

THE AUSTRALIAN MINING REVIEW

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GALVANISED

Zinc remains in bullish territory as supply enters critically low levels and demand continues its steady march upwards - making it a great time for MMG's \$1.4 billion, 170,000ozpa Dugald River mine to enter production.

FEATURE p26

Image: MMG.



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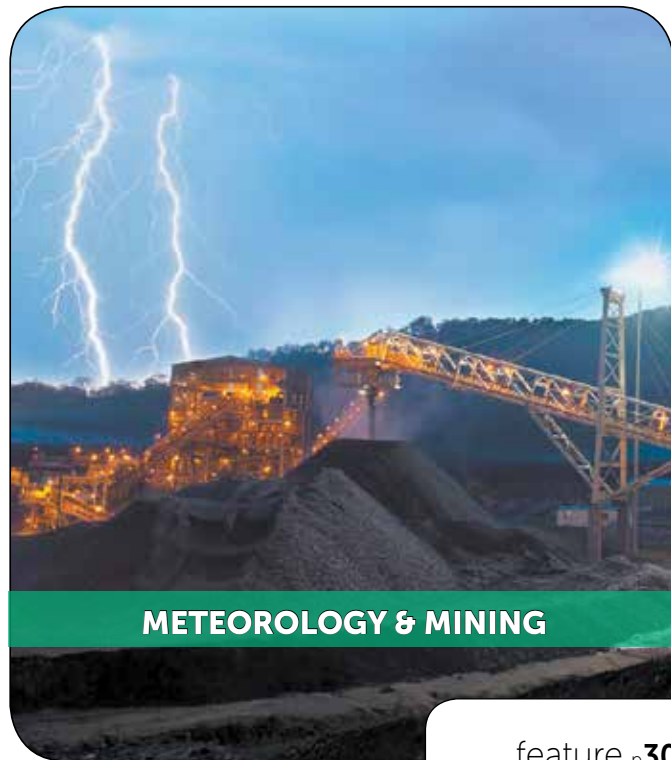
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CLIVE JONES
CAZALY RESOURCES JOINT MANAGING DIRECTOR

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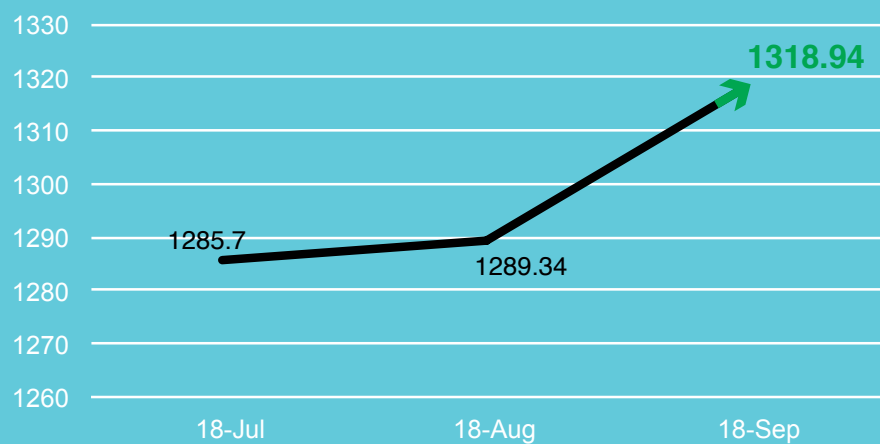
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GOLD

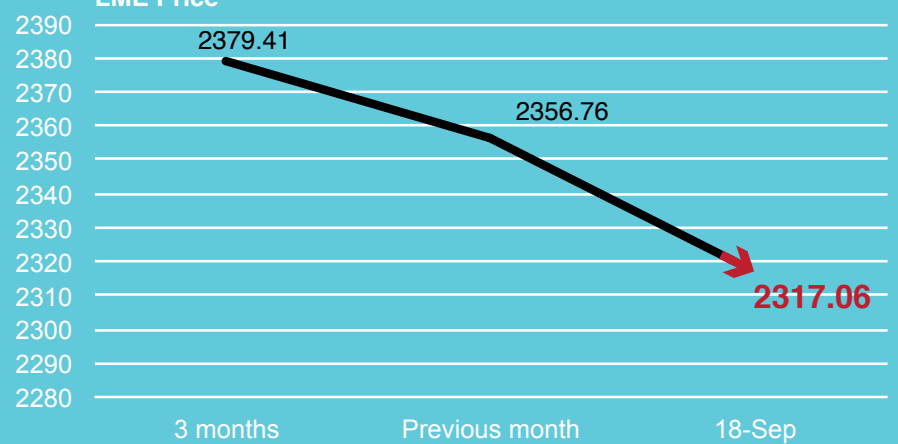
\$US/oz



LEAD

LME Price

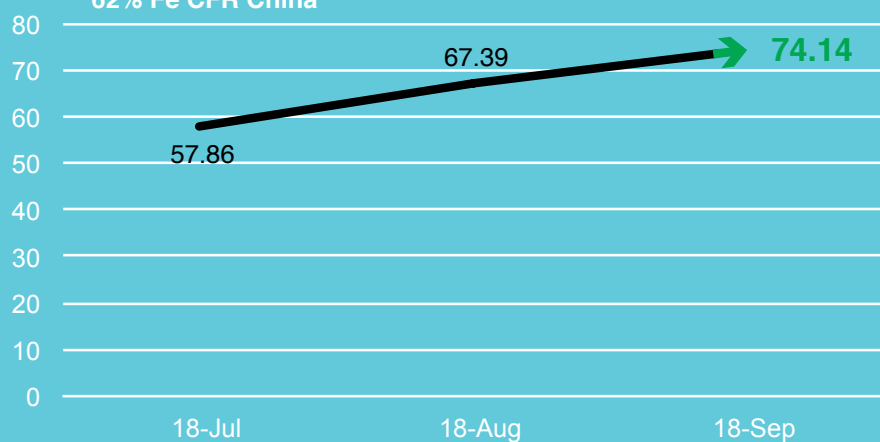
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IRON ORE

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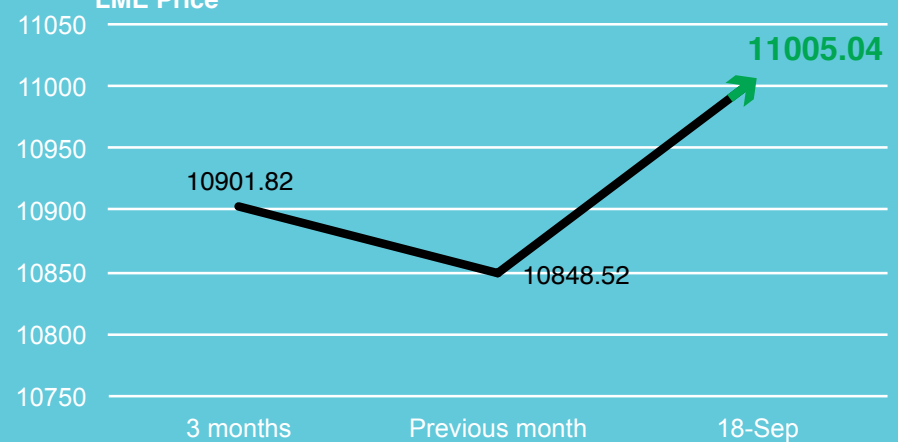
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NICKEL

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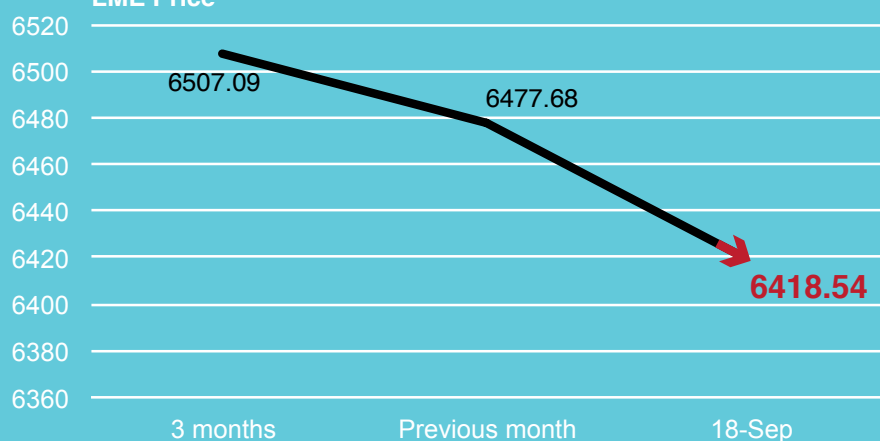
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COPPER

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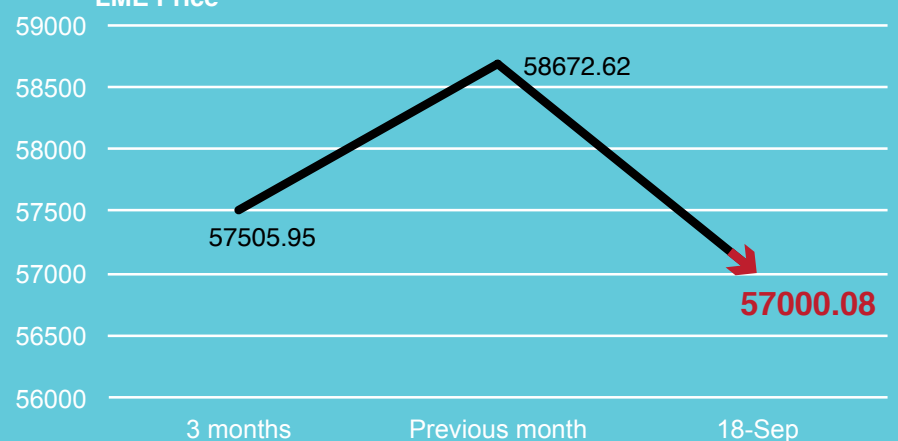
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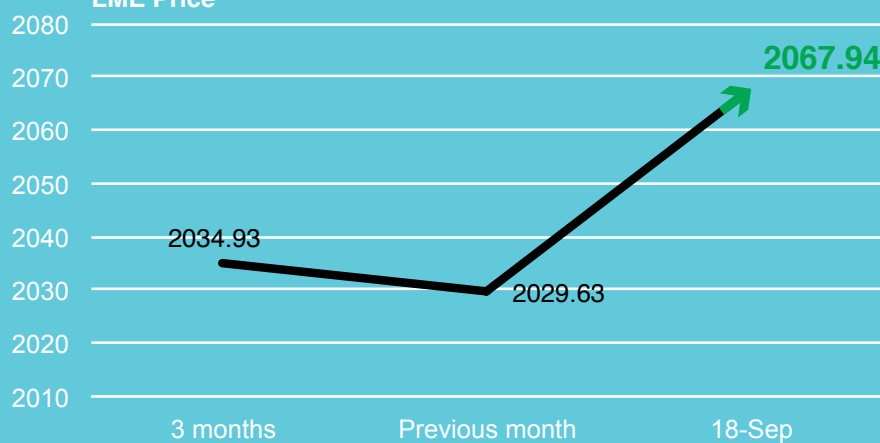
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ALUMINIUM

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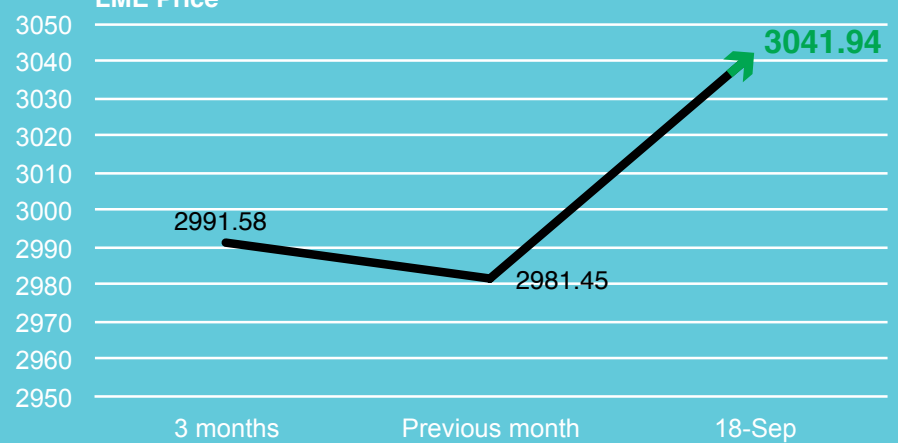
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ZINC

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IN BRIEF

Peabody offloads Burton coal mine stake

COAL

US miner Peabody Energy has sold the majority of the shuttered Burton coal mine in QLD's Bowen Basin for \$US11 million to the Lenton joint venture (JV).

90 per cent owned by New Hope Coal, the Lenton JV will assume the reclamation obligations associated with the assets, thereby reducing Peabody's retirement obligation by about \$US53m, while also releasing an estimated \$US30m of restricted cash.

\$60m capital boost for MACA

MINING SERVICES

MINING services provider MACA has received commitments to raise \$60 million through a placement of 33.4 million shares at \$1.80 per share.

The company said it expected strong growth given its exceptional pipeline of work available, which would require additional mining fleet and an increase in its working capital needs.

Such additions would be utilised at recent contract wins such as Pilbara Minerals' Pilgangoora lithium project.

Power steps down as FMG chief

IRON ORE

FORTESCUE Metals Group chief executive Nev Power has decided to step down from his role after almost seven years.

Fortescue chairman Andrew Forrest said Mr Power would finish in his role on 18 February 2018.

"Nev has executed his duties to the highest degree and met or exceeded the often unreasonable standards set by his board," Mr Forrest said.

"We could not be more pleased with his stewardship and respect his decision that it is time for the next chapter of Fortescue to begin.

"This is consistent with our long term succession plan and we both share great confidence in the quality of internal and external candidates to continue Fortescue's legacy."

Rio's Silvergrass opens

ELIZABETH FABRI

RIO Tinto has opened its 16th iron ore mine – the \$US338 million (\$468 million) Silvergrass mine.

The 10 million tonne per annum iron ore mine is a satellite deposit adjacent to Rio Tinto's Nammuldi mine and part of the Greater Nammuldi precinct, 70 kilometres north west of Tom Price.

The low-phosphorus Marra Mamba ore from Silvergrass will be treated at the Greater Nammuldi processing plant, and help Rio Tinto reach a production goal of 330 million tonnes this year.

Rio Tinto chief executive J-S Jacques said Silvergrass was a great example of its "value-over-volume approach" with the mine set to deliver a high-quality, low-cost ore to maintain the company's world-class Pilbara Blend product.

"Silvergrass is a further demonstration of our long-standing commitment to the Pilbara region in Western Australia where we've invested more than US\$20 billion over the past decade," Mr Jacques said.

WA Premier Mark McGowan said Silvergrass was the latest in a series of new mine developments that demonstrated confidence in the State's iron ore sector.

"Western Australia's leading iron ore sector produced 38 per cent of the world's iron ore last year, and plays a vital ongoing role in the State's economy through jobs and royalties," Mr McGowan said.

"I congratulate Rio Tinto on the opening, and on its commitment to local jobs, through initiatives like its new procurement program which will make it easier for local businesses to tender for work.

"Rio has also committed to creating 200 apprenticeship, traineeship and vacation work positions next year, which is great news for young Western Australians."



Image: WA Premier Mark McGowan.

Silvergrass is the first new iron ore mine in the Pilbara since Roy Hill, which loaded its first shipment for export in December 2015.

KEY STATS:

- Fast-tracked **12 month build** delivered on budget
- **500 jobs** during construction
- **250 ongoing positions**
- Utilising **7 Autonomous Haul Trucks**
- **\$180m** spent with WA suppliers

\$100m exploration boost

CAMERON DRUMMOND

JUNIOR exploration companies have received a \$100 million commitment from the Federal Government to help drive exploration activity in Australia.

The funding will be provided as tax incentives for mining juniors to encourage investment and risk in their exploration activities.

Under the new Junior Mineral Exploration Tax Credit scheme (JMETC), Australian resident investors of junior explorer companies will receive a tax credit where the exploration company chooses to give up a portion of their losses relating to greenfields exploration spending in an income year.

Prime Minister Malcolm Turnbull said the scheme was focused on promoting investment and driving economic activity in the resources sector.

"These tax incentives will encourage 'junior explorers' to take risks and to have a go at discovering the next large-scale mineral deposit," Mr Turnbull said.

"We want to back enterprise. We want to turn around the greenfields minerals exploration expenditure that has declined by almost 70 per cent over the past five years."

The Government said the ability to immediately distribute tax credits to investors would make investing in a 'junior explorer' more immediately attractive and encourage investment in



"We want to turn around the greenfields minerals exploration expenditure that has declined by almost 70 per cent over the past five years."

Image: Supplied.

The government incentive is designed to help drive the next wave of mineral exploration.

small companies undertaking greenfields exploration.

Resources and Northern Australia minister Barnaby Joyce said greenfields mineral exploration was a catalyst for new investment opportunities and job creation which supported local businesses in regional communities across Australia.

"Despite good prospects Australia has not had a world-class mineral discovery in more than twenty years," Mr Joyce said.

"This credit will make it more financially attractive for our mineral

explorers to find resources in untapped regions."

The government said only newly issued shares relating to capital raising for investment in new greenfields exploration activity would be eligible for the tax credits to help maximise the incentive for additional investment.

Tax credits of up to \$100m over four years will be available from this financial year, on a first-in, first-served basis consistent with arrangements to be administered by the Australian Taxation Office.

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¹National Drug & Alcohol Research Centre ²2013 NDSH Survey

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Nova celebrates milestone

ELIZABETH FABRI

INDEPENDENCE Group (IGO) has entered commercial production at its wholly owned Nova nickel-copper-cobalt project in WA, five years after its discovery.

In September, IGO celebrated the milestone with an official opening ceremony on site, attended by almost 200 people including State and regional government representatives, traditional land owners, contractors, investors, and employees.

Nova's opening marks IGO's fourth producing operation, and will be one of the lowest-cost nickel mines in Australia, with an initial mine life of 10 years.

IGO inherited the project back in September 2015 during its \$1.8 billion takeover of Sirius Resources, and has since invested \$456m in construction and development costs, including the construction of a 1.5 million tonnes per annum (mtpa) underground mine and 1.5mtpa processing plant.

In FY18, the company expects Nova to produce between 23,000t and 27,000t nickel, between 10,000t and 12,000t copper and between 800t and 1050t cobalt contained in concentrate.

IGO managing director and chief executive Peter Bradford said the opening was an "outstanding milestone" with the project expected to reach its nameplate capacity of 125,000 tonnes per month a year earlier than expected in its bankable feasibility study.

"I would like to thank the many contributors to the exploration and development of Nova and to reiterate IGO's commitment to delivering long term value to all our stakeholders, especially our local communities," Mr Bradford said.

"Our people, whether employed directly by IGO or our contractor partners, are the lifeblood of IGO and it is through their focus, commitment and hard work that Nova has been delivered to commercial production within five years of when the Sirius exploration team, led by

"Today, Nova is our flagship asset and represents the type of operation that IGO wants in its portfolio – a quality asset that is high margin, with scale and a long mining life, which anchors our presence in the Fraser Range where we are actively exploring to find the next Nova."



All images: Independence Group.

Nova is IGO's fourth producing operation, and will be one of the lowest-cost nickel mines in Australia.

Mark Bennett, drilled that now-famous discovery hole back in July 2012.

"Today, Nova is our flagship asset and represents the type of operation that IGO wants in its portfolio – a quality asset that is high margin, with scale and a long mining life, which anchors our presence in the Fraser Range where we are actively exploring to find the next Nova."

WA Mines and Petroleum minister Bill Johnston congratulated the company on its achievement.

"We are proud to have played a part in successfully bringing the project to life, the first diamond drill hole at Nova received co-funding from the Exploration Incentive Scheme," Mr Johnston said.

"Production commencing at Nova is excellent news for the mining sector, especially as this is the first mine of its scale in the highly prospective Fraser Range."



L-R: Peter Bradford (MD and CEO), Peter Bilbe (Non-Executive Chairman), Hon. Bill Johnston, Chris Carr (General Manager).

Evolution's 'win-win' \$90m Edna May deal

ELIZABETH FABRI

AUSTRALIA'S second largest gold miner Evolution Mining has agreed to sell its Edna May project in WA to Ramelius Resources for up to \$90 million.

After months of speculation, Evolution confirmed rumours in September that it would be offloading the WA mine to improve the quality of its asset portfolio.

Ramelius' annual group production will increase by an estimated 54 per cent to between 195,000oz and 205,000oz.

The sale involved an initial \$40 million cash payment, and an additional \$20 million in cash or Ramelius shares upon a board approved decision to mine the Edna May Stage 3 open pit.

Evolution will also receive royalty payments of up to \$30 million payable at \$60 per ounce from gold production of more than 200,000oz, or up to \$50 million payable at \$100 per ounce if Stage 3 is not mined.

Evolution Mining executive chairman Jake Klein said Edna May, which represented 8 per cent of the company's

total gold production in FY17, was "no longer a core asset" for the company.

"Edna May was a founding asset of Evolution and its predecessor company Catalpa Resources," Mr Klein said.

"It formed an important part of the development of both companies [and] we thank everyone at Edna May for their important contribution to Evolution."

"In line with improving the quality of the portfolio, the decision to sell Edna May will lower our All-in Sustaining Cost by approximately A\$30 per ounce in FY18 and A\$40 – A\$50 per ounce on an annual basis.

"Our average mine life based on reserves will increase from 8.3 years to 8.7 years."

Ramelius managing director Mark Zeptner said the acquisition represented a step change in the company's overall production profile to build on the strength of its existing WA operations, Mt Magnet and Vivien.

