

CALENDAR

■ 25th Annual Mineral Exploration Roundup

January 28 –31, 2008
Westin Bayshore Resort & Marina
Vancouver, B.C., Canada
Email: cgirouxschmidt@amebc.ca

■ 110th Annual National Western Mining Conference & Exhibition

February 12 –14, 2008
Westin Hotel
Denver, Colorado
Email: jcolgan@coloradomining.org

■ 2008 SME Annual Meeting & Exhibit

February 24 –27, 2008
Salt Palace Convention Center
Salt Lake City, Utah
Email: cs@smenet.org
Visit PAH/Runge at Booths 717 / 719

■ PDAC 2008 International Convention, Trade Show & Investors Exchange

March 2 – 5, 2008
Metro Toronto Convention Centre
Toronto, Ontario, Canada
Email: info@pdac.ca
Visit PAH/Runge at Booth 708

PAH Opens Brazilian Office

PAH has opened an office in Belo Horizonte, Brazil to better serve our South American clients. Contact Darrel Buffington at the following address:

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Mining Activity in Brazil

Introduction

While the first images that Brazil conjures for the person off the street may be beautiful beaches, Carnival and the Girl from Ipanema; the international mining industry's view of Brazil includes the active expansion of mine production and future potential of under explored regions of the country's interior. With a land area of over 8.4 million square miles (approximately equal to the 48 contiguous states of the United States) and a comparable range of geologic environments to Canada and the US, Brazil offers both diversity in mineral commodities and exploration potential.

Nationalized mining companies and restrictive foreign investment policies established during a military dictatorship that ended relatively peacefully in 1985, impaired broad-scale expansion of the mining industry for almost 20 years. Along with the establishment of a new constitution in 1988 and implementation of the current Federal Republic form of government, there has been privatization of the national mining companies and an opening to foreign investment. Brazilian companies may now have 100 percent

foreign ownership. Results of the market opening to foreign investment have been very positive. The November 18, 2005 Mercantile Gazette reported a study by Consultant Technique, Ltda. that estimated a 34 percent rate of return on foreign investment for the previous 10 year period in the mining and ferrous metals sector.

Mining Industry Support

With a population of 190 million having a median age of 28 years and a literacy rate of 88 percent, as well as having a mining history that extends to the Portuguese colonial days, Brazil provides established technical capacity and a trained workforce for mining. This capacity is being strained to keep pace with today's level of activity. Technology development and educational systems are also in place to support the expanding mining industry. The Centro de Tecnologia Mineral (Center for Mineral Technology) or CETEM located in Rio de Janeiro is an important federally funded research and development center under the Ministry of Science and Technology.

The federal education system in Brazil includes 16 universities offering courses in geology, geochemistry and

geostatistics and seven universities offering degrees in mining engineering. The mining engineering curriculum in Brazil for the first awarded degree is a 5 year program with an equal emphasis on mining and on mineral processing. The second degree is commonly taken to specialize in either the extractive aspects of mining or the area of mineral processing. Advanced degrees, obtained both nationally and internationally, are common with mining professionals in Brazil.

There is an established infrastructure system (ports, power supply, roads and railroads) to serve the Iron Quadrangle in Minas Gerais state and the Carajas region of Pará state. The investments made to develop the iron ore deposits of the Carajas region have been largely responsible for the feasibility of development of the copper, manganese and nickel deposits in that area. The infrastructure capacity is being increased with expansion of Vale's railroad from Carajas mines to the port facility. Capacity of the shipping ports is scheduled to increase from 500 million to 700 million tonnes per year between 2006 and 2007. The geographic extent of the country results in heavy reliance on air transportation for people and freight. The capacity of this system is being stressed with the broader expansion of the Brazilian economy. Limitations on the capacity of the air traffic control system combined with increased safeguards following two recent air

accidents has resulted in frequent delays and common cancellations of flights.

