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2025 MinEx CRC Annual Report

1 July 2024 - 30 June 2025

Table of Contents

1. Written Annual Report

1.1 Executive Summary	3
1.2 Achievements	4
1.3 Research Case Study	10
1.4 Risks & Impediments	12
1.5 Education and Training (E&T)	14
1.6 Intellectual Property Management	18
1.7 CRC Future Plans and Transition Arrangements	20
1.8 Financial Management	21

Appendices

Appendix A: Sponsors	24
Appendix B: 2024 Year in Review	27
Appendix C: ACIL Allen Report	35
Appendix D: Student Register	44
Appendix E: Registered IP (Patents, Trademarks, Designs)	51
Appendix F: Publications	53

1.1 Executive Summary

Mineral exploration in Australia remained robust in FY25. In the March 2025 quarter, companies spent approximately A\$933 million searching for new mineral resources, slightly lower than the previous quarter but higher than the same period last year¹. For the full 2024 calendar year, total exploration expenditure reached A\$3.95 billion, with A\$2.82 billion focused on existing mining areas (brownfields) and A\$1.13 billion on new areas (greenfields)². This sustained level of investment provides a strong foundation for MinEx CRC's research into technologies that enhance exploration efficiency, reduce costs, and contribute to Australia's transition to net zero.

During the reporting period, MinEx CRC strengthened its collaboration network with three new global sponsors—Fortescue Metals, Vale S.A., and Newmont Mining—bringing the total to 25 Participants and 18 Affiliates. The CRC had a \$2.2M deficit in FY25 (life to date surplus of \$7.0M) which was in line with expectations, reflecting continued investment in drilling campaigns and research. The CRC maintains a healthy cash balance of \$7.5M at 30/6/25. Notably, forward projections now indicate a small cash surplus by the conclusion of MinEx CRC in 2028.

MinEx CRC successfully completed Phase 2 of its three-phase research program and achieved all 11 Commonwealth Milestones that were due in June 2025. Phase 3 commenced on 1 January 2025 and is progressing on schedule. Research highlights included field-ready prototype drilling automation platforms, trials of downhole LIBS and swept-frequency electromagnetic tools, and the open-source release of automated 3D modelling software.

MinEx CRC advanced its commercialisation agenda with two new licence agreements: the spin-out of start-up CoilRig to manufacture coiled tubing drill rigs for the shallow geothermal heating and cooling market, and licensing of fluid processing technology to an industry contractor. Our service provider DIG CT successfully completed two National Drilling Initiative campaigns using the CT500 rig in collaboration with sponsoring organisations the Geological Survey of South Australia (GSSA) and Geological Survey of Western Australia (GSWA).

Our education program continues to exceed expectations, reaching the 2028 target of 60 enrolled postgraduates ahead of schedule, with 20 completions to date. All graduates have transitioned into industry or research roles, contributing skilled expertise to Australia's exploration sector.

Outreach and impact grew significantly. MinEx CRC issued two media releases, launched pre-commercial brochures, and expanded its digital presence, achieving over 15,000 YouTube views, 41,000 website visitors, and 3,700 LinkedIn followers. Research outcomes were highlighted in prominent media outlets, and MinEx CRC researchers produced 62 scientific publications related to their work.

MinEx CRC remains firmly on track to deliver all milestones within its ten-year life with reporting and closure in mid-2028. The Board has endorsed exploration of a post-MinEx CRC entity to ensure the ongoing impact of our research and partnerships beyond the life of current funding agreements.

¹ Australian Bureau of Statistics, Mineral and Petroleum Exploration, Australia – March 2025, A\$933 million (seasonally adjusted); –2.4% quarter-on-quarter; –11.4% year-on-year.

² Geoscience Australia, Exploration Statistics, 2024 calendar year totals: A\$3.95 billion (total), A\$2.82 billion in brownfields, A\$1.13 billion in greenfields; breakout by state: WA A\$2.51 billion (64%), QLD A\$566 million, NSW A\$280.5 million.

1.2 Achievements

AWARDS

- The MinEx CRC Project 2 team was awarded \$450,000 in Seed-Start Grant funding from the South Australian Government for their new tech start-up, CoilRig.
- Helen McFarlane (CSIRO) was selected by Science & Technology Australia as one of the 2025 Superstars of STEM.
- Sam Bizhani (University of Adelaide) and the 'Magnetic Misfits' team won first place in the 2025 Next Generation Explorers Award at PDAC 2025.
- MinEx CRC Board Member Peter Rossdeutscher AM was appointed Chair of the Industry Innovation and Science Australia (IISA) Board by Minister for Industry and Science, Ed Husic MP, in February 2025.
- Internal MinEx CRC awards were presented at the Annual Conference as follows:
 - MinEx CRC Publication Award: Wei Hong (lead author) for the publication "Metallogenic setting and temporal evolution of porphyry Cu–Mo ± Au mineralisation and alteration in the Delamerian Orogen, South Australia: Insights from zircon U-Pb, molybdenite Re-Os and in-situ white mica Rb-Sr geochronology."
 - MinEx CRC Publication Award: Wei Hong, Adrian Fabris, Tom Wise, Alan Collins, Sarah Gilbert, David Selby, Stacey Curtis, and Anthony Reid for their article published in Economic Geology, Volume 118, Issue 6, pp. 1291–1318, September 2023.
 - MinEx CRC Team Player Award: Richard Chopping, Fawna Korhonen, Simon Johnson, and the GSWA for their consistent support of MinEx CRC's goals, particularly in advancing technology development within the National Drilling Initiative.
 - MinEx CRC Technology Award: Tom Raimondo, Jack Fraser, and Andrew Cunningham for their application of virtual and augmented reality technologies to mineral exploration through the development of LogAR and the MinEx CRC Virtual Drill Site.

PARTICIPANTS AND AFFILIATES

- 25 sponsoring Participant organisations
- 18 sponsoring Affiliate organisations

Changes to Participant and Affiliate membership are summarised below:

- Fortescue Metals Group Ltd (FMG) joined as Participant on 5/12/2024 and was approved by the Board.
- Newmont Mining and Vale S.A. joined as Participants on 17/04/2025 and were approved by the Board.
- South32 changed from a Participant to Affiliate status as of 01/01/2025 and was approved by the Board.
- Cartwheel Minerals joined as a new Affiliate as of 01/01/2025 and was approved by the Board.
- HiSeis Pty Ltd, Matsa Gold, Santos QNT Pty Ltd and University of Tasmania have withdrawn as Affiliates at 31/12/2024 with the expiration of their agreement.

A complete list of Participant and Affiliate sponsors is included in Appendix A.

EQUITY, DIVERSITY, AND INCLUSION (EDI)

MinEx CRC is committed to growing and supporting an equitable, diverse, and inclusive environment where everyone feels safe, valued, supported, and treated fairly with dignity and respect.

The following EDI actions were undertaken during the reporting period:

- The MinEx CRC Board (excluding the CEO) comprised eight members, 50% male and 50% female.

- The MinEx CRC Executive Management Committee, including the CEO, comprises eight members, 62.5% male and 37.5% female.
- Research Leads for the nine primary programs are 78% male and 22% female.

EDUCATION AND TRAINING (E&T)

- As of 30 June 2025, MinEx CRC had registered 20 completions in total (6 Masters by Research, 14 PhDs), 35 active students (3 Masters by Research, 32 PhDs), and four students not supported by a MinEx CRC bursary (funded via surplus allocations).
- Five postgraduate students qualified for their degree during this reporting period. Two of these students are now employed with MinEx CRC Participants or Research Participants. The completed students are now employed as follows:
 - Osama Abdullah A Alzubaidi (Masters): Teaching Assistant, Department of Technical Training, King Abdulaziz University, Jeddah, Saudi Arabia.
 - Su Kwong Lee (Masters): Trainee, Nuri Cerah Miri, Sarawak, Malaysia.
 - Rui Huang (PhD): MinEx CRC Postdoctoral Researcher, Drilling Analytics Research Centre, Curtin University.
 - Alejandra Bedoya Meija (PhD): Lecturer, Colombia.
 - Mosayeb Khademi Zahedi (PhD): Geoscientist (Predictive Mineral Potential Mapping), Geoscience Australia.
- Seven video conference sessions were conducted during the reporting period to engage students and provide support within the CRC environment.
- Two mid-year postgraduate events were held during the reporting period. The 2024 Mid-year Postgraduate Workshop was held online over three days in mid-July 2024 and saw 30 students present technical updates on their research.
- Four students undertook 'Company Sponsored Projects' during the reporting period. These students have continued their research directly affiliated with MinEx CRC industry partners and complementary to the broader MinEx CRC research agenda. These projects are concentrated on case study areas of industry partners and include AIC Mines, Lodestone Mines, Strategic Energy Resources and Cartwheel Resources.
- A new 'Coffee Break' initiative was launched to connect students with industry professionals—virtually or in person—for informal conversations offering career insights and real-world industry perspectives.

COMMUNICATIONS AND EVENTS

- Two media releases were distributed during the reporting period titled:
 - *Augmented Reality Core Logging a Step Closer Under New Commercial Deal*
 - *CRCs Leading the Way to Net Zero Goals, Generating Billions in Value for All Australians* (in collaboration with Cooperative Research Australia)
- A pre-commercial product brochure titled '*Loop 3D Modelling Platform*' was published as a technical reference for those seeking further context on MinEx CRC research.
- Six videos highlighting key research outcomes were published on MinEx CRC TV. Total YouTube views now exceed 15,000.
- The MinEx CRC website received over 41,000 visitors during the reporting period.
- The 2024 *Year in Review* summary document was released and is included as Appendix B.
- MinEx CRC's sixth Annual Conference, *Frontier Exploration*, was held in November at the Adelaide Oval, with 133 delegates from 24 organisations attending the two-day (internal) event.
- The annual Mid-Year Science Review was held in June 2025 in Adelaide, attracting 112 attendees from 25 organisations.
- MinEx CRC research outcomes were featured in several prominent industry publications, including *Australia's Mining Monthly*, *Australasian Drilling Magazine*, *miningnews.net*, the *Innovation News Network*, and *The Precompetitive Review*.

- MinEx CRC, in partnership with Cooperative Research Australia, released an ACIL Allen report highlighting the CRC Program's impact on CO₂ reduction, economic growth, and job creation through private sector R&D. The report features contributions from 13 CRCs supporting Australia's decarbonisation goals. A summary is provided in Appendix C.

SME ENGAGEMENT

- MinEx CRC maintained its relationship with OMNI GeoX to coordinate and manage aspects of the Western Australia and South Australia NDI drilling campaigns in collaboration with GSSA/GSWA.
- 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 using and developing recently released products.

INTERNATIONAL COLLABORATION

- Cooperation is ongoing with European-based METS companies Sandvik, Epiroc, LKAB Wassara and AnTech.

RESEARCH MANAGEMENT

MinEx CRC's primary aim is to research topics of relevance to participants, which can be commercialised or utilised in the pursuit of improved exploration outcomes. Significant achievements in the 2024/2025 reporting period are as follows:

- All 11 Commonwealth Milestones were achieved by 30 June 2025.
- By 30 December 2024, 451 of 469 Phase 2 quarterly project milestones (96%) were completed; the remaining 18 milestones were transferred to Phase 3 research agreements.
- By 30 June 2025, 46 of 55 Phase 3 quarterly project milestones (84%) were completed.
- Project agreements for seven Phase 3 MinEx CRC projects (2025–2027) have been executed, and all projects commenced on schedule on 1 January 2025.

RESEARCH HIGHLIGHTS

Drilling optimisation and automation

During the early stages of Phase 3 (our deployment phase), researchers now have field-ready prototype drilling automation platforms for i) Fluid Automation (multiple systems optimised for various drilling scenarios), ii) Auto Drill for reverse circulation drilling and iii) Auto Drill for diamond drilling. Each platform includes novel hardware, sensors, software and user interfaces which are integrated with existing drill rig components and control systems as appropriate. In parallel, we have used extensive experimental data to refine our models of drill/rock interaction – focused on identifying "sweet spot" drilling parameters as a function of the data collected by our drilling automation platforms. Our ability to measure and monitor these parameters has been confirmed in field trials, with MinEx CRC technology integrated on drill rigs owned and operated by MinEx CRC Participant McKay Drilling. With consistent, high-frequency measurement and direct feedback to the rig control systems, researchers can automate the control of critical parameters (with a high degree of precision and short response time) to target the drilling sweet spot.

The next stage of research involves multiple field trials in various drilling scenarios, collaborating with our drilling service provider and mining company partners. We aim to quantify the productivity, safety and environmental gains of the drilling automation platforms in real-world applications and thus support the case for commercialisation.

Coiled Tubing (CT) drilling

Our coiled tubing (CT) drilling research progressed on multiple fronts during the reporting period:

- DIG CT continued to operate the CT500 drilling platform, including the 500m depth reach RoXplorer™ drill rig and hydraulic processing system (HPS), as a sub-contractor to MinEx CRC for NDI drilling campaigns at Nifty (northwest Western Australia), Moonera (on the Nullarbor Plain in eastern Western Australia) and in the northern Gawler Craton of South Australia.
- Modifications of the 1000m depth reach RoXplorer™ drill rig were completed in preparation for steering-while-drilling trials utilising the AnTech Ltd bottom-hole-assembly (BHA). The drilling trials have been postponed to the next reporting period (2025-2026) due to delays in the manufacture of the AnTech BHA, which is now due for delivery to Australia in Q3 2025. Modifications to the CT1000 rig to prepare for the trials have included; installation of a new communications cable in the CT1000 drill coil; design, fabrication and bench top trials of a bespoke down hole motor for integration with the AnTech BHA; construction and installation of a jibboom and winch (attached to the RoXplorer™ mast) required for mounting the ##m long AnTech BHA.
- We have incorporated the Wassara BHA research and development in our Project 2 Phase 3 research plan, as a potential alternative to the AnTech steerable BHA. Various iterations of the Wassara BHA have now drilled over 26,000 meters in trials and have demonstrated the ability to drill curved holes within strict tolerances, maintaining deviations of less than ± 30 centimetres, in boreholes of ~ 100 m depth. The Wassara research shows that a steerable drilling solution for the RoXplorer™ platform in hard rock conditions is possible. However, the Wassara BHA has a significantly larger diameter than can be accommodated on the RoXplorer™ rig, and a direct "shrink-to-fit" engineering solution does not appear to be feasible. The MinEx CRC research team will focus on what we have learnt from the Wassara trials and assess implications for the design of a new tool or modifications to the AnTech BHA if appropriate.

Downhole Assay

We have completed the first field trial of the prototype downhole LIBS tool at the Australian Automation and Robotics Precinct in Perth, logging over 220 m across several holes. The wireline deployment included full software control of the laser assembly and spectrometers, active and static focus, air jet, camera and centraliser. The tool returned geologically sensible data, including intervals that were doped with target elements Cu and Li, which were used to generate near-real-time downhole logs. Data collected during the trial were of high quality, with good counts, no electrical noise across the whole spectral range and with all expected elemental lines present. These field data have been combined with data from our laboratory experiments and synthesised data to investigate new calibration protocols and establish predictive models for LIBS spectra using physics-based forward modelling.

Key learnings from the AARP trial have been used to inform design improvements, including:

- Rebuild of the optical front end of the tool to increase performance and mitigate risk related to laser damage of the optics.
- Replacement of some components to improve serviceability and reduced dependencies on difficult to access parts.
- Redesign of the back-end connections (between tool and cable), to facilitate safer and more adaptable deployment options, which will be critical for upcoming trials at end-user mine sites.