"Upon completion, we become a 200,000 ounce per annum gold producer, with all operations within a one hour flight from Perth," Mr Zeptner said.

"We are also particularly excited about the potential for Edna May to significantly increase both its Ore Reserves and annual production via further extensions which represent huge optionality for Ramelius in the future."



Image: Evolution Mining.

Edna May is 350km east of Perth, WA.

"Not only does this acquisition drive a significant increase in group Mineral Resources and Ore Reserves, as a going concern it also delivers excellent returns on our initial A\$40M investment with minimal capex imposts.

"We are also particularly excited about

the potential for Edna May to significantly increase both its Ore Reserves and annual production via further extensions which represent huge optionality for Ramelius in the future."

The transaction is expected to be complete on 3 October.

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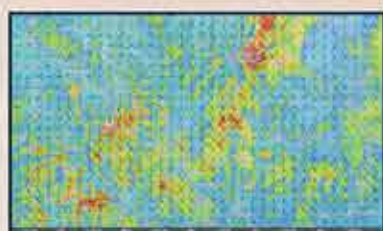


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THE PRODUCERS: REPORTING SEASON

Whitehaven (ASX:WHC)

WHITEHAVEN rode higher volumes and prices to post a massive 20-fold jump in full-year profit to \$405.4 million.

Whitehaven said it had received a combined average price of \$112 a tonne for its coal over the 12 months; a \$37 per tonne increase over the previous year.

Managing director chief executive Paul Flynn said the outlook for high quality coal was positive as more HELE technology coal-fired power plants were deployed into the Asian region.

Yancoal (ASX:YAL)

YANCOAL'S net loss after tax for the six months to June 30 narrowed to \$13.9m from \$180m the previous year, as stronger coal prices delivered the miner an operating profit.

"While initial price improvements were short-lived during the first half of the year, with gains mostly attributable to the impact of the Queensland cyclone event, metallurgical coal prices have subsequently appreciated in recent months in response to strong steel demand from China," Yancoal chief executive Reinhold Schmidt said.

The recent acquisition of Rio Tinto's Coal & Allied assets for \$US2.69 billion by Yancoal after a protracted bidding war with Glencore was also seen as a vote of confidence in the industry.

Glencore (LSE:GLEN)

GLENCORE recorded a 50 per cent jump in energy products industrial revenue to \$US5.037 million in its H17 report, supported by demand growth in the Pacific and Atlantic markets.

"Amid the best global economic growth momentum seen in recent years, our assets reported strong margins, generated by significantly better commodity prices and the favourable cost structures now embedded across the portfolio," Glencore chief Ivan Glasenberg said.

BHP (ASX:BHP)

"EVEN including the impact of Cyclone Debbie, coal created EBITDA of \$US3.8 billion," BHP chief financial officer Peter Beaven told analysts during its FY17 earnings call.

"Metallurgical coal prices increased significantly in the first half of the 2017 financial year, due to China's supply side reform policy and adverse weather conditions in China and Queensland."

China's coal supply reform policy was a positive for the sustainability of the industry in the long term, and yet it remained a source of uncertainty, Mr Beaven said.

Over the longer term, it would be emerging markets such as India which would support seaborne demand growth.



STRONGER FOR LONGER

Emerging in 2016 from some of the most difficult industry conditions in years, coal prices have stabilised as supply side tightness combined with international demand growth have analysts upgrading their price forecasts once again.

REUBEN ADAMS

GLOBAL thermal and metallurgical coal prices are spiking for the third time in the past 12 months due to supply tightness in the Chinese market, according to Citi analysts.

With ongoing safety inspections and other Government policy interventions, China's spot domestic thermal coal supply may remain tight in the coming months.

The impacts all along the Australian supply chain have been overwhelmingly positive.

For example, coal exports from northern Queensland surged in August to a multi-year high of 13.44 million tonnes (mt), the highest monthly total since January 2014.

Dalrymple Bay Coal terminal (DBCT) exported 6.95mt in August, which brought DBCT's annualised exports to 81.81 million tonnes per annum (mtpa); just short of its 85mtpa nameplate capacity.

At 53.56mtpa, the neighbouring Hay Point Coal Terminal (HPCT) came even

closer to hitting its 55mtpa nameplate capacity.

Meanwhile, metallurgical coal exports to China and Taiwan from Gladstone Port in Central QLD surged a respective 73 per cent and 191 per cent year-on-year in August.

In a September note, Citi said a combination of "robust demand, supply constraints and restocking" would act to keep export prices higher for longer.

A coal mine accident in the Shanxi Province which killed four prompted the Chinese Government to announce a new round of safety inspections in late August.

The effect of these safety inspections on domestic supply would last through the second half of the year, Citi analysts said.

On the demand side, China's electricity generation has grown 6.8 per cent year-on-year. Policies to keep power plants well-stocked could create tightness in the physical market and provide an ongoing boost to market sentiment.

And yet the country's opaque – and seemingly counterintuitive – import policies are cause for concern to Australian

producers.

There are unofficial reports that China has restricted coal imports to force local power stations into using more domestic coal, providing a boost to its local industry, according to *The Australian Financial Review*.

Treasurer Scott Morrison, who had just returned from a bi-lateral Strategic Economic Dialogue (SED) in Beijing, called them "practical issues", but downplayed any material impacts in an interview with *Sky News*.

Still, analyst consensus is that coal will shine for a while longer, with Macquarie Bank predicting prices for met coal to remain buoyant into next year.

"The biggest discernible change in fortunes for commodities has been a lifting in investor sentiment towards Chinese demand, with the strong June macroeconomic prints – including the third-highest ever loans data – having presented a more robust picture of activity for the second half of 2017," Macquarie analysts said in an August research note via *Business Insider*.



In a September note, Citi said a combination of "robust demand, supply constraints and restocking" would act to keep export prices higher for longer.

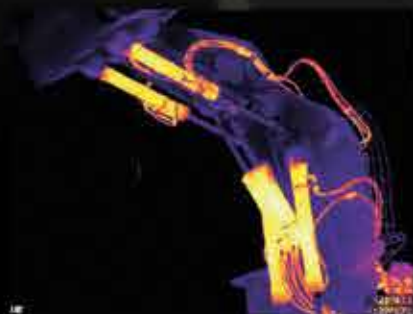


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IN BRIEF

Resolute joins
World Gold
Council

GLOBAL

RESOLUTE Mining has been appointed a member of The World Gold Council alongside some of the world's leading gold producers.

The council was founded with a purpose of stimulating and sustaining demand for the precious metal, while providing industry leadership and global authority on the market.

"Our ambition to unlock further value across Africa and Australia relies on an expert understanding of the broader gold market," Resolute chief executive John Welborn said.

"As such, the World Gold Council's insight into market dynamics and its contributions to further widening access to gold will strengthen our ability to deliver new opportunities.

"Together, we can ensure the gold market keeps growing and improving."

Syrah to raise
\$110m for
Balama

MOZAMBIQUE

MELBOURNE-based Syrah Resources has plans to raise about \$110 million to go towards ramp up at its Balama graphite project in Mozambique.

Soon to enter production, the Balama project will be the leading global producer of high purity graphite.

Syrah also intends to use the funds to cover costs associated with the commercial acceleration of its battery anode material (BAM) strategy, focused on developing growth opportunities in the emerging global battery industry.

"This will give Syrah the best opportunity to capitalise on opportunities as soon as possible," the company stated.

Centaurus
uncovers
high-grade find

BRAZIL

CENTAURUS has identified a "significant" new exploration opportunity at its newly acquired Pebas copper-gold project in the Carajás mineral province in northern Brazil.

Historical data collected in 2010 by the previous owners INV Metals has shown Gossanous rock chip samples returned grades of up to 27.6 per cent copper, 4.6 grams per tonne (g/t) gold, and 73.1g/t silver.

Centaurus managing director Darren Gordon, said to have identified a project with this level of potential and information was a fantastic development for the company, and will allow the team to fast-track initial exploration activities.

African risks easing: PwC

"Increasing commodity prices, the levels of global investment pouring back into resources projects, and the market rebound for mining services companies, shows positivity has clearly returned to the sector."

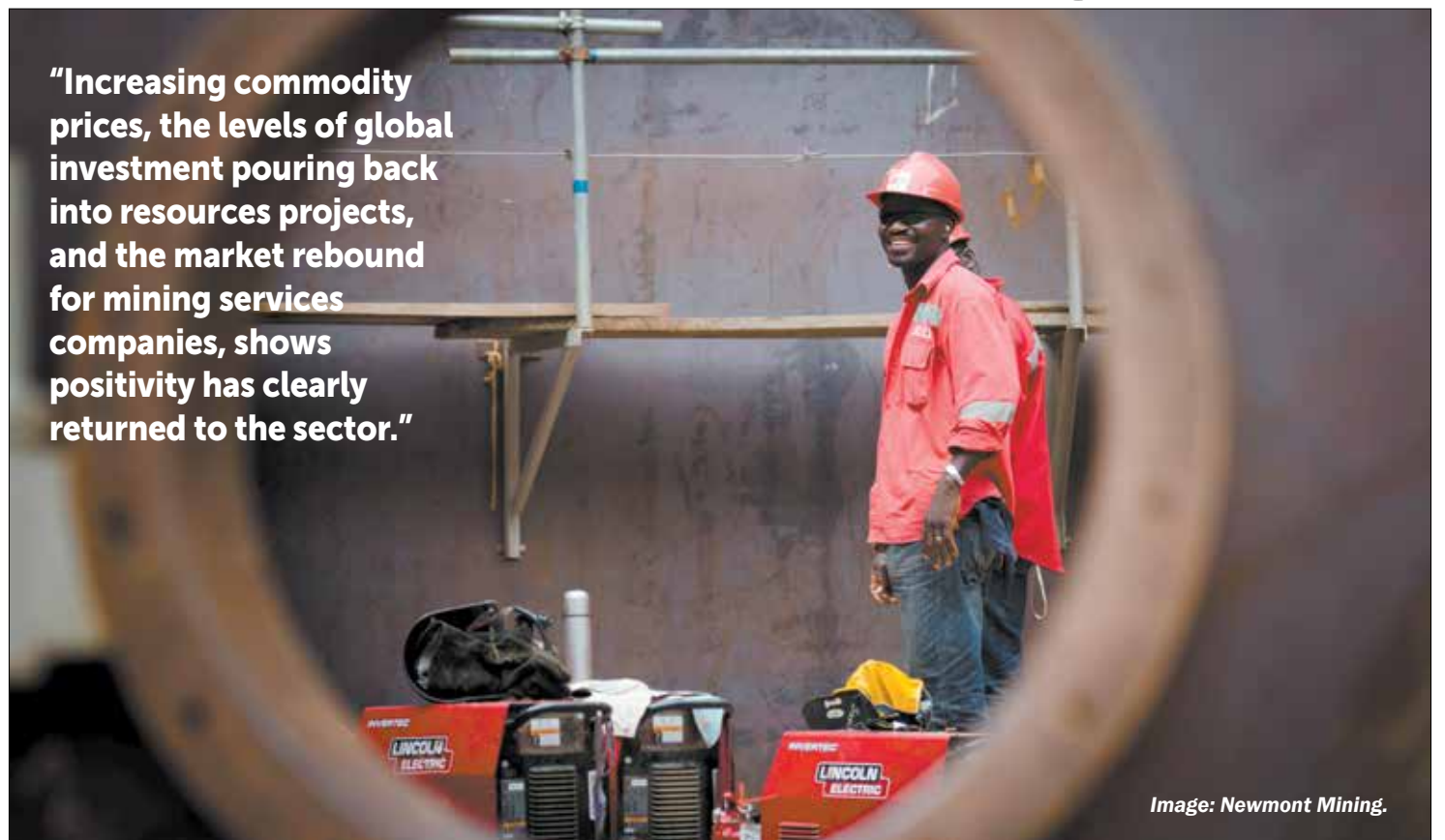


Image: Newmont Mining.

Newmont's Akyem project in Ghana.

ELIZABETH FABRI

SOVEREIGN risks linked to mining investment in Africa are declining, according to PwC Australia-Africa practice leader Ben Gargett.

Speaking at day two of the *2017 Africa Down Under* mining conference, Mr Gargett said the political environment in Africa "had stabilised", in turn reducing the risks attached to mining investment across the continent.

"Africa is changing," Mr Gargett said.

"Despite the challenges the mining industry has faced in recent years, increasing commodity prices, the levels of global investment pouring back into resources projects, and the market rebound for mining services companies, shows positivity has clearly returned to the sector," he said.

"Against this increasingly positive backdrop, opportunities abound for African countries to capitalise on this market environment and attract the capital to develop the resources of their continent."

However, Mr Gargett said the industry was seeing some African governments increasingly look for larger returns from foreign mining operations through increased taxes, royalties and increased free-carry stakes in the mines.

In July, the Tanzanian Government, for example, passed new laws allowing it to tear up and renegotiate contracts with natural resources companies, which caused widespread concern for ASX-listed miners in the region.

Mr Gargett said the question remained on how African countries could capitalise on the positive market conditions, while allowing sufficient returns.

PwC's recently released report *Two steps forward, one step back – the African tax landscape* undertook an economic study examining a standard gold mine operation in Tanzania, Namibia, Ghana and Egypt under the same conditions with the same assumed capital and operating costs.

Mr Gargett said Namibia took top spot out of its sampled countries for foreign mining investment, as it was the "only country which generated a sufficient Internal Rate of Return (IRR)" to allow a clear decision for the mine to go ahead.

The same analysis showed no mining project would be viable in Tanzania given its recent changes to its tax laws.

Mr Gargett said while mineral resources in the ground were not mobile, capital that funds the development of those resources were, so the race was now on between nations "to attract the investment dollar".

Kinross flags \$US1bn expansion spend

CAMERON DRUMMOND

CANADIAN miner Kinross Gold Corp has announced it will spend more than \$US1 billion on expansion projects in West Africa and the US.

The company plans to proceed with a \$US590 million Phase 2 expansion of its Tasiast gold mine in Mauritania, raising its milling capacity from 12,000 tonnes per day (t/d) to 30,000 t/d.

The expansion would replace the two current ball mills with a new larger ball mill, and add new leaching, thickening and refinery capacity and additions to the mining fleet, and a new power plant would be added to power the 30,000 t/d mill.

The upgrade was expected to increase gold production at the project to 812,000 ounces per annum (ozpa) for the first five years at all-in sustaining costs of \$US655/oz.

The company said the project would generate free cash flow of \$US2.2bn over the life of the mine.

Construction has been slated for early next year, with an aim to reach commercial production by Q3 2020.

Kinross said it would also spend a further \$US445m to add five years of mine life to its Round Mountain project in Nevada, pending completion of the permitting process – which



Image: Kinross Gold Corp.

Kinross is the world's fifth largest gold producer.

Kinross said was proceeding as planned – adding 1.5 million ounces of gold reserves.

The miner said it expected to finance the projects through its strong balance sheet and a liquidity of about \$2.5bn.

"Our decision to proceed with the Tasiast Phase Two expansion underscores our determination to realise the potential of this world-class asset and generate significant value for our shareholders," Kinross chief executive J. Paul Rollinson said.

"This strong improvement in Tasiast's performance is expected to positively impact overall company performance metrics, strengthening our production profile and increasing cash flow.

"We have applied the same financial and technical rigour to the Phase W expansion at Round Mountain.

"Lower operating costs, combined with an optimized mine plan, have contributed to a further de-risking of the project and improved returns."



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IN BRIEF

UoA to lead \$14.6m METS research

WA

THE University of Adelaide will lead a \$14.6 million research consortium to develop advanced technologies to boost South Australia's copper production and develop a globally competitive mining technology services sector in the State.

The research consortium Unlocking Complex Resources Through Lean Processing has been granted \$4m over four years by the State Government through its Research Consortia Program under the Premier's Research and Industry Fund.

The move was in line with the government's Copper Strategy and objective of tripling South Australia's copper production to one million tonnes a year by 2030.

Neometals pushes forward lithium tech

WA

PERTH-based Neometals has lodged an Australian provisional patent application for the technology it is developing to produce lithium titanate oxide for use in lithium-ion batteries.

The company is undertaking optimisation testwork at the CSIRO to accelerate commercialisation of the advanced battery material technology, which it expects to complete by the end of the December quarter.

"The lodgement of this patent application is consistent with Neometals' IP strategy to protect its competitive advantage once the commercial viability emerges," Neometals managing director Chris Reed said.

Newcrest awards Cadia processing contract

WA

NEWCREST has appointed Eriez Flotation Division (EFD) and Eriez Australia to supply a separation process system at its Cadia Valley operations in NSW.

Comprising two Eriez' HydroFloat separators and four CrossFlow classifiers, the technology will be used to recover gold and copper from a concentrator tailings stream.

"EFD has assumed a leadership role in meeting increasing global demands for minerals flotation systems — especially for coarse particle recovery," Eriez-Australia managing director Jaisen Kohmuench said.

Detecting tramp metal



Tramp metal, such as bucket teeth, left in mined material and stock piles present a significant risk of blocking or damaging primary crushers.

ELIZABETH FABRI

AUSTRALIAN research body Mining3 has developed a new 'uncrushables' detection technology for real time identification of tramp metal in payloads.

Led by Mining3 principal research engineer Dihon Tadic, the system uses both hardware and software with a unique detector embedded in the bucket of digging and loading machines to alert an operator before the tramp metal enters the crushing circuit.

The technology was trialled in WA and South Africa on load-haul dump and front-end loader buckets, and a prototype has been

deployed in South Africa for extended mine trials.

Mr Tadic said the completed site trials confirmed the technology's ability to improve safety, and prevent costly equipment damage and downtime.

"Mining3 has been developing this technology for detection of tramp metal in machine payloads for several years, with successful upscaling from 1/10th size laboratory tests to most recently a large front-end-loader trial at a South African iron ore mine," Mr Tadic said.

"These site tests, in addition to previous work at a site in WA, have allowed us to assess performance in full-scale operations,

enabling fine tuning of system design and configuration to improve system reliability and sensitivity."

Mr Tadic said with strong support from several mining companies, Mining3 was able to continue to progress the development of advanced prototype systems.

"We continue to progress the development of advanced prototype systems, and are looking forward to medium-term prototype installations at two mines in the next six months," he said.

"These installations will provide critical learnings to inform commercial system development, which we anticipate will commence in 2018."

BHP advances heap leach tech

CAMERON DRUMMOND

BHP has produced the first copper cathode from its heap leach research and development trials which could support a large increase in Olympic Dam's annual output.

Speaking on 4 September at the Bureau Veritas pilot plant in Wingfield, Adelaide, BHP Olympic Dam asset president Jacqui McGill said heap leaching technology could revolutionise production at the mine.

"Integrated heap leach ore processing is a low-cost processing option being assessed for Olympic Dam to extract copper, uranium, gold and silver from our unique poly-metallic orebody, and support our future growth plans in the State," Ms McGill said.

BHP said a series of larger scale experiments and testing on the heap leach process would be undertaken over the next three years.

The miner also announced another Olympic Dam milestone, with first ore being produced from its underground expansion into the Southern Mining Area (SMA) of the project.

"The move into the SMA forms the foundation of Olympic Dam's long-term expansion plans, and successful tests of the heap leach copper extraction technology have the potential to support an increase



BHP said its heap leaching technology meant Olympic Dam could potentially produce more than 450,000t of copper each year.

in production to over 450,000 tonnes of copper a year," Ms McGill said.

"We believe Olympic Dam can underpin jobs and economic development in South Australia for generations to come.

"An estimated \$250m had been invested in the SMA expansion by the end of the 2017 financial year.

"A dedicated team of approximately 180 people have accelerated the development

of the Southern Mine Area over the past 15 months, and confirmation today of first ore is a testament to their hard work and commitment.

"Seeing the first output from the heap leach trials and from the SMA supports moving toward unlocking Olympic Dam's potential and building a foundation for long-term, sustainable growth in South Australia."

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Pilgangoora win for MACA

CAMERON DRUMMOND

MACA has been awarded a two year open pit mining contract for Pilbara Minerals' Pilgangoora lithium-tantalum project, plus three, one year extension options.

The company will provide drill and blast and load and haul services, at a mining rate of 8 million tonnes per annum (mtpa) for the production of 2mtpa of ore to meet requirements of Stage 1 project development.

Mobilisation and establishment on site was set to commence shortly, with pre-stripping of the main Pilgangoora deposit expected during November 2017.

Pilbara Minerals said mining activities would progressively ramp-up through the rest of 2017 and into the 2018 in order to meet the company's expected timetable of commencing shipments of concentrate to its customer base in China during the second quarter of 2018.

Pilbara Minerals managing director Ken Brinsden said the award of the open pit mining contract was a key milestone for the project, as site-based activities continued to ramp-up on several fronts.

"The site is already a hive of activity, and this will only continue to increase in the coming weeks following the award of this pivotal contract as the MACA mining team begin to mobilise to site," Mr Brinsden said.

"MACA has vast experience working

"This contract will employ around 70 personnel and will require the mobilisation of an extensive mining fleet comprising two hydraulic excavators, seven large capacity haulage trucks, drill rigs and numerous items of support equipment."

Image: MACA.



in the Pilbara region and they are a perfect fit with our organisation.

"This contract will employ around 70 personnel and will require the mobilisation of an extensive mining fleet comprising two hydraulic excavators, seven large capacity haulage trucks, drill rigs and numerous items of support equipment.

"We are looking forward to working closely with MACA over the coming years in the execution of this key contract and growing the subcontract and work opportunities for the Njamal people at the Pilgangoora Project."

MACA'S STRONG FY17

Revenue	\$497.9m	(↑ 15% on FY16)
EBITA	\$99.2 million	(↑ 9% on FY16)
NPAT	\$32.1 million	(↑ 33% on FY16)
Order book (30 June):	\$1.130 billion	
FY18 forecast revenue:	\$560 million	

Image: Metro Mining.
Accommodation construction at Metro's Bauxite Hills project.

