

THE AUSTRALIAN MINING REVIEW

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GAINES TAKES THE REINS
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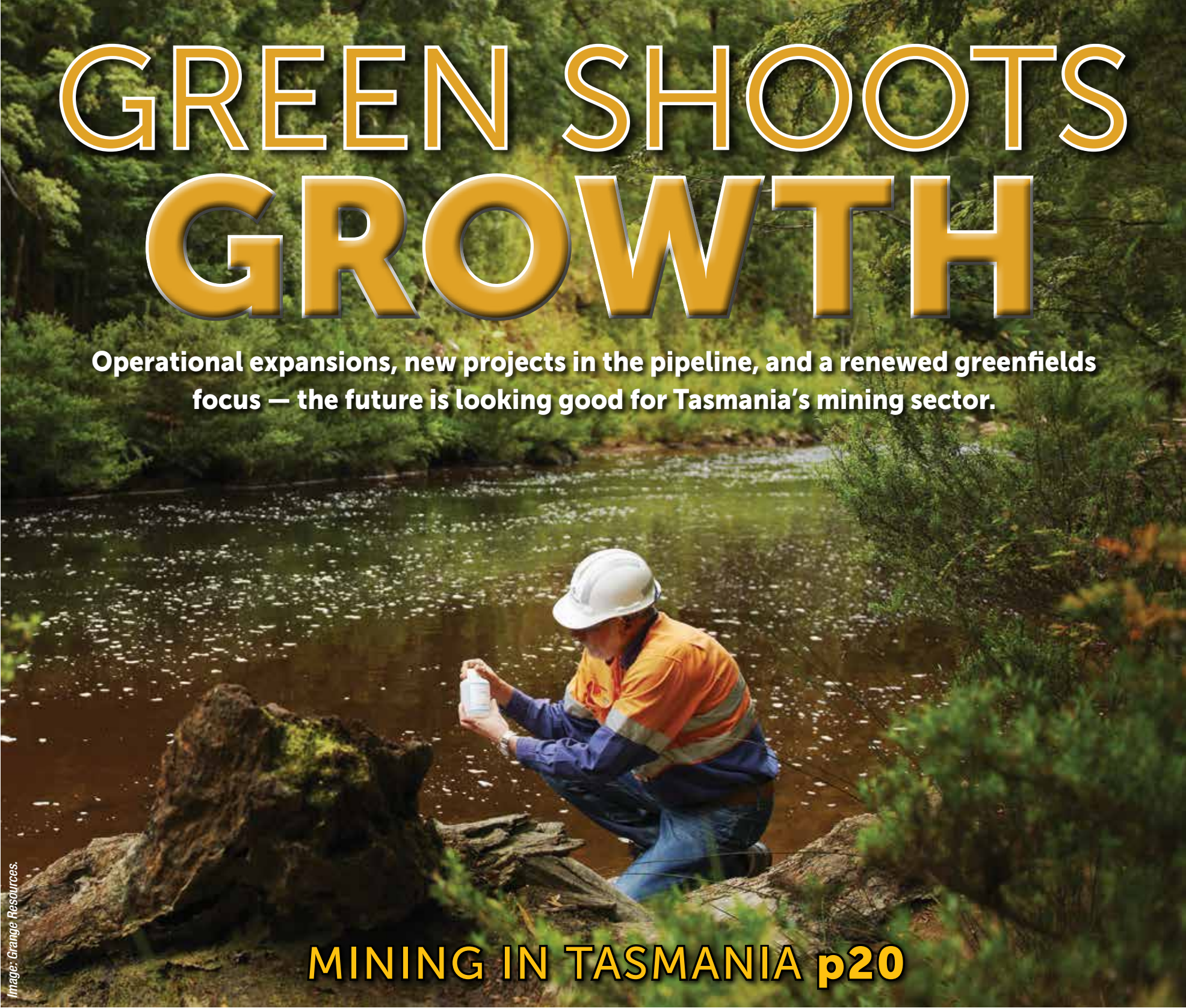
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GREEN SHOOTS
GROWTH

Operational expansions, new projects in the pipeline, and a renewed greenfields focus — the future is looking good for Tasmania’s mining sector.



MINING IN TASMANIA p20

Image: Grange Resources.

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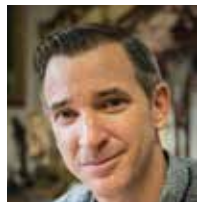
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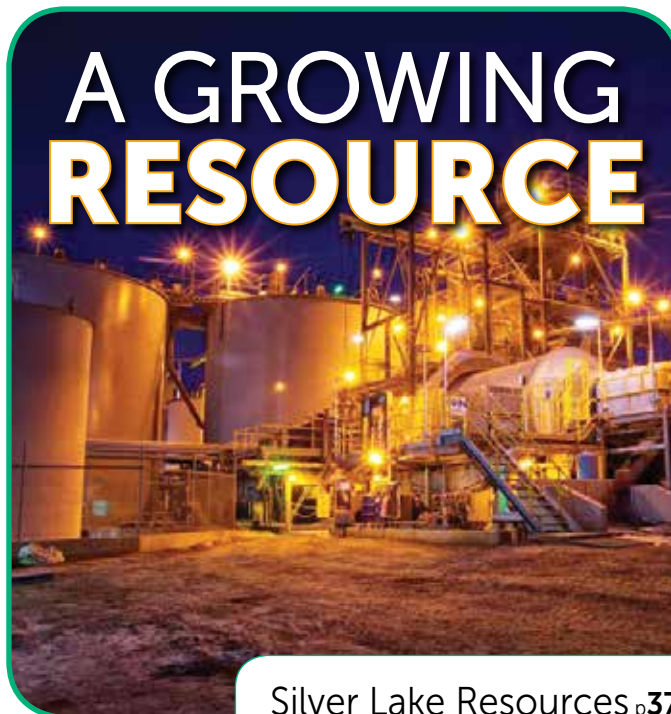
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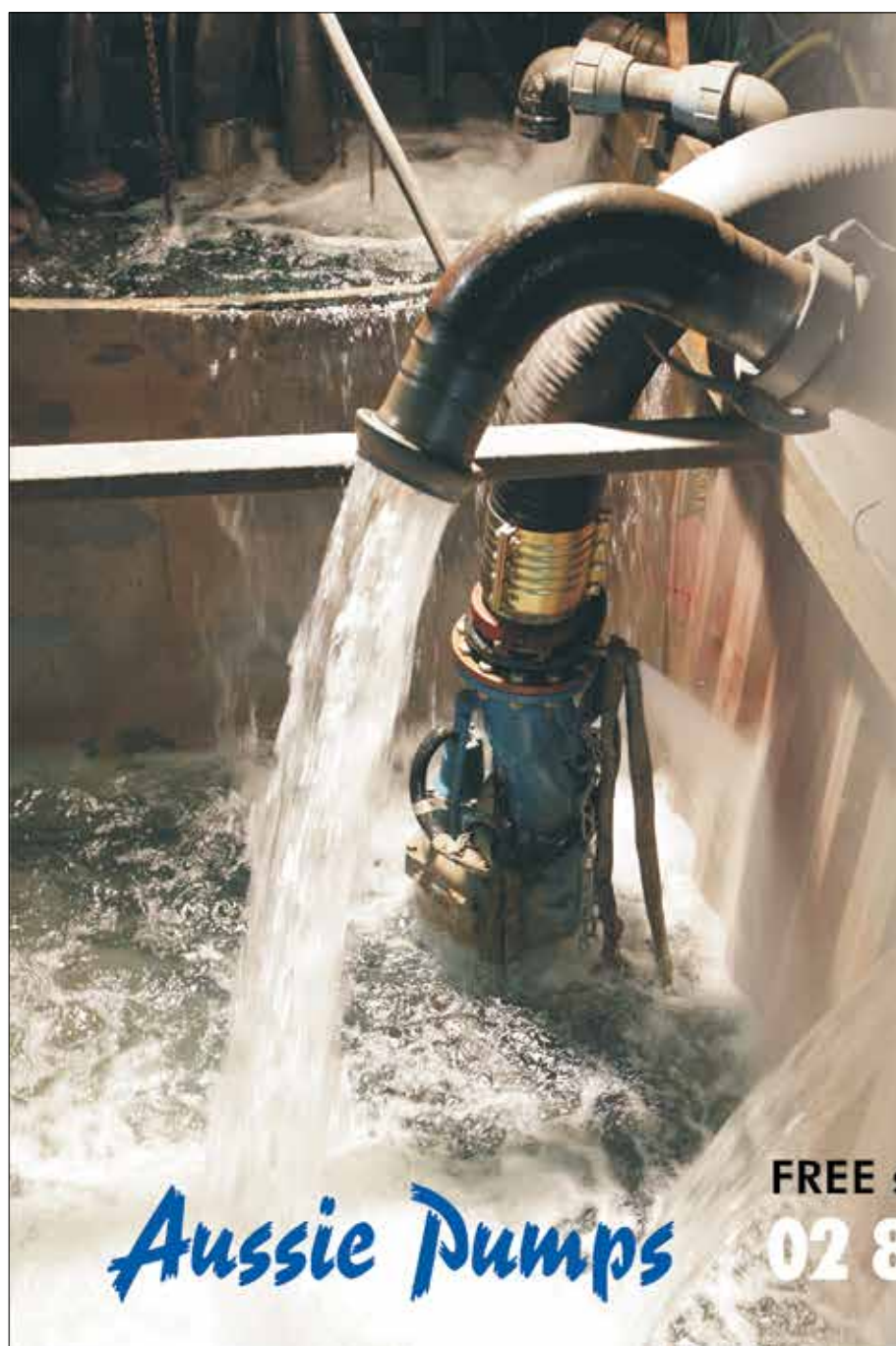
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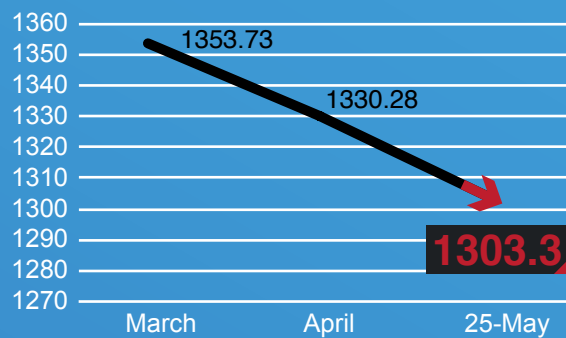
MAJOR COMMODITIES

SNAPSHOT

GOLD

\$US/oz

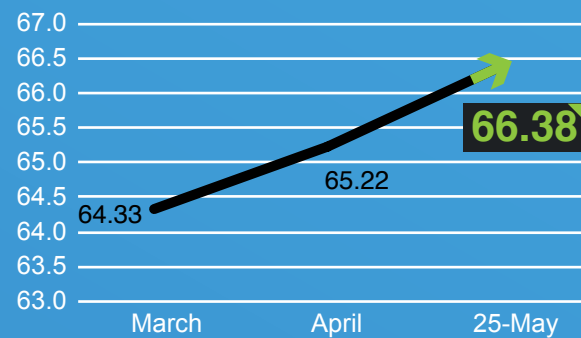
Gold remains at around \$US1300/oz, and expectations of higher US interest rates are likely to continue weighing on the precious metal.



IRON ORE

\$US/t
62% Fe CFR China

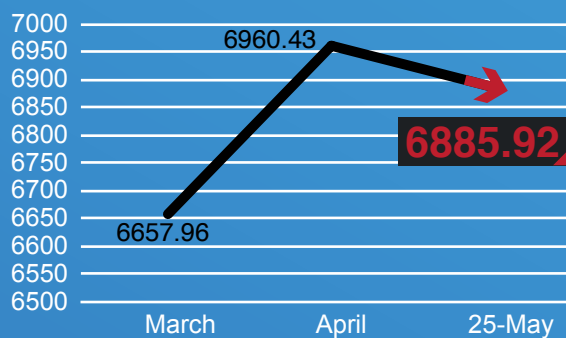
Iron ore remains under pressure, having sat at around \$US65/t since mid-March.



COPPER

\$US/t
LME Price

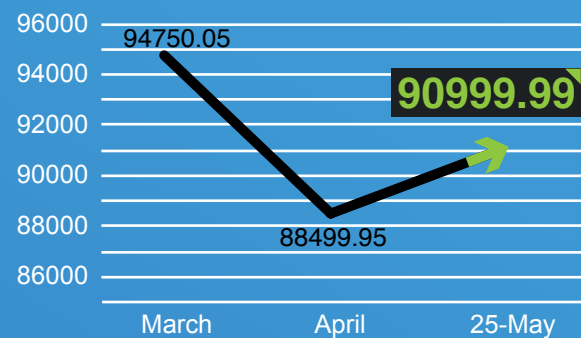
Copper remained solid in May on the back of high demand and the closure of Vedanta's 400,000t Tuticorin smelter, which accounts for about half of India's copper concentrate output.



COBALT

\$US/t
LME Price

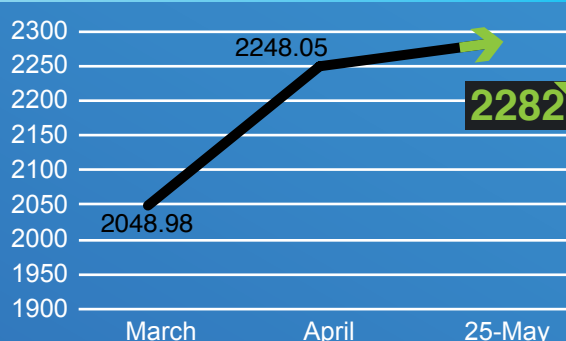
Cobalt has continued its cool off period, hovering at April levels, and still below all-time highs of almost \$US95,000/t.



ALUMINIUM

\$US/t
LME Price

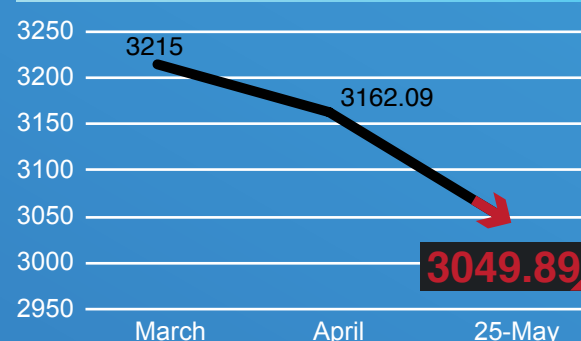
Aluminium prices have soared to seven-year highs, but the market is likely to rebalance once the dust settles over US sanctions against Rusal.



ZINC

\$US/t
LME Price

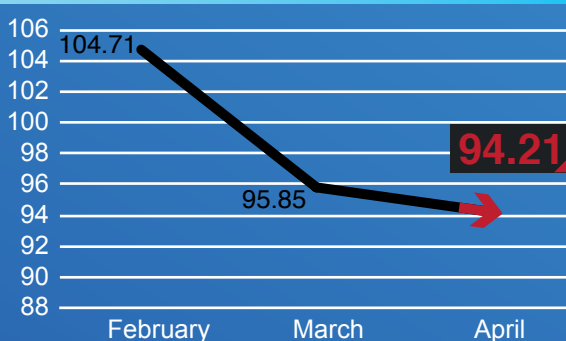
Rising steel prices have kept zinc buoyant, albeit down from March highs of around \$US3200/t.



COAL

\$US/t
Australian Thermal

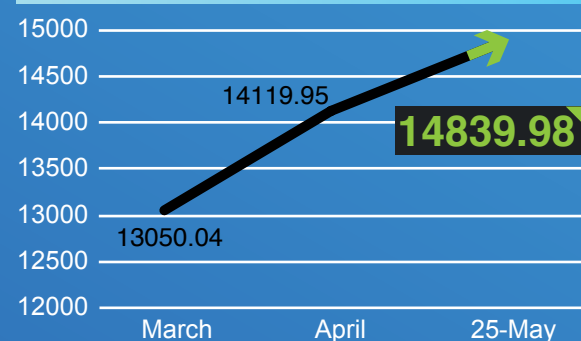
Coal prices fell nearly 10 per cent for March, as analysts forecast imports to China to ease during 2018.



NICKEL

\$US/t
LME Price

Nickel is one of the biggest gainers of the month as increasing demand outstrips supply after the turnaround of a 10-year surplus.



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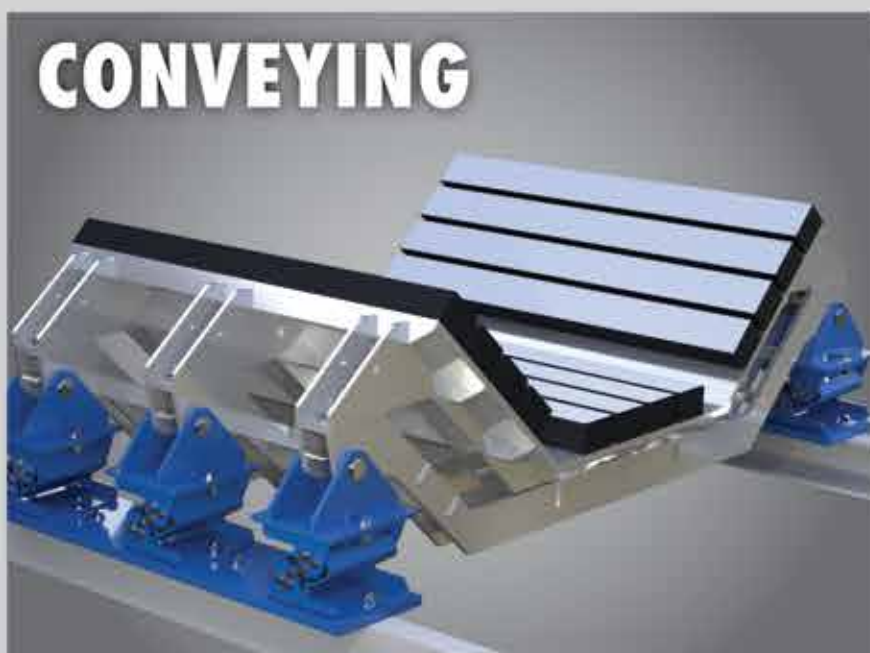


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IN BRIEF

Jobs in limbo after Super Pit rock falls

WA

FOLLOWING rock falls on the eastern wall of the Fimiston Open Pit on 14 and 15 May, KCGM has advised employees and contractors that there will be an impact to workforce numbers due to reduced mining rates.

“Experts are continuing to evaluate the rock fall and subsequent safety precautions that have been implemented, to understand how it will impact mine planning and sequencing going forward,” KCGM stated.

“Mining rates will be reduced as we work to develop these plans. There will be an impact to workforce numbers at KCGM for both employees and business partners, which continues to be defined.”

Mining operations would continue in the southern end of the pit.

Siecap powers up mining division

QLD

BRISBANE-based project management and advisory firm Siecap has appointed Romeo Ayoub as its new mining division advisory director.

Mr Ayoub’s 25 years’ experience in technical professional services includes work for large scale bulk mining operations in Australia and Asia, as well as mining advisory services to numerous domestic and international clients across a range of commodities.

“Having spent the bulk of his career in mining advisory services for global groups including SRK Consulting and RungePincockMinarco, Romeo has successfully directed, managed and worked on an extensive range of mining projects combining deep technical and mining operational skills with study project management and leadership capabilities to deliver successful client outcomes,” Siecap stated.

South32 buys \$US133m Eagle Downs stake

QLD

SOUTH32 will acquire a 50 per cent stake in the Eagle Downs metallurgical coal project in QLD’s Bowen Basin from China BaoWu Steel Group.

The deal comprises of an upfront payment to BaoWu of about \$US106m upon completion of the acquisition, and a deferred payment of \$US27m due three years thereafter.

A coal price linked production royalty will also be payable and is capped at \$US80m.

“This acquisition embeds an attractive development option within our growing operating footprint and puts our strong balance sheet to work in a disciplined manner,” South32 chief executive Graham Kerr said.

Kidman’s Tesla deal

“In addition to the agreement with Tesla, Kidman is in discussions with other strategic, globally significant parties also seeking refined lithium offtake.”



Kidman is the first Australian company to sign such an agreement with Tesla.

Image: Kidman Resources.

CAMERON DRUMMOND
WA

LITHIUM developer Kidman Resources is the first Australian miner to sign an offtake agreement with Elon Musk’s Tesla.

Kidman entered into a binding agreement to supply lithium hydroxide to the electric vehicle maker over an initial three year term on a fixed price, take-or-pay basis.

Kidman and Sociedad Quimica y Minera de Chile (SQM), under their Western Australia Lithium (WAL) 50:50 joint

venture, are building a lithium hydroxide plant in Kwinana, south of Perth, to process spodumene concentrate from their Mt Holland hard rock lithium project.

According to Kidman, the Tesla offtake deal equates to less than 25 per cent of Kidman’s proportion of output from the proposed 44,000tpa refinery.

Other commercial terms of the agreement were strictly confidential.

The agreement follows a 4 May announcement that WAL had entered into an exclusive option to lease a site for the processing facility in the Kwinana Strategic

Industrial Area.

“In addition to the agreement with Tesla, Kidman is in discussions with other strategic, globally significant parties also seeking refined lithium offtake,” the company said in a statement.

“To date, expressions of interest from these parties have materially exceeded Kidman’s portion of initial refinery nameplate production.

“Kidman is currently targeting to enter into a limited number of offtake agreements, while leaving a minority portion of future supply uncontracted.”

ASX: Recent Floats & Listings

The undeveloped Cloncurry project – including the proposed Eva copper mine – could give CMMC a global production footprint.



Image: Altona Mining.

REUBEN ADAMS
NATIONAL

COPPER MOUNTAIN MINING (ASX:C6C)

Canada-based Copper Mountain Mining (TSX: CMMC) is now trading on the ASX following a \$93m acquisition of QLD-based Altona Mining and its world-class Eva copper project.

In the transaction Copper Mountain acquired \$30m in cash, the development-ready, permitted 73,000tpa Eva project, and a 379,000 hectare mineral land package in the prolific Mt. Isa area of QLD.

JUPITER MINES (ASX:JMS)

Jupiter is back in the ASX, with its \$240m initial public offering (IPO) reportedly the largest in the Australian metals and mining

industry over the last decade.

Jupiter’s main asset a 49.9 per cent interest in South Africa’s Tshipi é Ntle, an independently operated and managed manganese mining company operating the lucrative, world-class Tshipi Borwa manganese mine.

Jupiter listed at 40 cents per share, on 18 April, settling down over the weeks to 36 cents per share by 24 May.

MAKO GOLD (ASX:MKG)

Explorer Mako Gold is focussed on highly prospective and under-explored terrains in Cote d’Ivoire, Burkina Faso and other favourable countries in West Africa.

A \$2m cornerstone investment was secured from Resolute Mining as part of Mako’s oversubscribed IPO on the ASX to raise \$6m.

During April, Mako commenced a maiden drilling program at its Napie gold project as

part of the first phase of a planned 11,500m RC and diamond drilling campaign.

Mako listed at 20 cents per share and closed at 18.5 cents on 24 May.

GALILEO MINING (ASX:GAL)

Exciting cobalt player Galileo Mining has closed its IPO raising the maximum amount of \$15m in a heavily oversubscribed listing.

Galileo was founded by WA-based prospector Mark Creasy, who holds a 31 per cent interest in company as its largest shareholder. Other top shareholders include Independence Group and Mineral Resources’ founder Chris Ellison.

Part proceeds from the IPO will be used for the drilling of prospective areas near the Norseman cobalt-nickel project, which boasts a JORC-compliant indicated and inferred resource of more than 22,000t of cobalt and 106,000t of nickel.

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Image: Jwmcdonald81

Court imposes \$200m Palmer asset freeze

REUBEN ADAMS
QLD

THE QLD Supreme Court has taken the extraordinary step of freezing more than \$200m of Clive Palmer's assets, as Queensland Nickel liquidator PPB Advisory looks to recover millions of dollars allegedly owed by the mining magnate from the refinery's collapse in 2016.

On 25 May the Supreme Court granted an application by Queensland Nickel liquidators for freezing orders against Mr Palmer and several of his companies.

In Mr Palmer's case the value specified was \$204,943,664.39, but other amounts were specified for the companies concerned.

In its Summary of Judgement, the Court based its decision on its belief that Queensland Nickel liquidators had a good arguable case against Mr Palmer and the companies concerned.

Also, the Court also found there was a "real risk of steps being taken [by Palmer] which would have the effect of inhibiting or frustrating the prospective Court processes of execution and enforcement in respect of any eventual judgment in the plaintiffs' favour".

The complex orders made by the Supreme Court apply until final judgment or further order in the proceeding.

In a subsequent interview on ABC's 7:30 program with Leigh Sales, Mr Palmer insisted that he owed no money.

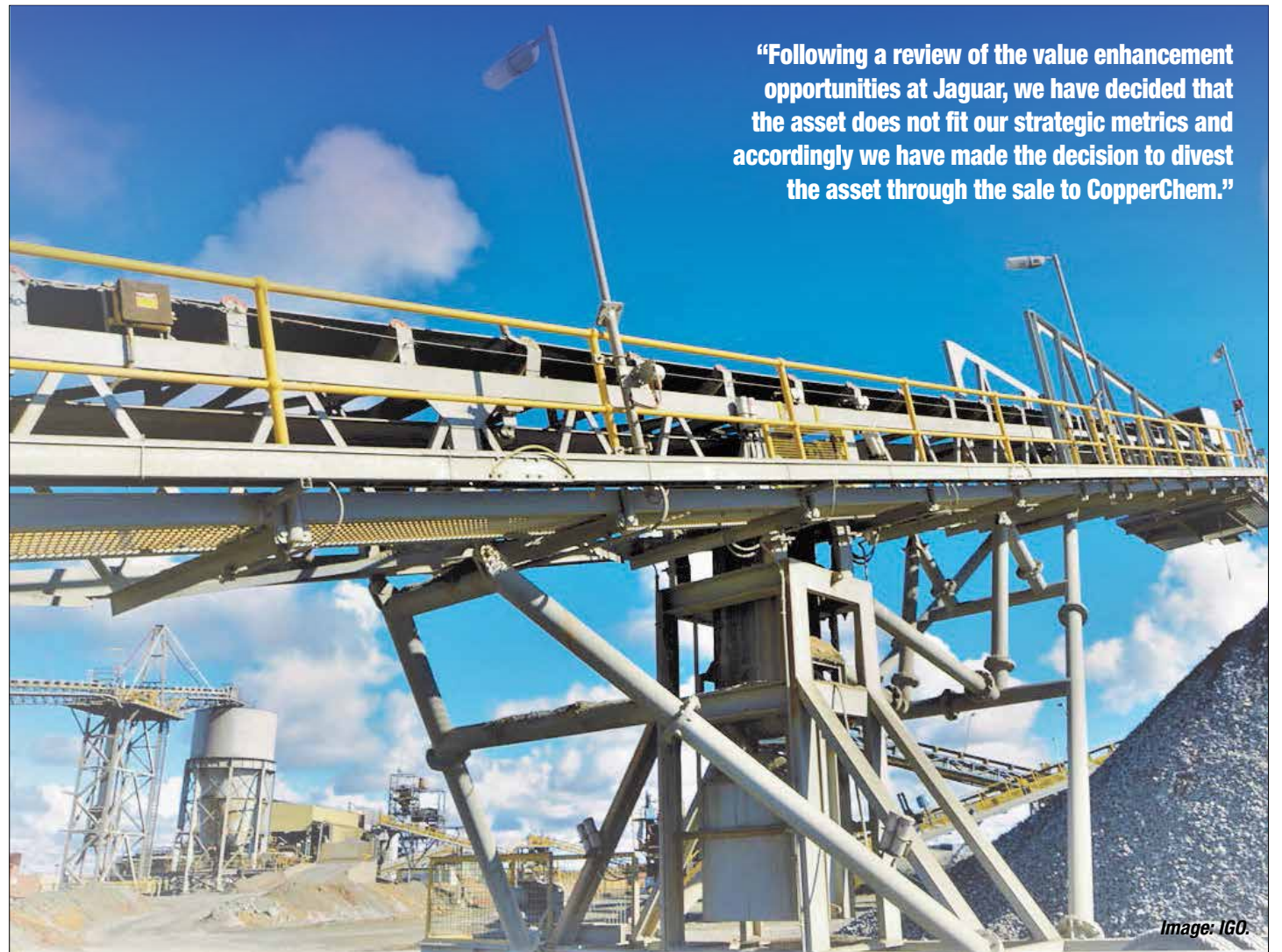
"Well I don't owe them any money, that's the reality of it. The second thing I would say, it's come out of the Court, but not been reported on the ABC, that the administrators of QLD Nickel have gone under oath in the Supreme Court and confirmed that [former QLD Nickel director] Clive Mensink offered to pay all the creditors and all the employees; the administrator refused to do that," he said.

Ms Sales said the administrators had refuted this claim, calling it "scandalous, defamatory and grossly misleading".

"They write in this letter dated May 16 2018 that if you were serious about paying your debts to the workers you would have submitted a finalised proposal for a Deed of Company Arrangement, which you never did," she said.

Mr Palmer also confirmed that he was paying his nephew and former QLD Nickel director Clive Mensink \$4000 a week via his Mineralogy Company, despite Mr Mensink being the subject of two arrest warrants after failing to return to Australia from overseas for scheduled court appearances.

CopperChem leaps on Jaguar



"Following a review of the value enhancement opportunities at Jaguar, we have decided that the asset does not fit our strategic metrics and accordingly we have made the decision to divest the asset through the sale to CopperChem."

Image: IGO.

REUBEN ADAMS
WA

INDEPENDENCE Group (IGO) has confirmed an evolving focus on assets "aligned to the emerging super-cycle for energy storage minerals" after announcing the sale of its Jaguar zinc-copper operation in WA to CopperChem for just \$73.2m.

In June last year CopperChem, a subsidiary of diversified investment house Washington H. Soul Pattinson and Company, also acquired IGO's Stockman copper-zinc project in north east Victoria for \$47.5m. IGO acquired both the Jaguar/Bentley and Stockman assets in a \$531m takeover of Jabiru Metals in 2011.

\$25 million will be paid on completion of the Jaguar transaction – scheduled for 31 May — and an additional \$48.2 million in deferred cash payments.

The transition of ownership will be rapid, with the handover to be completed by the start of June following completion

of the transaction in late May.

IGO will provide "agree corporate services" for a further 3 months including payroll, accounting, HR, It and concentrate logistics to CopperChem on a cost-plus basis.

IGO chief Peter Bradford said that although the company recognised opportunity for future discovery at Jaguar, it was not consistent with its future strategy.

"Following a review of the value enhancement opportunities at Jaguar, we have decided that the asset does not fit our strategic metrics and accordingly we have made the decision to divest the asset through the sale to CopperChem," he said.

"This enables IGO to concentrate on delivery from, and growth of, our key assets, Nova and Tropicana, and the execution of our exploration strategy.

"The Jaguar Operation has played a significant role in the growth of IGO to-date and, on behalf of the company, I would like to recognise the achievements of the team including their commitment

to safe and consistent production and outstanding local community engagement.

"The efforts of our people, both employees and contractors, is greatly appreciated."

IGO maintained that it was not expected to make a loss on the \$73.2m transaction, despite Jaguar's value seemingly recorded at \$185.61m, minus \$32m in liabilities, in its December half year financial statements.

"I'd have to go back and look at those numbers, but there's definitely been some depreciation and amortisation, [and] the value at 31 May will be closer to the order of \$70m," IGO chief financial officer Scott Steinkrug said during a 28 May conference call.

"We take a look at the carrying value of Jaguar at the point of sale, being 31 May, and then we compare that with the value which won't be too far off that \$73.5 million.

"What we end up with is effectively neutral, or minimal, movement in terms of the profit or loss on the sale."

Mining job knowledge gap in youth

ELIZABETH FABRI
NATIONAL

NEW research has confirmed an age-old issue; more than 50 per cent of young people could be unaware of mining and METS industry career paths.

A recent Youth Insight survey of 1061 high school students and first year university students between 15 and 20 years old highlighted a knowledge gap about mining and its associated careers.

Only 30 per cent surveyed had an interest in the mining or mining equipment, technology or services (METS) sectors, while 59 per cent of

respondents knew nothing at all about available mining careers.

Of the students interested in mining, 48 per cent were driven by high incomes and 20 per cent were driven by the number of jobs.

METS Ignited chief executive Ric Gros said it was time for the industry to "work smarter" to make young people aware of the careers out there.

"Australia's world-class METS sector will need many highly-skilled young people to fill the jobs of tomorrow including drone pilots, environmental and social scientists and engineers," he said.

"The jobs are there — areas of the

METS sector such as information and communication technologies and professional and technical services saw 164 per cent job growth between 2005 and 2015."

MCA Minerals Tertiary Education Council executive director Gavin Lind said the industry needed to tell its story better.

"Our industry has a great story to tell — our high-skill, high-wage workforce is younger, better-paid, better trained and has a much higher share of apprentices than other sectors, with average full-time weekly pay of \$2610; 67 per cent higher than the all-industries average," Mr Lind said.



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IN BRIEF

Kathleen Valley drilling success

WA

LIONTOWN Resources has defined further high-grade mineralisation at its Kathleen Valley lithium project north-east of Perth, WA.

The company recently undertook a 46-hole 5919m drilling program, and is now commencing resource definition drilling, which it expects to complete end of June in readiness for a maiden Resource estimate to be released next quarter.

“Given its grade, scale and location, Kathleen Valley already has many of the key attributes required to become an exciting development and growth opportunity for Liontown in the lithium industry,” Liontown managing director David Richards said.

“We are focused on unlocking this value as quickly as possible for our shareholders.”

Jervois copper resource increases

NT

A RECENT drilling program has confirmed increased copper resource and grade at KGL Resources’ Jervois project in the Northern Territory.

Total contained copper has increased by 18 per cent to 384,000 tonnes, and the overall grade has risen to 1.53 per cent copper.

KGL chairman Denis Wood said the results underwrite a “robust base-case mining scenario”.

“Updated resource estimates for the Jervois copper project are excellent, and when viewed together with the drilling exploration potential from the wider tenement package, allow KGL to continue to build momentum as it progresses towards key decisions for the development of Jervois,” he said.

Venture raises \$2.5m for exploration

WA

VENTURE Minerals will raise \$2.5 million to fund future drilling and exploration programs across its Thor copper-lead-zinc, Odin nickel, and Pingaring nickel-cobalt projects in WA.

The funds will be raised via a two-tranche placement of 85.1 million shares at \$0.03 per share.

Venture, which also has a portfolio of tenements in Tasmania and South East Asia, recently announced the first hole at its Odin prospect had intersected disseminated nickel-copper sulphides which extend more than 10 strike kilometres.

“The company is excited by the new opportunity identified at the Odin Prospect,” Venture managing director Andrew Radonjic said.

Kairos rockets to 643,000oz



The upgraded 486,000oz Mt York deposit.

Image: Australian Mines.

REUBEN ADAMS

WA

DRILLING at Kairos Minerals’ Pilbara gold project 100km south of Port Hedland has delivered a massive 290 per cent resource increase for the Mount York deposit to 486,000oz – with strong potential for further growth.

The updated indicated and inferred resource for Kairos’ Pilbara gold project, including Mt York, Iron Stirrup and Old Faithful, has been boosted by 150 per cent to 14.4 million tonnes at 1.3g/t gold for 643,000oz.

Each of the deposits remain open both along strike and at depth, providing outstanding opportunities to further increase the resource and target higher-grade mineralisation at depth, the

WA-based explorer said.

A major new drilling program has commenced to follow up these opportunities and pave the way for further resource increases.

Kairos Executive Chairman Terry Topping said these results confirmed the project’s significance.

“This is a great result which firmly cements Kairos’ position as a significant player in the Pilbara gold scene,” he said.

“The maiden drilling programs completed late last year have confirmed that the zone of BIF-hosted gold mineralisation at Mt York is continuous between the previously mined Breccia Hill and Main Hill shallow open pits, and extends for at least a further 1km to the east to Gossan Hill.

“The upgraded 486,000oz Resource at Mt York encompasses three contiguous

deposits in Main Hill, Breccia Hill and Gossan Hill, extending over a strike length of 3.5km and to a depth of 150m.

“The Resource remains open in most directions, and there is clear potential to add further ounces both along strike and at depth – including the opportunity to target higher grade zones at depth.”

After acquiring the Mt York Prospect in early 2016, Kairos quickly established a maiden resource of 258,000oz by evaluating historical work and reinterpreting the geology at each of the deposits, Mr Topping said.

“We have now more than doubled that resource through focused, cost-effective exploration, and I am confident that we can continue to grow it rapidly – establishing a gold project of significant scale and potential right on the doorstep of a major new lithium mining centre at Pilgangoora,” he said.

Big cobalt hits at Thackaringa

ELIZABETH FABRI

NSW

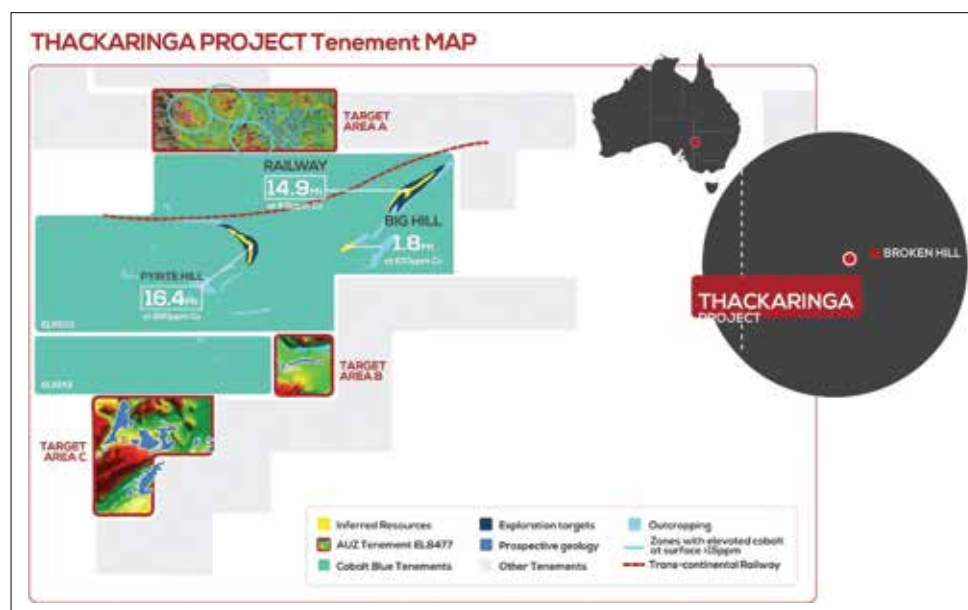
ASX-listed Australian Mines has identified large-scale cobalt-in-soil anomalies at its Thackaringa project near Broken Hill, NSW.

Recent surface geochemical sampling at Target Area A uncovered three zones of elevated levels of cobalt that are reportedly similar to the Pyrite Hill and Big Hill prospects at Cobalt Blue’s identically named Thackaringa project.

Australian Mines said with the anomalous zones partially buried by a shallow alluvial cover, surface expressions of cobalt mineralisation greater than 15ppm (grams per tonne) were considered significant.

“This technique, for example, has been successfully used by Alloy Resources on its Ophara CobaltGold project directly to the west of the Australian Mines’ Thackaringa Project, as well as being the documented geochemical signature of the Pyrite Hill and Big Hill cobalt deposits,” Australian Mines said in a statement.

The company will continue its soil and surface sampling program at Thackaringa across Target Area B and C, and make further announcements in the September quarter.



The Thackaringa project tenement map.

Image: Australian Mines.

“At the completion of the geochemical exploration program, the new areas of elevated cobalt will be the subject of the company’s maiden drilling program at Thackaringa, which will also include the testing of the recently-identified bedrock conductor, BR_02_CC,” it stated.

Meanwhile, Australian Mines was also making progress at its flagship Sconi cobalt-nickel-scandium project in northern QLD.

After signing an offtake-agreement

with SK Innovation in February, project financing negotiations have accelerated, and Australian Mines was currently engaged in discussions with a range of global financial institutions.

“Sconi is the only cobalt project in Australia with a 100 per cent off-take agreement already secured for production,” the company stated.

Sconi is slated to begin construction later this year.



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Sedgman wins \$110m Century deal

ELIZABETH FABRI
QLD

CIMIC Group subsidiary Sedgman has secured a five year, \$110 million contract to operate and maintain New Century Resources' processing plant, pipeline and port facilities at its Century zinc mine in QLD.

The contract builds on Sedgman's early involvement on the project, providing the restart feasibility study for the mine, and engineering, procurement and operational readiness activities in December 2017.

CIMIC chief executive Michael Wright said the work package demonstrated Sedgman's engineering and operational expertise and highlighted the value the team delivers across the project lifecycle of its mining clients.

New Century Resources managing director Patrick Walta said Sedgman had been integral to achieving delivery milestones at the Century mine restart.

"We look forward to continuing this relationship during operations and ramp up as we establish Century as a globally significant zinc producer," Mr Walta said.

Operations are scheduled to begin in the third quarter of 2018, with first production expected in August 2018.

New contracts at Far West and Black Rock

ELIZABETH FABRI
QLD

PYBAR has secured two new mining services contracts at Red River Resources' Thalanga Far West mine and the Glencore-owned Mount Isa Mines' Black Rock Cave project in QLD.

PYBAR will complete surface development works at Red River's Far West zinc project in preparation for the underground development.

The project will be Red River's second underground mine in central QLD, and contains a current JORC reserve of 1.5 million tonnes at 12 per cent zinc equivalent and a minimum mine life of five years.

"The Far West portal site has been cleared, and drilling has commenced with the main blast expected this week," Red River said in a statement mid-May.

"Underground development is expected to commence shortly after the completion of the box cut."

The miner said it was currently selecting a contractor for the underground development phase of the project.

PYBAR is already undertaking a 21-month underground mining contract at Red River's West 45 underground mine, indicating the contractor may also be considered for the Far West underground work.

In early May, PYBAR was also awarded a two-year contract at the Black Rock Cave copper project to complete underground decline and level development, including



Image: Red River Resources.

A blast hole pattern being drilled at Far West Portal.

primary development, drive stripping and shotcreting.

PYBAR said it mobilised to site mid-May, and will employ 43 personnel on site at peak production.

"We have a long history at Mount Isa

Mines," PYBAR chief executive Brendan Rouse said.

"The award of Black Rock will expand our existing presence and enhance our ongoing partnership with Glencore and the local community."

Heron preps for tailings campaign

ELIZABETH FABRI
NSW

HERON Resources has entered into two contracts with National Pump & Energy and Paragon Tailings Australia to prepare for the reprocessing of historic tailings from its Woodlawn zinc-copper project in NSW.

The Woodlawn project, scheduled to begin commissioning late 2018, involves processing fresh ore from underground, as well as reprocessing 9.5 million tonnes of tailings from the previous operations (between 1978 and 1998) using low-cost hydraulic mining.

National Pump & Energy (NPE) will provide a mining equipment supply and installation package including main and standby track mounted, remote controlled water monitors; water delivery pumps; slurry pumps; screens; and other infrastructure like strategic spares and consumables.

Paragon Tailings will undertake hydraulic mining services, including process design, mining planning, construction supervision and support, operator training and personnel.

Heron Resources said reclamation rates for the tailings ore would be at 190 tonne per hour, using the cost-effective mining method of remote controlled water cannons.

"Heron is pleased to have facilitated the combination of NPE and Paragon to provide an integrated solution for the supply of equipment and services for tailings mining at Woodlawn," Heron Resources managing



Image: Heron Resources.

The historic tailings dams at the Woodlawn project.

director Wayne Taylor said.

"These contract awards ensure that Heron's tailings mining operation will utilise an efficient equipment design with

locally available support, operated and supervised by experienced and capable project partners who will also provide training for our own personnel."

Earlier this year, both NPE and Paragon Tailings were also selected as contractors at New Century Resources' Century zinc mine in QLD.



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IN BRIEF

A fresh approach to digital transformation

NATIONAL

DIGITAL effectiveness is the top risk facing the mining sector, according to new research by EY.

While mining companies have made progress using technology to improve productivity, productivity alone was not enough to generate a competitive advantage, EY stated in its latest report.

EY said introducing a four-pronged “wave” approach to digital transformation was the optimal way to transition a business, and establish an overarching strategy.

“The value from digital will only be realised when companies change how they work, rather than succumbing to the lure of individual technology programs and pursuing local optimisation, which is not necessarily transformational,” EY said.

METS funding round opens

NATIONAL

METS Ignited will award \$6 million to mining equipment technology services (METS) projects as part of the third round of its Collaborative Project Fund.

Eligible projects must be collaborative and industry-led with clear commercialisation applications that address one of a number of topics, such as key mining challenges, or ‘blue sky’ opportunities where solutions do not currently exist.

Previous groups to receive funding include Unearthed, CORE Innovation Hub, RESA’s Resources Ready program, Austmine’s Women in STEM: METS Career Pathway Program, and the Coalition for Energy Efficient Comminution. Applications close 31 August.

New Lithium Strategy launched

WA

A WA Government taskforce will oversee development of a Lithium and Energy Materials Strategy to capitalise on burgeoning global battery demand.

The Strategy will look to build on WA’s competitive advantages and develop a world-leading energy materials industry “that maximises benefits to WA and creates jobs”, the Government said.

“WA possesses all the elements required to produce [lithium] batteries such as lithium, nickel, graphite and cobalt, meaning we are in the box seat to capitalise on the growth of this industry,” Mines and Petroleum Minister Bill Johnston said.

“This isn’t just about extracting resources from the ground. It’s also about processing them here in WA to create jobs for Western Australians.”

It is expected the taskforce will present its recommendations within six months.

Ausdrill embraces assay tech



“The result is a technology export opportunity for Australia worth \$1 billion in gold mining alone, and a competitive edge for Australia’s mining industry on the global stage.”

Image: Ausdrill.

PhotonAssay accurately and rapidly detects low levels of gold in ore samples so that miners can determine grades in gold and other metals.

CAMERON DRUMMOND WA

MINING services provider Ausdrill is the world’s first adopter of a CSIRO-developed x-ray technology that could revolutionise the way gold is analysed.

Developed by CSIRO and brought to market by Chrysos Corporation, PhotonAssay gold analysis is faster, safer, and more environmentally-friendly than traditional fire assay techniques.

The PhotonAssay method uses high powered x-rays to bombard rock samples and activate atoms of gold and other metals.

A highly sensitive detector picks up unique signatures from these elements to determine their concentrations.

Fully automated, the new analysis dramatically reduces the turnaround time on assays from days to minutes, providing

critical data to miners on gold grades in near real-time to support operational decisions.

CSIRO research program director Nick Cutmore said the agency partnered with investors to create Chrysos Corporation in late 2016 to bring the technology to market.

“We developed photon assay recognising the market need for innovative data solutions to drive better and faster decision-making across the minerals value chain,” Dr Cutmore said.

“The result is a technology export opportunity for Australia worth \$1 billion in gold mining alone, and a competitive edge for Australia’s mining industry on the global stage.”

The first photon assay system is now operational at Ausdrill’s MinAnalytical facility in Perth, with two more systems to be established in the Kalgoorlie goldfields in the coming months.

Ausdrill said it had longer term plans to take the innovation to Africa.

Chrysos chief executive Dirk Treasure said that the company had a rapid growth plan and were well placed to disrupt the global gold analysis services market, offering near-real time, accurate analysis for the first time.

“With the first system now up and running at Ausdrill, we have successfully progressed the photon assay technology from concept through to a deployed product in just 16 months,” Mr Treasure said.

“Our lease model has been well received by the industry, with photon assay technology benefits being delivered without any increase in operating or capital costs.”

The photon assay system will analyse at least 50,000 gold samples a month, at a similar cost to conventional methods. It can be applied to a range of other minerals, including silver and copper.

AutoHaul gets regulatory tick

ELIZABETH FABRI WA

RIO Tinto is a step closer to commissioning its AutoHaul rail project in the Pilbara after receiving approval to run its autonomous trains without a driver on board for supervision.

AutoHaul involves the automation of Rio Tinto’s 200 locomotives which transport ore from 16 mines to four port terminals in the Pilbara across more than 1700km of track.

The project aims to unlock significant safety and productivity benefits, including increased speed across the network and reduced average cycle times.

In October last year, Rio Tinto completed a 100km pilot run without a driver on board; the first autonomous heavy haul train journey ever completed in Australia.

With approvals now granted by Australia’s Office of the National Rail Safety Regulator, Rio will begin a phased approach to deploying the autonomous trains, which it expects to complete by the end of 2018.

“Once commissioned, the network will be the world’s first heavy haul, long distance autonomous rail operation, unlocking significant safety and productivity benefits



Image: Rio Tinto.

“Once commissioned, the network will be the world’s first heavy haul, long distance autonomous rail operation, unlocking significant safety and productivity benefits for the business.”

Rio Tinto’s AutoHaul project will be completed by the end of 2018.

for the business,” Rio said in a statement.

In early May, the miner also announced it had almost doubled its fleet of autonomous production drills across its Pilbara iron ore operations.

Rio recently deployed four additional drills fitted with Autonomous Drilling System (ADS) technology at its Yandicoogina mine, adding to the existing seven autonomous drills at West Angelas.

A further nine drills will be deployed

across its Pilbara operations by the end of 2018, bringing the total fleet to 20.

“The autonomous drills provide a significant safety advantage by reducing the number of employees exposed to potential hazards and fatigue levels, as well as limiting exposure to dust, noise and vibration,” Rio stated.

“All drills are monitored remotely by operators in Rio Tinto’s Operations Centre in Perth, more than 1500 kilometres away, and to date have operated injury free.”



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BHP's Escondida has increased production back to normal levels following strikes last year.

Copper output flat in March quarter

CAMERON DRUMMOND
INTERNATIONAL

GLOBAL March quarter copper production decreased 4.8 per cent quarter-on-quarter as only one-third of the top 15 producers reporting an increase in output, according to S&P Global.

Production from the top 15 producers in the 2018 March quarter fell by 136,548 tonnes (t), compared the December 2017 quarter. However, output rose by 14.8 per cent, or 345,725t, on an annual basis in the March quarter.

MMG, Grupo México and Vale sustained the bulk of those losses, with Vale recording the biggest fall – down 20.3 per cent – due to unscheduled mine maintenance and lower processed ore grades across some of its operations.

MMG reported a loss in production of 31,799t, or 19.9 per cent, primarily due to geotechnical instability at its Las Bambas mine in Peru; and Grupo Mexico was down 10.4 per cent due to a landslide at its Mission mine.

BHP Billiton and Rio Tinto reported the largest year-on-year production gains, primarily driven by the resumption of normal operations at Escondida, of which they have 57.5 per cent and 30 per cent stakes respectively.

In the March 2017 quarter, output at Escondida fell to 94,900t due to strikes by union workers.

Its 2018 March quarter output more than tripled that figure, totalling 322,000t.

BHP's stronger first-quarter performance was also boosted by increased output at its 33.8 per cent owned Antamina mine; its share of production was up to 35,200t, from 29,200t in the first quarter of 2017.

Although virtually flat year-on-year, production at BHP's Olympic Dam more than tripled to 40,500t quarter-on-quarter as the mine ramped up production following a smelter maintenance campaign.

Rio eyes Grasberg exit



Image: Richard Jones.

REUBEN ADAMS
INDONESIA

RIO Tinto is looking to offload its interest in the troubled Grasberg copper-gold operations for \$US3.5 billion to an Indonesian State-owned entity.

Rio confirmed ongoing discussions between the company, partner and mine operator Freeport McMoran, and potential State-owned buyer PT Indonesia Asahan Aluminium in May, but said no agreement over the sale had been reached, and there was "no certainty that binding agreements will be signed".

The Indonesian Government has been ramping up pressure on US-based Freeport to sell it a majority stake in its Grasberg operations, which is expected to produce about 1.15 billion pounds of copper and 2.4 million ounces of gold for the 2018 calendar year.

"We continue to engage in negotiations with the Indonesian government to restore long-term stability for our Grasberg operations and look forward to reaching a mutually positive resolution," Freeport chief Richard Adkerson said in the miner's March quarter report.

If it is unable to reach a definitive

agreement with the Indonesian Government on its long-term mining rights, Freeport has threatened to reduce or defer investments "significantly" in its underground development projects.

Through the JV with Freeport signed in 1995, Rio was entitled to a 40 per cent share of production from Grasberg operations above an agreed threshold until the end of 2023, and 40 per cent of all production thereafter.

However, Rio has received no income from the mammoth copper-gold mine in recent years because this production threshold had not been reached.

Syrah buys downstream site

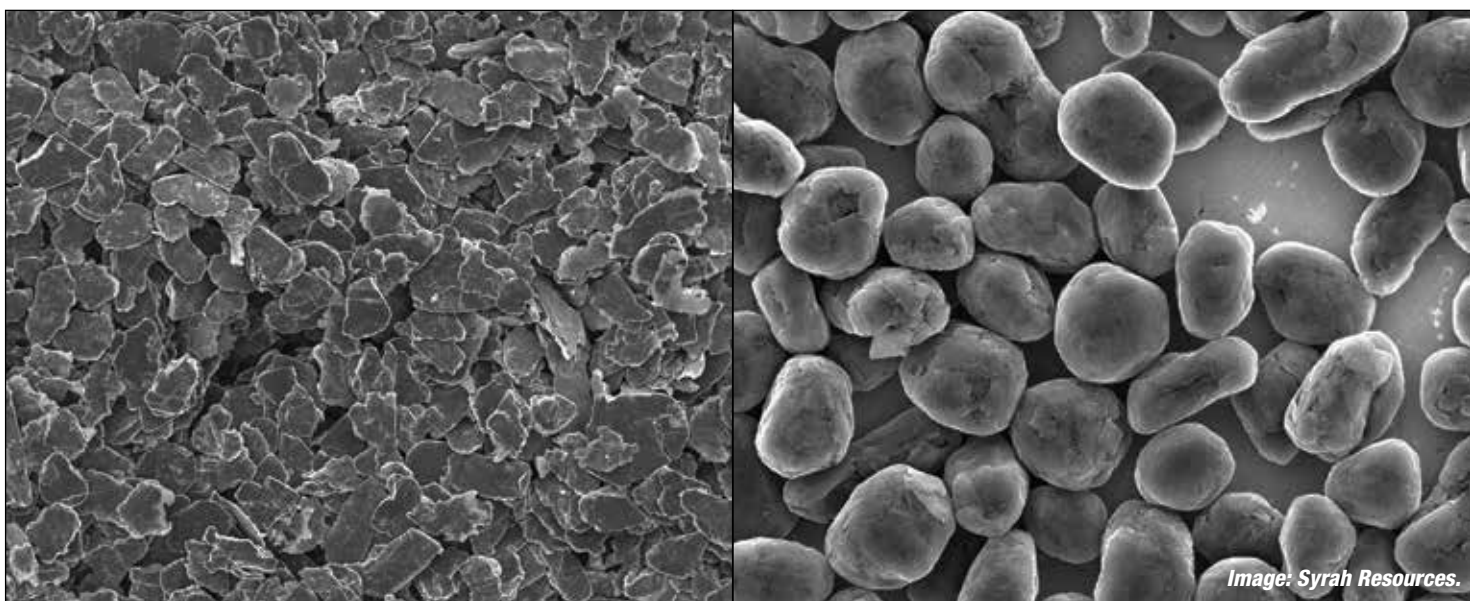


Image: Syrah Resources.

Images of flake (left) versus spherical natural graphite (right). Syrah's BAM strategy will initially focus on precursor (unpurified, purified spherical graphite) and finished BAM product (coated spherical graphite).

ELIZABETH FABRI
US

ASX-listed Syrah Resources will become a battery anode material (BAM) producer, after purchasing a US industrial site to establish downstream processing facilities.

The \$US1.225 Vidalia industrial site in Louisiana covers 25 acres and has an existing 50,000 square foot building.

Once developed, the commercial plant will process graphite from Syrah's Balama project in northern Mozambique to produce BAM for anodes in lithium ion batteries.

The 60,000tpa capacity plant will have an initial output of 20,000tpa using proven

technology and processes.

Syrah managing director and chief executive Shaun Verner said the company expects to complete the purchase in advance of a 90 day due diligence period.

"With the purchase agreement for the Vidalia site, we continue to progress our initial entry into the BAM market," Mr Verner said.

"Consistent with our approach in Mozambique, Syrah is committed to environmental sustainability and community engagement through development and into operations.

"The Company's recently awarded ISO Certifications for Health, Safety and

Environmental management systems for its Balama Operation demonstrates the Company's commitment to global best practice."

Syrah's Balama operation began production in November 2017, and was officially opened in April.

The project is set to be one of the leading global producers of high purity graphite.

In the March quarter, the mine produced 11,200t of graphite, lower than expected due to a slower ramp up in recoveries.

The company's 2018 guidance remains between 160,000t and 180,000t, with 75 per cent of production to come in the second half of the calendar year.

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ASX PLAYERS

Altech Chemicals

WA

ALTECH Chemicals (ASX:ATC) has ambitions to become one of the world's leading suppliers of 99.99 per cent (4N) HPA. The company is developing a kaolin deposit at Meckering, WA and plans to build a 4500 tonne per annum processing plant at Johor, Malaysia.

All approvals have been received, and Altech is currently securing the final stage of project financing, with development scheduled to begin this year.

Hill End Gold

VIC

IN July 2017, Hill End Gold (ASX: HEG) acquired the Yendon HPA project near Ballarat, Victoria. The project contains rich kaolin deposits with results from metallurgical test work confirming the resource is highly responsive to acid leaching, which is a key part of the process to convert kaolin to HPA.

A Pre-Feasibility Study (PFS) is underway and due for completion this quarter.

FYI Resources

WA

FYI Resources (ASX: FYI) is currently advancing plans to develop its Cadoux kaolin deposit, northeast of Perth, and a HPA hydrochloric acid leach processing operation in Kwinana.

FYI is currently undertaking a Pre-Feasibility Study scheduled to be complete end of June. In May, the company completed a 1200 metre drilling program, which collected 3 tonnes of kaolin for advanced metallurgical test work.

Andromeda Metals

SOUTH AUSTRALIA

ANDROMEDA Metals (ASX: ADN) signed a JV heads of agreement in April to acquire up to a 75 per cent interest in Minotaur Exploration's (ASX: MEP) high-quality kaolin HPA Poochera project for \$6 million over five years.

Andromeda hopes to make a development decision within two to three years.

Collerina Cobalt

NSW

COLLERINA Cobalt (ASX: CLL) owns the Collerina nickel-cobalt deposit near Nyngan in central NSW. The deposit is based on a nickel laterite which has lower grades of aluminium, and if developed would utilise a Counter Current Atmospheric Leach (CCAL) process to produce HPA.

Collerina is undertaking a Pre-Feasibility Study and solvent extraction test work in readiness for a mini-rig program to produce 1kg of HPA.

A BRIGHT FUTURE

Image: Altech Chemicals

There was lithium, cobalt and graphite; now, a new technology commodity market is emerging – high purity alumina (HPA). Currently fetching prices as high as \$US40,000 per tonne, demand for the aluminium oxide powder is set to explode in the coming years. We chat with near term producer Altech Chemicals.

All images: Altech Chemicals.

A number of high purity alumina developers were emerging on the ASX.

ELIZABETH FABRI

AUSTRALIA is well placed to meet global demand for HPA, with a handful of projects at various stages of development.

The processed premium non-metallurgical alumina product (with a purity equal to or greater than 99.99 per cent) is characterised by its low friction, non-corrosiveness, and thermal and electrical insulating ability.

The product is sought after in an array of technology applications, acting as the separator between the anode and cathode in lithium ion batteries; in sapphire glass for smart phones, television screens and watch faces; artificial sapphire gemstones; space and aeronautics industry components; and high-strength ceramic tools.

However its use in light emitting diodes (LED) and electrical vehicle (EV) battery components is what will see HPA demand skyrocket in the mid-term, according to market research.

The current global 4N (99 per cent) HPA market is around 25,000 tonnes per annum.

By 2020, demand is expected to rise to 48,000tpa, and grow to 86,000tpa by 2025, in parallel with the respective LED and EV industries.

A group of ASX producers have been closely watching HPA's fundamentals and are now advancing projects to capitalise on demand.

Take Altech Chemicals managing director Iggy Tan; the former head of Galaxy Resources and trailblazer in the lithium space, left the company five years ago (before the lithium boom) to join Altech when he saw a growth opportunity in the HPA sector.

Altech is now the most advanced HPA player on the ASX, with development due to



begin this year at its kaolin deposit in WA and 4500tpa processing plant in Malaysia.

"Our proposed state-of-the-art production facility will produce high purity alumina specifically designed for the synthetic sapphire and lithium-ion battery markets," Mr Tan told *The Australian Mining Review*.

"High purity alumina is a crucial raw material for a new generation of lithium-ion battery separators which are coated with HPA in order to greatly improve the thermal stability of the battery.

"German engineering firm, SMS group, has been appointed to construct Altech's high purity alumina plant in Malaysia. The project is well advanced with German government-owned KfW IPEX-Bank to provide the majority of project finance, as part of a key debt-funding package of \$US190 million for a total capital cost for the HPA project of \$US298m."

Altech said in light of its success a number of ASX-listed HPA developers had emerged, including Hill End Gold, FYI Resources, Collerina Cobalt and a joint venture between Andromeda Metals and Minotaur Exploration.

But this peer group are in the early stages, and if following the same timeline as Altech will not be development-ready until around 2021.

"Their recent emergence is positive as it provides critical mass and raises awareness of the robust HPA thematic," Mr Tan said.

"The global market for HPA is expected to quadruple in size by 2025, growing at around 15-20 per cent CAGR to 2025."

Reducing Production Costs

HPA manufacturing costs, long recognised as a key industry challenge, would be significantly lower at the Altech project because of the type of feedstock used.

Established HPA producers use highly processed feedstock like aluminium metal or aluminium sulphate, and reportedly apply one of four re-processing methods: hydrolysis of aluminium; choline hydrolysis of aluminium; thermal decompression of ammonium aluminium sulphate; or thermal decomposition of ammonium aluminium carbonate hydroxide.

Altech has the advantage of using kaolin (ore) feedstock that is very low in both sodium and iron; impurities that are not ideal for HPA processing, Mr Tan said.

"Aluminium metal typically has higher levels of sodium and iron, which are known to impact the processing of HPA, and can increase processing costs," he said.

Selecting a plant location in a low-cost country like Malaysia would also reduce production costs further, which the company expects to be under \$10,000 per tonne.

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When second-hand makes ‘cents’



An example of a rebuilt Caterpillar AD55B ejector truck by EMS Group.

NATIONAL

EMS Group is responding to strong demand for equipment as customers seek to replace ageing fleets and invest in additional machines in response to improved market conditions.

And, in the interests of affordability and efficiencies, savvy operations are seeking quality second-hand equipment over new.

“In the mining industry it’s vital to keep things running smoothly, productively and profitably,” EMS Group director Tom

Cavanagh said.

“Our clients find they can get a ground-up rebuilt machine quicker and more competitively priced than buying new.”

EMS Group has one of the largest selections of underground mining equipment in Australia, with access to teams of highly skilled tradespeople and distribution points in east and west coast locations.

In 2016/17, EMS Group delivered 10 major rebuilds – a number it exceeded in the third quarter of 2017/18.

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emsgroup.com.au/AMR

GROWTH PUSH

Growth projects are underway across many of Tasmania's larger operations. As the energy mineral boom strengthens, Mineral Resources Tasmania director of mines Brett Stewart believes the State is well positioned to benefit.

The Rentails tailings expansion is currently awaiting environmental approval.
Image: Metals X.

CAMERON DRUMMOND

TASMANIA'S mining industry is starting to rebound, with several potential projects now in the pipeline.

Mining is the Island State's largest export industry, accounting for more than 50 per cent of earnings, or nearly \$2 billion in the 2017 financial year.

Tasmania's three large operating mines include Rosebery (zinc, lead, gold, copper and silver), Savage River (magnetite, which is converted into iron ore pellets at Port Latta) and the Renison joint venture – a major tin producer.

With a number of proposed projects – such as the significant tailings operations of Rentails and Hellyer, tin mining at Zeehan and Luina, and a resumption of copper mining at Mount Lyell – the mining industry is starting to show signs of rejuvenation.

However, a lack of exploration spending that has consistently declined since its peak in 2012-13 has meant greenfields exploration is falling behind.

The Australian Mining Review spoke with Mineral Resources Tasmania director of mines **Brett Stewart** about the current and future prospects of the State's mining sector.

Q. How important is mining to the State economy?

The mining and mineral processing industries remain one of the pillars of the Tasmanian economy and consistently

MAJOR OPERATING MINES	PROPOSED PROJECTS
MMG Rosebery (Silver, Lead, Zinc)	Dundas Mining Avebury (Nickel)
Bluestone Mines Tasmania Renison (Tin)	Bluestone Mines Tasmania Rentails (Tin)
Grange Resources Savage River (Magnetite)	Venture Minerals Mount Lindsay (Iron and Tin-Tungsten)
Diversified Minerals Henty (Gold)	King Island Scheelite Dolphin (Tungsten)
Cornwall Coal (Coal)	NQ Minerals Hellyer (Gold)
	Elementos Cleveland (Tin)

generate between 50 and 60 per cent of the state's mercantile exports.

The industries contribution to Tasmanian jobs and revenue has rebounded over the last 12 to 18 months, with mining jobs increasing from 2200 in May 2015 to average over 4000 for the last three quarters.

Income from royalties per year for 2016-17 and 2017-18 is forecast to be \$38 million – up 160 per cent compared with 2015-16.

Increased employment levels and economic activity in regional areas will result in higher payments to Government, including rates, fees and rentals and payroll tax.

Tasmania is well placed to provide some of the commodities required to meet increasing global demand for electric cars and solar and wind generation infrastructure.

I believe Tasmania is well positioned to benefit from the energy minerals boom, both

in terms of contributing to the increased levels of production and in providing the metals required to support the new economy.

Although Tasmania lacks lithium resources, we are well endowed with other commodities, such as tin.

A recent Rio Tinto-MIT study indicated tin as the metal whose demand will be most positively impacted by the new economy.

Q. Are there any new or upcoming projects you are excited about?

In addition to projects aimed at increasing the productivity and the life of existing mines, there is a well-established development pipeline for new projects covering a range of commodities, from coal to tin and tungsten.

One exciting area for new developments is the retreatment of tailings and slags and there are currently five projects in the varying stages of development.

The most advanced is NQ Minerals' project to re-treat the Hellyer mine base and precious metal tailings, which is on track to produce first concentrate in August this year.

The largest project in terms of capital expenditure is Rentails, which will re-treat the tailings from the Renison tin (and copper) mine.

This type of project is attractive as it creates value from what are now waste products and has the potential to improve environmental outcomes at the sites.

(CONTINUED ON PAGE 22)

Thinking ‘outside the box’

NATIONAL

ESTABLISHED in 2011, Jemrok has quickly become a leader in underground mining and associated services in Tasmania.

Built on a strong foundation of working with integrity, intelligence and responsible engineering practices, the national company offers an extensive range of surface and underground equipment for hire.

It is also a highly respected multi-specialist mining provider, with expertise in mine development and rehabilitation, vehicle and heavy equipment maintenance, light and heavy auto parts procurement, mine production activities and professional labour hire.

“Jemrok is part of the Kyda Group and currently have five operational sites throughout Tasmania, NSW and Victoria, which includes the management of automotive workshops for maintenance and repair of service fleet and customer vehicles,” Jemrok sales and marketing director Paul Sturzaker said.

“While based from our operational sites our civil engineering and mining



Jemrok has a wide range of surface and underground equipment for hire.

teams travel Australia wide, and we are dedicated to providing the highest possible level of service and customer satisfaction, with quality products and

availability throughout our distribution network.”

Parts available on demand include a full range of genuine, OEM and

aftermarket parts, suitable for CV shafts, joints and axle components, exhaust systems, suspension, brakes, filtration, steering, cooling and more.



Jemrok has established ourselves as the ‘go-to’ for smart solutions. With a heritage in underground mining services, Jemrok leads the way with innovative outcomes and technical advice. This success is built on a strong foundation of integrity, commitment and responsible engineering practices. Offering an extensive list of capabilities, Jemrok is leading the way in:

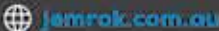
- MINING SERVICES • VEHICLE MAINTENANCE
- PARTS PROCUREMENT • LABOUR HIRE

Jemrok’s point of difference lies in the level of ingenuity, innovation and project execution. We pride ourselves in our professionalism and the capability of our employees to complete projects to a high standard.



TASMANIA

- Level 1/10 Mount Street and PO Box 89
Burnie TAS 7320
- 10 Tom Moores Road and PO Box 489
Wynyard TAS 7325
- 21 Faulkner Drive, Latrobe TAS 7307
- (03) 64 31 7074
- admin@jemrok.com.au



LABOUR HIRE



VEHICLE MAINTENANCE



PARTS PROCUREMENT



MINING SERVICES

(CONTINUED FROM PAGE 20)

“I believe Tasmania is well positioned to benefit from the energy minerals boom, both in terms of contributing to the increased levels of production and in providing the metals required to support the new economy.”



Image: Metals X.

The ore sorter at Renison.

A feasibility study has been completed for this project and a notice of intent has been submitted to the State Environmental Protection Authority as part of starting the approvals process.

Q. Tasmania was significantly disadvantaged by the Australian mining boom several years' back – largely due to the stronger currency.

Can you provide some commentary on this?

Although Tasmania was affected by the high exchange rates, a larger effect was felt from the additional costs of labour, services, and consumables which pushed up production, exploration, and resource definition costs significantly.

Since the boom many operations have slimmed down and with lower service

costs and a lower dollar the profitability of some sites has improved, even at lower commodity prices.

Q. In a 2017 interview economist Saul Eslake said the remaining mineral resources in Tasmania were “more or less fully exploited”. Do you agree?

While we'd agree that it is probable that

most of the exposed or near surface ore deposits have now been found, there is still potential at depth and under cover.

We think the issue is not the presence of more mineral resources, but minimising the risk to explorers who are looking for these more difficult-to-find ore deposits.

To this end we are working on providing new pre-competitive geoscience data, improving the currency and completeness of our legacy exploration databases, and contributing to initiatives such as UNCOVER and the recently announced MinEx CRC which aim to provide the ideas and techniques to improve the success rate of exploration under the cover of younger, often un-mineralised rocks.

Q. What is Government doing to encourage the next wave of greenfields exploration?

According to ABS figures exploration expenditure is on the decline.

Although exploration, as measured by expenditure, declined dramatically from a peak in 2012-13 and was at relatively low levels, it has now increased with expenditure for the 2017 calendar year to \$21.2m. This is 57 per cent higher than the previous year.

This increase has mostly been the result of exploration around known mineral deposits; greenfields exploration has remained at relatively low levels and is yet to respond to improving markets.

For this reason the Government recently committed to a four year, \$2m Exploration Drilling Grant Initiative commencing in 2018 to encourage exploration and in particular greenfields exploration in Tasmania.

Savage River celebrates 50 years

TASMANIA

GRANGE Resources is Australia's most experienced magnetite producer, with more than half a decade of mining and production from its Savage River mine in Tasmania.

This year marks 50 years since production began at the mine, with the project expected to continue producing well beyond 2030.

To celebrate the milestone, the Grange Resources team took a step back in time to reflect on its successes.

“Exploration began at the project back in 1956, including ground and air magnetometer surveys carried out by the Australian Bureau of Mineral Resources,” a Grange Resources spokesperson said.

“Between 1957 and 1959 diamond drilling was then undertaken, and in 1965, after the completion of a \$2.5 million feasibility study, Savage River Mines Limited was born.

“Within two years of first drilling the orebody, they took the project from exploration to mining, to processing the ore, creating concentrate, and pumping concentrate 85km via a 9 inch steel pipe to our Port Latta pellet plant to dewater, agglomerate and indurate, stack and load onto ships.

“This feat is not likely something that could be repeated today.”

Grange Resources attributed its achievements to the team at the time who had a vision for what was possible.

“The early pioneers had an unyielding determination to succeed and it is this



The Savage River mine comprises three principal open pits - North, Centre and South Deposit Pits.

energy, passion, and persistence that continue to drive our operation today,” the spokesperson said.

“Our innovation now extends to projects around mining, remote control equipment, plant optimisation, and rehabilitation of legacy environmental issues.”

Grange's operations currently consist of owning and operating the Savage River integrated iron ore mining and pellet production business.

In addition, Grange is a majority joint venture partner in a major magnetite development project at Southdown, near Albany in WA.

The Southdown magnetite project, once developed, is expected to have the capacity to supply more than four times the amount of iron ore produced at Savage River, at an annual production rate of 10 million tonnes of premium magnetite concentrate.

The company is continuing its search for an equity partner for a strategic interest in

the project.

Furthermore, the company has also commenced a pre-feasibility study into the potential for underground mining below the Savage River North Pit to see if they can transition the open pit to an underground block cave, as well as an additional feasibility study for future development of Centre Pit and Long Plains.

More information can be found at: www.grangeresources.com.au.





Image: Grange Resources.

MINE DEVELOPMENTS: SNAPSHOT

Renison Tin Operations

METALS X announced the construction of an ore sorting circuit at its 50:50 Renison JV was on track to be finished in the June quarter, increasing tin production by between 15 and 20 per cent.

A third diamond drill rig was introduced late last year to cater for the extra production, and a new tailings dam is also near completion.

"At the Renison tin operations, the JV partners have just completed another phase of capital injection for the future of the project, spending over \$30m to establish a new tailings dam and installing a new crushing and ore sorting plant," Metals X managing director Warren Hallam said.

"Commissioning of the crushing and ore sorter plant will commence in June and it is anticipated that this will result in a 15-20 per cent expansion and place the operation in a strong position on the global cost curve.

"The operation, after having being closed and abandoned when we acquired it, is now in the best shape it has ever been in, with over seven years of reserves and almost 18 years of resource.

"With the past and recent investments, the mine has a much more secure future."

Image: Metals X.



Rentails Expansion

The Rentails expansion project is aimed at producing tin and copper from tailings, and would increase Renison's mine life to

11 years.

"The Rentails project has been through a feasibility study which shows very robust economics and we are currently seeking Environment Protection Authority (EPA) approval, which is a mandatory 12 month process," Mr Hallam said.

Metals X said it expected studies and assessments required by the EPA would be completed and the environmental management plan lodged early in the December 2018 quarter.

If approved, Rentails is expected to create about 330 direct and indirect employment opportunities during operation, with a workforce peaking to between 400 and 500 during the construction period.

The all-in sustaining cost (AISC) for expanded operations at Renison are estimated at less than \$17,000 per tonne (t), and could be extremely profitable on the back of the perceived future high demand for tin.

The projected AISC already compared favourably to the current tin price of about \$26,000/t.

Traditional uses for the soft metal include solder, chemicals, tinplate and lead-acid batteries, and more modern uses in electronics and next-gen battery technologies.

In recent years, a lack of investment in new production capacity has tightened global supplies, with stocks at multi-decade lows pushing up the commodity price.

Hellyer Gold Mine

Shuttered in 2002, the Hellyer gold mine in Tasmania's North West will again open its doors as a tailings operation after NQ Minerals acquired the project from Keen Pacific for \$20m in 2017.

NQ stated that Hellyer had life of mine revenues of more than \$US1.3 billion.

In April, the company secured a \$US10m loan facility to start early works

on restarting the mine.

NQ chairman Brian Stockbridge said Hellyer would be a flagship project for the miner.

"First work will involve the refurbishment of the existing operating facilities in order to extract and treat the large high-grade tailings deposit on site and produce three marketable concentrates (lead, zinc, gold/silver/pyrite)," Mr Stockbridge said.

By early May, the miner announced that refurbishment was "well underway" and on schedule for commissioning in the September quarter this year.

"It is exciting for NQ to see the momentum of the refurbishment build up and seeing the plant moving rapidly towards commissioning," Mr Stockbridge said.

"We are clearly looking forward to commencing production at Hellyer."

Once up and running, the tailings operation is expected to produce between 80,000oz and 90,000oz each year for the next decade.



Image: Savage River.

Savage River Magnetite

As production continued at the North Pit of Grange Resources' Savage River magnetite iron ore pellet operation, work was progressing on feasibility studies for the nearby Centre Pit and Long Plains deposits.

Grange stated that the two deposits had potential as additional ore sources

for blending, supporting extended life and providing risk mitigation against any wall instability in the North Pit.

"Investigation has also commenced into the ability to access the ore body in North Pit through underground development," the miner stated in a March corporate strategy update.

"Conceptual studies have indicated that an underground block cave may be a suitable method to extract ore at greater depth.

"The board has approved expenditure of \$10m for the first stage of a feasibility study to define the extents of the orebody and locate the position of an exploration decline."

Phase 1 of a diamond drilling program to investigate accessing the underground ore body in the North Pit has already commenced.

It consists of nine holes for about 8700m, combined with downhole geophysics, hydrogeological assessments, and laboratory testing for the feasibility study.

Work was also progressing on the feasibility study for Centre Pit.

A surface diamond drilling program has been planned in order to enable the conversion of resource to reserve, and to inform the geotechnical parameters within the ore zones and planned mining areas.

Grange was also pursuing strategic investments for its Southdown Magnetite JV, of which SRT Australia owns a 30 per cent stake.

"The JV partners continue to monitor all ongoing project requirements to ensure that the current status of the feasibility studies allow the full recommencement of the project once Grange is able to secure an equity partner for a strategic share of the company's interest in the project," the company stated in April.

Innovative, cost effective solutions

TASMANIA

THE Mancala Group is an Australian-based group of companies that has been providing specialised mining services for almost 30 years.

The group began within the Tasmanian mining industry some 27 years ago, and provides ongoing services to valued clients and business partners.

Over the years, Mancala has demonstrated expertise in the construction of vertical and lateral mine development, including efficient mine production and ancillary activities as a contractor and mine owner/operator.

Mancala has a proud history of safe work practices, procedures and cost-effective underground service provision in both mining and civil markets.

Vertical development services Mancala provides include mechanised slot rising, conventional raise boring, collars and liners, flame proof systems for raise bore underground coal, bore hole hoisting, shaft sinking, shaft rehabilitation, horadiam excavation and



Mancala Group is committed to its core values of safety, quality, integrity and innovation.

egress systems.

Mancala also offers specialised services in underground spaces, rehabilitation of tourist mines, labour hire, slope stabilisation and ground support.

In addition, the team’s engineering services comprise equipment maintenance and rebuilds, and its global mine development covers open cut mining, mechanised mining, traditional and

mechanised narrow vein mining.

More information on Mancala can be found by emailing enquiries@mancala.com.au or calling (03) 8562 9400.



Mancala has a proud history of safe and cost effective underground service provision, in both mining and civil Markets, as a contractor, an alliance partner, and as an owner operator.



MANCALA CORE VALUES

- Safety** - Striving to achieve zero harm.
- Quality** - Taking pride in what we do; on time, on budget and to specification.
- Integrity** - Doing what we say we will with honesty and respect.
- Innovation** - Revolutionising processes and applying technology to achieve better outcomes for all stakeholders.
- People** - Recognising people as our greatest asset and encouraging personal excellence.

OUR SERVICES

- Vertical Development
- Specialised Mining
- Engineering
- Global Mine Development
- Equipment

ORESTRUCK

Big Pilbara iron ore developments are incoming – FMG has just confirmed development of its Eliwana mine, Rio Tinto is expected make a decision on Koodaideri sometime this year, while BHP is weeks away from a final announcement on its massive South Flank project.



All images: BHP.

STAFF WRITER



BHP chief executive Andrew Mackenzie.

SPEAKING at the Global Metals, Mining & Steel Conference in Florida in May, BHP chief Andrew Mackenzie said it was crucial the miner replenished its pipeline with new opportunities.

“This pipeline has the potential to add a further 40 per cent to the value of BHP, subject to our strict capital allocation processes,” he said.

“BHP is set-up for future success. We

have a simple, unique portfolio of the very best assets, diversified across attractive commodities.”

While Mr MacKenzie was not speaking explicitly about South Flank, the 80mtpa project remains crucial to the miner’s future success.

Tapped to replace the depleting Yandi ore body by 2021, the project is expected to be submitted for board approval by the end of June and, if approved, would make Mining Area C the largest standalone ore mining and processing centre in the world.

In February, BHP flagged an estimated increase in the capital cost for South Flank, which was now expected to be around \$US45 per tonne, up from \$US40/t.

Mr Mackenzie said this reflected the stronger Australian dollar, and updated estimates as feasibility studies progressed.

This spend would still fit within existing guidance for sustaining capex in iron ore of \$US4 per tonne.

Importantly, these cost increases could be offset because South Flank would bump BHP’s average iron ore grade from 61 per cent to 62 per cent.

This higher grade could be important; the price differential between high and low grade ores has widened dramatically as Chinese steel mills demand higher quality raw materials, a result of Chinese Government-led supply side reform.

“We believe that China will continue to pursue its supply-side reforms, but the strategic focus is expected to shift away from capacity removal towards industry optimisation and upgrading,” BHP chief commercial officer Arnoud Balhuizen wrote

in May this year.

“We have observed that steel mills across the nation have been actively upgrading their production facilities – with bigger and more efficient blast furnaces and cokeres designed to produce high-quality steel products.

“At the same time, China’s increasing focus on environmental protection and ‘ecological civilisation’ have prompted the steel industry to simultaneously pursue greener capacity that can meet increasingly strict emission standards.

“In particular, far more stringent Sulfur Oxide (SOx) and Nitrogen Oxide (NOx) standards have been introduced.

“Each of these observed trends will support the demand for high-quality seaborne raw materials going forward.”

Contracts Update

Full development of South Flank remains subject to approval by the BHP Board, but since it approved an initial \$US184m investment in South Flank in June last year, activity has gathered pace.

The West reported that of the \$US184 million of initial funding already approved for South Flank, almost \$US168 million had been awarded to Australian companies, 94 per cent of them in WA.

In August 2017 BHP awarded Fluor a project and construction management services contract to be undertaken from BHP’s Perth office, with the two companies managing the project together as an integrated team.

Decmil Australia then snagged a \$75

million contract in November, the first phase of a \$105 million overall project to upgrade and expand Mulla Mulla village to support current operations at Mining Area C and the proposed South Flank.

“Each of these observed trends will support the demand for high quality seaborne raw materials going forward.”

“The contract award is following the successful delivery of other project works at major WA Iron Ore sites, including a \$13 million civil and initial works contract awarded in August 2017,” Decmil Group managing director Scott Criddle said.

In May, Clough scored the Engineering, Procurement, and Construction contract for early works for non-process infrastructure to support the development of the South Flank iron ore deposits.

“We are very pleased to have been selected as BHP’s delivery partner. Clough has been delivering EPC solutions in other sectors over the last few years and it is a natural progression to utilise this capability for our mining clients too,” Clough chief executive and managing director Peter Bennett said.

“These early works provide a strong platform to continue building the relationship between our companies.

“The engineering and construction of this facility will be self-performed by Clough’s WA based team, with the scope including civil, structural, mechanical, piping, electrical and instrumentation.”

CPC spreads its wings

INTERNATIONAL

CPC Engineering is a leading mid-tier provider of engineering design, construction and maintenance services to the resources sector.

CPC is committed to forming long term relationships with clients, by engaging with them in an open and honest manner and delivering on its promises.

This simple philosophy forms the basis for the company's continuous growth and success.

The CPC group of companies has been in existence for more than 45 years.

Today, CPC employs more than 300 personnel and due to the vertically integrated nature of the company, provides a comprehensive range of in-house services including: metallurgical testwork, feasibility studies, engineering design, project management, and asset management.

It also provides construction and commissioning work as well as labour hire for projects.

CPC has completed more than 20 major contracts in Australia and across the globe.

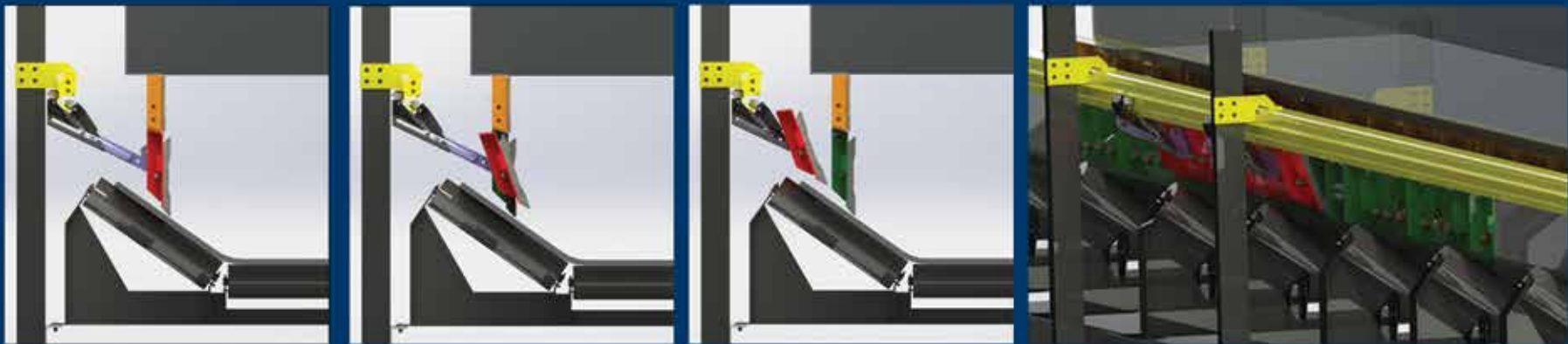
Contracts included scoping studies, feasibility studies, detailed designs, engineering-design-construction, and EPCMs.



CPC provides a comprehensive range of mining project services.

Recent projects have included infrastructure for Independence Group's Nova nickel mine in WA, and projects for First Quantum Minerals Limited. More information on CPC's services can be found at: www.cpcengineering.com.au.

CPC Trac Skirt System



The Trac Skirt System [TSS]* is a new, fully adjustable, removable and safer conveyor skirt system, that can be changed out in minutes rather than hours. All work is external to the conveyor and chute, and significantly reduces or eliminates the need for work in confined spaces and manual handling. Larger and longer skirt liners can be used, reducing the number of gaps between

liners, enabling accurate adjustment of the gap between the liner and the belt, minimising spillage, dust and belt damage. Liners can be adjusted in a fraction of the time and can be locked in both directions. Wear remaining on the skirt plates can be checked externally without stopping the belt and affecting production. A full skirt panel can be replaced and adjusted in less than 15 minutes.

* Patent applications: 2017903475 [Trac Skirt Rail System], 2017903474 [Trac Skirt Adjustment]

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GAINES TAKES THE REINS

The resignation of long-term Fortescue Metals Group boss Nev Power in February marked the end of an era for the iron ore giant. But it hasn't taken long for new chief Elizabeth Gaines to begin paving a legacy of her own, as FMG diversifies into new markets and commodities, and advances its \$US1.27 billion Eliwana project.



FMG's new chief executive Elizabeth Gaines.



All images: FMG.

ELIZABETH FABRI

LESS than six months since her promotion from chief financial officer to chief executive, Elizabeth Gaines has settled well into the FMG driver's seat.

When announced as Nev Power's replacement back in November, it was clear Ms Gaines had some big shoes to fill – who can forget Mr Power's resolute leadership in 2012/2013, when FMG was strapped for cash during the market downturn?

And just like her immediate predecessor, Ms Gaines would be stepping into the role inheriting a unique set of challenges; namely the steep discounts FMG was receiving for its lower grade 58 per cent ore in China.

In the first half of FY18, FMG's net profit slid 44 per cent. Price realisations for its ore decreased from 86 per cent to 68 per cent of the 62 per cent CFR Platts index as Chinese steel producers increasingly favoured higher grade ore.

The challenges, while not comparable to those experienced during the early years of Mr Power's tenure, would test the fresh executive team.

Since stepping into the new role in February, Ms Gaines has made it her mission to steer the company towards prosperity, identifying key opportunities for growth.

The first has been expanding FMG's customer base in new markets, to partially offset the widening gap between the prices received for high grade and low grade ore from China.

In its March quarterly results, FMG revealed it had more than doubled the amount of iron ore it exported outside of China, with non-China markets now accounting for 11 per cent of its total shipments; up from 5 per cent last financial year.

The growth extended to new customers

in India – now the third largest producer of steel globally ahead of the US – as well as customers throughout broader South-East Asia like Vietnam and Indonesia.

And in a recent trip to China, Ms Gaines said the ore grade price spread would narrow in time.

"We've seen one of the drivers for that spread (between the higher grade and the lower grade ores) has been the high profitability of the Chinese steel mills," Ms Gaines told *Bloomberg TV*.

"Our view, and we're hearing this from our customers, [is that] as profitability comes under pressure they will be chasing the very high value in use (the 58 per cent grade) ore."

FMG also cited in its March quarterly report that profit margins for China's steel mills had in fact declined from the peaks reached in the December 2017 quarter.

"There are now signs that steel mills are refocussing on costs resulting in increased demand for Fortescue's high value-in-use lower iron content ores," the company stated.

Yet discounts remain a concern for the Pilbara producer.

During the March quarter, the average realised price for contracts entered was 62 per cent of the benchmark Platts 62 CFR index, while in the first half of FY18 this averaged at 68 per cent.

Several months back, FMG also amended its iron ore price guidance to 65 per cent of the benchmark price for FY18; a 35 per cent gap compared to what was between 10 and 15 per cent two years ago.

Moving into FY19

With weeks to go until end of financial year, the next question is: will FMG meet its production and C1 costs guidance?

In the first half of FY18, FMG shipments

were sitting at 84.5 million tonnes, and by the end of the March quarter year to date shipments had risen to 123.2mt.

FMG has assured investors it will meet its guidance of 170mt and C1 costs of between \$US12 and \$US12.50 per wet metric tonne.

However, rocky results during the March quarter have triggered caution, with a 4 per cent dip in shipments (38.7mt) and a 9 per cent rise in unit costs to \$US13.14/t compared to the previous quarter.

The small slump – attributed to higher fuel costs, a higher Australian dollar, maintenance and equipment downtime – was softened somewhat by the announcement FMG had exported its one billionth tonne of iron ore in April; a decade after Cloudbreak's first commercial shipment from Port Hedland.

Ms Gaines said the shipment of one billion tonnes was a "testament to everyone's hard work, dedication and innovation".

"Our strategic goals of investing in the core long term sustainability of the business while pursuing low cost growth options are firmly in our sights as we continue to generate strong margins, leveraging Fortescue's position at the lowest end of the global cost curve," she said.

One of the measures to drive efficiencies is the company's autonomous strategy.

In the March quarter, the team commissioned the first of its autonomous haulage fleet (AHS) at its Christmas Creek operation, with seven trucks now converted.

"Together with the relocatable conveyor at Cloudbreak, the ongoing rollout of AHS at the Chichester Hub is set to contribute to further productivity and efficiency improvements across the business," Ms Gaines said.

Growth Options

FMG was also a step closer to advancing its 30mtpa \$US1.27 billion Eliwana deposit as the replacement project for its depleting

Firetail mine in the Pilbara.

Late last year, the FMG board was faced with a decision: extend the rail line from its Solomon Hub project 130km west to the Eliwana deposit, or develop a new operation at Nyidinghu about 40km south of its Chichester Hub to the east.

The Eliwana project, 90km from Tom Price, offered more product options, better capital and operating costs and quicker timeline to market.

Eliwana will also be a key contributor to enable FMG to achieving a higher 60 per cent iron grade product.

In late May, the FMG board approved the development of the mine, 30mtpa dry ore processing facility, and 143km rail project, with production to begin in December 2020.

FMG has completed a definitive feasibility study (DFS) and was now moving into detailed design and securing approvals for two public environmental reviews and a mining proposal.

Ms Gaines said the project was important to FMG and the State of WA, creating up to 1900 jobs during construction, and 500 full time positions once operational.

"Development of the Eliwana Project will maintain Fortescue's low cost status, providing us with greater flexibility to capitalise on market dynamics while maintaining a minimum 170 million tonnes per annum production rate over 20 years," Ms Gaines said.

FMG also has a 60 per cent interest in the Iron Bridge magnetite project in the Pilbara, another area of focus.

FMG was currently progressing feasibility studies with a decision, in conjunction with Fortescue's Joint Venture partners, expected during calendar year 2018.

The company was also actively exploring other areas in the Pilbara, NSW, South Australia, Ecuador, Columbia and Argentina in not only iron ore but lithium, copper and gold.

Reducing costs, improving safety

NATIONAL

ONCE simply a supplier of wear materials, Bradken's fixed plant business has evolved into a complete solutions provider covering all aspects of mining fixed plant equipment including inspection, analysis, design, fabrication, refurbishment and project management.

Bradken general manager Craig Lee said the business had invested a great deal into developing a solid reputation for putting customers' needs first.

"We work closely with our customers and provide innovative solutions that reduce expenditure on wear materials, the frequency of shutdowns and maintenance downtime," Mr Lee said.

"Our commitment to increasing the overall service life of equipment by reducing product wear and ensuring our customers use less of our products may sound counter-intuitive, but doing just that has enabled us to build strong relationships with our customers and gain their trust and confidence."

Mr Lee said Bradken's Smart Liner remote wear monitoring system was one such product that not only reduced shut down time and costs, but also improved employee safety.

"Smart Liner gives our customers automatic alerts when change outs are required, eliminating the need for manual liner inspections which are often completed in confined spaces."



More information can be found at: www.bradken.com.

At the core of Bradken's fixed plant business is a range of wear materials – one for almost every application – including Nihard, Duablock, Duaplate and Vulcabrix ceramics.

These materials are continuously being refined to maximise performance.

Bradken's team of skilled engineers and product specialists conduct regular site inspections with customers to assess the performance of the products, using a combination of traditional methods and the latest 3D scanning technology.

In addition, Bradken has extensive experience in fabricating steel structures,

transfer chutes in particular, and carry out refurbishment and repair work on equipment such as train load outs, transfer chutes, deflectors and skips.

The Bradken team is also equipped to carry out on site services like liner installation, repair work and project management.

Manufacturer of consumable wear liners:

- > Duaplate, Chromium Carbide Overlay wear plate
- > NiHard and Duablock chromium white iron castings
- > Vulcabrix modular ceramic wear liners

Fixed Plant specialists in:

- > Chute and hopper flow modelling and design
- > Industry leaders in rotatable chute refurbishment
- > Smartliner monitoring systems, enhancing the voice of your asset

Our promise:

- > Increased asset availability
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THINK INNOVATION

An uptick in mining activity, advances in automation, and improved collaboration; the industry has many reasons to celebrate at this year's Queensland Mining & Engineering Exhibition (QME). The biennial event is set to be one of its biggest to date – more than 35 per cent larger than QME 2016.

ELIZABETH FABRI

RUNNING across three days in July, QME is set to deliver another impactful year of presentations and networking opportunities for the mining industry and its supply chain.

The free-to-attend trade event provides a platform for the industry to engage, interact and experience innovative new mining products and machinery; meet face-to-face with the industry's leading suppliers; witness live demonstrations; network with peers, and of course, hear from the biggest names in the business.

This year, conference director Brandon Ward said QME celebrates a 25 year presence in Mackay.

The event will also play an important part in refocusing the mining community's attention on the adoption of transformative practices to stay relevant over the next decade, particularly around digital technologies and maintenance.

"It is a big milestone to reach 25 years in operation and this is a credit to the customers, visitors and partners that have supported QME over this time," Mr Ward said.

"Without the support of the industry we serve, it would not have been possible to have achieved this milestone."

Mr Ward said the event has always tracked in parallel with what the industry was seeing in good times and bad, and this year there was a renewed sense of optimism.

"We have felt that the sector is improving and this has so far translated into QME being 35 per cent larger than in 2016," Mr



QME is running 24-26 July at Mackay Showground.

Ward said.

"The frequency of the event suits the pace of change in the mining industry and hence we have traditionally always run QME every two years."

This year, the conference will feature more than 200 suppliers on the exhibition floor, including brands such as FLSmidth, FITT Resources, Becker Mining, Marco, Hastings Deering, GE Power, Valley Longwall and CAT Energy Power, to

name a few.

Industry heavyweights such as Panasonic, Downer, and Flender (a Siemens company) will also attend.

(CONTINUED ON PAGE 32)

All images: QME.

25 years for QME in Mackay



QLD

IN 2018, The Queensland Mining & Engineering Exhibition (QME) will celebrate its 25th year in Mackay and will deliver the strongest line up of companies to the event when it runs from the 24-26 July.

QME will showcase more than 200 leading suppliers, including Hastings Deering, Flexco and Becker Mining who are eager to provide new and advanced solutions for the QLD mining sector and also welcome Adani, Anglo American, BHP and Yancoal as exhibitors in the 2018 edition of the show.



Dedicated to innovation and progress,

QME will attract more than 4000 industry personnel to Mackay and will be strengthened by the inclusion of a free to attend seminar series that has been developed in close consultation with the industry.

QME is also excited to partner with the Bowen Basin Mining Club who will host the 2018 Queensland Mining Awards on Wednesday 25th July.


The awards celebrate innovation, excellence and collaboration from suppliers and contractors who have worked in operations in QLD.

QME is an event not to miss, with registrations now open and available online at: qmeexpo.com.au.



