Submission to the Standing Committee on Industry, Science and innovation Enquiry into Australia's International Research Collaboration

Preamble:

AMIRA International, formerly The Australian Minerals Industry Research Association, is the preeminent organisation that develops and administers much of the precompetitive collaborative research for the world's minerals industry. In 2009 it celebrated its 50th anniversary.

AMIRA International is an association of most of the world's largest mining companies and many of their major suppliers (www.amirainternational.com). AMIRA International's principal role is to develop, broker and administer collaborative research projects with leading research groups around the world for the benefit of its member companies. We are a not-for-profit company with offices on four continents and current research projects underway with researchers on five continents.

Some statistics for AMIRA International as of 2010 are:

- Members: 77 minerals industry explorers, producers and suppliers; Australia counts for about 30% of members and 37% of membership revenue.
- Business model: Projects are sourced from multiple regions and then marketed to many relevant companies via our international nodes regardless of where the project is developed.
- Current portfolio: 34 projects worldwide (as of 30 Dec 09), covering: Geoscience, Mine Engineering, Mineral Processing & Extractive Metallurgy, and Sustainability. Since its birth AMIRA has developed and had oversight of over 1000 projects
- Portfolio value: ~$80M (industry funds) as of 30 Dec 09 with ~$15-20M new projects started each year
- Research collaborators: 221 researchers from some 62 Institutions around the world
- International reach: head office in Melbourne, offices in USA, Chile and South Africa

1. The nature and extent of existing International research collaborations

In December 2009 AMIRA International's portfolio consisted of 34 collaborative projects with industry funding of some $80m. The majority of collaborative projects funded by industry involve two or more research institutions and many engage with institutions from different countries. AMIRA International is currently working with the following overseas institutions through a variety of projects:

- University of Cape Town – Republic of South Africa
- University of Witwatersrand – Republic of South Africa
- University of Stellenbosch – Republic of South Africa
- Universidad de Chile - Chile
- Universidad de Concepcion - Chile
- McGill University – Canada
- Laurentian University – Canada
- University of British Columbia - Canada
- University of Toulouse – France
- Nancy-Université – France
- Russian Academy of Sciences - Russia
- University of Ouagadougou – Burkina Faso
- Hacettepe University – Turkey
- Universidade Federal do Rio de Janeiro – Brazil
- University of Nottingham – UK
- University of Utah – USA
- Colorado School of Mines - USA
- University of Auckland – New Zealand

The best way to explain the nature of the collaboration that AMIRA International promotes is through an example. One of AMIRA International's most well-known successes is the "P9 – Mineral Processing" series of projects. The P9 program consists of a succession of projects that have focused on improving mineral processing technologies. For 48 years and over 15 project extensions, P9 has been the backbone of a significant relationship between the Julius Kruttschnitt Mineral Research Centre (JKMRC - University of Queensland), AMIRA International and the minerals industry. In 1996 further collaboration between the JKMRC and University of Cape Town was developed. In 2000 McGill University in Montreal, Canada also joined as a research collaborator in the project. In order to build on areas of special expertise, the current project extension P9O now includes collaboration with the University of Newcastle (Australia), Hacettepe University (Turkey) and Universidade Federal do Rio de Janeiro (Brazil). Additional researcher linkage is achieved in Australia through the Centre for Sustainable Resource Processing CRC.

The current scope of P9 project is to improve comminution, classification and flotation performance of ores through modelling, simulation and characterisation of particles and their process environments and through training and transfer of skills and technology to the industry. The project is supported by a consortium of 35 companies from Australia, South Africa, North and South America and Asia.

The JKMRC leads the overall management of the project, with Professor Emmy Manlapig as Project Manager. The project consists of five research themes with 22 modules each led by a project leader. Each research institution is involved in one or more of the modules depending on its expertise. The majority of the research modules have post-graduate students involved.

Another excellent example of the international collaboration being developed by AMIRA International is the West African Exploration Initiative (P934A) which involves the following institutions:

- Institut de Recherche pour le Développement (IRD) - France
- University of Ouagadougou – Burkina Faso
- University of Witwatersrand - South Africa
- University of Western Australia - Australia
- Bureau de Recherches Géologiques et Minières - France
- Université Montpellier II - France
- Nancy-Université - France
- Université Henri Poincaré - France
- Czech Geological Survey
- University for Development Studies Ghana

This initiative has been awarded a grant from AusAid to fund the entire student, local researcher and government geological surveys training capacity component, a very important social development part of the initiative.