SAB scores at Bauxite Hills

CAMERON DRUMMOND

METRO Mining has awarded the mining contract for its Bauxite Hills project on the Cape York Peninsula to SAB Mining.

The contract is for an initial two year term, with a further two year option at Metro's selection.

Key mining equipment will be provided by SAB at a fixed monthly rate and ancillary equipment on an agreed hourly schedule of rates.

"Metro is delighted to have engaged SAB Mining to carry out the mining services for the Bauxite Hills Mine," the company stated.

"SAB has been an integral part in assisting Metro advance the project to where it is today and their formal appointment for mining operations represents another key milestone for the project."

Metro has now awarded all major contracts for the mine.

"Metro and SAB will work together to prepare for mining activities with the view of mobilising the mining fleet to site in March 2018, ahead of forecast production starting in April 2018."

Collapsed Brierty loses contracts



Image: Newmont Mining Corporation.

Brierty's \$30m Boddington contract has been terminated.

CAMERON DRUMMOND

BUCKLED mining services provider Brierty has lost two major contracts totalling \$330 million, after it was placed into administration in early September due to market uncertainty and an inability to generate profits.

Rio Tinto terminated a \$300m, 4.5 year mining contract awarded to Brierty in 2014 at its Western Turnery Syncline project in the WA Pilbara.

A \$30m contract for 30 months' worth of mining services at Newmont's Boddington gold project was also cancelled.

Rio had suspended the contract in June to address safety concerns, however

allowed Brierty to resume work four weeks later.

Brierty said it would work with Rio to agree upon a mutually suitable outcome in relation to the handover of works, and was grateful for the miner's support in arranging flights and making its employee assistance program available for Brierty personnel.



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Stokes swallows Coates for \$517m



Coates Hire is one of Australia’s largest industrial equipment hire businesses.

CAMERON DRUMMOND

SEVEN Group Holdings will take 100 per cent ownership of one of Australia’s largest equipment companies Coates Hire in a deal worth \$517m.

Seven Group will acquire the remaining 53.3 per cent interest from Carlyle Asia Partners as part of a strategy to boost

industrial services division in Australia.

Originally established in 1885 as a small Melbourne-based engineering company, Coates Hire is one of the most recognisable names in the equipment hire industry.

It has more than 200 branches across Australia and provides a wide range of products including earthmoving and access equipment.

A consortium comprised of Seven Group, Carlyle and other minority owners

acquired the company in 2008 when it was privatised as part of a \$2.9 billion deal.

Seven Group managing director Ryan Stokes said the company was pleased to reach an agreement with Carlyle to acquire the shares in Coates it didn’t already own.

“We have a long history with the Coates Hire business and believe with the visible market opportunity associated with east coast infrastructure activity, along with

the current performance of the business and management team, the company is extremely well positioned to create value for all shareholders,” Mr Stokes said.

“The move to full ownership of Coates Hire will enhance Seven Group’s position as a leading operator of industrial services businesses, with strong macroeconomic environment and a positive outlook providing the potential for significant opportunities to be realised.”

**FY17
Performance:
Coates Hire**

Total revenue and
other income:
\$918 million

Underlying
EBITDA:
\$308 million

Royalty sting for WA gold

ELIZABETH FABRI

THE McGowan Government's decision to increase royalty rates for WA gold miners has been labelled a "disappointing move" by the Chamber of Minerals and Energy of WA (CME) and a "baffling cash grab" resulting in potential job losses and mine closures by the Association of Mining and Exploration Companies (AMEC).

Under the Budget, from January next year gold miners will pay a tiered royalty rate of 3.75 per cent when the Australian gold spot price is above \$1200, or the current rate of 2.5 per cent if at or below \$1200.

Australian gold prices were currently hovering around the \$1600 mark.

In addition, from 1 July 2018, the State will remove the current exemption for the first 2500 ounces of gold production for miners who produce more than that amount in a financial year.

The McGowan Government said the changes were estimated to raise \$392 million in additional royalty revenue to assist with the "difficult task" of repairing the State's finances.

WA Mines and Petroleum minister Bill Johnston said the decision was consistent with the *2015 Mineral Royalty Rate Analysis* report, which found the gold industry provided a lower return to the State than other commodities.

"Small producers and prospectors producing under 2500 ounces per year will not be impacted by these changes," Mr Johnston said.

"The McGowan Government understands the challenges smaller producers and prospectors face.

"It is only fair that the WA community receives a more appropriate return on the State's gold resources."

The minister added recent increases in exploration expenditure, employment and high gold prices indicated strong conditions for the gold industry.

"Given these strong conditions, and that WA ranked third for investment attractiveness in the recent Fraser Institute *2016 Survey of Mining Companies* — ahead of other major gold producers — the changed royalty arrangements are not expected to impact investment in the State's gold industry," he said.

Based on the current Australian gold price, the increased rates would equate to an additional \$20 per ounce.

Chamber of Minerals and Energy WA acting chief executive Nicole Roocke said the changes would have a "devastating impact" on the State gold sector.

"To introduce such austere measures at a time when the gold sector is just experiencing an improvement in production and sales is unjustified, especially when the majority of royalties raised from this increase will eventually be redistributed to other states through GST after four years," Ms Roocke said.

"The gold sector employs 25,000 people — around 23 per cent of the total WA mining industry workforce — and many of these jobs may now be put at risk due to this royalty increase."

Earlier this year, the Chamber spent about \$2 million on a media campaign fighting a proposed increase of 25 cent per tonne production rental fee on iron ore to \$5 per tonne.

Ms Roocke said through the new State Budget, some gold companies would face a double-hit, with the State Government also announcing a new payroll tax scale from 1 July 2018.

The scheme would see employers with Australia-wide payrolls of between \$100 million and \$1.5 billion taxed at a marginal rate of 6.5 per cent.

"For some gold companies, the prospect of paying higher royalties and payroll tax could be crippling," she said.

"The resources sector is the main target of this new payroll tax, with iron ore companies bearing the brunt and contributing one fifth of the total additional revenue generated from the levy, expected to be \$435 million over the forward estimates.

"The Budget is bad news for the resources sector and not reflective of the contribution it makes to WA, which amount to \$5.2 billion in royalties in 2016-17."

Association of Mining and Exploration Companies (AMEC) acting chief executive Graham Short, said the decision to increase the royalty rate was based on a "flawed" Mineral Royalty Rate Review that used "inaccurate methodology and pre-2014 financial data".

"The royalty increase represents a 50 per cent hike in a major business input cost for the gold industry," Mr Short said.

"This is significant and cannot be easily met without consequences; it will be paid for in jobs, investment and mineral exploration activities."

"The perplexing issue is that the majority of the revenue raised will go out the backdoor to other Australian States and Territories through the GST re-distribution process, whilst the jobs will be lost in WA.

"The Budget has increased the cost of doing business for the mining and mineral exploration industry in WA."

"For some gold companies, the prospect of paying higher royalties and payroll tax could be crippling."

CME WA acting chief executive Nicole Roocke.



"The perplexing issue is that the majority of the revenue raised will go out the backdoor to other Australian States and Territories through the GST re-distribution process."

AMEC acting chief executive Graham Short.



GOLD IN WA

- Employs about 23 per cent of total WA mining industry workforce.
- Accounts for about 5 per cent of total resources industry royalties (about \$238 million).
- 70 per cent of Australian gold is produced in WA.
- Gold sales reached a record \$10 billion in 2015–16; a 10 per cent increase on the previous year.

SPECIAL FEATURES

ROCKHAMPTON: A MINING HUB

CARDS ON THE TABLE

After hours of meetings with Adani representatives, Rockhampton Regional Council Mayor Margaret Strelow and the local business community community have their collective fingers crossed as they await a decision by the Indian miner on the location of its Carmichael project's FIFO Hub.

(L-R): Adani Australia head Jeyakumar Janakaraj, Rockhampton Mayor Margaret Strelow and Adani chairman Gautam Adani.

All images: Rockhampton Regional Council.

CAMERON DRUMMOND

A PLETHORA of direct and indirect job opportunities would become available for the region if Adani chose Rockhampton as the FIFO hub for its \$16.5 billion Carmichael mine, rail and port project.

Rockhampton Regional Council Mayor Margaret Strelow said the council had worked closely with Adani around the imminent decision of the FIFO Hub, and the deal remained an absolute priority.

Cutting her planned leave short in mid-August to attend last pitch meetings with Adani decision makers, Mayor Strelow remained confident of Rockhampton's ability to provide the Indian giant with the necessary infrastructure and business frameworks for the project.

"I understand how critically important the FIFO jobs would be for our community," Mayor Strelow said.

"We have been heavily involved with our business community to cater to the resources sector, and showing people how to get their manuals and quality assurances up to date.

"An opportunity like this doesn't come twice in one generation and we can't afford not to throw everything we've got at it.

"If we are successful in our bid, around 1000 jobs would be injected into our community, filled by people who already live here and people that move here.

"That injection of new jobs and new people is like gold for our community."

Rockhampton Regional Council chief executive Evan Pardon said the council continued to work with local businesses to get them ready, with forums held in Rockhampton and Gracemere.

"These forums are about helping local

"Airport traffic is sitting at about 600,000 passengers a year, but can cater for an annual throughput of 1.6 million."



Rockhampton Airport is the third largest in QLD, able to support heavy haul aircraft such as the Boeing 787 Dreamliner.

businesses prepare and position themselves competitively for any direct work out of Adani's Carmichael mine project," Mr Pardon said.

More than 50 Rockhampton businesses registered for training courses aimed at helping them do business with Adani as part of the council's 'Gear Up Rocky' initiative, including a fully council-subsidised Certificate IV in small business in conjunction with the local TAFE.

The seminars provide advice on how to make the most of upcoming opportunities; including how to expand their business, partner with other businesses, and how to use online tendering platforms.

"These seminars are one of a number of initiatives being undertaken by Council as part of our Gear Up Rocky campaign with further events scheduled throughout the year including training courses, business development discussions, networking sessions

and more," Mr Pardon said.

A key factor in Adani picking a location would be based on having suitable infrastructure to cater for the hub.

Mayor Strelow said that wouldn't be an issue, as the council-owned Rockhampton Airport was "well suited" to handle the increase in traffic Adani's FIFO Hub would bring.

"Our runway is the third longest in the whole of QLD, so we are the diversion point for international flights if they for some reason cannot land in Cairns or Brisbane," Mayor Strelow said.

"The capacity in our runway is not yet full utilised, as currently, airport traffic is sitting at about 600,000 passengers a year, but can cater for an annual throughput of 1.6 million passengers, as well as heavy haul aircraft such as the Antonov and Dreamliner.

"We are also about to do a \$10m refurbishment of our tarmac at the airport

which will give it a stronger base of stability during heavy rains or flooding."

Mayor Strelow said that Adani's commitment to the region was not just about Carmichael, but also other projects in the pipeline in the surrounding area.

"Everybody is really keen for the jobs that will come from Adani and other mines that will follow behind them, however it goes beyond mining; we see the opportunity for engagement with India on agriculture, solar energy and a host of other projects.

"We see Adani as both jobs for now and a handshake across from India into the Central QLD region."

Mayor Strelow said the city owned the title deeds to Rockhampton's water supply, which contains twice as much water as is currently used in an average year.

"It's a huge asset for us that we can spin off into much wider opportunities as the region develops," Mayor Strelow said.

"I look forward to the announcement, and hopefully news that we can celebrate and provide the very best services Rockhampton has to offer."

Jobs on the way

Rockhampton businesses are already being positively impacted by Carmichael's development.

In June, Rockhampton-based Austrak won an \$82m contract to supply more than 730,000 concrete sleepers for the construction of Adani's 388km standard gauge rail line from the mine in central western Queensland to the company's bulk coal handling port at Abbot Point near Bowen.

(CONTINUED ON PAGE 21)



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The Deer Hastings workshop, Rockhampton.

The Palaszczuk Government welcomed the announcement by Adani.

“Adani advise this contract will mean Austrak will triple its workforce to more than 80 and generate up to 30 supply chain jobs, and provide job security for the two-year life of the contract,” Member for Rockhampton and Rural Economic Development minister Bill Byrne said.

During August, representatives from Adani met with SMW Group and Coxon’s Radiators, both based in the Parkhurst Industrial Estate and completing equipment overhauls for the mining industry.

Adani Regional Content manager Ben Hughes said he was impressed with the calibre of operations that he’d seen.

“Visiting regional businesses is a real eye-opener to the capability of regional Queensland,” Mr Hughes said.

“There are fantastic businesses in places like Mackay and Rockhampton who have

only grown more resilient over the past few years.

“Adani Australia are looking to partner with these kinds of businesses who offer innovative approaches and value for money.”

Apart from Adani’s footprint in the region, projects such as Carbine Resources’ Mount Morgan would create further employment opportunities.

The planned project would see the historic Mount Morgan mine revitalised into a 1.1 million tonnes per annum operation and produce 60,000 ounces of gold each year over an initial 9.5 year mine life.

“We are very excited about Carbine Resources’ Mount Morgan project opening again as the area has struggled since the mine was shuttered in the 1970s,” Mayor Strelow said.

“About 80 direct jobs will be created out of Mount Morgan which will be a huge boost for that area.”

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Image: Adani Australia.

ALL HANDS ON DECK

The Carmichael coal, rail and port project will purportedly make up just one third of Adani’s total investment into Australia by 2022, with the Indian mining giant earmarking 1500MW worth of renewables projects and a 1 million tonnes per year agribusiness export mechanism.

CAMERON DRUMMOND

CONSTRUCTION works have started this month on Adani’s mammoth \$16.5 billion Carmichael coal mine, rail and port project, two months after company chairman Gautam Adani gave the operation the green light.

The massive undertaking has come under intense scrutiny by environmentalists, as well as the State and Federal politicians since it was brought to the table six years ago.

However, Adani persevered through a myriad of red tape and court appeals, confirming in late August it would commence major construction works in October.

Once developed, the Carmichael mine will be able to extract more than 2.3 billion tonnes (t) of coal over a 60 year mine life, equivalent in size to the United States’ largest coal mine – Peabody Energy’s North Antelope Rochelle in Wyoming.

Carmichael has approvals to extract 60 million tonnes per annum (mtpa) of coal each year, however phase one – to be completed by 2020 – will have an initial production rate of 25mtpa.

\$3.5bn has been invested into the project to date, including the purchase of the bulk handling facility at the port of Abbot Point.

A further \$3.5bn will be invested by 2020, with another \$8.5bn over the next 10 years.

The combined mine, rail and port operations are expected to provide 10,000 direct and indirect jobs, as well as unlock the development potential of other proposed mines in the coal-rich Galilee Basin.

Project updates

On 6 July, Adani gave the green light for the development of the Carmichael project.

“This is the largest single investment by an Indian corporation in Australia, and I



believe others will follow with investments and trade deals,” Mr Adani said.

“We have been challenged by activists in the courts, in inner city streets, and even outside banks that have not even been approached to finance the project.

“We are still facing activists. But we are committed to this project.

“We are committed to regional Queensland and we are committed to addressing energy poverty in India.”

One of those activists was Adrian Burragubba who led a splinter group of the Wangan and Jagalingou people – one of the traditional owners of lands to be accessed by the Carmichael project – asking for a judicial review of the granting of the project’s mining lease.

However, on 22 August the Queensland Court of Appeal upheld the State Government’s approval of the mining lease and awarded costs against Mr Burragubba.

An Adani spokesperson said the company welcomed the decision as it “represented yet another independent judicial decision upholding nearly eight years of development planning and rigorous approvals, and dismisses activist claims to the contrary”.

“Mr Burragubba suggests he is acting on behalf of the Wangan and Jagalingou (W&J) community, but the W&J people voted by 294–1 to support an Indigenous Land Use Agreement with Adani,” the spokesperson said.

“It is also another legal rebuff to activists’ use of the courts to seek to delay a project that will create 10,000 direct and indirect jobs, including a minimum 7 per cent of jobs going to traditional land owners covering the almost 400km long strip from Abbot Point to central western Queensland.

“The most likely people to be harmed now by further law fare by Mr Burragubba is not the project which has considerable momentum, but the right of the majority group to realise a benefit.”

Other traditional owners had given their support to the project.

Six days after courts upheld the approval of the mining lease, Mr Adani confirmed an October start for construction, with first coal to be produced by the facility in March

2020.

Adani Australia head Jeyakumar Janakaraj said Charters Towers-based civil contracting firm GA Services would be among the first regional contractors to benefit from the start of works.

“Adani Australia’s regional content initiatives will have long-term benefits for Queensland, particularly for contractors like GA Services who help us meet our Indigenous content targets,” Mr Janakaraj said.

Adani said it was committed to providing more job opportunities for regional QLD.

“Actions speak louder than words; we have opened our regional headquarters in Townsville – the first major mining operation in Australia with a regional headquarters instead of basing our project in a capital city,” Adani spokesperson Ron Watson said.

“We also have an online registration for people looking to work, with more than 9000 people registered and companies advertising their services through our online work portal.

“We are not just advertising jobs for our project, but are scanning other job opportunities that arise from the region and putting them on our website free of charge.”

“We are also proposing to have a port and rail operations centre and rail maintenance yard at Bowen up and running within the next few months.”

Mr Watson said Adani would also soon announce where to base its fly-in fly-out hub for the project.

“We are very close to a decision on our FIFO hub as we gear up to get workers to and from Carmichael’s project areas,” he said.

“This is a major project in terms of size and value, and we are all hands on deck moving the project forward, with broad smiles all around.”

(CONTINUED OVER)

Funding

A report by energy analyst Tim Buckley from anti-coal research group the Institute for Energy Economics and Financial Analysis (IEEFA) said there was still doubt over whether the mine was even viable.

"All of my financial analysis over the last four years says the mine is neither financially viable nor strategically required or justified," Mr Buckley said.

"Financial closure is going to be a major obstacle, I have absolutely no doubt."

Mr Watson said he didn't understand people who were quoted saying the project was not financially viable.

"When we received the FID from the board in June, not only did that give us the 'green light', it also injected \$400m into our coffers through equity funding to start the project with," Mr Watson said.

"We are close to our financial close for the project and are expecting to realise a complete funding package by March next year."

Part of that financial close would likely come via the Federal Government's Northern Australia Investment Fund (NAIF) – a \$5bn scheme to encourage and finance private sector investment in economic infrastructure that benefits Northern Australia to which Adani had applied.

Earlier this year, the QLD Government said it would not stand in the way of Adani receiving funding from the NAIF.

"We will not stand in the way of those arrangements [and] in the case of the Carmichael mine, any funds will pass directly from the Federal Government to Adani," QLD Treasurer Curtis Pitt said.

Mr Watson said once Adani had received commercial investment commitments it would have a better idea of how much it would require from the NAIF.

"The funding gap will be realised once we finalise funding from the international market – at this stage a figure for funding from the NAIF has not yet been determined," Mr Watson said.

"Numbers being thrown around in the media such as \$900m, or \$1bn, simply aren't accurate at this stage."

Other Australian projects

The central western QLD coal mining town of Moranbah will soon boast a \$100m, 65MW solar energy plant, marking Adani's first foray into the Australian renewables sector under subsidiary Adani Renewables.

The Rugby Run solar farm will be built on a 600 hectare block that was part of the Rugby Run grazing property – and



Adani Australia's head Jeyakumar Junakuraj.

is expected to use the latest mono-PERC technology and single axis tracking systems developed to improve efficiency and output.

Further stages are planned to take the generation capacity up to 170MW.

The Rugby Run Solar Farm is expected to be completed over a 12 month period with a workforce likely to peak at up to 150 employees during construction.

Upon receiving development approval from the Isaac Regional Council on 12 September, Adani Renewables chief executive Jennifer Purdie said work would start on the first stage of the solar plant by the end of the year.

"This is an exciting project in terms of its size, location, and the technology we are using," Dr Purdie said.

"This will be Adani Renewables' first project – the first of many – and we thank the Isaac Regional Council, in particular Mayor Anne Baker and her officers for their assistance and encouragement."

Isaac Regional Council mayor Anne Baker said the council supported responsible industry development which genuinely engages with all stakeholders.

"We are excited to welcome Rugby Run Solar Farm as the first renewable energy project in the region," Mayor Baker said.

"This project continues to diversify our local economy, and will contribute towards a sustainable future for both Isaac and the state."

"We look forward to the employment opportunities and long-term benefits that Rugby Run will deliver to our communities."

"Adani Australia's regional content initiatives will have long-term benefits for Queensland."

Adani said prep work, including heritage surveys and engineering design had commenced and orders for critical equipment were under way.

It also executed the initial stage of works to expedite a network connection application with Powerlink to feed into their existing network supplying the State.

Adani said it was the first of a number of solar projects to be developed in Australia and had earmarked a total capacity of 1500MW within the next five years.

"The objective is to be the largest solar power generator in Australia by 2022," Mr Watson said.

"Solar plays a big part for Adani as we are already the largest provider in India, which includes the world's largest single site solar generation plant at Tamil Nadu in southern India which has a capacity of 648MW."

The company has constructed 793MW of solar plant in India to date, with a further 1225MW in the construction or late development phase.

Mr Watson said Adani's strategy within the next five years would see the company's \$16.5bn investment in the Carmichael project represent just one-third of the company's operations in Australia.

"The rest will be divided between renewables – particularly solar – and agribusiness which will represent the export of about 1 million tonnes of pulse crops each year."

"We are currently in discussions with a number of agricultural areas – particularly in QLD's Central Highlands and Darling Downs regions."

MINE

160km northwest of Clermont in Central QLD's Galilee Basin, the Carmichael coal mine will be Australia's largest thermal coal operation.

- Built on the world's largest single coal tenement
- Six open cut pits and five underground mines
- 25mtpa Phase One production by 2020
- 60mtpa at full production

RAIL

The Carmichael Rail Project will transport coal from the Galilee Basin to the Port of Abbot Point via a 388km multi-user standard gauge rail line, providing an alternate and shorter route to Abbot Point compared to the existing narrow gauge system via Moranbah.

- 40mtpa Phase One capacity by 2020
- 100mtpa at full capacity
- Coal trains up to 3.97km in length and 31,964-tonne gross weight
- Optimised for 3 diesel locomotives and 220 bottom discharge hopper wagons
- 23,760 tonnes of coal transported in a round trip of under 24 hours

PORT

Adani's expansion of its owned and operated bulk coal facility at Abbot Point will boost throughput capacity from 50mtpa to 120mtpa, making it the world's largest coal export facility.

- New T0 coal export terminal adjacent to Abbot Point's existing T1 terminal
- Increase of up to 70mtpa total port export capacity
- Rail loading facilities
- 2 new ship berths 3km offshore

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In addition, Buslink VIVO can engineer, build and maintain transport infrastructure including depots, bus stops, refuelling stations and wash bays.

The team prides itself on its wealth of logistical and local knowledge, with the



More information can be found at www.buslinkvivo.com.

expertise to provide cost-effective employee transport solutions, tailored to clients' specific needs.

"We are also able to assist clients with comprehensive early-stage project transport planning," Buslink VIVO

national business development manager Eliza Carbines said.

"We work with them to understand the key criteria and time frames for their project, in order to recommend specific execution plans that align with industry best-practice and regulations."

Its quality delivery of services resulted in Buslink VIVO being awarded the 2016 Northern Territory Resource Supply and Service award.

Promoting the importance of international trade and industry, these awards recognise the outstanding achievements and success stories of industry leaders in the mining and resources field.

This recognition is something that Buslink VIVO is very proud of, along with contributions to the local communities where the company employees live and work.

Buslink VIVO is committed to providing safety, comfort, value, on time delivery, quality assurance, community connection and a sustainable world.

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“With every operation that I have come across there is always an intention by management to try and see if you can push it above nameplate – especially while prices are good.”

THINK ZINC

A surge in zinc demand over the last 12 months has MMG well placed as its \$1.4 billion Dugald River mine nears first shipment in December, several months ahead of schedule.

The Dugald River tailings storage facility dam wall. All images: MMG.

ELIZABETH FABRI

SITTING on one of the world’s largest undeveloped zinc-lead-silver deposits, Dugald River will come online at an opportune time for MMG as it works towards its goal of becoming a top mid-tier mining company by 2020.

It will be a game changer; once Dugald River enters production MMG will add a further 170,000 tonnes of zinc (at peak) to its group production a year.

This represents a sizeable increase on current group zinc production, which was expected to reach between 65,000t and 72,000t in 2017.

The improving zinc market will also work to the company’s favour.

It has already been a watershed year for the base metal; after steadily climbing over the course of the year following a sequence of mine closures, in August zinc surged above \$US3000 a tonne for the first time in almost a decade.

Higher prices were expected to continue out to 2019 as the global market rides through a deficit.

“Just looking at the fundamentals supply and demand wise there’s certainly the expectation that the current price situation won’t change overnight,” Dugald River general manager of project delivery Pierre Malan told *The Australian Mining Review*.

“It will take some time for what is currently about eight days of zinc stock in the international market (eight days of consumption).

“That’s a very small stock position, and for that stock position to change, there



The project will begin first shipment in December 2017.

will need to be some radical changes by the supply or demand side, and as we know on the supply side changes to increase takes a bit of time.”

Dugald River is expected to be one of the world top 10 producing zinc mines. The company’s optimised mine plan

supports a 1.7mtpa zinc operation plus by-products including 18,000 tonnes of lead and 981,000 ounces of silver in concentrate per annum.

The project has been on the drawing board for some time, but wasn’t progressed until July 2015 when an

updated development plan was approved.

Not wasting any time, MMG began construction a month later, and has since been pushing towards its goal of first production in 2018.

However a few months ago, the company announced production was in fact able to begin earlier than expected, with first shipments in late 2017.

When asked how the company was able to achieve this milestone ahead of time, Mr Malan attributed the progress to “good work from its contract partners” and the project management team on site.

“Our development program for this project was quite an aggressive one,” Mr Malan said.

“We haven’t had any major critical path delays and as a result we haven’t had to go significantly into any schedule contingency.

“That’s the reason we’ve been able to bring it forward into 2017.

“We are hopefully looking at December (before Christmas) getting our first shipment of concentrate out of the Port of Townsville.”

Commissioning begins

At the end of August the project, including the underground mine and surface infrastructure, was more than 80 per cent complete.

“We’re getting to a stage where we are focusing on commissioning and construction verification throughout the surface plant while producing ore from underground and stockpiling that on the surface,” Mr Malan said.

(CONTINUED ON PAGE 28)



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MICROMINE mine solutions go live at Dugald River

LEADING provider of innovative mining solutions, MICROMINE has successfully implemented its leading underground fleet management and mine control solution, Pitram, at MMG's Dugald River mine in north-west QLD.

Dugald River has one of the world's highest-grade known zinc deposits, and in 2016 announced an optimised mine plan that will support a 1.7 million tonnes per annum operation with annual production of around 170,000 tonnes of zinc in zinc concentrate, plus by-products.



More information can be found at www.micromine.com.

River with a robust mine control solution that will allow the operation to record, manage and process mine site data in real-time. "Improvements in safety, productivity and reporting efficiency are already being realised, and the business looks forward to leveraging these benefits as the operation ramps up," Mr de Vries said.

Additional modules implemented will include drill and blast, which provides tools for planning and managing drill and blast operations, additionally, the controlled areas module improves safety by monitoring access to dangerous and hazardous areas.

A single source of the truth, Pitram, allows control room administrators to make decisions in real time based on the data captured to increase productivity and reduce costs.

"We are very excited to have implemented Pitram at Dugald River," Mr Rowohlt said.

"Pitram will provide MMG with an overall view of the current mine status, therefore enabling more control over the operation."

The successful implementation of Pitram enables the control room administrators to capture live data ensuring data accuracy, increasing efficiencies and control over equipment, tasks and personnel.

"Real-time data entry allows the control room to make proactive decisions which ensures the operation can run safely and efficiently to maximise output," Pitram business development manager Chris Rowohlt said.

The solution utilises voice radio data capture, allowing production data to be entered into Pitram via radio communication.

Included in the deployment is Pitram's Materials Management module which utilises mine design, survey and production data to provide real-time stockpile balances throughout the mining operation.

"The Pitram Materials Management module adds value to the Dugald River operation by providing an accurate method of tracking the material flow including grades from source to processing," Mr Rowohlt said.

MMG Dugald River technical services superintendent Rhett de Vries said the implementation of Pitram provided Dugald



Mining data goes mobile

Pitram Connect provides insight into what is happening within your mine at your fingertips. It allows users to retrieve information about their assets (people, equipment, production, locations, time allocations) without directly impacting mine control personnel or having to be at a workstation. Pitram Connect saves time, reduces radio traffic and misinterpretation, allowing the mine controller to focus on maintaining data integrity without interruption.

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(CONTINUED FROM PAGE 26)



"Our development program for this project was quite an aggressive one."

The Dugald River 1.7 million tonne per annum processing plant.

"We have already managed to [stockpile] about 330,000 tonnes of ore on the surface in readiness for start-up and ramp up.

"We'll continue with that over the next two to three months, and add about another 100,000t to the stockpile prior to start up."

While it was too early to determine ore quality, so far there had been "no surprises" from the three small stopes it had mined, Mr Malan said.

On the surface, MMG had completed about 97 per cent of construction works including the tailings storage facility, reclaim and utility areas, and was getting close to ore commissioning its grinding circuit and starting wet commissioning of its flotation plant.

"The intention will be to progress through wet commissioning into ore commissioning and hopefully produce the first concentrate somewhere late October," Mr Malan said.

The expected remaining capital cost to project completion was still consistent with previous guidance of between \$US600 million and \$US620 million plus interest costs.

Recruitment was also in full swing, with all maintainers and plant operators now on board.

"They've all started," Mr Malan said.

"We have started to introduce at a limited scale, a night shift on the surface operations from the end of August, and that will form part of the wet commissioning and ore commissioning of the plant over the next two months."

Once production begins, the company expects to employ a total of 350 employees; slightly under its initial estimate of 400.

Many of these employees will come from



The expanded permanent village.

the nearby Cloncurry and Mt Isa regions, helping bring in economic benefits to the local communities.

"We don't have any quotas; we have a process where we are very transparent and open about that we prefer to employ locally," Mr Malan said.

"Only once we have exhausted all opportunities to employ people out of those two locations, or to get people who are interested to relocate to those centres, do we go out to Townsville and fill the rest of vacancies with suitably qualified people."

The next phase

While commissioning and training staff was the primary tasks for the rest of 2017, the Dugald River team will soon shift its focus to ramp-up.

For the first six to nine months of next year, all efforts will be placed on safely increasing production from the mine and processing plant in order to hit nameplate capacity.

"We will be hoping and planning to achieve nameplate capacity towards

the end of 2018 at which point we can see what opportunities there might be to further debottleneck the mining operation and processing plant [to] boost the volume above nameplate," Mr Malan said.

"With every operation that I have come across there is always an intention by management to try and push it above nameplate, especially while prices are good; the return on that incremental volume is often very good."

Mr Malan said he had no "crystal ball" for zinc's trajectory, but he was confident prices would be sustained, especially within the first few years of the project's operating life.

"At the current price of around \$US1.40 per pound, that's certainly a good price for us," he said.

"We will be hoping to make some reasonable margins when we come into production.

"Coming into production even every week earlier than what you otherwise would be beneficial for the company."

Looking ahead, Mr Malan didn't rule out an extension to the current 25 year mine life.

"We've got plenty of potential within the orebody, so what's currently a 25 year mine life could potentially extend up to 40 years and beyond," he said.

"However, there is a lot of work that will have to happen in later years to properly delineate that potential resource lying underneath the current orebody; [we need to] work through details in terms of mining method and costs and see what needs to be done to bring that into the operation."

Expert geotechnical support

MineGeoTech offers geotechnical engineering support, mine planning engineering services and technology solutions from exploration phase to mine closure.

Principal geotechnical engineer Dr John Player has more than 23 years' experience and holds a PhD in Dynamic Testing of Rock Reinforcement Systems.

Dr Player founded the company in 2010 and it has since grown to have offices in Kalgoorlie and Perth.

The team of 10 geotechnical engineers, mining engineers and engineering geologists have a wealth of experience in metalliferous mining projects both in Australia and internationally.

The company has undertaken mining and geotechnical feasibility studies to both underground and open cut mines.

MineGeoTech's strong base of operational support and geotechnical coverage assists clients that do not have their own geotechnical staff, and to those requiring additional support and training.

Demonstrating MineGeoTech's capacity to meet its client's requirements was the provision of engineering expertise to MMG during the Dugald River geotechnical feasibility study.

The keystone being the establishment of a structured, 19 stope, trial mining program over an eight month period, extracting 355,000 tonnes of ore.

The trial stoping program achieved the objective of characterising the hangingwall rock mass conditions, and measured its performance (geotechnical and mine production) for the revised feasibility study.



MineGeoTech's team are some of the most expert geotechnical engineers in the resources sector.

Mining methods tested included multi-lift, extended strike, longitudinal and transverse stopes, in a sequence that also simulated crown stopes of a mining panel.

MineGeoTech's mining engineering services undertake mine optimisation,

design and scheduling of open pit and underground projects.

This includes scoping to feasibility studies, ore reserve statements and LOM operational support servicing operations from 0.2 million tonnes per annum (mtpa)

to 5mtpa.

The MineGeoTech integrated approach of mining, geology and technology provides explorers and miners with a single solution from core logging through to feasibility with a tailored solution for each client.



MineGeoTech congratulates MMG on the commissioning of the Dugald River mine following an extended and technically challenging feasibility study.

It was MGT's pleasure to work in collaboration with the MMG team developing over a two year period:

- » A Geotechnical assessment program from core to excavation with a focused and ongoing geotechnical logging program, defining stope performance and rock mass variability.
- » A mechanistic rock mass model for ELOS and stope strike lengths from core generating accurate and rapid generation of mining blocks, with strike tailored to rock mass conditions. The model captures stope by stope performance, allowing real-time assessment and prediction of performance, reducing uncertainty and ELOS for future stoping.
- » The design and installation of an extensive instrumentation program (66 MPBX's, 15 RWE's, 15 open hole camera surveys, 23 TDR's) with dataloggers for rock mass displacement.
- » Understanding of the controls on cemented rock fill strength development with testing, achieving a 50% reduction in cement content.
- » Stope blasting damage monitoring and assessment from vibration monitoring on geophones, displacement on extensometers, borehole cameras for observation of ground change.
- » LOM layout requirements and productivity inputs through monitoring and assessment of:
 - > Manual and remote loader productivity during stoping
 - > Loader productivity for the mixing and placement of CRF
 - > Software for Stope blast hole deviation analysis
 - > Truck haulage capacity



EYE OF THE STORM

Lightning, high-speed winds, heavy rain, droughts and even humidity are some of the adverse weather events facing mining projects. MetraWeather meteorologist and storm chaser **Rebekah LaBar** spoke to **Elizabeth Fabri** about how meteorologists can help resources companies minimise downtime and manage weather risks through tailored real-time forecasts and commentary.



Q. What inspired you to become a meteorologist?

When I was 12 years old I saw my first tornado. It passed right by my family's farm in central Washington State in the US, which is not a common place to see tornadoes.

I was absolutely terrified, which drove me to learn about severe weather; I believed that if I understood it better I would not be so scared if I ever saw another severe storm.

However, meteorology remained an interest rather than a career goal for me until I was almost finished with my Bachelor's degree, when I had the opportunity to join a summer meteorology research program in Oklahoma.

Once I went on my first storm chase I was hooked, and knew that I'd found my passion.

I decided to pursue my Master's in Meteorology at the University of Oklahoma – not just because the meteorology program has a world-class reputation, but because I wanted to chase storms.

Q. Tell us about your storm chasing adventures.

People chase storms for many different reasons. My interest initially stemmed from my passion for using science to formulate a prediction and verifying it in the form of a beautiful, photogenic storm. Each time I chase, I learn something new, whether I nail the forecast or I bust.

I will admit it is an adrenaline rush to see a supercell thunderstorm or a tornado out over the empty plains.

My favourite storm chase was in southeastern Colorado on 31 May 2010, where my friends and I saw the most photogenic tornado touch down about a hundred meters away from us in an open field.

It was slowly moving away from us, but the hail core was slowly moving towards us. If



MetraWeather
meteorologist
Rebekah LaBar.

you're storm chasing, this is what you hope to see, a tornado that is slow-moving and doesn't wind up hurting anyone or their home.

Unfortunately, not every storm chasing story has a happy ending. On 4 May 2007, I saw a nearly 3km-wide EF5 (top-rated) tornado devastate the small town of Greensburg, Kansas. This tragic experience led me to make sure I reported every tornado I saw, as soon as I saw it, before I started to photograph the event.

Even if many other chasers are in the field, you can't assume that someone else has already reported the severe weather.

Q. Why is meteorological data integral to mining operations?

There are many impacts that weather can have on mining operations.

Lightning is a safety risk to anyone outside

in the storm, and it is important to know when to cease certain activities (or avoid them altogether when lightning is expected) such as blasting and refuelling.

Heavy rain can cause flash flooding and make roads around the mining complex muddy or impassable.

High winds can blow objects around as well as pose a risk to equipment and anyone working at heights. If the ground is also dry enough, the winds could cause a dust storm or blow coal dust over the neighbours, causing a health hazard.

Extreme heat is another health risk, and alerts allow mining supervisors to ensure plenty of water is available for staff working outdoors and to consider whether certain activities should be postponed.

Q. How can meteorologists mitigate weather impacts for miners?

We forecast for all of these threats and more, both through frequently-updated automated forecast data as well as forecast discussions written by trained meteorologists, so that mines can take appropriate action to prepare for each weather event.

We also provide the likelihood of an event occurring, so operations don't necessarily have to be called off if it's a low risk, but at least contingencies can be in place.

Q. The first step is providing the data, but how do you put this into context for companies?

While we provide weather observation and forecast data, where we really add value is through learning the customer language and being able to convey what the data means for each customer.

For example, we can say that it's going to be windy, but if we know how dry it needs to be, and what the wind direction and speed needs to be, for dust to become a problem, we can put together a forecast that highlights the risk of dust transport tailored to a specific mine.

Or while one mine may be quite concerned with rain above a certain threshold, another mine may need more rain for it to become a problem.

In addition to forecast graphs and weather risk matrices for each mine, we have consultant meteorologists who provide commentary to further illuminate why the weather models might be highlighting certain risks.

Q. What technology is used deliver data in real time?

We have a decision-support dashboard that holds many of the products available, including frequently updated observation and forecast data, and this can be customised by the individual.

One particularly useful real-time tool on our dashboard is called StrikeCast, which allows lightning strikes and radar images to be overlaid on a Google-Maps-type interface.

We are able to plot the location of the mines on the map, and set up range rings to indicate the proximity of the lightning to each mine.

StrikeCast can also produce a forecast of lightning risks in areas near to where lightning is currently ongoing.

Another lightning tool that we offer is called a Lightning Circle, where the user can set mine coordinates and the range rings of interest (for example, 15km, 30km and 60km), and then the rings around the centre will light up whenever lightning is detected within that ring.

We also have an email and SMS lightning alert system that will send out a message whenever lightning is detected within the desired range ring of the mine, as well as send out an “all clear” after a certain amount of time has passed following the last lightning strike.

Q. How accurate are these forecasting tools, and how far ahead can they predict?

Our best model was developed in-house, an ensemble model we call ePD. One of the greatest strengths of this model is the ability to tune forecasts to weather observations.

The longer history of observations we have for a site, the more we can train the model to produce increasingly accurate forecasts for that site.

Given a solid history of observations, this model produces excellent temperature and wind forecasts, both of which can be forecast up to 14 days in advance.

The ePD model predicts a range of possibilities, and we can use this to determine the model confidence.

If the lower decile and upper decile are very close together, we know that we can have high confidence in the forecast.



However, if there is a large spread, we can caution that the model members have not come into close agreement and there is a 10 per cent risk of the temperature exceeding 40C, though we expect it to only reach 35C.

Q. What advice would you give to companies in the lead up to serious weather events, like Cyclone Debbie?

In the case of Cyclone Debbie and some other tropical cyclones we work a bit of extra time making people more aware of

the situation.

Before the tropical cyclone makes landfall we send out updates on what the official forecast is showing, as well as any other titbits of information that we can offer.

Q. Have you visited mining operations in person?

About a year ago, I had the opportunity to visit a coal mining complex in the Hunter Valley of New South Wales. I had been working with the mining company and

several departments in MetraWeather to develop a suite of weather support products, including a dispersion model that a colleague and I were able to demo.

Meeting in person allows us to better understand customer perspectives and needs, often more so than discussions via telephone or Skype.

In this case, touring the mine offered me a much better understanding of why the customers were asking for certain things, and why certain weather conditions prove a threat to mining operations.

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Precise hyper-local weather data

LEADING global commercial provider UBIMET specialises in precise meteorological services, providing companies with high-resolution forecast data, advanced lightning detection and tracking, and time critical severe weather warnings.

The company's precise, hyper-local weather solutions increase efficiency and ensure safety within a number of industries, including mining, construction and other critical infrastructure.

One particular solution, the Weather Cockpit, is a web-based portal that showcases everything UBIMET does in one place, from in-house numerical forecast models to unique severe weather warnings and lightning detection.

"Our Weather Cockpit has been used to provide critical weather data to partners such as Formula 1, Frankfurt Airport, the Austrian and German federal railways and PORR, an international construction company," UBIMET Australia general manager Casey Palmer said.

"PORR uses the Weather Cockpit to keep its construction workers safe and better deploy resources.

"It provides all relevant weather information at a glance for better decision-making, sends warnings when conditions are no longer safe for working on rooftops and helps identify the best time to set up a crane."

In Australia, UBIMET has long-standing relationships within insurance and in sports, and has recently started new projects in mining and the construction industry.

"We have built our own lightning network here in Australia, covering even the most remote areas," Ms Palmer said.

"It is the newest and most advanced technology here, and our partners in mining have been particularly interested in this data.

"The Weather Cockpit is designed to reduce risk, prevent damage and ensure safety, and accurate lightning data is a critical piece of data for making that happen.

"We track all strikes in real-time, and mining clients have reported that they have reduced false alarms and prevented downtime incidents."

In cases where a suspension of operations could not be avoided, mining companies have reported significant reductions in downtime while maintaining confidence in



UBIMET remain at the forefront of weather technology and services.

the safety of all personnel.

Lightning alerts are generated when the first strike is detected within a set radius of a site, which UBIMET customises depending on specific operational requirements.

"However these alerts are just the first part of the service – mine sites also need decision making support on when to resume operations, and there are no clear standards and how much time needs to pass before it is deemed to be "all clear", Ms Palmer said.

"We have actually conducted a large-scale study calculating the risk of another lightning strike after the last strike has occurred within a set area.

"This was done by analysing more than

one million events over multiple climate zones and topographical areas.

"This has allowed us to develop All Clear messages based on safety buffer times specific for each site, allowing mine sites to further reduce downtime."

In some cases UBIMET has reduced downtime from one to two hours to less than 20 minutes.

UBIMET invests more than 25 per cent of its global revenue into research and development every year.

This allows the team to create industry and customer specific products and services to continually improve forecasting and weather related services

for its end customers and keep UBIMET at the forefront of weather technology and services.

"Lightning is a particularly interesting topic for us in Australia, especially as there are parts of the country without radar coverage," Ms Palmer said.

"We'll be implementing more features around lightning tracking and related decision making.

"We have seen partners throughout a number of industries reduce downtime by between 50 and 70 per cent, simply by commissioning the lightning study for a particular site, so this will be a focus for us over the next year."



The Weather Cockpit has been used to provide critical weather data to partners such as Formula 1.



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GOLDFIELDS BEHEMOTH

After Chinese-owned suitor Minjar Gold walked away from a takeover deal in April, JV owners of the KCGM Super Pit have continued to mull over plans to extend both open pit and underground mine life.

All Images: Barrick Gold.

CAMERON DRUMMOND

124 YEARS after the discovery of Kalgoorlie's 'Golden Mile', the prized gold district celebrated the pouring of its 60 millionth ounce of gold, extracted from the super-massive Kalgoorlie Consolidated Gold Mines (KCGM) Super Pit.

In 1893, prospectors Paddy Hannan, Thomas Flanagan and Dan Shea found nearly 100 ounces (oz) of gold in the dry red soil of what is now the town of Kalgoorlie-Boulder.

This sparked a gold rush and the discovery of the Golden Mile, one of the richest gold deposits in the world.

By 1903 there were 49 operating mines, 100 headframes and more than 3000 kilometres of underground workings on the Golden Mile.

Small mining operations remained dotted in the Golden Mile region until the 1980s, when in 1989 the entire area was combined and KCGM was created to manage the assets and operations of Normandy and Homestake.

Existing smaller pits were amalgamated into the Fimiston open pit – originally nicknamed the Big Pit, later becoming known as the Super Pit.

It wasn't until 2001 that interest in operating the Super Pit sparked a bidding war; Normandy had attracted interest from South African gold miner AngloGold and US-based Newmont.

Newmont came out on top, securing the takeover at \$2.04 per share which valued Normandy at \$US4.56 billion.

Canada's Barrick Gold snapped up Homestake for \$US2.2bn, making it the second largest gold miner in the world at the time.

Since then, Barrick and Newmont share KCGM in a 50:50 joint venture (JV).

In late November last year, Minjar Gold – a subsidiary of Chinese property developer Shandong Tyan Home – bid \$1.35 billion for Barrick Gold's 50 per cent stake in the Super Pit.

The move was welcomed by Barrick, as it was markedly higher than the next best previous offer of \$900m, and would help reach its target of paying down \$US2 billion worth of debt during FY17.

However the transaction would not



The KCGM Super Pit was consolidated from a range of small mining operators in 1989.

eventuate, as Minjar walked away from the deal.

Operation

The Super Pit was Australia's largest open cut gold operation until 2016, when Newmont's Boddington gold mine opened south east of Perth.

It covers more than 26,000 hectares of land, made up of about 260 mining tenements, and is about 3.5km long, 1.5km wide and 570m deep.

Within is contained 1000 individual ore lodes, some extending up to 1.8km long, 1.2km deep and 10m wide.

The Fimiston open pit (Super Pit) is currently 3.5km long, 1.5km wide and more than 600m deep; and will be 700m deep by the end of its projected mine life.

Kalgoorlie's processing plant was first commissioned in mid-1989 and has since undergone two major expansions (1991 and 1995).

The Fimiston plant processes ore from the Super Pit and Mt Charlotte underground mine.

Both ores are processed via two milling circuits, which consist of two SAG mills and associated ball mills capable of treating up to 40,000t per day.

Excess concentrate, which is unable to be treated on site, is sold to overseas smelters for processing.

In 2015, the two roasters at Gidji were decommissioned and a new 30 tonne per hour (tph) ultra-fine grinding mill was installed.

This was in addition to the already existing 10tph ultra-fine grinding mills at Gidji since 2000 and at the Fimiston processing plant since 2002.

When scheduled open pit mining at Fimiston ends in 2019, KCGM will begin processing stockpiles of low grade ore until 2029.

Looking to the future

Gold production in 2016 was 752,000oz at all-in sustaining costs (AISC) of \$US706/oz, and proven and probable mineral reserves by the end of that year stood at 8.2 million ounces (moz).

Production guidance for 2017 was expected

to be between 750,000oz and 850,000oz, at all-in sustaining costs of between \$US665/oz and \$US715/oz.

Both JV partners were looking at options to extend the mine life of the historic operation.

In 2014, KCGM identified the Hidden Secret underground ore body at Mt Charlotte, which has an estimated 665,000t of ore at 3.56 grams per tonne (g/t) of gold equating to 76,000oz.

In May 2015, 11 new positions were created at Mt Charlotte after approval was given for the Hidden Secret project, extending mine life until 2018.

With the Super Pit close to the end of its mine life, and mining of the Mt Charlotte underground mine due to finish in 2018, KCGM turned its focus to the Morrison extension of the Super Pit – currently in the definitive feasibility stage.

JV partner Newmont said it was considering a \$US100m, two-year development of the extension, and would make a final investment decision by the end of the year.

Newmont chief operating officer Tom Palmer told analysts in a 25 April conference call the company still saw growth potential in the Super Pit.

"You're looking in the order of \$US100 million for the capital cost of that layback and we'd be aiming to approve that in the latter part of this year and achieve commercial production in early 2019," Mr Palmer said.

Mr Palmer said further drilling work could also be planned to extend mineral reserves.

"I'd look at over the next two-year timeframe us doing further work on what those opportunities might look like and what that drilling might look like," he said.

More recently, September saw the accession of Cecile Thaxter to the role of General Manager at KCGM, taking over from Ian Butler who had held the position since 2014.

Ms Thaxter joined KCGM from Newmont's Phoenix/Lone Tree operations in Nevada where she was general manager.

Since 2008, Cecile had served in a number of roles at Newmont, including as Regional Chief Financial Officer for North America, and is the company's first female and financial professional selected to fill an executive operational role.

Partnering with KCGM



Force Equipment is a leader in mining equipment maintenance services and earthmoving equipment hire.

FOUNDED in 1987 in Kalgoorlie, WA, Force Equipment has built its reputation based on performance and excellence. The company offers an unwavering commitment to customer service, with quality machinery presented to the highest industry standards. Force Equipment has developed its capabilities to provide an integrated service nationally for earthmoving equipment hire, sales, and maintenance for mining,

construction, and infrastructure projects. Force Equipment has operations and large workshop facilities in Perth, Kalgoorlie, Port Hedland and Mackay. With an experienced and professional maintenance team of more than 200 staff and a fleet of 170 heavy earthmoving machines, the company has the resources to deliver trusted solutions to its clients. Force Equipment is engaged in several mining projects throughout the Pilbara

and Goldfields regions of WA. One of these projects is for Australia's largest open-cut mine, the KCGM Super Pit in Kalgoorlie. At this project Force Equipment provide a fleet of more than 20 Caterpillar machines. With a large number of experienced onsite staff, the company maintain and support its own equipment and the client's equipment on site, performing scheduled

maintenance and break down repairs. Force Equipment run 24-hour maintenance crews of heavy duty mechanics, boilermakers and servicemen to ensure all maintenance schedules are met and breakdowns are repaired promptly. KCGM is a valued client and the team at Force Equipment said they were privileged to be working into the future with such an iconic operator.



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HEAVY LIFT

Image: thyssenkrupp.



Port Kembla is the second largest coal export port in NSW, handling about 11 percent of total exports from the State. To meet current needs and future expansion demands the coal terminal is undergoing extensive restoration and compliance works – which will culminate in the replacement of the existing stackers and reclaimers with brand new machines.

REUBEN ADAMS

IN 2014, thyssenkrupp was awarded the contract for the design, supply and construction of the reclaimer and in 2015, of the three replacement stackers.

Over three years, the \$100 million project has generated more than 400 jobs in design, supply, construction and commissioning of the equipment which is currently being shipped from WA to its new home at Port Kembla.

thyssenkrupp Industrial Solutions Australia AG chief executive Andrew Howie and chief operations officer Russell McBain explain how this equipment will help transform performance at Port Kembla.

Q. Can you provide a short background on thyssenkrupp's involvement in the Port Kembla Coal Terminal Restoration and Compliance project?

Russell McBain:

thyssenkrupp was invited to tender for the supply of the replacement 3 stackers and 1 bucketwheel reclaimer in 2013, following PKCT's review of other thyssenkrupp operating machines in similar markets.

Following conceptual layouts of the replacement machines and agreed implementation methodology, thyssenkrupp was formally awarded a contract in 2014 for the design, supply and construction of the reclaimer and subsequently in 2015, of the three replacement stackers.

thyssenkrupp is the only EPC (engineer, procure, construct) contractor in the country that does end-to-end design, fabrication, procurement, and construction work within Australia.

Q. Why the decision to design, supply, construct and commission the three coal stackers and a giant reclaimer at the AMC in Perth?

Andrew Howie:

The service conditions for the equipment at Port Kembla are severe, and the Port Kembla Coal Terminal was exact in their specification to counter these environmental conditions. thyssenkrupp Industrial Solutions surveyed the global and Australian fabricators and concluded that the optimum location was in Western Australia.

The access to deep water ports immediately adjacent to the fabrication and assembly yards was certainly a factor, but also were the high quality of the local companies and their proximity to our design and engineering teams in Perth.

The location allowed us to pre-assemble the equipment for shipping and will minimize the erection time and disruptions to the operations at Port Kembla Coal Terminal.

Q. What logistics were involved in design, construction and commissioning? Did you encounter any unforeseen issues?

Russell McBain:

In order to minimise the impact to operation requirements of PKCT's brownfield site, thyssenkrupp's strategy was to construct and commission the machines offsite in WA prior to transporting finished machines to Port Kembla.

This required the use of self-propelled motorised trailers (SPMT's) to transport the heavy equipment alongside ship using specially engineered transport frames, and from ship to stockyard rails using the same equipment.

The unique capabilities of Jumbo's Heavy Lift Vessel has permitted the lifting and loading of the bucketwheel reclaimer to be shipped in one piece at a

mass of 1490t.

This is the first for thyssenkrupp anywhere in the world to our knowledge.

Q. How has this equipment been designed increase efficiencies and transform performance at Port Kembla?

Russell McBain:

These units have the ability to be operated fully autonomously, and we've used the latest GPS and radar technology to maximise safety and optimise stockyard and outloading capacity by smoothing feed patterns and reducing shiploading time.

The reclaimer has been designed with an integral surge bin and feeder to optimise load out capacity through existing material handling equipment — essentially, the new machines will have an increased capacity through more efficient operation.

Stackers are now slewing machines in order to maximise stockyard capacity.

The machines are designed to optimise stockyard capacity and out loading capacity of existing infrastructure by smoothing feed patterns, thus reducing the loading time of coal into ships.

Machines were fully modelled and designed in 3D. Material handling flow characteristics fully modelled using DEM software. Full FEA modelling of all key components allows machine masses to be optimised.

Q. The 1490t reclaimer will be the heaviest piece of machinery ever loaded onto a ship in a single lift at the AMC. Was this a nervous moment?

Andrew Howie:

The reclaimer is yet to be loaded onto the ship; the plan was to send two of the

stackers on the first shipment, with the reclaimer and the third stacker going on the second.

To date, with a couple of delays due to weather, the shipment has progressed safely and has been fully unloaded at site. The second shipment is due to start loading early next week.

The size of the lift will always require special attention, but with the team of professionals that has been assembled for the lift of the reclaimer we are very confident it shall proceed safely and without any hitches.

Q. The equipment is being transported to NSW on the Jumbo Kinetic – the biggest heavy-lift vessel in its class. How is this tracking?

Andrew Howie:

It is tracking well, although the recent storm activity across the Bight did cause some delays in the shipment times.

Our focus has been on the safety of our teams and we have been very proud of the way everybody has combined to ensure that we maintain our record.

Q. The WA Government stated that you're now looking to recruit skilled professionals and construction workers on the back of a strong project pipeline. Can you provide more details on these projects?

Andrew Howie:

Our contract to supply three stackers and seven trippers into Rio Tinto's East Intercourse Island Stockyard in Dampier, Western Australia, is expected to create more than 100 jobs.

We have other projects in the pipeline but are not able to disclose the specifics at this point of time.

Liberty Industrial undertakes demolition at PKCT

NATIONAL deconstruction and remediation services provider Liberty Industrial has completed the first stage of a coal reclaimer and a coal stacker demolition at Port Kembla Coal Terminal (PKCT).

Liberty Industrial were commissioned to complete the demolition of the reclaimer and stacker on site to make way for new plant as part of PKCT's broader restoration project.

Prior to moving the reclaimer, Liberty Industrial disconnected and extracted the impact table from underneath the structure while it was still in the stockyard, without damage to the conveyor belt.

Once disconnected from all its services, the 1250 tonne structure was pulled over purpose-built extension rails to a temporary position where the machine underwent all preparatory works required for its transport using Self-Propelled Modular Trailers (SPMT).

To pick-up and secure the reclaimer in position during transport, a special-purpose 40t steel "transport frame" was fabricated and mounted on the bed of the SPMT trailers.

Once lowered to the ground and secured, the structure was pre-weakened to facilitate its demolition with explosive cutting charges.

The charges were placed at strategic locations and the structure pre-weakened as per recommendations from Liberty Industrial's consulting structural engineer.

After the structure was safely collapsed to ground level, a combination of 70t and 36t excavators fitted with shear attachments processed the steel structure for removal and recycling off site.

In the next few months, Liberty Industrial will begin part two of the project: the demolition of the coal stacker.

The coal stacker to be removed is currently straddling an operating conveyor line, which means the demolition methodology will involve dismantling the structure into smaller components using heavy crane lifts, with minimal impact on the terminal's operations.

To achieve this, Liberty Industrial will utilise a 600t crawler crane located within one of the coal stockyards.



The coal reclaimer was recently blasted to facilitate the demolition process.

After completion of the lifts, the lowered sections of the structure will be downsized at ground level, lifted onto trucks and transported to the main demolition area for processing by excavators with shear attachments.

The products of demolition will then be

transported off site for recycling.

In addition, Liberty Industrial will also salvage a various range of items (drive units, electrical and PLC cabinets, cable reelers, transformers etc.) which will be retained by Port Kembla Coal Terminal as spare parts for the machines still in

operation inside the terminal.

The salvage must happen before the demolition works can occur in order to minimise potential damage to the items – this will principally involves the use of mobile cranes to lower the items down to the ground.



Liberty Industrial is a leading provider of deconstruction and remediation services.

We provide end to end solutions for large and complex heavy industrial deconstruction projects, offering a full spectrum of integrated capabilities including decommissioning and hazardous materials removal, dismantling and demolition, asset and resource recovery, environmental remediation and site preparation. We challenge the status quo and leverage technology to deliver innovative and resourceful solutions that create value for our project partners and stakeholders.



All images: PWCS.

CRUCIAL LINK IN THE COAL CHAIN

Port Waratah Coal Services represents a conduit between Hunter Valley coal producers and world markets. In 2016 PWCS received, stockpiled, blended and loaded about 109.5 million tonnes of coal onto 1225 vessels for export across its Carrington and Kooragang Terminals. In 2017, robust international demand for Hunter Valley coal has PWCS on track for another strong year.

REUBEN ADAMS

THE significant increase in coal prices in the second half of 2016 from the lows experienced at the start of 2016 was encouraging, but “our industry remains a challenging one” Port Waratah Coal Services (PWCS) chair Penny Winn stated in the 2016 Annual Report.

“As to whether this increase is sustainable for the future remains unclear,” she noted.

Now – nearing the end of the 2017 calendar year – coal prices are robust and are expected to remain so for the foreseeable future. This is great news for both PWCS and its customers, the Hunter Valley coal industry.

A mid-year update from PWCS chief Hennie du Plooy indicated that both PWCS and the Hunter Valley Coal Chain were on track to break records in 2017.

“Coal prices have remained stable at the improved levels I reported in the previous edition and demand for Hunter Valley coal has been strong,” he said.

“In terms of coal tonnes, both Port Waratah and the coal chain as a whole are well ahead of where we were at the same time last year.”

To support this level of operational activity PWCS has been busy have been improving its processes and assets.

A 2016 decision to reduce coal handling charges was complimented by a 2017 collaboration with other service providers to reduce vessel turnaround times which successfully reduced customers’ exposure to demurrage costs.

In May “very significant, once in a generation” maintenance on the original



Kooragang terminal shiploader and out loading system was also completed.

Much of this work was conducted around 24 hours a day, seven days a week and “held high inherent risks such as working at heights and over water”, Mr du Plooy said.

“It is therefore a significant achievement, for which I congratulate everybody involved, that this was done without any injury or environmental incident,” he said.

T4: A New Milestone

In October 2015 the NSW Planning and Assessment Commission (PAC) approved

the \$4.8 billion, 70mtpa Terminal 4 Project after almost 5 years of sustained effort from PWCS.

Part of a master plan developed with government, rail providers and coal producers, T4 would ensure PWCS had a smart and efficient system in place to meet future coal demands. PWCS stated that – if approved – the project would inject \$770 million each year into the Hunter with over 2900 direct and indirect jobs required at peak construction.

During operations, it was estimated an extra 80 operational jobs would be needed, plus contractor support work.

While T4 was seen as vital to cope with future demand, a recovering coal industry did not see extra capacity as an immediate priority.

PWCS maintained that T4 was only be built if demand required additional terminal capacity, but wanted to ensure that it was placed in the best position to service customers without disrupting the coal chain or the community.

In essence, a Final Investment Decision on the construction of T4 would probably not be made in the foreseeable future, and remained subject to the demand for Hunter Valley coal, now and in the future.

In September, PWCS general manager Development Terry Tynan said that Port Waratah had reached a key milestone – the submission of the Site Management Plan and Priority Action Statement, which outline the works that must be completed to sustain T4 approvals.

“This is all part of the process to plan, adjust and optimise for T4 and the changing global demand for coal, and we remain committed to keeping the community informed at every stage,” Mr Tynan said.

“Part of the development process is to keep reviewing the plan to make sure the outcome is in the best interests of our customers and stakeholders, including the community,” Mr Tynan said.

“Currently, items under the Site Management Plan and Priority Action Statement are deemed construction activities which trigger a number of the conditions associated with the actual construction of T4.

“We are proposing some administrative changes to the Approval as part of this review process to make sure we undertake certain works at the appropriate time. We’re



“This is all part of the process to plan, adjust and optimise for T4 and the changing global demand for coal, and we remain committed to keeping the community informed at every stage.”

GOING LOCAL

In 2016 PWCS spending in the local community once again exceeded its target to maintain **75 per cent of spend invested locally**. Of the \$108.7 million total, \$4 in every \$5 was spent locally.

1 per cent
Overseas

6 per cent
Australia

13 per cent
NSW

80 per cent
Hunter and Central Coast

requesting this amendment so we can sequence the works in a more sustainable and efficient manner.”

An example of “triggered conditions” was the need to construct a 4 way traffic light along a busy road, which would only be necessary during peak construction.

“We don’t want to unnecessarily inconvenience commuters along the road, so the ability to postpone their construction until they’re really needed will significantly reduce unnecessary traffic disruption and

delays,” he said.

Rio Exits, Yancoal Enters

On 4 September Rio Tinto completed the \$2.69 billion sale of Coal & Allied to Yancoal Australia following a protracted and competitive bidding war with Glencore.

Yancoal now manages of Rio Tinto’s thermal coal business in the Hunter Valley as well as a 36.5 per cent interest in PWCS. Yancoal Chief Executive Officer

Reinhold Schmidt said the completion of the strategic acquisition of Coal & Allied would provide new opportunities for continued growth.

“We look forward to maximising significant operational synergies from the combination of Coal & Allied’s world-class assets with our existing portfolio,” he said.

Through its shareholding in Port Waratah, Coal & Allied has the right to appoint three Directors and nominate one of these Directors as the Chair of

the PWCS Board. It also has the right to nominate a person to fill the role of Chief Executive Officer.

“As we currently understand the proposed transaction these rights will remain with Coal & Allied as it transitions to new ownership,” PWCS said in a statement.

“Employees of Port Waratah are employed by Port Waratah Coal Services Limited and are unlikely to be affected by the proposed transaction.”

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BUILDING MOMENTUM

With construction now underway at its flagship Dalgaranga project, Gascoyne Resources' time in the sun has arrived as it transitions into production.

ELIZABETH FABRI

THERE is light (and gold) at the end of the tunnel for Gascoyne Resources, with first gold slated at its Dalgaranga project in the second quarter of 2018.

The Dalgaranga project within the Murchison region WA – formerly operated by a JV between Equigold and Western Reefs – produced 229,000 ounces of gold between 1996 and 2000, with little exploration undertaken at the site since.

It wasn't until 2013 that Gascoyne Resources, recognising the region's vast potential, purchased an 80 per cent interest.

The company's decision to acquire Dalgaranga has since paid dividends, with the JORC measured, indicated and inferred resources now sitting at 31.1 million tonnes at 1.3 g/t gold for 1.32moz of contained gold, and proved and probable ore reserve at 14.3mt at 1.27 g/t for 581,000oz of gold.

In December last year, Gascoyne Resources purchased the remaining 20 per cent interest.

The project comprises two open pits; a high-grade Golden Wings deposit, a cutback of Gilbeys deposit; and potential third pit, Sly Fox, to come online in the next few years.

In November 2016, the company completed a feasibility study, which included developing a new 2.5 million tonne per annum (mtpa) processing facility at the site.

Breaking ground

A \$55 million capital raising was completed in March this year.

On 5 July, Gascoyne Resources awarded a \$66.5 million engineering, procurement and construction (EPC) contract to GR

Engineering to design and construct the project's processing facilities.

By early September, the bulk earthworks and 240 person accommodation village was completed, and the engineering and design of the 2.5mtpa processing plant was 75 per cent complete.

