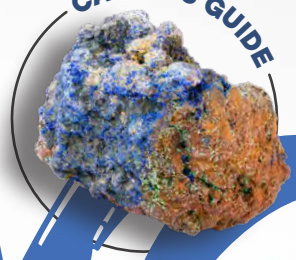
CAREERS GUIDE



MAKE YOUR CAREER IN MINING

SAFE TO WORK

"It's safety first, production second."

BIG DATA MINING

From artificial intelligence to robotics, the future of mining is digital

From TAFE to tertiary, how to make it in mining

ARE YOU READY TO LEVEL UP?

Pathways for every stage of your mining career

ARE YOU A GAMER?

Australian mining needs you!

DRIVING CHANGE

The face of mining is changing – and everybody's welcome

Why mining matters for a zero emissions future

CLIMATE ACTION

How mine sites are reducing carbon emissions

PAGE 29

"There's hardly a safer environment to be working in. It's safety and people first, production second."

JASON CRAVINO
NEWCREST

PAGE 12

"We want everyone to bring their authentic self to work, to be who they are."

RENATA ROBERTS
THE BLOOMFIELD GROUP

There's more to Australian Mining

Warning Please be aware that this guide may contain the names or images of Aboriginal and/or Torres Strait Islander people who may now be deceased.

© Minerals Council of Australia 2022

PAGE 08

"Rather than removing people from the business, technology is giving them an opportunity to extend their life in the business."

JONATHAN WARD
RIO TINTO

PAGE 28

"Companies are making mine sites more efficient to reduce our emissions and impacts on the planet."

BRONWYN MOORE
SAFESCAPE

PAGE 11

"The mining industry in Australia is leading the way using technology to to make front line work safer, easier and more inclusive."

ALEX BERTRAM
BHP

PAGE 15

"I'm very lucky that my company was completely supportive of my Olympic dream."

KIARA REDDINGIUS
RED ROCK AUSTRALASIA

PAGE 16

"Most people think that mining rehabilitation is about growing plants over old mine sites, but it is way more complicated and dynamic."

NORM GALLI
ANGLOGOLD ASHANTI

BHP

Cover image
Jacqueline and Fiona from BHP's Tjiwarl Work Readiness Program, an 8-week course supporting Traditional Owners in the Leinster area of remote Western Australia with opportunities to work in mining.

INDUCTION

A CAREER IN MINING

With more career pathways than ever, Australia's world-class mining industry needs motivated people of all ages, genders and experience to remake the future of mining.

With more than 100 careers across the mining industry, opportunities exist on mine sites, in high-tech remote mining centres, in science as well as computer laboratories – or any mix of locations.

You can make your career managing a team, rehabilitating mine sites, building robotics or piloting drones, engineering machinery, safeguarding native plants and animals, or tackling climate change.

Advances in technology – AI, big data, automation and connectivity – are core business for mining today. Technology makes workplaces safer and healthier, and is enabling industry to employ more people in roles ranging from virtual reality to mechatronics.

Mine sites are also using technology to reduce reliance on fuel, generate cleaner energy and minimise water use as part of the industry's commitment to reduce carbon emissions.

Improving the environmental performance of mining extends to land management. Long before any excavation begins, mine rehabilitation is planned in consultation with local and First Nations communities.

And those whose job it is to make mining more sustainable? Environmental scientists, Indigenous engagement specialists, cultural heritage advisers, hydrogeologists, social performance advisers... mining has a career for everybody.

Demand for Australia's minerals and metals – and highly skilled employees – will only grow. The industry added another 58,000 jobs in the past five years and over the next couple of years aims to add 5000 new apprenticeships.

With global demand for energy and infrastructure rising to meet an ever-growing world population, society is consuming more minerals and metals than ever before.

Australia's miners produce more than 45 minerals used in the manufacture of products ranging from smartphones, electric cars, space travel, solar panels, glass and concrete to golf clubs, wind turbines and medical implants.

Renewable energy is also driving demand for resources. Australia is fast becoming the supplier of choice for a low carbon future, whether it be silver, silicon and copper for solar panels, lithium for battery storage and electric vehicles, or vanadium, cobalt and rare earths for wind turbines.

So whatever your age, gender identity, cultural background, sexual orientation, physical ability or caring responsibilities, with so many jobs on offer there has never been a better time to consider a career in Australian mining.

Why mining matters... *A low carbon, high tech future depends on*

If you want electric cars

...mining matters

Manufacturing an electric vehicle (EV) battery requires more than a dozen minerals. With EV numbers to reach 145 million globally by 2030 – higher if governments accelerate climate ambitions – sustainable mining has never been more important. According to the International Energy Agency, at least 30 times as much lithium, nickel, rare earth elements and other key minerals will be required by the electric vehicle industry by 2040.

If you want high tech health

...mining matters

High tech health care depends on the minerals and metals we mine. Gold nanotechnology is the new focus of advanced medicine, delivering antibodies into cancerous tumours. Rare earth elements are used in medical imaging, such as x-rays and MRIs, while nuclear medicine is used to diagnose and treat illnesses such as cancer. Copper kills viruses and bacteria on contact, titanium is used to make surgical implants and lithium powers medical devices.

Newmont

Mitch and Sarah are graduates at Newmont's Boddington gold mine, Western Australia.

278k

EMPLOYMENT

Direct jobs in the resources industry in 2021-22.

Source: ABS

5000

APPRENTICESHIPS

and traineeships to be created by industry.

Source: BHP, Mining Skills Org. Pilot

$2770

WEEKLY PAY

Average full-time adult weekly wage in 2021 – 52% above average.

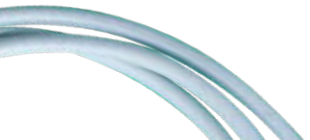
Source: ABS

sustainably - sourced minerals and metals.

If you want the latest gadgets

...mining matters

From smartphones to earpods to laptop computers, minerals are what makes electronic devices smaller, faster and more advanced. According to CISCO, there are more than 27 billion networked devices globally – that's 3.5 devices per person. And mining supplies the world's insatiable demand for consumer electronics. Every smartphone contains more than 40 mined metals and minerals, including copper, gold, silicon, manganese, silver and zinc.



If you want a zero emissions future

...mining matters

Renewable energy generation, such as wind and solar, and the transition to a low carbon economy is made possible by mining. Permanent magnets in wind turbines and the photovoltaic cells in solar panels require rare earth elements, while battery storage is heavily dependent on lithium, nickel and cobalt. As electricity networks expand to accommodate increasingly electrified cities, large quantities of copper and aluminium will also be needed.

CAREERS IN MINING

A gold mine of opportunity

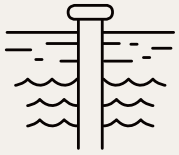
Exploration

Exploration is critical to drive the next wave of mining investment, jobs and tax revenue.

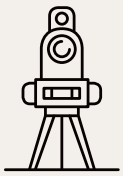
EXPLORATION GEOSCIENTIST

GEOPHYSICIST

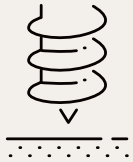
GIS SPECIALIST



HYDRO GEOLOGIST



SURVEYOR

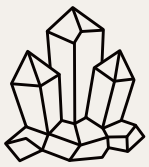


DRILLER

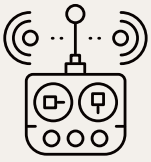
CHOOSE YOUR OWN PATH

MINE MANAGER

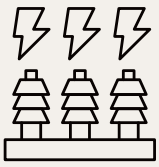
HAUL TRUCK DRIVER



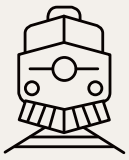
GEOLOGIST



REMOTE SYSTEMS TECHNICIAN



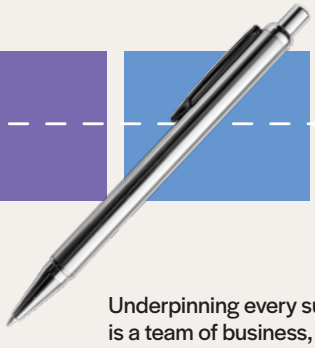
ELECTRICIAN



DIESEL MECHANIC

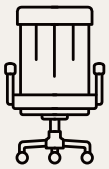
Extraction & processing

Pathways into high paid, high skilled mining careers have never been more varied and accessible.



The business of mining

Underpinning every successful mining operation is a team of business, finance and legal professionals.



CHIEF EXECUTIVE

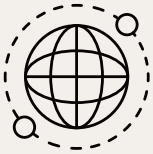
CORPORATE AFFAIRS

LAWYER

INVESTMENT ANALYST

BUSINESS ANALYST

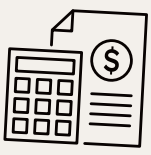
CONTRACT MANAGER



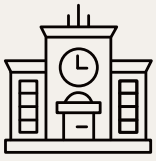
SUPPLY CHAIN SPECIALIST

ESG ADVISER

HUMAN RESOURCES MANAGER



ACCOUNTANT



TRAINING & DEVELOPMENT MANAGER

HEALTH & SAFETY OFFICER

minerals.org.au

awaits those ready to explore a career in mining.

Mine planning

An identified mineral resource informs the planning, development and construction of a mining operation.

MECHANICAL ENGINEER

ELECTRICAL ENGINEER

MINING ENGINEER

GEOTECHNICAL ENGINEER

CIVIL ENGINEER

WELDER

DRAGLINE OPERATOR

SHOT FIRER

CHEMICAL ENGINEER

METALLURGIST

LAB TECHNICIAN

DRONE PILOT

ICT SUPPORT OFFICER

CHEF

Community engagement

Earning and maintaining the trust of communities requires respectful and transparent engagement and enduring community benefits.

COMMUNITY LIAISON OFFICER

INDIGENOUS ENGAGEMENT SPECIALIST

SOCIAL PERFORMANCE ADVISER

Technology

From mechatronics to artificial intelligence, mining is undergoing a digital transformation.

SOFTWARE ENGINEER

CYBER SECURITY SPECIALIST

AI TECHNICIAN

MECHATRONIC ENGINEER

VIRTUAL REALITY DEVELOPER

BIG DATA ANALYST

Environment

Mine rehabilitation, conservation and heritage protection is considered at every stage of a mine's life.

MINE CLOSURE MANAGER

ENVIRONMENTAL SCIENTIST

AGRICULTURAL SCIENTIST

CULTURAL HERITAGE ADVISER

There's more to

Australian Mining

DIGITAL TRANSFORMATION

SMART MINES CALL FOR NEW SKILLS

From drones, robotics and autonomous systems to remote monitoring, virtual simulators and smart sensors, Australian mining is undergoing a digital transformation.

Technology is transforming mining skills with traditional mining trades increasingly incorporating some element of computing, and new career paths coming online such as mechatronics and artificial intelligence to advance the digital ambitions of mining companies.

Robots rock!

Australian mines are using some of the biggest robots on the planet to make mining more sustainable, productive, energy efficient and safe.

There are robots that test oxygen levels and check for hazards, squeeze into small spaces, drop medical supplies, test soil and water, manoeuvre inside and fix big machinery on the go, and provide on-location 3D printing.

Rio Tinto launched the world's heaviest robot in 2019. AutoHaul is the first fully autonomous, long distance, heavy haul rail network. Once the train controller sets the route (from an Operations Centre 1500 kilometres away in Perth), a network of computers makes its own decisions about safe speeds and collision avoidance to ensure safe and efficient haulage to port.

In mining, robots don't replace people – they remove the dangerous aspects of mining and make people more productive. AI, big data, automation, and robotics have transformed the industry and will continue to do so.

Remote mining

Entire command centres have emerged over the past decade to build and manage autonomous fleets of trucks, trains and processing machinery. And they're being run by everyone from gamers to engineering graduates.

Rather than being located alongside the mine, these command centres can be placed anywhere – including in cities and regional centres, meaning fewer people need to fly in and out of remote mines as part of day-to-day work.

Technology is bringing mining jobs closer to where you live while creating a more flexible workplace.

Robots don't replace people – they remove the dangerous aspects of mining and make people more productive.

Virtual and augmented reality

New technologies helped protect jobs and mining activity during COVID-19 restrictions. Unable to fly people to mine sites to check and service equipment, BHP equipped fitters on-site with a mixed reality device – a head-mounted computer with a see-through display – to work with experts across the world to maintain equipment.

Devices such as the Microsoft HoloLens 2 are at the cutting edge of world industry best practice. They can be set up to have floating checklists and step-by-step instructions on a heads-up visual display, along with pictures or videos to provide instruction and help prevent errors.

"The fact we can do this training before we start work is amazing. Using the simulator gives you real life experience in the safety of an office."

BEN HOLLAND
RIO TINTO

BHP

Rio Tinto

BHP FutureFit Academy combines virtual reality, digital learning and immersive cinema. Above left, Immersive Technologies simulators and right, Rio Tinto trainee Ben Holland in the virtual driver's seat.

Advanced simulators

Employee training in mining is among the best in the world, with many companies turning to virtual reality, such as Immersive Technologies simulators.

At New Hope's Bengalla coal mine in the Hunter Valley, new employees clock hours in the simulator before they climb into the driver's seat of a 500-tonne Hitachi dump truck.

The mine site roads, stop signs and infrastructure are programmed into the simulator to provide a highly realistic safe, modern and effective training platform. Large touch-screens allow trainees to do a virtual 'walk-around' of their machines, looking for maintenance issues and learning the difference between worn and damaged parts.

The result is a workforce with improved safety and efficiency.

Smart mines

Rio Tinto's $3.6 billion Gudai-Darri iron ore mine north-west of Newman, Western Australia is one of the world's most technologically advanced mines.

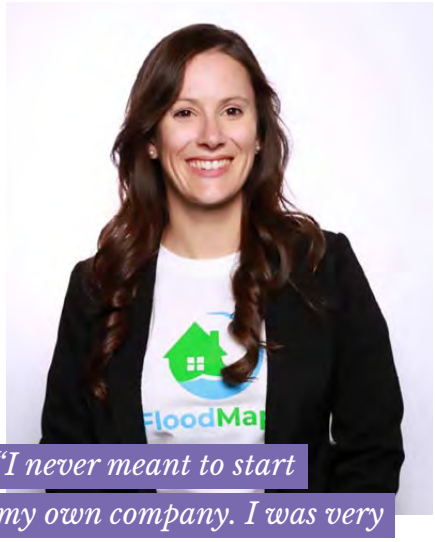
In addition to using Immersive Technologies simulators, Rio Tinto has invested in 20 autonomous haul trucks, and by late 2022, six autonomous blast drills.

