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MINE EXPLORATION

Botuporã Project

Copper Ore

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1. The Mineral Good

The metal element copper is relatively rare on the crust and it is economically very important and essential to the industrial development due to its characteristics such as thermal and electrical conductivity.

Some mineral-ores sources of copper are chalcopyrite, bornite and chalcocite.



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2. Resources and Reserves

In 2008, the ranking of countries with copper reserves shows the following order: Chile (36%), which keeps isolated as the most important producer; Peru (12%) that after reevaluations is placed as one of the great holders of the copper resources; USA (7,0%) and China (6,3%); totaling 60% of the world resources.

Brazil was placed in the 13th position, with 1,73%, with a total of reserves (measured and indicated) of 17,3 Mt Cu-containing. It is expected that the country reaches self-sufficient condition in 2013, with addition of the production from the new projects of Vale and Caraíba, apart from other lower projects, and also expansions.

Resources in the State of Bahia

The main reserves sized in Bahia are located at the Copper District of *Vale do Curaçá*, which the mineralization is associated to the basic/ultra basic rocks embedded on the high grade metamorphic rocks of the *Grupo Caraíba*.

3. Supply

The Brazilian copper production presents the following historic performance, in recent times:

- **1988** – 80% of the copper ore and concentrate production was from the mine of *Mineração Caraíba*, in Jaguarari, in Bahia; 18% from the mine of Caçapava do Sul, in Rio Grande do Sul, owned by *Companhia*

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Brasileira do Cobre (CBC); and 2% from *Mineração Manati*, in Cáceres, in Mato Grosso.

- **2004-2006** – the Brazilian production of copper concentrate shows significant increase in the period of *boom* in the price of metals – with the start of the *Projeto Sossego* (Jul/2004), and, in 2006, the *Projeto Chapada* (Yamana) – that allowed the national production to reach the value of 222.102 tons of Cu-containing in 2008.

The Structure of the National Mining-Metallurgical Park

The copper metallurgical park in Brazil is currently composed by *Caraíba Metais*, in Bahia, and hereafter by the Hydrometallurgical Plant of Carajás (UHC – in Portuguese, *Usina Hidrometalúrgica de Carajás*). The expectations over this new project are aiming, upon the efficiency in the processing of copper ores with a higher grade of impurities, a more flexible processing of chalcopryite and secondary sulfides.

In the *Caraíba Metais* plant buys the copper concentrates from the *Mineração Caraíba* (about 10% of the total volume), from Vale (mine of Sossego, in Pará) and from the mine of Chapada, in Goiás, and the remainder is importated (mainly from Chile and Peru).

The prevalence of opinion among the analysts of the mineral business is that copper has the best prospect among the base metals, in majority due to factors of supply and demand. It is in this favorable environment to investment activities that the Brazilian copper mining-metallurgical segment stands.

4. Demand

The application by excellence of copper as a conductor of electricity is imposed as the main determinant factor of demand for manufacturing wires, cables, connectors and motors, accounting for about 60% of world consumption of the metal. The thermal conductivity, in turn, is the key attribute of heat transfer applications in air conditioning systems and cooling, accounting for about 10% of the total demand.

5. Prospects

By contextualizing copper on the international market for base metals, it becomes clear the increase in the pressure on the demand on structural conditions of supplies in the thread of metal production, in that scenario it is observed the increase of import from China, that was estimated to account for

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30-35% of the global demand in 2009. It is expected that the copper price keeps greatly over the cost-support levels for the next 2-3 years.

6. The Botuporã Project

The project has a total area of 1048 ha, located near the city of Botuporã, in the state of Bahia, in the Brazilian Northeast. The region is in the central portion of the state, which is rich in sandstones, feldspar sandstones, mudstones, eluvial and colluvial deposits, gneisses, quartzites, basic-ultrabasic rocks and siltites.

The copper estimated reserve is accounted to 10 million tons, with veins from 3 to 18 meters of width and outcropping percentage from 0,5 to 5% of Cu. However, in the same region, with 10 m pits, it has been found copper in percentages equal to 15-17% (chalcopyrite).