The plant is being designed for soft ore, and will comprise a single jaw crusher, single stage SAG mill, high gravity gold recovery and rapid leaching capabilities.

Recent modelling has also found the plant will be capable of processing more than 3mtpa while treating soft oxide and transitional ore.

GR Engineering was now mobilised to site and had begun concrete work including the SAG mill foundations, CIL tank foundations and bunding, and workshop and warehouse foundations.

The tailings storage facility life and water evaporation pond construction was well advanced as was the water bore construction and dewatering pipeline.

The access road and clearing for the airstrip was also nearing completion.

Construction of the airstrip will begin in October to allow flights straight into the site from early next year.

From a financial perspective, the company has mandated Commonwealth Bank of Australia (CBA) and National Australia Bank (NAB) to arrange a debt facility of up to \$60 million to see the project fully funded.

"Mandating tier 1 Australian lenders CBA and NAB for the debt funding required for the development of the Dalgaranga Project is a strong vote of confidence in the project and the work undertaken by the Gascoyne Team since we finished the Feasibility Study in November last year," Gascoyne Resources managing director Mike Dunbar said.

"The terms we have negotiated highlight the quality of the project.

"With the mandate completed, construction will continue on schedule towards production in Q2 of next year."

Entering production

The mine will produce about 100,000oz of gold a year.

However, during its first two years of operation this will be higher at 120,000oz a year while the plant processes soft oxide and transitional ore.

The higher production in the first few years was announced earlier this year as part of an update to the mine design and schedule.

Mr Dunbar said the new plan will see the project now produce 244,000oz in its first two years.

"This represents an increase of over 35,000 ounces in the first two years of production when compared to the Feasibility Study mine schedule, and is expected to have a significant positive improvement to the project economics," he said.

"This production profile and schedule excludes the recently discovered Sly Fox deposit, which adds a further 77,000oz to the resources base, and is expected to improve the production profile in year three and four of the operation.

"However the exact impact is yet to be determined as exploration is ongoing in the region and the JORC modifying factors yet to be fully determined."

Sly Fox was discovered late last year 600 metres south of the Gilbeys deposit, following an aircore drilling campaign that found near surface and significant downhole thicknesses of gold mineralisation.

Mr Dunbar said the new mineral resource estimate for Sly Fox further enhanced the Dalgaranga project's scale and potential to extend the current mine life of six years.

"With the resource updated and the increase in the resource confidence, it is

expected that a maiden ore reserve for Sly Fox will be completed in the next month, less than 6 months since the deposit was discovered," he said.

"The addition of these shallow and soft ores through the mill in the early years is expected to lift the production rates in the early years of production."

"This production profile and schedule excludes the recently discovered Sly Fox deposit, which adds a further 77,000oz to the resources base."

Future prospects

Beyond continued exploration upside at Dalgaranga, Gascoyne Resources' next development opportunity was its 100 per cent owned Glenburgh gold project.

Within the company's namesake Gascoyne region, Glenburgh was its initial first choice to bring into production before Dalgaranga was acquired.

While the focus remains on Dalgaranga at present, the company is continuing to evaluate Glenburgh to define meaningful increases in the resource base and progress project permitting.

The company recently completed a 30 hole RC drilling program at the 1.05 million ounce resource, targeting resource extensions to the Icon, Tuxedo, Apollo, Mustang and Torino deposits, and will soon begin updating its pre-feasibility study for the project, which hasn't been updated since 2013.

Once given the green light, Glenburgh development could be funded through cash flow from Dalgaranga, and enable Gascoyne to double annual production to 200,000oz.

Global mineral processing solutions

GR Engineering Services (GRES) is a market leading ASX-listed process design, engineering and construction company providing safe, quality, cost competitive and timely engineering solutions to the global mineral processing industry.

GRES is currently delivering the Dalgaranga gold project for Gascoyne Resources and the construction for the 2.5mtpa plant has commenced.

The Dalgaranga gold project is scheduled for completion in Q2 of 2018 and GRES is proud to have been selected by Gascoyne to construct its flagship project.

The innovative engineering solutions developed by GRES enable its clients to achieve project success at the earliest opportunity.

GRES has an established track record in the provision of high quality technical and feasibility study work for a broad range of clients.

GRES has successfully completed the process and engineering designs and construction for projects of various scale and covering a diverse range of mineral commodities and geographic locations.

It has delivered processing facilities and infrastructure for gold, base metals, mineral sands, tin, tungsten and iron ore projects for a range of clients in Australia and internationally.

GRES also has a presence in the hydrocarbons industry via its wholly owned subsidiary, Upstream Production Solutions, which is a leading provider of operations, maintenance and well management services to the oil and gas industry in Australian and South East Asia.

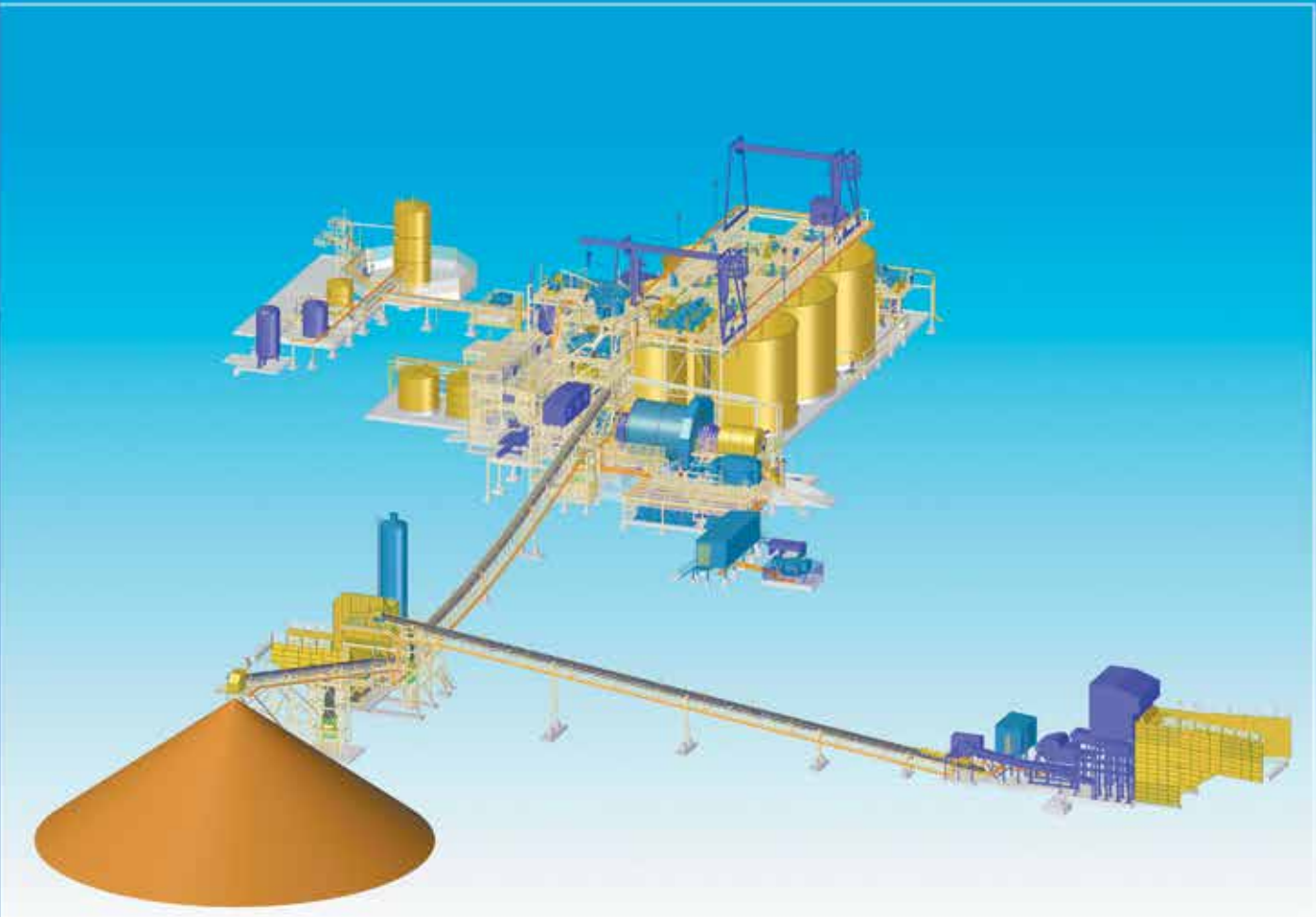


GRES is a proud construction partner of Gascoyne Resources' Dalgaranga gold project.

- PROJECT STUDIES
- ENGINEERING & PROCUREMENT
- CONSTRUCTION & COMMISSIONING
- OPERATIONAL SUPPORT
- ASSET MANAGEMENT
- CONSULTING SERVICES

A market leader in
safe, quality, cost
competitive and timely
engineering solutions to
the global mineral
processing industry.

Proudly supporting
Gascoyne Resources
Limited in the
development of the
Dalgaranga Gold Project.



Quality, Kwik logistics

SINCE its inception in the 1980s, Kwik Logistics has grown into one of WA's largest providers of cranes, transport and traffic management services.

The company operates a large, modern fleet of Franna, Tadano, Demag and Grove cranes up to 250t capacity, as well as Hiabs, Tilt Semis and Rigid Tilt Trucks, to provide flexible lifting and trucking solutions for a vast array of clients.

Kwik also has a long range trucking fleet of more than 25 prime movers capable of undertaking a wide variety of tasks, including the transportation and installation of modular transportable buildings, mine site accommodation and camps, and house transportation.

Kwik has the largest modular building transportation fleet in Australia.

Its services extend to all over mass requirements with its fleet of drop decks, low loaders and flat top trailers.

Kwik also provides general transport services both locally, intra state and interstate.

FTL dedicated solutions are its speciality, particularly for non-standard loads.

Kwik's professional services ensure that its clients are provided with their exact crane, transport or traffic management requirements, together with complimentary site and job assessment capabilities.

The company's dedicated management team are always available to provide advice and work on any of the technical, safety and compliance requirements.

Through Kwik's industry leading Fleet Management System, client requirements



Kwik prides itself on its flexible, fast and quality services.

are met on time, all of the time.

The fast and flexible system captures and stores all relevant site and job information,

as well as compliance, permits and regulatory documentation and for the site and assets required.

More information on Kwik Logistic's quality services can be found at: www.kwik.net.au.

SERVICING WESTERN AUSTRALIA



Kwik operates a significant fleet of cranes, Hiabs, rigid trucks and semi-trailers, as well as traffic management services capable of servicing the entirety of WA and beyond.



Kwik's specialised over-mass and general transport fleet services all parts of Western Australia, and Kwik has an extensive Perth based mobile crane fleet. Kwik can provide an integrated logistics solution for all of your mining needs.

Contact us now for a no obligation free quote for all your crane hire, transport and traffic management needs.

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KWIK Logistics
CRANES - TRANSPORT - TRAFFIC MANAGEMENT

INDUSTRY PROFILES

COMPANIES GEARING UP

Digitalisation in the aggregates industry: What does it all mean?

An interview with Metso Life Cycle Services Global Vice President Giuseppe Campenelli.



Metso's Giuseppe Campenelli.

Q. What are the main challenges facing aggregate producers today?

The main challenge facing our clients in today's markets is how to make their operations more efficient and therefore more profitable.

Key to building better efficiency is having the right information at your fingertips to help make the right decisions.

With mobile crushing and screening equipment frequently moving between sites, often in remote locations, it can be difficult to track, monitor and maintain fleets of equipment for maximum performance.

The often-conflicting pressures to drive performance while keeping costs in check, can also be problematic. When a decision is made without the correct information or data, the result can be extended downtime or lower production rates which impacts the bottom line of any operation.

Q. What trends are you seeing in the industry to address these challenges?

We are seeing more and more aggregate producers focusing on their core business while turning to partners to find smarter, more efficient ways to design, operate and service their equipment and processes.

Services and tools that can help address things such as utilisation rates, maintenance planning and spares management are all being looked at by our clients to help lower costs.

Q. You launched a new digital solution, Metso Metrics Services, at Conexpo 2017 in Las Vegas. Can you explain what it is?

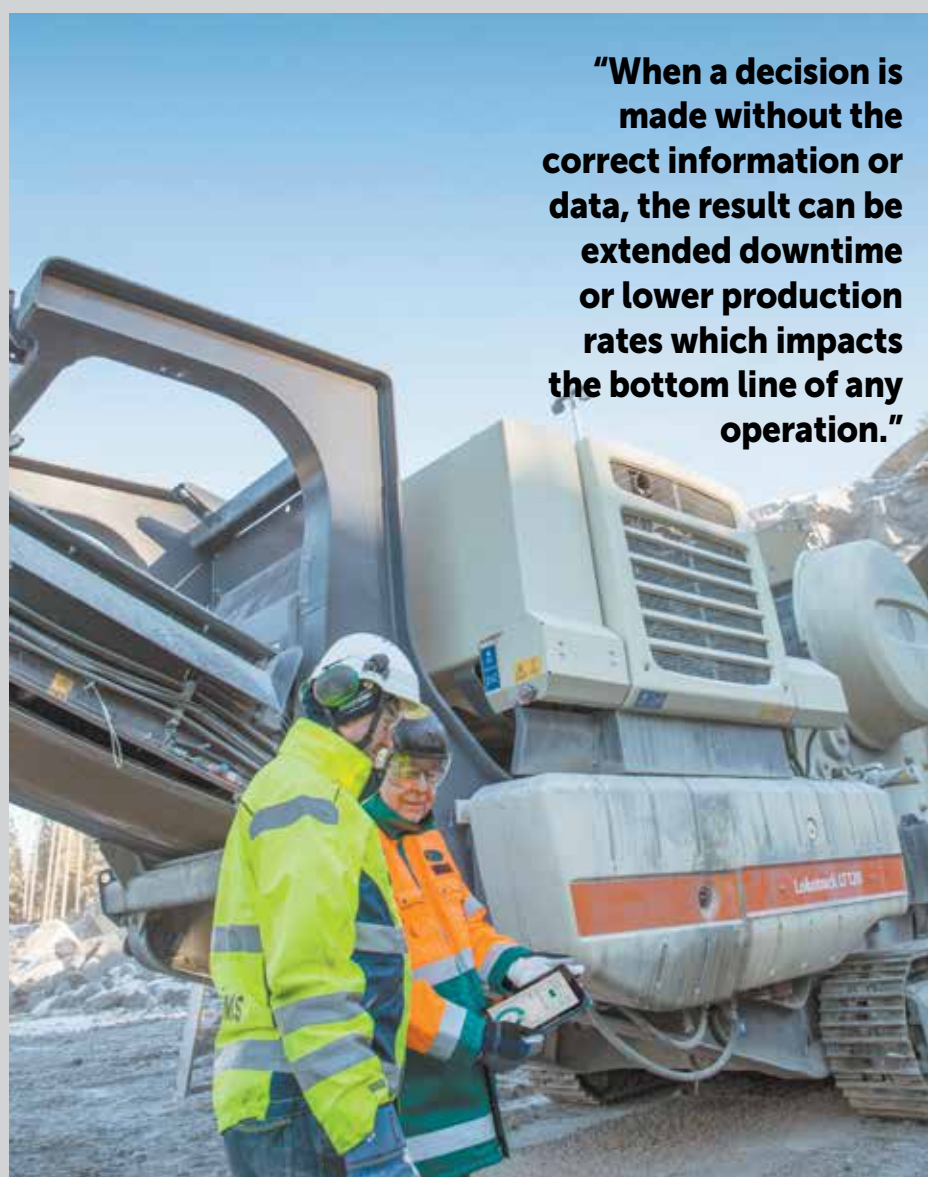
Metso Metrics Services is a remote monitoring and reporting system that gives our customers access to key operational metrics and data.

It allows utilisation rates, production levels, maintenance plans and fuel consumption for mobile equipment to all be remotely accessible by authorised personnel wherever they happen to be.

The solution also helps track the location of a single unit or an entire fleet no matter where they are located.

Time stamped alarm notifications and maintenance planning as well as logging capabilities are also built in. By accessing the right information at the right time, an operator supported by advice from Metso can maximise equipment utilisation and minimise maintenance related costs, helping them to achieve their business goals.

Q. Can digital tools solve all your customer's production issues?



"When a decision is made without the correct information or data, the result can be extended downtime or lower production rates which impacts the bottom line of any operation."

No. A solution such as Metso Metrics Services is not just a digital tool, it can provide a range of operational and maintenance data on a single crusher or an entire crushing and screening fleet. Once a trend or outlier is identified, steps can be taken to address the issues.

The key is having the know-how to analyse the data provided by such a digital solution. This is where the expertise provided by Metso and our partners makes the difference.

Using decades of crushing and screening experience acquired through working with customers around the world, coupled with an intimate knowledge of our equipment, means that operators can rely on us to provide solid recommendations that can help them to get more out of our equipment and their process.

Q. How can this solution help operators get more out of their existing assets?

One key way it can help is by providing the data to see how each crusher in your

fleet is performing in terms of production levels and utilisation rates.

By looking at outliers, customers, supported by Metso when needed, can quickly identify underperforming assets.

The interesting part then becomes trying to understand what is causing the underperformance. Is the machine set up with the right operating parameters? Is the equipment out of action because the right spare parts aren't readily available?

It could also be a question of a need for operator training to push the equipment to its full capabilities.

Metso Metrics Services will not identify the exact cause of underperformance for you, but it will help you to start asking the right questions. You need to have the data to analyse in order to spot these types of situations.

With additional support, insights and expertise available from the Metso team and our distributors in terms of operational or maintenance planning, there are opportunities to make a big difference in terms of performance.

Q. How does a solution like Metso Metrics help with maintenance planning?

It helps by shifting the focus away from corrective maintenance and more towards preventive maintenance. Corrective maintenance has been shown to be many times more costly than preventive maintenance.

The reason being is that when assets fail in the field, production is often interrupted, resulting in costly downtime.

Parts may not be readily available or may be on order, causing further delays. Repair staff may not be available immediately or allocated to other sites.

With a built in digital log book, individual maintenance plans integrated into the system and access to optional troubleshooting advice, customers gain visibility of their equipment to help them take the next step towards having a true preventive maintenance program.

This in turn, helps to minimise unwanted service issues in the field, and ensures that operations are run in the most cost effective manner.

Q. What does it take for an OEM like Metso to succeed in a world pushing towards digitalisation?

A very good question! At Metso, we don't see digitalisation as a stand-alone subject. It ties in with all the service activities we offer but takes them a step further, amplifying the results we can provide.

To succeed in a world heading towards digitalisation, we believe an OEM needs to:

- (1) Have a global service presence with people on-site, close to the customer
- (2) Possess a deep understanding of the customers' processes and productivity levers
- (3) Create skills and capabilities to solve the customer's digital challenges with remote monitoring and advanced analytics, coupled with efficient backend and service processes and supported by easy-to-use digital sales channels.

Q. We are already leading the way in all three within the crushing and screening space.

However, we believe there is much more to do and feel that we are very well positioned to extend our digital capabilities allowing us to capture the growth that digitalisation offers.

The next 10 years will be an incredibly exciting time for Metso as we blend together technology, parts and service elements to offer the very best solutions for our clients.

Hagstrom tackles all drilling projects

FOR more than 25 years Hagstrom Drilling has been recovering rock and soil samples from the most challenging materials nature can provide, delivering exploration, construction and civil programs on land and underwater.

Founded in WA, the company has successfully expanded on the quality results and the services it provides and is now delivering drilling projects nationwide.

The diversity of geographical locations and project requirements certainly is a challenge, from drilling coal feasibility studies in northern NSW, to providing geotechnical drilling on Koolan Island in WA.

Hagstrom Drilling has just completed more than four months of geotechnical drilling investigation as part of Sydney's major Western Harbour Tunnel and Beaches Link project.

As one of NSW's priority infrastructure projects, this proposed large scale motorway is expected to deliver time savings of up to 45 minutes for motorists travelling from the Northern Beaches to Sydney's CBD and North Sydney and will take pressure off Sydney Harbour Bridge.

Overwater drilling in Australia's busiest waterway brought unique challenges that



The Hagstrom Drilling team have the experience and skills to complete the toughest of drilling jobs.

required the team to operate 24 hours a day, seven days a week in order to meet project deadlines and accommodate stringent operating restrictions.

In busy shipping and recreational

channels, working at night was often the only option.

With investigations almost complete and the project successfully and safely managed within time, budget and zero

injuries, the Hagstrom Drilling team will soon be packing up and moving on to the next drilling program.

Hagstrom is proud of its drilling personnel and their ability to achieve results where others fail.

Not only is it the skills of its workforce, but the investment by management to consistently achieve high results and succeed whatever the challenge.

Hagstrom has invested in Aircore, RAB, Mud Rotary, Diamond, CPT and overburden drilling systems to meet the demands that nature provides.

The company is also the only drilling contractor in Australia that owns and operates drill rigs, CPT equipment and jack up barges.

This unique combination of assets eliminates the requirement for multiple contracts, duplication and review of HSE Management information, providing a cost saving on any project.

Poor methodology and techniques can be costly and time consuming, so by engaging Hagstrom Drilling, clients can be assured they will receive more than 25 years of industry experience.

Hagstrom maintains a track record of delivering, while remaining true its "Quality Service Safely" motto.

Sub pump has stretch

A NEW high head, Tsurumi submersible sub pump designed for tough jobs in dewatering and batch plants has been launched by Australian Pump Industries (Aussie Pumps).

Tsurumi, the world's biggest manufacturer of submersible pumps, has developed the unit in recognition of the need for tough pumps that have head capabilities of up to 55 metres.

"Traditionally, dirty water submersible pumps aren't designed for high head applications," Aussie Pumps product manager Neil Bennett said.

