

- In the hydrometallurgical area, research is being done on bacterial leaching of marginal resources, leaching of copper concentrates, hydrometallurgical treatment of process dust and determination of optimum conditions for leaching different existing mineral resources.

- In the concentrate melting area, studies are being made to streamline energy use in the processes, based on increasing the oxygen in these processes and reducing the load's humidity. The goal is to concentrate the process gases in SO₂ to facilitate their subsequent treatment in acid plants. In addition, a pyrometallurgical process has also been developed to produce molybdenum trioxide from molybdenite concentrates without prior purification.

- In the electro-refining area, research on impurities elimination and anodic mud treatment is being done.

II.2.2 ENAMI.

The Empresa Nacional de Minería, ENAMI, is a state-owned mining company second in importance to Codelco, with a completely different nature and functions from Codelco. Its major objective is to encourage small and medium-sized mining. ENAMI does not own mines. It buys mineral from private entrepreneurs which it processes, smelts, refines and markets. For this purpose it has three processing plants, two smelters and one refinery, in addition to a number of strategically located mineral purchase points.

ENAMI's fine copper production is approximately 210,000 tpy in addition to 8,000 kg. of gold and significant amounts of silver, sulfuric acid and selenium.

In 1991 the commercial value of this production was US\$ 886 million, 12% higher than the previous year.

The principal products purchased by Enami from small and medium-sized miners are concentrates, precipitates and direct smelting minerals, minerals concentrated by flotation or leaching for its processing plants, and metal doré from Codelco for its Noble Mineral Plant in Ventanas.

During 1991 the company bought 1,595,000 tons of minerals from the small and medium-sized mining sector, compared to 1,735,000 in 1990.

Silver production in 1991 was 241,030 kg compared to 134,532 kg the previous year. Gold production was 9,887 kg compared to 8,311 kg of fine in 1990.

The increase in electrolytic copper production since 1988 has resulted from the start-up of the improvement project at the Electrolytic Refinery in Ventanas.

As a by-product of the Ventanas Refinery, Enami also produces nickel and selenium sulfate. In 1991 production of nickel sulfate was 181,595 kg compared to 196,307 kg the previous year.

Production of selenium was 19,300 kg, and it had been 16,290 kg in 1990. The production of sulfuric acid in Paipote and Ventanas was 166,766 tons. Small amounts of palladium and tellurium concentrates were also obtained in the processing plant.

In 1989 tellurium production on a commercial scale was initiated, and 1,376 kg were obtained. The product was sold to Japan and Holland. Production in 1991 was 1,292 kg.

Enami is planning the expansion of its Ventanas Smelter and Refinery, and it is also participating in a joint venture which is evaluating the installation of a new copper refinery in the North.

Future Investment.

ENAMI has planned a total of US\$ 27 million in investments for 1992 in new projects and projects already in progress.

Currently Enami is assessing the technical feasibility of building a mineral processing plant in Tocopilla. The cost of this plant would be US\$ 1.8 million. The Enami miners' production is approximately 3,500 tons which could increase to 5,000 with the opening of new ore deposits.

In the José Antonio Moreno Plant in Taltal, Enami is implementing a Heap Leaching Plant with a capacity of 20 tpd of ore.

At the Ventanas Smelter and Refinery, in addition to the sulfuric acid plant and the oxygen plant, the following investments are included within a 5-year period: