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Mining in the next 20 years

Dr. Norman B. Keevil

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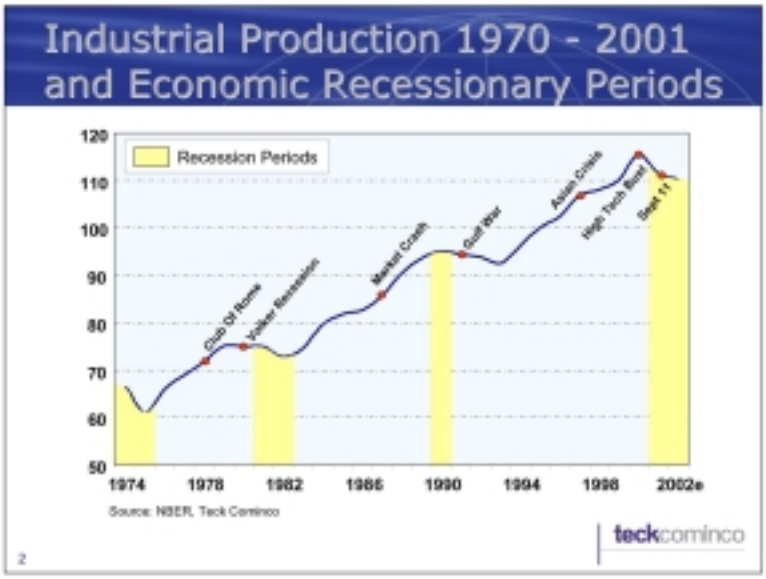
Mining Over the Next 20 Years

It's a bit of a challenge to speak on where the mining industry will be over the next 20 years, because most such projections in the past have turned out to be way off base.

However, I do have the advantage of being at a certain age, such that if I am wrong I may not be around to have to defend it, and if I am I probably won't care.



SLIDE 2 If we look back 20 years we had just passed through the famous Club of Rome days, in which the adherents thought the world was entering into what they called "a new era of resource scarcity".

Whether cause or effect, inflation had been rampant, leading to interest rates reaching as high as 20%. This was followed by a clamping down by the US FED, leading to the most severe recession most of us ever experienced.

As a result, many of us who had been super-optimists a few years earlier had suddenly become super-pessimists, and the watchwords exactly 20 years ago were to "cut costs and survive".

Does this sound familiar?

One of the recurrent problems we have in this business, and probably in lots of businesses, is a natural tendency to project the present into the future.

As a result, when things are looking good, and prices are up, we tend to think this is some sort of new era and make decisions to expand mines or develop new ones.

Similarly, when things are bad and prices are down, we find ways to convince ourselves that the world has changed -- that we are into a different new era when things will always be bad, and we make our decisions accordingly.

Three years ago all of the major zinc companies had long term price forecasts in the 55 cents range. Most long term copper forecasts were in the order of a dollar a pound.

Now we all use lower projections, but they are all over the map. I know of one large company that uses a long term price of 80 cents copper, which is probably

unrealistically low, and another that uses 95 cents – the latter on the basis that "if we didn't use 95 cents we couldn't buy anything".

To this one wag suggested, "Why don't they use $1.50? Then they could buy everything".

The fact is -- it is hard for any of us to ignore the hard realities of the present, whatever they are at any given time.

If the present is good, and prices and profits are high, then our investors press us to expand. Conversely, when prices are low and profits disappear, we are urged to pull in our horns and cut costs. It is not easy in either case to be contrarian.

But what are the softer realities? What are the recent trends from which we might draw conclusions?

I think there are at least seven which may be relevant.

SLIDE 3 These are:

First:	The trend towards industry consolidation.
Second:	A secular decline in real terms in many commodity prices.
Third:	A tendency to create overcapacity in many products – a tendency which is not restricted to mining.
Fourth:	The advent of new processing technology in some products.
Fifth:	The emergence of China as a major demand centre for our products.
Sixth:	The ongoing need for new supply sources to meet growing demand and as existing mines are depleted, and
Seventh:	Changes in the geopolitical landscape, with mining encouraged more in new areas and discouraged in some historic ones.

Some of these are inter-related, and I'm sure some of you could add others.

Industry consolidation:

Let's start with industry consolidation.

We've all noted the wave of mergers and acquisitions which has occurred over the last few years. Egged on by institutional investors, many of whom have demanded the liquidity that large capitalization gives, the watchword – as Pat James of Rio Algom said – was "Size Matters". Rio Algom itself was shortly thereafter a victim of this.

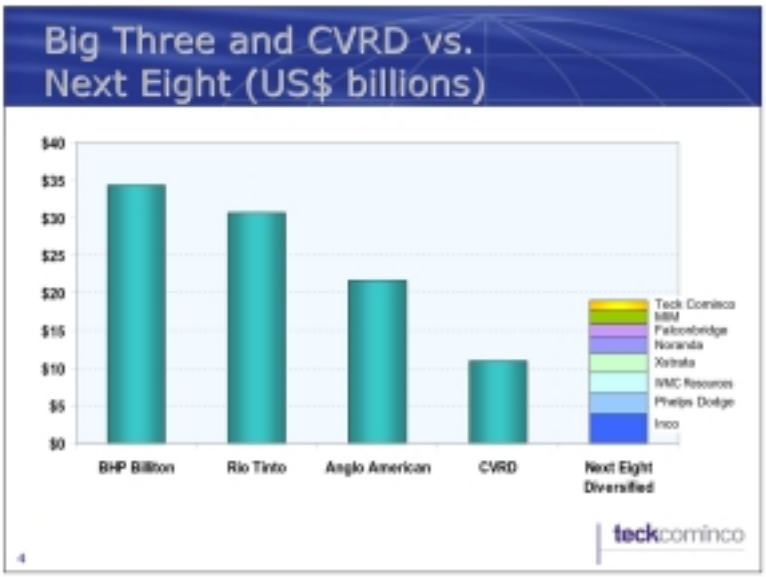
This, combined with simple opportunism, has resulted in a consolidation frenzy in both the gold and base metals side of our industry, not to mention coal and iron ore.

For simplicity, I am going to confine my remarks to the industrial or base metals – although many of the conclusions could apply to gold, diamonds and coal as well.

Historic names like ASARCO disappeared into Grupo Mexico, Cyprus into Phelps Dodge, North and Ashton into Rio Tinto, and Rio Algom into Billiton, which itself arguably has disappeared into BHP. Our own Teck and Cominco merged into one company. MIM is in talks with Xstrata and will likely be gone as well.

WMC in Australia appears to be the exception, with its "demerger" into separate aluminum and mining companies, but that itself may just be a prelude to these two being swallowed up by others.

In Canada, we are now down to three large non-gold mining companies, Inco, Teck Cominco and the Noranda-Falconbridge combination. This compares with six only a few years ago.



SLIDE 4 We now have three large world mining companies: BHP Billiton, Rio Tinto and Anglo American, each with a market cap exceeding US $20 billion. CVRD is in fourth place at just over $10 billion – followed by the rest of us.

None of these is based in North America.

If we put the eight largest of the rest of us together, WMC, Inco, Xstrata, PD, Noranda, Falconbridge, Teck Cominco and MIM, the combination would still be smaller than Anglo, the smallest of the big three!

That is humbling, and it is also not likely to happen.

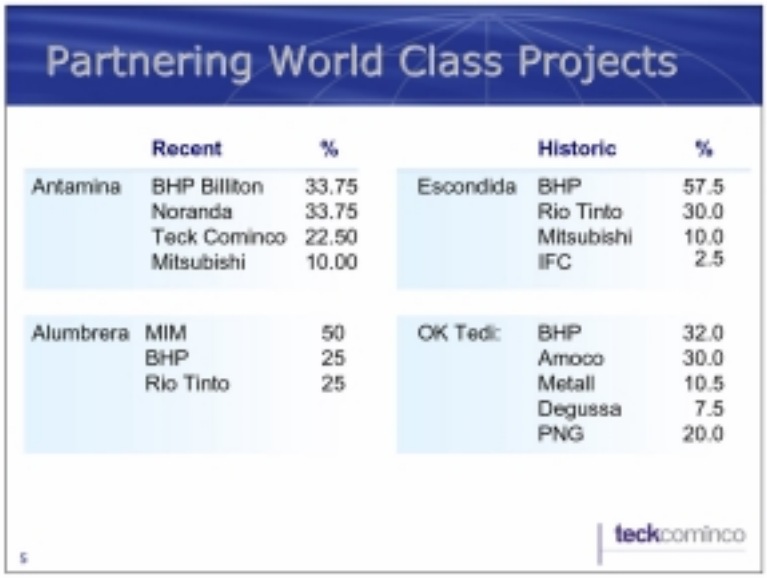
There may well be smaller combinations, such as Xstrata and MIM, depending upon perceived synergies, but the point is that these will not significantly alter the relative landscape of three mega-companies and the others.

An interesting question is, ”Does it matter”?

The interest of some institutions in large caps aside, it seems to me that it must be much more difficult to grow shareholder value in a $30 billion company than in one an order of magnitude smaller.

In our business there are only a limited number of opportunities out there to add real value at any given time. The larger you are, the larger the opportunity has to be to make the same difference, and there have to be fewer and fewer of them available.

In this context size matters only to the extent that one must achieve a certain critical mass to be a player, and that mass in not $30 billion, which in fact is probably an impediment.



SLIDE 5 There are some projects which are so large that they may be beyond the scope of a single company, and our recent US $2 billion Antamina mine is a good example.

But the solution there was to put together a joint venture between Rio Algom, Noranda and Teck, who together had the financial as well as technical capacity to pull it off.

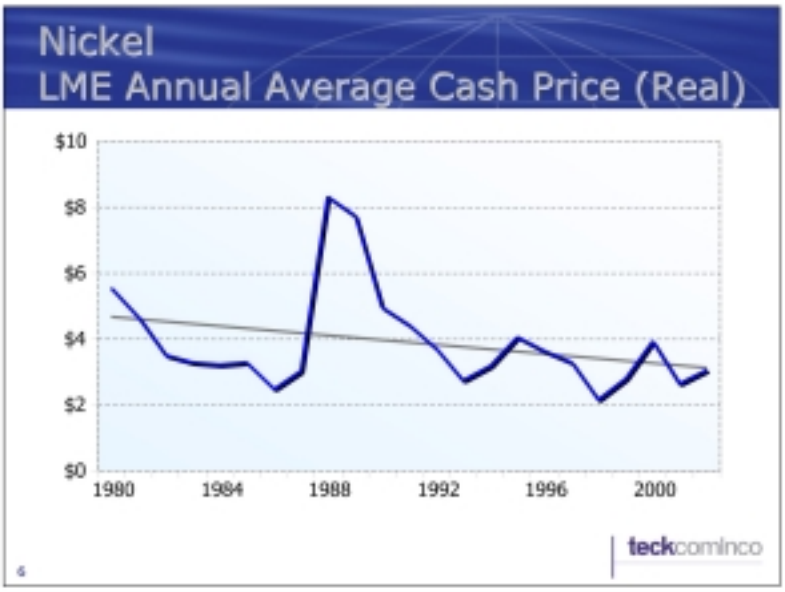
This slide shows some other examples of joint ventures in the industry. Large or risky projects are made to order for this formula.

To sum up, I think the era of consolidation will continue, as it has in the past from time to time, but that it will likely be driven by opportunities and synergies rather than by the need to be bigger for its own sake.

Where particular projects require size, it can and will often be achieved through joint ventures, as good companies in the second tier develop the working relationships that make them feel comfortable in these.

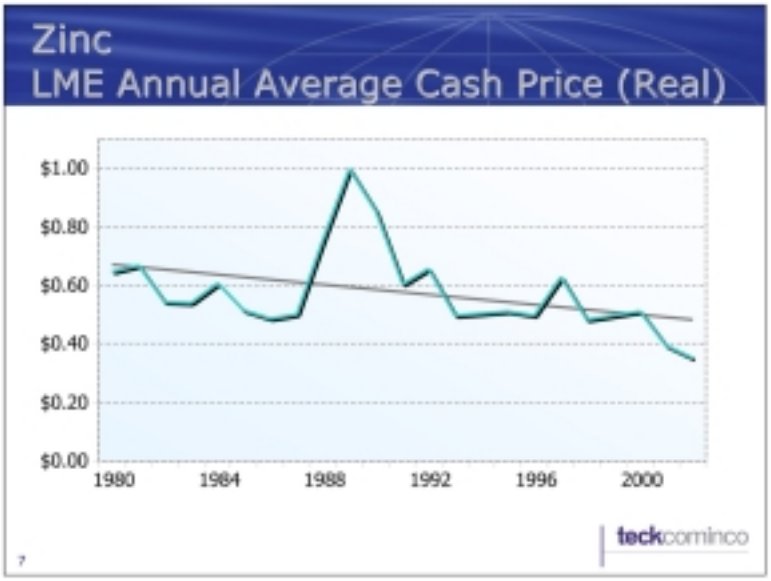
Secular price decline:

The second trend is the familiar “secular decline” in the real price of many of our commodities.



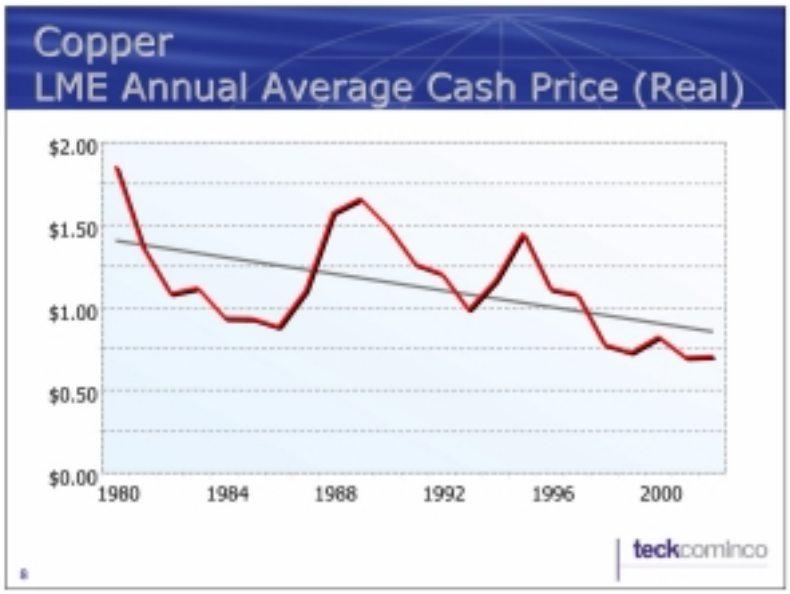
SLIDE 6 If we look at nickel, the price in real terms is lower today than it was in 1988, but with some fluctuations It has been remarkably steady for the last 20 years. One can fit a declining trend line onto this, but the argument is not overly compelling.

However, nickel may be the exception that proves the rule.



SLIDE 7 If we look at 20 year zinc the trend line is definitely down.

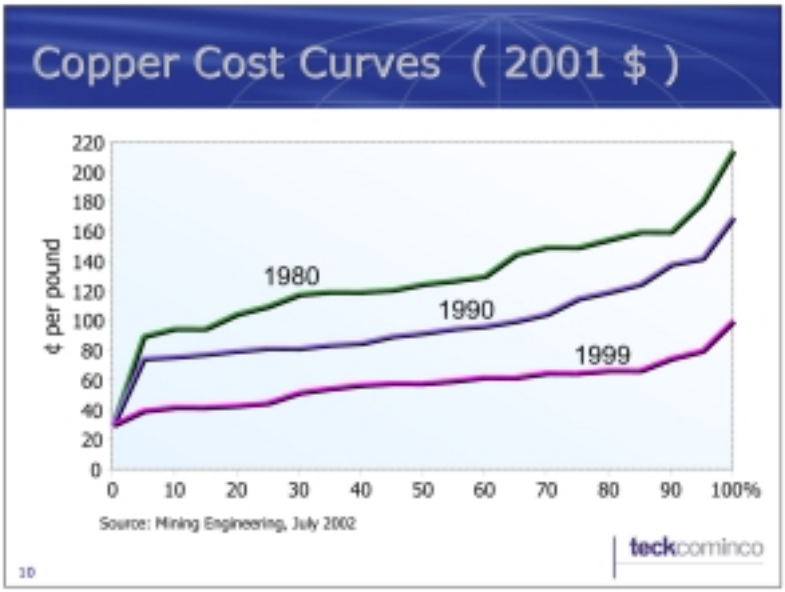
It is fair to say, though, that if we took out the low price of the last two years and the peak around 1989 as being aberrations, one would draw a much flatter trend line – down, but not by as much.



SLIDE 8 The 20 year case for copper is less clear, because it has fluctuated more dramatically. If the price were to recover in a couple of years, as it has tended to do every 6 or 7 years, historians of the day would draw a new, flatter trend line.

SLIDE 9 On the other hand, if we look back on 40 years of copper prices, the declining trend seems inexorable. If we project this to the year 2022, the end of today's forecast period, the price will be less than zero.

Now this may happen if the metal is replaced in its entirety, but that is not likely to occur. Failing that, the 40 year trend line will have to be broken, if not reversed.



SLIDE 10 One of the reasons for this decline is a decline in the cost curve, as this slide illustrates, The median cost of producing a pound of copper in 1999 was about half that of 20 years earlier, and I'll come back to that.

Overcapacity:

SLIDE 11 This decline in commodity prices in real terms is not restricted to metals. It has occurred in the so-called high tech sector as well, with the price of memory chips, cell phones, computers, DVD players, and so on falling with time. It has also occurred in things like automobiles, where world production capacity is at least 50% higher than demand, leading to intense competition.

In most cases this has been a result of industry building up production capacity and lowering unit costs, sometimes leading to overcapacity, and in the high tech case augmented by technical innovation.

The natural instinct of people, when demand is strong, is to find ways to increase production and productive capacity.

SLIDE 12 This is compounded by the fetish for growth that infects the investment community in good times, lending encouragement to people to develop new production or to expand existing capacity.

Ironically, some people in our business go so far as to increase production in bad times as well, in the mistaken belief that this will somehow improve their position by lowering unit costs. We hear otherwise-intelligent zinc refiners say that the last pound of zinc they produce is the cheapest, so when the demand is down they will increase production!

That is another story, and fortunately most businesses are a bit more far-sighted.

