Technology

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The Secretary
Standing Committee on Science and Innovation
House of Representatives
Parliament House
CANBERRA ACT 2600

Dear Sir

This is in response to your invitation to provide a submission to the Standing Committee on Science and Innovation, as addressed to Chip Goodyear on 11th April 2005.

Brief descriptions of three case studies in innovation which have been initiated and implemented by BHP Billiton in the past 3 years, are attached. These are:

- Ravensthorpe-Yabulu Nickel (minerals process)
- Dust Control for Iron Ores from Mining Area C (dust management)
- Mine Planning and Optimisation (mathematics / software development)

These innovations have had a major impact on value generation in Australia, in the range of hundreds of millions of dollars, and each has the potential for application well beyond a single minerals deposit.

These and other cases, illustrate some of the government-related factors which influence success in major innovations.

- Facilitating redeployment of skilled personnel across national borders was critical to successfully developing the Ravensthorpe-Yabulu investment of over US$1,000million. The primary technology development was initiated in BHPB's laboratories in Reno Nevada. During a rationalisation of facilities, the Reno Laboratories were closed down. To achieve continuity of innovation, enabling the enhanced technology to be tested, considered and ultimately adopted for the project, it was necessary to be able to relocate key personnel to Australia (Newcastle) rapidly, consistent with Australian Immigration requirements. Our ability to move key personnel across borders is an ongoing feature of our business. We have Research, exploration and technical personnel in a number of countries.
- Government support of R&D in universities and research centres sufficient to nurture people skilled in the specialist areas applicable to the Minerals Industry is fundamental. Such support should provide a sustainable environment of innovation generating the people and expertise to keep the industry robust. A good example of how this can work pertains to the "Australian Minerals Science Research Institute".

We are seeking to set this up to support the ongoing health of the more fundamental end of R&D relevant to a substantial portion of our industry. To do this we are engaging with key University Centres in Adelaide (Ian Wark Research Institute) Melbourne (ARC Special Research Centre for Particulate Fluids Processing) Newcastle (ARC Special Research Centre for Multiphase Processes) and Brisbane (Julius Krutschnitt Research Centre). We have engaged the industry research broker AMIRA to facilitate and coordinate the initiative. Federal Government support is critical if this is to proceed. An application for a Large ARC Linkage Grant is being submitted. State government support is also being sought. A number of Minerals Companies are part of this effort. An alternative example in the area of hydrometallurgy lies in our close collaboration with the AJ Parker Cooperative Research Centre in Perth, which combines the efforts of both Universities and CSIRO. In all of the above, Government initiatives which encourage and reward collaboration with Industry are needed. Encouragement of cross-discipline interactions is also important since this is part of the engine for innovation in any industry.

- Ongoing Government support of undergraduate education in the broad disciplines of Science and Engineering, as well as the specific areas of mining and minerals processing, provide a major base for the Minerals Industry. They produce people capable of initiating and delivering innovation. Supplementary education services through specialist training courses are also of great value in bringing staff up to date in specialist areas.

We submit these comments in the hope that they will be of value to the deliberations of the Standing Committee on Science and Innovation.

Yours sincerely,

B Smith

Dr Brian Smith
Global Manager
Science & Technology

Copy to: Megan Clark, Vice President, Technology
Bernie Delaney, Vice President Government Relations
Marcus Randolph, President, Diamonds & Specialty Products

ATTACHMENT

BRIEF CASE STUDIES

Case study #1: Ravensthorpe-Yabulu Nickel

In March 2004, the BHP Billiton board approved the development of the Ravensthorpe laterite nickel deposit in Western Australia and in parallel the expansion of the existing Yabulu nickel refinery, near Townsville in Queensland. The two components of the project are linked in that ore will be mined and processed to produce a nickel rich product (up to 50,000 tonnes of contained nickel) at Ravensthorpe. This will be shipped to Townsville for refining at Yabulu in an operation to be expanded from its current production of approximately 30,000 tonnes nickel to near 80,000 tonnes nickel.

This project required a large capital investment of approximately US$1,400million. Also, nickel laterite developments to date do not have a good track record, with the only three existing mines in Australia all having had performance problems. So, in order for this project to gain approval through rigorous company review processes it was necessary to show that project economics were attractive and technological risk was well managed.

Technological innovation played a key role in the development and approval of this project. Conventional practice for the processing of nickel laterite ores involves high pressure acid leaching. BHP and then BHP Billiton has had a longstanding program of development of novel technologies for processing such ores. This has involved a team carrying out extensive laboratory and pilot trials over a period of more than 10years. The BHP Billiton patented process applied to Ravensthorpe is termed Enhanced Pressure Acid Leach (EPAL) in which an atmospheric leach step is added to the conventional pressure acid leach. The different characteristics of the two process elements means that a larger proportion of the resource can be utilised (saprolite as well as limonite minerals) resulting in a better mine life / production profile as well as other benefits. This enhances the project economics and does so by use of relatively simple, and hence relatively low risk, hydrometallurgical process in stirred tanks.

This is a major technology and project development event for Australia.

Case Study #2: Dust Control for Iron Ores from Mining Area C

Mining Area C is a major iron ore deposit in the Pilbara region of Western Australia which is now in production. The iron ore product is sufficiently prone to generating dust that this health and safety issue was identified by BHP Billiton as a major risk constraining the development of the deposit. The issue applies across the production, transportation, handling and end use chain but is particularly visible during ore handling at Port Hedland.

A longstanding R&D team, experienced in understanding the characteristics of the range of BHP Billiton iron ores, is based in Newcastle and took this issue on as a challenge. While the specifics of the solution are proprietary, suffice it to say that a simple and highly effective solution was devised and enabled the development of this ore to proceed. Essentially dust-free handling of the first MAC iron ore shipments from Port Hedland occurred in early 2002.

This relatively simple innovation arose from having the right kind of team in place and has had a major economic impact in opening up production and marketing of tens of millions of tonnes of iron ore. Further work is progressing to extend these findings to benefit other ores.

Case Study #3: Mine Planning and Optimisation

Conversations within BHP Billiton, across organisational and discipline boundaries, led to the realisation that there were significant shortcomings in available mine planning software. The shortcomings reduced the ability to develop mines to maximum effect in real situations: where there is ongoing uncertainty in ore body characteristics and therefore in ore supply to processing plants; and where operations may afford a number of alternative process routes. Within our Technology function we had the necessary mathematical and programming skills to work with our mine planners and undertake an extensive and mathematically innovative initiative. Algorithms and software that would improve the effectiveness of our decision making and resulting operational performance were developed.

The software has been applied to a number of mining operations to date and has been shown to clearly outperform existing software resulting in major improvements in value – estimated to be in the range of hundreds of millions of dollars. This work is continuing both in terms of development and application.