

Robyn Storer
Westhouse Securities LLC

Testimony
Before the Committee on Resources
Subcommittee on Energy and Mineral Resources
United States House of Representatives

May 18, 2006

THE COPPER MINING INDUSTRY: THE CHALLENGE TO MEET DEMAND

Mr Chairman, members of the Committee, I am Robyn Storer, Consultant Mining Analyst for Westhouse Securities in London.

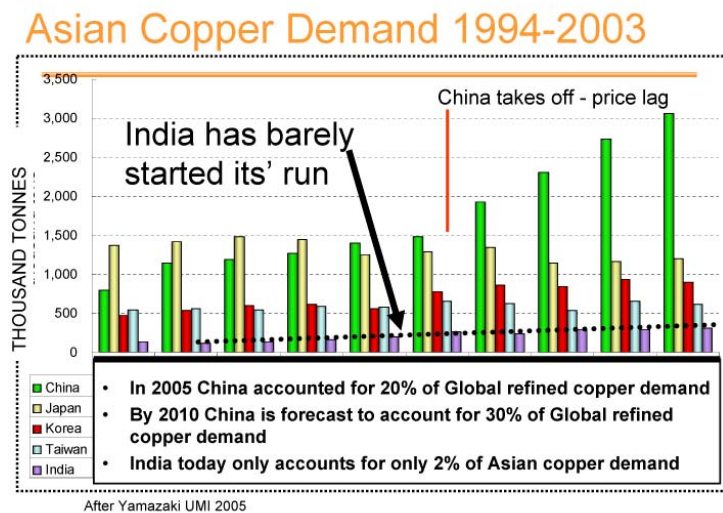
I am pleased to have the opportunity to speak with you today regarding the Daunting Challenge the Copper Mining Industry Faces to Meet the Growth in World Demand.

DEMAND DRIVERS

Demand for copper, and metals in general, is growing worldwide.

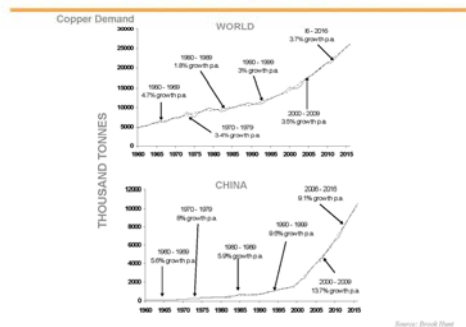
GDP and investment are rising in the emerging economies of China, India, Russia Brazil and elsewhere, and will continue to rise, as people in these countries work towards bringing a North American standard of living to their families. There are over 2.3 billion Chinese and Indians today, nearly 40% of the world's population; by 2050 this figure is forecast to rise to 3.2 billion.

Fig. 1



This demand for housing, automobiles, telephones, white goods and electronics – and in turn for the commodities that are the building blocks of these products means that these economies will need to consume mountains or, in the mining context, great pits of metals, to realise the dream of urbanization, industrialisation and consumerism. Fig. 2

Growth in Copper Demand



However, the growth in demand for copper is not restricted to these fast growing emerging economies.

Copper is what I like to term a 'modern metal', a metal with a long past, but a bright future.

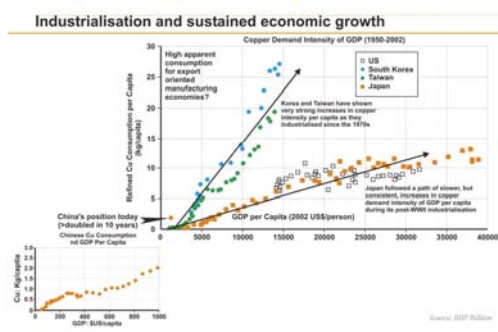
The electrical characteristics of copper make it an essential component of modern electronics. Whilst it seems obvious that copper helps runs our televisions and computers, less obvious are some other electrical applications. A modern family car today contains some 50lbs of copper and over a mile of copper wiring. However, it would be a mistake to assume that this is solely the result of the introduction of power windows, GPS systems and video monitors to entertain the children.

A significant proportion of the increase in copper in vehicles has been under the hood applications, where electrical motors have replaced moving mechanical parts, boosting fuel efficiency and lowering fuel consumption. In this respect, the move to hybrid cars, vehicles containing on average 100 lbs of copper, is just an extension of this trend.

MAJOR NEW MINE DEVELOPMENTS NEEDED

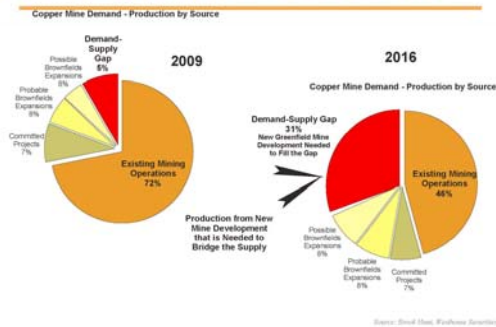
Thus projected growth in demand for copper mine production of some 3.7% per annum (**Fig. 3**) over the next decade, translates into a growth from the current, just under 13 million tonnes per year of mined copper production to a number close to 20 million tonnes per year.

Copper Usage Increases with GDP



Allowing for the inevitable closure of some mines through reserve depletion, this means that by 2016 less than half of world demand for copper mine supply can be met from production from existing mines. **Fig. 4.**

The Challenge to Meet Demand



Brownfields expansions at existing operations can meet only a small part of the projected increase in demand.

