CSIRO Submission 11/421

Inquiry into greenfields mineral exploration and project development in Victoria

Economic Development and Infrastructure Committee, Parliament of Victoria

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Introduction

CSIRO, through the Minerals Down Under National Research Flagship and its partners, conducts research in support of the mineral exploration industry in Australia and seeks to improve exploration discovery success and highlight Australia as an attractive exploration investment destination globally. The Flagship's Discovery Theme has a diverse portfolio of projects in four key areas:

1. Development of national data infrastructure and data integration;
2. New detection tools for exploration;
3. Mineral systems research; and
4. Education, technology transfer and collaboration.

In this research program we partner with the mineral exploration industry and with state and territory governments to forge collaborative partnerships that lead to the application of innovation outcomes and expertise for the benefit of exploration in a specific region.

In addition to its exploration expertise, the Minerals Down Under Flagship conducts research across the mineral resources value chain in the following broad areas:

- Expanding available ore reserves by transforming mining and processing methods;
- Improving the productivity of existing mining and processing methods; and
- Reducing the footprint of the industry and securing an ongoing license to operate.

Having access to extensive capability through its partnerships with industry, and the great diversity of stakeholders and operating environments involved, assists the Flagship to manage a variety of projects and ensure strategically targeted research.

CSIRO sees tremendous value in aligning its goal to re-establish Australia as the leading destination for greenfields mineral exploration, with the State Government's commitment to stimulating such exploration in the State of Victoria. Some specific opportunities are presented below, together with our response to the research-relevant Terms of Reference for the Inquiry.

The challenges

Australia's international competitive advantage for investment in the minerals industry has to date been based on the extensive, high-quality resources that were discovered in the last century, with some (such as the Victorian goldfields) being discovered in the century before that. A problem that Australia faces for the future is that these resources are rapidly being depleted at the same time that demand is increasing with the rise of the Chinese and Indian economies. Major new discoveries have not been forthcoming and exploration success has become more difficult to achieve especially in those areas considered well explored or mature. This apparent lack of recent success in finding deposits in Australia has contributed to a reduction in our share of international exploration expenditure. Many companies thus prefer to invest in poorly explored countries such as those in West Africa or South America where the perception is that deposits (such as gold and copper) are still easily found at the Earth's surface. Despite the ease of exploration, these countries have high risk

profiles for business development, typically very different to Australia. To improve investment appeal, Australia needs to reshape the perceptions on which these judgements are made.

While significant progress was made in the past to understand Australia's geology and mineralisation, considerable technical challenges still remain. This was the subject of a recent Theo Murphy Think Tank at the Australian Academy of Sciences that brought together early- to mid-career exploration researchers from around the country; from universities, CSIRO, Geoscience Australia and State Geological Surveys, as well as from the exploration industry. (*Searching the Deep Earth* www.science.org.au/events/thinktank2010/index.html)

Researchers identified key priorities to foster exploration success in Australia. These included three topics that research institutions such as CSIRO, working together with Geological Surveys, can seek to address for the benefit of a particular state or territory economy and therefore for the nation as a whole:

1. Map the depth and character of the cover across Australia;
2. Map the deep crustal architecture; and
3. Identify the distal footprints of Giant Ore Deposits.

Taking these topics as a guide to the challenges for mineral exploration in Australia now and in the future, there is a need for federal and state governments, the research institutions and the Geological Surveys to take a collaborative approach to address these priorities. Such studies have the potential to reveal regions hitherto considered non-prospective for different commodities or ore deposit types as having exploration potential. The cover across Australia is often considered to be very deep and therefore a formidable challenge but the extent and depth of such cover is actually poorly understood. Having a map of that cover through point 1 above and at a range of scales (region, state, national) has the potential to identify areas where cover is not deep and therefore accessible to existing exploration technologies. Pre-competitive data is essential to make such a map achievable.