But this natural tendency towards creating overcapacity is a fact of life in any commodity which has few barriers to entry, whether it be copper, consumer products or investment banking – and usually tends to lower prices in real terms over time for those sectors which, unlike investment banking, are capital intensive and relatively inelastic.

Will the trend towards consolidation help to correct this? Will it result in a better-disciplined industry?

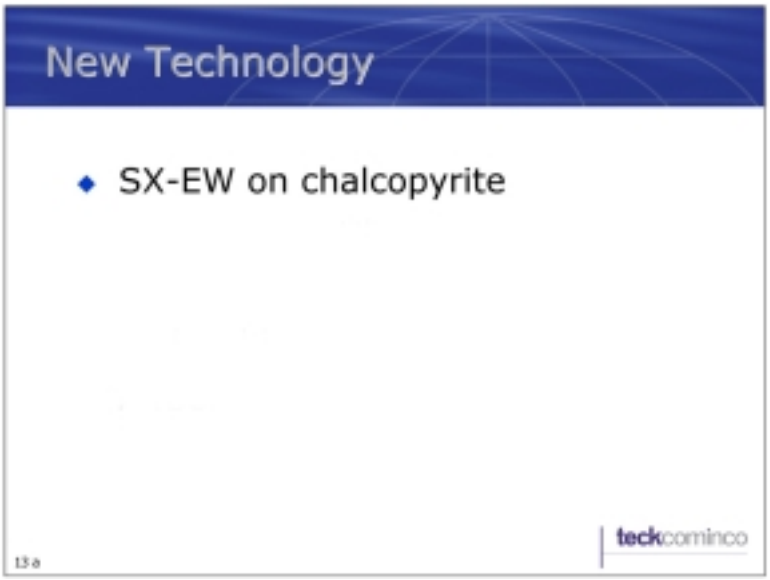
Some people are optimistic that it will -- and it may -- but I'm a bit from Missouri on this.

The investment community pressures on larger companies to grow in good times are just as great as on smaller ones. We are all as guilty as the next guy of making expansion decisions when the opportunity is there, and of blaming the rest of the industry when the fallout occurs.

So my prediction is that we will all keep our horns pulled in for the next little while, while prices remain low, but that we will revert to “normal” once that period is past us. “Normal” means we will succumb to the natural pressures to build and expand when prices recover, aided by what appears to be another “new era” of expected long term prices.

If this is true, over the next 20 years we will continue to have cyclical prices, with periodic downturns as the results of our enthusiasm come home to roost.

Technological Innovation:



SLIDE 13 (a)

The other factor leading to lower prices has been a reduction in real costs, led by technological innovation.

The decline in the cost curve for copper which we showed is the most dramatic, coming down by 50% over 20 years.

Will this continue?

The main reason, as we all know, has been the advent of the SX-EW process on a large scale.

Initially applied to oxide copper, it has been extended to chalcocite orebodies, and there is work going on which could possibly take this further into chalcopyrite deposits.

It is probably fair to assume that the number of available oxide and chalcocite deposits to benefit from this technology will be less in the future, as the industry has worked through its inventory of the more obvious ones.

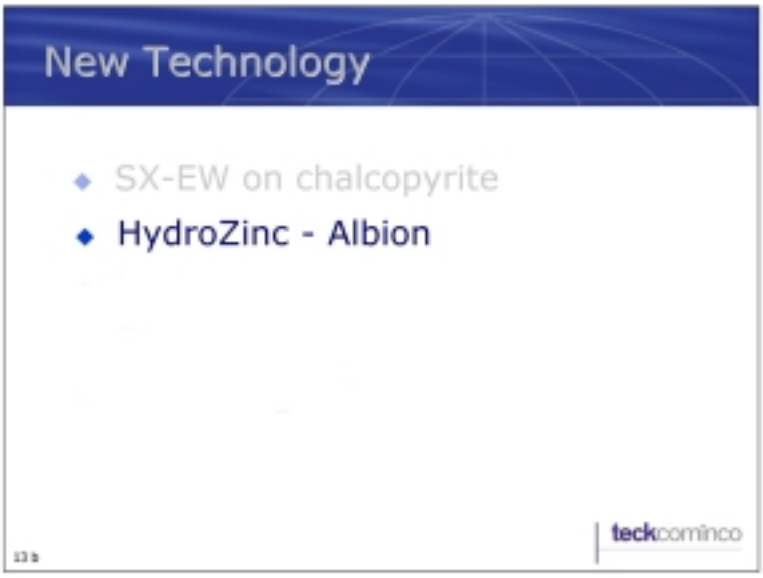
If so, we have probably seen the worst -- or the best depending on your point of view -- of the decline in the cost curve from this source – unless it can be extended with similar results to chalcopyrite orebodies.