These design improvements will be tested in our second major field trial at the AARP in Q3 2025. In October 2024, we submitted a Provisional Patent Application for the LIBS downhole assay tool, and we have begun to map potential commercialisation options in consultation with our Participants.

Logging-while-drilling petrophysics

We have now built four prototype versions of the downhole swept frequency domain electro-magnetic (FDEM) tool and conducted trials in the ~ 1000 m deep research well at Curtin University

and, most recently, at the remote Kojonup locality in the Western Australian wheat belt. Meaningful electro-magnetic information about the formation has been collected across all frequencies (ranging from 3000 Hz to 98000 Hz at 500 Hz intervals in the Kojonup trial). The raw data are converted to relative residual phase offset for each frequency measured at each depth interval. The relative phase offset is then used to calculate frequency-dependent electrical conductivity at each depth. The data closely match conductivity logs (at the same source frequency) from conventional EM logging tools, but, with ~180 source frequencies measured, produce much richer multi-channel log.

The swept frequency tool is sensitive to instrument self-response and temperature changes. Accounting for these effects (and the very small analytical signal) requires complex, time-consuming processing. An important component of our pathway toward commercialisation of the tool will be to streamline and, if possible, to automate data processing.

Researchers have also made progress on our downhole time domain electro-magnetic (TDEM) tool. A prototype sensor and circuit board have been built and tested in the laboratory with promising results. Researchers are now building a housing so that the sensor can be tested in the Curtin University research borehole. If we can establish the validity of the tool in a controlled borehole environment, we will turn our attention to building a slimline tool suitable for mineral exploration drilling.

Seismic in the drilling workflow

Our seismic research team have released a comprehensive report which outlines recommendations and insights into the deployment of fibre optics in instrumented field sites. The report is derived from multiple field case studies across various environments and projects, illustrating the effectiveness of fibre optic technologies in diverse applications. The report details the comparative performance of different DAS interrogators, cable designs and deployment strategies.

Our comprehensive review and characterisation of fibre optic DAS technologies led to the insight that DAS receivers could mimic the functionality of three-component (3C) receivers if coupled with an appropriate 3C source. We have now built a lightweight, low-cost 3C source and tested with an optic fibre DAS receiver in the Curtin University research bore hole. The resulting seismic data can be resolved into three-components and demonstrate seismic anisotropy in the formation around the Curtin borehole. We have now submitted a Patent Application for the 3C source, which believe has commercialisation potential.

We have developed two ML methods for de-noising fibre optic DAS data and evaluated them on numerous field datasets acquired with different seismic sources (borehole and surface), on passive data for event detection, and on seismic while drilling data. Both ML methods are effective in attenuating noise and thus increasing the signal-to-noise ratio of DAS data, specifically for data acquired with low-power sources, such as the MinEx CRC designed 3C source. This combination has the potential to drastically reduce the cost of borehole seismic acquisition, bringing it within reach of mineral exploration budgets.

Automated 3D modelling

Our efforts in this research theme have been focused on rapid production and updating of 3D geological models using readily available geological and geophysical constraints. Researchers have developed a series of software 'modules' which address discrete aspects of the automated 3D modelling challenge including; map2loop (for rapid 3D modelling from geological mapping data), dh2loop (incorporation of drill hole data), loopstructural (incorporation of structural geology data), tomofast-X (geophysical inversion software) and loopUI (calculation of model uncertainty). During the 2024-2025 reporting period we developed QGIS plugins for these 3D modelling software modules. QGIS is a free, open-source geographic information systems package that will allow access to our 'Loop' suite of software without the need for third-party licensing.

Our ongoing work will be aimed at integrating the modules into a single, user-friendly interface (using QGIS as the 'host' software platform) and establishing workflows (data protocols, communication between modules, sequencing of tasks, preferred outputs) that will minimise time and processing cost. The aim is to have a flexible all-in-one geological and geophysical modelling package that can be operated by a geologist, in the field using off-the-shelf computer hardware and software. We have established a not-for-profit company "Loop Foundation" which will become the vehicle to deliver and support the Loop software suite to end-users.

COMMERCIALISATION PROGRESS

During the past year, two licence assignments were executed and one was modified, following four assignments completed in FY24.

Details of the FY25 agreements are as follows:

- The MinEx CRC CT500 drill rig licence with Epiroc was changed from an exclusive to a non-exclusive contract, allowing MinEx CRC to offer additional construction licences.
- A licence to construct the CT500 and its associated IP was granted to the start-up company CoilRig. CoilRig will undertake CT drilling using equipment, methodologies, and personnel currently managed by MinEx CRC. DIG CT is working to grow demand for MinEx CRC CT drilling technology by actively deploying existing equipment and facilitating orders for new CT rigs.
- A licence to use components of MinEx CRC fluid processing technology, developed in MinEx CRC Project 1 (Drilling) and in partnership with Curtin University, was granted.

1.3 Research Case Study

Research Case Study: National Drilling Initiative campaigns

During the 2024-2025 reporting period third party service provider company DIG CT Pty Ltd operated the CT500 rig as a sub-contractor to MinEx CRC for the National Drilling Initiative (NDI) drilling campaigns. We conducted two drilling campaigns, the first in the immediate area of the Nifty deposit, northwest Western Australia (in collaboration with the Geological Survey of Western Australia) and the second in the northern Gawler Craton, South Australia (in collaboration with the Geological Survey of South Australia).

The Nifty campaign was a continuation of the drilling program which began in 2023. Drilling resumed in July 2024 and was completed in early September 2024. We completed three additional drill holes, bringing the Nifty campaign to a total of 3,129 meters drilled in nine holes. In addition to new coiled tubing drilling, the Nifty NDI campaign involved relogging and sampling of legacy drill samples from the ore body, proximal host rocks (within 100s of meters) and distal (kms to 10s of kms) parts of the Nifty mineral system. These samples have been the subject of a range of analyses aimed at characterising and dating key elements of the mineral system, including:

- Mineralogy and geochemistry, from which we observe multiple, overprinting mineralisation events at the Nifty deposit. Disseminated sulfide mineralisation is widespread in the Yeneena Basin (the host basin of the Nifty deposit), but does not reach economic concentrations, is commonly linked to primary mineralisation events (associated with sedimentary and diagenetic processes), whereas coarse-grained chalcopyrite mineralisation reflects dynamic remobilisation which post-dates basin formation.
- Forward modelling of fluid-rock interactions (using Geochemist's Workbench® software) involved in each mineralising event, utilising constraints from our mineralogical and geochemical observations.
- Synthesis of petrophysical data across the Yeneena Basin, including assessment of data quality as a function of the various acquisition and processing techniques used to collect legacy data.
- Analysis of traditional (e.g. oxygen and carbon) and novel (e.g. Cu) stable isotopes from ore, gangue and host rock minerals, which support the interaction of at least two discrete fluid sources in formation of the Nifty mineralisation.
- Preliminary fluid inclusion data which suggests that the fluid associated with chalcopyrite mineralisation was relatively lower salinity and higher temperature than formation waters associated with pre-ore processes.
- Apatite geochemistry, which shows a characteristic hydrothermal signal (depleted light rare earths, depleted heavy rare earths and elevated mid-range rare earths with a positive europium anomaly) associated with apatite in the ore deposit.
- In situ Rb-Sr geochronology, which is consistent with a post-basin fluid flow event associated with the ~680 to 610 Ma Miles Orogeny.

We have also conducted prospectivity modelling across the Yeneena Basin utilising both knowledge-driven (fuzzy logic) and data driven approaches. The knowledge-driven approach integrates geological and geophysical data to create fuzzy logic-based prospectivity maps, while the data-driven approach uses machine learning algorithms to analyse spatial data layers and predict mineralisation potential. Key findings of the prospectivity modelling include:

- The identification of high prospective zones for Cu mineralisation, particularly in areas with a high density of structures and proximity to source rocks.
- The effectiveness of available datasets as proxies for mappable criteria in the knowledge-driven approach.

- The challenges of limited and biased training data in the data-driven approach, highlighting the need for more representative datasets and rigorous model validation.

The current study will be continued by geochemical-mineralogical modelling to test the conceptual above-mentioned multi-stages model of Nifty sediment-hosted copper mineralisation and constrain the source and controlling factors of copper precipitation.

Following the Nifty NDI campaign the CT drilling platform was mobilised to South Australia where DIG CT completed 2,309 meters of drilling in seven drill holes, delivering high quality cuttings samples through hundreds of meters of cover material, cored basin-sediment intervals in two holes and cored basement intersections in five holes. The field deployment included wireline geophysical surveys (total counts gamma and magnetic susceptibility), cuttings and core photography, geological logging and portable XRF geochemical analyses of cuttings and core samples. These preliminary data have been made available to the public via the South Australian National Drilling Initiative Dashboard (link at bottom of page). The dashboard presents drill hole data in visual format using simple dropdown menus and provides access to a metadata download link from which they can download the raw data.

The drilling samples have been transported to Adelaide where they will be analysed by HyLogger and made available for logging, sampling and analysis as part of the South Australia Drill Core Library's public collection. MinEx CRC and the GSSA conducted a Northern Gawler NDI sampling workshop as part of our midyear meeting in June 2025. The samples collected will be subjected to a range of analyses, including petrology, geochronology, isotopic tracing, mineral chemistry and petrophysics, scheduled to be completed in the second half of 2025.

Complimentary analyses are being conducted on legacy drilling samples from the northern Gawler Craton as part of the Project. Geochronology, combined with petrological modelling, of these materials has already delivered new insights into the tectonic history and potential timing of mineralisation events in the northern Gawler Craton. Combined with analyses from the new NDI drill holes, these data will allow us to characterise and map the basement rocks in the northern Gawler Craton, deepen our understanding of the geological history and identify areas of mineral prospectivity, stimulating new exploration in this part of the state.

(<https://www.energymining.sa.gov.au/industry/geological-survey/gssa-projects/ndi/northern-gawler-ndi>)

1.4 Risks & Impediments

Risk management is an important governance task and management function, and the MinEx CRC Board Audit and Risk Committee provides oversight on risks that may impact MinEx CRC's ability to achieve our vision and goals.

Risks are constantly monitored and reviewed formally by management with the Audit and Risk subcommittee twice yearly. The current risks are summarised and addressed in the attached table, with the following notes:

- The change to a model of sub-contracting out of field work involving the CT Rig in 2024 significantly decreased risk exposure to MinEx CRC.
- OHSE remains the top risk for MinEx CRC, primarily because the consequence of an incident may be extreme (fatality-level), with a rare chance of occurrence still resulting in a mitigated risk of 'High'.
- The focus of MinEx CRC is changing from that of primarily research to commercialisation of the research and hence the risk landscape is evolving, reflecting this.

The two highest risks, based on the mitigated risk ranking which takes into account controls in place, are as below. The strategies adopted to address the risks are listed as controls which are in place and mitigating factors which exist. Note that impediments to MinEx CRC are viewed as risks and are included in MinEx CRC risk mitigation.

<i>Risk Issue</i>	<i>Controls in Place</i>	<i>Mitigating Factors</i>
<i>OHSE Performance</i> <i>Failure to achieve satisfactory OHSE outcomes</i>	<i>OHSE Policies in place which are regularly reviewed and updated.</i> <i>* OHSE reporting regime in place.</i> <i>* Detailed OHSE Risk Assessment completed for drilling campaigns.</i> <i>* Specific mitigation steps in place, e.g. journey management, whistleblower policy, sexual harassment awareness.</i>	<i>* Apart from Drilling Campaigns and associated field activities, most CRC activities are relatively low risk.</i> <i>* Risk assessment completed for each Drilling Campaign and implemented.</i> <i>* CT500 drilling operations subcontracted to DIG CT.</i> <i>* NDI drill contracts have rigorous OHSE scrutiny in selection and operation.</i>
<i>Staff Retention and Diversity</i> <i>Failure to achieve satisfactory Staff retention and diversity of HO Management and Researchers</i>	<i>* Active diversity and inclusion strategy</i> <i>* Market based employment conditions</i> <i>* Monitoring of staff turnover and diversity</i>	<i>* MinEx CRC track record and reputation established</i> <i>* Depth of experience of pool of candidates increasing</i> <i>* Management focus in these areas</i>

The following significant risks are also recognised:

Risk Issue	Controls in Place	Mitigating Factors
Cash Management and Fraud a) Loss of funds or income due to fraud b) Loss of funds or income due to poor debtor management c) Loss of funds or income due to poor investment returns	* Best practice fraud prevention in place * Low-risk investment policy * Rigorous debtor management and small number of Debtors & Invoices	* Spread of funds across accounts & low risk Banks * Conservative investment policy
Commercialisation Outcome Failure Failure to achieve commercialisation outcomes of the Coiled Tube System	* Clear commercialisation mandate in place for CT500 Rig and HPS including non-exclusive contracts * Commercialisation committee consideration and support	* Understanding by key personnel of Commercialisation pathways * Commercial METS partners * Successful field trials * Dedicated personnel responsible * Commercialisation agreement with specialised drilling company * Substantial remuneration received from DIG CT to date * Extension to payment plan by 9 months
Research Portfolio Failure to: a) Meet industry requirements b) Maximise outcomes from Opportunity Fund c) Address industry research requirements in Phase 3	* Project agreements with Milestones & budgets * Ongoing Project reporting & tracking * Project review panels include Participants	* Diversification of research portfolio across sectors, researchers and participants * Track record of efficient Opportunity Fund leverage * Phase 3 project agreements in place
Crisis Management Business Continuity and crisis management. Failure to develop and implement suitable strategies	* Risk Register process and Management controls * Approved Crisis plan * Detailed plans and procedures in place including communication	* Experienced Board and Management Team * Crisis Management Plan
Failure to Execute Drilling Projects a) Reliability of required drilling equipment, spare parts and support b) Community and Land access issues c) Integration of the Drilling Campaign with the Research Projects	* Drill contract undertaken by specialised drilling company following tender process * Proactive approach adopted for ground access * Detailed Plan in place	* Experienced personnel and learnings between states, including Drilling Manager * Process has commenced in a timely manner and regularly monitored * Alternative drilling techniques available * Closely managed relationship between research and subcontractor and execution teams * Track record of successful completion of drilling campaigns
Unsatisfactory Performance at a Management Level by: a) Executive & Education Committee b) Science Advisory Committee c) Research Project Leaders and Committees	* Regular review of Management performance by the Board * Ongoing reporting, feedback and monitoring processes by CEO * Well-defined business plans and objectives	* Experienced management team and Board with over 7 years of stable team and satisfactory outcomes

1.5 Education and Training

The MinEx CRC primary education goals are to support vocational training in drilling and mineral exploration and to achieve an ambitious target of 50 postgraduate completions. The CRC is making substantial progress toward both objectives.

Vocational Education and Training

The vocational education and training (VET) component of the MinEx CRC E&T program has concentrated on advancing development and application of a virtual reality (VR) environment based on the RoXplorer® CT drill rig and associated HPS system in education and training. In its initial phase, the Project produced a highly realistic, navigable, and multi-user virtual drill site was created. The VR environment features detailed animations, labelling, graphics, and embedded videos, along with safety warnings and visualisations to highlight site hazards. Augmented reality and 3D-printed versions were developed alongside the VR platform.

Through the reporting period, the E&T Committee explored opportunities to expand the use of the VR platform in classroom-based simulations, aimed at training students in emerging drilling technologies. The Committee has considered the integration of mechanisms for student feedback and validation to inform future development of VR training scenarios. This work has involved close collaboration between the E&T Committee, Program 1 engineers, VR platform at University of South Australia, and other key stakeholders.

