

The Case for a Greenfields Renaissance

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The collapse in commodity prices in the latter half of 2008, triggered by the Global Financial Crisis, heralded a clear end to the most recent Boom Cycle in the history of the global mining industry. At the beginning of an uncertain 2009, it is opportune to review and reflect on the large scale context in which our industry, and in particular the exploration sector, operates.

The strong increase in global demand for mineral commodities that we saw over the period 2003-2007 was driven by rapid economic growth in East Asia and, to a lesser extent, South Asia. This demand for growth led to an unprecedented global focus on the mineral resource sector. As a result, many major organizations, particularly from East Asia, entered the global mineral commodities market for the first time. An initial focus on buying minerals produced by others rapidly evolved to a move upstream to secure the primary sources of mineral production. This trend, together with prevailing high prices for mineral commodities, resulted in strong price increases for the pool of known, undeveloped and available mineral assets, most of which were discovered decades ago and remained undeveloped because they were of fundamentally poorer quality than those assets which *were* put into production.

With the benefit of hindsight, it is now possible to see that the prices paid for many of these assets were significantly greater than their underlying value. In fact, many of them are probably unlikely to be economically viable under any foreseeable set of long-term conditions. Their initial acquisition could only have been justified by a world-view that assumed that a structural shift in the global economy had occurred and boom-level commodity prices would now be the long-term norm. We are all aware that this assumption was dramatically punctured this year. Many companies appear to have based their growth strategies solely on this assumption and have now suffered significant reductions in enterprise value.

The most significant lesson to emerge from the recent boom is that ***increases in commodity prices alone are not enough to make poor quality deposits economically viable!*** This conclusion might seem to be counter-intuitive at first glance, but it is easily understood. In any environment of booming demand for metals, the key cost-inputs to metal production (energy, materials and skilled labour) also dramatically increase in price (although with a lag effect) and therefore margins change little. Furthermore, mines are most often very large projects with many integrated parts that must work together with relatively low variation in order to produce satisfactory returns. Low quality deposits inherently restrict the margin for error (i.e. variability) and this is probably why most newly-developed lower quality deposits incur significant write-downs during the early stages of production.

A key question that our industry must address at the beginning of 2009 is why the current pool of available resource assets is of such lesser quality than the world class mines that have sustained us in

the past. We believe that the fundamental reason is the lack of investment by the global mineral industry in greenfields exploration over the last twenty years.

Greenfields (also sometimes referred to as “grassroots”) exploration is the way that all major mining districts begin and is the foundation of our industry. Greenfields exploration seeks to discover mineral deposits in new areas, away from the immediate vicinity of producing mines. In contrast, brownfields exploration seeks to find new deposits close to existing mines. Greenfields is a high-risk, but high-reward, business that creates long term option value for the discoverers of new deposits. Brownfields exploration is lower risk, but is unlikely to deliver more than incremental growth, and the brownfields exploration opportunities in any one location will ultimately be depleted.

Geoscience Australia has recently compiled expenditure data for the last two decades of Australian mineral exploration (Figure 1). These data clearly illustrate a long term decline in greenfields exploration expenditure. During the same period, brownfields expenditure gradually trended upward until 2003, the start of the recent mining boom, when there was explosive growth.

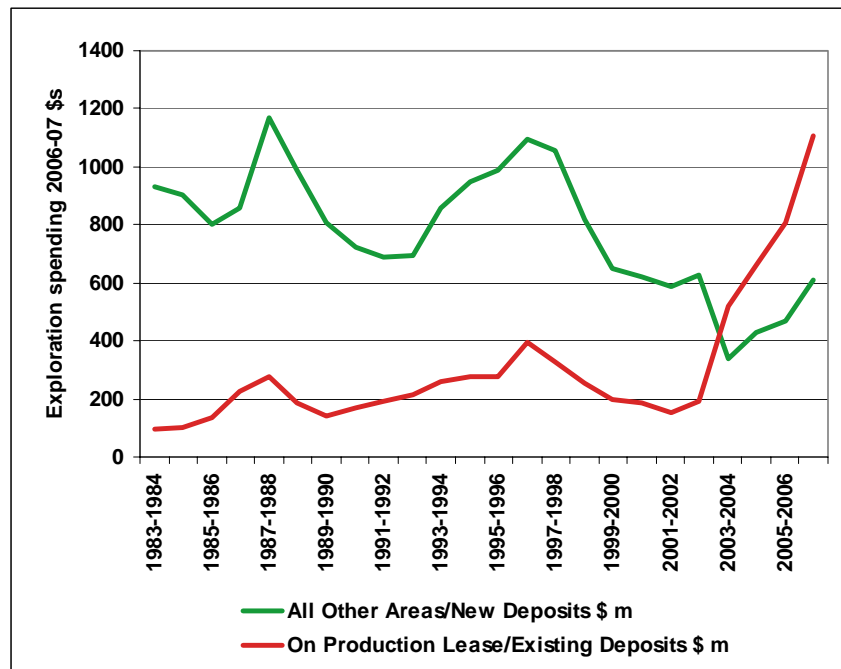


Figure 1: Australian Mineral Exploration Expenditure in constant 2006-07 Dollars separating greenfields from brownfields expenditure. Source: Geoscience Australia (based on ABS survey data deflated by CPI)

How should we interpret these data?

Greenfields exploration is a high-risk, long-term activity that companies tend to neglect during times of poor mineral prices. The period from the mid 1970s to 2002 was one of generally declining real metal prices and relatively flat demand growth that followed a period of globally successful greenfields mineral exploration between about 1960-1975. Therefore, it is not surprising that the period 1975-2002

saw a general decline in greenfields investment, and this contributed to tight mineral supply at the start of the recent mining boom.

