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# DIGGING DEEPER

## THE AUSTRALIAN SUPER TAX

Peter McCarthy

In its 2010–11 Budget released in early May the Australian federal government proposed to tax mining “super profits” at an effective rate of 57% and possibly higher. The Australian mining industry has reacted with shock and astonishment – how can the government have become so disengaged from the industry that saved Australia from the Global Financial Crisis? In Canada, with an effective tax rate of 23 per cent, politicians have enjoyed reminding mining companies that the country is open for investment. In the UK, the press response reflected the views of the large London-based mining companies, with no apparent sympathy for the Australian government’s position.

Can a mining consultant contribute to this debate? Experience in planning and optimizing mines around the world suggests so.

A good financial evaluation of a mining investment includes estimates of the after-tax return throughout the commodity cycle. This is usually done by modelling the commodity price cycles, running the model many times to ensure that the project delivers satisfactory after-tax returns over the project life, whatever the commodity price may do within reason.

If the Super Tax is modelled then the low profits or losses in the price troughs are not compensated by high prices and returns at other points in the cycle.

The decision maker may choose to cancel or defer the project, or take steps to improve the economics. One likely step is to increase the design cutoff grade, effectively “high grading” the deposit and leaving lower-grade minerals in the ground. This abandoned material is nearly always permanently lost. In surface mining, a smaller pit may be mined to extract just the high-grade core. These inevitable consequences of a Super Tax are bad for sustainability and bad for the environment.

The case for cancelling projects is simple. Mining investment is a high-risk business, with more than 70% of projects failing to deliver the expected returns. Nevertheless investment capital remains available because there is always a chance of above-average returns. Putting a Super Tax on the above average returns is like applying a punitive tax to lottery winners – who then would buy tickets?

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## MINING MINERAL SANDS

Nicola Farrell

Heavy mineral sands are a class of ore deposit that includes zirconium, titanium, thorium, tungsten, rare earth elements, the industrial minerals diamond, sapphire, garnet, and occasionally precious metals or gemstones. Titanium feedstock is used to produce both titanium dioxide (TiO<sub>2</sub>) for pigment and titanium metal. Titanium feedstock includes

TiO<sub>2</sub> slag, synthetic rutile, ilmenite, rutile or leucoxene, a natural alteration product. Zircon is often mined in conjunction with titanium feedstock.

The titanium feedstock sector contributes significantly to global economies. The total global production revenue from titanium feedstock and associated co-products is just

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The dredge pond at Eneabba, WA

## MINING MINERAL SANDS

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under US\$4 billion. About 90% of this goes into pigment and the remainder goes into titanium sponge metal, which was selling for US\$29/kg in mid 2006 but has since fallen in price. The Economics of Titanium Metal (4th Edition, 2007) explains that the explosive growth in Chinese demand for titanium metal is the most notable feature of the world market for titanium metal. This has arisen mainly from heat exchangers, pipes, tanks and pump components in the power, chemical, petrochemical and other process industries.

Many existing mineral sands operations are approaching the end of mine life and suffering declining grades so that in the next decade most will maintain flat or declining production. This creates opportunities for new suppliers so the exploration and development of new deposits from greenfields status and the financing of existing expansion projects will be important.

According to Geoscience Australia and USGS data, Australia has the world's largest resources of rutile and zircon with 50% and 47% respectively, and has the second largest share of the world's ilmenite with 17%, behind China, which has 30%. Other major country rankings include India (13%), South Africa (9%) and Brazil (6%) for ilmenite; South Africa (18%) and India (16%) for rutile; and South Africa (26%) and Ukraine (7%) for zircon. More than half of Australia's zircon resources are in the Murray Basin, with the main state resources being WA (31%), Vic (23%) and QLD (21%).

While many features of mineral sands projects are common to all mining projects, some are unique:

- Project Management is critical in the development of large, complex feasibility studies for project development to ensure clearly defined objectives, realistic budgets and work plans, a competent and adequately resourced team and good communication, with regular monitoring and reporting to the client.
- Analysis of the geology of mineral sands deposits enables assessment of induration, particle size and bulk density. This must be undertaken by competent persons capable of classifying JORC compliant Reserves and Resources who have experience in all aspects of resource estimation methodology, including the type of drilling required, sample collection, appropriate analytical methodology, mineralogy and quality control.
- Whether dry mining or dredging, effective mine design and planning requires appreciation of geological influences determining the location and continuity of dunes and mineralized areas. Mine optimization defines economic material, mining process and production rates specific to the needs of the project.