Higher Degree by Research (HDR) Program

MinEx CRC monitors student enrolments, progress, and completions against its goal of 50 postgraduate completions, using a student pipeline established under the Postgraduate Education Business Plan. As of 30 June 2025, a total of 20 students had completed their degrees, comprising six Masters by Research and 14 PhDs. At that date, 35 students—three Masters by Research and 32 PhD candidates—were actively enrolled in the MinEx CRC postgraduate program. All but four of these projects have been supported by a MinEx CRC bursary, with the remaining projects funded through surplus bursary allocations. Additionally, one Honours student and nine Masters by Coursework students completed MinEx CRC-related research projects during the reporting period.

Detail on all postgraduate, Masters by Coursework and Honours students and projects has been added to the MinEx CRC website during this reporting period. This includes links to theses for all completed students, provided the document is not under embargo.

A detailed register of all active students and project information as of 30 June 2025 is provided in Appendix D.

MinEx CRC support for HDR students

The MinEx CRC E&T Committee oversees the HDR program, including development of new projects, tracking student progress, and providing support to the HDR cohort. Students identified as high-risk are a standing item at quarterly E&T Committee meetings. Progress towards completion is closely monitored by both supervisors and the Committee, with consideration given to challenges such as experimentation difficulties, analytical delays and the ongoing impacts of Covid-19. High-risk students receive regular check-ins and are supported as appropriate, with additional guidance provided through monthly online video conference sessions.

Recognising the challenging environment for student retention due to strong industry demand for mineral exploration and mining graduates, the MinEx CRC E&T Committee has implemented the following strategies to attract, support, retain and ensure timely completion of postgraduate students:

- **A \$20,000 per annum bursary for each HDR student** (three years x \$20,000 = \$60,000 for PhD students, two years x \$20,000 = \$40,000 for Masters by research students). This funding is provided regardless of whether a student holds other scholarships or stipends. The funding is intended to support both the student and their Project, with allocations tailored to the specific needs identified by the supervisory panel. Typical uses of the bursary include scholarship support, scholarship top-up, operational project costs such as travel and analytical work and conference attendance.
- **A completion bonus** of \$3,000 for PhD students and \$2,000 for Masters by Research students awarded when a student qualifies for their degree. The E&T committee changed this to a 'thesis submission bonus' in February 2025 to better support students when they submit their thesis for examination. The awarded amount remains the same.
- **Support for Honours and Masters by coursework students** to undertake MinEx CRC-related research activities. One Honours and nine Masters students completed their projects during the reporting period, and five Masters students currently enrolled. A summary of research topics can be found in Appendix D.
- **MinEx CRC postgraduate students are invited and encouraged to be part of CRC's Equity, Diversity and Inclusion Committee.** Two postgraduate students sat on the committee during the reporting period.
- **HDR candidates are strongly connected to government, mining industry and METS Partners.** Every MinEx CRC postgraduate student is required to have an industry co-supervisor from a MinEx CRC Participant or Affiliate organisation. This arrangement involves formal endorsement from a MinEx CRC Participant or Affiliate industry representative, with project aims and objectives co-developed in collaboration with academic supervisors. Industry/end-user co-supervisors include staff from AIC Mines, Anglo American, BHP, CSIRO, Department of Energy and Mining/Geological Survey of South Australia, geological surveys of NSW, Victoria, Northern Territory and Western Australia, Geoscience Australia, Lodestone Mines, Sandvik, South32 and Strategic Energy Resources.

Four students undertook 'Company Sponsored Projects' during the reporting period. The students have continued their research that is directly affiliated with MinEx CRC industry partners and that is complimentary to the broader MinEx CRC research agenda. These projects are concentrated on case study areas of the industry partner. Partners involved include AIC Mines, Lodestone Mines, Strategic Energy Resources and Cartwheel Resources.

- Students interact with end-users through various channels, including ongoing project meetings with their industry co-supervisors. Where appropriate, students also participate in and present at quarterly Project Review Panel meetings and workshops involving MinEx CRC Participants and Affiliates. For example, PhD students involved in Project 3 attended and presented at all Project Review Panel meetings during the reporting period.
- MinEx CRC encourages students to pursue internship opportunities with MinEx CRC Participants and Affiliates. During this reporting period, one student undertook an internship supported by GSSA, which significantly enriched their postgraduate experience and skills development.
- A new 'coffee break' initiative was launched during the reporting period, offering students the chance to meet informally with industry representatives either virtually or in person. This

initiative provides students with the opportunity to gain valuable insights into industry workplaces and career guidance.

- **HDR candidates are strongly connected to core MinEx CRC research programs.** The approval process for MinEx CRC postgraduate student projects requires sign-off by a MinEx CRC Project Leader, Program Leader, Industry Co-supervisor(s), E&T Committee Coordinator and the CSO. All projects are tightly integrated with MinEx CRC's research agenda.

Student research is regularly featured in all forms of MinEx CRC reporting and is particularly significant in MinEx CRC meeting its milestones in the following areas:

- Project 1: Curtin university students conducting research on drilling fluid control and automation, cuttings transport, rock-bit interactions, impregnated diamond bits and down-hole percussive drilling. (Eu Lim Kean, Hing Hao Chan, Maryam Abdollahi, Rebecca Fogliani, Rui Huang, Snehal Jayakumar, Su Kwong Lee)
 - Project 3: University of South Australia students investigating machine learning algorithms for geostatistics and generation of synthetic data to train predictive models for automated interpretation of LIBS Spectra. (Adnan Haider, Ivan Gutierrez Agramont)
 - Project 4: Curtin University student research in using geophysics for drilling trajectory control. (Aruni Rajanayake)
 - Project 5: Students at Curtin University and University of South Australia undertaking a variety of projects including the application of artificial intelligence to seismic data processing, inversion and interpretation; development of borehole seismic imaging techniques; and the integration of geophysical and geological data using borehole information. (Emad Al-Hemyari, Mosayeb Khademi Zahedi, Mikhail Vorobev, Nikita Beloborodov)
 - Project 6: University of Western Australia students developing methods to streamline geological interpretation and construction of automated multi-scale 3D geological models from geophysical data, including associated uncertainty predictions. (Lizzie Bruce, Nuwan Suriyaarachchi, Ranee Joshi)
 - Program 3: Students at multiple MinEx CRC affiliated universities undertaking various projects on signatures of alteration, mineral chemistry, basin analysis, thermochronology, geochronology, petrophysics, geophysics, critical element mobility, biogeochemistry and microbial diversity and genetics in basement and cover sequence materials for understanding metal fertility and prospectivity in buried terranes as well as understanding social acceptance of mineral exploration. (Alejandra Bedoya Meija, Andreas Bjork, Andres Sifuentes, Bianca Palombi, David Yanyi-Ankfur, Elnaz Khazaie, Ernest Opoku, Himanshu Sekhar Bal, Jasmin Hiller, Joe Shifano, Justine Flahaut, Lucy Mathieson, Luke Tylkowski, Oliver Pring, Osama Abdullah A Alzubaidi, Rory Carter, Stacey Curtis, Yoli Wu, Zara Woolston, Zhufu Shao)
 - Company sponsored projects: Students at University of Adelaide and University of South Australia conducting geoscience-related projects that are not affiliated with one of the seven core MinEx CRC projects. These projects are focused on specific company exploration tenements and align with, or compliment, the broader MinEx CRC research agenda. (Hamid Bizhanikalatehahmad, Linde Li, Ruiqi Zheng, Travis Batch)
- **MinEx CRC conferences and events include dedicated HDR sessions.** Postgraduate students are provided financial support to travel and participate in these events.

The 2024 Annual Conference was attended by 28 of the 37 students actively enrolled at that time attending. The students took part in a Social Media Workshop led by Joe Milton (AusSMC: Australian Science Media Centre). The workshop featured participation from MinEx CRC

industry representatives, creating valuable networking opportunities through its interactive sessions. A total of 35 students showcased their work by presenting 'graphical-abstract'-style posters during the conference. Students also connected with industry and government representatives at the conference social events. Five students received their completion bonus at the conference dinner.

Two mid-year postgraduate events were held during the reporting period. The 2024 Mid-year Postgraduate Workshop was held online over three days in mid-July 2024 and saw 30 students present technical updates on their research. The 2025 Mid-year Postgraduate Workshop was held over two days in late-June 2025, and 26 students presented updates on their research. For the first time, students took on the role of session chairs at both the 2024 and 2025 postgraduate events, providing them with the opportunity to gain experience in leading discussions and posing questions within a supportive and welcoming environment. Six students were awarded their completion/thesis submission bonus as part of the event.

Students were also invited to the 2025 MinEx CRC Mid-year Science Review, held in Adelaide in June 2025. Although attendance was not mandatory, 12 MinEx CRC postgraduate and five MinEx CRC Masters by Coursework students attended. Three of the postgraduate students gave technical talks as part of the E&T update, with travel and accommodation provided for interstate presenters. The students also participated in the networking dinner held alongside the event, which offered valuable opportunity to engage with peers, MinEx CRC researchers, and representatives from industry and government.

Seven videoconference sessions were conducted during the reporting period to engage students and provide support within the CRC environment. Sessions were dedicated to discussion on student involvement with MinEx CRC events, preparation for the 2024 Annual Conference and the 2025 Mid-Year Postgraduate Workshop and professional development. Professional development covered topics including managing supervisor-student relationships, imposter syndrome, and publishing strategically and avoiding predatory publishers. Guest speakers included university leaders in postgraduate research education and librarians. The MinEx CRC Communications Manager participated in a discussion on online communications and social media within the CRC and how students can elevate their research through CRC social media channels.

Five postgraduate students qualified for their degree during this reporting period. Two of these students are now employed with MinEx CRC Participants or Research Participants. The completing students are now employed as follows:

- Osama Abdullah A Alzubaidi (Masters): Teaching Assistant, Department of Technical Training, King Abdulaziz University, Jeddah, Saudi Arabia.
- Su Kwong Lee (Masters): Trainee, Nuri Cerah Miri, Sarawak, Malaysia.
- Rui Huang (PhD): MinEx CRC Postdoctoral Researcher, Drilling Analytics Research Centre, Curtin University.
- Alejandra Bedoya Meija (PhD): Lecturer, Colombia.
- Mosayeb Khademi Zahedi (PhD): Geoscientist (Predictive Mineral Potential Mapping), Geoscience Australia.

1.6 Intellectual Property (IP) Management

The following principles are applied to IP in MinEx CRC under the guidance of a board sub-committee:

- IP resulting from MinEx CRC research is legally owned by MinEx CRC and beneficially owned according to project shares defined in individual Project Agreements for the five primary projects of MinEx CRC.
- For the single project (Project 6, 3-d modelling), where open-source software is being developed, the IP is legally and beneficially owned by MinEx CRC.
- Opportunity Fund projects recommended to the Board by the Science Advisory Committee (SAC) have IP legally and beneficially owned by MinEx CRC.
- IP rights can be sought by MinEx CRC participants by expressing interest and using a MinEx CRC proforma. Opportunities are highlighted at Project Review meetings and SAC meetings.
- IP is to be diffused into the METS supplier sector as rapidly as possible, as enhanced technology and/or services are available to mining companies, with the companies that sponsor MinEx CRC having preferential terms of access.

MinEx CRC currently holds:

- 54 properties across 5 patent families.
- Eleven properties across three design families including three trademark registrations.
- A total of 22 Licences/Options/Assignments (LOAs) are active.

During the past year two international patent applications were lodged by MinEx CRC as follows:

- The patent "Downhole Instrument for real-time laser-induced breakdown spectroscopy (LIBS) analysis" was filed in October 2024 by the Project 3 LIBS team led by Jessica Stromberg of CSIRO, with 7 other researchers.
- The patent "Electromagnetic Surveying Method and Device" was filed in November 2024 by the Project 4 Petrophysical logging while drilling team led by Brett Harris of Curtin University and 3 other researchers.

During the past year the following patent families were not renewed:

- Rotary Drill Head for Coiled Tubing Drilling Apparatus (all 11 family members)
- Sample Collection System and Parts Thereof (all 8 family members)
- High Speed Downhole Coring System (1 Australian family member)
- Drilling Fluids and Uses Thereof (all 7 family members)

During the past year two commercial licence assignments were executed, and one was modified.

Details of the FY25 agreements are as follows:

- The MinEx CRC CT500 drill rig licence previously concluded with Epiroc was altered from an exclusive contract to a non-exclusive contract and IP usage, resulting in MinEx CRC being able to offer additional construction licences to other parties.
- A licence to construct the CT500 and utilise the associated IP was agreed with Coil Rig, a start-up company (Coil Rig) based in Adelaide. CoilRig intend to design and supply innovative coiled tubing drilling rigs to the world, initially in the field of geothermal drilling.
- A licence to utilise aspects of MinEx CRC fluid processing IP technology and drilling fluids, originating from MinEx CRC Project 1 (Drilling, Masood Mostofi) and in conjunction with Curtin University, has been awarded to XtremeX. The company is USA based and is manufacturing a hybrid CT/conventional drill rig in Canada on behalf of a global mining company.

A list of Registered IP (patents, trademarks, designs) held by MinEx CRC is included in the MDQ and as Appendix E. Note that some Intellectual Property patents and families listed above originated in the DET CRC and were deeded to MinEx CRC on the termination of DET CRC in 2018.

1.7 CRC Future Plans and Transition Arrangements

Future plans and transition arrangements are now a regular item at MinEx CRC Board meetings. MinEx CRC is following two possible future paths:

1. Completion and Wind-Up

MinEx CRC plans to meet all milestones and cease operations as scheduled in late 2028. This will follow the completion of all research programs by December 2027, submission of all required reports by June 2028 (end of Commonwealth funding), and final closure later in 2028. The updated budget from May 2025 shows MinEx CRC has enough funds to cover staffing and other costs to successfully wind up by 2028.

The commercial potential of the six main technical projects in Phase 3 (2025–2027) is included in each Project's plan, with a focus on commercialisation and market-ready products. MinEx CRC has a clear process allowing participants to express interest in commercial outcomes from these projects.

MinEx CRC has a strong intellectual property (IP) model: MinEx CRC holds legal IP rights, and project participants hold beneficial rights. Project shares are reviewed annually.

2. Exploring Post-MinEx CRC Options

At a February 2025 strategy session, the Board agreed that MinEx CRC management should explore options for a post-MinEx CRC entity without distracting from current work. Over the last four months, the CEO and CSO have consulted with various people and organisations to understand the demand, preferred models, and potential stakeholders.

Feedback shows CRCs are respected with strong outcomes and support. However, a new Earth Sciences CRC would need to be different from MinEx CRC in theme and focus. Also, low carbon research is already well covered by existing initiatives. Nine entities and individuals have been consulted on valuable research areas for a CRC-like vehicle. This consultation will continue throughout 2025 to help define themes and plan future workshops or meetings. Commercial achievements to date and the potential for more achievements are also being carefully reviewed as part of the wind-up planning.

Additionally, a program is ongoing to simplify multiple royalty agreements transferred from DET CRC to MinEx CRC in 2018. The goal is to reduce complexity, legal fees, and IP management costs by terminating or consolidating these agreements.

1.8 Financial Management

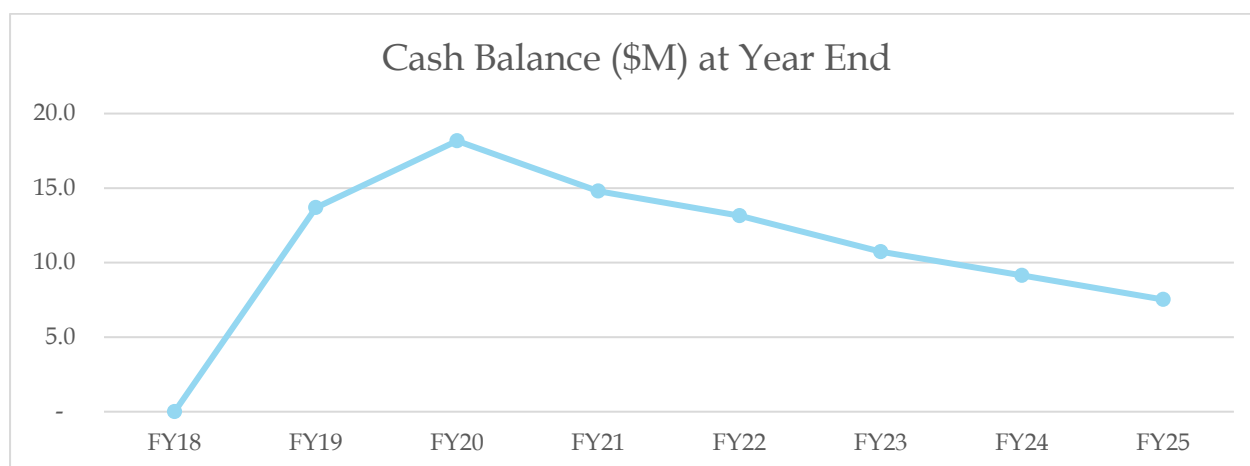
MinEx CRC commenced operations on 12 April 2018. The financial tables provided below compare the current FY25, with all previous years back to FY19 (which includes the period from 12 April 18 to 30 June 18).

REF	TITLE
Table 1	Revenue and Expenditure by Financial Year to date Including Cumulative Total
Table 2	Statement of Financial Position by Financial Year to date
Table 3	Cash Report by Financial Year to date Including Cumulative Total

The following key points provide an overview of the financial performance of the CRC during FY25.

Cash Balance and Surplus

The CRC remains in a strong financial position. The cash balance at 30 June 25 was \$7.5M compared to 30 June 24 of \$9.1M. All of these funds are committed to future research programs, drilling campaigns, education and training activities and management of operational activities.



The CRC had a deficit for FY25 of \$2.2M (a deficit of \$1.1M in FY24), with the CRC Life to date restricted surplus reducing to \$7.0M. With some Participant funds being received in advance in prior years, the CRC generated a significant surplus, which will gradually reduce to Nil over the 10 year life of the CRC.

Expenditure on Core Research Projects (\$5.2M in FY25) and Drilling Campaigns (\$3.1M in FY25) continued to be the main source of outgoings.

Participant Contributions

Revenue from participant & affiliate contributions was \$3.6M for FY25 (\$3.8M in FY24). This exceeded the Commonwealth Agreement Budget (CAB) in FY25 by approximately \$1.6M, primarily due to additional contributions from new Participants received for the year compared to the Agreement.

CRC Contributions

Cash payments from the Commonwealth were \$5.5M (GST exclusive) in the period (\$5.5M for FY24), in line with the Agreement. Payments from the Commonwealth are paid quarterly in arrears, following completion of the quarterly CRC Report.

Research Projects

Phase 1 of the research projects came to completion in December 2021. Phase 2 of the research projects came to completion in 31 December 2024, and Phase 3 research projects commenced in January 25 for a further three years. Payment to researchers is made quarterly in arrears based on actual expenditure. Project expenses were \$5.9M for FY25 (\$6.4M in FY24), including the Research Opportunity Fund and other projects.

Interest Income

Cash balances are invested in a mixture of short- and medium-term cash deposits appropriate for cash flow requirements. No interest income was included in the original CAB. Total interest income earned to date is \$1.8M.

National Drilling Initiative (NDI) Campaigns

Drilling commenced at Nifty Copper Mine on behalf of GSWA on ground held by Cyprium Metals in late July 23 for the Paterson Campaign. This drilling was halted temporarily in Oct 23 due to equipment maintenance requirements with the subsequent GSWA Moonera campaign undertaken on the Nullarbor in February 24 and completed in June 24. Drilling was recommenced in June 24 at Nifty Copper Mine on behalf of GSWA for the Paterson Campaign and was subsequently completed by Sep 24. The NDI drilling at Coober Pedy on behalf of GSSA then followed for the Northern Gawler Campaign and this was completed in Feb 25. No further drilling was undertaken for the remainder of FY25.

Financial Tables

Table 1 - Revenue & Expenditure (\$'000)	FY25	FY24	FY23	FY22	FY21	FY20	FY19	Cumulative Total
Revenue								
Commonwealth Funding	5,500.0	5,500.0	5,500.0	5,500.0	5,798.5	6,597.0	2,729.5	37,125.0
Other Government Grants	48.0	425.0	28.0	-	-	-	-	501.0
Participant Contributions	3,300.6	3,540.0	6,421.1	5,600.0	7,023.0	4,811.8	12,067.5	42,764.0
Affiliates Contributions	313.0	295.0	215.0	210.0	185.1	285.0	150.0	1,653.1
DET CRC Unspent Participant Contributions	-	-	-	-	-	-	113.6	113.6
Non-financial asset acquired for Nil Consideration	-	-	-	-	-	850.0	-	850.0
Gain on Sale of CT System to DIG CT Pty Ltd	-	1,301.0	-	-	-	-	-	1,301.0
Interest Income - Finance Lease CT System	37.3	20.5	-	-	-	-	-	57.8
Interest Income	352.1	465.8	365.3	70.1	112.9	300.5	124.0	1,790.7
Royalty Income	122.5	280.0	127.4	52.1	34.1	-	-	616.1
Other Income	97.5	123.7	18.1	79.8	9.6	122.2	30.8	481.7
Total Revenue	9,771.0	11,951.0	12,674.9	11,512.0	13,163.2	12,966.5	15,215.4	87,254.0
Expenditure								
Research Program Expenditure								
- Core Research Projects	5,183.6	5,419.2	5,025.7	5,236.6	6,070.5	5,355.8	1,684.4	33,975.8
- Drilling Campaigns	3,061.0	2,859.3	5,074.1	3,647.7	8,521.5	150.0	-	23,313.6
- Opportunity Fund & Other Projects	737.8	993.0	759.8	580.2	204.8	-	-	3,275.6
Total Research Program Expenditure	8,982.4	9,271.5	10,859.6	9,464.5	14,796.8	5,505.8	1,684.4	60,565.0
Education & Training	438.6	552.8	575.4	432.3	504.4	384.5	200.0	3,088.0
Management Expenses	569.3	845.7	841.3	717.2	418.2	492.3	503.8	4,387.8
Royalty Expense	75.2	104.2	85.5	28.7	22.0	-	-	315.6
Salaries & Wages - Drill Crew	92.2	1,099.2	1,372.3	987.8	97.2	-	-	3,648.7
Salaries & Wages - Head Office (incl Directors Fees)	1,627.8	1,218.1	1,167.4	1,049.8	1,046.7	996.9	1,005.3	8,112.0
Impairment Loss Allowance - Finance Lease CT System	122.0	-	-	-	-	-	-	122.0
Other Expenses	28.4	-	-	-	-	-	-	28.4
	2,953.5	3,820.0	4,041.9	3,215.8	2,088.5	1,873.7	1,709.1	19,702.5
Total Expenditure	11,935.9	13,091.5	14,901.5	12,680.3	16,885.3	7,379.5	3,393.5	80,267.5
Restricted (Deficit)/ Surplus	(2,164.9)	(1,140.5)	(2,226.6)	(1,168.3)	(3,722.1)	5,587.0	11,821.9	6,986.5

Table 2 - Statement of Financial Position (\$'000)	30-Jun-25	30-Jun-24	30-Jun-23	30-Jun-22	30-Jun-21	30-Jun-20	30-Jun-19
Assets							
Cash at Bank	7,527.8	9,142.7	10,728.5	13,148.8	14,794.8	18,167.3	13,688.1
Trade Receivables	55.0	313.5	271.6	596.2	369.8	-	255.0
Other Receivables	284.9	522.0	632.9	395.2	442.2	396.6	166.4
Prepayments & Accrued Income	68.3	386.4	267.5	135.7	101.8	84.3	100.4
Mining Exploration Bonds	20.0	20.0	130.0	-	39.9	-	-
Property Plant & Equipment	-	-	1,172.5	962.2	1,251.6	1,031.2	9.2
Net Investment in Lease CT System	1,122.3	1,723.7	-	-	-	-	-
Total Assets	9,078.3	12,108.3	13,203.0	15,238.1	17,000.1	19,679.4	14,219.1
Liabilities							
Trade Payables & Accruals	1,788.1	2,652.0	2,634.0	2,544.4	3,081.2	2,205.6	2,366.2
Employee Provisions	303.7	304.9	271.3	165.0	97.8	59.7	21.3
Lease Liability - Premises	-	-	5.8	10.2	134.3	5.2	9.7
Total Liabilities	2,091.8	2,956.9	2,911.1	2,719.6	3,313.3	2,270.5	2,397.2
Net Assets	6,986.5	9,151.4	10,291.9	12,518.5	13,686.8	17,408.9	11,821.9
Current Year Restricted (Deficit)/ Surplus	(2,164.9)	(1,140.5)	(2,226.6)	(1,168.3)	(3,722.1)	5,587.0	11,821.9
Retained Restricted Surplus	9,151.4	10,291.9	12,518.5	13,686.8	17,408.9	11,821.9	-
Equity	6,986.5	9,151.4	10,291.9	12,518.5	13,686.8	17,408.9	11,821.9

Table 3 - Cumulative Cash Report (\$'000)	FY25	FY24	FY23	FY22	FY21	FY20	FY19	Cumulative Total
Cash flows from operating activities (inclusive of GST where applicable)								
Government grants	6,050.0	6,050.0	6,050.0	6,050.0	6,378.4	7,256.7	3,002.4	40,837.5
Participant contributions	3,871.0	4,353.3	7,546.2	6,170.0	7,551.0	5,754.6	13,097.2	48,343.3
Other income	564.0	378.8	90.0	54.0	50.0	63.9	131.4	1,332.1
Royalties received	360.2	119.9	104.1	32.3	4.7	-	-	621.2
Interest received - finance lease receivable	37.3	20.5	-	-	-	-	-	57.8
Interest received	423.8	543.8	217.5	51.8	142.4	303.1	74.5	1,756.9
Interest paid - finance lease	-	(0.4)	(1.0)	(8.1)	(1.6)	(1.0)	(1.4)	(13.5)
Royalties paid	(152.6)	(89.6)	(39.3)	(16.9)	(2.6)	-	-	(301.0)
Payments to suppliers and employees	(13,219.5)	(13,540.4)	(15,976.7)	(13,846.1)	(17,259.9)	(8,656.4)	(2,611.9)	(85,110.9)
Net cash (used in)/ provided by operating activities	(2,065.8)	(2,164.1)	(2,009.2)	(1,513.0)	(3,137.6)	4,720.9	13,692.2	7,523.4
Cash flows from investing activities								
Payments for plant and equipment	-	(2.9)	(336.8)	(18.1)	(215.0)	(237.0)	-	(809.8)
Payments for motor vehicles	-	-	(69.1)	-	-	-	-	(69.1)
Proceeds from repayment of lease receivable	450.9	587.4	-	-	-	-	-	1,038.3
Net cash used in investing activities	450.9	584.5	(405.9)	(18.1)	(215.0)	(237.0)	-	159.4
Cash flows from financing activities								
Repayment of lease liability	-	(6.2)	(5.2)	(114.9)	(19.9)	(4.7)	(4.1)	(155.0)
Net cash used in financing activities	-	(6.2)	(5.2)	(114.9)	(19.9)	(4.7)	(4.1)	(155.0)
Net change in cash and cash equivalents	(1,614.9)	(1,585.8)	(2,420.3)	(1,646.0)	(3,372.5)	4,479.2	13,688.1	7,527.8
Cash and cash equivalents at the beginning of the year	9,142.7	10,728.5	13,148.8	14,794.8	18,167.3	13,688.1	-	-
Cash and cash equivalents at the end of the year	7,527.8	9,142.7	10,728.5	13,148.8	14,794.8	18,167.3	13,688.1	7,527.8

MinEx CRC Limited

Location: Curtin University Drilling Analytics Research Centre (DARC),
Building 619, 3 De Laeter Way, Bentley, WA 6102
Postal Address: 26 Dick Perry Avenue, Kensington, WA, 6151
Email: admin@minexcrc.com.au



Appendix A Sponsors

Sponsors – FY24/25

List of Participants during the reporting period

	Participant's Name	ABN or ACN	Organisation Type	Category
1	Anglo American Technical & Sustainability Services Ltd	81 629 813 216	Industry	Large Miner
2	Australian National University	52 234 063 906	Research	University
3	BHP Billiton Iron Ore Pty Ltd	46 008 700 981	Industry	Large Miner
4	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	41 687 119 230	Government Body	Statutory Body
5	Curtin University	99 143 842 569	Research	University
6	Epiroc Rock Drills AB	N/A (International)	Industry	METS
7	Fortescue Metals Group (FMG)	57 002 594 872	Industry	Large Miner
8	Geological Survey of New South Wales	38 755 709 681	Government Body	Geo Survey
9	Geological Survey of South Australia	83 768 683 934	Government Body	Geo Survey
10	Geological Survey of Western Australia	69 410 335 356	Government Body	Geo Survey
11	Geoscience Australia	80 091 799 039	Government Body	Geo Survey
12	Geotec Boyles Bros SA	N/A (International)	Industry	METS
13	Imdex Ltd	78 008 947 813	Industry	METS
14	LKAB Wassara AB	N/A (International)	Industry	METS
15	McKay Drilling Pty Ltd	21 009 392 625	Industry	METS
16	Minerals Research Institute of Western Australia	86 779 457 072	Government Body	Statutory Body
17	Newmont Mining Services Pty Ltd	22 008 087 778	Industry	Large Miner
18	Rio Tinto	12 002 183 557	Industry	Large Miner
19	Sandvik Mining and Construction Oy	N/A (International)	Industry	METS
20	The University of Adelaide	61 249 878 937	Research	University
21	University of Newcastle	15 736 576 735	Research	University
22	University of New South Wales	57 195 873 179	Research	University
23	University of South Australia	37 191 313 308	Research	University
24	University of Western Australia	37 882 817 280	Research	University
25	Vale S.A.	N/A (International)	Industry	Large Miner

List of Affiliates during the reporting period

	Affiliate's Name	ABN or ACN	Organisation Type	Category
1	AIC Mines Ltd (prev Demetallica)	11 060 156 452	Industry	Junior Explorer
2	AngloGold Ashanti	42 008 737 424	Industry	Large Miner
3	AuScope	33 125 908 376	Government Body	Statutory Body
4	Cartwheel Minerals	19 164 580 090	Industry	Junior Miner
5	Datacode Geoscience Pvt. Ltd	N/A (International)	Industry	METS
6	EnviroCopper Ltd	19 635 434 721	Industry	Junior Miner

7	Geological Survey of Queensland	59 020 847 551	Government Body	Geo Survey
8	Geological Survey of Victoria	83 295 188 244	Government Body	Geo Survey
9	HiSeis Pty Ltd	83 136 507 429	Industry	METS
10	Matsa Gold	88 613 060 352	Industry	Junior Miner
11	Mineral Resources Tasmania	36 388 980 563	Government Body	Geo Survey
12	Monash University	12 377 614 012	Research	University
13	Northern Territory Geological Survey	84 085 734 992	Government Body	Geo Survey
14	Santos QNT Pty Ltd	80 007 550 923	Industry	Large Miner
15	South32 Ltd	74 601 343 202	Industry	Large Miner
16	Strategic Energy Resources Ltd	14 051 212 429	Industry	Junior Explorer
17	University of Tasmania	30 764 374 782	Research	University
18	Veracio	N/A (International)	Industry	METS

Changes to Affiliates & Participants during the reporting period

Participant's Name	Retiring, Withdrawing or New	Department Approval
Fortescue Metals Group (FMG)	New	Y
Newmont Mining Services Pty Ltd	New	Y
Vale S.A.	New	Y
Affiliate's Name	Retiring, Withdrawing or New	Department Approval
Cartwheel Minerals	New	Y
South32	Changed from Participant to Affiliate	Y
University of Tasmania	Withdrawn	N/A
HiSeis Pty Ltd	Withdrawn	N/A
Matsa Gold	Withdrawn	N/A
Santos QNT Pty Ltd	Withdrawn	N/A

- Fortescue Metals Group Ltd (FMG) joined as Participant on 5/12/2024 and was approved by the Board.
- Newmont Mining and Vale S.A. joined as Participants on 17/04/2025 and were approved by the Board.
- South32 changed from a Participant to Affiliate status as of 01/01/2025 and was approved by the Board.
- Cartwheel Minerals joined as a new Affiliate as of 01/01/2025 and was approved by the Board.
- HiSeis Pty Ltd, Matsa Gold, Santos QNT Pty Ltd and University of Tasmania have withdrawn as Affiliates at 31/12/2024 with the expiration of their agreement.