"The new Tsurumi development is innovative in that it used the same philosophies and technologies from the existing KTZ range, but adds extra power and a bigger impeller to drive water even higher!"

A big six inch pump, Tsurumi's model KTZ615 uses a 15kW motor to achieve its excellent performance.

The pump's maximum flow is 2800 litres per minute, while its maximum head is an incredible 55 metres.

That high head is achieved with a single piece impeller, not multi stage, made from high-chrome cast-iron.

The pump has all of Tsurumi's normal features for heavy-duty dewatering pumps that have made the company a byword for reliability.

They include the unique double dual mechanical seals with integrated oil lifter.

Those seals are double face and run in oil to provide absolute longevity and performance reliability.

The unique patented oil lifter keeps oil circulating even if the pump is not running in a strictly vertical position.

They also have a pressure relief port to protect the mechanical seal faces from extreme pressure, while simultaneously draining abrasive particles away from the seal face; which is ideal for mining applications.

A unique Tsurumi feature, the cable at the top of the motor comes with a special sealed gland that won't let water into the motor even if the cable is damaged or cut.

"Other pump brands allow the water from a cut cable to wick down into the motor, causing catastrophic failures," Mr Bennett said.

Tsurumi's unique cable block is a major leap forward in technology to virtually eliminate water ingress from the top end of the motor."



A tough pump for tough applications, Tsurumi's KTZ615 has the ability to handle dirty water while still maintaining high head.

The new KTZ is made from high-chrome cast-iron and comes with a strainer that is able to handle solids of 12mm.

The KTZ series is widely used in mining, tunnelling, quarries, concrete batch plants or for dewatering and piling duties.

The product is widely used in the United States, South East Asia and Europe in tough applications where lighter weight pumps simply don't last.

"Tsurumi cut their teeth in dewatering pumps in the 1950s during the rebuilding of Japan," Mr Bennett said.

"Duties included land reclamation, piling and dewatering, and they soon found their way into concrete batch plants as the ready-mix industry took off in the country."

Further information on the new KTZ615, boasting its increased flows and higher heads than traditional Tsurumi KTZ dewatering pumps is available from www.aussiepumps.com.au.

Plastic parts for all applications



B & K Plastics is Australian owned and managed using Australian employees.

SPECIALISED plastic injection moulding company B & K Plastics has been pioneering plastic solutions for the mining industry for more than 20 years.

After 16 years as an underground miner, B & K Plastics founder and owner Brad Coleman decided to venture out on his own and manufacture plastic polyurethane, rubber and aluminium parts for the medical, mining and construction industries.

The idea was to combine his knowledge of materials with his vision of creating high-quality products that were both cost-effective and durable to reduce downtime and costs for companies.

Two decades later, the Queensland business is still going strong – today specialising in the design, manufacture and production of a variety of products; from wheel chocks, oil trolleys, bumpers, buffers, slingers, segment and slides, hose reels, cables and fitting, to storage boxes, lockers, fire safety products, water

tanks, liquid storage, machine guards and more.

"We can produce plastic components from runs of several hundred up to hundreds of thousands," Mr Coleman said.

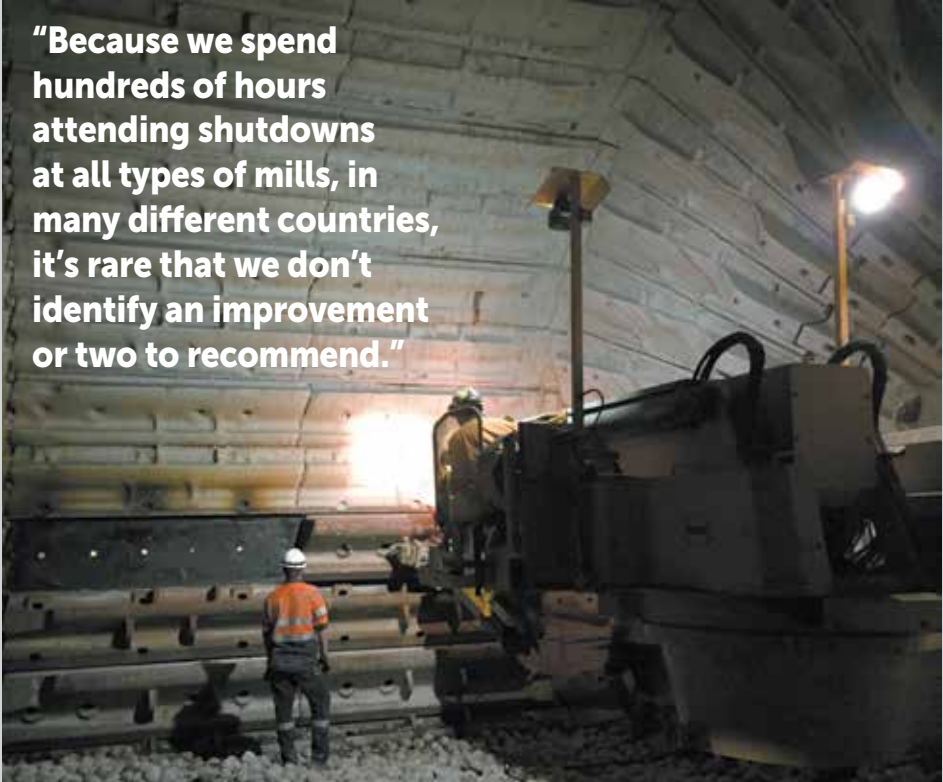
"The business has expanded to a purpose-built facility enabling a present range of five moulding machines to be increased to eight."

B & K Plastics is also a proud dealer of KAB Seating, with seats to suit all types of machinery.

Mr Coleman said KAB Seating was internationally recognised as the world leader for premium quality seat design, development and production.

"At B & K Plastics we offer monthly deals and cost saving, or if you refer to this advert you will get discount off your seat," Mr Coleman said.

The company now also has the ability to repair and supply new radiators for most machines.



“Because we spend hundreds of hours attending shutdowns at all types of mills, in many different countries, it’s rare that we don’t identify an improvement or two to recommend.”



All images: Donhad.

More than just a reline

While attending a reline on a SAG Mill at a major Australian processing plant, Donhad’s engineering team was able to identify and highlight some significant improvement opportunities to the owners for future shutdown procedure. The project’s engineer-in-charge noted that operational cost savings are expected to be in the hundreds of thousands of dollars.

DONHAD was commissioned by one of their clients to conduct an audit of the SAG mill reline during a scheduled shutdown. The scope of work was to replace discharge grates, feed-end liners and shell liners, and re-tension and/or replace pulp lifter bolts. Nothing unusual about that.

But during the course of the work some unknown problems were revealed along with some less-than-perfect routine operational procedures.

Torque units and air tools

“We were able to nominate some concerns we had relating to torque units and air tools regarding calibration and operation of these tools onsite. Even minor inconsistencies between operators will result in variability in the applied bolt loads,” Donhad Forged Product specialist Brad McCracken said.

“The Pulp Lifter and grate arrangements are the Achilles’ heel of most large SAG Mills. Pulp Lifter bolt failures are common because the calibration and operation of the torque tools can have a significant impact on the longevity of the pulp lifter bolts.”

Bolts installation

“It became apparent that when building liners back into the mill, night shift and day shift were building in a different order,” Mr McCracken said.

“Finishing on the discharge end can increase the risk of the bolts not being tensioned correctly due to actual or perceived pressure to inch the mill.

“Some tweaks to the order in which the liners are built would allow more time to tension the bolts on the discharge end which will improve the bolt tension outcome,” he said.

“Also, the bolts in the kits can be individually colour-coded prior to leaving



Donhad’s factory. This makes bolt identification on site a lot easier.

“A chart can be supplied showing sizes and colours. The kits themselves can also be colour-coded for ease of identification.”

Sealing washers

“The sealing washers being used on all of the M48 bolts were found to be an incorrect match for the cup washers. If the cup washer does not make metal to metal contact with the mill shell, any impact or movement can cause the bolt to lose tension, fatigue and fail,” Mr McCracken said.

“Having a correctly matching sealing washer will also save time when removing them.

“The practice of laying nuts and washers out at the face of the mill prior to assembly offered some further opportunities for improvement - removing trip hazards from the work area and improving the quality of the nuts and

washers being used during assembly.

“There is a substantial risk of tripping when heavy torquing equipment is being used and the nuts and washers get covered in mud, water, dust and grit when the holes are water blasted.

“Grit in the threads or on the face of the washer can contribute to the thread’s binding or loss of tension,” he said.

“Stands like this one can be supplied by Donhad. They keep the nuts and washers tidy and clean as well as reducing the number of times people have to bend to pick these items up. The stand stores everything at waist height and above.”

Pulp lifter bolts and recess washers

“Most of the washers and bolts which had been brought up from Spares were in poor condition and had to be cleaned up prior to being used,” Mr McCracken said.

“Even after being cleaned up they were still not ideal. Putting rusty washers and bolts in can create additional friction

causing bolts to be under tensioned.”

Donhad’s full scope of works for this operation comprised of:

- Set and monitor torque tool pressures
- Ensure pulp lifter bolts were not broken prior to grate and inner liner being removed
- Where practical, retorque/replace broken and leaking bolts not in the reline scope of work
- Visual inspection of mill shell for cleanliness prior to new liners being installed
- Visual inspection of correct lube application on the bolt thread and washer to nut contact face
- Conduct ring tests on all tensioned bolts
- Visual inspection of all reline materials removed from inside the mill
- Ensure all empty bolt holes were plugged prior to inching

“During our routine maintenance and service work, we’re constantly watching out for opportunities to recommend procedural and process improvements which the client can implement,” Mr McCracken said.

“Shutdowns are a fantastic opportunity for us to ‘run a microscope’ over various reline processes and procedures.

“Because we spend hundreds of hours attending shutdowns at all types of mills, in many different countries, it’s rare that we don’t identify an improvement or two to recommend.

“And when you consider about 1,000 liner bolts per average mill, if we can find how to shave even 30 seconds off each bolt procedure, the overall downtime will be very significantly reduced. This would likely save the client hundreds of thousands of dollars,” he said.

Keeping businesses on track

OPERATING across the length and breadth of Australia and with connections beyond rail, Pacific National's freight services are a critical asset to businesses in the resources sector.

When goods are valuable, heavy, require extra security or need to be carried over long distances, using rail is quicker and more economical.

Pacific National is an interconnected freight company which delivers resources and bulk to destinations around Australia, and to ports for transportation globally.

Providing trusted logistics support for coal, steel or bulk, Pacific National uses technology and tools that add value to its clients' important supply chains.

Its team of highly skilled and experienced people are committed to supporting customer needs and adding value.

Integrated Planning Services provide customers access to more agile and innovative solutions while industry experts partner with clients to ensure their freight and haulage are delivered safely and reliably from origin to destination.

Pacific National is proud of its customer base – working with companies, large and small, in the mining, steel, construction and grain industries as well as manufacturing and retail.

This breadth of experience and attention to detail is what sets Pacific National apart from its competitors.

With 180 services a week and Australia's largest network of interstate rail freight capability, the company offers a variety of service options including



Pacific National delivers highly valued haulage services across Australia.

Superfreighter, Express, IMEX and Sprinter.

When coal miners choose Pacific

National, they access a significant network of 6000 specialised coal wagons and 600 locomotives, with experienced teams

working 24/7 — connecting its customers to markets throughout Australia and the world every day.

YOUR LINK TO AUSTRALIA AND BEYOND

Pacific National is Australia's largest rail freight operator, providing a vital transport link in the global reach of Australia's mineral resources.

With a network of trains and tracks, people and partnerships, Pacific National will help you with your transportation needs. Talk to us today about how we can partner with you.

Head office
15 Blue Street, North Sydney

(02) 8484 8000
 pacificnational.com.au

pacificnational

Safe and reliable transport solutions



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

GKR Transport is a national transport company with depots in Brisbane, Sydney, Melbourne, Adelaide and Perth. The company transports all kinds of 'weird and wonderful' freight and has been indirectly and directly servicing the mining industry for more than 20 years. "We run freight regularly to the North West of WA to service the oil, gas and mining industries and into Kalgoorlie and other surrounding districts," GKR Transport manager Sean Liston said.

"We run predominately two up driver teams and have more than 50 prime movers and 150 pieces of trailing equipment." However, GKR's biggest selling point was its service; with no on-the-road sales staff the company relies heavily on customer service and word-of-mouth to keep the business growing. The company also has a team dedicated to HOTSHOT movements where they deliver freight any time of the day or night in a matter of hours, not days.



East-West Transport services

GKR Transport is a nationally recognised supplier of premium transport, storage and logistics services. We specialise in east to west road transportation of general freight (palletized and loose), crated and un-crated machinery, as well as Hotshot Services.



SERVICES:

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- Sydney – Perth – Sydney
- Brisbane – Perth – Brisbane
- Adelaide – Perth – Adelaide

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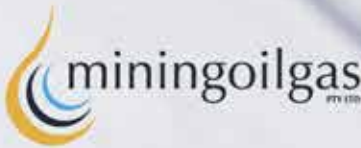
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- perth@gkrtransport.com.au
- gkrtransport.com.au



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Specialised Sunnen Honing Equipment



The Sunnen Tube Hone HTS.

WATSON Specialised Tooling has been the Australian distributor for the Sunnen Products Company since 1978 and has vast experience in all aspects of honing technology.

Watson is first and foremost the technical experts for honing in Australia.

With offices in QLD, NSW and WA, Watson's footprint ensures its ability to cater to businesses across Australia.

Honing can be used in any situation where a hole has to be round, parallel, and accurate with any surface finish requirement satisfied.

Sunnen tube honing machines are used worldwide for the repair and manufacture of hydraulic cylinders used in the mining industry.

The range of Sunnen machines caters to the requirements of any sized company and honing application.

Watson's staff will address its client's needs, consider their budget and help to select the most suitable machine and tooling package for the work.

The Sunnen range of portable honing equipment also allows for smaller onsite honing to be handled with ease.

Although the Sunnen product line still plays a key role in the business there are a variety of other products that the company has to offer, providing a wide range of tools and accessories for use in general engineering applications.

More information on Watson's range of products can be found at: www.watsonstooling.com.au.

Micron Technologies Hydraulic Cylinder Servicer

To accompany the Sunnen range of

honing equipment, Watson has partnered with Micron Technologies, a South African based world class hydraulic cylinder servicer manufacturer and distributor.

Micron's MCB Series cylinder servicers are purpose-built for the customer's requirements and feature the engineering, design and tooling requirements for heavy duty hydraulic cylinder disassembly, testing and reassembly.

More information on Micron Technologies range of products can be found at: www.microntech.co.za.

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MCB HYDRAULIC CYLINDER DISASSEMBLY BENCH

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Precision injection moulding

MOSS Industrial has been designing and manufacturing components and assemblies from plastics and metal for more than 50 years.

The company has been involved in a broad range of projects, working with clients from the initial concept to finished product, with an unrivalled flexibility to serve both small and large manufacturers with large or small-scale production projects.

Moss provides a full custom plastic injection moulding service, working with a wide range of thermoplastics and a large range of injection moulding machines.

The company takes a collaborative approach, capturing the best input from both its customers and design engineers to achieve superior outcomes.

The in-house engineers have experience with a broad range of materials and processes to form precise, superior products for its clientele.

To ensure products meet the highest industry standards, the company undertakes extensive research and development, stringent quality controlled testing and utilises best practice manufacturing processes.

Using advanced CAD/CAM technology,



Moss Industrial provides quality custom injection moulding services to the resources sector.

Moss can provide innovative and cost-effective solutions in the design of new products, from initial discussions to product development and manufacture.

After initial design, prototyping is used to ensure the product is good

looking, proportional and functional.

The prototypes are made from materials that closely resemble the final product and fit with any mating parts.

Where required, Moss is able to support product development with engineering

analysis such as Finite Element Analysis (FEA), vibration analysis, weight optimisation, mechanical event simulation and mould-flow simulation.

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



PRECISION DESIGN AND MANUFACTURE

Moss Industrial has over 50 years of experience in the design and manufacture of components for the mining industry. We offer a broad range of services to satisfy your supply needs from simple piece injection mouldings or die castings to complex multicomponent assemblies.



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Evolve Group is Australia's pre-eminent hardware accelerator and product commercialisation service provider. We match cutting edge design and manufacturing techniques & equipment, with real market experience to join the dots for our customers. We actively supply into the Global Mining market and have helped many of the most highly respected companies in the industry solve problems through the design and manufacture of solutions for their application.

Best of all we do it all right here in Brisbane at our world class facility and export to over 127 countries around the world. We are extremely proud of our ability to do it all here in Brisbane more cost effectively than China or other overseas suppliers. When you meet with us at Evolve you get to see the entire design and commercialisation process under one roof – there is no other facility or service provider like us in Australia.

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Minimise downtime with equipment inspections

WITH the pressures of a challenging economy and capital expense of new equipment, many mining companies are extending the life of their installed equipment by leveraging Eriez service capabilities to repair and refurbish existing units rather than buy new.

There is a lot to consider when making this decision, especially as it pertains to the Eriez equipment line, which includes vibratory feeders, metal detectors, suspended electromagnets, magnetic drum separators and high-intensity magnetic separators.

Eriez OEM technicians can provide free inspections of equipment on-site or at the factory.

While customers have to cover travel and freight costs, its personnel can provide a detailed report outlining the next best course of action, whether this means a simple preventative service, replacing some mechanical components, updating electronics, or carrying out complete tear down and refurbishment of the entire separator back to the OEM specifications – including an “as new” warranty.

In some cases, a total replacement is needed, but that is only after consideration is given to several scenarios to get equipment back on line and into production.

Most importantly, Eriez’ understanding of the dangers associated with managing the significant potential energy contained within its permanent magnetic separators cannot be matched by anyone.

Eriez personnel are fully qualified and experienced with the safety measures required to properly handle the dangers inherent to the high-powered magnetic elements which make its equipment second to none in terms of strength and performance.

For safety’s sake, Eriez always recommends working with its fully trained



Eriez can inspect, repair or refurbish equipment.

factory staff and representatives.

Eriez should be contacted prior to any dis-assembly, modification, rectification or handling of magnetic equipment to ensure safe procedures are in place, and to avoid injury to personnel.

Described in the simplest way possible, downtime equals loss of production.

As such, an Eriez inspection can help remove downtime from the equation by identifying anything that may ultimately cause a production stoppage.

Eriez on-site and factory-based technicians have an unparalleled level of skill and knowledge to service, repair or refurbish equipment so that it is operating again at peak performance – minimising problems.

Eriez Magnetics is always conducting research and development to bring technology improvements to the industry.

With Eriez-based services, whether at the factory or in the field, new technology and innovations can often be implemented during the rebuild process.

Other times these improvements can only be enjoyed if a new product is purchased.

For instance, one of Eriez’ early innovations

is the use of an external oil expansion tank on its line of suspended electromagnets (SE).

This attribute ensures that the magnet stays completely submerged in oil and prevents moisture infiltration and coil burn-outs.

In other words, the SE magnets run cooler, are stronger, and last longer than Eriez’ competitors.

Working with Eriez, this feature can even be added to a competitor’s piece of equipment if in the factory.

Similarly, clients will find that the magnetic power of new magnetic drum separators may be incorporated into their old model.

With vibratory feeders, newer designed products now come equipped with energy saving components that should be explored before rebuilding or buying new.

Even older metal detectors can be improved with updates in software and the addition of smart phone technology.

Optimum operating efficiency and equipment’s useful life depends greatly on the individual piece of equipment, its working conditions, duty and operating environment.

Since tramp metal protection and magnetic process equipment represent a significant capital investment, annual inspections of equipment are highly recommended to identify maintenance issues or process improvement opportunities.

Regular equipment checks, in-plant certifications and detailed reports will also help minimise equipment problems and achieve maximum productivity.

Eriez is recognized as world authority in advanced separation technology for magnetic, vibratory and inspection applications.

The company’s magnetic separation, metal detection, materials feeding, screening, conveying and controlling equipment have application in the process, mining, aggregate, plastics, metalworking, packaging, recycling and textile industries.

Eriez manufactures and markets these products through 12 international facilities located on six continents.

More information can be found by either calling (03) 8401 7400, emailing sales.au@eriez.com or visiting www.en-au.eriez.com.

Professional pressure vessel inspections

WITH more than 30 years’ experience inspecting pressure vessels at mine sites across Australia, NSW-based Adept Inspections and Training is committed to keeping the community safe, and business downtime and expenses to a minimum.

Comprising an experienced team from a diverse range of technical backgrounds, Adept Inspections and Training provide personalised and professional pressure equipment inspection service.

The company value continual improvement, tailoring each service and comprehensive report to exceed the expectations of its valued diverse customer base.

Adept is a Type A, AS/NZS NATA 17020 and ILAC accredited company for national and international pressure vessel inspection, providing independent, time-efficient, quality inspection services compliant to AS/NZS 3788.

The accredited quality management system compliant to QMS 9001, 2015 standard, is an endorsement of its competence, credibility, independence and integrity in assessment and inspection.

The Adept team are familiar with working within WHS 2011 legislation and mining regulations as they are AS/NZS 4801, 2001 standard accredited.

Adept’s professional services available include: boiler inspection, pressure vessel inspection (hazard levels A, B, C, D and E), pipework inspections, nondestructive testing and hydrostatic testing.

It also provides consultation on pressure equipment repair, verification, purchasing,



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

installing, commissioning, and maintenance.

“Our qualified team have access to a substantial variety of equipment for the most comprehensive inspection results, including top-of-the-range Olympus IPLEX Industrial Videoscope for remote video inspections,” Adept Inspections and Training senior in-service inspector Rob Svensk said.