Scrapers at Eneabba, WA

- The varied composition of sands and the extent of weathering of the heavy mineral particles can create technical challenges for processing to meet a range of product quality specifications. Audited mineralogical test work enables JORC classification, informs the metallurgical processing methodology and defines the products of a mineral sands project.
- The dominant water uses in mineral sands projects are for flotation of mining equipment, pumping mineral slurries, concentrates and waste, and processing of mineral streams. These and water losses, such as in tailings and permeability, are required to develop water management strategies for ground water, waste water, runoff, reticulation and associated community issues and to inform mine design and engineering.
- Mine engineering incorporates metallurgical models and water management strategies into mine and mineral process design, informs equipment selection, dredge path design, production schedules, and production supervision.
- Geotechnical assessment informs tailings disposal, processing site location, road and rail alignment and design. This involves laboratory tests and site assessments of standard penetration, particle size distribution, direct shear and density of the sand deposit, dune angles of repose, soil, regional seismicity and site bearing capacity.
- Product analysis and market assessment require knowledge of current market data and forecasts. Product marketing and shipment type, transport logistics and proximity influence competitiveness. Co-product revenues are increasingly important in supporting the feasibility of many projects.
- Financial cost modeling and revenue assessment requires detailed capital and operating cost estimates. The total mineral production cost constitutes production, process plant operation, transportation, storage and ship loading and is informed by cost drivers such as oil, energy, steel, equipment, labour and transport. Revenue optimization requires an understanding of the close relationship cost drivers have to ore grade and mineralogy, overburden removal, economies of scale and unanticipated operational issues.
- Detailed social and environmental base line studies are required to develop management, rehabilitation and closure plans, which are informed by legal requirements (such as those of the World Bank, IMF Guidelines and Equator Principles), environmental issue mitigation, analysis of the social context, relocation or displacement management and waste and hazardous material management.
- Infrastructure and services need to be considered for all mine site buildings, accommodation and ancillary services, fuel selection and storage, power generation or supply, information communications technology infrastructure and management and transport logistics, such as rail, road and port.
- Corporate policy and management strategies are developed to ensure secure and effective commissioning and operation. These include human resources, occupational health and safety and assessment of corporate, country and technical risk.

AMC has completed many mine planning and feasibility studies for mineral sands projects. The author may be contacted for further details.



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# MESSAGE FROM THE CHAIRMAN

Elsewhere in this issue I have written on the proposed Australian Super Tax. Many governments around the world are managing economies that have not yet recovered from the Global Financial Crisis and are looking for ways to extract more revenue from a mining sector that has recently been enjoying high commodity prices. Tanzania is expected to announce a new mining tax in July, and Finance Minister Mkulo is quoted as saying "We can increase revenue from mining companies by ten times if they all pay taxes".

If the Australian proposal gets up then many other "stable" governments will be inspired to follow suit. Their economies will become even more dependent on the minerals sector and will be at the mercy of the cycle of minerals prices. The Australian proposal includes rebates of tax to struggling companies. If a company is in difficulty then chances are the industry is in difficulty and the government will be in no position to prop up ailing companies. The impact of a global recession will be amplified in the economies of the mineral-producing countries.

It was only a few years back that I was making presentations to show that the minerals industry had not achieved a satisfactory return on investment for the previous two decades. The turnaround is quite recent and by no means permanent. History shows that mineral supply and demand and hence prices move through cycles. We haven't reached the end of history.



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## THE AUSTRALIAN SUPER TAX

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There is a perception within Australia that it is the "lucky country" and can forever rely on the minerals industry, as it has done since the gold rushes of the 1850s. However, new opportunities are opening up in sub-Saharan Africa, South America, Central Asia and elsewhere. Exploration in Australia is largely under cover, thus expensive and unpredictable.

The industry has prospered despite this because of a stable investment environment with low political risk. Whatever happens now, confidence has been seriously damaged and we can expect a withdrawal of capital from Australia.

Although it has Australian origins, less than half of AMC's business now relies on Australian projects. Geographically diversified service companies like AMC will not be greatly affected by the Super Tax. But more than 500,000 Australians, or nearly 5% of the workforce, have jobs that depend on mining. And there are hundreds of thousands of Australians who hold shares in mining and related companies, and millions more with a stake in the sector through their superannuation. The proposed Super Tax is to apply to quarrying, so the cost of building and construction materials will also rise.

The current Australian Labor government has strong links to the unions, who are generally supportive of the Super Tax, seen as a "fat cat" tax. The Super Tax itself is a child of long-term Labor ideology and is a corrupted form of a Resource Rent Tax that was first proposed in the 1970s. However, the proposed form of the Super Tax is in no way a Resource Rent Tax. Australian commentators have generally concluded that the government and its advisors did not understand the consequence of their actions. In other words, it was done out of ignorance and not out of malice.

The Super Tax seems to have been cobbled together quickly after the government, which has an embarrassing budget deficit, was forced to postpone or abandon a proposed Emissions Trading Scheme. In public discussions senior government ministers and advisors repeatedly showed that they did not understand the difference between the risk-free rate of return and a company's cost of capital.