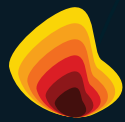
MinEx CRC Limited

Location: Curtin University Drilling Analytics Research Centre (DARC),
Building 619, 3 De Laeter Way, Bentley, WA 6102
Postal Address: 26 Dick Perry Avenue, Kensington, WA, 6151
Email: admin@minexcrc.com.au



Appendix B

2024 Year in Review



MinEx CRC

2024

YEAR IN REVIEW

BRINGING NEW EXPLORATION
TECHNOLOGY TO MARKET



Australian Government
Department of Industry,
Science and Resources

AusIndustry
Cooperative Research
Centres Program



KEY NUMBERS



355/367

Phase 2
milestones met



61

Peer-reviewed scientific
publications



23

Participant
Sponsors



50%/50%

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



20

Affiliate Sponsors



55

Postgraduate
enrolments to
date (on target
for 60)

15

Postgraduate
completions to
date (on target
for 50)



1,500m+

drilled with CT drilling
technology



3

Media Releases distributed
showcasing key technical
outcomes



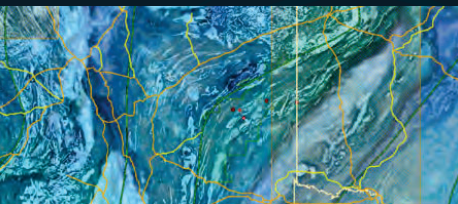
14K

Total YouTube
views

2024 YEAR IN REVIEW



RESEARCH FOCUS



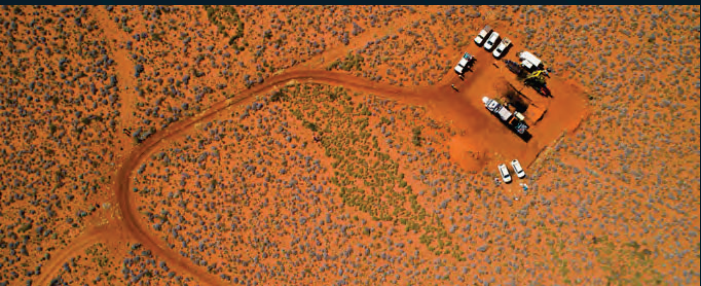
MinEx CRC remains focused on delivering:

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.

ADVANCING TECHNOLOGY

Program 1: Drilling

- Field prototypes for our automated drilling (AutoDrill) and fluid management systems (iFluid, Hobby and Unforgiven) for conventional rotary and RC drilling platforms are complete, have undergone preliminary field trials and are ready for long-term field deployments with MinEx CRC Participants starting in 2025.
- Used 'Woody' single impact drilling experiments to build a library of percussion bit-rock interactions that can be used to assess drilling performance and model rock mechanical properties during drilling operations.
- Collected logging-while-drilling (LWD) data from the MinEx CRC SMART bottom hole assembly (BHA) including our downhole gamma tool and drill string optic fibre distributed acoustic sensor (DAS) seismic receiver.
- Conducted successful trials of the hardware and operating procedures required to 'kick-off' from an existing drill hole during CT drilling, creating the potential for multiple deviations from the same collar location.



MinEx CRC WA NDI Campaign in collaboration with the Geological Survey of Western Australia.

MINEXCRC.COM.AU

Program 2: Data From Drilling

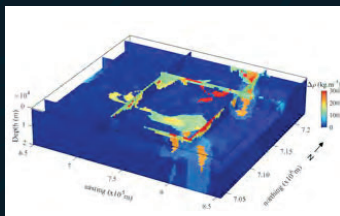
- Filed a provisional patent based on our prototype downhole LIBS system, which incorporates a high-powered, variable-focus laser and optics and spectrometers capable of detecting all elements on the periodic table to part per million levels. Completed first field trials of LIBS downhole geochemical tool. The tool returned geologically sensible data under various operating parameters and could detect and measure Cu and Li concentrations at levels useful for mineral exploration.
- Filed a provisional patent based on our prototype downhole swept frequency EM tool, which incorporates coil and control circuit design, generation of multiple 'swept' source frequencies and data processing methods to extract multiple petrophysical parameters from the signal response.
- Designed and built a prototype electromagnetic three-component (3C) source ideal for borehole seismic applications.
- Tested two machine learning approaches for denoising DAS data (traditional supervised methodology and noise-to-noise) on seismic-while-drilling DAS data. Tests demonstrated the increase of signal-to-noise of the DAS data, specifically for data acquired with low-power (low cost) sources.



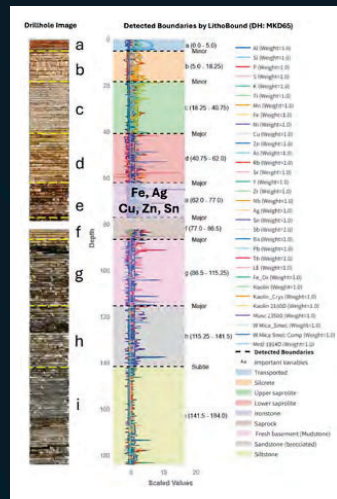
MinEx CRC researchers Steve Tassios, CSIRO (left) and Ben van der Hoek, UniSA (right) during first field trials of the LIBS downhole geochemical tool.



MinEx CRC Downhole Swept Frequency EM Tool.



3D Gravity inversion with disjoint interval bound constraints of the Yerrida Basin, Western Australia, using the Tomofast-x inversion platform.



Geological boundaries detected by LithoBound using field-based geochemical and Spectral data acquired from a drillhole near McKinnons gold mine in Cabar, NSW. The automated workflow highlights a critical zone (interval 'e') above the saprock, identifying effective variables for delineating secondary enrichment.



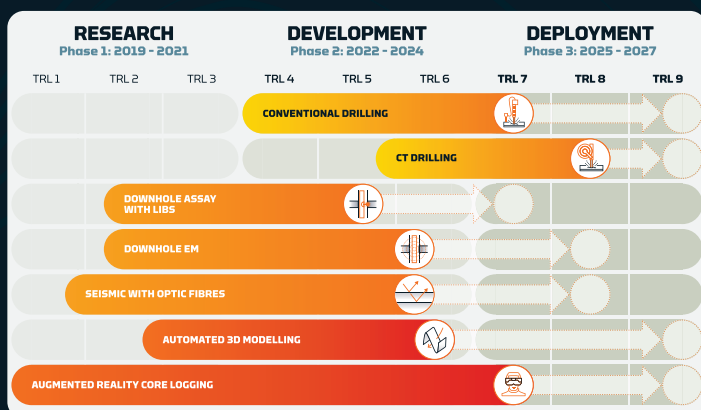
MinEx CRC researcher Yanbo Cheng (Geoscience Australia) undertaking experiments.

Program 3: National Drilling Initiative

- Completed NDI drilling campaigns in the Paterson Province (Nifty) and Madura Province (Moonera) in collaboration with the Geological Survey of Western Australia.
- Analyses of Delamerian and Delamerian Margins NDI samples have been used to refine and constrain the tectonic history and mineral potential of the eastern margin of Australia approximately 500 million years ago confirming the potential of the area to host significant deposits of base and precious metals.
- Developed the Lithobound web application for automated cover interface detection from drill-site geochemical (pXRF) and mineralogical (ASD and TIR) analyses.
- Applied joint inversion of seismic and AEM data for improved detection and mapping of cover boundaries, including the base of cover.
- Continued development of in-situ same mass radiogenic isotope measurement techniques aimed at increasing the number of mineral phases amenable to in-situ dating, focussing on mineral phases associated with ore deposits or hydrothermal alteration; Rb-Sr dating of whole rocks, feldspars, micas and clays; Lu-Hf dating of carbonates, apatite, epidote and garnet and Re-Os dating of sulphide minerals (especially molybdenite).



TECHNOLOGY READINESS LEVELS | MARCH 2024



PROJECT KEY:



COMMERCIALISATION PROGRESS

During the past year, four commercial licence assignments were completed successfully,

- Hobby: A system to achieve fluid automation for drilling mud systems, supported by Curtin University and the Federal Trailblazer program.
- Auto-drill, also through Curtin University and Trailblazer, is a high-tech early-stage drilling rig automation system that

facilitates a step change in drilling optimisation using data. Curtin University has committed significant funding to support Auto-drill and Hobby by funding a Drilling Analytics Research Centre (DARC).

- LogAR (CSIRO) an augmented reality platform and practical tool for geological logging tasks.
- The MinEx CRC CT500 drill rig and its associated IP are being leased

to a start-up company (DIG CT) undertaking CT drilling on behalf of MinEx CRC. DIG CT is endeavouring to expand the demand for, and use of, MinEx CRC CT drilling technology through safely and actively utilising the current equipment and by stimulating demand and facilitating or placing orders for the manufacture of additional CT Rigs.

COMMUNICATIONS & EVENTS

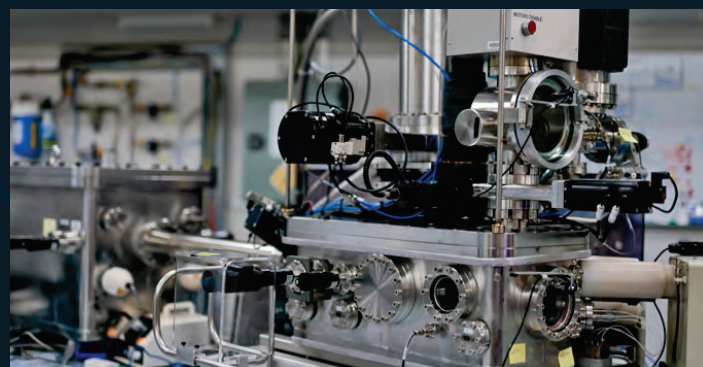
- Three media releases were distributed during the reporting period titled:
 - 'Augmented Reality Core Logging a Step Closer Under New Commercial Deal'.
 - 'Australian-designed Drilling Tech Set to Revolutionise Exploration via DIG CT Commercialisation Deal'.
 - One Ministerial Press Release was distributed in collaboration with Tom Koutsantonis, MP Minister for Energy and Mining, South Australia, titled 'Strong Mining Sector Sets Pace for Growth'.
- A suite of 'pre-commercial product brochures' to act as a go-to document for those seeking more technical context around MinEx CRC research was created, titled as below:
 - Pre-commercial Product Brochure: LIBS Downhole Geochemistry Tool
 - Pre-commercial Product Brochure: Downhole Swept Frequency EM Tool
- Research outcomes were featured in prominent industry publications such as Australia's Mining Monthly, Australasian Drilling Magazine, miningnews.net and the Precompetitive Review.
- The MinEx CRC Open Day was held on June 4 in Perth, with 127 attendees, spanning 32 organisations.
- The annual Mid-Year Science Review was held on June 5 in Perth, with 103 attendees, spanning 22 organisations.
- MinEx CRC's fifth Annual Conference: Frontier Exploration was held on 15-16 November in Perth. Over 155 delegates attended the 2-day conference spanning 28 organisations.
- 9 Videos uploaded to MinEx CRC TV
- 14K YouTube views in total
- 39K Visitors to the MinEx CRC website



MinEx CRC researcher Jess Stromberg (CSIRO) during first field trials of the LIBS downhole geochemical tool.



MinEx CRC completed Postgraduate student, Alexander De Vries Van Leeuwen (Unisa).



Geoscience Australia laboratory equipment.

EDUCATION

- As of June 30 2024, MinEx CRC had 36 Postgraduate students enrolled.
- Six MinEx CRC postgraduate students completed during this reporting period, bringing the total number of postgraduate completions to fifteen. The completing students are employed as follows:
 - Alex De Vries Van Leeuwen (PhD):** Externally Funded Research Fellow, University of Adelaide
 - Mahtab Rashidifard (PhD):** Geophysicist, Geological Survey of Western Australia
 - Jie Yu (PhD):** Research Associate, Curtin University
 - Elizabeth Bruce (Masters by research):** Undertaking a PhD project at the University of Western Australia with MinEx CRC Project 6
 - Nalina (PhD):** CSIRO
 - Victor Santos (PhD):** Rotating Equipment Engineer, ERM Consulting
- Seven video conferences were held throughout the reporting period to engage students and ensure they feel supported within the CRC environment.
- Eight students presented TEDx-style talks at the Annual Conference held in November 2023.



MinEx CRC completed Postgraduate student, Alexander Simpson (University of Adelaide).

EQUITY, DIVERSITY AND INCLUSION (EDI)

MinEx CRC is committed to growing and supporting an equitable, diverse, and inclusive environment where everyone feels safe, valued, supported, and treated fairly with dignity and respect.

The MinEx CRC Board (excluding the CEO) comprises eight members, 50% male and 50% female.



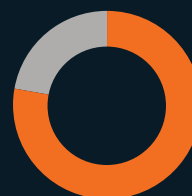
PERCENTAGE OF BOARD
(EXCLUDING THE CEO)

The MinEx CRC Executive Management Committee, including the CEO, comprises eight members, 62.5% male and 37.5% female.



PERCENTAGE OF EXECUTIVE
MANAGEMENT COMMITTEE,
INCLUDING CEO

Research Leads for the nine primary programs are 78% male and 22% female.