A virtual classroom modelled from Rio's real world mines will immerse learners in a safe and repeatable virtual environment, enabling the development of deep knowledge and muscle memory of operational procedures.

Training and development is a key focus to ensure Gudai-Darri's workforce is ready to take on the high tech jobs on offer.

TOP NEW SKILLS the mining industry is looking for:

- Collaboration
- Change management
- Stakeholder engagement
- Data and digital literacy
- Problem solving
- Stakeholder analysis
- Strategic planning
- Design thinking
- Data analysis
- Creativity



"I never meant to start my own company. I was very focused on solving how we communicate flood risk."

JULIETTE MURPHY
FLOODMAPP, CEO & CO-FOUNDER

Juliette won the AI in Mining category for Floodmapp at the 2021 Women in AI Awards.

THE ENTREPRENEUR

MAPPING FLOODS

Forecasting floods started as a hobby for Juliette Murphy. Today Floodmapp is saving lives and property.

Juliette Murphy was a Project Water Resources Engineer when her friend's home was lost to the 2011 Queensland floods that tore through 90 towns and affected more than 200,000 people.

"My friend lost everything that she owned, but was lucky to walk away with her life. I realised then we needed to do a lot better to communicate warnings about floods to the public," said Juliette.

A few years later she saw firsthand the flood damage caused to mines in Calgary, Canada and started creating her flood forecasting software.

"I'm not a coder, I just did it as a hobby. It required an understanding of catchment saturation, river networks, topography and terrain, along with the location of assets such as houses, buildings and mines."

Juliette partnered with software engineer Ryan Prosser and FloodMapp was launched in 2018.

Used by mining companies, government and emergency services, Floodmapp uses real-time data and machine learning to predict how and where flood waters will impact.

"For mines, that gives them time to ship in pumps, temporary barriers and equipment to stop the damage before it happens," said Juliette.

"It is also critical for everyone to know which roads will be impacted, because people die on the roads during floods.

"With advances in technology, there is so much room for innovation in the mining industry and elsewhere. It's an exciting time."

AUTOMATION

Critical thinking cracks challenges

Autonomy Engineer Rhys Mawn got his start after graduating with honours in 2018 and joining mining services provider Thiess' Graduate Program.

It wasn't his first experience with the company. While studying Mechanical Engineering at the University of Queensland, Rhys participated in Thiess' Vacation Program.

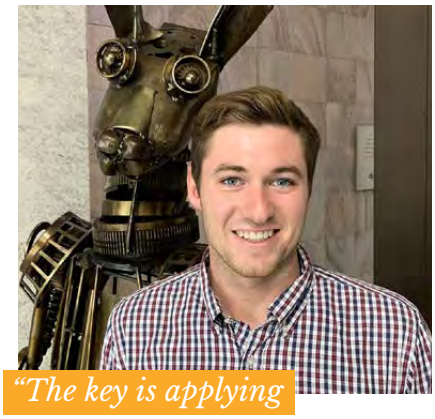
"An engineering qualification is a requirement of my role. However, many of the skills I use every day come from transferable backgrounds," Rhys said.

"The key is applying critical thinking when facing challenges and maintaining a proactive attitude to learning."

Rhys and the team at Thiess are exploring application of autonomous technology through a series of phased pilot programs. Already he's noticing benefits in terms of operator safety, utilisation and drill accuracy.

"My day-to-day tasks change as the project progresses. I'm currently working with network architects to implement a mobile network solution for autonomous drilling, building a feasibility assessment tool for future autonomous opportunities, and collating information on autonomous systems to establish a common maintenance structure," said Rhys.

"It's exciting to be working to deliver change throughout the business."



"The key is applying critical thinking when facing challenges."

RHYS MAWN
AUTONOMY ENGINEER

LEADING EDGE

A TRUCKFUL OF TECH

From robot trucks to edge analytics, Alex Bertram has built a career in mining technology at BHP.

When Alex Bertram joined BHP as a business analyst in the early 2000s, he didn't expect to still be working in the industry two decades later, let alone with the same employer.

"My friends ask me how I've had the same job for so long – the answer is that I haven't!" said Alex, Manager of Digital Operations at BHP.

"Over the past 13 years at BHP, I've had ten different roles ranging from investment evaluation to construction, from prefeasibility studies to robot trucks, technology development to capital prioritisation, and from project delivery to product management."

Most recently, Alex has led the development of Dash Tools which uses leading edge tech to keep mining equipment maintainers safe at site.

"Smartphones have improved how we get things done. With Dash, we have brought some of this convenience to the women and men on the front line of mining," said Alex.

"Dash puts sensors in harms way – not people. Sensors feed data to gauges for maintenance people to read on their smart phone or tablet. That means our team can stay safe at a distance while getting on with the job – all from the airconditioned comfort of their ute!"

The work Alex and the Dash product team are doing has attracted the interest of global technology leaders. Microsoft CEO Satya Nadella visited BHP last year to see Dash in action.

"It was surreal having Satya visit our team at South Flank. The mining industry in Australia is leading the way using technology to make front line work safer, easier and more inclusive."

THE AUTOMATION PROJECTS ADVISER

NAME: Claudia Haugg

POSITION: Adviser Automation Projects, Rio Tinto

QUALIFICATION: Bachelor of Science (Mechatronics Systems)

CAREER: "As a mechatronics engineer with a love of technology, it's an absolute dream come true to be part of innovating future technologies with a world leader in mining automation. I've had the opportunity to apply my skills to a variety of autonomous fields within the business. Tech terms like machine learning and AI are all involved with my day-to-day work."

My day ...IN THE ROC

See what a normal day looks like for **Claudia Haugg** at Rio Tinto's Remote Operations Centre in Perth. **PAGE 20**

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

"The mining industry in Australia is leading the way using technology to make front line work safer, easier and more inclusive."

ALEX BERTRAM
DIGITAL OPERATIONS MANAGER

"When you think of mining, you often think of a white male in a hard hat with a dirty face doing heavy work. The truth is so far from that..."

ATHALIE WILLIAMS
CHIEF PEOPLE OFFICER, BHP

DIVERSITY AND INCLUSION

THE CHANGING FACE OF AUSTRALIAN MINING

Mining has come a long way since the 1980s and '90s. Creating an environment in which everyone feels safe to bring their real and best selves to work is a priority for the industry.

Employing a diverse workforce has never been more important.

To remain globally competitive and to attract the best and brightest, the mining industry needs the diversity of thought and experience that comes from employing people from different backgrounds.

The mining workforce also needs to reflect the communities in which miners live and work, and that means actively seeking a mix of people across age groups, caring responsibilities, cultural backgrounds, physical abilities, gender identity and sexual orientation.

Women in mining

The number of women employed in mining is growing. From 8900 women 20 years ago, 52,500 women work in mining today, representing 19 per cent of the workforce.

Research by BDO Australia revealed women in mining are promoted to both managerial and technical specialist roles some nine years earlier than men.

While much work still needs to be done to encourage women to consider a career in mining, company programs are making a difference.

In 2016, BHP set its goal to achieve gender balance by 2025. Today women make up the majority of managers on its executive leadership team. At Rio Tinto, 60 per cent of its graduate intake in 2020 were women.

Gold miner St Barbara has received the Workplace Gender Equality Agency Employer of Choice for Gender Equality citation for seven consecutive years. In Australia, women make up 33 per cent of its Board and 28 per cent of its workforce. At St Barbara, there is no gender pay gap on like-for-like employment.

First Nations opportunities

The number of Indigenous Australians in mining doubled between 2006 and 2016 – the result of Traditional Owner, community and industry partnerships. First Nations people make up a higher proportion of the minerals industry than any other industry.

Over more than two decades the mining industry has developed tailored pathways for First Nations Australians including work readiness programs, apprenticeships, traineeships, graduate and cadetship opportunities and targeted recruitment.

Mentoring and career development support and workforce cultural awareness training is also offered by many mining companies. Increasing the number of First Nations people in leadership and STEM roles is an industry priority.

101%

HIGHER WAGES

Women working in mining are the highest paid of any industry, with total average weekly earnings 101% above the national average.

Source: ABS

12.1 wk

MATERNITY LEAVE

62% of mining companies offer an average 12.1 weeks paid maternity leave, well above the national average.

Source: Workplace Gender Equality Agency

120

LEADERSHIP ROLES

The number of Aboriginal and Torres Strait Islander people in leadership roles at BHP.

Source: BHP

BHP

AngloGold Ashanti

The Bloomfield Group

Above: Jasper is BHP's employee inclusion and diversity group; AngloGold Ashanti and Macmahon Holding's Get into Mining graduate Kyarah at Tropicana gold mine (WA) and far right, women drive change at The Bloomfield Group's Hunter Valley operations (NSW).

Rainbow pride

From rainbow cupcakes during Pride Month to marching in the local Mardi Gras, mining companies are demonstrating their commitment to being good allies.

Workplace programs and employee resource groups operate within most major mining companies to drive a safe, inclusive and supportive work environment for LGBTIQA+ employees.

Thiess is an active ally. Thiess' Allies Committee connects and advocates for LGBTIQA+ employees, consistent with the company's commitment to an inclusive workplace. At BHP, Jasper is an employee resource group formed to strengthen the company's culture through inclusion and diversity, while Rio Tinto has an LGBT+ committee designed to foster a supportive community among its workforce.

Career transitions

It's never too late to pursue a career in mining. Perhaps you're an electrician or a fitter and turner who wants to train in new technologies. Or you're handy behind the wheel or under the bonnet, and want a well-paying job where you can put those skills to work.

Or perhaps you were a teacher, or a dental assistant, who has spent the past few years caring for young children and are seeking a new career challenge that is well-paid and offers flexibility.

Traditional mining careers in the past required industry-specific qualifications and experience but today transferable skills are equally if not more important. For example, the mining industry was quick to recruit airline pilots and cabin crew who found themselves out of work during the COVID-19 pandemic because it recognised their skillsets.

Neurodiversity

Mining companies are also turning their mind to creating more inclusive environments for neurodiverse people. Neurodiverse people experience differences such as autism, Asperger's syndrome, ADHD and dyslexia.

Since 2017, BHP has worked with Curtin University's Autism Academy for Software Quality Assurance, Australian Computer Society Foundation and the Autism Association of Western Australia on a range of programs that make it a more inclusive employer.

Since then BHP has welcomed 20 interns to its Perth offices in data science, software development and testing, engineering and environmental safety placement roles. The program's success has encouraged BHP to expand the initiative, and the roles it offers, to other locations.

Thiess

"My proudest career achievement has been founding and developing Allies, Thiess' first LGBTIQA+ network."

JAMES COWIN
MINING ENGINEER

DRIVING CHANGE

ALLIES AT WORK

A conversation between colleagues was the catalyst for creating Allies, an LGBTIQA+ pride network at Thiess.

Mining engineer James Cowin knew from experience how difficult it was to tell anyone he worked with he was gay.

"I was worried about coming out to my colleagues and concerned whether it would impact my career due to bias and negative perceptions," James said.

But then one day while working on-site in Central Queensland a workmate approached him and told him they were thinking of quitting the mining industry because they didn't feel they would be accepted for being gay.

"I spent time listening and talking through what this person was experiencing and I knew this wasn't just a career decision but also a big life decision for them," said James.

"For whatever role I played, I'm proud to say that person is still working in the mining industry to this day."

Launched in 2019, Thiess' Allies network has more than 180 frontline and office based employees across Australia and Chile. As well as connecting employees who identify as LGBTIQA+, Allies is open to anyone who wants to support their colleagues and learn more about the community.

"That's where the idea of Allies first started – a network reinforcing that everyone deserves to be treated with respect and always feel safe to be themselves," said James.

"I would encourage people not to feel afraid of being part of the mining industry because they identify as part of the LGBTIQA+ community."

Red Rock Australasia

Above: Kiara Reddingius at work for Red Rock Australasia and main picture, competing at the Winter Olympics. Below, Newmont's rainbow truck tray, part of its commitment to increase visibility and inclusion of the LGBTIQA+ community.

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

"I'm very lucky that my company was completely supportive of my Olympic dream."

KIARA REDDINGIUS
COMMUNITY AND ENVIRONMENTAL LIAISON

WORK-LIFE BALANCE

CHANGING LANES

Former teacher Kiara Reddingius found the career flexibility she needed at Red Rock Australasia to help her rocket into the Australian Bobsled team at the 2022 Winter Olympics.

Kiara Reddingius is the Community and Environmental Liaison for Red Rock Australasia in Victoria – and an elite athlete. The former science and maths teacher represented Australia at the 2022 Beijing Winter Olympics in Bobsled.

"During COVID lockdowns I accepted an offer to move abroad for several months to join one of the Australian Bobsled teams. With my background in elite athletics – I was one of Australia's top heptathletes – I adapted and learned the sport quickly," she said. "Three months after seeing snow for the first time I was selected as a brakewoman in the Olympic team!"

"A lot of my work can be done remotely. Leading into the Olympics I took leave, however I was still able to work part-time for Red Rock for most of the time I was abroad," Kiara said. "I'm very lucky because my company was completely supportive of my Olympic dream."

Kiara discovered she could combine her environmental degree with what she loved most about teaching – community engagement – after joining the exploration company in 2020.

Her job involves helping people outside the industry understand what mining companies do. She also organises flora and fauna surveys, creates educational material and ensures that Red Rock's activities do not impact the people, plants and animals in an area.

"I spend a lot of time talking to people. They are worried exploration means that we blow up their farm in search for gold, but that's not how we explore. Modern technologies allow us to search for what's deep underground with little to no surface disruption. This gives us a big picture idea of the geology."

Kiara encourages others to explore whether a career in the mining industry is right for them.

"Do the work to find out what you need and talk to the right people. I didn't know this job existed and it actually fits me perfectly. I really enjoy it."

MORE CASE STUDIES
MAKE YOUR CAREER IN MINING

RESPONSIBLE CUSTODIANS

MAXIMISING SUSTAINABILITY

Mine rehabilitation is highly regulated, better implemented and more transparent than ever before.