The balance will need to come from new mine developments.

WILL THERE BE SUFFICIENT NEW MINE DEVELOPMENT TO MEET DEMAND ?

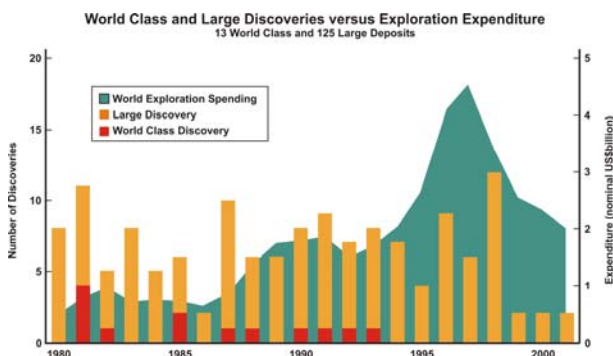
Will there be sufficient new mines in production by the middle of the next decade to meet demand ?

On current projections, the answer to this is question, is NO.

The world needs the equivalent of 30 new major mines by 2016 to meet the projected growth in demand.

However, new green fields mining projects few.

The reasons for this are: firstly, a period of prolonged underinvestment in exploration which has restricted the number of discoveries. (**Fig. 4a**) Secondly, the poor allocation of those exploration dollars which, for example, saw almost two thirds of the world's mineral exploration budget in 2004 spent on the search for gold and diamonds.



Not only has the mining industry not kept pace with the growth in demand, it is struggling to hold its ground. Worldwide, significant copper discoveries between 1998 and 2004 fell well short of what was needed to replace mine production. The growth in demand has meant that whilst 10 years ago the Industry needed to find 2.4 Mt of mineable copper to replace daily production; by 2005 this figure had risen to 4 Mt per day. This means that rate of discoveries to replenish daily production needed to increase by about 66%, in reality; it rose by only 25%.

SHORTAGE OF NEW PROJECTS IN THE PIPELINE

This shortage on new projects in the pipeline is a major issue for the Industry.

The rule of thumb is that it takes eight years from discovery to mine development. However, lead times can be significantly longer than this.

Aggravating the speed of new mine development is the increasing concentration in the mining industry, with fewer and larger companies.

This means major mine development decisions are now, by and large, in the hands companies who, by their very nature, tend to be more conservative decision takers. In the case of copper, only nine companies now produce half of the world's copper mine production.

Concentration is not all bad; given that major mine development costs usually run in the order of 1.5 to 2 billion dollars, only large companies can finance such projects.

However, the concentration in the industry is certainly a contributing factor to Chinese concern over future supply, and the consequent Chinese push to acquire companies, for example, MinMetals unsuccessful bid for Noranda last year, and to the growing investments by Chinese companies in new project development, in exchange for off-take rights.

Lead times for mine developments have also increased with the increased level of regulation and time taken over permitting.

INCREASINGLY COPPER MINE PRODUCTION WILL COME FROM NEW MINING AREAS

Another challenge facing the Industry is that it will need to develop mines in new regions of the world.

The occurrence of copper deposits is controlled by geology - with large deposits predominantly confined to modern or ancient continental margins. **Fig. 5**

Exploration for Porphyry Copper Deposits



1. the USA has a number of known but as yet undeveloped major copper deposits: the two largest by far being: Resolution in Arizona (which is planned to replace copper mined from Bingham Canyon when that mines begins to runs out of ore resources in 2017) and the large Pebble copper-gold deposit in Alaska.

However, Phelps Dodge's Safford mine development, still contingent on certain permit approvals, will be the first new major copper mine to be opened in the USA in over 30 years.

This lack of new mine development in the USA means that today the USA produces only half of the copper it consumes, a shortfall of 1 million tonnes per year.

2. B.C. in Canada has a number of large, but low grade copper deposits which can be brought on stream

However, with the difficulties and delays of permitting and the worrying trend to a 'not in my backyard' approach to new mine development in North America, then the backyards in which the major copper mine supply growth of the future will increasingly come from are:

1. Expansions of existing operations and some new mine developments in **Chile** - but to some extent this is only compensate for mine closures and the drop in ore grades;

2. The development of known deposits and yet to be discovered copper deposits in **Peru**. However, worrying is the recent political rhetoric of nationalisation in Peru, coming hard on the heels of the nationalisation policies emerging in Venezuela and Bolivia;

3. **China, Tibet and Mongolia** – the large, slowly developing Oyu Tolgoi copper deposit in Mongolia and the development if a number of mid-sized to large copper deposits in Tibet; will go to help feed the hungry Chinese copper market;

4. The **Philippines**, although the political situation in the Philippines has been a major source of development delays;

5. **Pakistan**, with the major Reko Diq copper deposit recently purchased by a consortium of Antofagasta and Barrick; but questions exist about security and stability in this region;

6. And of course the DRC, the **Congo** where a number of major and junior companies are looking to develop mining operations. However, political considerations, the long, 1500 km transportation distances to the coast and lack of infrastructure such as power generation – will not see the Congo reach anything like its mineral production potential in under several decades, at least.

After these areas, my pick of exploration areas for the next major discoveries are: the **Far East of Russia** – in similar geological terrain to Nth America, **Angola**, part of the central African copper belt and across the border from Pakistan, in **Iran** and along the same belt into **Turkey**.

CONCLUSION

So, in conclusion, there is no easy answer to where the next and subsequent generations of copper mine supply will come from, to supply an increasingly copper hungry world.

Thank you.