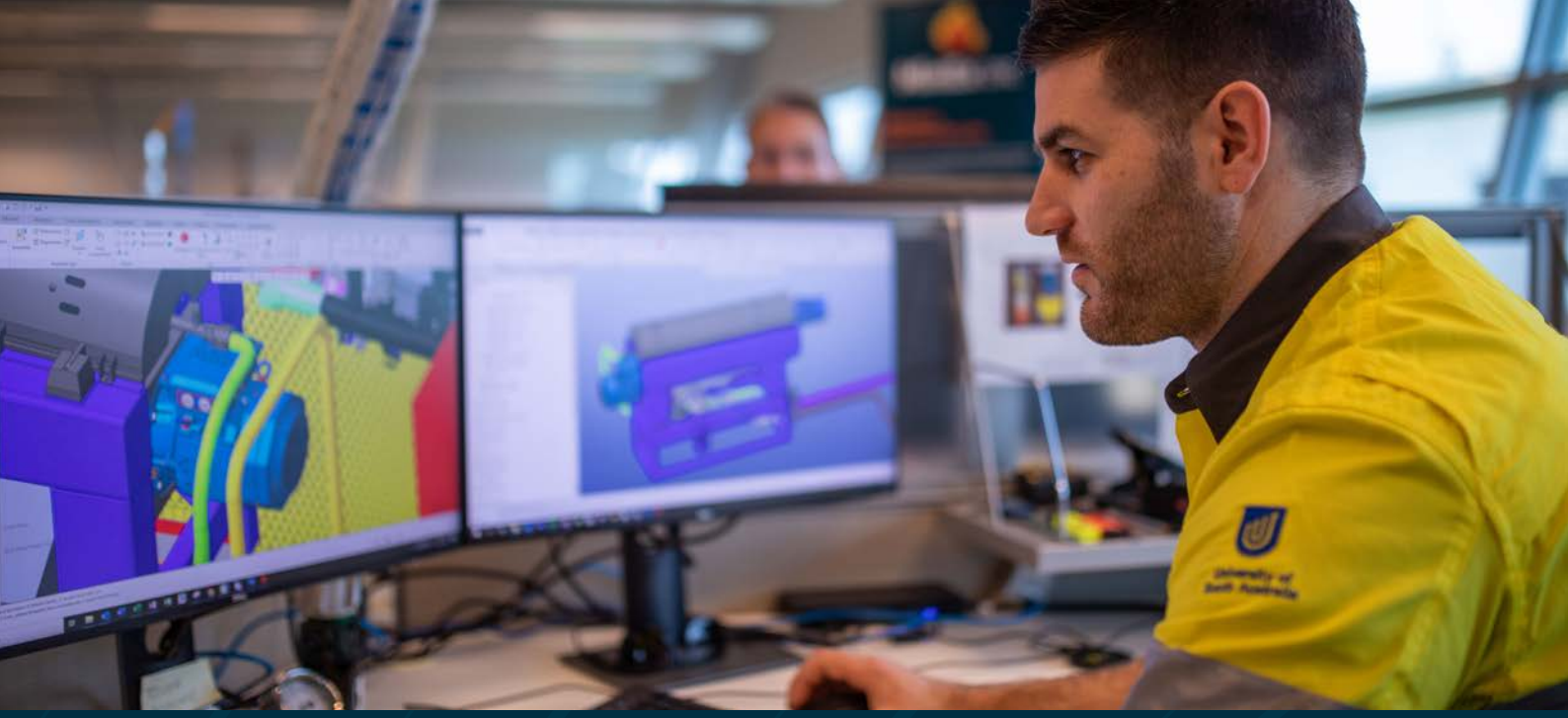


MinEx CRC

2023 YEAR IN REVIEW

Australian Government
Department of Industry, Science and Resources

AusIndustry
Cooperative Research Centres Program

CHEAPER, FASTER, CLEANER MINERAL EXPLORATION TECHNOLOGY

KEY NUMBERS

$4.4M
Ahead of Commonwealth Agreement budget

55
Peer-reviewed scientific publications

51
Postgraduate enrolments to date (on target for 60)

57%-43%
Pro-female gender split on MinEx CRC Board of Directors (excluding CEO)