Nevertheless, it does mean that we have a new class of potential deposit types that was not there 20 years ago, so that oxide deposits that are considered marginal today may

be there to compete with today's marginal deposits of a more historic type – such as porphyry copper or VMS – as new mines are required in the years to come.

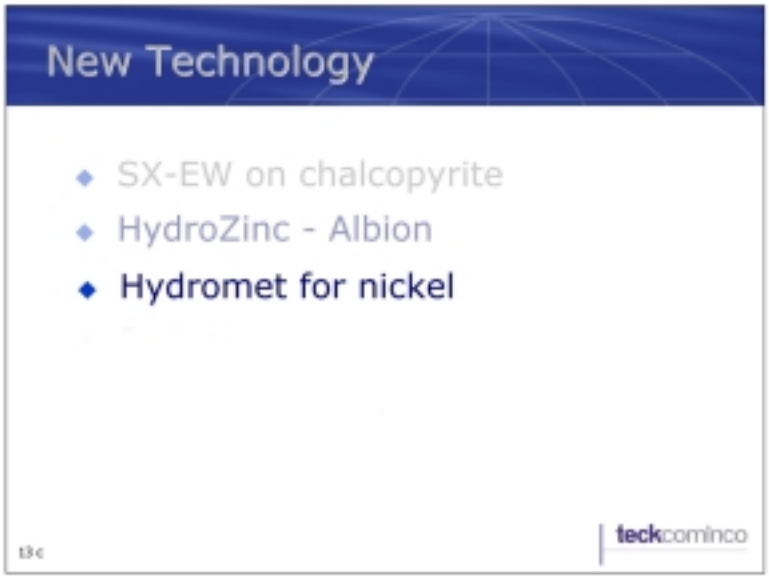
In zinc, today's production is still coming from historic deposit types, but a number of companies are working on processes for oxide zinc and these will become a factor, led by Anglo's new Skorpion deposit in Namibia.

The difference is that there are relatively few known zinc oxide deposits of any size, and if this is a fact of geological nature rather than the fact we have not historically explored for them, then this is less likely to have a major impact on the broader zinc business.



SLIDE 13 (b)

Some of us are also working on hydrometallurgical processes that seem likely to be applicable to sulphide zinc deposits: our own HydroZinc and MIM's Albion processes are examples – and these may result in known metallurgically difficult deposits like McArthur River in Australia and Gamsberg in South Africa becoming more attractive.



SLIDE 13 (c)

In nickel, hydrometallurgy is expected to become dominant, replacing the more costly and less environmentally-friendly pyrometallurgical complexes of the past. This will tend to lower the cost curve, quite possibly to a similar extent as that which occurred in copper, particularly as this technology becomes proven for sulphide nickel orebodies.

Hydrometallurgy will likely be a key factor in making metallurgically-challenged copper projects, such as some of those in Brazil, economic. Many deposits that have proven problematic for conventional smelting are amenable to hydromet, and these could become a large new source of copper in the last part of this decade.

SLIDE 13 (d)

Finally, there are developments in bioleaching that are already in advanced development for nickel, copper and zinc. The gradual and project-specific adoption of these technologies will take time and some degree of risk, but they are likely to happen, and to be a factor in the future.

SLIDE 13 (e)

There are advances in exploration technology as well, with perhaps one of the most interesting being BHP's airborne gravity system, known as Falcon.

This has direct application to diamond exploration, but also has promise for other deposit types such as massive sulphides, as well as indirect application as a tool to help map deep-seated geological trends.

What does this mean for the next 20 years?

First, these comments are based on currently-known technological improvements. The chances are there will be others we don't presently foresee, but these usually take time to develop and prove.

My guess is that, with the possible exception of nickel, these will not continue to lower the cost curve to the extent we have seen in copper, where SX-EW was applicable to a large number of known deposits.

What it will do is make some deposits economic which were marginal before, giving us more potential sources of new supply, over and above conventional discoveries.

If the impact is less on costs than on potential supply, then the bottom line for a healthy business will be whether the industry at large has the discipline to do a better job of matching that supply to demand than we have at times in the past.

