project is carried out in the target areas selected by the preceding survey in each district. Principal field work is exploratory core drilling spaced more or less regularly. Where necessary for geologic structures, ground and/or borehole geophysical prospecting and exploratory tunneling are integrated with drillings.

Geologic information and ore showings obtained by these projects are useful for interpretation and location of final target areas for advanced prospecting work of mining companies to which the government exploration fund is loaned.

During 10 years of operation of the national program, nearly 100 million tons of domestic new-ore reserves have been acquired, and operation of the program has contributed much to the progress in exploration methods and the concepts of explorationists.

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GEOLOGIC FRAMEWORK OF METALLIC MINERAL DEPOSITS OF NORTHEAST USSR

The structure of northeast USSR is composed of the following: the Yana-Kolyma and Chukotsk miogeosynclinal system and the Oloysk-Alazeysk eugeosynclinal system of the Mesozoides, median and residual massifs of pre-late Precambrian age (Omolon, Okhotsk) and Paleozoic age (Yablonsk, Yeropolsk), the Anadyr'-Koryak and Olutor-Kamchatka geosynclinal system of Cenozoic age, and the Okhotsk-Chukotsk volcanogenic belt.

Widespread deposits of gold, silver, tin, tungsten, and mercury are controlled by the structure and igneous activity.

Gold-bearing quartz veins of plutonic origin form the Yana-Kolyma gold belt with its alluvial and bedrock deposits. The analogous deposits of the Chukotsk system form a less consistent gold belt. The gold here is associated closely with tin and tungsten mineralizations.

The Okhotsk-Chukotsk volcanogenic belt is a province of volcanic gold-silver deposits, sometimes associated with tin and mercury mineralization.

Tin deposits of different types (sulfide, quartz, silicate, skarn, and pegmatite) are less abundant in the Yana-Kolyma system but are well developed in the Chukotsk system.

Commercial deposits of mercury are present in the Mesozoides, in the region of Cenozoic folding, and within the Okhotsk-Chukotsk volcanogenic belt. The deposits form linear zones either in carbonate rocks rimming the Yana-Kolyma system or in terrigenous rocks of widely differing age. Mercury also is present in volcanic rocks of the Cenozoic age as well as in the Okhotsk-Chukotsk belt. Conditions for the formation of copper, lead, zinc, and other minerals in the region have not been studied adequately. According to available data, they are related to the structures of the massifs of ancient consolidation, to the Oloysk-Alazeysk eugeosynclinal system, and to the Okhotsk-Chukotsk volcanogenic belt. Platinum and chromium are located within ultramafic belts of the Olutor-Kamchatka and Anadyr'-Koryak systems.

The major stage of endogenic ore deposition in northeast USSR is at the end of the Jurassic and in the Cretaceous. In the Anadyr'-Kamchatka system and in Kamchatka its main phase extends upward into the Paleogene, Neogene, and Quaternary. The most intensive period of placer deposition was in Pliocene-Pleistocene and recent times. The placers are connected to relief-forming processes connected with new tectonic activity. The sources of ore material for the placers were the Mesozoic-Cenozoic mineralized zones. In many regions oxide-weathering products also were formed as the result of the development of a semiplatform surface.

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INFLUENCE OF TEMPERATURE ON COALIFICATION OF TERTIARY COAL IN JAPAN

The main coal deposits of Japan are of Paleogene age. The coals are high-volatile bituminous to subbituminous rank. Their range of carbon-oxygen ratio (O/C) is below and above 0.120, respectively, with a range of carbon-hydrogen ratio (H/C) from 0.650 to 0.900. The Paleogene formations in coalfields consist of marine and nonmarine sedimentary rocks and their thickness varies in different fields. They are developed fully in central Hokkaido and northern Kyushu where their maximum thickness is 4,000 and 2,000 m, respectively.

The deformation of the coal measures is much stronger in central Hokkaido than in northern Kyushu, though coals in both regions are high-volatile bituminous. The deformations in northern Kyushu and Joban-Kushiro are similar, but coal of the latter is subbituminous. These facts strongly suggest that the degree of coalification apparently is not controlled only by depth of burial and tectonic deformation.

Various authigenic zeolites are present in altered silicic vitric tuffs interbedded with coal-bearing formations. Clinoptilolite and mordenite are associated with the host formations of subbituminous coal as in Joban-Kushiro, whereas analcime, heulandite, and laumontite are present with bituminous coal in central Hokkaido and northern Kyushu. These specific assemblages of zeolites and coal ranks are recognized throughout the Japanese coalfields. The zeolites are distributed in a vertically zonal arrangement which is, with depth, clinoptilolite-mordenite, analcime-heulandite, analcime-laumontite, and albite zones. This zonation is well established in the Japanese Neogene oil and gas fields. It is controlled mainly by depth of burial and geothermal gradient, *i.e.*, by temperature. The stability field of each of the zeolite species was estimated by using deep-well data.

Comparison with zeolite occurrence in the oil and gas fields suggests that the degree of coalification is controlled mainly by temperature, and that the temperature range of coalification of bituminous rank is estimated to be from 85 to 125°C.

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COAL RESOURCES OF INDONESIA

Coal reserves in Indonesia are estimated to be about 445 million tons, of which probable reserves from unexplored areas are estimated to be 365 million tons. The coal ranks from subbituminous to bituminous coal of which about one third may be considered recoverable. Reserves of brown coal and lignites are estimated to be several billion tons.

The amount of total reserves is based on exploration carried out during three periods, *i.e.*, prewar