Mine rehabilitation

From the initial stages of exploration, mining companies work with Traditional Owners, governments, communities, farmers and scientists to develop the mine rehabilitation plan.

Creating farmlands or recreational areas, protecting cultural assets and preservation of biodiversity and native species may all form part of the plan.

Mines might cover less than 1 per cent of the Australian landscape, but industry takes its commitment to rehabilitation seriously. Rehabilitation is about more than returning the land to its former state – it's about preparing and transitioning communities for the day the mine closes.

In 2020, Glencore spent $43 million on rehabilitation, sowing 33 tonnes of seed and planting almost 78,000 tube stock and seedlings. It marked the fifth year in a row the company exceeded its target of rehabilitating more than 1000 ha in a year.

Responsible partner

Australia's mining industry is globally recognised as an innovator in mine rehabilitation, tailings management, water accounting and stewardship practices.

The industry developed a water accounting framework that is used around the globe, and has also adopted the Towards Sustainable Mining (TSM) framework, an annual accounting system involving site-level reporting on safety, social, First Nations and environmental performance.

Sustained industry investment in, and partnerships with universities and researchers, is aiding continuous improvement in safety, environmental and social performance.

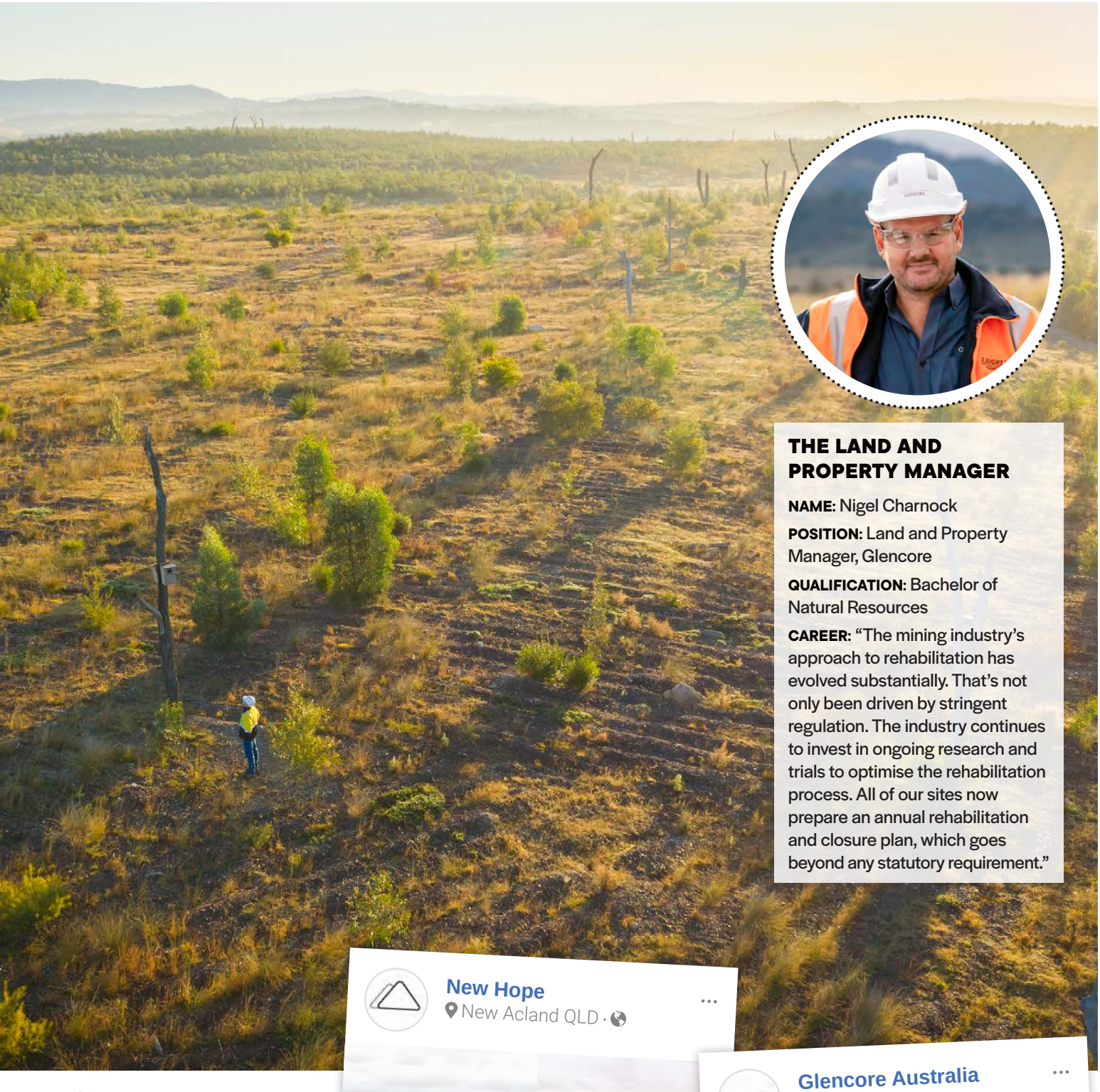
Preserving biodiversity

Mining companies contribute to the recovery of threatened species and provide extensive data and resources to national biodiversity research.

Rio Tinto's Amrun project is protecting endangered marine turtles from feral pigs in Northern Australia. In the Upper Hunter, Glencore and Aussie Ark are preventing the extinction of native mammals, including the Tasmanian devil.

AngloGold Ashanti is contributing millions of dollars to the Great Victoria Desert Biodiversity Trust for research and on-ground conservation of two of the desert's ecological sub-regions. The Trust has been particularly encouraged to find new sites of the rare sandhill dunnart, and record sightings of birds such as the scarlet-chested parrot.

Glencore



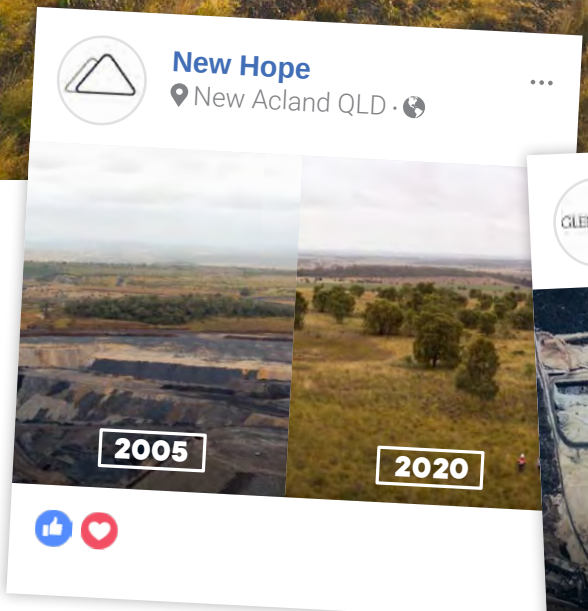
THE LAND AND PROPERTY MANAGER

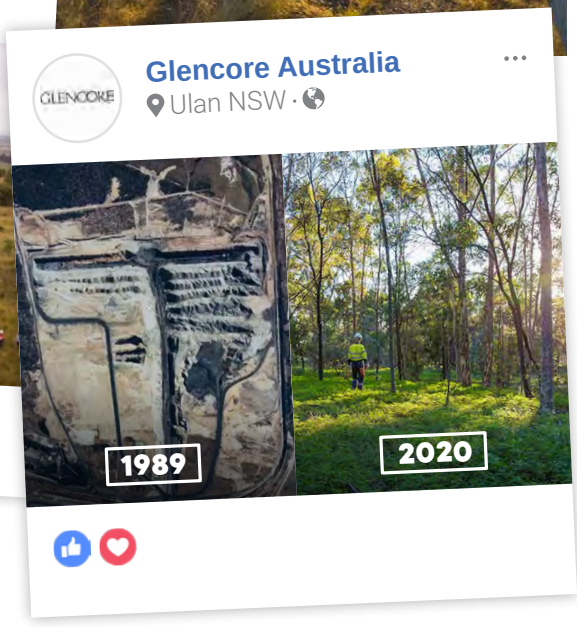
NAME: Nigel Charnock

POSITION: Land and Property Manager, Glencore

QUALIFICATION: Bachelor of Natural Resources

CAREER: "The mining industry's approach to rehabilitation has evolved substantially. That's not only been driven by stringent regulation. The industry continues to invest in ongoing research and trials to optimise the rehabilitation process. All of our sites now prepare an annual rehabilitation and closure plan, which goes beyond any statutory requirement."





Glencore's Mangoola open cut mine in the NSW Upper Hunter has pioneered the incorporation of natural landform into its rehabilitation, work that has been widely acknowledged as an industry benchmark. Right: Progress photographs demonstrate mine rehabilitation around Australia.

Anglo American

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

MORE TO MINING

FERTILE GROUNDS

Farmers are reaping the benefits of land suitable for grazing and a repurposed dam that was once part of a coal mine.

Anglo American has progressively rehabilitated its Dawson metallurgical coal mine in Central Queensland, including a 165 hectare pit originally used as a spoil dump and topsoil stockpile.

Pit rehabilitation began in 2012 with the aim of establishing the area for use by agriculture. A dam was repurposed for livestock and since then cattle have grazed on the rehabilitated land and shown strong weight gain.

Seeding at the site included native pasture grasses as well as shrub and tree species including Brigalow, Silver-leaved Ironbark and Bottle Trees.

In 2020, the company rehabilitated more than 400 ha of mined land using industry-leading technology and data analytics at its open cut coal operations in Central Queensland – the equivalent in area of more than 740 football fields.

Anglo American's Dawson metallurgical coal mine features in the #MoretoMining campaign showcasing rehabilitation and wildlife preservation being undertaken by mining companies across Australia.

Learn more
moretomining.com.au

Environment and social science jobs in mining:

- Conservation
- Water management
- First Nations engagement
- Community development
- Heritage protection
- Landscapers
- Nursery managers
- Soil and plant science
- Agricultural science
- Anthropology
- Archaeology
- Human rights
- Social performance

ENVIRONMENTAL SCIENTISTS

Did you know?

The mining industry is the third largest employer of environmental scientists in Australia. Mining employs between 1300 and 1600 environmental scientists.

Is this your next role?

ENVIRONMENTAL SCIENTIST

BACK TO THE BUSH

A career in mining hadn't crossed Hannah Croft's mind until her dad suggested a cadetship with Whitehaven Coal.

Hannah's family runs a sheep and cattle farm near Burren Junction in New South Wales. She didn't realise applying for a mining cadetship could kickstart her career as an environmental scientist.

Hannah was paid to complete her bachelor's degree at the University of Newcastle, and an honours year on top of that, and she gained practical experience working during her holidays at Whitehaven's Narrabri mine – an hour and half from her family's farm.

"I had never considered working in the mines, however I knew that vacation work and a graduate position would give me an amazing start," said Hannah.

"There aren't that many opportunities for environmental scientists in the area, so having a rewarding job that still allows me to visit home on the weekends is amazing.

"The practical experience I've gained doing vacation work has also helped me in my studies as I have been able to apply theories I have learnt."

When Hannah finishes her honours year, she will be eligible to start Whitehaven's graduate program.

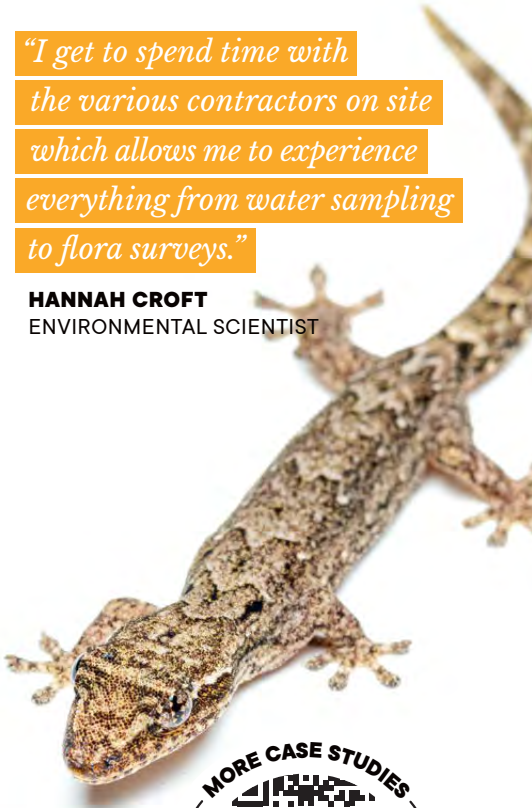
One thing that has surprised her is the amount of environmental legislation that mines have to comply with to ensure minimal impact – that, and the growing demand for more environmental scientists.

"I get to spend time with the various contractors on site which allows me to experience everything from water sampling to flora surveys," said Hannah.

"I also get to spend time in the office, learning from the other environmental officers about the processes behind the environmental legislation."

"I get to spend time with the various contractors on site which allows me to experience everything from water sampling to flora surveys."

HANNAH CROFT
ENVIRONMENTAL SCIENTIST



MORE CASE STUDIES
MAKE YOUR CAREER IN MINING

My day
...AT THE ROC

Claudia Haugg
Adviser Automation Projects
Remote Operations Centre, Perth
Rio Tinto

“Rio Tinto is at the forefront of technology and innovation. I’ve been able to apply my mechatronic skills and knowledge to a variety of different areas in the business.

BEST PART OF MY JOB

7:30 am
After a morning run and 30 minute drive, I arrive at the Remote Operations Centre in Perth. Rio Tinto’s mines, ports and rail systems are all operated from the ROC – more than 1000 km away from sites.

8:00 am
I scan my emails and check the weekly reclaimer report to see how my machine has been working before I head to the morning stand-up meeting where the team catches up on any safety incidents, as well as tasks for the day.

10.00 am
Time to get coding! I write code on Programmable Logic Controllers which run much of the equipment on site. These are purpose-built computers we program with very specific instructions to automate the machines.

1.00 pm
After lunch – spaghetti bolognese! – it’s time to write up a Change Management form for some new code I want to implement to improve the productivity of the reclaimer, including potential risks and how to mitigate them.

2.00 pm
Now for a catch-up with the mine site. I check in with the site engineers to understand any issues they have been observing with the machine to give us an idea if we need to make any changes to the code.