PERCENTAGE OF RESEARCH
LEADS FOR THE NINE PRIMARY
PROGRAMS

SPONSORS

Majors, METs & Survey Participants



Research Participants & Affiliates



REVENUE & EXPENDITURE

Revenue (\$'000)	FY24	FY23	FY22	FY21	FY20	FY19	Total
Commonwealth Funding	5,500.0	5,500.0	5,500.0	5,798.5	6,597.0	2,729.5	31,625.0
Other Government Grants	425.0	28.0	-	-	-	-	453.0
Participant Contributions	3,540.0	6,421.1	5,600.0	7,023.0	4,811.8	12,067.5	39,463.4
Affiliates Contributions	295.0	215.0	210.0	185.1	285.0	150.0	1,340.1
DET CRC Unspent Participant Contributions	-	-	-	-	-	113.6	113.6
Non-financial asset acquired for Nil Consideration	-	-	-	-	850.0	-	850.0
Gain on Sale of CT System to DIG CT Pty Ltd	1,301.0	-	-	-	-	-	1,301.0
Interest Income - Finance Lease CT System	20.5	-	-	-	-	-	20.5
Interest Income	465.8	365.3	70.1	112.9	300.5	124.0	1,438.6
Royalty Income	280.0	127.4	52.1	34.1	-	-	493.6
Other Income	123.7	18.1	79.8	9.6	122.2	30.8	384.2
Total Revenue	11,951.0	12,674.9	11,512.0	13,163.2	12,966.5	15,215.4	77,483.0

Expenditure (\$'000)							
Research Program Expenditure							
- Program 1	2,047.8	1,871.9	1,905.5	2,576.7	2,121.4	486.1	11,009.4
- Program 2	1,392.6	1,361.1	1,292.8	1,610.1	1,524.6	544.8	7,726.0
- Program 3	4,838.1	6,866.8	5,686.0	10,405.2	1,859.8	653.5	30,309.4
- Opportunity Fund & Other Projects	993.0	759.8	580.2	204.8	-	-	2,537.8
Total Research Program Expenditure	9,271.5	10,859.6	9,464.5	14,796.8	5,505.8	1,684.4	51,582.6
Education & Training	552.8	575.4	432.3	504.4	384.5	200.0	2,649.4
Management Expenses	845.7	841.3	717.2	418.2	492.3	503.8	3,818.5
Royalty Expense	104.2	85.5	28.7	22.0	-	-	240.4
Salaries & Wages - Drill Crew	1,099.2	1,372.3	987.8	97.2	-	-	3,556.5
Salaries & Wages - Head Office (incl Directors Fees)	1,218.1	1,167.4	1,049.8	1,046.7	996.9	1,005.3	6,484.2
	3,820.0	4,041.9	3,215.8	2,088.5	1,873.7	1,709.1	16,749.0
Total Expenditure	13,091.5	14,901.5	12,680.3	16,885.3	7,379.5	3,393.5	68,331.6
Restricted (Deficit)/ Surplus	(1,140.5)	(2,226.6)	(1,168.3)	(3,722.1)	5,587.0	11,821.9	9,151.4

CONTACT

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CEO MinEx CRC

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MINEXCRC.COM.AU



MinEx CRC



Australian Government
Department of Industry,
Science and Resources

AusIndustry
Cooperative Research
Centres Program

MinEx CRC Limited

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Email: admin@minexcrc.com.au



Appendix C

ACIL Allen Report

Mapping and quantification of CRCs' work on decarbonisation



Introduction

The Cooperative Research Centres (CRC) Program provides funding for long-term, industry-led research collaborations aimed at improving the competitiveness, productivity, and sustainability of Australian industries.

Existing CRCs play an important role in developing innovative solutions in response evolving national priorities, bringing together an extensive network of industry, academia and government.

CRCs are currently delivering a broad range of decarbonisation-related activities in line with Australia's suite of decarbonisation policies and strategies and are well-placed to support the Australian Government to realise its emissions reductions targets (a 43% reduction from 2005 levels by 2030 and net zero by 2050¹).

Analysis of the impacts of the research of 12 CRCs and one post CRC (collectively referred to as the 13 CRCs) shows a range of economic, social and environmental benefits, including the potential to enhance current CO₂ abatement. In addition, the report explores the opportunities for Government to better leverage the CRCs and CRC model to realise Australia's emissions targets.



iMOVE CRC



Future Fuels CRC



MinEx CRC



Blue Economy CRC



Future Battery Industries (FBI) CRC



CRC for Transformations in Mining Economies (CRC TiME)



RACE for 2030 CRC



SmartCrete CRC



Future Energy Exports (FEEx) CRC



Digital Finance CRC



Heavy Industry Low-carbon Transition (HILT)



One Basin CRC



Mining3

Department of Climate Change, Energy, the Environment and Water (2022). *Australia submits new emissions target to UNFCCC*. Accessed August 2023: <https://www.dcccew.gov.au/about/news/australia-submits-new-emissions-target-to-unfccc#:~:text=The%20updated%20NDC%3A,net%20zero%20emissions%20by%202050.>



Key Findings

Cooperative Research Centres contribute to Australia’s decarbonisation goals

Australia has a suite of decarbonisation-related policies and strategies aimed at supporting Australia’s national decarbonisation goals. The work of the CRCs is strongly aligned with these goals, but there is significant potential to further enhance their work programs to better leverage their existing and potential contribution to realising net zero outcomes.

CRCs provide a well-established capability that can be harnessed to accelerated effect and greater impact. As government grows its investment in the decarbonisation transformation, the established capability in CRC’s may be an efficient and cost-effective way to mobilise capability and scale quickly. All 13 CRCs see the potential to step up their contribution to the national effort.

The alignment between the CRCs’ decarbonisation priorities highlights the potential for collaborative efforts between CRCs and government to drive toward these goals and ensure the CRCs are addressing the areas of most need.

Distribution of resources toward decarbonisation priorities



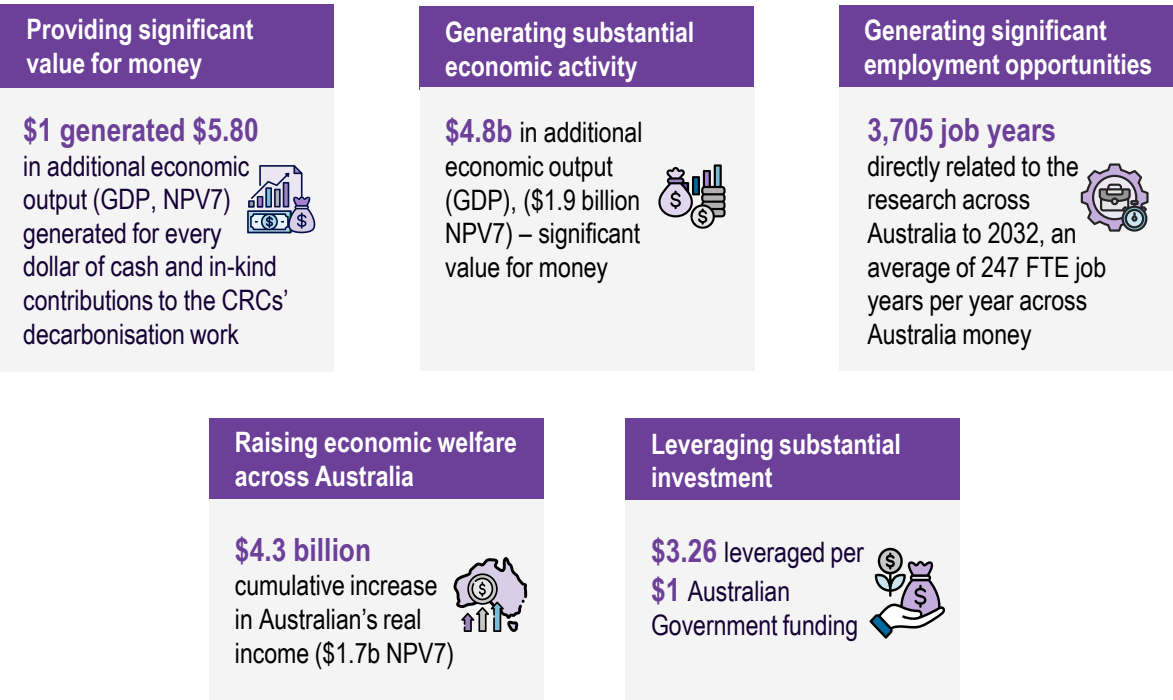
The CRCs are raising awareness and capacity among the research, industry, and government sectors about the need to, and opportunities and challenges, relating to decarbonisation. They also connect industry with research expertise, providing a framework for accelerated change.



Key Findings

Economic impacts

Seven of the 13 CRCs included in the analysis are projected to provide significant benefits to the Australian economy. Estimates of the full 13 CRCs (by scaling the costs and benefits) are expected to include (for grants awarded 2017-32):



The estimated economic impacts understate the CRCs' overall benefits as they do not account for the associated social and environmental impacts or future benefits not yet able to be quantified.

Key Findings

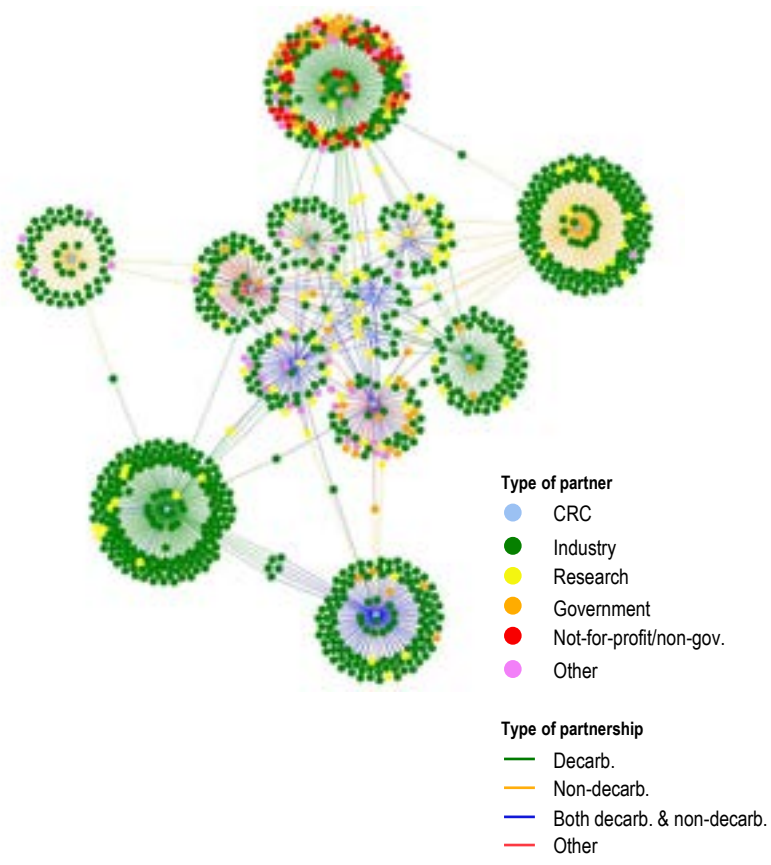
Collaboration and synergies between the CRCs

The CRCs collectively collaborate with a deep and broad network of research and industry partners, in Australia and internationally. These partners are a feature of the CRC model and enhance and extend their impact.

The CRCs' network demonstrates the collective reach of the CRCs. Many of these partners are complementary, enhancing and extending the impact of the CRCs by contributing to the CRCs' research, providing access to facilities, expertise, and funding, supporting impact translation, and by adopting the innovative products and services developed by (and with) the CRCs.

Most CRCs want to collaborate more. Greater clarity as to the limitations and opportunities for collaboration would facilitate further joint work. Further, the acquired knowledge from collaboration should be documented and transformed into best practices for future endeavours.

There is an opportunity for the CRCs and Australian Government to better leverage existing partnerships in the CRC network for decarbonisation-related efforts. These partnerships provide the foundation to leverage expertise across the CRCs and CRCs' partners, share resources, be better informed, have broader credibility and policy influence, and enhance research adoption.

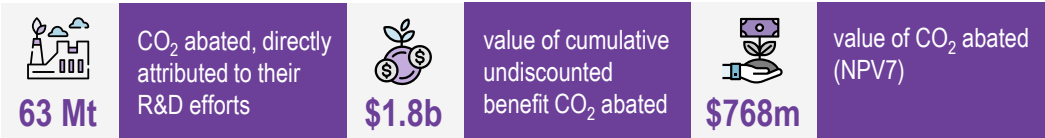




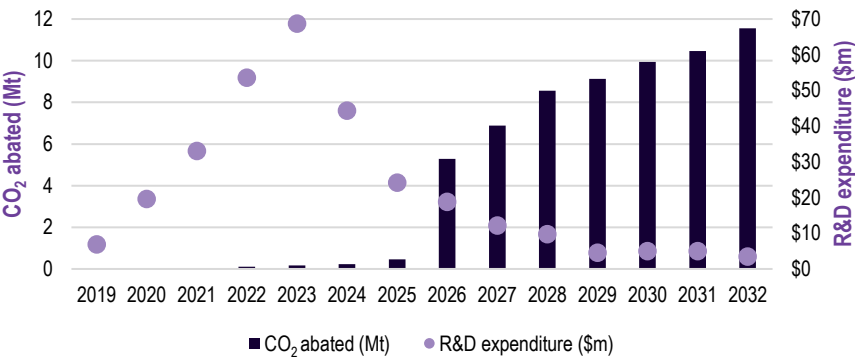
Key Findings

CO₂ abatement impacts

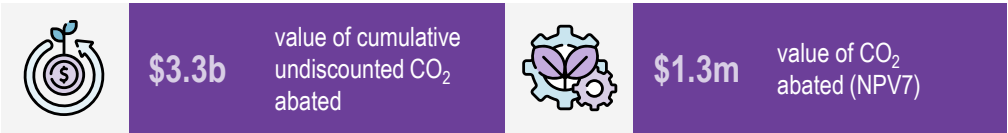
From 2017-32, the 7 CRCs reporting abatement impacts will achieve:



The expenditure required to realise the CO₂ abatement by the 7 CRCs that reported CO₂ abatement outcomes is:

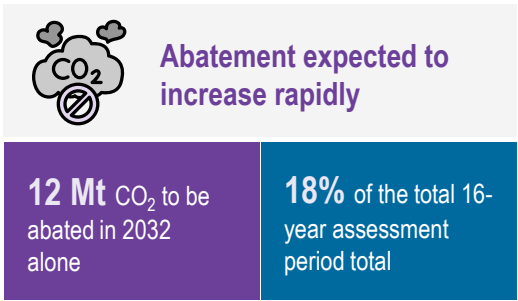


From 2017-32, scaled across the 13 CRCs the expected CO₂ abatement is valued:



These abatement outcomes are the tip of the iceberg for what may be realised as industry continues to adopt the work of the CRCs over time.

There is an opportunity to better understand, consistently map, and harness the decarbonisation impacts delivered by the individual and collective CRCs via the implementation of a consistent decarbonisation measurement tool over time.





Key Findings

Decarbonisation outcomes and impacts

CRCs have contributed to Australia’s decarbonisation goals by delivering new products and services, developing reports and other publications, contributing to education and capacity building, enhancing Australia’s export opportunities, informing decision-making, and engaging with end users.

As many of the CRCs are in the early stages of their life, it is likely that these impacts will continue to increase over time as end users continue to take up CRC products, services, insights, and advice.



Enhanced export
opportunities,
including supply
chain traceability



Better informed
policy decisions,
including legislation,
tax and strategic
planning



Engagement with
end users to
support uptake and
testing of new
processes and trial
proof of concepts

Future opportunities

Realising the full potential that the CRCs can offer in pursuing the nation's decarbonisation goals and net zero targets can be attained through a number of opportunities. Action by Government and the CRCs would support the CRCs to operate more effectively and deliver more impact toward Australia's decarbonisation goals as outlined below.

1

CRCs have the potential to further enhance their collaboration to support greater information transfer, leverage CRCs' expertise, and drive the expanded adoption of CRC outputs. This will create cross sectoral and industry opportunities and ensure that the CRCs are addressing areas of most need.