In mid-May The Australasian Institute of Mining and Metallurgy, which represents more than 10,000 geologists, mining engineers, metallurgists and other professionals, held a conference that passed a resolution "That this congress condemns the proposed Super Tax because of the adverse impact it will have on all Australian communities."

AusIMM President Greg Chalmers said professionals working in the minerals sector understood the impact the Super Tax would have, not just on their industry, but on the people of the communities in which they worked and lived.

"AusIMM members work for a broad cross-section of employers, from mining companies large and small through to technical services groups, universities and government departments. We don't represent a corporate agenda – what we have is immediate exposure to and an understanding of what this tax will do to Australian communities and the Australian economy. We know that this tax threatens to shut down investment in the mining sector, potentially moving thousands of jobs offshore as companies seek a more reasonable balance of risk and reward on their capital intensive projects."



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# MEXICAN CARBONATE REPLACEMENT DEPOSITS

Brian O'Connor

The Carbonate Replacement Deposits (CRDs) of Mexico consist of disordered Pb-Zn-Ag-Cu massive sulfide bodies associated with intrusive stocks. In Mexico the carbonate rock host is usually limestone whereas other CRDs, such as those in Canada, are more likely to be hosted in dolomite. While this deposit type occurs in close proximity to the intrusive, the intrusive is simply the heat source. Thus the intrusive can be barren, as the metals are derived from the underlying continental crust. Many of the deposits are buried by overlying volcanic rocks. The geometry of the mineralization is determined by the morphology of the structural conduit in which it occurs and the distance from the intrusive.

Exploration methods involve discovering a regional scale structural conduit for the metal bearing fluids and Anomalous Manganese Oxide Mineralization (AMOM), which is associated with primary sulphides in a carbonate environment. Then local exploration techniques include Natural Source Audio Magneto Telluric (NSAMT) geophysical surveys (to identify feeder structures on the project characterized by resistivity and conductivity highs) and biochemistry, by using ash samples from mesquite, a drought resistant deciduous tree that draws water through a tap route that can have a length of 60 metres.

Deposit size on average is about 10–15 Mt, but can go up to 120 Mt. CRDs are high-grade polymetallic deposits with average grade ranges of 60–600 g/t Ag, 2–12% Pb, 2–18% Zn, trace to 2% Cu and trace to 6 g/t Au, and can be very profitable.



Mexican Carbonate Replacement Occurrence Belt

The relatively low Mexican labour costs, compact but discordant nature of the mineralization and high grade of the deposits are best explored with underground development rather than by diamond drilling alone. CRDs are attractive targets for junior exploration and mining companies as the deposits can be put into production on a small scale, with low capital expenditure.



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## UPCOMING EVENTS

Look for us at these upcoming industry events:

AusIMM International Industry Conference  
in Adelaide on 16 and 17 June  
([www.ausimm.com.au/uranium2010](http://www.ausimm.com.au/uranium2010))

Melbourne Mining Club in London on 8 July  
([www.melbourneminingclub.com/series/3-MMC-Overseas/events/98](http://www.melbourneminingclub.com/series/3-MMC-Overseas/events/98))

Resources Victoria in Melbourne on 12 to 14 July  
([www.resourcesvictoriaconference.com](http://www.resourcesvictoriaconference.com))

Diggers & Dealers in Kalgoorlie  
from 2 to 4 August  
(<http://www.diggersnddealers.com.au>)

Melbourne Mining Club in Shanghai on 19 August  
([www.melbourneminingclub.com/series/3-MMC-Overseas/events/99](http://www.melbourneminingclub.com/series/3-MMC-Overseas/events/99))

Mining the Territory in Darwin  
on 23 and 24 September  
([www.iir.com.au/conferences/mining-resources/metals-minerals/mining-the-territory-conference-exhibition-E1016](http://www.iir.com.au/conferences/mining-resources/metals-minerals/mining-the-territory-conference-exhibition-E1016))

Second Australasian Ground Control in Mining  
Conference in Sydney on 23 and 24 November  
([www.ausimm.com.au/ground\\_control2010/home.asp](http://www.ausimm.com.au/ground_control2010/home.asp))

## NEW MANAGEMENT APPOINTMENT



### Colin Sprott

AMC is pleased to appoint Colin Sprott as the manager of the Melbourne-based Open Pit Group. Colin's expertise is in operational management and mine planning, including short to long-term planning, pit design, pit optimization, production management and the development of mine planning systems. He has a proven ability in leading technical teams in mine engineering, geotechnical, geology and hydrogeology disciplines and holds an unrestricted WA Quarry Managers Certificate of Competency.

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