3:00 pm
Back to more coding! Deciding the best way to go about writing code is rarely straight forward. Sometimes going for a walk or catching up with a colleague helps my mind churn away at a coding problem.

4.30 pm
And that’s a wrap! I tidy-up my desk and wave goodbye to my team. It’s time to beat the traffic and head home for the day.

My day
...AT ROLLESTON

Ethan Brydon
Graduate Surveyor
Rolleston coal mine, Queensland
Glencore

4:15 am

I wake up, get ready for the day and drive around 45 minutes to Rolleston. I do an 8 day on, 6 days off Tuesday to Tuesday roster. If everything goes well, my day starts just before 5.30 am and finishes at 5.30 pm.

6:45 am

After signing in, logging on and checking emails, I get the drone ready to head out to the pit for survey pickups (volume calculations of the resource). Two flights are planned as some coal has been exposed and will be mined during the day.

> **Working at one of the biggest coal producers in the Bowen Basin, I have had the opportunity to develop my skills as a drone pilot whilst assisting the planning and production of the everyday operation.**

9:00 am

A production meeting lets the team know what is planned for the next 24 hours. After the meeting I process flight images and generate a 3D point cloud. The drill and blast engineer use this information to design a drill pattern.

BEST PART OF MY JOB

10:30 am

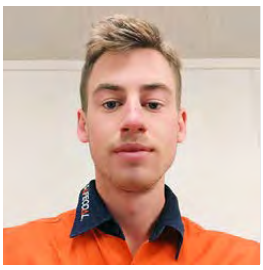
We peg the high wall crest and get a drone flight done where the shovel last finished. When a shovel, excavator or dragline finishes a pass or dig we calculate a volume which is used for the end of month reports.

12:00 pm

The afternoon is spent calculating volumes from the past few days and catching up on survey pickups. The drones collect large amounts of accurate data from a safe location – they've changed the game for surveyors.

4:30 pm

The last hour of the day is spent processing data from the afternoon flight, updating the survey job register and making sure the day's flights are logged in our drone maintenance/record sheet.



5:15 pm

Before heading to camp to go to the gym and have dinner, I charge the drone batteries. I'll get home about 7.30pm. The days are long but rewarding.

"It's really exciting to work on projects that make mine sites as environmentally sound as possible."

EMILY EVANS
YANCOAL

MINE REHABILITATION

PLAYING IN WATER AT LAKE KEPWARI

From open-cut mine to water sports hub, Lake Kepwari in Western Australia is testament to the Australian mining industry's commitment to rehabilitation.

After 50 years of mining, Yancoal's open-cut coal mine in the state's south-west has been transformed into a water sports and tourism hub embraced by the nearby community of Collie.

For many years the WO5B mine was an integral part of the local community, providing jobs, security, infrastructure and support for local organisations.

Today, former mine employees and their families number among the visitors and tourists to enjoy the 100-hectare man-made lake for its swimming, boating, waterskiing, camping and fishing.

Located on Ngalang Boodja land, the area is an important Aboriginal site. In the local Indigenous Wilman language, 'Kepwari' means 'playing in water'.

Mine rehabilitation works began in the 1980s, and ran alongside the open-cut operation up to and beyond the mine's closure in 1996.

Erosion gullies were filled and re-seeded, and everyone from botanists to soil consultants and biologists were employed to ensure the rehabilitation was of the highest standard.

Collie River, which was originally diverted around the mine site, was rerouted back through the lake to improve water quality, fish life and downstream ecosystems.

Today Lake Kepwari is populated with redfin, perch and marron, while the broader ecosystem supports water birds, reptiles and mammals.

Premier Coal Environment and Community Superintendent Emily Evans said the project exceeded the usual aims of mine rehabilitation.

"We've been able to create a space that can have a future land use of recreation, which is really exciting," said Emily. "We are one of the first mining companies to have done that and we're pretty proud of that. It's an exciting space to work in."

THE ENVIRONMENT AND COMMUNITY SUPERINTENDENT

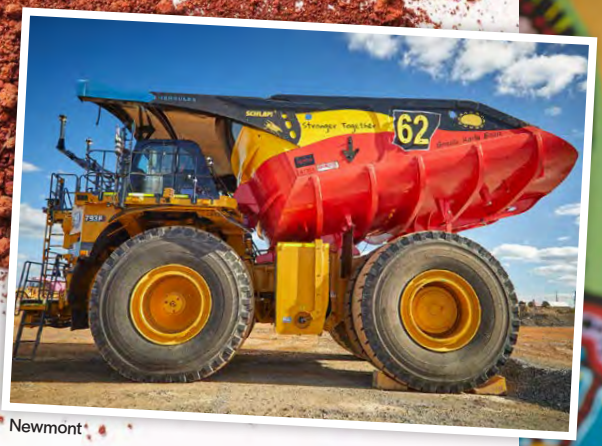
NAME: Emily Evans

POSITION: Environment and Community Superintendent, Yancoal

QUALIFICATION: Bachelor of Science (Land and Water Management, Environmental Geoscience)

CAREER: "I had never considered working in mining. My brother was working in the industry as a diesel mechanic and my mum told me mines employ environmental professionals as well. I've now been in the industry for 15 years. It's really exciting to work on projects that make mine sites as environmentally sound as possible."

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING



Newmont

A 'Stronger Together' truck tray developed by Newmont's employee-led business resource group, Moorditj Koodas.

Newmont

FIRST NATIONS ENGAGEMENT

MINING IN PARTNERSHIP

Australia's mining industry respects and values First Nations cultures, knowledge, histories and rights, and is committed to supporting opportunity and aspirations.

First Nations people and communities are core partners in mining's social and economic contribution to Australia.

More than 60 per cent of operating mines are located near Aboriginal and Torres Strait Islander communities.

Many mining companies have built strong and lasting relationships with Traditional Owners over decades and it is important to tell these stories.

Living our values

The mining industry deeply values its relationships with the First Nations landholders and communities with which it partners.

Miner companies engage with Traditional Owners and communities to identify areas of cultural or historical significance and learn what is important to them. This informs mine design and working together to protect culturally-significant heritage.

Where appropriate, First Nations communities share their knowledge to support biodiversity conservation and environmental management activities.

But the mining industry hasn't always got it right.

The tragic and inexcusable destruction of the 46,000-year-old Juukan Gorge shelters in 2020 did not reflect the industry's values. Industry has taken significant action to make sure it never happens again.

The mining industry has learnt from the tragedy, and is working harder than before for stronger, enduring and equal partnerships with First Nations people and communities.

Economic empowerment

Indigenous Australians make an immense contribution to the minerals industry workforce. First Nations mining jobs have more than doubled since 2006 and nearly 20 per cent of First Nations mining employees are women.

Indigenous businesses are also a critical part of the mining supply chain. Research shows the strong relationship between the mining and Indigenous business sectors.

Supporting the career development of Aboriginal and Torres Strait Islander people are industry priorities. Many companies have programs and traineeships aimed at helping First Nations people make their career in mining. First Nations people make up 9.7 per cent of mining apprentices and trainees, above the all industry average of 7.3 per cent.

Many mining companies, as well as the Minerals Council of Australia, also partner with youth organisations such as the Clontarf and Stars Foundations. Making the future better for First Nations communities starts at school.

Enduring partnerships

Whitehaven Coal has built enduring partnerships with First Nations communities connected to the lands it operates on in North West NSW and Queensland's Bowen Basin.

Committed to addressing social disadvantage, Whitehaven supports education and employment initiatives for First Nations people.

Sarah graduated from the Gnaala Work Ready program in 2018 and is now an apprentice boilermaker at Newmont Boddington.

"It's a fantastic program. It gives you an opportunity to come back to country... and the guys actually get a job at the end of the program."

ERIC DAVIDSE
TRAINING ADVISER
NEWMONT

A gold mine of opportunities

The Gnaala Work Ready program is an an entry-level work pathway for local Aboriginal and Torres Strait Islander people at Newmont's Boddington gold mine in Western Australia.

Participants work across the business in areas such as supply chain, processing, trades and drill and blast departments. At the end of the 12-week program, graduates have the chance to transfer to fulltime trainee positions on site.

Newmont's focus on long term, sustainable career pathways for Aboriginal employees also includes mentoring programs, employee and business resource groups and active recruitment through local job fairs.

It is a similar story at Newmont's Tanami gold mine in the Northern Territory, which operates on Warlpiri country.

Tanami's Yapa Crew learns on-the-job skills via the provision of general site services, cultural heritage, resource and land management and facilities maintenance. Crew members can also undertake off-site training to achieve machine operation and other competencies.

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

In 2015, Whitehaven set a target for 10 per cent of its Maules Creek workforce identifying as Indigenous. It has exceeded that every year and today around 20 per cent of its Maules Creek workforce identifies as Indigenous.

Industry partnerships extend beyond skills and training and economic development. Dozens of collaborative partnerships exist between the mining industry and First Nations communities across Australia, ranging from art spaces to cultural centres, heritage projects and health and literacy initiatives to native seed banks.

In Queensland, Peabody and the Barada Barna people developed a special 'Keeping Place' at the entrance to Coppabella mine near Moranbah. The 'Keeping Place' will house scar trees and serve as a reminder to all that the company is working on Barada Barna country.

48%

MINING SHARE

Supply Nation corporate members' spend with Indigenous businesses.

Source: Supply Nation, 2020

22%

WA APPRENTICES

Trainees and apprentices in WA's resources industry that identify as Indigenous.

Source: CMEWA, 2019

CHIEF EXECUTIVE & MANAGING DIRECTOR

NAME: Brad Welsh

COMPANY: Energy Resources of Australia Ltd

QUALIFICATION: Bachelor of Law and Masters of Mining Engineering (Mine Management) at University of New South Wales; Bachelor of Welfare (Aboriginal Community Studies) at University of Western Sydney.

...ON MY CAREER:

"I am from the Muruwari tribe in north-western NSW. Curiosity has driven me my whole life. Understanding how to bring the world's oldest living culture into one of the newest economies in the world is a unique opportunity. Finding a way to do so and making sure it is to the benefit of both groups is what drives me."

...ON WORKING TOGETHER:

"I've seen first-hand the mutual benefits mining can bring when done well. Prior to joining ERA, I worked in a number of roles within Rio Tinto. At Weipa in Cape York in Queensland, we designed the Amrun bauxite mine taking into consideration the cultural landscape, and today the Traditional Owners see it as their mine. I'm incredibly grateful for the time spent on Country, and with the old people ... and I'm proud of the work we did together."

...ON THE FUTURE:

"The industry has billions of dollars of mining investment in Aboriginal communities, and I believe we can do more to maximise the positive benefits while preserving the culture, the identity and the language of the community. One way we can do that is by bringing Indigeneity into company culture, celebrating it, and make it part of our decision-making. We should be proud to walk in two worlds."

AngloGold Ashanti

Clontarf students at AngloGold Ashanti's Sunrise Dam gold mine in Laverton, WA.

MINING IN THE LANDS

LIFE ON A MINESITE

From bunking in dongas and eating dinner at the mess, Mining in the Lands showcases life on a minesite.

Mining in the Lands is a joint initiative between the Clontarf Foundation, AngloGold Ashanti, Curtin University and the Western Australia School of Mines.

Now in its fourth year, the five-day camp raises awareness about mining careers amongst Aboriginal and Torres Strait Islander boys participating in the Clontarf Foundation program.

Senior students from Clontarf academies across Western Australia are selected to participate and flown to Kalgoorlie to take part in the mine tours.

AngloGold Ashanti charters a flight for the students each year to spend two days at either Sunrise Dam or Tropicana gold mine where they get to experience life on a mine site and speak first-hand with employees about their roles.

They also learn about TAFE and university pathways into the industry.

Since 2017, 40 Clontarf boys have taken part in the camp and several of them have successfully moved into jobs in the mining industry.

Student Waylon Anderson secured an entry level role with AngloGold Ashanti Australia as a Geology Technician.

Recent student Waylon Anderson has secured an entry level role with AngloGold Ashanti as a geology technician, while fellow student Beau Manson has relocated to Perth and is now working for AngloGold Ashanti contractor Barminco in the Pilbara.

Stars Foundation

Clontarf Foundation

Stars Foundation students and right, a Clontarf football academy.

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

ENGAGING YOUTH

KEEPING KIDS IN SCHOOL

Australia's mining industry supports organisations such as the Clontarf Foundation – a youth academy that uses football to keep First Nations boys engaged and at school.

The Clontarf Foundation began in 2002 when Fremantle Dockers coach Gerard Neesham offered boys at Clontarf Aboriginal College in Western Australia the chance to play football and attend football camps – but only if they kept up their school attendance.

Gerard Neesham said the success of the program prompted the team to expand the initiative to include further education and job placements in mining and other industries.

Today there are 136 Clontarf Academies across Australia, and 9700 students participating in a Clontarf program.

"When the boys see that there is an economic opportunity for them then they are motivated to get an education and finish school," said Gerard.

"They had football talent, but they also had broader talents. It built their confidence in realising, often for the first time, that they could do anything that any other kid in Australia could do."

One of the first Clontarf graduates was Jeff Farrell, who has since built a career in the mining industry. Today he is the Aboriginal Development Superintendent at Fortescue Metals.

"Clontarf brought young kids together with people from the non-Indigenous community who wanted to help them and it showed us that we weren't always being judged," Jeff said.

"We built strong relationships and for the first time, a lot of us were exposed to groups of non-Indigenous people who seemed to have our back."

The Stars Foundation

Stars Foundation CEO Andrea Goddard was determined to provide similar intensive support to First Nations girls. In 2015, the Stars Foundation was born.

Since then Stars has achieved outstanding outcomes, including a Year 12 completion rate above 90 per cent each year, and more than 80 per cent of graduates moving successfully into employment or further study.

Stars Foundation delivers programs in Western Australia, the Northern Territory, Queensland and Victoria.

Stars is now supported by the Minerals Council of Australia to support First Nations girls and young women who live in communities near mines.

"There's hardly a safer environment to be working in. It's safety and people first, production second. This is the mantra."

JASON CRAVINO
PROCESS CONTROL ANALYTICS SUPERINTENDENT

HEALTH AND SAFETY

SAFE AT WORK

The mining industry's number one commitment is that everyone who goes to work returns home safe and healthy, both physically and mentally.