Beginning in 2003, a dramatic change occurred in the macroeconomic environment for the global mining industry. As illustrated in Figure 1, the response of the mining industry has been to increase brownfields exploration dramatically.

The explanation for the brownfields explosion probably relates to the recent large expansion in production capacity of existing mines (including the development of previously uneconomic satellite deposits) in response to surging demand. The inevitable consequence is the shortening of mine life, unless exploration can keep up, and the reflexive response to this challenge is to increase brownfields exploration because it is the only exploration that can have a short term impact on ore supply.

Many large companies have assumed in recent years that they would no longer need to do greenfields because the large (although very volatile) increase in capital flows to the junior sector over the last two decades would see them increasingly doing this work. Unfortunately, as illustrated by Figure 1, this has clearly not been the case and in general, the majority of investment by juniors has been even more incremental and short-term in focus than for the majors.

Greenfields exploration remains relatively neglected for several reasons. For decision-makers in large companies and for the investment market that funds junior explorers, greenfields exploration struggles to compete with brownfields exploration. The returns are not as immediate, and in recent decades, greenfields investment has probably not delivered enough quality, high option value deposits to maintain favor in the risk-reward trade-offs of portfolio management. In addition, there remains widespread belief that new greenfields exploration is not really required due to the considerable number of low grade, low quality deposits that exist around the world and that were discovered during an earlier (1960-1975) period of greenfields success. However, as discussed above, we are now seeing that many, if not most, of these low-quality deposits are not economically viable, even in an environment of higher commodity prices, due to extremely high development and operating costs and to social concerns. In addition, the recent massive global deleveraging process is producing a more stringent credit environment, and this means that borrowing to finance development of lower-quality deposits will become even more difficult.

The focus on brownfields exploration, though rational in the short-term and for individual smaller mining companies, will exacerbate long-term problems for the global mineral supply. Recent large increases in production capacity imply that, since the beginning of the recent boom, the ratio of greenfields expenditure to unit of metal production has fallen dramatically and may now be at historically low levels. It is very likely that strong fundamental demand for resources will continue in the mid-long term, irrespective of the current global financial crisis. It is therefore a concern that, at a time when the long-term challenges of mineral supply remain great, we have the worst long-term investment ratio in greenfields exploration of recent decades!

At the industry scale, brownfields exploration is a lower risk investment than greenfields; however, in a given mining district, it is inevitably harder to sustain brownfields success over time. More importantly,

greenfields exploration is a long term business that requires persistence, planning and good risk management. It cannot be switched on after high quality brownfields opportunities have been exhausted. Therefore, it is critical that the industry put in place greenfields programs *now* so they have the time to deliver results before we start to confront the reality of widespread brownfields depletion.

The data in Figure 1 only relate to Australia; although we are not aware of similar data from other jurisdictions, our anecdotal experience suggests that this is a widespread phenomenon. With the exception of Canada, and in particular the province of Quebec, there is little evidence of the most recent mining boom resulting in a major increase in levels of greenfields exploration.

Another global factor is that prior to the 1990s countries in the former communist economic system all maintained very large state mineral exploration groups charged with the systematic long-term delineation of mineral resources. These groups were not governed by market considerations and, although arguably inefficient in many respects, were responsible for a large proportion of global greenfields discoveries in preceding decades. These discoveries were not just made in communist countries, but also in many “non-aligned” states, particularly in Africa, that received aid from the former Soviet Union. These groups all essentially disappeared with the fall of communism, and the market-oriented organizations that have replaced them in these countries have been much more focused on exploiting previously discovered resources than finding new greenfields deposits.

What is required to provide the necessary increase in global greenfields exploration? As an example, fiscal incentives have been put in place in Quebec that provide preferential treatment for exploration north of a certain latitude, thereby favoring greenfields exploration. This seems to have led to an increase in greenfields exploration expenditure and in the success rate. Similar incentives are under consideration by the Australian government. Perhaps we will see the emergence of new players from Asia who take a longer term view of the problems of mineral supply and therefore see it to be in their long term interests to sustain significant levels of greenfields exploration. The Japanese agency JOGMEC already has a stated strategy which favors investment in greenfields exploration projects.

It is also critical that greenfields capability be increased; we need a renaissance that (like the period 1960-1975) looks for and applies innovative science in unexplored and hard to explore areas, i.e., that encourages the risk takers. Such a renaissance, however, will require the following:

- There must be better education of senior management in mining and minerals companies as well as governments and financial industry workers as to the value proposition of greenfields exploration and its challenges.
- There must be more financial incentives (i.e., incremental reduction of short-term risk). Brownfields is often easier to support because costs can be capitalized and amortized. With the exception of Quebec and other flow-through regimes in Canada there are almost no real short term financial incentives for greenfields exploration.
- Industry capability and experience in the discipline of greenfields exploration must improve; there is no use increasing support for greenfields if the money won't be spent effectively.

Finally, the short-term view that is pervasive in public companies and capital markets is a considerable hurdle for a greenfields renaissance. The focus on immediate returns and return ranges makes it extremely difficult to treat greenfields investment as non-discretionary at some base level, which it must be to succeed. Much of this short-term thinking makes the fundamental philosophical mistake of confusing risk (i.e., the probability of a positive economic return from a project) with certainty (i.e., level of knowledge regarding the probable project parameters). For example, an acquisition target with a relatively high-level of certainty may be a much higher risk opportunity than an exploration project with highly uncertain outcomes, if it requires sustained boom-level commodity prices to be viable.

There is a clear case for the global mining industry to reverse the long-term trend of declining greenfields exploration. The case becomes increasingly urgent as we expand production from existing mines without a commensurate long-term investment in finding new mining districts. One can only hope that larger companies might lead the way, especially when faced with the limits of brownfields exploration and of merger and acquisition driven growth.