Market Development; China:

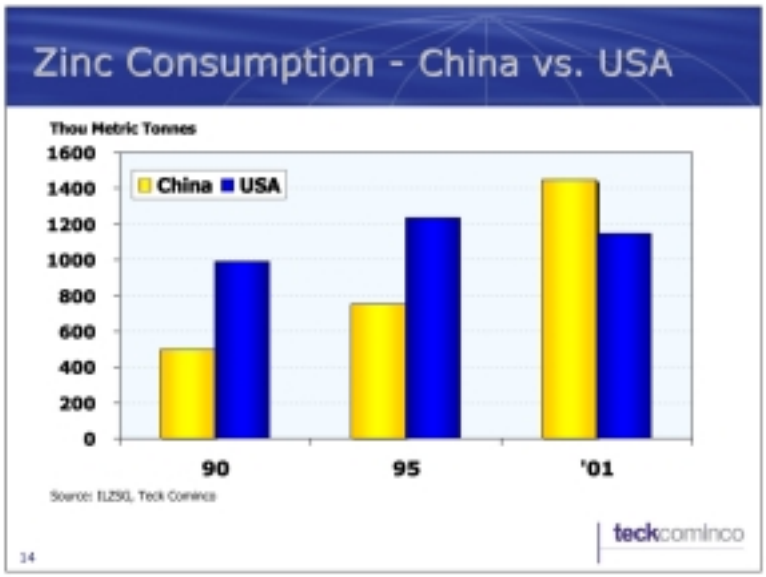
Turning to markets, the long term trend in consumption growth in both copper and zinc has been remarkably steady, at about 1.5% for zinc and 2.5% for copper.

However this obscures the fact that there have been different drivers for this growth in different eras.

In the developed world, intensity of use for copper plateaued for many years, although with the high tech boom of the 90's it began to increase again.

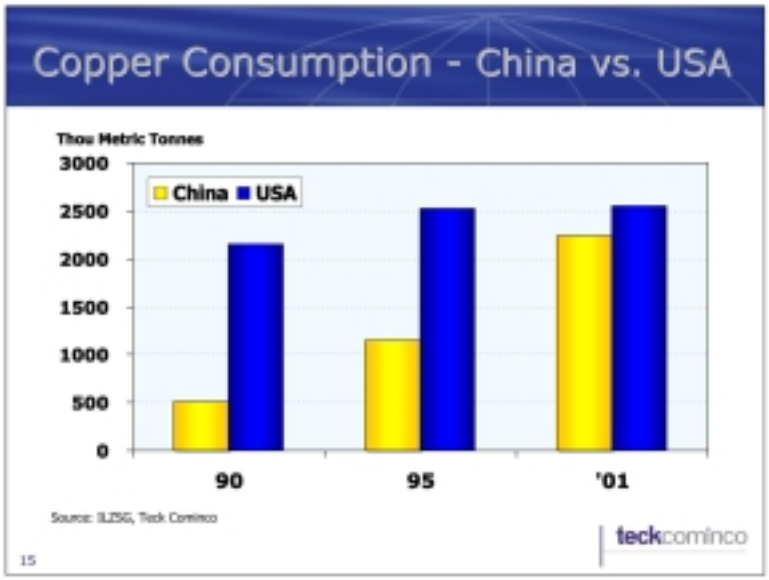
In the meantime, there was a buildup in usage first in Japan and then in the Tiger economies, so that overall world consumption growth has been fairly steady.

More recently China has emerged as a major factor.



SLIDE 14

This slide shows growth in consumption of zinc in China compared with the US from 1990 through 2001. Consumption in China has tripled, and is now higher than in the US.



SLIDE 15 The trend is even more dramatic for copper, with Chinese consumption more than quadrupling over the same period, and it is now almost as high as in the US.

Macquarie Bank recently predicted that "….by 2005 China will be the largest consuming country in the world in every metal traded on the LME: copper, aluminum, zinc, nickel, lead and tin…".

SLIDE 16 Intensity of use is a measure of per capita consumption. This slide shows how copper and zinc consumption have grown relative to world population growth in the last 20 years.

The trend line for copper increased in the early 90's, partly with the boom in information technology but in considerable part due to Chinese demand.

Nickel has shown a similar trend.

The case for zinc is less clear, although there has been a move upwards since the late 90's, modified by the recent recession.

It appears that intensity of use for these metals has been increasing recently, on a world basis, which is not surprising, given the surge in economic growth and living standards in China.

Will this continue?