24
Participant Sponsors

9
Postgraduate completions to date (on target for 50)

198/216
Phase 2 quarterly milestones met. 38 milestones progressing ahead of schedule

700m
Deepest hole yet drilled with the MinEx CT platform

25
Affiliate Sponsors

1/8TH
Water consumption compared to conventional drilling in Anglo American CT drilling campaign

1/5TH
CO_2 emissions compared to conventional drilling in Anglo American CT drilling campaign

TWO
New Opportunity Fund Projects commenced

1/1
Commonwealth Milestone met

7954m
Drilled over 23 holes in the Anglo American and Delamerian Margins NDI drilling campaigns

MinEx CRC

ADVANCING TECHNOLOGY

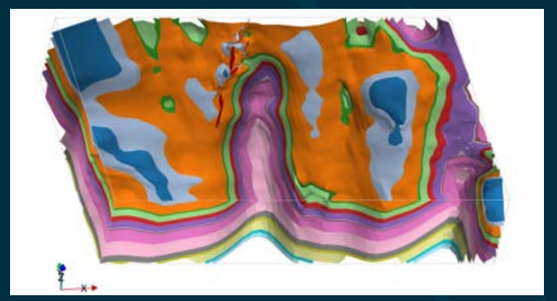
Program 1: Drilling

- Data from the "Woody" single impact percussion drilling experimental device is being used to develop a percussion drilling 'sweet spot seeking' algorithm.
- Our drill rig measurement and monitoring system for RC drilling (RC DTrol) has been updated to enable two-way digital communication with the drill rig, not only receiving data but also transmitting control commands. This is an important step on the pathway to drilling automation.
- Researchers commissioned a new LiqiCTrol production plant with 1 tonne/day capacity (ten times our previous production method) the plant can service between 6 and 10 field-deployed i-fluid systems.
- Researchers drilled a 700m hole (our deepest coiled tubing drill hole to date) with the prototype CT 1000m drill rig. Despite difficult ground conditions the hole was drilled without incident, with good sample recovery at an average 'all-in' drilling production rate of >40m per shift.
- The CT 500m drill rig and HPS were deployed at the Anglo American 'Diamantina Project' in outback Queensland between August and December 2022 and in the Delamerian Margins NDI campaign between March and June 2023. Researchers drilled 22 holes for a total of 7,254m.

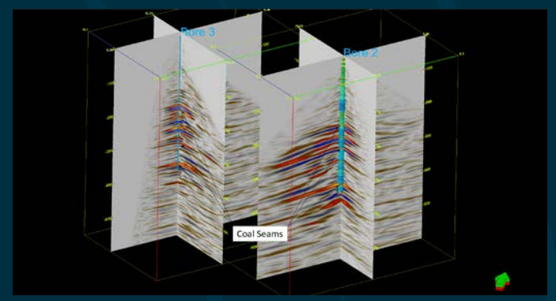
MinEx CRC drill rig on site during the Paterson Region National Drilling Initiative Campaign, West Australia.

Program 2: Data From Drilling

- Our prototype LIBS downhole geochemistry tool has been upgraded (including redesign of the optics, addition of an auto-focus mechanism and temperature sensors and updating of the GeoLIBS software) in preparation for downhole trials planned for 2024.
- Our prototype downhole swept frequency EM tool has been tested in a borehole to a depth of 450m. The sensor proved highly sensitive over a wide frequency range with logging results that compare favourably against commercial systems.
- Researchers have implemented a noise-to-noise approach for denoising of DAS seismic data which is remarkably effective at minimising noise and highlighting the seismic response of the near hole formation in borehole DAS data.
- Researchers have developed QGIS plugins, enabling free access to MinEx-developed 3D modelling software on standard personal computers.