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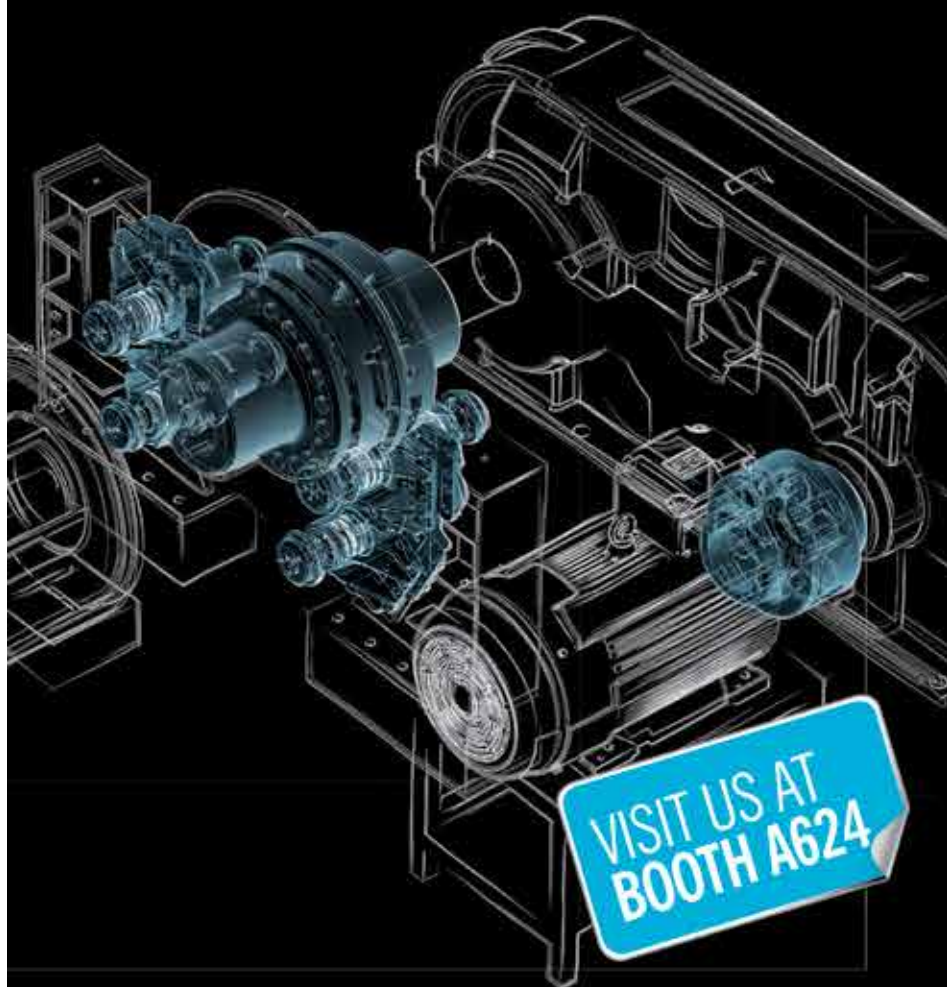
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"It is a big milestone to reach 25 years in operation and this is a credit to the customers, visitors, and partners that have supported QME over this time."



(CONTINUED FROM PAGE 30)

The speaker lineup is also a drawcard, with 12 sessions across the three days featuring presentations from Queensland Exploration Council (QEC) Minerals and Coal deputy chair Darren Walker; Caterpillar Safety Technology representative Kellen Timboe; Carpentaria Rail chief executive David Fletcher; Austmine chief executive Christine Gibbs-Stewart; Hybrid MicroGrid Systems - Segment Manager Energy Power Systems Australia Ron Hall, and more.

Mr Ward said the QME team spent a lot of time researching and speaking to industry about the type of content they would most like to see at this year's event.

"The key themes identified focused on maintenance, renewable energy, automation, procurement and supply chain and operational and occupation healthy and safety," Mr Ward said.

"The event will also feature lots of products on display that the visitors can get up close to."



ELIZABETH FABRI

QME is also a proud partner of the Bowen Basin Mining Club and Queensland Resources Council's *QLD Mining Awards*, which recognise achievements across the State's mining sector.

The awards, held at the Mackay Entertainment and Convention Centre on 25 July, are open to all businesses involved in the QLD minerals and energy resources sector, from mining companies to contractors and suppliers.

"The awards will celebrate the spirit of innovation, excellence and collaboration that is fostered within the Queensland mining sector," QME event director Brandon Ward said.

The award categories include a *Cost Saving, Initiative, Innovation, Safety, Product Launch* award, *Staff Engagement* or *Equal Opportunity* award, and *Mining Contractor of the Year*.

This year, a Collaboration award will also be introduced, which aims to put a spotlight on the most outstanding collaborative effort between producers and contractors or suppliers.

Bowen Basin Mining Club director Jodie Currie said the award was introduced to showcase some of the great work in the supply chain to achieve better outcomes in cost and time saving.

"The productivity focus of the last few years has definitely brought on this increase in collaboration as suppliers look for ways to add value and companies look for ways to increase efficiency," Ms Currie said.

"Collaboration is a natural product of the market conditions, and it's led to some very creative solutions and long-term efficiencies for both industry and suppliers."

Tickets to the awards night can be purchased online at www.bbminingclub.com/awards/gala-dinner.

Images: Port Waratah Coal Services.



LINK IN THE CHAIN

Port Waratah Coal Services exports declined marginally in the 2017 calendar year, however there have been other issues under the spotlight; the granting of approvals for its Terminal 4 project, and – more recently – a big question mark over the future of its long-running Carrington operation.

ELIZABETH FABRI

IN November, Port Waratah Coal Services (PWCS) was blindsided by a NSW Department of Planning draft report which stated it would explore options to move its Carrington coal terminal to another location.

Carrington and Kooragang are PWCS's bread and butter, and two of the three coal terminals that make up the Port of Newcastle (the third being operated by Newcastle Coal Infrastructure Group).

PWCS – the final link in the Hunter Valley coal chain – owns both terminals and leases the land from the Port of Newcastle, with its Carrington site due for a renewal in 2024.

However, the NSW Government's *draft Greater Newcastle Metropolitan plan 2036* report indicates there may be other plans in the works for the Carrington precinct.

On page 84 of the document, the Government states "The Port of Newcastle, working with Newcastle City Council and NSW Department of Planning and Environment will investigate the potential to relocate coal export facilities and bulk fuel storages away from residential areas and explore options to renew the Carrington Precinct for alternative uses (including tourism)".

Carrington, currently the closest coal terminal at the Port of Newcastle to residential housing, has been a point of contention within the local community and environmental groups for some time, with a history dating to 1976.

Carrington Debate

PWCS and the Port of Newcastle have both publically denied knowledge of the draft

report's contents on Carrington.

In February, the Port of Newcastle lodged a detailed submission, labelling the section on Carrington as a "significant error" and not aligned with its long term plans.

"Our submission to the NSW Government re: the *Draft Greater Newcastle Metropolitan Plan* noted the error in the draft plan and requested that it be corrected," A Port of Newcastle spokesperson told *The Australian Mining Review*.

"Port of Newcastle supports the continuation of coal exports at the PWCS Carrington Coal Terminal.

"This land is part of Port of Newcastle's landholdings under its 98 year lease with the NSW Government which commenced on 30 May 2014."

PWCS also told *The Herald* in February it was "very surprised and concerned" and it "did not know the statement within that draft would be there".

However, the NSW Department of Planning and Environment said it took advice from many people and agencies when preparing the draft plan.

"In relation to the Carrington coal terminal, there were concerns about the potential for conflict between the coal terminal and the adjoining residential," a Department spokesperson said in an emailed statement.

"We were also aware of the potential for a change to the nature of parts of Newcastle Port as tourism opportunities grew.

"The draft plan has suggested some options for the potential conflict to be resolved."

The Department said during the exhibition period the Department had spoken with residents in Tighes Hill and Carrington and key stakeholders including the operator of the coal export terminal, to

discuss the future of the Port of Newcastle.

"There are long standing and opposing views from the coal export operator and the local residents about the coal export facility. The Department is listening to both views," the spokesperson said.

"The Department will review all submissions collected during the draft plan's public exhibition, which closed in late February. A final plan will be released later this year."

According to the PWCS, the company has been discussing a lease renewal for Carrington with the Port of Newcastle (beyond 2024) for years, with views of coal being a continued force at the Port.

Yet some argue Kooragang can essentially handle PWCS' share of the load at current levels.

In 2017, PWCS received, stockpiled, blended and loaded 104.6mt of coal from its Carrington (14.6mt) and Kooragang (90mt) terminals, compared to 109.6mt in 2016.

Kooragang has a licenced capacity of 120mtpa, while Carrington has a capacity of 25mtpa, which means, in theory, Kooragang is all that's needed to fill demand at this point in time.

A PWCS spokesperson said it was correct that tonnage only appears to require Kooragang, however "there are periods of time where we need capacity to support Kooragang".

"There are certainly times where we're loading ships at a very rapid rate," the PWCS spokesperson told *The Herald*.

In fact, in early April PWCS's two terminals had 11 ships waiting offshore at various points, which fell to five ships at the end of the month.

In April, the terminals shipped 8.8 million tonnes of coal; 1.2mt from Carrington and

7.6 mt from Kooragang.

Terminal 4: On Hold

While the Carrington debate continues to play out, PWCS has also marked the award of key approvals for its Terminal 4 (T4) project.

T4, also part of the Port of Newcastle, has been in the planning pipeline for years, and was finally approved by the NSW Planning and Assessment Commission (PAC) in October 2015.

In late 2017, PWCS secured another parcel of approvals; the site management plan, priority action statement, and modification plan; giving the company flexibility to adjust to changing circumstances.

T4 has been a key pillar in PWCS' long-term strategy to secure global demand for Hunter Valley coal.

If developed, the third terminal would have capacity for 70 million tonnes per annum and would be a \$4.8 billion investment.

It would also inject \$770 million each year into the Hunter with more than 2900 direct and indirect jobs required at peak construction.

However, PWCS has reiterated T4 would unlikely be built in the near future, with a final decision on construction weighing on growing demand for coal in order for the investment to be viable.

"The responsible approach is to continue to review the demand for Hunter Valley coal and in turn the export services our customers require and maintain the option," PWCS said in its *2017 Sustainability Development Report* released in April.

(CONTINUED OVER)

(CONTINUED FROM PAGE 33)

“While the existing terminals currently have sufficient capacity to meet demand, this may change in the future.”

In 2017, PWCS’ thermal coal exports decreased by 4 per cent with shipments for the year totalling 90.7mt, despite an uptick in coal prices.

Coking coal exports also saw a 7 per cent slump, with shipments for the year totalling 13.9mt.

It’s still unclear how mixed demand for thermal and coking coal will impact the Hunter Valley.

In the Chief Economist’s *March Resources and Energy Quarterly* it said thermal coal consumption over the midterm was forecast to increase in India, South East Asia and other parts of developing Asia to satisfy growing power generation needs, but stagnate or decline elsewhere.

“Western nations appear likely to continue to push to phase down their thermal coal use in favour of renewables and gas, the latter both for heating and power generation,” the report stated.

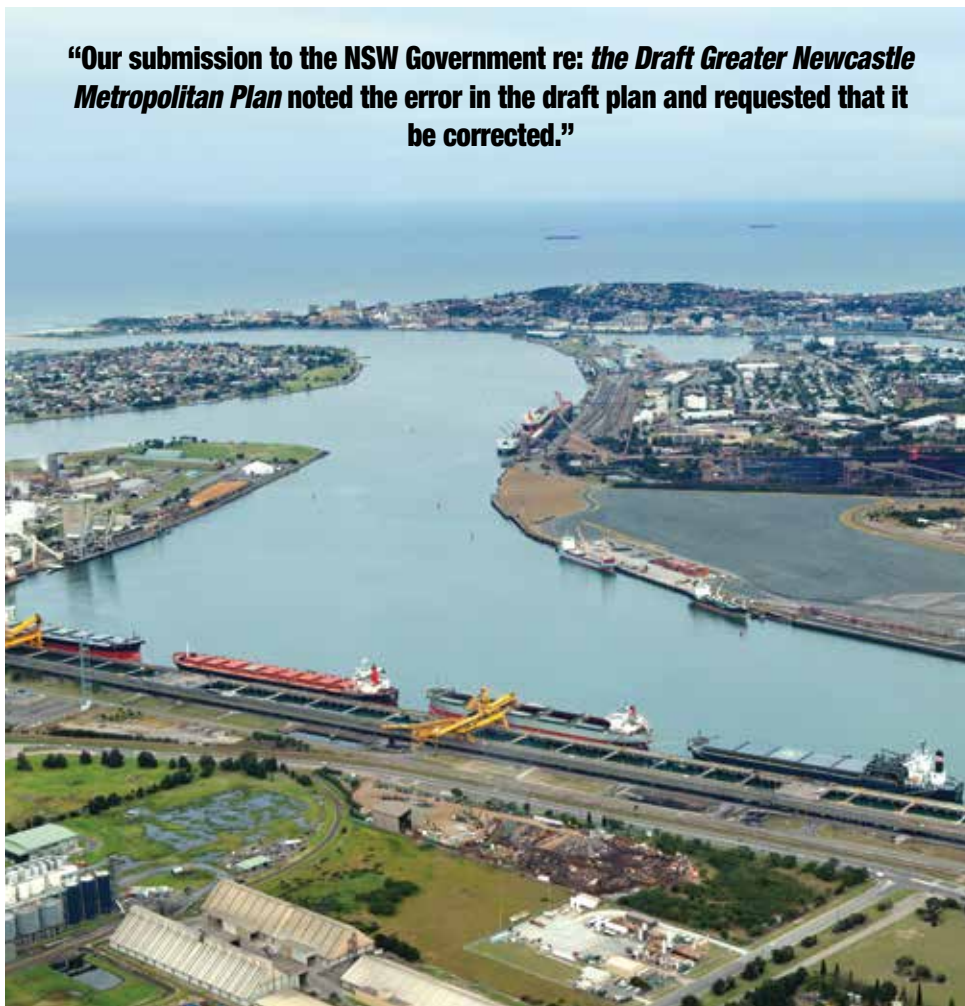
“Australian export earnings are expected to hit a record \$22.9 billion dollars in 2017–18 before declining to \$17.1 billion in 2022–23.

“Gains in Australia’s share of world seaborne trade rest on obtaining more of the (likely faster growing) Indian and ASEAN markets — the former currently being dominated by relatively low grade Indonesian and South African coal.

“The forecasts assume that Australia has some success in this endeavour: the higher quality of Australian coal will be needed to prevent the further build-up of air pollution, which is now a chronic problem in some of the larger Indian cities.”

Time will tell when – and if – T4 is

“Our submission to the NSW Government re: the Draft Greater Newcastle Metropolitan Plan noted the error in the draft plan and requested that it be corrected.”



needed to meet global demand.

Pushing Forward

Despite a decrease in tonnage in 2017, PWCS said its operational performance has been strong through a focus on “better planning and improved reliability”.

In July 2017, the Carrington and Kooragang terminals achieved a weekly

shiploading record of 2.76mt, and a reduction in vessel turnaround times.

And on 20 January – after four days of adverse weather – a new record of 512,504t was set at the terminals, breaking the previous daily shiploading record set in May 2016 by more than 10,000t.

PWCS chief executive Hennie du Plooy said the port actively continues to plan and remain flexible in changing circumstances

to benefit its customers, the coal chain and the community.

“The performance is a testament to the quality of our people – working together as one outstanding team, to deliver quality, agile service for our customers and the region,” Mr du Plooy said.

In 2017, two new shiploaders were integrated at Carrington (a \$60 million investment), along with other improvements, including two computer technology improvement projects which will be completed in 2018.

PWCS even partnered with its four rail haulage providers to automate all six of Port Waratah’s dump stations.

“This initiative delivered greater operational efficiencies to the Terminals while also reducing risks to employee safety,” PWCS said in its April report.

At a corporate level, the PWCS board had some new additions, following the sale of the Rio Tinto – Coal & Allied thermal coal asset to Yancoal Australia; a deal which included its 30 per cent shareholding in PWCS.

“My role and the chairperson role were retained through the transition and Port Waratah’s strategic direction has been sustained,” Mr du Plooy said.

Mr du Plooy said the company would continue contributing locally, after more than 80 per cent of its 2017 expenditure was spent in the local region (about \$80 million).

“In addition, we invest three quarters of a million dollars annually in local community projects, and are proud that 74 per cent of our employees live in the Newcastle and Lake Macquarie local government areas,” Mr du Plooy said.

“Our strategic focus is to meet the changing expectations and demands of our employees, customers and community.”

The power of smart technology

NATIONAL

THE internet has changed the way people today live their lives.

It’s altered how they order takeaway food, find directions when travelling, communicate with people across the globe, and ever more increasingly, how they complete their jobs.

In industry today, the Internet of Things (IoT) and Industry 4.0 can be seen in a negative light with a perception that robots are taking everyone’s job.

In reality, most of this technology exists to assist the labour intensive, time-lengthy work – not override it.

IoT solutions involve installing sensors to new or existing systems, which provide performance feedback.

Types of feedback include when and where a repair is required, when a filter or part needs to be changed, and reports on machine efficiency.

This allows owners and operators to make smart decisions regarding their operation.

Custom Fluidpower has designed a hydraulic filtration package with smart technology, which enables businesses to monitor their hydraulic system health and predict major problems before they lead to costly downtime.

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Custom Fluidpower’s hydraulic filtration package designed with smart technology.

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The filter design can easily be adapted to the system’s existing filter element, which allows for a quick and cost-effective

installation without the need to change filter element part numbers.

Once installed, the Custom Fluidpower team can provide continuous monitoring to ensure systems are running smoothly.

Reports can be frequently produced and assessed to see if improvements can be made to decrease consumption or increase

the life of the filter elements.

More information on the smart filtration solutions, or how IoT technology can be implemented into new or existing systems, can be found by contacting Custom Fluidpower on 1300 781 178 or by visiting www.custom.com.au.

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A GROWING RESOURCE

Boosted by a cash balance of \$87 million, junior gold producer Silver Lake Resources is poised to add a fourth mining centre, Aldiss, to its Mount Monger operations after successfully executing a three year strategy to optimise value from existing production.

All images: Silver Lake Resources.

CAMERON DRUMMOND

MOUNT MONGER, south of Kalgoorlie in WA, is home to a highly-endowed gold camp with multiple mines and a history of replacing reserve life.

Following the major gold discoveries at Kalgoorlie in 1893, prospectors found gold 50km southeast of the town near Mount Monger in 1896.

The main production period started in 1916, when several mines were developed close to the Mount Monger homestead.

Some of these were the Caledonian, Daisy, Big Bull, Leslie, Pauline, Milano, Haoma and Maranoa mines.

Records show that the average production grade for all of these mines was in excess of one ounce (oz) per tonne (t) – more than 32 grams per tonne (g/t) in modern terms.

The Mount Monger field continued to be mined on a small scale over the next 50 years, with mine development and exploration activities driven by the gold price.

Mount Monger eventually consisted of 25 mine workings exploited by either small scale underground mining or shallow open pit.

Most of this mining did not extend more than 50 metres below the surface, and very little exploration had previously been completed below and along strike of these areas.

During this period the Mount Monger field remained unconsolidated with numerous mines operating along the tenements.

In 2003, the Daisy Milano underground complex was formed as part of a strategy to consolidate the remaining high grade Mount Monger field by buying out independent prospectors.

Then owner – Ridgeview Nominees – sold Daisy Milano to Perilya in 2005 for \$3.2 million.

Perilya had to transport ore more than 100km to other plants in the region, and eventually put the mine on care and maintenance in 2007.

Silver Lake acquired Daisy Milano for \$14.5m at the end of 2007, and first gold was poured in 2008.

Over the next few years Silver Lake began and completed mining operations at Christmas Flat, Wombola and Wombola Dam.



The Randalls gold processing plant.

In January 2013 Silver Lake bought out Integra Mining for \$426m, which included mining operations in the Mount Monger region.

Assets included the 1.2 million tonne per annum (mtpa) Randalls gold processing facility, Maxwells open pit, and the Cock-eyed Bob underground mine, as well as a significant exploration package in the Mount Monger area.

Currently, three established mining centres, the Daisy Complex, Imperial/Majestic, and Mount Belches feed the centrally located Randalls mill at a rate of 150,000 ounces per annum (ozpa).

A value optimising strategy was implementing in 2015 to achieve consistent high-grade mill feed through its three mining centres while new mines were being developed/ramped up.

Over the last three years, this strong focus on cost controls was able to maintain all-in sustaining costs (AISC) below gold sale prices, leaving Silver Lake in the enviable situation to develop its fourth mining centre, Aldiss, in a cash positive position.

Pre-development works at the new mining centre began at the start of the June quarter.

Production Increase

Results from the March quarter showed record gold production from Mount Monger, underpinning a substantial increase in the company's quarterly cash flow.

310,000t of ore was processed through Mount Monger's Randalls processing facility during the quarter grading at 4.98g/t to

produce 46,780oz, a 36.7 per cent increase from the December quarter.

Of this, 45,200oz were sold during the quarter, a 31 per cent increase on the December quarter and 21 per cent higher than any previous quarter.

Quarterly AISC of \$1168/oz reduced the year-to-date AISC to \$1302/oz, leaving Silver Lake well positioned to deliver its full year cost guidance.

Despite investing \$8m on exploration and capital development during the period, Silver Lake ended March with a cash increase of \$20.6m, leaving the company with a total cash and bullion balance of \$87.3m and zero debt.

The strong results also lifted Silver Lake's FY18 sales guidance to between 145,000oz and 150,000oz.

"Record March quarter production and strong cash generation from Mount Monger was underpinned by higher mined grades from both underground and open pit ore sources and is a direct result of our investment in the field," Silver Lake managing director Luke Tonkin said.

"Silver Lake remains favourably positioned to end FY18 strongly and is exceptionally well capitalised to pursue value creating opportunities for our shareholders."

At the end of March, the company's forward gold hedging program totalled 142,500oz, to be delivered over the next 26 months at a lucrative average forward hedging price of \$1720/oz.

Exploration

The company's \$12m exploration program

is focused on targets in the Mount Monger camp, with the objective of delivering lower cost discoveries proximal to existing mines and mine infrastructure.

Drilling during the quarter returned strong results across all mining centres, demonstrating the potential for new lode discoveries and extensions to known lodes.

New lode structures discovered at Daisy North and Easter Hollows had "increased the confidence in the potential for new mining fronts", higher in the mine elevation and proximal to existing development at the Daisy Complex.

At Mount Belches, drilling commenced at Santa, targeting high-grade BIF hosted ore shoots beneath the existing open pit floor to assess the potential for a third shallow underground mine, complementing the in-production Maxwells and Cock-Eyed Bob mines.

With final board approval for Silver Lake's fourth mining centre, Aldiss, received in March this year, pre-development works kicked off in April.

The Aldiss mining centre is comprised of the Harry's Hill and French Kiss deposits, with the possible addition of Karonie South following recent resource definition drilling.

Once established, Aldiss is expected to provide "base case" open pit production of between 130,000oz and 150,000oz between FY19 and FY21.

Silver Lake has flagged the delivery of first ore to the mill in the latter part of the 2019 September quarter, which "dovetails" with the drawdown of stockpiles after completion of the Imperial open pit.

"A hybrid owner-operator mine model will be adopted at Aldiss whereby all major earthmoving equipment will be dry hired with Silver Lake providing all operating labour," the company stated.

"The adoption of this model (as opposed to engaging a mining contractor) results in an accelerated mine plan and an improvement in project margins."

Silver Lake said that once the Aldiss mining centre was established it would focus on broadening the deposit to several near surface exploration targets along the north-trending shear zones that host the Aldiss gold deposits known as the "SAT" trend.

Thrifty expands Kalgoorlie operations

WA

WITH more than 3000 vehicles and a branch network of 17 locations across the state, Thrifty WA is a 100 per cent WA-owned and operated vehicle rental business, forming part of the national and international Thrifty brand – a combination of local knowledge and global strength.

Thrifty WA has a large range of vehicles available for hire; from cars, trucks, buses to 4WDs, utes, vans and full mine equipped vehicles.

This year, the company is proud to celebrate 40 years servicing the metropolitan, country and regional areas of WA.

Thrifty's philosophy of providing bespoke vehicle solutions is still the primary focus of the company and the reason it has remained a trusted name throughout WA.

An upturn in mining activity gave Thrifty the final nudge it needed to expand its Kalgoorlie-Boulder operations.

The multimillion dollar expansion to a new location at the Kalgoorlie Airport is set to be up and running by mid-August this year.

The new facility will allow the business to bring its new arms of service — retail car sales, external mechanical services and vehicle leasing — to the region.

"The strengthening of the resources part of the economy has given us



Thrifty WA is expanding its Kalgoorlie operations to service the growing Goldfields mining sector.

the confidence to steadily build our operations State-wide and the Goldfields has lots of opportunity at the moment and more coming," Group general manager David Hendry said.

"We are diversifying our company; we are very much Thrifty vehicle rentals but

we also offer complete fleet management solutions – from long term leasing to mechanical servicing and repairs, with tyres, batteries and windscreens; plus we sell cars, trucks, four wheels drives and more.

"The new facility is designed to do the

whole lot.

And it's an opportunity to grow; the Goldfields at the moment is growing and we want to be able to grow with it, so a bigger, more efficient and state-of-the-art facility here gives us the capability to do that."