The mining industry is committed to eliminating fatalities, injuries and occupational illnesses. It is equally focused on building respectful workplaces.

Mine sites are potentially risky, with heavy machinery, mine shafts, loose dirt, noise, chemicals and flammable materials typically found on site.

These risks are managed through a comprehensive system of leadership, compliance processes, culture and behaviour working in unison and backed by robust regulation.

ZERO

INJURIES GOAL

Working towards zero sector fatalities, injuries and preventable diseases.

61%▼

WORKERS' COMP

Reduction in workers' compensation claims in the mining industry since 2000.

Source: Safe Work Australia

Safety improvements

Australian mining leads the world in mine safety and research. Over the past 20 years, the industry has advanced the use of technology and equipment to better manage risk.

From three-dimensional drone mapping of underground mines to methane emissions monitoring and cameras that detect hazards before they become a problem, technology is reducing the exposure of mine workers to hazardous processes and environments.

Through a combination of technology, leadership and advanced systems and awareness, mine site injuries have dropped considerably since 2000 with a reduction of 61 per cent in workers' compensation claims.

Careers in safety

Careers in mine safety extend beyond occupational health and safety officers. Emergency response co-ordinators, occupational hygienists, risk managers, training managers, onsite nurses and paramedics are employed across the mining industry.

Career pathways are also varied. From graduate traineeships to mid-career transitions, the most important attributes of safety professionals is an ability to manage compliance and respond rapidly to changing situations.

The development and implementation of compliance systems and procedures is a core responsibility of health and safety officers to ensure effective, workable safety procedures are designed that will protect the workforce.

Respect@Work

Sexual harassment occurs across society and in our workplaces, causing profound physical, emotional and psychological impacts.

In the wake of the Australian Human Rights Commission's Respect@Work report, the mining industry is bringing focus, leadership and its safety-first culture to ensure a respectful approach with clear expectations and protocols.

Every worker needs to feel safe to do their job. All forms of discrimination, bullying or abuse are unacceptable, and workplace incidents brought to the attention of mining companies are treated seriously and professionally.

Mental health

The mining industry also supports programs and initiatives to ensure the mental wellbeing of its workforce.

MATES in Mining is a suicide prevention program that works with employees on mine sites providing general awareness, as well as more advanced crisis training.

Although Australia has one of the world's best health systems, research shows only 7 per cent of men are likely to seek help when they are struggling.

The mining industry has also developed a mobile phone app called MineWell to help miners and their families build better mental health and resilience.

As well as offering mental health tools such as breathing exercises and tips on how to manage sleep, MineWell helps workers stay connected with friends and family.

THE PROCESS CONTROL ANALYTICS SUPERINTENDENT

NAME: Jason Cravino

COMPANY: Newcrest

DUTIES: Jason leads a team dedicated to process control analysis, stabilisation and optimisation.

QUALIFICATION: Certificate III in Electrical Fitting; Certificate IV in Frontline Leadership

...ON WORK LIFE BALANCE:

"I live 20 kilometres away from Cadia Valley Operations, so it's easy for me to get home every day to see the kids. I can take them to soccer training during the week and soccer on the weekends. It's allowed my kids to have a really good education and grow up in a country environment."

...ON CAREER PROGRESSION:

"That's the best thing about mining. It has all these different levers that you can pull to move across the industry. That's my biggest advice: if you get started in my industry and you get stuck in a certain area, there are a lot of different streams to be able to sidestep and move forward."

...ON MINE SAFETY:

"Mining still has a stigma about it from the '80s, that it's a highly dangerous field. It's exactly the opposite. There's hardly a safer environment to be working in. It's safety and people first, production second. This is the mantra and that was a real eye-opener for me. I suppose the other myth is that it's a hard industry to get into. It's not. You've just got to apply yourself."

Glencore

"It's about making sure that we set the work environment up so that individuals can make good choices."

KYLIE AH WONG
GENERAL MANAGER OF HEALTH, SAFETY AND TRAINING

ADVANCED TECH

MANAGING RISK

Risk management and awareness around physical safety in the workplace is at the centre of every mining operation.

Proximity detection technology – that beep warning an object is too close when backing your car into a tight spot or making a turn – has saved many an unwary driver from a scratch or worse.

But in open cut and underground mines, the introduction of proximity detection has been "a major move forward," according to Kylie Ah Wong, General Manager of Health, Safety and Training at Glencore Coal Assets Australia.

The potential impact of a collision between vehicles or equipment can have serious safety implications and life changing consequences.

Fortunately, risk management and the promotion of personal safety is now integrated across the industry, said Kylie.

"I'm proud of us as an industry in regards to the focus and attention that we put on safety. We've taken what was once a very dangerous industry and improved our approach to put safety first and foremost to make sure that our people are looked after."

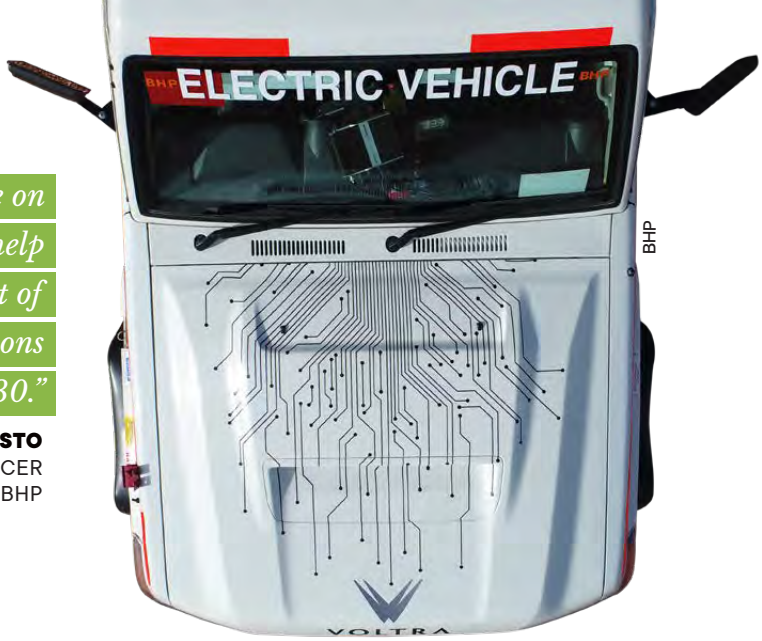
Alongside new technologies, the industry has innovated and drawn on systems and practices used in other industries, such as oil and gas, to improve its approach to identifying, managing or eliminating risk. Understanding how people interact and tolerate risk is an important element to developing an effective system.

"We're all human," said Kylie. "Everybody knows that you need to comply with the regulated speed limit, however every now and again you probably don't. So it's important to overlay that human behaviour to the systems of work and our work environment.

"I do think it's about common sense and it's about making sure that we set the work environment up so that individuals can make good choices."

"Reducing our reliance on diesel at our operations will help achieve our medium-term target of reducing operational emissions by 30 per cent by 2030."

EDGAR BASTO
CHIEF OPERATING OFFICER
BHP



BHP

A LOW CARBON FUTURE

HOW MINING IS TACKLING CLIMATE CHANGE

From electric vehicles to autonomous haulage to renewable energy coupled with utility battery storage, the mining industry is acting to reduce its carbon footprint.

Mining has an important role to play in the global shift to zero emissions, both in the production of minerals critical for a low emissions future and by reducing emissions across its operations.

Low emissions technology

The manufacture of solar panels, wind turbines, batteries, and hybrid and electric vehicles depend on the extraction and processing of minerals such as cobalt, silver, copper, nickel, lithium, rare earth elements and zinc.

Australia is a plentiful source of these and other minerals, and will play a major role in meeting global energy demands.

Annual production of electric vehicles, for example, will almost quadruple over the next few years from 3.4 million units in 2020 to 12.7 million units in 2024, according to GlobalData.

The sector is already experiencing jobs growth from increased global demand. Recruitment was a key focus for Albemarle's Kemerton Lithium Plant in 2021. The Kemerton plant will process spodumene ore to produce lithium hydroxide for the global lithium market which is largely being driven by electric vehicle production.

Carbon targets

The Minerals Council of Australia and its member companies support the Paris Agreement and the transition to net zero carbon emissions.

Major mining companies including BHP, Glencore, Rio Tinto, Idemitsu, Newcrest, Newmont, AngloGold Ashanti, South32 and St Barbara have publicly declared a commitment to net zero emissions by 2050. Anglo American has announced a target date of 2040.

To support these emissions reduction targets, companies are taking rapid climate action and demonstrating a pro-active approach to research and deployment of technologies.

Renewable energy

Mine sites in remote areas of Australia are increasingly being powered by solar, wind and battery energy.

Rio Tinto is installing a 34MW solar farm at Gudai-Darri in Western Australia that will consist of around 100,000 solar panels made up of photovoltaic cells.

Together with a new lithium-ion battery energy storage system, it is estimated the solar plant will reduce Rio Tinto's annual greenhouse gas emissions by about 90,000 tonnes.

At the end of 2019, more than three quarters of Rio Tinto's electricity consumption across its managed operations was sourced from renewable energy (solar, hydro and wind).

Electric vehicles

From light passenger utilities to large haul trucks, mining companies are making the switch to electric vehicles.

Anglo American is developing a hybrid haul truck that uses both a lithium-ion battery and a hydrogen fuel cell module. If successful, it will become the world's largest hydrogen powered truck.

Meanwhile, at Tropicana gold mine near Kalgoorlie in Western Australia,

"The global technology-led transformation to net zero only increases the reliance on Australia's key metals and minerals, such as lithium and copper."

TANIA CONSTABLE
CHIEF EXECUTIVE OFFICER
MINERALS COUNCIL OF AUSTRALIA

Bravus

Rio Tinto

WATCH THE VIDEO
MAKE YOUR CAREER IN MINING

Bravus' 65 MW Rugby Run Solar Farm (QLD) produces enough energy to power 23,000 homes; Rio Tinto's automated rail network (WA) has cut emissions by replacing the almost 1.5 million kms of annual road transport previously required.

BHP has teamed up with Toyota to trial an electric-powered LandCruiser 70 Series.

EVs drive demand for Australia's minerals

Impact on world mineral demand of producing only electric vehicles.

▲ 2898%
LITHIUM

▲ 1928%
COBALT

▲ 655%
RARE EARTHS

▲ 105%
NICKEL

▲ 22%
COPPER

Source: Visual Capitalist

AngloGold Ashanti is upgrading its current diesel haul trucks by trialling a fleet of six new electric haul trucks to reduce diesel consumption.

Electric passenger vehicles are also increasingly appearing on mine sites.

BHP is expanding its pilot program for electrified Land Cruisers to its iron ore and nickel businesses after successful testing at Olympic Dam in South Australia. It has even installed an EV charging station at its Kwinana Nickel Refinery for employees' private electric vehicles.

Carbon Capture and Storage

One of Australia's most advanced onshore carbon capture use and storage projects is Glencore's Carbon Transport and Storage Company (CTSCo) project in the Surat Basin.

With support from Low Emission Technology Australia, CTSCo and its global partners aim to capture CO_2 from the Millmerran coal-fired power station and store it safely underground.

Reducing emissions from the use of fossil fuels and other industrial processes is an important component of achieving a low carbon economy.

The CTSCo project has the potential to become a large scale CCUS hub in Queensland.

Green job prospects

Working in mining is increasingly a smart choice for those with an interest in working with the latest renewable technologies and green energy.

Mining companies will need people with experience in renewable energy – designing, building, maintaining and managing solar panels, wind turbines, and battery energy storage systems.

The industry will also need people to maintain fleets of electric haul trucks or trucks running on hydrogen fuel cells.

For this reason, the industry provides some of the best opportunities to have a big impact on emissions reductions across major operations using cutting-edge research and technology.

Anglo American aims to achieve carbon neutrality across its operations by 2040.

Anglo American

CARBON FOOTPRINT

INVESTING IN TECH

Advancing alternative fuel and energy sources is a focus of Kirkland Lake Gold's environmental technology centres.

Kirkland Lake Gold will invest US$75 million each year for the next five years in environmental technology centres aimed at further reducing its carbon footprint through technology and innovation.

The technology centres will focus on advancing and commercialising alternative fuel and energy sources, building the smart mines of the future with a focus on automation, digitisation and connectivity, and providing more support to the communities in which the company operates in the areas of senior citizen care, mental health, addiction, youth training and skills development. The company also aims to be a net zero greenhouse gas emission company by 2050 or sooner.

Sustainability is an essential aspect of operations at Kirkland Lake Gold. The investment is part of its commitment to integrate and promote sustainability across all facets of the business.

INVESTMENT

Newmont's $500 million climate fund

Newmont has committed to a 30 per cent reduction in carbon emissions by 2030, with an ultimate goal of becoming net zero carbon by 2050.

As a part of this commitment, it will invest US$500 million in climate change initiatives over the next five years to 2025 to build the pathways necessary to meet its emissions reduction targets.

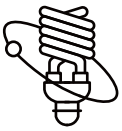
This will require the use of various technologies, including renewable energy, electrification, fuel switching and carbon capture and storage, and involve investigatory projects such as the piloting of new technologies, investing in renewable energy and improving microgrid energy storage.

Australian mining abatement activities

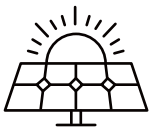
The mining industry is actively reducing its carbon emissions

AUTONOMOUS OPERATIONS
Drilling, loading, haulage

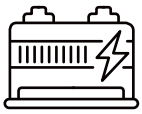
FUEL SWITCHING
Hybrid diesel, out of diesel



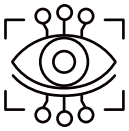
ENERGY EFFICIENCY
Lighting, motors, pumps, conveyors



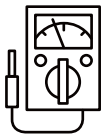
RENEWABLE ENERGY
Procurement, PPAs, on-site



BATTERY STORAGE
Energy storage, electric vehicles



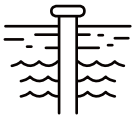
ARTIFICIAL INTELLIGENCE
Analytics, machine learning



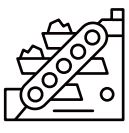
ELECTRIFICATION
Mine processes, transport

DIGITISATION
Data processing, interfaces

FUGITIVE EMISSIONS REDUCTION
Ventilation Air Methane, CH_4 capture



WATER MANAGEMENT
Treatment technologies



PROCESSING EFFICIENCIES
Bulk processing efficiency

HYDROGEN FUEL CELLS
Electricity, machinery

BHP

Stock image

Idemitsu Australia Resources

EV charging stations at BHP's Kwinana Nickel Refinery (WA); biomass trials as a fossil fuel alternative at Idemitsu Australia Resources (QLD); and green hydrogen, the focus of a consortium by mining majors Anglo American, BHP, Fortescue and Hatch.