Automated 3D geological model generated from map and drill hole data.



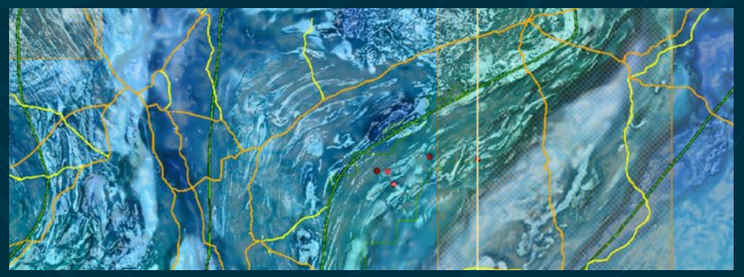
Seismic reflection data collected using borehole and surface deployed optic fibre distributed sensing (DAS).

Program 3: National Drilling Initiative

- Researchers have developed a semi-automated workflow to generate pseudo-logs and deliver near real-time identification of regolith/basement interfaces from downhole geophysical logs, pXRF and portable radio-spectrometer data from drilling samples.
- Enhanced detection of cover interfaces using novel airborne electro-magnetic inversion techniques has been favourably tested in the vicinity of NDI boreholes in the Delamarian Margins NDI campaign.
- 3D modelling and geophysical inversion in the southern Cobar Basin has highlighted elements of the regional architecture that control the localisation of known mineral deposits and has identified prospective, under-explored parts of the basin.
- A select group of 'downstream' analytical techniques are emerging as the most useful for delivering exploration relevant data from the NDI drilling campaigns. These include U-Pb dating coupled with multi-element analysis of zircon and monazite; Ar/Ar thermochronology; in-situ Rb-Sr, Lu-Hf and Re-Os dating of ore, gangue and alteration phases; Cu-isotopes, and; apatite chemistry for characterising mineral systems.

Dr Hamid Zekri and Dr Indrani Mukherjee (both UNSW) undertaking experiments at the School of Biological, Earth and Environmental Sciences, UNSW.

RESEARCH FOCUS



MinEx CRC remains focused on delivering 1) cheaper, faster, safer and cleaner mineral exploration technology, 2) in-field sensing and data science to enable informed decisions while drilling, and 3) pre-competitive geoscience data to de-risk exploration in frontier mineral provinces, delivered by the National Drilling Initiative.

RESEARCH ENGAGEMENT

- MinEx CRC-designed measurement, monitoring and control systems ("DTrol") have been installed on two drill rigs, a Reverse Circulation percussion drill rig and a Diamond drill rig, operated by MinEx CRC Participant McKay Drilling.
- MinEx CRC maintained its relationship with OMNI GeoX to coordinate and manage aspects of the Delamerian South NDI campaign.
- Participant Imdex Limited provided significant in-kind contributions of people and equipment to research projects and logging equipment for the NDI drilling program. The equipment was a valuable aid to the project and provided Imdex with important feedback on the use and development of recently released products.
- MinEx CRC's seismic research project conducted field trials at Anglo American and BHP field sites.
- Cooperation is ongoing with European-based METS companies Sandvik, Epiroc, LKAB Wassara and Sercel. Staff from the Anglo American London office have become involved with the pull-through of MinEx CRC CT drilling technology, which has prompted discussions with international companies interested in the commercial manufacture of the CT platform.
- Chilean-based drilling company Geotec Boyles remains an active participant in Project 1, with field trials in South America is being planned for the calendar year 2024.
- MinEx CRC and Schramm (a subsidiary of Epiroc) have agreed upon a commercialisation agreement to build the CT rig and associated Hydraulic Processing System. Subject to orders for CT Systems being placed, Schramm will manufacture all CT rigs in Adelaide, South Australia.

