

MinEx CRC - Exploration innovation through industry and researcher cooperation

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SUMMARY

Current declining mineral discovery rates mean fewer future mines. The Mineral Exploration Cooperative Research Centre (MinEx CRC) is a consortium of 36 Participants creating new opportunities for mineral discovery by delivering; 1) more productive, safer and environmentally friendly drilling methods; 2) new technologies for collecting data while drilling and; 3) exploration data on never before sampled rocks in Australia that are hidden but prospective for minerals.

The innovative exploration outcomes through industry and researcher cooperation will also grow the high value Mining Equipment, Technology and Services (METS) sector.

Key words: Exploration, MinEx, CRC, discovery, research.

INTRODUCTION

The Mineral Exploration Cooperative Research Centre (MinEx CRC) is an incorporated not-for-profit company established under the Australian Government Department of Industry, Science and Technology Cooperative Research Centres (CRC) Program with the support of 36 Participants and Affiliates from the mining industry, METS sector, government geological surveys and research providers. Our purpose is to reverse the trend of declining mineral discovery on the Australian continent.

The threat of declining mineral discovery is risking the significant role of mineral and energy resources, which contribute to ~50% of Australia's exports and ~10% of Australia's GDP. Australia's attractiveness as an exploration destination has been diminished by a range of factors including;

- perceptions of Australia as a mature exploration destination where there are fewer opportunities for new discoveries, and,
- challenges in exploring for deposits buried under the overlying sand, soil and sediment that covers much of Australia.

The technical challenge of cost-effectively finding major, new mineral deposits hidden beneath barren cover rocks has not yet been met. In order to reverse this trend, we are investigating a new set of exploration tools and new ways to deploy those tools which recognise the fundamental importance of collecting quantity and quality data from the subsurface. Collecting these

data requires drilling, and the opportunities presented by developing drilling technology are three fold:

- 1) Unlock the mineral potential of the extensive, deeply covered regions of the Australian continent by efficiently exploring this space.
- 2) Improve the productivity of drilling, and collect data while drilling, so as to drive down the time and cost of deposit drill-outs and bring forward production, to increase NPV and make Australian mining operations more competitive.
- 3) Technologies and services developed by MinEx CRC will add to the value and export income of Australia's world leading METS sector by creating new drilling and sensing technologies, determining how the technologies should be best applied and providing training to ensure most effective uptake of the technology and services.

KEY ACTIVITIES

The three research programs of the MinEx CRC commenced in January 2019. The research programs are being undertaken in three phases of three years each and are backed by a total of \$218,000,000 in cash, in-kind, research and federal government funding. The current research programs are:

Program 1: Drilling Technologies

This includes extending the capability of Coiled Tubing (CT) drilling so that it can drill deeper, is steerable and delivers the highest quality sampling. Coiled tubing technology promises drilling at 1/5th the cost of conventional diamond drilling and thus has the potential to drive a revolution in mineral exploration whilst delivering significant Health, Safety and Environmental benefits. Drilling tasks that are more suited to conventional drilling will also be tackled by the MinEx CRC, developing technologies for optimising the performance and increasing the productivity of Reverse Circulation (RC) and diamond drilling techniques.

Program 2: Data from Drilling

This program is developing technologies for capturing geochemical, petrophysical and seismic data either during drilling or within the drilling workflow. The program will also deliver software that will enable drilling data to be integrated into 3D geological models in real-time, delivering timely data to inform decisions on drill holes during drilling. This will contribute to drilling productivity through more efficient targeting, by minimising mobilisation costs and by allowing modifications to the drilling program during deployment.

Program 3: National Drilling Initiative (NDI)

MinEx CRC is commencing to deploy novel drilling technologies in collaboration with all Australia's geological surveys to map the deep cover search space and determine its mineral prospectivity. Application of CT drilling will allow the

subsurface to be sampled at a density and with a dataset never before economically possible; and the samples will be subjected to a suite of cutting-edge analytical techniques which will allow 4 dimensional geological reconstructions. Whilst the NDI is not designed to discover mineral deposits in its own right, it will provide sufficient data to 'de-risk' areas of previously unknown geology and guide mineral explorers toward areas with the greatest chance of exploration success.

In addition to its three funded research programs MinEx CRC has set aside an "opportunity fund" which will be directed towards new and innovative research initiatives that may arise in the course of its 10-year life.

Outcomes and Impacts of MinEx CRC

MinEx CRC's research has commenced and in the first three-year phase the CRC will deliver the following outcomes; (1) new technologies for improving the efficiency and productivity of mineral exploration drilling, including a next generation CT drilling rig with extended depth range, steering capability and sample quality comparable with diamond drilling; (2) new technologies for acquisition of geochemical and geophysical data while drilling and incorporation of those data into automated, constantly-updating 3D models, and; (3) commencement of a >\$20M drilling program (the NDI) that will deliver an unprecedented density of samples and data from as yet unexplored regions of Australia and provide a test bed for novel drilling, sampling and analytical technologies.

MinEx CRC's research outcomes will result in;

- (1) more efficient and productive drilling technologies which will reduce the cost and time of exploration drilling, which in practice will lead to more metres drilled;
- (2) downhole geochemistry and geophysics will reduce the cost of data acquisition and, delivered in real-time, will lead to better informed targeting and timely decision making reducing the time and cost of drilling programs;
- (3) geological data collected by the NDI will de-risk previously underexplored regions and encourage significant additional exploration and drilling, and
- (4) METS companies commercialising MinEx CRC technologies will gain competitive advantage in the global exploration market.

CONCLUSIONS

Research across nine specific projects, utilising sixty researchers from eight research organisations, and including the goal of graduating 50 PhD students commenced in January 2019.

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