2

There would be value in the Government exploring incentive structures to encourage increased collaboration on shared initiatives, to extract greater value from the CRC program (e.g. recognising collaboration in reporting, funding projects undertaken by 2 or more CRCs, ensuring contracting does not constrain activity, aligning milestones/reporting with project investment timelines, and supporting CRC responses to changes in the external environment). The CRCs require more clarity on limitations to CRC-CRC collaboration (funding and contractual) to collectively expand strategic planning and develop more effective alliances.

3

CRCs are long-term entities and would benefit from increased flexibility to refresh their priorities as Australia's decarbonisation sector matures, new demands and opportunities emerge, and partners' needs evolve. The CRCs should account for these changes by embedding funding flexibility (funds reserved for emerging opportunities and flexible agreements with partners), program flexibility (allowing changes to delivery and priorities), and governance that supports this flexibility.

4

Providing CRCs with access to/eligibility for additional funding (to scale, collaborate, and develop a critical mass of decarbonisation-related efforts) would better leverage the CRCs' capacity, expertise, and flexibility to drive change and enhance progress toward the national goals. The CRCs require greater clarity on their eligibility for other Australian Government funding programs to create transparency and ensure equity in the application processes, so that CRCs can support more capital-intensive activities (e.g. pilots, demonstration projects), where projects are not already funded under the CRC.

5

There is an opportunity to create a pathway for more strategic coordination and planning to identify opportunities and pursue new/expanded research topics or collaborative projects across the CRC network as they emerge. This could be guided through a dynamic and flexible, decarbonisation-specific reference group or Cooperative Research Australia (CRA). This would allow the Government to better leverage the existing capability and capacity within CRCs and their networks, to accelerate decarbonisation and support Australia to reach its net zero goals.

6

The work of the CRCs typically aligns with more than one Australian Government portfolio, which makes it challenging to communicate the capacity and capability of each CRC and their potential for leverage by the Australian Government. There is a role for coordinated activity led by the Department of Industry, Science and Resources, together with CRA and the CRCs, to ensure that the CRCs' work is communicated across the Australian Government, and that CRCs' capacity is further leveraged to deliver more value. This should grow the brand of individual CRCs and the collective CRC network in delivering decarbonisation outcomes for Australia.

MinEx CRC Limited

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Email: admin@minexcrc.com.au



Appendix D

Student Register

Student Register

Postgraduate students

#	Student	University	Supervisor	Industry co-supervisor	Degree	Project title	Project	Start Date	Finish date	Date registered
1	Adnan Haider	University of South Australia	Ben van der Hoek	Lequn Zhang, Steve Tassios (CSIRO)	PhD	Geostatistics and Machine Learning applied to LIBS geochemical data	2	25/11/2024	2/06/2028	11/11/2024
2	Andreas Bjork	University of South Australia	David Giles	James Austin (CSIRO)	PhD	Application of the multi-sensor core logger for petrophysical analysis and geophysical modelling	7	18/04/2022	17/04/2025	2/06/2022
3	Andres Sifuentes Chamochumbi	UniSA	Caroline Tiddy	Benjamin Zammit (SA Dept. Energy & Mining)	PhD	Impacts of technology development on social and governance frameworks in the context of mineral exploration	7	9/08/2022	9/08/2025	12/08/2022
4	Aruni Rajanayake	Curtin University	Brett Harris	Fiona Best (South32)	PhD	Innovative geophysics for drilling trajectory control	4	01/02/2021	1/02/2021	16/02/2021
5	Bianca Palombi	University of Newcastle	Brett Neilan	Chris Folkes (GSNSW), Nathan Reid (CSIRO)	PhD	Microbial diversity and their genetic basis for heavy metal resistance in regolith	7	1/03/2022	1/03/2025	23/03/2022
6	David Yanyi-Akfur	Monash	Pete Betts	Philip Skladzien (GSV)	PhD	Predicting gold mineralisation: Using geophysics and petrophysical characteristics to map prospective structures under cover	7	1/01/2023	1/02/2027	22/03/2023
7	Elnaz Khazaie	UoA	Alan Collins	Peter Haines (GSWA)	PhD	Novel Isotope Techniques for Basin Exploration: Chrono and Chemostratigraphy of the Officer Basin	7	4/03/2024	4/09/2027	15/04/2024
8	Emad Al-Hemyari	Curtin University	Andrej Bona	Tim Dean (Anglo American)	PhD	Seismic data processing and inversion with distributed acoustic sensing and artificial intelligence	5	9/05/2022	9/05/2025	3/06/2022
9	Ernest Opoku	University of South Australia	Caroline Tiddy	Jen Porter (GSWA), Anthony Budd (GA)	PhD	Resistate mineral chemistry for Cu-Au exploration	7	19/06/2024	19/12/2027	8/07/2024

#	Student	University	Supervisor	Industry co-supervisor	Degree	Project title	Project	Start Date	Finish date	Date registered
10	Eu Lim Kean	Curtin	Masood Mostofi	Alton Grabsch (CSIRO)	PhD	Non-Newtonian fluid flow in naturally fractured rocks with application in fluid loss control	1	1/04/2022	1/04/2024	22/08/2022
11	Hamid Bizhanikalatehahmad	UoA	Graham Heinson	David DeTata, Chris Yeates (Strategic Energy Resources)	PhD	Investigating Crustal Anomalies in the Curnamona-Mundi Mundi Region using an Integrated Geophysical Approach	Company	20/06/2023	19/06/2026	11/09/2023
12	Himanshu Sekhar Bal	Curtin	Chris Clark	David Kelsey (GSWA)	PhD	Extracting petrological information from low sample volumes	7	1/01/2024	31/12/2026	5/10/2023
13	Hing Hao Chan - PhD	Curtin	Masood Mostofi	Yevhen Kovalyshen (CSIRO)	PhD	Effect of wear on drilling response of an impregnated diamond bit	1	1/09/2022	1/09/2026	2/09/2022
14	Ivan Gutierrez Agramont	University of South Australia	Caroline Tiddy	Neil Francis, Yulia Uvarova (CSIRO)	PhD	Generating synthetic data for training predictive spectroscopic models	3	12/07/2021	12/07/2024	12/07/2021
15	Jasmin Hiller	University of South Australia	Laura Morrissey	Carmen Krapf (GSSA)	PhD	Developing a model for the exploration of clay-hosted rare earth elements	7	8/10/2024	8/10/2027	18/09/2024
16	Joe Shifano	University of New South Wales	David Cohen	Chris Folkes (GSNSW)	PhD	Regional biogeochemical mapping (and associated regolith studies) of the Cobar Basin for mineral exploration at regional to local scales	7	1/03/2019	1/07/2021	18/04/2019
17	Justine Flahaut	UniSA	Justin Payne	Claire Wade (GSSA)	PhD	New approaches for rapid analysis and tracing of fluids and their ligands in regional mineral systems	7	14/11/2022	14/11/2025	7/12/2022
18	Linde Li	University of Adelaide	Juraj Farkas	Adrian Fabris (GSSA), Rudy Gomez (Cartwheel Resources)	PhD	Potassium isotope tracing and novel dating of potassic alteration associated with iron oxide copper-gold systems of the Gawler Craton	Company	20/01/2025	20/01/2028	2/12/2024
19	Lizzie Bruce - PhD	UWA	Vitaliy Orgarko	Richard Chopping (GSWA)	PhD	Tomofast-x Gravity-Magnetic Inversion to Map Greenstone Belts in Archean and Paleoproterozoic Terrains	6	1/04/2024	1/04/2027	29/04/2023

#	Student	University	Supervisor	Industry co-supervisor	Degree	Project title	Project	Start Date	Finish date	Date registered
20	Lucy Mathieson	Curtin University	Chris Kirkland	Klaus Gessner (GSWA)	PhD	Mapping radiogenic Pb loss in space and time: a new tool to track fluid rock interaction	7	7/03/2022	6/03/2026	21/03/2022
21	Luke Tylkowski	University of South Australia	Caroline Tiddy	Ross Cayley (GSV), Rob Thorn (CSIRO)	PhD	Resistate indicator minerals as an exploration tool for orogenic gold mineralisation: a case study from the Murray Basin, southeastern Australia	7	1/3/2021	1/03/2024	4/03/2021
22	Maryam Abdollahi	Curtin University	Masood Mostofi	Yevhen Kovalyshen (CSIRO)	PhD	Design and evaluation of shape memory polymers composite (SMPC) to control lost circulation of water-based mud	1	2/05/2023	2/05/2026	13/06/2023
23	Mikhail Vorobev	Curtin University	Konstantin Tertyshnikov	Tim Dean (Anglo American)	PhD	Passive seismic imaging and monitoring	5	10/01/2024	11/01/2027	11/12/2023
24	Nikita Beloborodov	Curtin University	Rman Pevzner	Ilmur Minniakhmetov (BHP)	PhD	Seismic imaging and monitoring using low-power and ambient sources	5	1/10/2023	2/10/2026	13/09/2023
25	Nuwan Suriyaarachchi	University of Western Australia	Mark Jessell	Lachlan Hennessey (Anglo American), Richard Chopping (GSWA)	PhD	Integrated passive seismic/EM characterisation of cover as constraints on drilling	6	21/10/2019	20/10/2022	3/12/2019
26	Oliver Pring	UoA	Lucy McGee	Phillip Blevin (GSNSW)	PhD	Tracing the movement of metals through the mantle and crust using Cu isotopes	7	14/03/2022	14/09/2025	24/10/2022
27	Ranee Joshi	University of Western Australia	Mark Jessell	Tim Ivanic (GSWA)	PhD	Multi-scale 3D geological modelling of the Yalgoo-Singleton Greenstone Belt using the Loop Platform	6	22/01/2019	22/01/2022	26/02/2019
28	Rebecca Fogliani	Curtin University	Richard Thomas	Yevhen Kovalishen (CSIRO), Henna Jussila (Sandvik)	PhD	Percussion drilling: sweet spot and effect of bit wear	1	20/05/2024	20/10/2027	21/05/2024

#	Student	University	Supervisor	Industry co-supervisor	Degree	Project title	Project	Start Date	Finish date	Date registered
29	Rory Carter	UNSW	Ian Graham	Brenainn Simpson, Chris Folkes (GSNSW)	PhD	Rare earth element (REE) geochemistry, mineralogy, and mobility in the Cobar Basin - from potential primary granite sources to the surface environment	7	12/02/2024	6/02/2028	11/12/2023
30	Ruiqi Zheng	University of Adelaide	Juraj Farkas	Erick Ramanaidou (CSIRO)	PhD	Geological and geochemical constraints on the origin and diagenetic history of Neoproterozoic Breamar ironstones (SA) based on new metal isotope (Fe, Cr) and REE proxies	Company	31/01/2022	30/01/2025	25/03/2022
31	Snehal Jayakumar	Curtin University	Masood Mostofi	Yevhen Kovalyshen (CSIRO)	PhD	Cutting transport in RC drilling using compressible fluids	1	15/06/2020	15/06/2023	7/09/2020
32	Stacey Curtis	University of South Australia	Justin Payne	Mark Pawley (GSSA)	PhD	Integrated framework for the magmatic evolution of the greater Delamerian Orogen	7	10/02/2020	9/02/2023	1/04/2020
33	Travis Batch	University of South Australia	Caroline Tiddy	Michael Taylor, Vaclav Metelka (AIC Mines)	PhD	Magnetite and monazite chemistry for iron oxide-copper-gold exploration	Company	30/09/2021	30/09/2024	5/10/2021
34	Yoli Wu	ANU	Marnie Foster	David Kelsey (GSWA)	Masters	Application of argon geochronology to constrain shear zone movement and exhumation of the northern and eastern margins of the West Australian craton	7	30/09/2022	30/09/2024	24/10/2022
35	Zara Woolston	University of Adelaide	Juraj Farkas	Anna Petts, Alicia Caruso (GSSA), Phil Gilmore, John Greenfield (GSNSW)	PhD	Tracing subsurface ore deposits through the isotope analysis of regolith/cover in Australia: Coupled Cu and S isotope approach applied to a rock-soil-water-plant system	7	1/3/2021	1/03/2025	7/04/2021
36	Zhufu Shao	University of Adelaide	Juraj Farkas	Charles Verdel (NTGS)	PhD	Novel isotope techniques for basin exploration: In-situ dating and metal isotope analysis of glauconite/apatite from the Georgina Basin	7	29/11/2021	29/11/2024	21/02/2022

Completed students

#	Student	University	Supervisor	Co-supervisors	Industry co-supervisor	Degree	Project title	Finish date	Graduation Destination
1	Osama Abdullah A Alzubaidi	University of Adelaide	Juraj Farkas	Alan Collins (UoA), Marnie Forster (ANU)	Geoff Fraser (GA)	Masters	Novel dating of fluid-flow metallogenic events in East Tennant Creek region, Northern Territory, Australia: Insights from the coupled in-situ Rb-Sr and Ar-Ar geochronology of micas and feldspars	27/09/2024	Teaching Assistant, Department of Technical Training, King Abdulaziz University, Jeddah, Saudi Arabia
2	Rui Huang (Eric)	Curtin University	Thomas Richard	Masood Mostofi, Dimple Quyn (Curtin)	Yevhen Kovalyshen (CSIRO)	PhD	Experimental study of Impregnated Diamond Bit Wear	7/02/2025	Postdoctoral Researcher with DARC, Curtin University
3	Su (Joel) Kwong Lee	Curtin University	Thomas Richard	Masood Mostofi (Curtin)	Yevhen Kovalyshen (CSIRO)	Masters	Methods to detect inadequate bit cleaning in diamond drilling	11/03/2025	Looking for employment
4	Alejandra Bedoya Meija	University of Adelaide	Stijn Glorie	Martin Hand (UoA), Chris Kirkland (Curtin)	David Kelsey (GSWA)	PhD	Thermochronology of the 'The Gap', Western Australia	15/05/2025	Lithodat Pty Ltd and Lectureship at a university in Columbia
5	Mosayeb Khademi Zahedi	University of South Australia	Dave Giles	Caroline Tiddy (UniSA), Andrej Bona (Curtin)	Mark Lindsay (CSIRO)	PhD	Linking Geophysics and Geology Through Borehole Data: A Framework for Quantifying the Value of Information in Mineral Exploration'	24/06/2025	Geoscientist (Predictive Mineral Potential Mapping), Geoscience Australia

Honours-Masters by Coursework Students

#	Student	Affiliation	Degree	Project Title	Primary Supervisor	Co-Supervisor(s) & Affiliation(s)
1	Matthew Barnett	University of Adelaide	Honours	Uncovering the Hidden Delamerian margin: A geochemical and geochronological analysis of an arc undercover	Prof Alan Collins	Dr Darwinaji Subarkah, Dr Morgan Blades (UoA)
2	Haopeng Ma	UniSA/University College London	Masters by Coursework	Environmental economics of MinEx CRC's innovative laser-based downhole geochemical sensor	A/Prof Caroline Tiddy	Dr Ben van der Hoek
3	Jiahang Tang	UniSA/University College London	Masters by Coursework	Life cycle cost analysis of MinEx CRC's downhole LIBS sensor	A/Prof Caroline Tiddy	Dr Ben van der Hoek
4	Jingyan Sun	UniSA/University College London	Masters by Coursework	Evaluating the cost and time efficiency of downhole LIBS, portable XRF, and traditional laboratory methods in mining operations	A/Prof Caroline Tiddy	Dr Ben van der Hoek
5	Ting Guo	UniSA/University College London	Masters by Coursework	Environmental impact of LIBS downhole sensor: A mining scenario in Australia	A/Prof Caroline Tiddy	Dr Ben van der Hoek
6	Xinglong Yang	UniSA/University College London	Masters by Coursework	Time and cost benefit analysis of downhole LIBS technology in lithium exploration	A/Prof Caroline Tiddy	Dr Ben van der Hoek
7	Yifan Yang	UniSA/University College London	Masters by Coursework	Economic assessment comparing the cost and benefits of downhole LIBS tool with portable XRF in a mineral exploration scenario	A/Prof Caroline Tiddy	Dr Ben van der Hoek
8	Yirgon Sun	UniSA/University College London	Masters by Coursework	Apatite chemistry for copper discovery in northern Queensland, Australia	A/Prof Caroline Tiddy	Dr Adrienne Brotodewo, Travis Batch
9	Danlin Ye	UniSA/University College London	Masters by Coursework	Chemistry of pyrite in the Delamerian Orogen, South Australia: Implications for mineral exploration	Dr Adrienne Brotodewo	A/Prof Caroline Tiddy, Travis Batch
10	Yaojia Sun	UniSA/University College London	Masters by Coursework	Exploring pyrite chemistry in relation to copper mineralization in the Delamerian Orogen, South Australia	Dr Adrienne Brotodewo	A/Prof Caroline Tiddy, Travis Batch