EDUCATION

- As at June 30th 2023 MinEx CRC had 37 active postgraduate students enrolled, with 51 postgraduate enrolments to date.
- There were seven MinEx CRC postgraduate completions during the reporting period, bringing the total number of completions to nine.
- Seven video conferences were held throughout the reporting period to engage students and ensure they are supported within the CRC environment.
- Four students presented at the Annual Conference held in November 2022.
- A fully immersive VR digital twin of the RoXplorer® CT drilling platform in collaboration with the Australian Research Centre for Interactive and Virtual Environments at UniSA. The digital twin will be used to optimise engineering and user workflows of the drill site, train drillers on the new platform, and act as a technology showcase for stakeholder engagement and commercialisation.

COMMUNICATIONS

119
press articles generated

37K
website visitors

2.2K+
YouTube views

- Three quarterly episodes of the MinEx CRC vNews were published on MinEx CRC TV (the MinEx CRC Annual Conference serves as the Q4 update for researchers and sponsors).
- Two press releases were distributed during the reporting period titled:
  - New Tech Promises Smaller Carbon Footprint in South Australian Drilling Campaign (October 2022).
  - MinEx CRC Clean and Green Drilling Tech: A Step Closer Following Trial in Collaboration With Anglo American (February 2023)
- 7 videos were published on MinEx CRC TV, with two thousand views.
- 119 press articles generated.
- 37k visitors to the MinEx CRC website, with 74k page views in total.

SPONSORS

Majors, METs & Survey Participants

Research Participants & Affiliates

REVENUE & EXPENDITURE

Revenue ($'000)	FY23	FY22	FY21	FY20	FY19	Total
Commonwealth Funding	5,500.0	5,500.0	5,798.5	6,597.0	2,729.5	26,125.0
Other Government Grants	28.0	-	-	-	-	28.0
Participant Contributions	6,421.1	5,600.0	7,023.0	4,811.8	12,067.5	35,923.4
Affiliates Contributions	215.0	210.0	185.1	285.0	150.0	1,045.1
DET CRC Unspent Participant Contributions	-	-	-	-	113.6	113.6
Non-financial asset acquired for Nil Consideration	-	-	-	850.0	-	850.0
Interest Income	365.3	70.1	112.9	300.5	124.0	972.8
Royalty Income	127.4	52.1	34.1	-	-	213.6
Other Income	18.1	79.8	9.6	122.2	30.8	260.5
Total Revenue	**12,674.9**	**11,512.0**	**13,163.2**	**12,966.5**	**15,215.4**	**65,532.0**
Expenditure ($'000)						
Research Program Expenditure						
- Program 1	1,871.9	1,905.5	2,576.7	2,121.4	486.1	8,961.6
- Program 2	1,361.1	1,292.8	1,610.1	1,524.6	544.8	6,333.4
- Program 3	6,866.8	5,686.0	10,405.2	1,859.8	653.5	25,471.3
- Opportunity Fund & Other Projects	759.8	580.2	204.8	-	-	1,544.8
Total Research Program Expenditure	**10,859.6**	**9,464.5**	**14,796.8**	**5,505.8**	**1,684.4**	**42,311.1**
Education & Training	575.4	432.3	504.4	384.5	200.0	2,096.6
Management Expenses	841.3	717.2	418.2	492.3	503.8	2,972.8
Royalty Expense	85.5	28.7	22.0	-	-	136.2
Salaries & Wages - Drill Crew	1,149.1	987.8	97.2	-	-	2,234.1
Salaries & Wages - Head Office (incl Directors Fees)	1,390.6	1,049.8	1,046.7	996.9	1,005.3	5,489.3
	4,041.9	**3,215.8**	**2,088.5**	**1,873.7**	**1,709.1**	**12,929.0**
Total Expenditure	**14,901.5**	**12,680.3**	**16,885.3**	**7,379.5**	**3,393.5**	**55,240.1**
Restricted (Deficit)/ Surplus	**(2,226.6)**	**(1,168.3)**	**(3,722.1)**	**5,587.0**	**11,821.9**	**10,291.9**

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