CSIRO's Response to the Terms of Reference

The remainder of this submission provides comment to those terms of reference that are particularly relevant to research and the role of CSIRO as a research provider:

A. Victoria's mineral endowment (often referred to as 'prospectivity') across a portfolio of commodities (including energy, earth resources, and extractives products)

The geological history, mineral production and mineralising environments of Victoria are well understood and have been summarised by Geoscience Victoria. There are opportunities to improve on the current state of understanding of the geology, the barriers to exploration success and the key geological and technical issues that impact on investment decisions, exploration and project development.

Historically, Victoria's mineral production has been dominated by a distinctive suite of deposit styles with distinct impacts on investment decisions. For example, the high grade but 'nuggety' gold of many Victorian goldfields and associated difficulties in

developing robust resource models led to many companies being reluctant to commit significant capital. A thorough understanding of these drivers is essential to any future Victorian investment strategy.

To complement this approach, there are also significant opportunities to consider exploration in greenfields areas beyond the 'traditional' Victorian resources. A strong survey approach and links to the latest research thinking are important to unlock this potential.

Two immediate prospects for potentially unlocking the value of major Victorian mineral resources currently lying dormant are:

- Victorian deep lead-gold resources with the potential to unlock up to 5 million ounces of in-situ resources valued at more than A$7 billion. Two alternative approaches could be considered for the deep leads and both require new technology development:
    - in-situ leaching of the gold using a new, environmentally benign leach solution - a pilot program is already underway and is discussed in more detail below; and
    - non-invasive mining technologies to remove the gold bearing gravels without the need for human access to the ore bodies.
- Fine-grained Murray Basin mineral sand deposits with the potential to unlock up to 100 million tonnes of in-situ resources valued at approximately A$50 billion. The commercial viability of the fine-grained Murray Basin mineral sands will largely depend on holistic solutions to complex technical challenges that are common to many of the deposits and include:
    - processing of ilmenite;
    - characterisation of the variability within and between deposits;
    - mineral separation technologies; and
    - chrome spinel removal.

Both of these research programs would need to comprise an integrated series of projects and research providers to tackle the complex and often inter-related technical challenges that limit current development opportunities.

F. Different approaches and programs applied in other Australian and international jurisdictions to foster increased investment in greenfields exploration for, and development of, minerals and energy earth resources

The Plan for Accelerating Exploration (PACE) PACE program in South Australia and the Exploration Incentive Scheme in Western Australia are two leading examples of state governments taking a very proactive approach to encouraging mineral exploration in their regions.

Within those programs there is co-investment available to partly fund company drilling programs through a merit based proposal system. There is strategic new data collection to highlight the exploration potential of specific regions and inspire innovative new technologies, while exploration related geoscience research is also funded. Geological, geochemical and geophysical data in a previously poorly studied

region can open up new terrain to exploration as well as to increasing prospectivity through a better understanding of the regional geology and its potential to host mineral resources and how best to explore in that particular region.

Another initiative in Western Australia is funding from the WA state government for the Minerals and Energy Research Institute of WA (MERIWA). These funds provide support for student research scholarships and provide small research grants for projects in direct partnership with industry that can show benefit to WA.

G. The different roles of government (this may include, but is not limited to, targeted industry engagement, facilitation and generation of geological survey information)

State and territory government departments play an important role in facilitating mineral exploration and research. Pre-competitive data collection and delivery by the State Geological Surveys, partnership with research programs in institutions like CSIRO, and schemes that support industry expenditure on exploration are all critical elements that can encourage exploration activity and new mineral resource discoveries in a region.

The government can support access to research expertise to generate new data-sets, to develop region specific exploration programs and to co-invest in region specific research projects. Examples of CSIRO research partnerships with other governments in this way are:

- the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)satellite map of surface geology in South Australia with the Department of Primary Industries and Resources of South Australia (PIRSA);
- a hydrogeochemical survey of groundwater chemistry for mineral exploration in the Yilgarn (with the Geological Survey of Western Australia - GSWA); and
- a Joint Geological Surveys project in uranium mineral systems aligning the interests of companies and State Governments to tackle regional exploration challenges.

Conclusion

CSIRO looks forward to contributing further to this important Inquiry at the forthcoming hearings and to discussing the points made in this submission.