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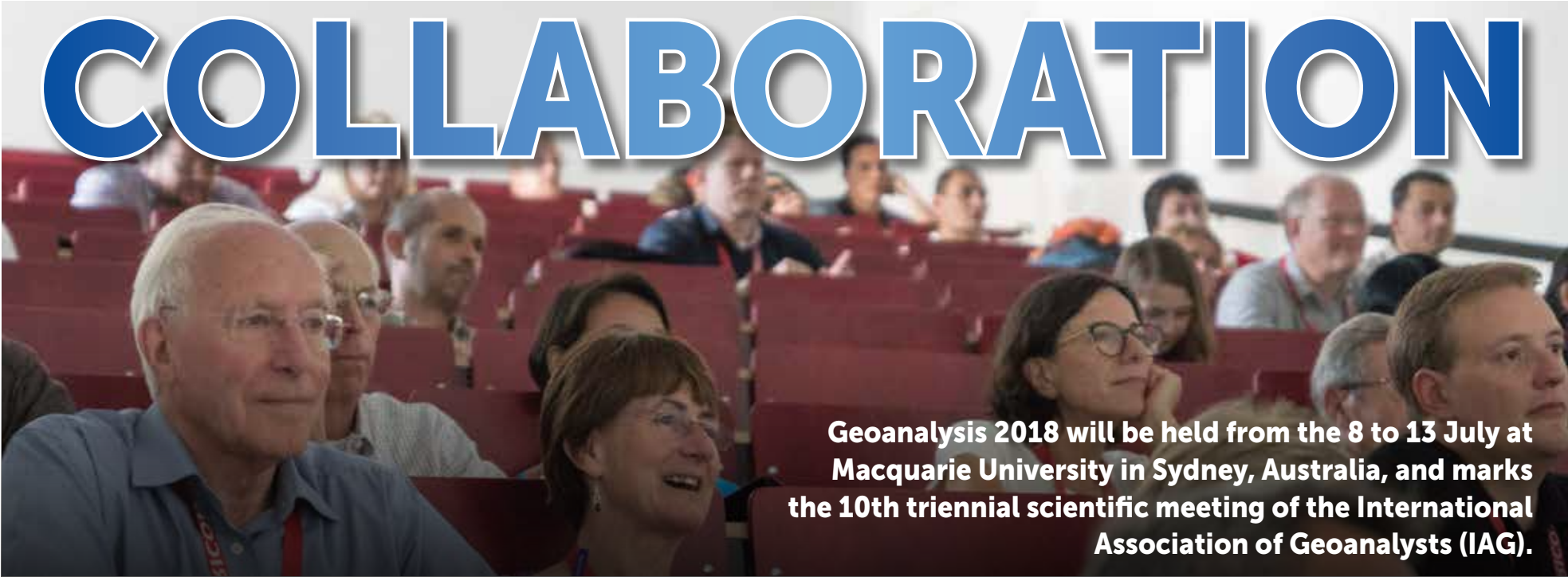
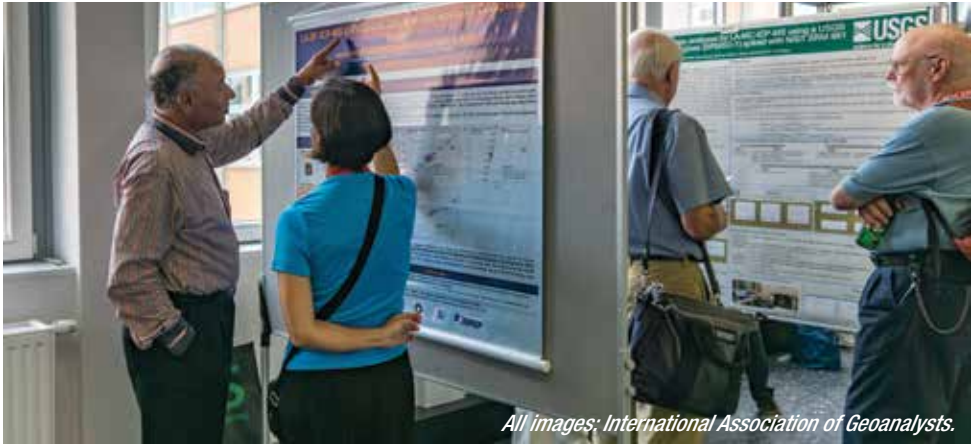
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KEYNOTE SPEAKERS

SESSION 1

Reference Material production
and applications

Stephen Wilson

(U.S. Geological Survey, Denver, CO USA)

SESSION 2

Geoanalysis in mining, exploration and
remediation

Danielle Toase

(Arcadis Australia Pacific)

SESSION 3

Dating, geochemical mapping and
imaging with elements and isotopes

Jon Woodhead

(University of Melbourne)

SESSION 4

Instrumentation and new developments

Chen Wei

(China University of Geosciences, Wuhan)

CAMERON DRUMMOND

GEOANALYSIS 2018 provides an opportunity to meet with colleagues and discuss the latest developments and future needs in the field of measurements applied to geological and environmental materials.

It is also hosting significant company exhibitions that testify to the traditionally strong interactions between the community of analytical geologists and environmentalists and industry.

The event is backed by leading industry companies including Rio Tinto, ThermoFisher Scientific, Bruker, CAMECA, Core to Crust Fluid Systems, and Agilent.

Strong links with industry are also demonstrated in the two pre-conference workshops, which are run by teams of colleagues from industry and academia that focus on applications of specific analytical instruments for elemental, isotopic and mineralogical applications for industry and research.

During the conference, four scientific sessions will cover the latest advances in geosciences, including geochemical reference material, geoanalysis in mining, exploration and remediation; as well as latest news in instrumentation and new developments.

The keynote talks will be given by distinguished researchers from academia, including Professor Jon Woodhead from the University of Melbourne and Professor Wei Chen from China University of Geosciences, as well as industry speakers Stephen Wilson from the US Geological Survey and Danielle Toase from Arcadis Australia Pacific.

Jon Woodhead's keynote presentation will explore recent developments in the LA-ICPMS technique as an imaging tool and exciting new opportunities for the future.

Wei Chen will focus on the new developments for the in-situ carbon isotope analysis by laser ablation MC-ICP-MS approach.

Stephen Wilson will talk about the significance of the newly developed shale reference materials to support the needs of the petroleum industry and research community for the next 10 to 20 years.

Danielle Toase's presentation will describe the physio-chemical properties, fate and transport behaviour and analytical challenges associated with measuring of synthetically produced highly-fluorinated organic compounds in the environment.

These organic compounds are highly mobile, resistant to environmental degradation and have been shown to bioaccumulate in the ecosystem.

They naturally resistant to degradation by hydrolysis, biotransformation and abiotic reduction, thus the management of waste and contaminated soil is highly challenging.

IAG – Sponsoring Growth

The mission of IAG is “to serve as an international forum for the advancement of geoanalytical science and to promote the interests and support the professional needs of those involved in the analysis of geological and environmental materials.”

One of the industry body's main objectives is to organise conferences and meetings and to act as the main sponsor of the Geoanalysis series of conferences, as well as encouraging younger scientists in the profession and their participation in meetings.

Macquarie University in Sydney, Australia was selected by the IAG Council to host the 10th of the IAG's main triennial conferences.

The venue was chosen because of Macquarie's importance as a leading centre of geochemical and environmental microanalysis and as a thriving hotspot for research in earth sciences.

The conference offers the opportunity to young scientists to get international exposure to the leading scientists in the field of geoanalysis.

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Isotope ratio mass spectrometry (IRMS) is a widely used technique for measurements of stable isotopic compositions and is employed in different applications for environmental and geochemical studies.

One example is paleo-environmental reconstruction based on carbonate measurements. In the past, high throughput and high precision of the measurements could only be achieved with a Thermo Scientific™ Kiel Carbonate Device connected to the IRMS via the dual viscous flow inlet system or as a second option with the Thermo Scientific™ GasBench II™ with the carbonate option. Now, in addition to IRMS systems, Thermo Fisher Scientific™ offers a laser-based and field

deployable instrument: the Thermo Scientific™ Delta Ray™ Isotope Ratio Infrared Spectrometer (IRIS) with the Universal Reference Interface (URI) Connect. Because of its size and robustness, the Delta Ray IRIS with URI Connect can be moved and installed much easier than mass spectrometers and it offers a possibility of direct measurements in the field.

Access this paper now to learn about the sample preparation and sample processing method for the determination of the isotopic composition of carbon ($\delta^{13}\text{C}$) in dissolved inorganic (DIC) and carbonate material with the Delta Ray IRIS and URI Connect and provide a comparison with traditional mass spectrometry methods.



thermofisher.com/IRMS-Carbonates-Seawater

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INDUSTRY SPOTLIGHT

COMPANIES GEARING UP

Botanical consulting minimises risks, costs

WA

WESTERN Australia is well known for its huge range of wildflowers and native plants that are endemic to the State.

In fact, there are more than 12,000 named species of land plants in WA, many of which are found nowhere else on the continent.

The exploration and mining industries play a major and rarely recognised role in conducting flora surveys that add to the State's knowledge of its flora and vegetation.

As a leading WA-based botanical service company, Western Botanical has been servicing the exploration and mining sector since the early 1990s.

Company founder and director, Geoff Cockerton, was inspired, like many of his colleagues, to enter the environmental industry by the awakening of knowledge about WA's native plants and animals through popular programs such as Harry Buttler's *In the Wild* series.

Since then, Mr Cockerton and his teams of botanists have worked as environmental practitioners in WA and conducted studies from the Kimberley to the Goldfields and the south coast.

"We have been extremely fortunate to have had some wonderful opportunities to travel to remote parts of the State, undertake detailed and extensive surveys of



The WA mining industry makes a huge contribution to science through the discovery of new flora species.

the flora and vegetation, assist our clients in understanding the environment in which they wish to operate, and find ways of enabling their mining operations to proceed while minimising impacts on significant flora and vegetation," Mr Cockerton said.

No-one likes challenges in developing a mining proposal.

Time is money, and delays could mean missing the price opportunity for a commodity or adding significantly to the

cost of development.

"That is why it is important to do our work diligently, to advise our clients of any limitations early in the process so they can make amendments to their plans before they make final funding commitments," he said.

"An eleventh hour problem is painful and costly for everyone."

Problems can be in the form of rare plants, new species that are poorly known

or vegetation communities that are restricted and not widely distributed.

"Funnily enough, the mining industry is targeting unusual geology containing the various minerals they have a market for," he said.

"Weird rocks make weird soils, which then often grow weird plants."

Mr Cockerton said new species are still being found in WA at an "astonishing rate" and often in the most unexpected places.

One example is recent findings of new *Acacia* species in the north-eastern Goldfields during 2016-17.

"We were conducting EIA surveys north of Menzies when we found some small trees with pods that just didn't match our knowledge of named species in that region," he said.

"This led to targeted surveys in a broader region which then confirmed several new species of *Acacia* trees that are associated with the greenstone geology of the north-eastern Goldfields.

"Fortunately, while these represented new species and potential problems for mine site development for two of our clients, we were able to confidently report extensive populations of each of the new species over a broad range and also determine why they grew in such a restricted fashion."

More information on Western Botanical's services can be found at: www.westernbotanical.com.au.

Right-first-time environmental solutions

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» Botanical Consulting

- Flora surveys and monitoring
- Vegetation mapping and management
- Targeted threatened flora searches and recovery planning
- Rehabilitation assessments
- Development of practical completion criteria for Mine Closure Planning.

» Revegetation Services

- Revegetation planning and implementation
- Rehabilitation monitoring and maintenance
- Native seed collection, cleaning, storage and supply
- Weed management programs.

Here at Western Botanical we have been providing integrated botanical consulting and revegetation services across WA for more than 20 years.

westernbotanical.com.au

We have worked across projects of all types and sizes with WA's leading mining companies, including Rio Tinto Iron Ore, BHP Billiton, Fortescue Metals Group, Anglo American, Ravensthorpe Nickel Operations, and more.

✉ info@westernbotanical.com.au



**Western
Botanical**

Setting the standards in guarding

NATIONAL

WITH more than 30 years' in the mining industry, NEPEAN Conveyors has the experience and the people to audit existing guarding.

NEPEAN Conveyors is more than a conveyor system original equipment manufacturer (OEM); it is one of the world's largest OEM's and industry leaders in conveyor products, including designing and manufacturing modular guarding systems for use on all bulk materials handling conveyors.

With ergonomic designs that meet or exceed all relevant Australian standards, NEPEAN customers receive high-quality conveyor solutions at better prices and reduce the amount of vendors they need to be in contact with on a day-to-day basis.

Through the recent change in the Conveyor Guarding Standard there is an increasing emphasis on safety around conveyors and moving machinery.

Equipment guarding acts as the ultimate personal protection, providing entanglement protection, pinch point protection and impact protection.

The challenge associated with designing guarding is adequately protecting personnel from the hazards of moving parts without interfering with the operation and maintenance of the plant.

NEPEAN provides sound practical advice on clients' level of compliance and provide cost-effective solutions to rectify non-compliance issues.



NEPEAN Conveyors is across the recent change in Conveyor Guarding Standards.

The company's safety guarding systems can be direct machine mounted or totally free standing designs, and comply with the new Australian standards.

The boltless systems are standardised to improve efficiency, and are rapidly assembled and dis-assembled to minimise any impacts on maintenance or production down time.

All structural components are manufactured to exacting standards from galvanised material powder coated in either safety yellow or black to suit the end user's requirements.

NEPEAN's purpose designed and manufactured latching system is manufactured from stainless steel to last the test of time in the harshest of

mining environments.

All guarding is designed with the end user in mind, ensuring ease of handling, installation and transport — saving time and money.

NEPEAN Conveyors is the materials handling partner for robust mining solutions.

Get the Complete Regal Experience

Regal Engineering & Line Boring is dedicated to providing excellence in engineering by integrating experience, efficiencies, quality and safety into every project we are given.



The Regal Experience

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Supply Partners: AURY TALON VICTAULIC

Custom switchboard solutions

NATIONAL

POWER distribution systems built for mining applications need to be robust in design and quick to manufacture.

This is an area Victorian-based DaRa Switchboards prides itself on offering its clients; with almost 10 years' experience pioneering electrical switchboards that meet high electrical standards, client budgets, and project deadlines.

"Our mission is to relentlessly revolutionise switchboard design, manufacture and speed of delivery to energise Australian mines, industries and cities," DaRa Switchboards managing director Shanaka Unantenne said.

With a deep understanding on the importance of the latest technology, the team have the capability to manufacture any type of switchboard, from a small load centre to 3200A motor control centre.

"Our mining duty grade switchboards are used in many mines in WA, including BHP's Nelson Point facility," Mr Unantenne said.

"We are also currently manufacturing switchboards for part of BHP's Mulla Mulla workers' village to support Mining Area C and match BHP's highest standard in electrical infrastructure."

Mr Unantenne said while the investment in Australian manufacturing has been in decline, Dara Switchboards has expanded its operation in the last 12 months to two new purpose-built assembly plants specialised in producing switchboards in record time.



More information on the company's services can be found at: www.electricalswitchboards.com.au.





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World class mining services

NATIONAL

CMI Technical Services began in 2011 as a single man operation with company managing director Zeb Ogilvie as the brain child.

From humble beginnings, the company's original offerings were mill installation management and maintenance.

However over the years this has grown into much more; services extend to mill and crushing plant, CIL, flotation, thickeners, and wash plants to suit diverse commodities.

The team also offers construction management, procurement, commissioning planning and management, asset management, condition monitoring, and training and development.

Reflecting on the company's seven years in business, Mr Ogilvie said customer satisfaction has always been his main driving force.

"Our potential and growth has gone down the simple path of customer satisfaction," Mr Ogilvie said.

CMI Technical Services general manager Tito Chacone echoed Mr Ogilvie's views, citing a focus on customers as the



More information on its services and products can be found at: www.cmitech.com.au.

company's recipe to success.

"Our team is very diverse; we have professionals now coming from around the world and different industries to join the CMI family, all with the one mantra that has propelled us — precision and customer satisfaction," Mr Chacone said.

"We are lucky in that we are now in many different facets of maintenance in mining, oil and gas as well as touching on marine.

"New additions to our maintenance equipment, include one of the only fully mobile lineboring units in Australia capable of 254mm (10") to 1524mm (60")

bore diameters.

"This unit in particular has proved to give better accuracy and faster finish times for bores more than 500mm (19.68") due to heavier cut and feed rates through a superior set up in rigidity over smaller boring bar units."

LINX looking to partner with mining innovators

NATIONAL

SINCE LINX Cargo Care Group parted ways with Patrick and Pacific National following the sale of Asciano in 2016, the group has enjoyed the opportunity to reinvent itself and re-establish its position as a leading supplier of supply chain solutions.

Unencumbered by industry allegiances from the Asciano era, LINX has embarked on a mission to forge new partnerships with future-focused innovators determined to create competitive advantage in an increasingly competitive and demanding marketplace.

LINX's renewed focus on delivering end-to-end solutions for a wide range of customers is founded on its proven expertise across materials handling, stevedoring, warehousing, transport and rail, including an extensive track record providing services to the mining and resources sector across Australia.

In Port Kembla, NSW, LINX partners with a central NSW-based mine to transport bulk product to key export markets.

Its vast supply chain experience and trusted partnership with the customer has enabled LINX to implement an industry-leading ship loading revolving loader technology with specialised containers that delivers proven environmental benefits and productivity gains.



LINX' award-winning Port Kembla team.

The LINX team delivers for the customer an operation that accounts for all cargo, is productive and environmentally friendly and is endorsed by the local EPA.

LINX is now looking for more partners who share the same passion for creating efficiency and driving productivity gains from the pit-to-port supply chain.

For more information, the LINX customer team can be reached via email on communications@linx.com.au or on 1300 487 837.



CASE STUDY



Blackhead Quarries general manager Tony Hunter.

ESTABLISHED in 1986, Blackhead Quarries is a joint venture between Palmer & Son (founded in 1880) and Fulton Hogan and operates a number of quarries in the region surrounding Dunedin, on New Zealand's South Island.

Opened in the 1950's, the company's Blackhead Quarry, located at Blackhead on the seaward side of Green Island, produces 300,000 tonnes per year.

The company also operates quarries at Logan Point, in Dunedin and Balclutha as well as the Walton Park sand plant in Fairfield. The Balclutha quarry, about 80km south-west of Dunedin, is the largest producer of quality aggregates in the South Otago area and supplies around 30 different products.

With a population of approximately 130,000 people, Dunedin is the second largest city of New Zealand's South Island and is the principle city of the Otago region, with the harbour and the hills surrounding it being the remnants of an extinct volcano.

It has a diverse economy, but the city's most important activity centres around tertiary education – Dunedin is home to the University of Otago, New Zealand's oldest university (established

in 1869), and the Otago Polytechnic.

While primary industries are the main economic drivers of New Zealand's economy, in recent years the Otago region has experienced a large increase in tourism. As a result, local government authorities have increased their expenditure on infrastructure in the region, driving strong demand for quarry products.

Investing in the Future

Until recently, Blackhead Quarry's Balclutha quarry operated a fixed crushing plant that required rock to be transported up to 5km from its primary sources to the ageing facility. In the interest of improving operational flexibility and safety, the company decided to invest in a new mobile crushing and screening plant for its Balclutha operations.

Blackhead Quarries has extensive experience with Metso equipment, having bought its first Lokotrack mobile impact crusher back in 2005. With its latest acquisition, Blackhead now operates the largest fleet of Metso mobile crushing and screening equipment in New Zealand.

But the company's relationship with Metso and Mimico, Metso's exclusive dealer in New Zealand, dates back a lot further than that. Much of the equipment in the company's original fixed plants includes Nordberg, Allis Chalmers and Barmac machines which can all be traced back to Metso origins.

General Manager of Blackhead Quarries Tony Hunter has been involved in the industry for over 30 years and is a fifth-generation descendant of one of the company's original founders. Tony has overall operational responsibility for all of the company's quarries.

He said that being near the sea, the Blackhead quarry's fixed plant, which had been in place for over 30 years, was suffering from extensive corrosion issues. Management was worried about the safety of fixed walkways and the quarry's 23 conveyors.

"Five years ago, we decided it was

best to build a whole new plant at Blackhead with only nine conveyors and no walkways," he said.

In doing so, the existing Nordberg C100 jaw crusher, a cone crusher and Barmac 9600 crusher were relocated. The new plant is fully automated and was designed to keep the amount of structural steel work to a minimum, which led to the elimination of walkways.

"For maintenance we use cherry pickers, which give better access to the equipment than walkways and in our opinion, are much safer for our maintenance staff," he said.

Hard Rock Drives Need for Reliable Wear Part Supply

Gavin Hartley is the quarry manager at Blackhead quarry, and has 10 years' experience with the company. He describes his job as "making stones as cheaply and efficiently as possible while ensuring that his staff is safe."

"Staff compatibility and continuity are very important, as is giving our people the right tools for the job," he said.

The Blackhead quarry produces a full range of quarry products, including base courses (for road base), sealing chip, asphalt dust, and railway ballast. The rock quarried in the Otago area is a heavy, fine-grained rock that is hard, brittle and abrasive.

"Jaws and liners typically last about 3500 hours, and Barmac tips only about 500 hours," Mr Hartley said.

"Bucket teeth can last anything from 800 to 2000 hours."

So reliable, local supply of wear and spare parts is very important.

The Importance of Local Support

"Here in New Zealand we are a long way from Finland, or other countries where rock crushers are manufactured," Mr Hunter said.

"It's important that we can get ready access to the support we need, because a crushing equipment failure can stop our production."

MIMICO Crushing & Screening Business Manager Garth Taylor agrees.

"New Zealand is a small country and Dunedin is a small community," he said.

"If Blackhead Quarries has two LT106 jaw crushers they only need one set of spare parts. They have two of New Zealand's 12 LT1213 impact crushers. The significant population of Metso machines in New Zealand means that we keep a comprehensive range of spare parts to support our customers."

While there are now more brands of crusher available in the New Zealand market than ever before, Mr Hunter likes to work with organisations that support the local quarrying industry.

"The large number of Metso crushers in New Zealand means that there's good support locally," he said.

"Wear parts are one thing, but these technically advanced machines can be stopped by the failure of a small component like a sensor. While we perform most of the maintenance ourselves, it is good to have local technical support. MIMICO provides all that we need and we have a great relationship."

Blackhead Quarries experienced the benefits of crushing and screening at the quarry face when it introduced its first mobile crusher in 2005. The company has been growing its fleet of Metso Lokotrack mobile equipment ever since, gradually reducing its reliance on fixed plant.

"You can't bust a rock without energy and even though it is fuel efficient, the mobile plant uses a lot of diesel – the machines have quite large motors to move them around as well as for processing rock," Mr Hunter said.

"With our move to mobile equipment and reduction in the number of trucks, our diesel usage has remained about the same, but we no longer consume electricity in our fixed plants – so overall, our energy costs have gone down in the order of \$100k per annum."

According to Mr Hunter, the reduction in truck usage has also delivered significant benefits in respect to staffing levels, site safety and maintenance costs.

(CONTINUED OVER)

(CONTINUED FROM PAGE 45)

Blackhead Quarries now owns a total of 10 Lokotracks across its sites, and is the largest user of these machines in New Zealand.

“Our Lokotrack fleet has become very important to our business,” Mr Hunter said.

“Our original LT1213 unit was the first one in New Zealand and is still operating – and now we have more across our quarries. They are the core of our mobile fleet.

“We bought our first Lokotrack because, at the time, it was the best machine for the job.

“There weren’t as many options on the market as there are today. While we are always evaluating alternatives, we keep choosing Metso because of the strength of the backup available through MIMICO, the great track record and reliability of Metso equipment, and the quality of product we can produce with Metso machines.”

Going Mobile at Balclutha

The company’s most recent addition to its Lokotrack fleet took place in 2017 at its Balclutha quarry, which mostly produces road and construction materials as well as manufactured sand.

A significant part of the quarry’s production also feeds the concrete plant next door. The quarry’s demand tends to be seasonal – the Clutha district council for example has an annual road sealing season, and there are periodic maintenance gravel contracts.

Craig Upston, quarry manager at the Balclutha quarry, is a veteran of the industry. Having been with the company for 25 years, he is a third-generation employee.

“The shape of the product is critical for our customers – if we don’t get it right it will be rejected,” he said.

“Our Barmac crusher helps us to achieve consistent product shape and quality.”

The Metso Barmac vertical impact crusher uses an autogenous (rock-on-rock) crushing method. Its adjustable rotor speed



Mimico’s Garth Taylor discusses mobile Barmac setup with Craig Upston at Balclutha quarry.

and feed rate give operators precise control of the grade and shape of the final product.

From Mr Upston’s perspective, moving from fixed to mobile plant was a matter of future-proofing the quarry.

“We were planning to replace our older Barmac with a new one, and because the market for Balclutha’s product has a lot of ups and downs, being able to move the crusher around to different sites creates better business flexibility,” he said.

The quarry was originally opened some distance from the town of Balclutha, but with the growth of the town bringing suburbia closer to the quarry, the issue of dust has become more of a problem. By eliminating the fixed plant that was close to the road and moving to Lokotrack machines, quarry staff can choose where crushing occurs.

The reduction of truck movement and decommissioning of the fixed plant has made it much easier for the company to manage dust.

At first, Upston proposed putting a new Barmac on tracks then in five years’ time adding a tracked cone and jaw crusher as well. As it turns out, the company’s management loved the idea and acquired all three Lokotrack versions in the same year.

Mr Upston’s first exposure to Metso crushers was the Nordberg GP300 when

Blackhead Quarries took over from Fulton Hogan around 2003.