GREEN ENERGY

Cadia mine to run on renewables

Newcrest intends meeting the future energy requirements of its Cadia gold mine through renewable power sourced from the Rye Park wind farm located in New South Wales.

It recently struck a 15-year power purchase agreement (PPA) contracting for more than 40 per cent of Cadia's projected energy demand from 2024, when the wind farm is expected to commence operations.

The PPA is expected to help deliver a 20 per cent reduction in Newcrest's emissions intensity and is a significant step towards achieving its target of a 30 per cent reduction by 2030.

FUGITIVE EMISSIONS

POWERING HOMES

Methane captured at Anglo American's metallurgical coal mines is generating enough electricity for 90,000 homes.

Methane captured at Anglo American's Moranbah North, Grosvenor and Capcoal underground metallurgical coal mines is being used by nearby power stations to generate more than 140 MW of electricity per annum, or enough to power 90,000 homes.

By capturing the methane, Anglo American is reducing its emissions by about 5 million tonnes per annum.

Anglo American is also undertaking a concept study into the abatement of dilute ventilation air methane (or VAM) which could ultimately contribute to a commercial scale demonstration of VAM abatement to address fugitive emissions at Australian coal mines.

MINE-A-WORD

Can you mine the minerals and metals that make every day possible?

Y	N	O	M	I	T	N	A	M	U	I	B	R	E	K	T	R	C	O	P	B	R	L
R	E	P	P	O	C	V	H	G	M	V	C	S	M	U	I	M	Y	D	O	E	N	W
B	C	I	J	T	M	F	F	Z	A	N	I	T	G	I	Z	A	N	K	C	F	J	R
T	O	R	P	E	T	S	D	N	A	S	L	A	R	E	N	I	M	H	K	M	I	J
P	A	M	I	R	P	A	A	C	N	M	M	U	I	D	N	I	R	F	U	M	M	G
R	L	U	Q	B	M	D	D	M	U	I	D	O	S	A	C	O	E	I	A	U	O	H
O	M	I	K	I	I	C	L	N	Y	C	A	W	C	Y	M	D	N	N	I	S	L	L
M	U	R	D	U	X	E	A	H	P	E	L	X	Z	I	N	O	G	S	F	P	Y	I
E	I	A	M	M	A	H	S	F	L	R	U	X	U	E	C	A	E	X	T	L	B	T
T	S	M	J	D	T	D	H	L	K	I	M	M	G	R	N	N	O	I	J	C	D	H
H	S	A	U	N	V	C	T	L	U	U	I	X	I	E	G	J	T	Q	B	E	E	I
I	A	S	A	P	O	N	R	E	M	M	N	Z	S	A	T	A	O	O	I	U	N	U
U	T	L	G	B	Q	O	A	K	C	P	I	E	M	C	N	L	R	D	Y	R	U	M
M	O	X	A	E	Q	C	E	C	N	M	U	I	N	I	L	O	D	A	G	O	M	M
O	P	L	O	E	O	I	E	I	I	Y	M	L	U	Q	N	W	R	Q	G	P	Y	U
M	T	U	X	R	R	L	R	N	Z	S	L	M	L	W	E	H	D	I	O	I	F	I
U	B	A	P	D	R	I	A	H	Q	S	C	A	N	D	I	U	M	J	F	U	V	N
I	T	P	M	A	N	S	R	E	K	T	H	U	L	I	U	M	R	P	F	M	W	F
R	B	E	R	Y	L	L	I	U	M	U	I	M	Y	D	O	E	S	A	R	P	N	A
T	T	Q	V	M	U	G	G	C	T	U	N	G	S	T	E	N	L	H	B	Y	Y	H
T	Q	Y	T	T	E	R	B	I	U	M	R	D	L	O	G	M	U	I	M	L	O	H
Y	V	S	I	L	V	E	R	C	V	Y	T	S	U	O	M	U	N	I	T	A	L	P
M	U	I	N	A	R	U	R	Y	H	E	S	D	Y	S	P	R	O	S	I	U	M	S

Aluminium
Antimony
Beryllium
Boron
Cerium
Chromium
Coal
Cobalt
Copper
Dysprosium
Erbium
Europium
Gadolinium
Gold
Hafnium
Holmium
Indium
Iron
Lanthanum
Lead
Lithium
Magnesium
Manganese
Mineral sands
Molybdenum
Neodymium
Nickel
Platinum
Potassium
Praseodymium
Promethium
Rare earths
Samarium
Scandium
Silicon
Silver
Sodium
Terbium
Thulium
Tin
Titanium
Tungsten
Uranium
Vanadium
Ytterbium
Yttrium
Zinc
Zirconium

ROCK STARS

ARIES
A natural born leader, Aries is an enthusiastic and driven employee with enviable determination. They might start at the bottom, but Aries' drive and enthusiasm ensures they won't stop until they are the boss – or maybe the mine manager.

TAURUS
Patient and dependable, Taurus is drawn to stable, long-term work that rewards loyalty. Although bull-headed at times, Taurus is a team player with excellent attention to detail and an aptitude for contracts and process-driven tasks.

GEMINI
Gemini is imaginative, versatile and energetic, although liable to grow bored with routine. With a quick wit and abundance of charm, Gemini might enjoy the travel and autonomy of being a mine engineering contractor.

CANCER
Intuitive and self-motivated, although sometimes maligned as overly sensitive, Cancer thrives in workplaces that value culture and community. Cancer is not afraid of hard work and well suited to social performance and advocacy roles.

LEO
Leo is creative, broad-minded and sometimes prideful. A well-paid career with enough autonomy to keep them ahead of the pack is important to Leo. Warm-hearted Leo is a favourite with colleagues and often found in managerial roles.

VIRGO
Analytical and meticulous, Virgo will never leave a job half-done. Quick to judge their own work (and everybody else's), Virgo creates order from chaos and is well suited to science and technology roles that demand exacting standards.

LIBRA
Capable, loyal and charming, Libra is a team player that will accomplish any task and make friends along the way. Libra has excellent negotiation skills and is well suited to roles that allow them to be creative problem solvers.

SCORPIO
Determined, magnetic and sometimes intense, Scorpio goes full throttle when committed to a goal. With an unshakable drive and laser focus, Scorpio often performs best in research, data and science roles.

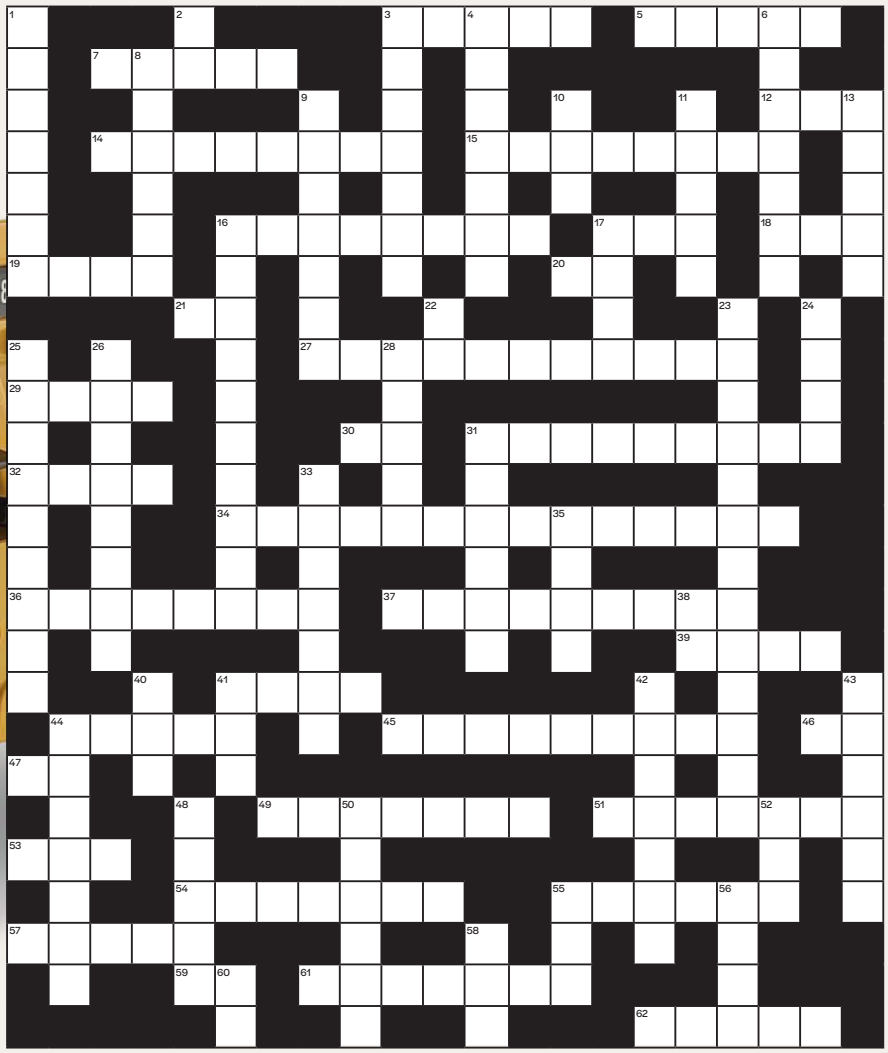
SAGITTARIUS
Optimistic and good-humoured, Sagittarius is idealistic and full of good ideas. Travel and autonomy may help alleviate boredom for Sagittarius. Careers that offer variety over repetition, and plenty of scope, are a good match.

CAPRICORN
Cool under pressure, Capricorn is unstoppably efficient but can be fatalistic and prone to overwork. Capricorns love a challenge and are always looking for the next project. They are equally at home in creative or data-driven roles.

AQUARIUS
Aquarius is honest, loyal and a true humanitarian. Independent by nature, Aquarius wants to leave the world a better place. Environmental and earth sciences and cultural heritage might be fields of interest for out-of-the-box Aquarius.

PISCES
Imaginative and highly perceptive, Pisces seek personal fulfillment over financial gain. The 9-5 grind can be stifling for Pisces. Pisces are suited to careers that value their empathetic nature, such as counselling and human resources.

MINE GAME SOLUTION
MAKE YOUR CAREER IN MINING



THE MINE GAME

ACROSS

3 Decorative award
5 Sloping or vertical mining excavation
7 Contract granting land use
12 Piece of earth
14 Heavy machine used to excavate ore
15 Waste from minerals separation
16 Solid, naturally occurring deposits
17 Mining excavation
18 CO_2 capture and storage
19 Acronym of Mining Equipment, Technology and Services
20 Chemical symbol of cobalt
21 Chemical symbol of platinum
27 The process of finding commercially viable concentration of mineral ores
29 An infinite period of time
30 Chemical symbol of gold
31 A British gold coin
32 To leave out
34 Restoration of mined land
36 An endless loop carrying ore
37 An abundant metal in earth's crust
39 A formation of coal
41 Type of mining in Coober Pedy
44 Someone who extracts ore
45 A scientist who studies rocks
46 Chemical symbol of titanium
47 Chemical symbol of iron
49 Zero emissions power generation
51 A stone pillar used as a monument
53 Legislation passed by parliament and assented to the Governor-General
54 Uranium mine in SA – ..... Dam
55 Element in both diamond and coal
57 A boring machine with a rotating tip
59 Chemical symbol of scandium
61 A concentration of metals or minerals
62 One of Australia's largest gold mining operations – ..... Valley

DOWN

1 Mineral used in psychiatric medication
2 Chemical symbol of radium
3 How precious metals arrived on earth
4 Term for a pliant metal
6 Search for gold in abandoned workings
8 A group of metallic elements – rare .....
9 Sedimentary rock formed from peat
10 A liquid derived from petroleum
11 Acronym of Australian Nuclear Science and Technology Organisation
13 A physical characteristic of rocks
16 The study of metallic elements
17 Freight harbour for mineral exports
22 Chemical symbol for aluminium
23 Assessment required of mine sites
24 A streak of valuable minerals
25 Australia's biggest industry
26 Chemical element with the symbol Sb
28 To measure depth
31 An element associated with rotten egg
33 Coal used in electricity production
35 Exhausting physical labour
38 Australia's third largest trading partner
40 Pigmented liquid made from minerals
41 Rock that contains minerals and metals
42 A mining region known for its red earth
43 This metal shares its name with a coin
44 Poisonous metal, liquid at room temp.
48 A common name for pyrite – ..... gold
50 The oldest metal known to man
52 A positively or negatively charged atom
55 Above ground mining – open ...
56 Acronym of Organisation for Economic Co-operation and Development
58 Soda ..., or sodium carbonate
60 Chemical symbol of calcium

METALLURGIST

ON-THE-GROUND EXPERIENCE

A 12-week vacation program at Lynas Rare Earths in Laverton, Western Australia led to a sponsored PhD for metallurgist Yamini Kannappan.

Yamini didn't expect the level of care and interest shown in her when she boarded the plane bound for Lynas Rare Earths in Laverton.

"The people were so friendly. They knew I would be there and made the effort to get my name right. The vice president even knew I was coming," said Yamini.

Yamini grew up in India where she studied metallurgy before she moved to Australia to complete her Masters degree at the Western Australia School of Mines (WASM) at Curtin University.

It was WASM's reputation in metallurgy and mining, and links to industry, that helped her make the decision. When a lecturer recommended the vacation program at Lynas, Yamini enrolled.

Before starting the program, Yamini was asked about her interests so the 12 weeks could be tailored specifically for her. She was also given her own technically challenging projects and a week in the lab doing training.

"They really wanted to make sure that I got the most out of it," she said.

Every fortnight Yamini would fly in and out from Perth to Laverton, working eight days and then having six days off.