2. The benefits to Australia from engaging in international research collaborations

The value that AMIRA International has created over the years as an “industrial matchmaker” through its syndicated collaborative projects is significant although difficult to totally quantify because of the many intangible outcomes. Perhaps one of the best indicators is the fact that although the funding support for its current projects is sourced from around the globe, approximately 80% of it is research spent in Australia. This is mainly a reflection of the excellent quality of the research capacity in Australia. Indeed, such support has over the years helped to underpin the success of many Australian research groups such CSIRO, JKMRC, the Ian Wark Research Institute, the Parker CRC, and CODES, all of which are recognised as world class research institutions.

AMIRA International commenced its global expansion over ten years ago in response to the growing needs of our members outside of Australia. Many have mining operations throughout the world but importantly want to source the best researchers wherever they are in the world. However, they also have an obligation in less developed countries to help build and nurture local research capacity. The latter is important to them not only as a source of local graduates but also as source of future researchers to tackle the uniquely local challenges. AMIRA International plays an important role in this space by developing partnerships between the best of the local researchers and world leading researchers, many of whom are located in Australia.

By encouraging the international collaboration Australia benefits in the following ways:

- Additional funds to support Australian research institutions are obtained. This ensures that these institutions continue keeping a level of critical mass by employing additional researchers, attract students etc.
- The opportunity to extend national priority activity as many industry problems share common characteristics across countries thus allowing the potential of leveraging on existing activities elsewhere.
- The opportunity to leverage the additional resources required to tackle larger scale technical problems.
- Allows Australian researchers to work with the recognised best in their field.
- Maintaining the well deserved reputation that Australian researchers are world leaders in many areas of the mining and minerals industry.
- Showcasing Australia's technical excellence in research and top class research facilities.
- Attracting post-graduate students and post-doctoral fellows to work in Australian institutions.
- Providing exposure of Australian expertise to the world to allow additional consulting or 1:1 research of a less precompetitive nature

3. The key drivers of international research collaboration at the government, institutional and researcher level

Although AMIRA International does not propose to speak for the various stakeholders, in our experience however some key drivers can be readily identified.

<u>Government level drivers:</u>

- Enhance productivity and competitiveness through innovation - brought about and enhanced through collaboration
- International prestige by showcasing Australia's successful national innovation system
- Strengthen political and trade relationships with other countries
- Benchmarking – comparing Australia's innovation system with other countries

Institutional level drivers:

- Secure broader funding support
- Maintain capacity
- Attract students and post-doctoral fellows
- Offer access to world class infrastructure/facilities to other institutions
- Offer education and training courses/curricula
- Enhance research reputation

Researcher level drivers:

- Being involved in larger multi-disciplinary projects
- Opportunity to collaborate with other top researchers and the best in their field
- Enrich their experience by looking at problems in different areas of the world and learn from the experience of other researchers
- Accessing research facilities not available in Australia

4. The impediments faced by Australian researchers when initiating and participating in international research collaborations and practical, measures for addressing these

Much of the collaboration that is developed in AMIRA projects relies on personal relationships. Many of our leading researchers have developed their own contacts internationally and go on to set up partnerships as necessary. An obstacle to developing partnerships outside one's immediate network is of course is the fact that it's difficult if not impossible to be abreast of all relevant activity around the world. Even more challenging, is the fact that many potential solutions to problems originate from other technical fields and identifying researchers and possible technologies in those fields relevant to the issues is very difficult without a dedicated study.

AMIRA International plays an important role in introducing our key researchers to a wider group of potential partners. To achieve this we rely on not only on our own networks in the international research community but also on the networks of our members to identify where specific research skills may be found and what relevant research is being undertaken. Thus if we feel that there is a particular researcher or there is some specific activity going on at an institution that has a bearing on the project being proposed we explore the possibility of collaboration with the researcher or institution. A significant obstacle to this is the costs associated with visiting these researchers to develop a collaborative relationship. This would normally be done prior to a project commencing thus requiring investment capital that many institutions, including AMIRA International, have difficulty accessing. The same issue may also apply when developing and deepening relationships with member organisations domiciled abroad.

Before the collaboration project is initiated, the Intellectual Property ownership issues need to be resolved and appropriate agreements put in place to protect the rights of all parties. This is always a challenging process, particularly when dealing with foreign jurisdictions.

AMIRA International believes that believes that there are enormous opportunities to develop collaborations utilising mechanisms that don't just rely on personal contacts. This is important because the challenges that countries with a tradition of mining, like Australia and Canada for example, face are not unique. Many issues relating to energy, water, social acceptance and environment are common, albeit some of the specifics may be unique and much is pre-competitive. Indeed it is difficult to see how solving these challenges independently will provide the relevant countries with any real competitive advantage.