“We already had a lot of Metso gear and had a great run with the crushers, so it made sense to keep on dealing with the same company,” he said.

“As we were happy with the Metso equipment that we already owned, it was a no-brainer.”

The decision to move to tracked equipment was driven by the need to quarry without access to electricity. Additionally, if the quarry had to relocate, it would be easy to move the equipment elsewhere.

“If you bolt it to the ground there is no flexibility,” he said.

“All the mobile plant is self-powered. We don’t have any three-phase power at the new quarry face, so mobile, diesel-powered crushing and screening is the only way to go.”

Reducing Dependence on Fixed Plant

In July 2017, MIMICO supplied a Metso Lokotrack LT106 mobile jaw crusher along with an LT200HP mobile cone crusher and an ST3.5 mobile screen for the Balclutha quarry. An additional ST3.5 and an LT7150 mobile Barmac VSI (impact) crusher were supplied in October.

At a time of increasing infrastructure expenditure in the growing Otago region, being able to produce large quantities of quality aggregate in a more flexible way allows the company to be highly responsive to market fluctuations, which is important for Blackhead’s future business success.

The company also deploys some of its Lokotrack mobile crushers and screens in contract crushing operations around the Dunedin area and is now looking to purchase another LT106 for a new job that will deliver half a million tonnes of aggregate for a major road building project.

A Positive Outlook for the Future

Technology aside, Mr Hunter sees his people as the company’s greatest asset.

“There are all those buzzwords people use like safety, productivity and profitability, but it all comes down to people,” he said.

“We have a 25-year club here, comprising more than a quarter of our staff, which means a lot of experience.”

The Blackhead Quarries business is like a big family that has existed for five generations, and Hunter wants it to continue to succeed for future generations.

“It’s an inter-generational thing we have here, and as much as we get covered in dirt and dust, it’s a lot of fun and a very good life.”

In a world where concern for the environment means that people look at mining and quarrying with an increasingly critical eye, Hunter has a positive outlook on the future.

“This is a simple business. You can’t have a city without stones, and so we are lucky to be a mature company in a mature local economy, that will always need infrastructure,” he said.

“In buying the Lokotrack equipment, I am trying to set the company on a good path for whatever may happen over the next 10 to 15 years to come and beyond.”

Professional rubber spring solutions

WA

ROSTA Australia is a leading supplier of tensioning, oscillating and rubber suspension technology solutions across Australia and the Asia Pacific Region.

In conjunction with its partners, ROSTA Australia supports the mining and quarrying industries, from large to small operations, with a range of cost-effective products and technical services.

ROSTA components are also widely utilised across all sectors of industry, including industrial, manufacturing, food processing, transportation, agricultural, forestry, fitness and playground equipment.

With a wide breadth of products and applications, and dedication to service, many companies across Australia and the Asia Pacific Region are partnered with ROSTA Australia.

ROSTA’s client partners enjoy the benefit of a dedicated local team, which is further supported by a strong global operation and team of technical experts.

An Extensive Range of Products

ROSTA tensioning solutions (including



ROSTA is a global business with a specialised, local touch.

SE Tensioners and MB Motorbases) are renowned for their durability in any environment, and for their innovative design to assist in the maintenance-free and safe tensioning of belts and chain drives – from the smallest to the largest of drive sizes.

ROSTA oscillating mountings are incorporated into mining and quarrying

related material processing equipment; including vibrating screens, feeders and grizzly’s.

ROSTA Australia supplies a wide range of standard Rubber Suspension Elements that are used within anti-vibration mounts and elastic torsion mounts, to provide superior springing, damping and supporting performance.

Backed by a Global Team of Experts

ROSTA Australia’s commitment to innovation and service began with the inception of the Swiss parent company ROSTA AG in 1944.

The company’s patented rubber spring element was designed to incorporate tensioning, dampening, bearing and suspension capabilities.

This then led the way to an ever-expanding product range that is now utilised the world over.

Today, ROSTA solves a myriad of issues faced by its client partners by prescribing the right products and systems advice.

The extended global team includes more than 100 technical and support staff that can assist in providing an extensive range of ROSTA solutions.

Customers that are experiencing problems related to belt and chain tensioning, coil spring suspension, conveyor load points or vibration isolation, can call the local team on (08) 9248 1588, drop them an email at sales.aus@rosta.com, or check them out at Queensland Mining & Engineering Exhibition Stand A738.

ROSTA’s huge range of products is also available to view at: www.rostaaustralia.com.au.

Powered by quality control

WA

MEGATRONIC Power Systems is a control systems and electrical engineering company based in Perth, WA, specialising in electrical and control systems design, commissioning, and maintenance.

The company was set up in 2013 to provide a trustworthy and efficient service with quality as its key objective.

Its team has demonstrated experience and expertise in engineering, design and project management of small to large projects; from concept and feasibility to completion.

From technical design and implementation, to operator interface, every detail receives specialist engineering precision that both its customers and the company can be proud of.

From an operation and maintenance perspective, Megatronic takes a proactive approach to identifying all risk to operations and advises on appropriate preventative action.

Its team of electrical and control system engineers have a vast range of experience in industries including mining, water treatment, power generation, manufacturing and process plants.

Megatronic is an ISO:9001:2008 certified company and its staff are proud of the quality management system which is the heart of the company's operations.

Through functional project planning,



Megatronic's control systems provide a range of technical capabilities.

control of records and administration, combined with Megatronic's specialist technical abilities, projects are delivered on

time and on budget, to a standard clients can trust.

It is the standout company when it comes

to electrical and control system design and strives to stay at the top through its continual improvement policy.

Agitator Pumps that work

NATIONAL

AUSTRALIAN Pump Industries, Tsurumi's Australia distributors, are proactive in developing applications for slurry pumps.

Tsurumi is now regarded as a leading submersible slurry pump manufacturer, with a wide range of pumps suitable for handling everything from sandy, salty water, to heavy duty slurry found in the quarry, mining or the concrete industry.

The company is highly specialised, making slurry pumps from 2-pole to 6-pole, capable of handling sandy liquids in quarries and concrete plants.

The secret of the products' success is the design of high chrome, cast iron agitators that ensure the smooth suction of the settled matter.

This same philosophy is used in single and 3-phase pumps alike, providing the ability to move solids in suspension that conventional pumps can't handle.

The ultimate extension of the product range is 4 and 6-pole pumps with huge flows, capable of pumping thick slurry.

Tsurumi's 4-pole GSZ Series will handle flows of up to 18,000 LPM, and heads of up to 54m.

The impeller, agitator and suction plate are made of high chrome cast iron to resist abrasion.

Even if the impeller and suction plate wear down to the point of diminishing pump performance, the plate can be easily replaced or its gap from the impeller adjusted, giving users an easy and

inexpensive means of extending use.

Tsurumi's GSD series, a new range of heavy duty, high powered agitator pumps, feature horse power ratings of up to 75kW.

They feature high heads and volumes and are set to change the way the international market thinks about mine, quarry and heavy mineral movement.

The impeller, agitator and mouth ring are made of high chrome cast iron to ensure long use. Tsurumi has developed a unique mechanism for this series that continuously adjusts the clearance between the mouth ring and the impeller.

The pumps in this new series are also equipped with pressure relief ports that release pump pressure applied to the mechanical seals.

This enhances reliability in extended use applications.

Like all Tsurumi pumps, the GSZ and the GSD Series offer Tsurumi's anti-wicking cable entry.

This prevents water incursion due to wicking should the power cable be damaged or the end submerged.

Tsurumi also offer two double silicon carbide mechanical seals, which are located in an oil chamber fitted with a unique "oil lifter".

Australian Pump's Tsurumi division has achieved notable success in the mining and construction markets.

Further information is available by contacting Australian Pump Industries, who have extensive experience with these products in the Australian mining and quarrying markets.



Big GSZ slurry pumps have an inbuilt agitator impeller to make sure the liquid is moving before it comes into the main pump chamber.

United Aero opens Newman ops base

NATIONAL

UNITED Aero Helicopters has long been synonymous with airborne geophysical surveys and the helicopter provider of choice for most survey companies currently exploring in Australia and the surrounding region.

From the company's beginning, low level airborne surveys have been an integral part of United Aero Helicopters' core competencies, which is why it holds a reputation for providing the best low level survey pilots in the industry.

United Aero Helicopters recently expanded its national footprint with the opening of an operational base in Newman, WA, to better service existing and new customers in the Pilbara mining region and is complemented by bases in Sydney, Melbourne, Brisbane, Adelaide and Perth.

An AS350 B3 Squirrel is permanently based at Newman, with further helicopters to arrive soon.

United Aero is one of the most experienced aerial work providers in Australia, with a large modern fleet of helicopters ensuring the business can continuously meet and exceed its clients' expectations.



United Aero's Newman base will help cater for the expanding Pilbara mining sector.

The range of services offered by United Aero Helicopters includes remote area operations, airborne geophysical surveys, seismic surveys, camp resupply and cargo relocation, aerial construction, gas and utility inspections, as well as emergency services contracts – including firefighting – using winch-equipped search and rescue helicopters, as well as VIP IFR charter operations and national media operations for Channel Nine and Channel Seven.

Complementing these services is United Aero Helicopters' in-house maintenance organisation, Aerofix and Part 141 Flight Training School, which offers ab-initio training for commercial and private helicopter pilots and provides students with a unique opportunity to learn within a commercial operation.

Pilot training is also a key factor in United Aero Helicopters' consistent success in providing quality airborne survey flying.

Having experienced survey pilots will not only significantly improve data quality and improve production by reducing costly reflights, but will also greatly enhance safety performance and offer additional redundancies in controlling risk.

It is a formula which is hard to emulate as it takes years to build up this expertise and experience.

More information can be found at: www.unitedaero.com.au.

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Advanced Rockwell Automation MCC up to task

NATIONAL

MOTOR control technologies have advanced rapidly, delivering tighter integration between devices and access to data. These advances provide actionable information to help optimise operations.

“Customers around the world are growing more aware of international regulations, including IEC regulations around the Motor Control Centre (MCC) and safety, so they are really looking for solutions to meet these criteria,” ACS engineering and operations manager Andrew Taylor said.

International Explosives Equipment, ACS and the end user, collaborated on the programming requirements for operating the production facility incorporating a high level of safety, automation and control.

The Allen-Bradley CENTERLINE 2500 MCC from Rockwell Automation was selected as the most appropriate choice for this application.

The MCC features the complete Rockwell Automation Connected Components range, including E300 Electronic Overloads and PowerFlex 525 and 753 drives all on an Ethernet backbone.

“One of the key considerations for international customers is that they are able to find support for their equipment locally,” Mr Taylor said.

Rockwell Automation has a large install base and support all over the world, so this provides some reassurance should a problem arise.”

To minimise any potential downtime, the MCC was assembled as two completely



Rockwell's advanced motor control centre is perfectly suited to the resources sector.

independent systems; with two separate CompactLogix controllers and two PanelView terminals.

Each system was responsible for running two different processes, so if one system needs maintenance, the other part of the plant can continue to run with no interruption.

“The CENTERLINE MCC also provides the functionality to remove a component for maintenance, close the door and continue to run without any danger to the operators,” Mr Taylor said.

Comparing this to the older MCCs, personnel would need to shut down the whole system while the component in question was being worked on.

“The solution was developed using Studio 5000 and we also incorporated aspects of the PlantPax libraries,” Mr Taylor said.

“The temperature, pressure and flow equipment is all supplied by Endress+Hauser which integrates well with the Rockwell Automation system.”

The plant used Ethernet communications

to provide the capability for premier integration of the Rockwell Automation Connected Components, as well as mass flow meters from Endress+Hauser, a Rockwell Automation Strategic Alliance Partner.

The complete system was built as a containerised solution and assembled and tested prior to being packed and shipped to Europe.

Upon arrival the system will be installed and commissioned by engineers from the end user plant and ACS.

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rok.auto/2FBfnHT

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NATIONAL

FOUNDED in the early 2000s, Hydrosshield is an Australian family owned business.

It has grown to service more than 120 clients with an average relationship of more than seven years.

It is an Australian leader in water treatment equipment, services and chemicals for boilers, cooling towers, close loop systems and accommodation facilities.

Hydrosshield focuses on asset maintenance and the prevention, containment and eradication of water borne bacteria across industrial sites, accommodation facilities and home environments.

The company works with local suppliers and government agencies to share knowledge and provide thought leadership on regulation.

Hydrosshield has built a team of technicians with a combined industry



Hydrosshield provides unparalleled water treatment services.

experience of more than 63 years that are dedicated to providing unparalleled service.

The team is agile and able to mobilise quickly when adapting to each client's needs.

They provide immediate attention to all urgent matters with proven triage methodologies.

Hydrosshield instills a tight-knit, personal dedication to its work, and its chief executive David Tozer is available around the clock to personally respond to

customer requests.

Hydrosshield services many large, familiar companies including Qantas, Shell, Ramsay Healthcare and Inghams.

More information can be found at: www.hydrosshield.com.au.

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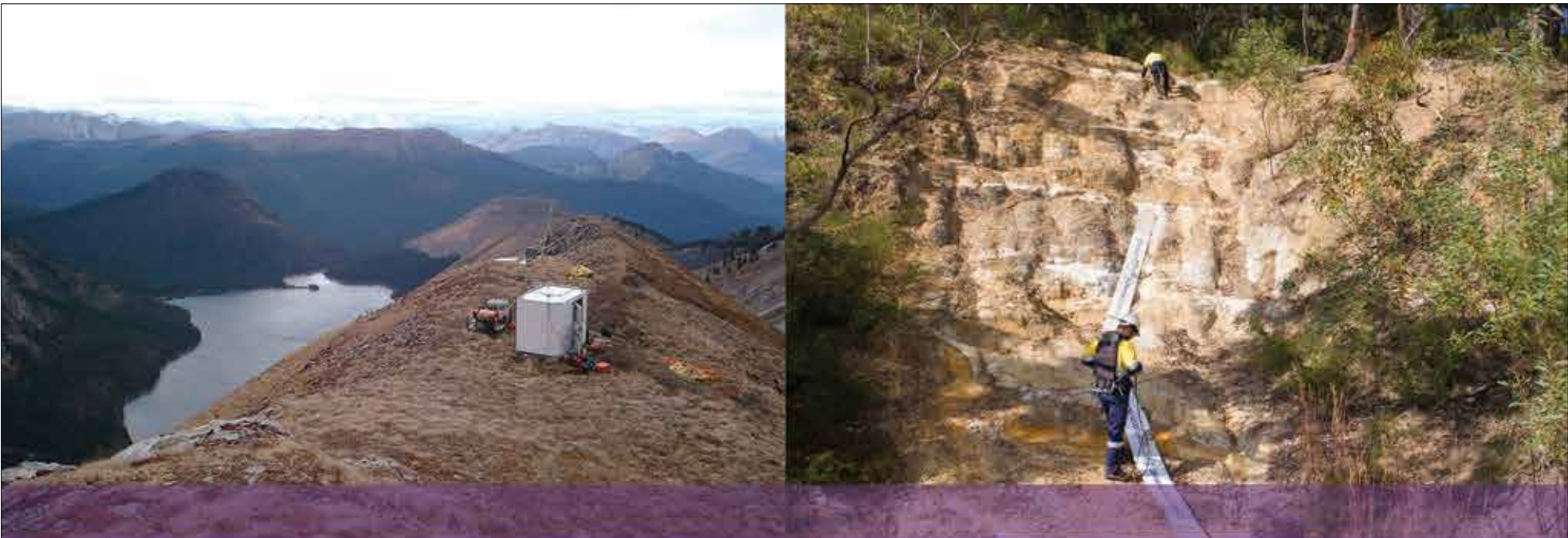
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Seismic shift for mineral exploration under cover

Near surface passive seismic surveying is a rapidly growing geophysical exploration technique in regions with young sedimentary deposits and / or regolith cover, and is rapidly becoming a common tool for mineral exploration programs and assisting with mine development studies. Passive seismic surveying has been the subject of research studies where it has been applied to earthquake hazard mapping and geotechnical investigations. Recent innovations in passive seismometer design and easy to use data processing software by MoHo s.r.l (Italy) have resulted in the development of the miniaturised and self-contained Tromino® seismometer and Grilla software, which have been designed to make passive seismic surveying a simple and rapid subsurface geological prospecting method, which a growing number of geoscientists are starting to use.

The horizontal to vertical spectral ratio (HVSr) survey technique, which the Tromino® seismometer was specifically developed for, is fast becoming a proven passive seismic survey method that provides information about the subsurface through the recording of resonant seismic frequencies and shear wave velocities of near surface geology layers. This information can be used to estimate the depth to strong acoustic impedance contrast boundaries in the subsurface, such as the depth to crystalline bedrock or intra-sedimentary layers and contacts.

What makes passive seismic surveying different to conventional seismic surveying, such as seismic reflection and refraction, is that no active seismic source (e.g. hammer, weight drop, vibroseis or dynamite) is required. Passive seismic surveying exploits natural seismic energy that exists everywhere in the Earth caused by microtremors, wind, waves, anthropogenic sources etc. It can also detect the depth to a steeply dipping interface.

In geological settings where a strong acoustic impedance contrast occurs, such as poorly consolidated sediments overlying crystalline bedrock, the ambient seismic energy is trapped within overlying low density and low velocity deposits, typically sedimentary and

regolith cover layers. This trapping of energy, and associated constructive interference generates seismic amplification at a local resonance frequency within the soft sediment deposits. The resonance frequency can be determined through the analysis of natural vibrations recorded using a 3-component seismometer over a 5-20 minute recording period. When a strong acoustic impedance contrast occurs, the ratio between the horizontal to vertical vibration data will generate one or more frequency peaks at geological boundaries above hard bedrock.

HVSR passive seismic surveying using the Tromino® seismometer can be carried out using recording stations distributed in a regular grid pattern, or acquired along detailed traverses. Once processed, HVSR data can be visualised as both plan images and contours, highlighting depth to geological boundaries or crystalline bedrock, or visualised as cross sections, highlighting bedrock topography and intra-sedimentary contacts. This has widespread application for general prospectivity by reliably measuring the thickness of un-mineralised overburden, but also for direct detection of geological settings hosting paleochannel uranium, gold, gemstones, heavy minerals, potash and lithium brines, groundwater supplies, coal deposits, quarry materials, oxide and laterite deposits, mineral sands, geotechnical applications, and many more. It also compliments other geophysical survey results, such as active seismic, electrical, magnetics and gravity.

Perth based Resource Potentials are the Oceania and SE Asian representative for MoHo s.r.l products, who manufacture geophysical instruments for near surface applications, including the Tromino® seismometer and Grilla software, providing sales, rentals, training, surveying and data processing and interpretation services. For more information on HVSR passive seismic surveying or other geophysical enquiries please contact the team at Resource Potentials: info@respot.com.au.



Resource Potentials
Subsurface Exploration Technologies

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in partnership with

Resource Potentials are geophysical consultants specialising in passive seismic surveys and a range of geophysical methods, survey design and budgeting, acquisition and QA/QC, data processing, modelling and inversion, data integration and interpretation of geophysical results for mineral deposit targeting and mine development.

TROMINO®

- Tromino® passive and active seismometer
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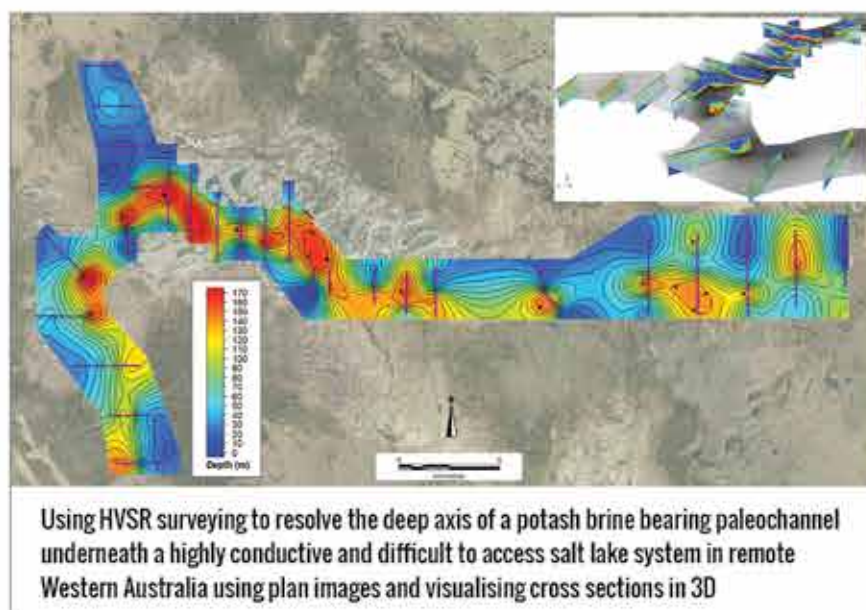
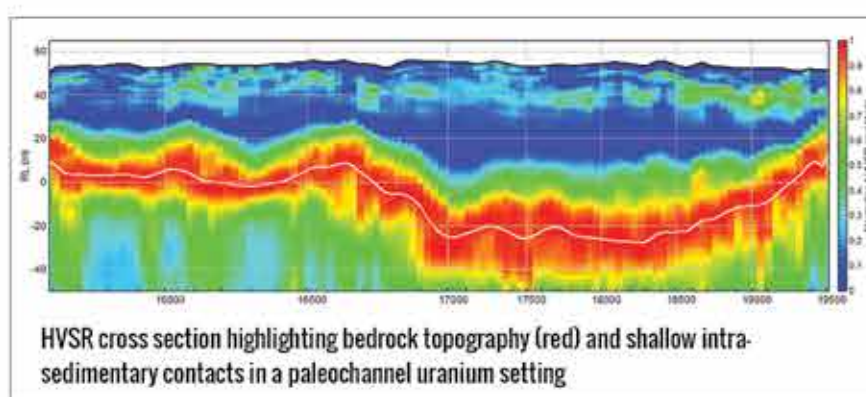


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HVSR survey data cross section resolving crystalline bedrock below a sedimentary basin (red colours) to a depth of 700 m in central Australia

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NATIONAL

USING conventional and proprietary techniques, the GapGeo Group provides a unique offering.

Gap Geophysics is an innovative geophysical services solutions provider, with world-leading, locally designed, built and supported equipment, able to provide a wide array of electrical geophysical surveys to support an exploration program.

Sub Audio Magnetics (SAM) is one such proprietary technique helping clients by providing a very high-resolution, low-cost survey to cover a lot of ground very quickly and cost effectively.

One of the benefits of SAM is simultaneous dynamic acquisition of physically independent data sets – magnetics, conductivity and electromagnetics.

SAM can be used to see through highly conductive surface layers, such as salt lakes, which usually limit other forms of electrical geophysics.

SAM has been used successfully in the Goldfields and Pilbara areas in WA

to locate structures associated with shear hosted gold deposits.

Recent developments have enabled high-powered deep penetration EM capability from helicopter platforms (HeliSAM).

Gap EOD specialises in explosive ordnance detection and has developed what is arguably the most advanced digital metal detection system available – the UltraTEM 3.

This technology is currently being used to find buried UXO in mining areas in South East Asia where there has been prior military conflict.

The technology is also used to locate Ground Engaging Tools (GET) lost in stockpiles, allowing their removal prior to causing damage to crushers.

From greenfields exploration to resource delineation, in mine GET detection and downhole surveys, to tailings leakage detection and monitoring, GapGeo can assist every step of the way.

With an experienced team able to support a project from start to finish, the GapGeo Group is the complete solutions provider.



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Gap TM-7 SAM receivers and Total B-field Cs vapour sensors. Extremely low noise measurements at very low Tx frequencies. Orientation independent readings. Relative immunity to wind and vibration.

SAM EM

Sub-Audio Magnetics Technology. Dynamic (non-stop) acquisition of high-definition Total B-field EM and TMI at low Tx frequencies.

HeliSAM FLEM

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GeoPak Transmitters

Gap operate a range of state-of-the-art transmitters capable of up to 80kW and 350A. High power provides for deep exploration and high quality data at reduced cost. Remotely operated for safety and survey efficiency.



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Seismic – shaking up the exploration industry



HiSeis has developed seismic techniques used in oil and gas exploration to be applied to the mining sector.

NATIONAL

HISEIS is a geophysical exploration services company based out of Technology Park in Perth, Western Australia that uses innovative seismic technology to deliver high resolution 3D imagery of mine geology.

The company was established in 2009 to commercialise research developed by Curtin University, to solve contemporary mining problems associated with deeper mining and exploring under cover.

HiSeis has developed proprietary methods for the application of modern seismic in brownfield mine environments and provides integrated services including planning, modelling, design, acquisition, processing and interpretation.

With more than 60 seismic projects completed to date, the company has

assembled a global portfolio, each tailored to the complex geology experienced in the majority of mining terrains covering precious metals, base metals, industrial metals and bulk commodities industries.