Adept will also advise if the pressure vessel requires registration, will complete registrations on behalf of clients, advise when renewals are due and guide clients through the specific requirements of each relevant Australian State Authority.

“You will always remain compliant when Adept is managing your plant item registrations,” Mr Svensk said.

“Our friendly, super - efficient Adept administration staff can provide you with instant administrative assistance and see to your pressure equipment queries.”

“Give us a call on 1300 BOILER and let us make sure your pressure equipment is safe.”

Adept

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Specialist calibration services

HK Calibration Technologies (HKCT) is a highly regarded specialist calibration services company with laboratories Australia-wide.

The company provides exceptional on-site and in-house calibration services for all types of test and measurement instrumentation, such as fluke digital multimeters and air flow meters.

HKCT's adherence to the requirements of ISO 17025-2005 guarantees that customers receive the highest levels of service from its seven state-of-the-art laboratories located conveniently across five States.

Its diverse clientele represent a broad cross-section of industries and range from one-man electricians to multi-national corporations.

HKCT employs highly qualified technicians from numerous engineering disciplines.

This expertise means quality calibration and repair services for all types of testing and measurement instruments.

No matter if it is for a gas monitor or flow meter calibration, HKCT provides a 48 hour turnaround on all types of calibration services.

The E6000 Portable Multi-Gas Detector is a compact and lightweight detector that continuously measures combustibles such as O₂, CO, H₂S and other toxic gases in ambient air.

The E6000 can detect up to seven gases at the same time using six sensors. Its functional and watertight design (IP 66) incorporates a bump proof, rubberised housing to meet the toughest requirements of harsh environments.



HK Calibrations provide high quality calibration services to the resources sector.

HKCT's CD4 Multi Parameter Gas Detector, adopting an advanced 32-digit MCU, can be used to monitor multi gas concentration continuously.

It has the advantages of a high sensitivity

gas detector and fast response. Once the gas reaches the preset alarming level, the detector will give video and audio alarming, which informs the user to adopt safety measurement to avoid potential accidents.

The BX616 4x Gas Detector has been marketed in Australia for the last three years and received high commendations for its performance and calibration integrity by ISGM technicians.

LEADING EXPERTS IN CALIBRATION

Our specialised expertise is based around the provision of calibration services of test & measurement instrumentation from corporate companies to a one-man electrician.



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AUSTRALIAN DESIGNED & MANUFACTURED



PCWI designs and manufactures a world leading range of Compact Porosity (Holiday) Detectors with application in industrial and pipeline industries.

Porosity Detectors are employed in the non-destructive detection and location of pinholes (holidays), bare spots or thin points in protective coatings applied for corrosion protection over metal and concrete (conductive) surfaces.

PCWI manufactures both high (DC and Pulse) and low voltage (wet sponge) instruments with a complete range of relevant accessories for such inspection and detection.

High voltage industrial and pipeline kits are available with minimal lead time.

Our range of porosity accessories include:

- External pipeline brushes to suit OD 33mm to 1,270mm
- Internal pipeline brushes to suit ID 52mm to 498mm
- Flat (straight) brushes from 50mm to 600mm
- Coils for pipelines from 50mm to 1470mm
- Larger brushes or coils can be manufactured to order.

PCWI Calibration laboratory supports testing and conformance certificates for a range of instruments operating in accordance with ISO/IEC 17025. Laboratory certified coating thickness standards are manufactured. All certification is Traceable to International Standards of Measurement.

The PCWI Quality Management System is certified to ISO 9001:2008

To view our full range of instrumentation and accessories visit our website or email us.

Phone: 02 4954 3900 to speak to one of our sales staff.

✉ sales@pcwi.com.au  pcwi.com.au



Quality radar sensor level solution



The VEGAPULS 69 is a reliable, cost-effective radar sensor level measurement solution for bulk solids.

THE mining industry presents some of the harshest conditions for equipment and workers.

But with industry pressure to keep costs to a minimum while maximising efficiency, execution of tasks simply cannot be jeopardised by equipment that isn't capable of withstanding and delivering accurate results under these conditions.

Even the smallest design or functional fault of a bulk solids level measurement radar sensor can have astronomical consequences for lost profits.

Thus, businesses need to implement convenient, cost-effective and reliable innovations that enable task execution with reliability and efficiency.

When the level of bulk solids in a silo is detected and converted into an electronic signal, the level signal is either displayed directly on site or incorporated into a

process control or management system.

However, often harsh conditions present obstacles to achieving an optimal measurement, which in turn affects operational efficiency.

NOISE — In containers and silos with many internal obstructions and complexities, sensor focusing can be influenced by extreme noise; hindering the level measurement result.

DIRT & BUILDUP — Operating inside harsh environments riddled with dust, dirt and vapour, can mean measurements made by the sensor are fundamentally inaccurate.

Therefore, implementing a non-contact level management solution for bulk solids that allows continuous and efficient operation and delivers reliable measurement data while ensuring maintenance-free operation, would be welcomed by the mining industry.

A reliable, cost-effective and convenient solution

Delivering reliable measurement data in spite of extreme noise, maintenance-free operation and lower servicing costs, the VEGAPULS 69 radar sensor takes a big step closer to the ideal of an all-round radar level measuring instrument for bulk solids.

The VEGAPULS 69 can be equipped with an encapsulated plastic antenna or lens antenna integrated in the metal flange, meaning it is completely unaffected by dirt and build-up; guaranteeing maintenance-free operation.

The level transmitter operates at a frequency of 79 gigahertz (GHz), which allows a better focusing of the transmitted signal.

The enhanced focusing helps to reduce the influence of background noise commonly found in complex internal structures such as silos, ultimately providing reliable measurement.

Bulk solids that often have poor reflective qualities can be measured with high reliability due to new microwave components that allow the sensor to detect even the smallest of reflected signals.

A measuring range of up to 120 metres and an accuracy of +/- 5mm gives the VEGAPULS 69 sensor the capability to execute level gauging in mine shafts or distance measurement on conveyor systems.

More information on the reliable, cost-effective and convenient VEGAPULS 69 radar sensor level measurement solution for bulk solids can be found online at: www.vega.com.

Clive Jones

Cazaly Resources Joint Managing Director

"The emerging battery metals space has been a real fillip for the junior resource space. The industry went through a 'near-death' experience for a few years and many didn't survive, which some say wasn't such a bad thing."

The Interview, page 62





Dust and buildup on the antenna? No problem!

The future is 80 GHz:
a new generation of radar level sensors

VEGAPULS 69 is designed specifically for level measurement of bulk solids. Even in dusty conditions, it always provides precise readings. Dust in the silo or buildup on the antenna have no effect.

This radar sensor also features unrivalled focusing at a frequency of 80 GHz. Simply world-class!

www.vega.com/radar



Wireless adjustment via Bluetooth with smartphone, tablet or PC. Compatible retrofit to all plics® sensors manufactured since 2002.



RAPID-ly changing the diamond drilling landscape

THE mining industry has long relied on a single shot or 'gyro' survey instrument to determine the drill hole path and its deviation.

However, these instruments have limitations, as single shot data is often magnetically affected and can be difficult to interpret; and gyros are expensive, sensitive instruments that can be difficult for operators to use.

Adding to this, previous uphole surveys required an exhausting, manual labour intensive process of the drill rods being run in and out of the hole, where a 300m uphole survey would take about two hours of hard labour.

Over the last two years, Downhole Surveys has been developing a solution to provide high speed, continuous surveying, while still offering a driller-operated survey instrument that is easy to run and produces highly accurate data.

After thorough R&D and onsite trials, the DeviFlex RAPID was introduced in January 2017 and has since delivered several productivity and operational improvements to a number of mine sites across Australia.

The DeviFlex RAPID performs a

continuous survey, taking readings every two or five seconds as the instrument is run into the hole.

With an increased survey speed of 25 metres per minute, a 300m drill hole can now be surveyed in/out in just 24 minutes.

Now, upholes with a dip range between +85 and +30 can be easily surveyed in conjunction with a Boart Longyear Roller Latch, with the DeviFlex being simply pumped up and control winched back using the water pressure bleed valve.

Drillers currently using the DeviFlex RAPID are reporting an increase of between 10 and 15 per cent more metres drilled per month due to the reduced rig down time associated with downhole surveying.

Rework is significantly reduced, the instrument is highly reliable, and the software is simple and intuitive.

The DeviFlex RAPID can also be paired with the company's 13 stage QA Software which allows drillers to process survey data at the rig, increasing data reliability and drilling productivity.

More information can be found at: www.downhole.com.au/products/deviflex-rapid/.



Surveying upholes is now easier with the DeviFlex RAPID.

Introducing faster, continuous surveying with

DeviFlex **RAPID** »

0-100 in 3.3 minutes



Rental Instrumentation | Quality Control | Deviation Measuring

www.downhole.com.au

Absolute Precision

Fully equipped shutdown specialists

THE Corporate Protection Australia Group (CPA Group) is one of the largest private safety and emergency response companies in the southern hemisphere.

Its key individuals and associates have a sound history of successfully negotiating rigorous, high-profile environments and situations.

Through experience, CPA Group has become a dedicated shutdown specialist, and wholly understands the specific challenges and requirements inherent in facility maintenance projects.

The quality of its workforce, site familiarisation, and its ability to reduce any potential down-time is crucial to the success, and the cost, associated with any shutdown.

CPA Group successfully delivers services such as consultancy, personnel, equipment, and vehicles to major shutdown works in the mining, oil and gas, energy, critical infrastructure, and maritime industries — both on time and on budget.

Regarding process, its site team fully integrates with the shutdown project team, to be both highly visible and accessible.



CPA Group has a dedicated safety culture which reflects its success in the resources sector.

The company structures employee reporting to 'drive behaviour', ensuring a successful integration.

This includes outreach activities such as walk-arounds, safety inspections, hydration circuits, fire extinguisher test and tags, and more.

Every day, employees must report on what they have done to enhance their visibility and value to their clients.

CPA Group has a strong safety culture,

starting from the top and its operational model places safety at the forefront of all its activities.

CPA Group executive chairman Harley Sparke is dedicated to safety, and ensures this passion governs everything the company do: a commitment that goes hand in hand with its exemplary safety record.

The company is well-placed to provide a highly efficient, cost-effective solution, with cross-trained professionals covering

all appropriate combinations of security, medical, or emergency service skillsets.

CPA Group paramedics and nurses are trained in emergency rescue, its emergency services officers are trained medics, and its security guards can provide first aid and form part of the emergency response team.

Clients can rest easy knowing that they receive a highly efficient, productive and cost-effective service fully equipped to meet the risk profile of their shutdown.



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Leading the way with CAP

ESTABLISHED in 1984, Territory Roadmarking has the experience, expertise and tools to deliver high-quality linemarking services for highways, streets, airstrips, carparks and sports courts across the Northern Territory, WA and Queensland.

Based in the Northern Territory, the locally owned company has built a strong reputation over the years, and is now the preferred contractor for airstrips and roads at remote mines.

The vehicles used to carry out the work are all are custom designed and made to deliver lasting results, and allow for the edge lines and centre lines to be painted simultaneously, which promises a perfectly parallel result.

A three-gun airless spraying system is used for all jobs and data logging systems are fitted to all vehicles and equipment, ensuring the quality is second to none.

One of the latest additions to its fleet includes the new H-18 Hoffman vehicle; a compact, narrow and manoeuvrable machine used to lay Cold Applied Plastic (CAP).

CAP is a high performance long-life road marking material that has been used extensively throughout Europe in the last two decades.

The long life material can be applied as a flat, structured pattern that allows water to drain freely from the road surface or as audio tactile profiles that are easy to see and provide an audio tactile effect when driven over by vehicles.

Benefits include excellent night and rain visibility, driver fatigue safety, heat and skid resistance, a short drying time, and maintenance in colour.

“We recently did 190km of this in the



Territory Roadmarking is a member of the Roadmarking Industry Association of Australia, is PCCP accredited, and recognised nationally for meeting industry standards.

Northern Territory using Audio Tactile Line Marking and wish to expand our operations around Australia,” Territory Roadmarking

director Adam Cole said.

“Spot flex is a brand-new technology and now available in Australia using our H-18

machine with a two component cold plastic.”

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

MAKING A MARK IN MINING

Territory Roadmarking is the industry's leading linemarking organisation specialising in remote applications in the Northern Territory, WA and Queensland regions.

Our linemarking services cover:

- Aerodromes • Highways • Minesites • Carparks
- Sports courts • Line removal • Audio Tactile (safety)
- Spot Flex (wet weather markings) • Install Retro Reflective Pavement

“We are widely recognised for delivering a superior finish and service for a number of projects.”

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Time-tested durability

BLACK Duck Seat Covers (Black Duck) is an Australian owned and operated company making high quality seat covers for a range of applications.

For years, mining companies and farmers have used canvas seat covers to protect and preserve vehicle seats; not only from the infamous red dust, but also from grease and grime and general wear damage.

Black Duck's seat covers increase resale value of vehicles by protecting the original seats and keeping them looking like new.

The company's time-tried and tested 12 ounce canvas cover range contains a custom polyester-cotton blend made in Australia to Black Duck's specifications.

It was originally designed for agricultural and mining applications but quickly became popular in recreational four-by-four and commercial vehicle circles.

Black Duck also produces a foam backed denim material that focuses on comfort and style and is designed for light duty daily drivers and general spill protection.

Both materials are water resistant and have a 12 month, 100 per cent satisfaction guarantee.

They are tailor fitted for a wide range of vehicles, and boast more than 6000 patterns for customers to choose from.

Seats with side impact airbags fitted to them are very common in modern cars.

Because there is no 'one size fits all', every variance is tested to make sure all of Black Duck's seat covers for vehicles



Black Duck seat covers provide superior protection for use in the mining industry.

with fitted side impact airbags are independently tested and certified to meet Australian standards.

The company is currently expanding its three Australian manufacturing plants and holds stock of the more popular seat

cover patterns, allowing a delivery time of between one and three working days Australia-wide.



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**PIONEERING
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Pioneered by Black Duck and continually improved for the last 25 years, our canvas seat covers are the ultimate in durability. Tailor made to perfection, Black Duck canvas seat covers are proven as the seat protection benchmark for heavy wear situations such as mining and commercial industries.

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- Unique and exclusive 12oz canvas developed for the harsh Australian conditions
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Clive Jones

Cazaly Resources Joint Managing Director

Clive Jones gives journalist Cameron Drummond insight into his company's flagship Mount Venn gold project, and the impact of the 'battery revolution' on junior exploration in Australia.

Q. What is your educational and professional history?

I obtained a Bachelor of Applied Science (Geology) from the Western Australian Institute of Technology — or Curtin University as it is known today — and have been involved in the minerals industry for over 30 years.

I have worked on the exploration and development of a range of commodities, including gold, base metals, uranium, mineral sands, iron ore and industrial minerals, both in Australia and overseas.

The last 15 years or so I have been involved in several listed companies and am currently joint managing director of Cazaly Resources, a director of Bannerman Resources, and chairman of Corazon Mining.

Q. Tell us about your role at Cazaly.

My main focus is running Cazaly where we are focusing on our Mount Venn gold project, which lies in the Yamarna region of WA near Gold Road's 6 million ounce Gruyere gold development.

The project is very large, encompassing an entire greenstone belt which has never really been adequately explored for gold.

We also have a portfolio of other projects which we are looking to advance, including the Parker Range iron ore project located near Southern Cross.

Parker Range is pretty much a forgotten asset in the company.

It is a "mine-ready" asset with a fully completed feasibility study, all requisite approvals to mine and is relatively quick and easy to develop, however given the fickle market for iron ore in recent years it has been difficult to finance.

My other roles in Bannerman and Corazon also see me dealing with ongoing board and occasionally operational decisions. Having projects based in Africa for Bannerman, and Canada for Corazon, also sees me dealing with interesting and challenging jurisdiction issues from time to time, there's always a curve to learn!

Q. What does a typical day look like for you?

Well, after being Superdad at home it's generally into the office and dealing with the issues of the day. Currently it is facilitating access for on-ground work and dealing with a tad too much bureaucracy.

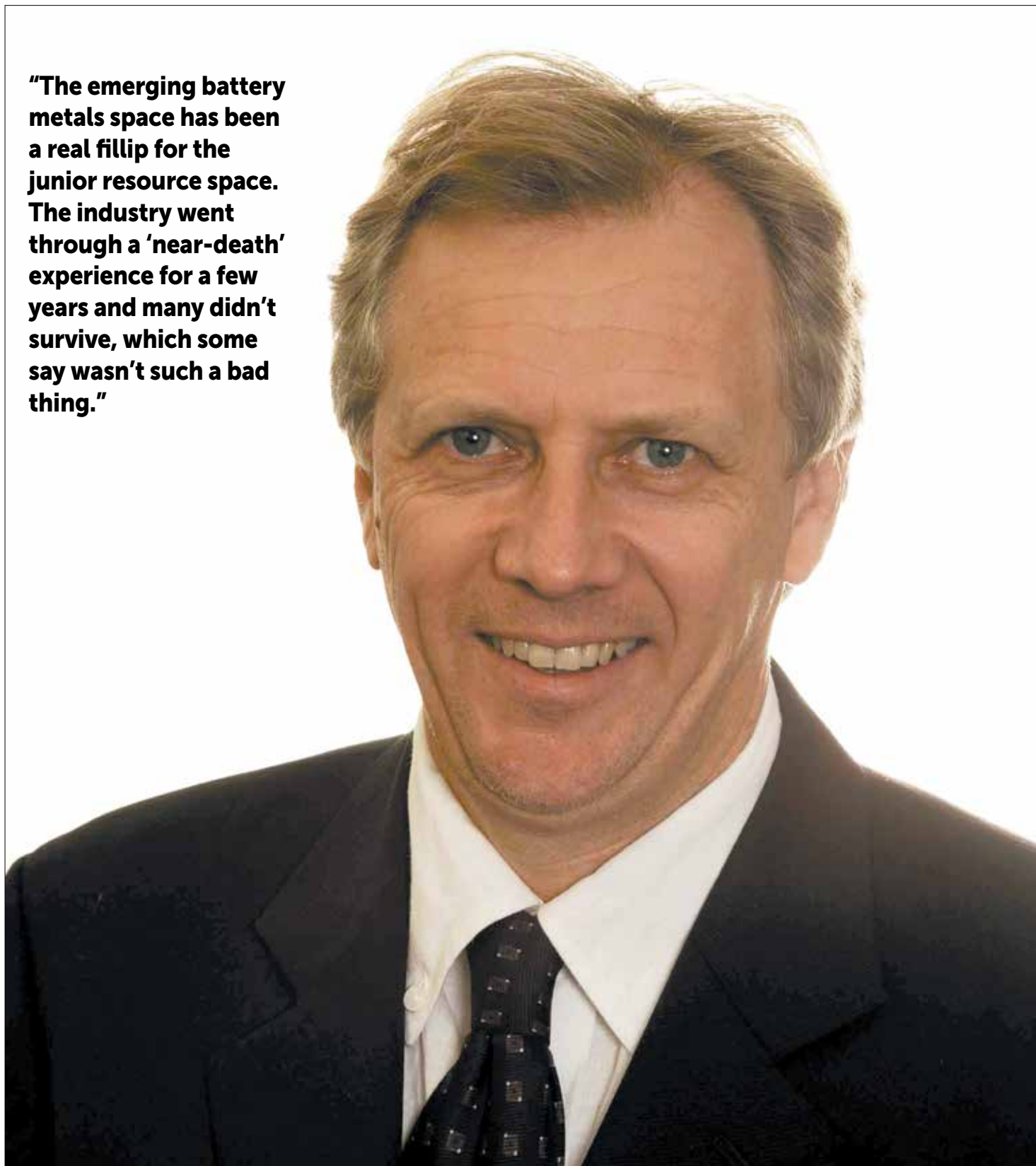
I'm not sure our industry gets enough recognition for the amount of people we keep employed in government! I change a lot between the corporate role and getting into the data on our projects so I'm certainly busy enough.

Q. How is Mount Venn tracking?

We got on the ground and conducted our first drilling program in January this year and followed up again recently.

We initially targeted the central portion of the belt where the geology is reminiscent of the geology hosting Gold

"The emerging battery metals space has been a real fillip for the junior resource space. The industry went through a 'near-death' experience for a few years and many didn't survive, which some say wasn't such a bad thing."



Road's Gruyere discovery.

The work successfully identified a +3km long gold bearing structure and we are about to commence some follow-up deeper RC drilling. The drilling also highlighted what looks to be VMS zinc mineralisation at the Rutters prospect.

A recently completed geophysical program of Dipole-Dipole IP highlighted a +1km long anomaly coincident with anomalous zinc and gold in RAB drilling, surface geochemistry and an airborne EM anomaly.

The presence of extensive zinc mineralisation, with coincident elevated levels of gold, arsenic, silver, copper and lead, occurring within a felsic volcanic pile indicates the potential for primary

VMS (Volcanic Massive Sulphide) mineralisation at depth which we will be RC drilling shortly.

Q. What other developments are on the horizon for Cazaly?

Cazaly has several other projects including the Mackenzie Springs graphite-nickel project which sits along strike of Panoramic Resources' Savannah nickel mine, the Halls Creek copper project in the Kimberley region of WA, two cobalt projects on the east coast and even some applications for uranium in the Czech Republic. There's always some 'smokies in the drawer' at Cazaly!

Q. What does the 'battery metals' revolution mean for junior explorers?

The emerging battery metals space has been a real fillip for the junior resource space. The industry went through a 'near-death' experience for a few years and many didn't survive, which some say wasn't such a bad thing! The demand allowed for an injection of new money into the sector and has revitalised many in the industry.

It has also shown how quick footed the junior sector can be to accommodate new and emerging demands and has had obvious benefits to not only to the companies, but to the economy as a whole as funds raised gets spent in the wider community.

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