"In the mining industry back home, it's hard," she said. "People work six days a week and they get paid much less when compared to here. But here the work-life balance is so good."

Yamini was surprised by everything from the quality of the food to the way everyone looked after her.

"It is a small company with only 60–70 people on site at a time. Everyone knows everyone, it's more like family."

"The people were so friendly. They really wanted to make sure that I got the most out of it."

On completing the vacation program, Yamini had helpful mentorship from her Lynas manager, and was then given the chance to undertake a PhD funded by the company, with lots of opportunities to keep working on site.

"It was great career advice," she said.

MINING ENGINEER

BRIDGING CULTURES

A scholarship set graduate mining engineer Danny Kim on the career path to Whitehaven Coal.

Danny Kim moved to Australia from Korea at the age of nine without speaking a word of English. After high school, Danny started a dentistry degree but realised it wasn't for him.

"I was working out what to do and discovered that more than 50 per cent of Australian exports are tied to mining," he said. "I wanted to be a part of it."

So Danny switched to an engineering degree at the University of Wollongong, and won a scholarship with Whitehaven Coal. As well as a guaranteed job at the end of his degree, the scholarship included work opportunities during his university holidays.

"One of Whitehaven's biggest customers is South Korea. I was able to attend meetings and learn about joint ventures – something I'm sure wouldn't have been possible if I didn't speak Korean," Danny said.

Now a full time graduate mining engineer, Danny is continuing to upskill himself through a Masters in Ventilation System Management at UNSW.

"There's a massive opportunity for me with my South Korean background, given the size of the Asian market and the need for people who can create a bridge between the Asian and Australian cultures."

Metallurgist Yamini Kannappan on site at Lynas Rare Earths in Laverton, Western Australia with Plant Metallurgist Kallan McElroy.

LEARN MORE
MAKE YOUR CAREER IN MINING

$80-100k

GRADUATE PAY

Graduate mining engineers have among the highest starting salaries. Mining graduate salaries are $30,000 higher on average than other industries.

Source: gradaustralia.com.au

WHERE TO STUDY

Mining engineering

UNIVERSITY OF NEW SOUTH WALES
Bachelor of Mining Engineering (Honours)
unsw.edu.au

UNIVERSITY OF QUEENSLAND
Bachelor of Engineering (Honours)
uq.edu.au

CURTIN UNIVERSITY
Bachelor of Engineering (Honours)
Bachelor of Science (Mining)
curtin.edu.au

UNIVERSITY OF ADELAIDE
Bachelor of Engineering (Mining) (Honours)
adelaide.edu.au

UNIVERSITY OF WOLLONGONG
Bachelor of Engineering (Honours)
uow.edu.au

FEDERATION UNIVERSITY
Bachelor of Engineering (Mining) (Honours)
federation.edu.au

MONASH UNIVERSITY
Bachelor of Engineering (Honours)
monash.edu.au

UNIVERSITY OF WESTERN AUSTRALIA
Bachelor of Science (Engineering Science)
uwa.edu.au

CENTRAL QUEENSLAND UNIVERSITY
Bachelor of Engineering (Honours)
cqu.edu.au

Mining engineers are in high demand across Australia.

Industry-funded pathways

The Minerals Tertiary Education Council, funded by industry through the Minerals Council of Australia, also invests in tertiary education tailored for the future mining workforce.

Associate Degree of Engineering
University of Southern Queensland
Central Queensland University
With a focus on automation, data analysis, sensor technology, sustainability and First Nations issues, the associate degree is a pathway to a professional engineering career.

Foundations of Modern Mining Professional Certificate (online)
University of Queensland
Curtin University
A professional certificate available through edX that covers the mine lifecycle, sustainable development, digital transformation and health, safety and wellness. The one-year course includes a pathway to further study.

Thiess' high voltage electrical apprentices headed to the Bowen Basin after a six-week induction program where they gained essential workshop experience and learned about site safety.

TAFE & TRADES

MAKE IT YOUR WAY

More than 5000 mining apprenticeships are being created, but that's only one of many pathways into mining.

Mining skills

The Federal Government's $585 million Skills Package announced in 2019 backed the mining industry to find new ways to skill its workforce of the future.

The first of the new courses is an accelerated apprenticeship program for diesel fitters being piloted in Western Australia and Queensland, supported by Rio Tinto, Fortescue and BHP.

Not only will the apprenticeship take two years instead of three to four years, it will provide graduates with the future skills to work with electric vehicles. Topics include data management, electronics and systems integration.

Certificates in automation

Rio Tinto launched Australia's first accredited automation qualification in 2019 in partnership with South Metropolitan TAFE and the Western Australian Government.

Certificate II in Autonomous Workplace Operations looks at autonomous workplaces, how data drives processes and the human-machine interface.

Rio Tinto has also rolled the course out to its tradespeople. A diesel fitter who got their ticket 20 years ago, for example, can augment their trade today with new skills in automation.

BHP FutureFit Academy

No matter what stage of life or career, BHP's FutureFit Academy offers a fast track pathway into mine maintenance.

Perfect for students with a passion for DIY, courses combine virtual reality, digital learning and immersive cinema alongside practical sessions.

Dedicated learning centres operate in Perth (WA) and Mackay (QLD) and students get paid to learn a nationally accredited traineeship or trade apprenticeship. Once qualified, graduates go on to a permanent job at one of BHP's operations in WA's Pilbara or QLD's Bowen Basin regions.

THE BHP FUTUREFIT ACADEMY STUDENT

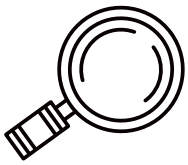
NAME: Kellie Watson

CAREER CHANGE: "My background was working in disability employment but I had always wanted to have a go at working in mining. When the opportunity came up to apply to BHP's FutureFit Academy, I thought I had better have a go before I got 'too old'. Being in my 50s hasn't been an issue – BHP clearly recognise the opportunity that diversity in age, knowledge and experience brings to the workplace."

Having completed her traineeship, Kellie starts work in the Bowen Basin.

What next?

With so many options, choosing the right career or the right course can be overwhelming. Fortunately there are some great resources:



MySkills
myskills.gov.au

Your Career
yourcareer.gov.au

Good Universities Guide
gooduniversitiesguide.com.au

Company programs

From internships to vacation work to graduate programs, mining companies provide tailored pathways to help people establish a career in the industry.

VACATION PROGRAMS AND INTERNSHIPS

Vacation and internship programs are for people undertaking an undergraduate degree. Students gain hands-on experience and apply skills and knowledge learned at university to real-life projects, as well as get a taste of life at the company and in the industry. These programs vary in length and frequency and can include opportunities to work in both office-based roles or in remote locations. Completing a vacation or internship program can help participants secure a graduate program position.

Some examples

New Hope Group Programs, Newcrest Vacation Program, BHP Internships, National Exploration Undercover School (University of Adelaide)

TRAINEESHIPS

A traineeship is an agreement between the trainee and a company, whereby the company agrees to providing training to the trainee in a specific vocation. Traineeships are available for people of all ages and usually last between 12 to 24 months, depending on the vocation and certificate level undertaken. Depending on the program and the company, a traineeship can start while the trainee is still at school, about to finish school, recently graduated high school or an older person looking to transition into a new career.

Some examples

Glencore Indigenous Employment Pathways Program, Whitehaven Dump Truck Operator Traineeship Program, Peabody Trainee Program

Learn more
Visit company websites

APPRENTICESHIPS

An apprenticeship is a paid, structured training arrangement of usually 3.5 or four years duration. The training combines practical experience at work with complementary off-the-job training with a Registered Training Organisation. On successful completion, apprentices are issued with a nationally recognised qualification and have on-the-job skills, usually in a skilled trade occupation. Completion of Year 10 is usually a pre-requisite, and there are also mature age entry pathways.

Some examples

Glencore Apprenticeship Programs, Thiess Apprenticeship Program, Newmont Boddington Gold Apprenticeships, BHP Future Fit Academy

CADETSHIPS

Cadetships are similar to apprenticeships and traineeships in that they involve earning and learning, but are geared towards people studying at university or high school students planning on commencing a university degree. Cadetships allow the cadet to complete tertiary studies while being employed and gaining professional experience. Companies may also help pay for the cadet's study costs. A cadetship provides a pathway to permanent employment when the cadetship is finished.

Some examples

Whitehaven Cadetship Program, Rio Tinto Indigenous Cadetship Programme, Yancoal Cadetship Program

GRADUATE PROGRAMS

Graduate programs are designed for people who have recently completed or are nearing the end of their university degree. Duration varies across companies, but typically run for 18 months to 2 years with participants rotating through different areas of the business. Cadetships are designed to provide on-the-job training, mentoring, career management and professional development opportunities, and upon successful completion of the program participants are offered a permanent role with the company. Tailored Indigenous graduate programs are also often available.

Some examples

Rio Tinto Graduate Program, Orica Global Graduate Program, Anglo American Graduate Program, Yancoal Graduate Program

Skilled trades

Whether you're straight out of high school or seeking a mid-career change, there are plenty of skilled trades in mining to explore. Here are just a handful.

SHOTFIRER

EMPLOYMENT 95% FULL TIME | **AVERAGE AGE** 37 YEARS | **AVG. WEEKLY PAY** $2500

Shotfirers are responsible for assembling, positioning and detonating explosives to break or dislodge rock and soil on a mine site and are mainly employed by drilling and blasting contractors.

Education required: Certificate IV in mining related disciplines or a licence for the appropriate class of work (mining, explosives).

Personal requirements: Enjoy physically demanding manual activities, basic skills in mathematics and science, and an ability to work in confined spaces, including underground.

Duties and tasks: A shotfirer assists in blast design, checks blasting areas to make sure that safety regulations are met and inserts detonators and charges into holes and fire charges.

BOILERMAKER

EMPLOYMENT 96% FULL TIME | **AVERAGE AGE** 33 YEARS | **AVG. WEEKLY PAY** $1890

Boilermakers or fabrication engineering tradespersons cut, shape, join and finish various metals to make, maintain or repair heavy machinery and processing equipment on a mine site.

Education required: An apprenticeship, with completion of Year 10 a requirement.

Personal requirements: Enjoy working with machines, have good hand-eye coordination and the strength to handle materials.

Duties and tasks: Boilermakers may produce moulds or patterns for metal castings, apply coatings and work with a variety of materials to construct, repair or strengthen heavy machinery, processing equipment and structural supports.

HEAVY VEHICLE MOTOR MECHANIC

EMPLOYMENT 94% FULL TIME | **AVERAGE AGE** 32 YEARS | **AVG. WEEKLY PAY** $1436

Heavy vehicle motor mechanics work on mining trucks and heavy equipment, diesel generators, pumps, compressors and drilling rigs and are employed across the mining industry.

Education required: An apprenticeship, with completion of Year 10 a requirement.

Personal requirements: Enjoy practical and manual activities and good at mathematics with solid mechanical aptitude.

Duties and tasks: Heavy vehicle motor mechanics diagnose, repair and maintain diesel, petrol and gas-powered vehicles, as well as the hydraulic components of diesel, petrol and gas engines used to power hoists, booms, scrapers, buckets and augers.

TRUCK DRIVER

EMPLOYMENT 85% FULL TIME | **AVERAGE AGE** 47 YEARS | **AVG. WEEKLY PAY** $1509

Truck drivers are employed in the mining industry to transport blasted rock and mineral ore from the mine pit or an underground mine to designated dump areas ready for crushing and sorting.

Education required: Heavy vehicle licences are required. Traineeships are available, with Year 10 a requirement.

Personal requirements: Mechanical aptitude and safety-conscious with an ability to cope with the physical demands of the job.

Duties and tasks: Reporting to the shift supervisor, truck drivers are responsible for meeting operational haulage targets in a safe, environmentally compliant and efficient manner. A basic mechanical knowledge and ability to perform logbook maintenance.

LABORATORY WORKER

FUTURE GROWTH STRONG | **GENDER SHARE** 52% FEMALE | **AVG. WEEKLY PAY** $1500

Laboratory workers typically work under the direction of scientists and are responsible for preparing mining samples for testing using specialised equipment.

Education required: Traineeship in laboratory skills, with Year 10 a requirement. VET qualifications in laboratory skills, laboratory techniques or laboratory technology are also available.

Personal requirements: Enjoy scientific activities with an ability to produce accurate and detailed work, and work as part of a team.

Duties and tasks: Laboratory workers collect, classify and conduct scientific tests on mineral specimens and samples, perform routine mathematical calculations and prepare reports.

DRILLER'S ASSISTANT

EMPLOYMENT 93% FULL TIME | **AVERAGE AGE** 31 YEARS | **AVG. WEEKLY PAY** $1683

Driller's assistants often work in remote areas and under physically challenging conditions to support the work of drillers contracted to mining companies and other rural industries.

Education required: A traineeship or training provided on the job. Employers generally require completion of Year 10.

Personal requirements: Good organisational skills and an aptitude for mechanics and machinery with a willingness to work in remote areas and under physically demanding conditions.

Duties and tasks: Driller's assistants set up drilling rigs, mix and test drilling fluids, chemicals and grout, and carry out routine maintenance and repairs.

Source: **www.gooduniversitiesguide.com.au/careers-guide/**

MINER

EMPLOYMENT	AVERAGE AGE	AVG. WEEKLY PAY
95% FULL TIME	42 YEARS	$2500

Miners are employed by mining companies to operate the equipment to excavate, load, and transport coal, iron ore, mineral sand and rock, either underground or in open-cut mines.

Education required: A traineeship or VET qualification, with completion of Year 10 generally a requirement.

Personal requirements: Aptitude for operating machinery and prepared for physically demanding work, including shiftwork.

Duties and tasks: Miners extract minerals or ore by drilling, blasting or excavating; install lighting, pumps, cabling and other equipment to service the mine; and monitor the operation of plants and ensure the safety of other workers on mining sites.

MOBILE PLANT OPERATOR

EMPLOYMENT	AVERAGE AGE	AVG. WEEKLY PAY
86% FULL TIME	45 YEARS	$1491

Mobile plant operators undertake levelling and excavation works during the construction of a mine site, during operations and through the rehabilitation phase of a mine's life.

Education required: No formal qualifications required with on-the-job training provided. Completion of Year 10 usually required.

Personal requirements: Enjoy practical and manual activities, have good hand-eye coordination and work as part of a team.