There is therefore an opportunity to promote international collaboration at a more strategic level and to be more sustainable, not simply reliant only on personal industrial or researcher contacts. With the right framework in place we can nurture collaboration on issues of common interest between countries that capitalises on the strengths of the individual research capabilities.

Engagement with Canada can be cited as an example. The creation of an Australian–Canadian Mineral Science Initiative, supported by both governments, to investigate areas of mutual interest, and that builds on the research strengths in both countries would benefit both countries. Geosciences is clearly one strength that both countries have. Creating a special vehicle that will help to identify the common issues that the two countries can collaborate in the first instance and promote collaboration on these issues through special leverage funding of university-industry partnerships would benefit all those involved. It seems very inefficient to duplicate effort in pre-competitive issues at the international level, although local political needs have to be considered and addressed in developing such an undertaking. At the moment this sort of international activity is generally ad hoc and relies heavily on the constrained support of government funding agencies like the ARC in Australia, THRIP in South Africa and NSERC in Canada as dictated by their generally restrictive funding rules. Making funding available for this type of focussed activity would be an important way of enhancing international collaboration.

Canada has a vehicle to promote country-to-country collaboration called the International Science and Technology Partnerships Canada (ISTPCanada) although it does not appear to encompass the mining sector per se and seems to be restricted to its key trading partners including India, China, Brazil, Israel and USA (www.istpcanada.ca). It is a non-profit corporation mandated by the Canadian Government through the Department of Foreign Affairs and International Trade. Its role is to facilitate the development of new R&D partnerships between Canadian companies, research organizations and their counterparts in other countries; invests in collaborative research projects with high commercial potential; and stimulates early-stage partnership development activity. The organisation develops and implements R&D collaborative programs under Science and Technology (S&T) cooperation agreements between the various countries. The aim of ISTPCanada is to enhance Canada's competitiveness through the increased use of international research-based partnerships.

It is possible to envisage a similar vehicle in Australia that has a broader mandate that would encompass the challenges in the energy and resource sector and work with organisations such as AMIRA International to nurture and support collaboration on issues of common national interest. International partnerships of the nature envisaged here will require political support. It would be worthwhile to undertake a study that identifies those countries that are successfully promoting international collaboration as envisage above and examine how they do it.

5. Principles and strategies for supporting international research engagement

Currently development of international research alliances seem ad hoc and depend heavily on the interests of individual researchers and rely on their existing networks. Furthermore, there does not seem to be an adequate framework in Australia that encourages and promotes deep partnerships on issues of common interest with other countries that are generally pre-competitive in nature. There is a great deal to be gained in developing such a framework. It would help address national priorities by leveraging off other international efforts. For this to happen however, it will require agreements between countries and a mutual commitment to provide funds.

In summary, if there is support for the concept that government intervention is required to encourage collaboration between countries on problems of common interest, the following general principles and strategies should be considered:

Principle	**Strategy**
Collaboration should be encouraged on issues of national interest that coincide with the interests of other partner countries	• Develop a suitable national framework that specifically focuses on promoting international collaboration between selected countries. • Identify an industry sector and negotiate with an appropriate partner country with which to pilot the scheme. A pilot program using the mining sector with Australia and Canada as the partner county is recommended. Canada is suggested not only because of its strong mining tradition but also because of the many complementary skills that exist. • Once a suitable framework has been put in place a dialogue with relevant stakeholder will be necessary to identify those specific priority areas that should be the focus of collaboration. • A discussion will need to take place to establish where such a scheme would fit in the existing Australian Government innovation programs. For example should it be incorporated in the existing ARC programs or some other program or would it require a separate body as in ISTPCanada. • Government funding for the scheme should be guaranteed for an agreed period of time including funding for establishment costs.
Grants should be competitive	• Awarding of grants should be based on a merit system.

	• Suitable rules and guidelines should be developed that will provide applicants the appropriate information.
Funding should be based on some minimum level of matching funds from industry or other eligible sources	• Details like the minimum level of co-funding form industry partner(s) and the balance of contribution from participating countries will need to be determined. • The scheme should take advantage of organisations like AMIRA International to help to set up initiatives and secure co-funding from industry. There is little point in setting up another substantive secretariat to duplicate what is already available. Also on competitive neutrality grounds Government should rely on existing private sector organisation to assist with delivery. Although it should be noted that in some industry sectors such organisations may not exist.
Project need to be innovative and demonstrably of benefit to the partner countries	• Clear guidelines will need to be developed to describe the eligibility criteria. • Although projects with the potential for commercial outcomes are important it is vital to ensure that projects focusing on fundamental science can also qualify for support.

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