MinEx CRC Limited

Location: Curtin University Drilling Analytics Research Centre (DARC),
Building 619, 3 De Laeter Way, Bentley, WA 6102
Postal Address: 26 Dick Perry Avenue, Kensington, WA, 6151
Email: admin@minexcrc.com.au



Appendix E

Registered IP (Patents, Trademarks, Designs)

MinEx CRC Limited

Location: Curtin University Drilling Analytics Research Centre (DARC),
 Building 619, 3 De Laeter Way, Bentley, WA 6102
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ABN: 66 625 533 913

Registered IP (Patents, Trademarks, Designs)

Patents

PATENT FAMILY	RELATES TO	COUNTRY	APPLICATION NO.	FILING DATE	STATUS	MANAGEMENT
Borehole Logging Methods and Apparatus	AutoSonde	International, including Australia, Canada, China, the US, Europe, Peru, Chile and Brazil	2013904475	19 Nov '13	Patent applications lodged in numerous countries by Boart Longyear. Australian patent 2014353871 in the name of MinEx expired in November 2024 and Australian patent 2018279062 is due to expire in November 2025. No renewal is planned.	Boart Longyear (through Griffith Hack, Melbourne)
Sampling and Analysis System and Method for use in Exploration Drilling	Lab-at-Rig®	International	2014904646	19 Nov '14	Patent applications lodged in numerous countries by Imdex	Imdex
Drying apparatus and related method	Lab-at-Rig®	International	2014904649	19 Nov '14	Patent applications lodged in numerous countries by Imdex	Imdex
Capture of drilling fluid returns	Lab-at-Rig®	International	2015903272	Aug '15	Patent applications lodged in numerous countries by Imdex	Imdex
Electromagnetic surveying method and device	Project 4	Australia	PCT/AU2024/051242	Nov 2024	PENDING, published	Imdex
Mobile Coiled Tubing Drilling Apparatus	CT Rig	International	2017050508	30 May '17	Patent applications filed in numerous countries, being renewed on expiry.	POF (MinEx)
High Speed Downhole Coring System	CT Rig	Australia	2017101088	10 Aug '17	Patent applications filed in numerous countries. Renewals not being undertaken on expiry.	POF (MinEx)
Sample Collection System and Parts Thereof	CT Rig, LAR for CT	International	2018050938	31 Aug '18	Patent applications filed in numerous countries. Renewals not being undertaken on expiry.	POF (MinEx)

Rotary Drill Head for Coiled Tubing Drilling Apparatus	CT Rig	International	2017051098	11 Oct '17	Patent applications filed in numerous countries. Renewals not being undertaken on expiry.	POF (MinEx)
Drilling Fluids and Uses Thereof	CTrol, CT Rig	International	2019050486	21 May '19	Patent applications filed in numerous countries. Renewals not being undertaken on expiry.	POF (MinEx)
Downhole Instrument for real-time laser-induced breakdown spectroscopy (LIBS) analysis	Project 3	Australia		October 2024	PENDING, published	POF (MinEx)

Registered Designs

DESIGNS	COUNTRY	APPLICATION NO.	FILING DATE	STATUS	MANAGEMENT
Fluids Capture Apparatus	Australia	AU201514172	14 Aug '15	Registered, 10 years, expiry due 14 Aug' 2025. Not being renewed.	Imdex
Mobile Coiled Tubing Drilling Apparatus	International	AU201710287	18 Jan '17	Registered various countries on behalf of MinEx	POF (MinEx)
A Cone Member for a Cone Splitter	Australia	AU201715232	1 Sep '17	Registered, 10 years, renewal required at 5 yrs	POF (MinEx)

Trademarks

TRADEMARK	COUNTRY	APPLICATION NO.	CLASSES	FILING DATE	STATUS	MANAGEMENT
Lab-at-Rig®	Australia	1581982	7, 9, 37 & 42	23 Sep '13	Valid to 2033	Imdex
RoXplorer®	Australia	1664080	7,37	11 Dec '14	Lapsed in 2024, not renewed	POF (MinEx)
CTrol®	Australia	1827061	1	21 Feb '17	Registered, 10 years, to 2027	POF (MinEx)

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Appendix F Publications



Publications

Scientific Publications

1. **Al-Hemyari, E., Isaenkov, R., Shashkin, P., Pevzner, R., Tertyshnikov, K.** (2025) Passive multichannel analysis of surface waves: a two-dimensional seismic dataset acquired with geophones and distributed acoustic sensing at a mineral exploration site in the Pilbara region of Western Australia. *Geosciences*, 15(2), 51.
2. **Batch, T., Tiddy, C., Brotodewo, A., Giles, D.,** Little, G., Belperio, A., Taylor, M., Metelka, V. (2024) REE-bearing phosphate mineral chemistry for iron sulfide-copper-gold exploration: A study at Jericho, NW Queensland, Australia. *Journal of Geochemical Exploration*, 267, 107608.
3. **Bedoya, A., Stijn Glorie, S., Hand, M.,** Kirkland, C.L., **De Vries Van Leeuwen, A.T.** (2025) In situ Rb–Sr insights in the cooling history of the Petermann Orogeny, Central Australia, *Geoscience Frontiers*, 16(4), 102080.
4. **Collins, A.S.,** Blades, M.L., Krapf CBE, Gilbert, S., Preiss, W., **Fabris, A.** (2024) New developments in laser Rb–Sr dating and their application in exploring Proterozoic sedimentary basins — an example from the northern Stuart Shelf, South Australia. *Geological Survey of South Australia*.
5. **De Vries Van Leeuwen, A. T., Glorie, S., Hand, M.,** Mulder, J., Gilbert, S. E. (2025) A comparison between in situ monazite Lu–Hf and U–Pb geochronology. *Geochronology*, 7, 199–211.
6. Gu, X., Collet, O., **Tertyshnikov, K.,** Pevzner, R. (2024) Removing instrumental noise in distributed acoustic sensing data: a comparison between two deep learning approaches. *Remote Sens*, 16, 4150.
7. **Hong, W., Fabris, A.,** Gilbert, S., **Curtis, S., Wise, T., Collins, A.S.** (2024) Porphyry Cu–Mo mineralization at Anabama Hill, Delamerian Orogen, South Australia: Fertility assessment implicated from epidote and chlorite chemistry. *American Mineralogist*, 118(6), 1291–1318.
8. Lister, G.S., **Forster, M.A.** (2024) Quantitative modelling of the morphology of age plateaux in muscovite argon spectra and the implications for thermochronology. *Australian Journal of Earth Sciences*, 71(7), 950–964.
9. Lister, G., **Forster, M., Morrissey, L.,** Quentin de Gromard, R., Kelsey, D. (2025) Simulation and modelling of an argon age spectrum from biotite in the Yilgarn Craton immediately adjacent to the Albany–Fraser Orogen, Western Australia. *Journal of Structural Geology*, 199, 105487.
10. Lloyd, J.C., **Collins, A.S.,** Blades, M.L., **Gilbert, S.E.,** Mulder, J.A., Amos, K.J. (2024) Mid- to Late Neoproterozoic development and provenance of the Adelaide Superbasin. *tektonika*, 2(2), 85–111.
11. Loyola, C., **Farkaš, J., Collins, A.S.,** Gilbert, S.E., Verdel, C., Löhr, S.C., Brock, G.A., Shields, G.A., Baldermann, A., Redaa, A., Blades, M., **Subarkah, D.,** Bishop, C., Giles, S.M., Christie-Blick, N., Haines, P.W. (2025). In situ Rb–Sr dating and REE analysis of glauconites and detrital feldspars from the Ediacaran/Cambrian strata: Centralian and Adelaide Superbasins, Australia, *Precambrian Research*, 427, 107851.
12. Martin, R., **Ogarko, V.,** Giraud, J., Plazolles, B., Angrand, P., Rousse, S., Macouin, M. (2025) Gravity data inversion of the Pyrenees range using Taguchi sensitivity analysis and ADMM bound constraints based on seismic data, *Geophysical Journal International*, 24;1:829–858.

13. **Mathieson L.M, Kirkland, C.L.**, Bodorkos, S., Daggitt, M. (2025) From discordance to discovery: extracting fluid–rock interaction timescales through zircon U–Pb analyses in the Arunta region, Central Australia. *Journal of the Geological Society* 182 (4), jgs2024–111.
14. **Mathieson, L. M., Kirkland, C. L.**, Daggitt, M. L. (2025). Turning trash into treasure: Extracting meaning from discordant data via a dedicated application. *Geochemistry, Geophysics, Geosystems*, 26, e2024GC012066.
15. Portes, L., **Pirot, G.**, Nzikou, M.M., **Giraud, J., Lindsay, M., Jessell, M.**, Cripps, E. (2025) Feature fusion-enhanced t-SNE image atlas for geophysical features discovery. *Scientific Reports* 15, 17152.
16. **Simpson, A., Glorie, S., Hand, M.**, Gilbert, S., Spandler, C., Dmitrijeva, M., Swain, G., Nixon, A., Mulder, J., Münker, C. (2024) In situ apatite and carbonate Lu-Hf and molybdenite Re-Os geochronology for ore deposit research: method validation and example application to Cu-Au mineralisation. *Geoscience Frontiers*, 15(5), 101867.
17. Soares, J., King, R., Holford, S., **Collins, A.S.** (2025) Structural evolution of the resource-rich Proterozoic western greater McArthur Basin: A focus on the Daly Waters Fault Zone, northern Australia. *Precambrian Research* 416, 107616.
18. **Subarkah, D., Nixon, A., Collins, A.**, Blades, M., Simpson, A., Lloyd, J., Virgo, G.M., **Farkaš, J.** (2024) Double dating sedimentary sequences using new applications of in-situ laser ablation analysis. *Lithos*, 480-481, 107649.
19. **Tylkowski, T., Tiddy, C., Giles, D., Cayley, R., Brotodewo, A., Thorne, R.**, Edgar, W. (2025) Investigating detrital apatite from the Castlemaine Group, central Victoria, to unravel sources and multi-cycle sedimentation. *Gondwana Research*, 146, 146-162.
20. **Wise, T.**, Doublier, M., Preiss, W., **Pawley, M.**, Thiel, S., **Krapf, C., Abdullah, R., Wade, C.**, Miller, R., Costelloe, R., Hossain, M., Rasheed, H., Nicoll, M. Basins and Ranges: a cross-section through sedimentation and tectonism along the Delamerian-Lachlan deep crustal seismic line 22GA-DL1. *MESA*, 2, 13–30.
21. **Zekri, H., Cohen, D., Rutherford, N., Folkes, C., Thomas, M.** (2025) Rapid analysis of drill core data for detection of geological boundaries, *Journal of Geochemical Exploration*, 269, 107634.

Extended Conference Abstracts / External Presentations

1. **Al-Hemyari, E., Collet, O., Tertyshnikov, K., Pevzner, R.** (2025) Supervised Deep Learning for Passive Seismic Event Detection Using DAS: Methodology and Field Application. Active & Passive Seismic – DAS Session, Australian Exploration Geoscience Conference 2025: 8-11 September 2025, Perth, Australia.
2. **Al-Hemyari, E., Isaenkov, R., Shashkin, P., Pevzner, R., Tertyshnikov, K.** (2025) Multichannel Surface Wave Analysis: A Case Study Evaluating Passive Seismic Recordings Using Geophones and DAS. 5th EAGE Workshop 5th EAGE Workshop on Fiber Optic Sensing for Energy Applications, Jul 2025, Volume 2025, p.1 – 3.
3. **Al-Hemyari, E., Isaenkov, R., Shashkin, P., Pevzner, R., Tertyshnikov, K.** (2025) Surface Wave Analysis with Passive Seismic: Insights from a Case Study in the Pilbara Region. Passive Seismic Session, Australian Exploration Geoscience Conference 2025: 8-11 September 2025, Perth, Australia.

4. **Beloborodov, N., Tertyshnikov, K.,** Collet, O., Isaenkov, R., Vorobev, M., Shashkin, P., Gurevich, B., **Pevzner, R.** (2024) A field trial of cross-well seismic with DAS and a high-frequency source. 1st ASEG DISCOVER Symposium 2024: 15 -18 October 2024, Hobart, Australia.
5. **Beloborodov, N., Tertyshnikov, K.,** Collet, O., Isaenkov, R., Vorobev, M., Shashkin, P., Gurevich, B., **Pevzner, R.** (2025) Timelapse Crosshole Seismic with High-Frequency Source and DAS for CO2 Migration Monitoring. 86th EAGE Annual Conference & Exhibition, Jun 2025, Volume 2025, p.1 – 5.
6. **Beloborodov, N., Tertyshnikov, K., Shashkin, P., Pevzner, R.** (2025) Crosshole tomography with DAS and high-frequency source. Active & Passive Seismic – DAS Session, Australian Exploration Geoscience Conference 2025: 8-11 September 2025, Perth, Australia.
7. **Kohan Pour, F., McFarlane, H.,** Liu, J., **Stromberg, J.** (2025) Nifty sediment-hosted copper deposit mineralisation constrained by mineralogical mapping and geochemical modelling. Mineral Exploration Case Studies Session, Australian Exploration Geoscience Conference 2025: 8-11 September 2025, Perth, Australia.
8. **McGee, L.,** Foden, J., **Payne, J.** (2025) Rapid fractionation of copper with magmatic volatiles in volcanic systems. 2025 International Association of Volcanology and Chemistry of the Earth's Interior SA.
9. **Pirot, G.** (2025) Inference and characterization of mineral assemblages with multiple-point statistics. Artificial Intelligence and Machine Learning in Geoscience Session, Australian Exploration Geoscience Conference 2025: 8-11 September 2025, Perth, Australia.
10. **Pirot, G.,** Irvine, D., Solórzano-Rivas, C., Werner, A. (2025) Stochastic modelling of the Lower Burdekin Delta aquifer. 3D Geological Modelling Conference, April 8-9 2025 Fremantle Western Australia.
11. **Reid, N.,** Schroder, I., **Thorne, R.,** Folkes, C., Hore, S., Eastlake, M., Petts, A., Evans, T. , Fabris, A., Pinchand, T., Henne, A., Palombi, B. R. (2024) Hydrogeochemistry of the Curnamona and Mundi region. Geoscience Australia, Canberra.
12. **Schifano, J., Cohen, D., Rutherford, N.** (2024) Entwined in the Pines' Results of Some Regional Biogeochemical Mapping Studies. Exploration Stream, International Applied Geochemistry Symposium, 14-18 October 2024, Adelaide Australia.
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