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Hydrothermal Resources of Makushin Volcano Region of Unalaska Island, Alaska

Eight fumarole fields have been located in the Makushin Volcano region of Unalaska Island. Large vapor-dominated hydrothermal reservoirs are suspected to exist in the region of the fumarole fields located on the southeast flank of Makushin Volcano. The driving heat sources for some of these reservoirs might be at vertical depths of several kms and located laterally to the west, northwest, and north. The other fumarole fields are suspected to have driving heat sources near the surface, where these fumarole fields are in or near centers of Quaternary volcanic activity. The locations of the southeast-flanking fumarole fields are controlled by plutonic-metavolcanic contact boundaries and corresponding fractures, as well as by large northwest-trending fracture systems that are believed to have been caused by tectonic stresses.

There is a need for deep exploratory drilling within this geothermal resource area in order to define the potential of any hydrothermal reservoirs. Further exploration is planned.

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Circum-Pacific Map Project: Framework for International Resources Assessment

The Circum-Pacific Map Project is an innovative approach to the compilation and presentation of geological and geophysical data related to the genesis and distribution of energy and mineral resources. Some of the innovations already developed by this cooperative international mapping program are in respect to: (1) techniques for cooperation between geoscientists and resource specialists in industry, academia, and government; (2) depiction of new categories and sources of data; and (3) the presentation of geologic and geophysical data such as sea-floor sediment distibution, bottom photography of manganese nodules, representation of active geologic phenomena, and the representation of plate motion.

The seven series of geologic, tectonic, and geophysical maps provide an integrated regional framework to illustrate the relationship of significant mineral and energy resources to the geological environment. Especially important are those deposits that are related to subduction phenomena, rifting, and sedimentation.

Future Map Project activities that offer opportunities for new or expanded areas of international cooperation include: the standardization of data systems, the comparative modeling of mineral deposits, the classification of continental margins in relationship to mineral genesis or deposition, and factors affecting the distribution of resources.

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Experimental Results and Potential for Hot Dry Rock Geothermal Resources

Development of hydrothermal geothermal resources associated with volcanic fields of the Circum-Pacific region is progressing at an accelerating pace. This valuable energy resource base can be greatly expanded by forming artificial reservoirs in rock that is hot but contains insufficient permeability and fluid for hydrothermal development. The formation of significant in-situ heat transfer systems and subsequent testing of these man-made geothermal reservoirs have indicated the technical and economic feasibility of the hot dry rock (HDR) geothermal concept. Extended production history and heat-extraction data obtained during the period of 1978-1980 have confirmed heat transfer, chemical, water loss, and thermal drawdown models of the systems. Closed-loop heat extraction operations during a 9-month test, during which 15×10^6 kwh of thermal energy were produced, have demonstrated growth of the reservoir's effective heat-transfer area and volume due to secondary fracturing caused by thermal contraction and sustained pressurization. Drilling, fracturing, and testing of a larger reservoir system, are underway, which will demonstrate a HDR geothermal reservoir of commercial size. HDR projects within the Circum-Pacific area include the Los Alamos experiments supported by the U.S. Department Energy and of the governments of Japan and Federal Republic of Germany. A small-scale field test has been carried out at Yakedake, Japan, since 1979. This project will be continued until 1983 and a candidate site chosen for the construction of a several megawatt pilot plant.

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Recent Development in Pacific Metallogenetic Provinces of Mexico

Mexico conducts continuous regional explorations and detailed evaluations of its Pacific metallogenic provinces. Efforts of the past few years have resulted in 300,000 mi^2 (775,900 km^2) of Landsat imagery coverage, photogeology, surface and subsurface geology, surface and aerial magnetometry, geochemistry and diamond drilling, plus underground mining methods of exploration. Isotope geochronologic determinations were performed on 719 rock samples, mostly from the Sierras of the Pacific provinces.

Economic geologic investigations resulted in the discovery of 183 polymetallic deposits, many of which are already in operation. La Minita, eastern State of Michoacan (Ag, Ba, Zn, Pb; 2000 t/d), is a notable example. Fourteen important nonmetallic orebodies were also found, some of which are already in production. One of these is Teliztlahuaca in the State of Oaxaca, where reserves of crystalline graphite, estimated at more than 2 MMt, assay at 4.25% and are processed by a 600 t/d plant.

The total reserves of in-situ metallics amount to 124 MMt, with a value of US$8,680 MM. They include Au, Ag, Cu, Pb, Zn, As, Bi, W, Fe, etc. The total volume of in-situ nonmetallics is 78 MMt, valued at US$3,600 MM. The most important of these are barite, borates, gypsum, marble, anthracite, and magnesite. Geologic and geophysical maps show the locations of outstanding deposits.

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Geology and Production History of Offshore Northwest Palawan, Philippines

The area of study is the continental shelf and rise off northwest Palawan and part of the southeastern margin of the South