectonic belts.

The mineral industry has expanded rapidly in the last decade. The total value of metal production in 1973 was $839 million in contrast to $189 million in 1963. Production of major metals for the whole terrane in 1973 was copper, 730 million lb; zinc, 553 million lb; lead, 431.5 million lb; and molybdenum, 25 million lb.

For copper, the 1973 production represented about 8% in international trade. Production and reserves have greatly increased in this decade. For British Columbia geologic reserves at present rates of extraction are estimated to be sufficient for copper and molybdenum for 100 years, for zinc about 60 years, and lead about 35 years.

Mode of discovery has changed radically. Classical prospecting is still the most important method although it shares with more technical methods the revelation of actual significance. Of some 60 major mines and prospects discovered in the last 15 years, the primary discovery credit may be attributed as follows: classical prospecting, 50%; geologic deduction, 21%; geochemistry, 20%; geophysics, 9%.

Factors other than discovery, development, and markets are becoming increasingly important. The industry currently is based significantly on low-grade porphyry deposits most of which have no enriched zones. The profitability of such mines is marginal during periods of low metal prices. To survive, operations have had to become highly efficient. The task becomes more difficult in the face of new legislation in British Columbia and proposed legislation in Yukon. More stringent reclamation and environmental regulations and royalties and increased taxes are being applied. There is a hiatus in mine development awaiting clarification of the impact of the new laws, but exploration and discovery continue at a high level.

SUTOWO, IBNU, President-Director of Pertamina

CIRCUM-PACIFIC CONFERENCE, LUNCHEON ADDRESS

No abstract available.

THIGPEN, J.

EXPLORATION FOR GEOTHERMAL ENERGY IN NICARAGUA

No abstract available.

THOMPSON, T. L., Amoco Production Co., Tulsa, Okla.

HYPOTHESIS FOR PETROLEUM GENERATION AT CONVERGENT PLATE BOUNDARIES

Plate tectonics, the hypothesis of multiple crustal plates floating on a viscous layer called the asthenosphere, provides rationale for viewing the earth's outer shell as a system of shifting continents and growing ocean basins. The idea of diverging plates (or sea-floor spreading) implies that plates converge elsewhere at compatible rates. Estimated convergence rates range up to 4 in. per year, or 140 mi in the 2 m.y. since the beginning of Pleistocene time.

Convergence between oceanic crust and continental crust may result in thermal generation of oil and gas in sediments as young as Pleistocene age because of rapid deep burial associated with subduction. Mountainous source areas for sediment and steep continental slopes favor rapid burial of organic material with turbidites. Rapid subduction of oceanic crust under continental margins may carry sediments to depths which provide requisite thermal environments for generation of oil and gas from organic matter disseminated in the sediment. Continued subduction of oceanic crust under continental slopes may cause reverse faulting such that oil and gas accumulations are uplifted toward the ocean bottom.

Core samples obtained adjacent to the Aleutian Trench in the western Gulf of Alaska apparently show effects of subduction and reverse-fault uplift on a section of Pleistocene sediment. Although this Pleistocene sediment is only a few hundred feet below the ocean bottom, organic matter carbonization suggests previous burial of at least 8,500 ft and late pregeneration stage of organic carbonization. In contrast, noncommercial oil production from uplifted deep-water sediment of early Tertiary age at Katalla, Alaska, suggests formerly significant accumulations have been dissipated by faulting, uplift, and erosion. Late Tertiary rocks beneath outer continental shelves and/or upper continental slopes at convergent margins may be in the