Infrastructure outside the Carajas region and the Iron Quadrangle of Minas Gerais state is frequently lacking, particularly in the areas of exploration focus in northern and western regions of Brazil. As new mineral deposits are identified outside the established mining districts; limitations of roads, power and railroads may well be controlling factors for project development.

Regulatory Structure

The 1988 Federal Constitution defines mineral resources as assets of the Federal Government. The legal right to mine is provided in the form of a Mining Decree in accordance with the Mining Code that was originally established under Decree Law No. 227, dated February 28, 1967. There is a separation of the surface and mineral rights, therefore, a company may hold valid mineral rights but must still negotiate with the surface rights holder. There is a legal process for the equivalent of condemnation of the surface rights if a negotiated settlement with the surface owner cannot be reached.

The Mining Code addresses both prospecting permits and the Mining Decree, which is issued after the project proponent has demonstrated the technical and economic viability of the project. The Mining Decree,

along with the appropriate environmental permits form the basis of the right to mine. The Departamento Nacional de Produção Mineral (National Department of Mineral Production) or DNPM is responsible for issuing the licenses under the Mining Code. DNPM maintains a website (www.dnpm.gov.br) that includes an online copy of a useful document entitled "Mineral Business – An Investors Guide in Brazil".

The Federal Constitution also addresses environmental and social impacts of mining projects. There is concurrent authority by the Federal, State and Local governments over environmental aspects of mining. The overall environmental regulations are developed by the Ministério do Meio Ambiente (Ministry of Environment) and implemented by the Conselho Nacional do Meio Ambiente (National Council of Environment) or CONAMA which formulates the standards and policies to implement the environmental regulations. Actual control and supervision of the environmental licensing process is with the Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis (Brazilian Institute of Environment and Renewable Resources) or IBAMA.

In certain situations IBAMA is the lead licensing entity but in general, IBAMA oversees the review and authorization of environmental licenses by state environmental

protection agencies. Environmental licenses for new mining operations are provided in three stages: a Preliminary License at the time the environmental impact analysis has been approved, a Construction or Installation License at the time detailed design of the facility is completed and determined to comply with the requirements established in the PL, and an Operating License (OL) at the time the project is constructed and has been determined to comply with the environmental standards. The licenses have a term of 2 to 5 years with renewal based on environmental compliance.

Current Industry Activity

Project development and production data for Brazil are regularly and widely reported in the mining press and company news releases. Production of iron ore continues at ever increasing production rates. Limitations in transportation and port capacity are currently the primary constraints. Major companies such as Vale (formerly CVRD), Samarco (Vale and BHP-Billiton), Rio Tinto and CSN are all planning significant production expansions. MMX Mineração & Metálicos S.A. is a new player in the iron ore segment, having acquired mineral deposits in Matto Grosso do Sul, Minas Gerais, Amapá states since 2005. MMX has partnered with Cleveland Cliffs on the Amapá system and Anglo America on the Minas-Rio system in Minas Gerais state. Small scale producers are also active in acquisitions and

expansions, as demonstrated by the mid-year 2007 acquisition of Minas Itatiaucu in the Serra Azul region of Minas Gerais State by London Mining.

Since Brazil has become more available to international mining companies, there has been an increased focus on nickel. Projects under development by Vale, Anglo American Brasil, and Xstrata reflect increasing confidence in the ability to treat nickel laterite ores by pyrometallurgical as well as hydrometallurgical methods. The Australian based Mirabela Nickel company adds to this activity with their planned construction of the Santa Rita nickel sulfide project in Bahia state using flotation processing to produce a nickel concentrate.

In 2003, Brazil had only the Caraiba Metais copper mine located in Bahia state in production. Copper production has increased from 27,900 tonnes in 2003 to 163,000 tonnes in 2006 and the Brazil Copper Association is projecting 368,000 tonnes in 2010. Projects that have come on line include Yamana Gold's Chapada project and Vale's Sossego Mine. Research by Vale into hydrometallurgical processing of copper concentrates from the Carajas region may change the economics of future copper projects. Regardless of the hydrometallurgical research outcome, Vale is advancing projects such as the Alemão

Project, an underground extension of the Igarapé Bahia open pit, the Salobo project, and the Alvo-118 project. Mineração Caríba recently invested a reported \$US 80 million to purchase Codelco's exploration license for the Boa Esperança advanced exploration copper deposit.