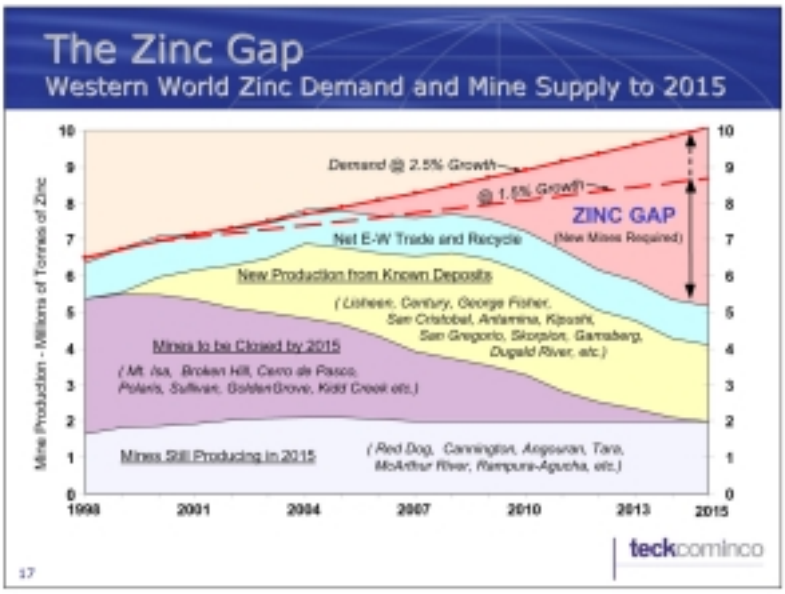
Barring economic calamity, the balance of probabilities is that it will, and that it will be augmented by growth in India. Together, these countries represent about half of the world's population, and they have the same aspirations to improve living standards as people everywhere.

Assuming this, growth in consumption of the major metals should be at least as strong as the long term trend lines for the next decade or more, and could easily be higher.

New Supply Requirements:

This will inevitably mean the need for new supply sources, as our existing mines are depleted and easy brownfields expansion prospects are exhausted.

The key questions are how much – and when?



SLIDE 17 – "The Zinc Gap"

Our own internal projections for zinc – based on existing capacity, expected closures and planned developments and expansions – indicate a concentrate supply gap that is imminent. There is a shortage of mined zinc concentrate today, and while that is partly due to production cuts because of low prices, even at full capacity we can see a chronic supply gap beginning in the next couple of years.

If growth in demand continues at 1.5% a year, and allowing for development of known, large deposits such as Gamsberg, we can see a shortage of mined zinc of as much as 4 million tonnes of metal a year ten years from now.

This is equivalent to the annual production of 8 Red Dogs, currently the largest zinc mine in the world.

For copper, one can argue similarly that we may have to find a way to produce an additional three to five million tonnes of metal a year ten years from now, based upon anticipated closures and demand growth.

This is equivalent to three to five new Escondida's.

That is mind-boggling but, as my friend Robert Friedland says about life itself -- "The situation is hopeless, but it's not serious".

The fact is that we as an industry will find a way to do it.

We will do it in part through new discoveries – so long as we keep looking, and keep developing the talent to do this.

We will do it in part through development of known deposits, but with the possible exception of nickel there is a reason most of these are known but undeveloped. They need either new technology or, in most cases, higher prices.

The bottom line is that there are essentially no significant deposits known that can be economically developed at current copper and zinc prices.

This means that unless demand growth stops or we suddenly find a new class of orebodies, prices for these metals simply have to improve to the point where we can once again develop the necessary new supply.

That is both a hope and a prediction.

Where will we do it?

It seems pretty clear that the necessary discoveries will come in countries or regions in which we are exploring. Few are likely to come where there is little or no exploration!

SLIDE 18 We will obviously be drawn to areas of prospective geology, but also to areas where the rules of the game encourage exploration – and where there is a reasonable chance of turning a prospect into a producing mine on a timely basis.

In the latter respect Australia is good. We were able recently to take a prospect through feasibility study, all necessary approvals including settling an aboriginal land claim, and to build a new gold mine, all within 18 months.

The US is more difficult, with the regulatory process alone taking many years even when there are no significant issues.

Parts of Canada have been difficult. Some jurisdictions are willing to change the rules in mid-stream. Others have been anti-business, let alone anti-mining, for a time. Ottawa has long since lost interest in helping to foment a competitive mining industry.

As a result, the world's largest new mine development in recent years has been in Peru.

The largest exploration project in the world today is in Mongolia, and Ivanhoe will speak to this later this morning.

If China is to become a major consumer, it also has the geological potential to increase its production. We can assume that the natural desire to be self-sufficient will lead it in this direction.

Whether or not Canadian or other Western companies will play a role in this is an interesting question.

SLIDE 19 So to sum up:

1. Barring Armageddon, world demand for the industrial metals will continue to grow, potentially quite dramatically as intensity of use continues to grow in some of the less developed countries.
2. We will need to develop new supply sources to service that increased demand, and we will do that through discoveries and new technology. Success will come to those who think “outside of the box”, and at times are contrarian.
3. Metal prices will have to reflect the cost of filling that supply gap, as and when it occurs.
4. New production will come largely from jurisdictions that encourage mining through rules that are fair and consistent, and refrain from expropriation.
5. Industry consolidation notwithstanding, absolute discipline is unlikely to be invented, the economic cycle will not be abolished, and in due course we will over-perform on the supply side again.

In short, good times are just ahead – but enjoy them while you can!