Duties and tasks: Mobile plant operators load and unload equipment from low loaders and move it around worksites; excavate or scrape earth, rock or rubble to the correct level and service and maintain equipment, including minor repairs.

NATURAL RESOURCE MANAGER

FUTURE GROWTH	GENDER SHARE	AVG. WEEKLY PAY
STRONG	35% FEMALE	$2259

Natural resource managers are employed across the minerals industry to support environmental programs and manage the progressive rehabilitation of a mine site throughout its life.

Education required: A VET qualification in conservation and/or land management.

Personal requirements: Interested in land conservation and environmental management with good project management skills.

Duties and tasks: Natural resource managers work indoors and outdoors to measure and monitor components of the environment, such as soil, water and air, undertake laboratory work and run community education programs.

GEOGRAPHIC INFORMATION SYSTEMS OFFICER

SKILL LEVEL	AVERAGE AGE	AVG. WEEKLY PAY
VERY HIGH	40 YEARS	$1838

GIS officers design, develop and customise geographic information systems and provide technical and analytical support to the exploration and mining industries.

Education required: A VET qualification in an area like geographical, spatial or geospatial science, or surveying.

Personal requirements: Good communication and computing skills with an ability to analyse and produce detailed work.

Duties and tasks: Geographic information systems officers design, develop and customise geographic information systems and provide technical and analytical support to areas such as environmental management, exploration and mining.

OCCUPATIONAL HEALTH & SAFETY OFFICER

FUTURE GROWTH	GENDER SHARE	AVG. WEEKLY PAY
STRONG	42% FEMALE	$1914

OHS officers coordinate health and safety systems across a mining operation to identify hazards, assess risks to health and safety, and provide advice about accident prevention.

Education required: A VET qualification in work health and safety, occupational health and safety or health science.

Personal requirements: Good interpersonal skills, ability to work independently or as part of a team and respect for confidentiality.

Duties and tasks: OHS officers inspect workplaces and equipment to ensure they meet safety regulations, conduct training sessions on health and safety practices, and assist with the rehabilitation of injured workers to help them return to work.

CHEF

FUTURE GROWTH	GENDER SHARE	AVERAGE AGE
VERY STRONG	25% FEMALE	35 YEARS

Mine site chefs plan and prepare evening meals and crib lunches for miners often working for extended periods on mine sites in remote parts of Australia.

Education required: An apprenticeship, with completion of Year 10 a requirement.

Personal requirements: Enjoy cooking with an ability to work under pressure and both as a leader and part of a team.

Duties and tasks: Mine site chefs order food, kitchen supplies and equipment, plan staff rosters and supervise the activities of cooks and assistants, and prepare and cook food. Skills are highly transferable and in demand.

Learn more **www.gooduniversitiesguide.com.au**

Mining professions

From mining engineers to data specialists to environmental scientists, opportunities across the mining industry for university graduates have never been better.

SURVEYOR

EMPLOYMENT 88% FULL TIME | **AVERAGE AGE** 39 YEARS | **AVG. WEEKLY PAY** $1958

A mine surveyor measures underground and open-cut mines, helping mining companies locate and develop new mines, avoid older mines and safely connect underground passages.

Education required: A degree in surveying, spatial science, geospatial science or geographical information systems.

Personal requirements: Good at mathematics, strong organisational and communication skills and attention to detail.

Duties and tasks: A surveyor measures the size and shape of an area of land using specialised tools and technology; works with architects, engineers and developers to plan and monitor projects, and produces plans, maps, files, charts and reports.

METALLURGIST

FUTURE GROWTH VERY STRONG | **EMPLOYMENT** 87% FULL TIME | **AVG. WEEKLY PAY** $2094

Metallurgists design processes to seperate valuable metals and reduce minerals to metals and alloys, often working for mining companies as well as organisations such as the CSIRO.

Education required: A degree in metallurgical or chemical engineering, or science with a major in metallurgy.

Personal requirements: Enjoy technical and engineering work, be practical and creative with an ability to problem solve.

Duties and tasks: Metallurgists supervise sampling from various stages of minerals processing for laboratory analysis and testing, as well as control expenditure, prepare budgets and other technical reports for their employees.

GEOLOGIST

FUTURE GROWTH VERY STRONG | **GENDER SHARE** 25% FEMALE | **AVG. WEEKLY PAY** $2192

A mining geologist assesses an ore body and advises on the economic viability of extracting the ore, as well as monitoring and controlling the grade of ore being mined.

Education required: A degree in science or applied science with a major in geology, applied geology, geophysics or earth sciences.

Personal requirements: Able to work independently or as part of a team in outdoor environments, and enjoy scientific activities.

Duties and tasks: Geologists examine geological specimens in laboratories using microscopes, X-ray diffraction and other electronic, chemical and mechanical techniques and study natural events such as erosion and sedimentation.

ENVIRONMENTAL SCIENTIST

FUTURE GROWTH STRONG | **GENDER SHARE** 44% FEMALE | **AVG. WEEKLY PAY** $1779

Environmental scientists study, assess and develop methods to minimise the effects of mining on the environment and support land management and rehabilitation programs.

Education required: A degree in environmental science, science or applied science with a major in environmental science, natural resource management, geography, marine science or related field.

Personal requirements: Aptitude for technical tasks, good communication skills and a logical approach to problem solving.

Duties and tasks: Environmental scientists undertake field and laboratory work, run community education programs and monitor and rehabilitate land, water and air on mining sites.

MECHANICAL ENGINEER

EMPLOYMENT 92% FULL TIME | **AVERAGE AGE** 38 YEARS | **AVG. WEEKLY PAY** $2414

Mechanical engineers design machines and systems to support mineral extraction and processing, taking into account cost, availability of materials, strength and maintenance requirements.

Education required: A degree in engineering with a major in mechanical engineering.

Personal requirements: Enjoy computing and technical design, good communication skills and ability to problem solve.

Duties and tasks: Mechanical engineers plan, design and oversee the development, installation, operation and maintenance of machinery and solve practical engineering problems and improve efficiencies.

HYDROLOGIST

FUTURE GROWTH STRONG | **AVERAGE AGE** 38 YEARS | **AVG. WEEKLY PAY** $1500

Hydrologists measure, analyse and maintain water quality across a mine site and develop strategies for water conservation and the improvement of water quality.

Education required: A science degree with a major in hydrology, environmental science, water science or natural resources.

Personal requirements: Aptitude for physics, mathematics and statistics, mechanical ability and ability to work with technology.

Duties and tasks: Hydrologists monitor water levels, sediments, quality and flow, complete field observations and collect sample data at various locations and prepare reports on sites, data collection and quality.

Source: **www.gooduniversitiesguide.com.au/careers-guide/**

MINING ENGINEER

SKILL LEVEL	AVERAGE AGE	AVG. WEEKLY PAY
VERY HIGH	36 YEARS	$3118

Mining engineering degrees include elements from disciplines such as geology, metallurgy, commerce and economics. Graduates can advance rapidly within the minerals and associated industries.

Education required: An engineering degree with a major in mining or geotechnical engineering.

Personal requirements: Practical and creative with an ability to identify, analyse and solve problems, and think and act decisively.

Duties and tasks: Mining engineers oversee mine construction and installation of plant machinery, evaluate mine deposits with geologists and economists, and determine employment levels to ensure safe, efficient and profitable mine development.

ELECTRICAL ENGINEER

FUTURE GROWTH	EMPLOYMENT	AVG. WEEKLY PAY
STABLE	91% FULL TIME	$2160

Electrical engineers design, develop and supervise the manufacture, operation and maintenance of electrical and electronic systems on a mine site.

Education required: An engineering degree with a major in electrical, electronic, electrical power, telecommunications and network, or communications engineering.

Personal requirements: Enjoy computing and technical design, ability to analyse and solve problems, and work independently.

Duties and tasks: Electrical engineers prepare and interpret specifications for the use of electric power equipment, and design, install and control telecommunications equipment and networks.

COMPUTER ENGINEER

FUTURE GROWTH	EMPLOYMENT	AVG. WEEKLY PAY
STRONG	93% FULL TIME	$2021

Computer and software professionals are in demand across the minerals industry, with roles in network management, geological modelling and increasingly remote systems and artificial intelligence.

Education required: A degree in electronic, computer, computer systems or software engineering.

Personal requirements: Active interest in learning, maintaining and developing advanced technical skills and knowledge.

Duties and tasks: Computer engineers oversee the installation and maintenance of computer systems. Software engineers create, maintain and modify software to improve efficiencies, manage processes and evaluate new programming tools.

DATA ANALYST

FUTURE GROWTH	GENDER SHARE	AVG. WEEKLY PAY
STRONG	30% FEMALE	$2274

Data analysts identify, collect and analyse data to improve decision making across a diverse range of mining systems to improve efficiencies and gain a competitive advantage.

Education required: A degree in mathematics, statistics, computer science, information management, finance or economics.

Personal requirements: Imaginative with skills in creative reasoning, good communication skills and an ability to think logically and analytically in problem solving.

Duties and tasks: Data analysts translate and extrapolate data to improve systems and efficiencies by reviewing and developing collection systems, processes and reporting.

HUMAN RESOURCES OFFICER

FUTURE GROWTH	GENDER SHARE	AVG. WEEKLY PAY
STRONG	72% FEMALE	$1662

Human resources officers provide administration services for the recruitment and employment of staff across a mining operation.

Education required: A degree in human resource management, or a degree in business or commerce with a major in human resource management.

Personal requirements: Good planning, organisational, analytical, communication and decision-making skills and tactful and discreet when dealing with people and confidential information.

Duties and tasks: Human resources officers advertise vacancies and interview applicants, oversee workplace policies such as anti-discrimination, and manage organisational change.

ACCOUNTANT

SKILL LEVEL	GENDER SHARE	AVG. WEEKLY PAY
VERY HIGH	52% FEMALE	$1660

Accountants and financial professionals play a critical role in the business of mining and are typically responsible for payroll and associated record keeping and compliance requirements.

Education required: A degree in accounting or related field such as business or commerce with a major in accounting.

Personal requirements: Good organisational, analytical and problem solving skills and an ability to build relationships with colleagues and clients.

Duties and tasks: Financial professionals conduct investigations, undertake audits, prepare reports and advise on matters such as the purchase and sale of businesses, mergers, financing and taxation.

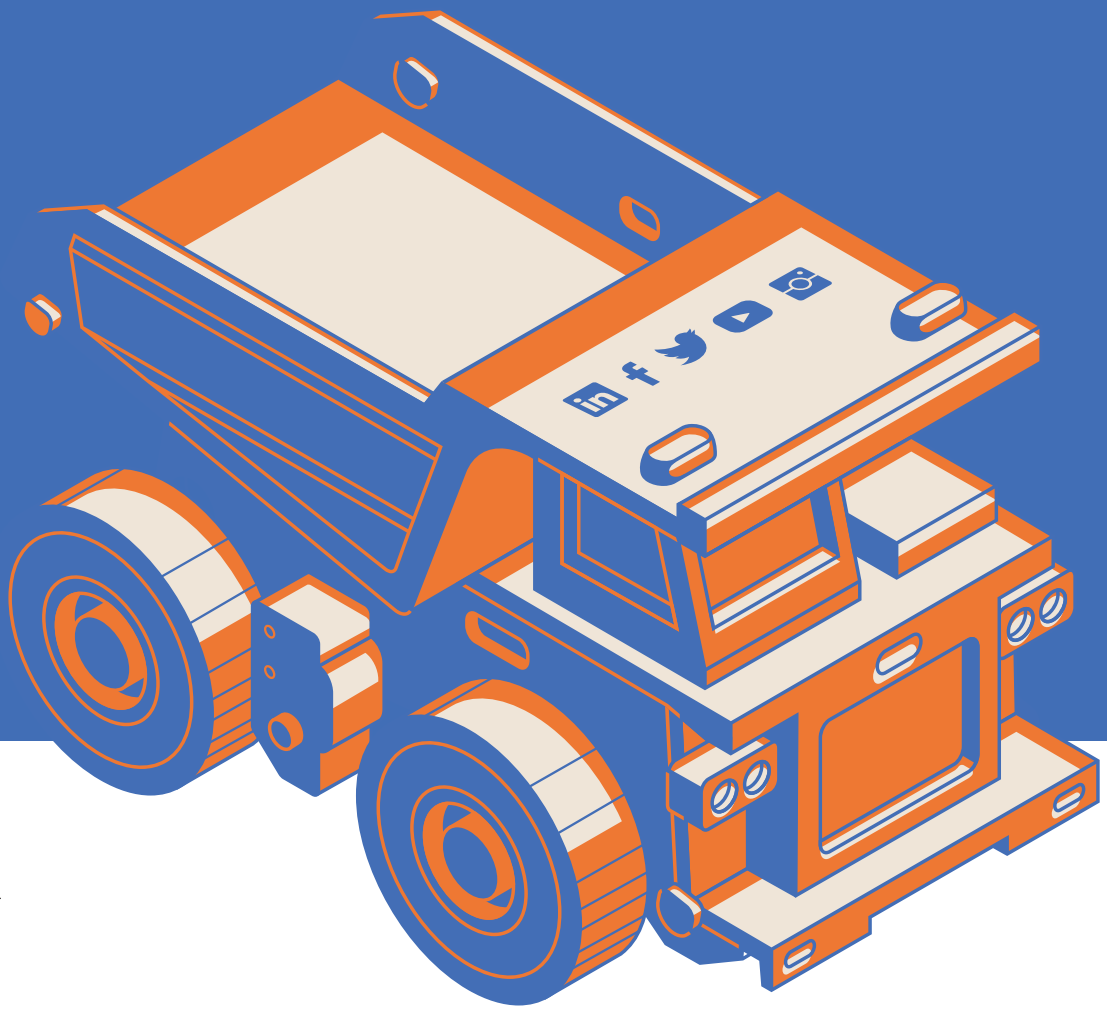
Learn more **www.gooduniversitiesguide.com.au**

DOWNLOAD THE PDF

MAKE YOUR CAREER IN MINING

NOW HIRING

Australia's world-class mining industry needs motivated people of all ages, genders, experience and skillsets. With so many career pathways, there's never been a better time to make your career in mining.



minerals.org.au

There's more to Australian Mining