A significant change to the Brazilian mining industry has been the entry of large, midsize and junior US, Canadian and Australian companies both in exploration and project operation. Kinross entered Brazil through acquisition of TVX and implemented a \$US470 million expansion for the Paracatu gold mine. Yamana Gold has exhibited success both in developing projects like their Chapada mine as well as acquiring and operating existing mines. Eldorado Gold and Jaguar Mining have acquired mines and also have active exploration and project development activities. The Canadian Canico Resources Corp. acquired the Onça Puma nickel project in 2002 and advanced the project to the feasibility stage. At that time the project was acquired by Vale and is currently under construction.

Bauxite and related alumina production in Brazil may be overshadowed by the activity in precious metals, base metals and nickel, but remains active. Vale has announced investing \$US 196 million for a 244 km concentrate pipeline from the Paragominas Mine. Alcoa is investing US\$1.6

billion in Brazil, including a 2.6 million tonne per year bauxite mine at Juriti in Pará state. Votorantim Group's Companhia Brasileira de Alumínio is planning a \$US 700 million investment in plant construction, infrastructure and a new mine in Minas Gerais state.

Brazil also has coal and oil shale resources primarily in the southern states of Rio Grande do Sul, Santa Catarina, and Paraná. Total coal resources are estimated at 32 billion tonnes and annual production is on the order of 12 million tonnes. Coal tends to be low thermal value with high ash and sulfur. Use is primarily for local thermal power plants. Mining is primarily by underground methods, although the country's largest producer, Companhia Riograndense de Mineração has open pit operations. A moderate expansion of the Brazilian coal industry is planned due to expansion of thermal powerplant capacity in the south of the country.

Oil shale resources of 700 million barrels of oil have been estimated by Petrobras in Rio Grande do Sul, Santa Catarina, Paraná and Goiás states. Petrobras is currently processing oil shale using the

Petrosix process developed by Petrobras, beginning in the 1950s. The plant is located in Paraná state. It is reported that 7,800 tonnes per day of oil shale is processed to produce fuel oil, asphalt, naphtha and liquefied petroleum gas.

The 1988 Constitution provide a government monopoly on uranium exploration and production. With the world market for enriched uranium, this is a topic of discussion within the country. Opening this to private companies is being lobbied by the mining industry.

Brazil's contains a significant portion of the world's resources of important minerals with low production rates such as graphite (27%), niobium (96%), and tantalum (46%). The DNPM reports that these commodities represented about \$US 500 million annual revenues as contrasted to \$US 15 billion for the ferrous mineral segments.

Brazil's historic production of gemstones has also seen increased activity with diamonds receiving exploration and project development attention. Vaaldiam Resources Ltd. commenced

production at the Duas Barras deposit in 2007 and is advancing exploration at the Pimenta Bueno area in western Brazil as a joint venture with Rio Tinto. Brazilian Diamonds Ltd. has active exploration programs in a number of areas in Minas Gerais and Bahia states.

Sources for Additional Information

In addition to the DNPM website previously referenced, other resource for information on Brazilian mining industry can be found as follows:

Instituto Brasileiro de Mineração (IBRAM) <http://www.ibram.org.br/>

Serviço Geológico do Brasil (Companhia de Pesquisa de Recursos Minerais) <http://www.cprm.gov.br/>

Centro de Tecnologia Mineral (CETEM) <http://www.cetem.gov.br/>

This months news letter was prepared by Darrel Buffington, P.E., Vice President of Environmental and Process Engineering, in collaboration with Vinicius Alvarenga, Director of Lyon Engenharia, a Belo Horizonte based engineering and project management company.



Happy Holidays from all of us at PAH!



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