In August 2017, Northern Star Resources announced the discovery of the Zodiac orebody at Jundee Gold mine, drilling off targets generated from a high resolution 3D seismic survey completed by HiSeis.

The company also recently completed the acquisition of Australia's largest ever minerals 3D seismic for Independence Group at its Nova nickel mine, and is busy processing the 300 cubic kilometres of Nova geology, which contains more than 800 million voxels of information, imaged by seismic.

More information on the HiSeis technique can be found at:

www.hiseis.com.

Total rental solutions

NATIONAL

ATLAS Copco; companies across Australia would be hard-pressed to find anyone on their site that doesn't recognise the companies iconic grey and yellow colours.

Whether they have seen the logo in the compressor room, outdoors on one of their portable generators, or even in their hands as they use Atlas Copco tools – one thing is for certain: Atlas Copco has been delivering efficiency and reliability to Australian industries for more than half a century.

What people may have missed is the Atlas Copco Rental division.

Established in 1964 and brought to Australian shores a short time later, the Rental division was Atlas Copco's response to the growing demand for temporary hire and long-term rental solutions.

Clients now had solutions that allowed them to continue using the Atlas Copco machines they had come to rely upon during periods of increased workload, maintenance or breakdowns.

Today, Atlas Copco Rental has built a fleet specifically tailored to Australian conditions.

With eight branches across Australia and New Zealand positioned in key industrial sectors, rental solutions to its client's applications are never far away.



An Atlas Copco truck on the move.

What differentiates Atlas Copco Rental from other rental companies is its 'Total Solutions' philosophy.

Not satisfied with simply providing a machine to its clients, Atlas Copco Rental focuses on delivering full support

over the entire life of their project.

This philosophy encompasses all aspects of the project to ensure complete peace of mind for its clients.

From contingency planning, logistics and design of the temporary installation

to energy management, dedicated service technicians and decommissioning, Atlas Copco Rental can be relied upon to provide the support and expertise required to ensure all projects run smoothly.



ADVANCED MACHINES EXTENSIVE SUPPORT TO HIRE

Businesses across the world rely on cutting-edge Atlas Copco machinery and our comprehensive support network to stay productive and profitable. Atlas Copco Rental brings these to you exactly when and where you need them - on a short or long-term hire basis.

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The HG-507 hydraulic tool has a capacity C50L 1 to 1-1/8.

NATIONAL

RECEIVING the right Huck gun and fasteners from one source is easy when going through Huck Aerobolt.

Huck bolts and rivets work differently to most fasteners, as they are installed via a tool that provides a permanent result.

Taking the hassle out of Huck, Aerobolt has an extensive range of quality rental equipment and fasteners available in one delivery, drawing on more than 25 years' experience in the Huck tool hire industry.

The team is uniquely placed to offer a professional and personal service that is second to none, supplying Huck tools and equipment to a wide variety of markets, including mining and resources, manufacturing, rail, building construction, motor body builders, and Government.

Its comprehensive range of mining rental equipment includes hydraulic tools to install Huck Bolts from a ½ inch diameter through to 1-1/8 inch diameter; offset and right angle Huck tools; hose set (3.6 and 8 metres); and Huck power rigs (hydraulic pumps).

Huck Aerobolt ensures the sales process is as smooth as possible, with no account required – just an official purchase order, and is flexible with hire choices (daily, weekly, weekend and monthly options).

The team also offer Australia-wide delivery through an extensive transport network; equipment consignment tracking, one on time deliver; 24/7 support, and comprehensive technical mechanical support.

More information can be found at: www.aerobolt.com.au.

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A new look and vision

NATIONAL

SUPPLYING the transport industry since 2003, Truckworld Rental has undergone some exciting changes in recent months.

The company, acquired by Mark Cates in 2016, is bidding farewell to its old name and signage and saying hello to a fresh new look, trading as Axle Hire.

The rebranding reflects the company's upgraded fleet offering and premises to better service clients' requirements, and the culmination of two years of work behind the scenes to grow the business.

The same great staff, company values and services will remain, Axle managing director Mark Cates assured.

"Our approach is to build professional, long-lasting relationships and we give this simple guarantee to our clients – modern, fit for purpose prime mover, rigid truck



Axle Hire specialises in prime movers, rigid trucks and trailers.

and trailer rentals," Mr Cates said.

"It's easy to understand why a wide range of industries choose Axle Hire for their trucks, trailers and road transport equipment - we provide a quality fleet that you can always rely on.

"We understand that your business can't tolerate downtime or inefficiencies which is why we pride ourselves on providing a quality, modern and diverse fleet, backed by professional customer service."

The fleet includes late model, low kilometre and quality-brand prime movers, rigid trucks and trailers that are meticulously maintained.

"We stock a diverse equipment selection because we know that this industry isn't a one size fits all – you need the right equipment for the right job," Mr Cates said.


Mr Cates said the new name was chosen to invoke his other business Axis Hire, and symbolise its aim of becoming a

critical point of support for clients.

"We are creating a focus within the business to deliver on our vision to be the supplier of choice for the transport industry," he said.

The new Axle premises is at the centre of the key Welshpool transport hub in WA, with easy access from Kewdale Road and Orrong Road and close to the Forrestfield Assembly Area.

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NATIONAL

MINE sites and their management teams don't want to worry about water treatment.

For that reason they have treatment systems installed so that day to day operations run smoothly.

However, there are a number of scenarios where their water treatment systems temporarily need extra water capacity including: construction water for projects; planned outages of existing facilities; major shutdowns with additional people on site; unexpected breakdowns; and temporary systems while new systems are being manufactured.

"Most of our customers just want to know that the water tank is full so that they can keep operations going and their employees can have a hot shower at the end of their shift," MAK Water chief executive Andy Byk said.

"Where a waste water treatment plant has been installed it's critical that the site's license commitments are met.

"Our service team is the key ingredient here – clients don't want to have to fly personnel across the country for minor issues, so all of our hire plants have ClearAccess remote monitoring installed enabling us to fix most issues remotely, and with service offices in each state we guarantee a rapid response."

Hire equipment is available for short or long-term lease, and can be mobilised to site at short notice and be fully operational



More information can be found at www.makwater.com.au.

within hours.

Benefits include no capital costs, and the flexibility to hire and off-hire units as required.

Longer terms can be accommodated through a Build Own Operate (BOO) or Build Own Operate and Transfer (BOOT) model.

MAK Water's technical sales team leader Michael Hartnett said to enable quick and simple site installation, the hire plants are containerised or modular providing genuine plug and play capability.

"This means all they need is a feed water supply and power (which can also be provided by a generator) and it can be set

up to produce or treat water on site within a matter of hours," Mr Hartnett said.

"We also offer clients the opportunity to hire full turnkey packages including generators, tanks and distribution pump sets, which can be operated by MAK Water and are all fully maintained by the local service team located in every state of Australia."

A History of Hire Excellence

Hire equipment is available for short or long-term lease, and can be mobilised to site at short notice and be fully operational within hours.

If you are facing any of the following challenges, MAK Water has the solution:

- Construction water for projects
- Planned outages of existing facilities
- Major shutdowns with additional people on site
- Unexpected breakdowns; and
- Temporary systems whilst new systems are being manufactured

MAK Water can construct, distribute and install water treatment & equipment across Australia, as well as export internationally.



MAK Water containerised plants en route to site



MAK Water hire plants are containerised providing genuine plug and play capability



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A step above



WAKU Telescopic Ladders can be configured for use as many different ladders.

NATIONAL

LADDERS, safety steps, platforms and aluminium scaffolds are essential pieces of equipment in all mining and construction sites.

Safety is paramount here, and project managers are looking for a robust, and quality product that has been trialled and tested, conforms to industry standards and, of course, is built to last.

Little Jumbo Ladders has a large selection of ladders at its workshop (more than 1000), and has been supplying products for more than 20 years.

The company imports the famous Waku Telescopic Ladders and the Little Jumbo Safety Steps from Germany, and distributes them across Australia and New Zealand.

The Waku Telescopic Ladders, conform to AS/NZS 1892.1 for Portable Aluminium Ladders, and while there is no Australian

standard for step stools, the Little Jumbo Safety Steps conform to the European Standard EN 14183.

The products are used throughout Australian industry and Government, and now a large range of ladder accessories are available for use with industrial standard ladders.

Examples include automatic leg levellers for safe operation on uneven, stepped or sloping ground; ladder protectors to anchor a ladder in position and prevent movement (without using a second person to foot the ladder); and removable hand rails fitted to the top of the ladder giving direct access to and from a roof.

In addition, the ladder can be modified to accommodate a client's special requirements.

More information can be found at: www.littlejumboladders.com.au or by calling (03) 9587 1964.

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LADDERS



LITTLE JUMBO SAFETY STEPS



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INDUSTRIES FOR OVER FORTY YEARS

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Along with Importing & Distributing Ladders throughout Australia & New Zealand, Little Jumbo Ladders sells a wide range of Ladder Safety Accessories.

Ladder Leg Levellers



Ladder Stopper/Anchor



Gutter Brackets



Ladder Roof Hooks



Removable Walkthrough Handrails



Ladder Scaffold Brackets



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High-accuracy data in real time

NATIONAL

CQMS Razer (CR) is a global IP, engineering, software, and manufacturing company, delivering innovative productivity technology to large surface mining operations around the world.

The technology behind its range, both products and software, is proven with extensive industry-leading research, detailed data and case studies to support productivity outcomes.

The company is a collaborative partner with the world's best miners, delivering solutions that improve mining productivity, asset availability, and safety.

Historical Truck Loading Practices

The majority of truck shovel fleets are loaded by eye, based on the operator's experience and feedback from the truck weighing systems.

Mining operations can be restricted by overload limits whereby the truckloads must not exceed 110 per cent of the truck rating, more than 10 per cent of the time, and should never exceed 120 per cent of the rating (the 10:10:20 rule).

Across most 3-5 pass operations, truckload distributions typically have a standard deviation of about 9 per cent to 12 per cent of the average truckload.

The result of this distribution is that if a truckload target of 100 per cent



More information can be found at www.cqmsrazer.com.

is achieved, it will always exceed the overload limits.

Consequently, most operations back off their goal to ensure they do not exceed the overload limits.

If the distribution can be tightened (if the standard deviation can be reduced), the overall average can be increased without exceeding the load limits.

Use of the Titan system allows the final payload into the truck to be adjusted to

match the truck target better, reducing the standard deviation to below 5 per cent of the truckload.

This means that while a traditional operation needs to limit the truckload average to no more than 98 per cent of the target, and still have some loads >120 per cent, the Titan system can deliver up to 104 per cent of the target with no more overloads >110 per cent, and fewer overloads >120 per cent.

The Titan 3330 load haul optimisation system

The Titan 3330 Load Haul Optimisation system uses advanced sensors and robust algorithms to calculate the payload of each bucket pass in real-time.

It uses CQMS Razer's truck logic algorithm to identify the start and end of each truckload and log the total truckload and number of passes.

The system is configured over the existing loading excavator, providing high-resolution 20Hz data across a range of optimisation metrics.

The system forecasts the remaining loads needed to meet the truck target load and provides operators timely operational data feeds to an intuitive in-cab touch screen display to allow them to dramatically reduce the variation in truckloads, eliminate overloads and lift productivity.

Titan also calculates fatigue duty for the boom and stick sub-systems to provide feedback on the relationship between production and machine duty for improved operational decisions and tracking.

The Titan data analysis reporting covers a range of productivity and maintenance critical metrics, including fleet analysis of all shovels running with CQMS Razer systems, specifies the operator's overall spread of payload distribution, production rates, cycle times, boom and stick duty, to highlight a few.



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AVAILABLE NATION-WIDE.

Australian-made accurate front end loader scales

NATIONAL

APPLYING the principles behind load cell temperature compensation, Instant Weighing has found a way to better compensate for the temperature changes that the scale on the front end loader experiences during its 24-hour day of operating.

In the following example, a front end loader was parked up while awaiting for the next road-train to arrive (as each road-train driver loads themselves).

Instant Weighing's client used the COMPULOAD scale to obtain the weight loaded onto the four-trailer road trains, which would then haul the ore about 500km to the port authority.

The second load weight is obtained by the port authority as they load and survey the ship.

To the client's delight, the subsequent comparison of weights were recorded.

In the first shipment, the COMPULOAD scale recorded a total weight of 18,800 tonnes (t) of ore, and the port authority recorded a difference of just 37t; this is an error of 0.2 per cent.

The second shipment proved similar.

The COMPULOAD scale recorded a total weight of ore transported as 20,070t, and the port recorded a difference of just 48t; an error of 0.24 per cent.

Instant Weighing, an Australian distributor of COMPULOAD, said the scale's ability to temperature compensate has in turn saved its customers substantial wear and tear of their equipment and



COMPULOAD front end loader scales recorded highly accurate load weights for this four-trailer road train.

expense to fulfil their contract.

The company said the COMPULOAD scale can also be programmed with specific target weights for each individual identified axle group to stop the operator overloading.

The scales also have the ability to electronically transmit the loaded weight data back to the office PC, provided the front end loader is working within either

WIFI or 3G/4G transmission areas.

Instant Weighing is also heavily involved in the testing of various existing scales, and supplies new scales that are used to determine the Verified Gross Mass (VGM) of an export sea container for SOLAS/AMSA weighing purposes.

AMSA audits have become very stringent.

However, Instant Weighing test procedures and reports have always been passed by the AMSA auditors.

Instant Weighing's calibration testing services spans from Esperance to Derby, and can be undertaken at least yearly, or as and when required.

More information can be found at www.instantweighing.com.au.

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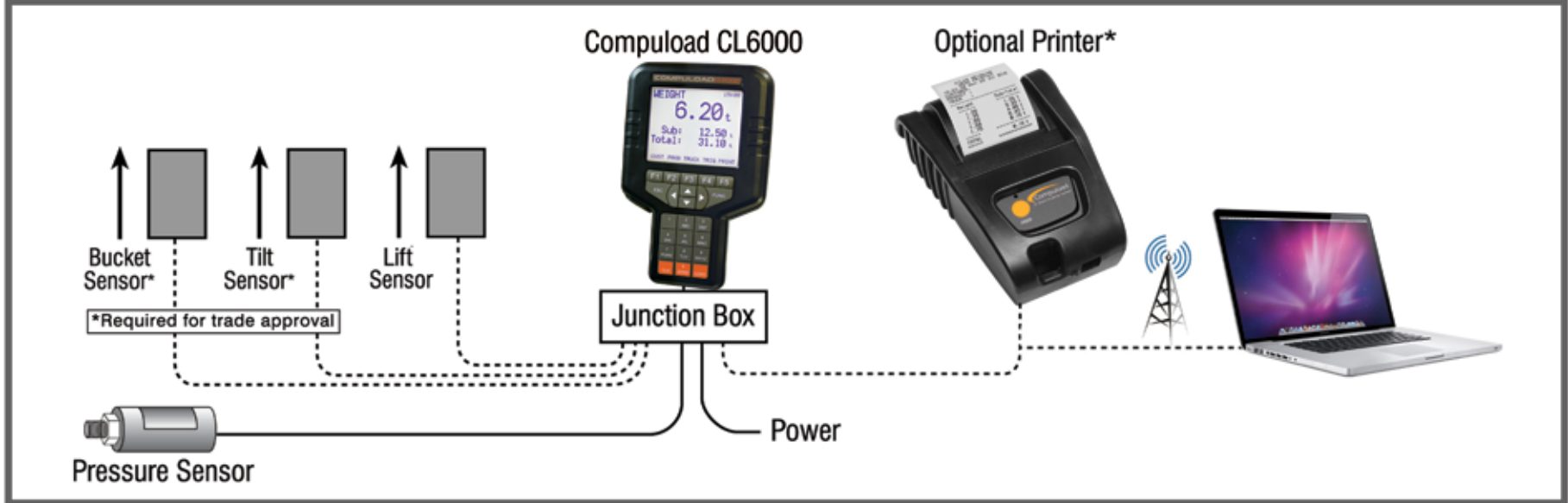


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THE SYSTEM SETUP



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Machinery Annual Compliance sparks recruitment drive



CES has begun a new annual inspection program for crane compliance.

NATIONAL

CRANE Engineering Services (CES) was established in 2016 to meet the growing voice of Australian crane owners and provide an alternative solution to meeting their compliance with major inspection requirements found in various legislation, regulations, codes of practice and standards.

CES has continued to listen to crane owners and a wide range of industry leaders across the country, and has

expanded from major inspections into the arena of annual inspections for all types of cranes, with the introduction of the Machinery Annual Compliance (MAC) program.

The MAC program focuses intensively on the ability for continued safe use of the crane for a 12-month period which meets all required guidelines, giving crane owners peace of mind that their machines comply with the industry-wide 12-month annual inspection requirements.

CES acknowledges that crane owners recognise the importance of safety with

their machines, and, by providing an alternative program to the industry, gives all relevant stakeholders – including crane hire customers – a fair and level playing field.

After all, crane safety is in everybody's best interests.

The CES MAC program focuses heavily on the crane being safe for continued safe use.

Road access issues are heavily scrutinised on cranes with pick and carry capabilities.

For cranes without, road access issues are noted for owners to rectify in accordance with their individual State road law requirements.

The CES MAC program has begun recruiting competent assessors who will operate as third-party inspectors of cranes (they have to meet strict experience requirements) to enable crane owners further choice with meeting their annual inspection obligations.

More information can be sought via email at info@craneengineeringservices.com.au.

MACHINERY ANNUAL COMPLIANCE

Do you have crane - material handling - access equipment industry experience? Are you a *competent person?

Apply for the Machinery Annual Compliance Program as an assessor now.

The Machinery Annual Compliance Program focuses intensively on the ability for continued safe use of the crane and machinery for a 12-month period, as a part of the annual inspection obligations in accordance with Australian Standards.

CRANE ENGINEERING SERVICES



Apply for the Machinery Annual Compliance Program as an assessor.
Applications now open Australia wide.

*Competent person refers to a person who has acquired through training, qualification, experience or a combination of these, the knowledge and skill enabling that person to correctly perform inspections and assessments.

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Minimise downtime with equipment inspections

NATIONAL

WITH ever growing pressures on mining operations, companies are extending the life of their equipment by leveraging Eriez' service capabilities.

Its technicians can inspect equipment on-site or in-factory.

Customers typically cover travel and freight costs, and Eriez provides a detailed report outlining the best courses of action.

This may mean preventative maintenance or replacing minor components; updating electronics, or carrying out a complete rebuild to original OEM specifications.

All repairs and refurbishments are covered by an Eriez warranty.

Most importantly, Eriez understands the dangers associated with handling permanent magnets.

Its personnel are specially trained and follow specific job safety procedures to properly handle high-strength magnetic elements.

Eriez should always be contacted prior to any dis-assembling or when handling magnetic equipment to help ensure safety is paramount.

Downtime equals loss of production.

Eriez inspections and performance audits improve equipment availability by avoiding unscheduled downtime.

Its technicians have an unparalleled level of skill and knowledge understanding the application and limits of magnetic equipment.



Suspended electromagnetic repair.

Eriez is dedicated to its research and development programs that deliver technology improvements for the industry.

Advancements in technologies and innovations are often implemented as upgrades during rebuild processes.

An early innovation was the external oil expansion tank developed for its suspended electromagnets (SE).

This ensures that the magnet coils always stay completely submerged, thus preventing moisture infiltration and coil burn-outs.

Subsequently, Eriez SE magnets run cooler, are stronger, and last longer than the competition.

The company has also retrofitted expansion tanks to competitor SE's to boost performance.

Eriez can improve the magnetic power of wet drum magnetic separators with enhanced circuit design and better-quality magnets.

The performance of vibratory feeders is improved with new energy saving components, metal detectors are improved with software updates and smart phone technology can feedback real time data to enhance maintenance and operating processes.

Getting the maximum life depends on the equipment, its working conditions, duty and operating environment.

Process equipment represents a significant capital investment, and annual inspections are mandatory to maintain them in peak working order, to identify any looming issues and for the possibility of process improvements.

Regular equipment checks, process audits and in-plant certifications by Eriez will help maximise life.

Eriez has the complete in-house capability necessary to service, repair and refurbish damaged equipment quickly, accurately, and safely.

More information can be found by calling +61 3 8401 7400, emailing sales.au@eriez.com or by visiting: www.eriez.com.au

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GALILEO MINING MANAGING DIRECTOR BRAD UNDERWOOD

Mark Creasy-backed Galileo Mining is one of the newest exploration companies to list on the ASX, focused on mining battery metals such as copper, nickel, cobalt, platinum and palladium. **Cameron Drummond** spoke to managing director **Brad Underwood** about the company's drilling plans this year, and his take on WA's position as a leader in battery minerals production.

Q. What is your professional history?

I have been working as a professional geologist for over 15 years. However, before then I spent some time prospecting for opals and gold and making no money in the process. I realised that a steady pay cheque certainly has its charms.

One of my first real jobs was at the Tritton/Murrawombie copper mine in NSW which was a fantastic learning experience as we had both an open pit and underground mine operating at the same time.

As part of the exploration team, I was able to assist in discovering significant new resources through understanding the geometry of the ore shoots. I believe these resources are still being mined today, which demonstrates the significant impact mining can have on a district given the original discovery was made in 1875.

I also spent some time working in the Pilbara and in the Northern Territory before commencing work with Mark Creasy in 2010.

My most valuable lessons and career experiences have been working with Mark over the last eight years. We have explored for just about every mineral that occurs in hard rock. Most of my work has been in WA, with some memorable trips to Myanmar looking for gold and zinc back in the days when Myanmar was a global pariah.

More relevant to Galileo Mining, I was responsible for the exploration and project development of the Creasy tenements in the Fraser Range surrounding the Nova mine which was discovered in 2012.

This area attracted a huge amount of interest at the time, but what is not so well known is that Mark has been spending money in the area since the mid-90s and doesn't look like stopping anytime soon.

Q. Tell us about your new role at Galileo Mining.

My role as managing director is a fantastic opportunity as it is the first time I have led a publicly listed company. I have been managing privately funded exploration programs for many years and believe that there are plenty of improvements that can be made to the way most junior companies run their exploration programs.

I hope to demonstrate that well thought out exploration strategies can yield success within a reasonable time-frame but I am also very aware that luck is a big factor in our industry.

Q. From a geological point of view, what excites you about Galileo's Norseman and Fraser Range projects?

The great potential for discovery in WA is what excites me every working day.

I'm not a believer in the idea that we



Mining mogul Mark Creasy (left) with Galileo Mining managing director Brad Underwood.

Image: Galileo Mining.

need to go to exotic locations for new discoveries. The jurisdictional risk in some foreign locations is so high that unless a deposit is sticking out of the ground it's not worth bothering about.

In comparison, WA has excellent infrastructure, a mining culture second to none, and vast areas of underexplored prospective ground.

We have only scratched the surface of our Norseman tenements looking for cobalt and there is additional potential for palladium, platinum and nickel sulfide at depth. Our Fraser Range tenements have never been drilled for nickel simply because the concept that they are prospective for nickel has only developed over the last few years.

Q. After a successful, oversubscribed IPO and ASX listing, what will be Galileo's first moves?

Galileo plans to start diamond drilling in late June for metallurgical samples from our cobalt deposit. We have designed a comprehensive work program to include

mineralogy, beneficiation and leaching test work on the core.

Each ore deposit is unique and we want to develop a detailed understanding of our resource at a very early stage as this preliminary work will guide us towards the completion of a scoping study.

In July we plan to start drilling aimed at boosting our resource base with several new targets already identified as well as possible resource extensions. Our Mt Thirsty resource is open to the north and our Mission Sill resource is open to both the north and the south.

We are optimistic that we can add more tonnes to our resource base by the end of the year.

Q. What are the key drivers behind Galileo's decision to target nickel, copper and cobalt?

We are big believers in new technology, particularly electric vehicles, and the increasing demand for battery minerals.

Over the last five years a number of new lithium mines have opened in the State and, with nickel miners now talking about the production of nickel and cobalt sulphate, it looks like WA is set to become a globally significant player in battery minerals.

We want to be a part of the new battery mineral development cycle and we believe that we have the assets to make it happen.

Q. Final thoughts?

In 1900, horses were the dominant means of transport and within 20 years the combustion engine had taken over.

It would be a mistake to think that similar step-changing technological revolutions are not capable of occurring again, given that we have the very recent examples of computing and smart phones.

The ability of humans to adapt and take on new technology is amazing. I think that in 10 years we will all be driving electric vehicles as if we had been doing it our entire lives.



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"With the Loki PPK integrated with our DJI Matrice 200, we have increased efficiency with survey-grade accuracy and proven reliability with over 50 flights successfully completed within the first two weeks we have been using this solution. The Matrice 200 with Loki PPK is now an integral part of our daily survey toolkit."

– Benchmark Surveys WA



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