

THE AUSTRALIAN MINING REVIEW

PP100007123

DECEMBER 2018

australianminingreview.com.au

A product of Publications & Exhibitions Australia Pty Ltd

AUSPAN


WA's LEADER IN THE DESIGN & CONSTRUCTION OF STEEL FRAME SHEDS AND BUILDINGS

www.auspangroup.com.au 1300 271 220

SEE INSERT FOR MORE INFO


COMMODITY FOCUS: COPPER

NEWS p18




ORE-SOME START

BHP IRON ORE p20



STEPHEN BIGGINS CORE LITHIUM

IN THE SPOTLIGHT p70

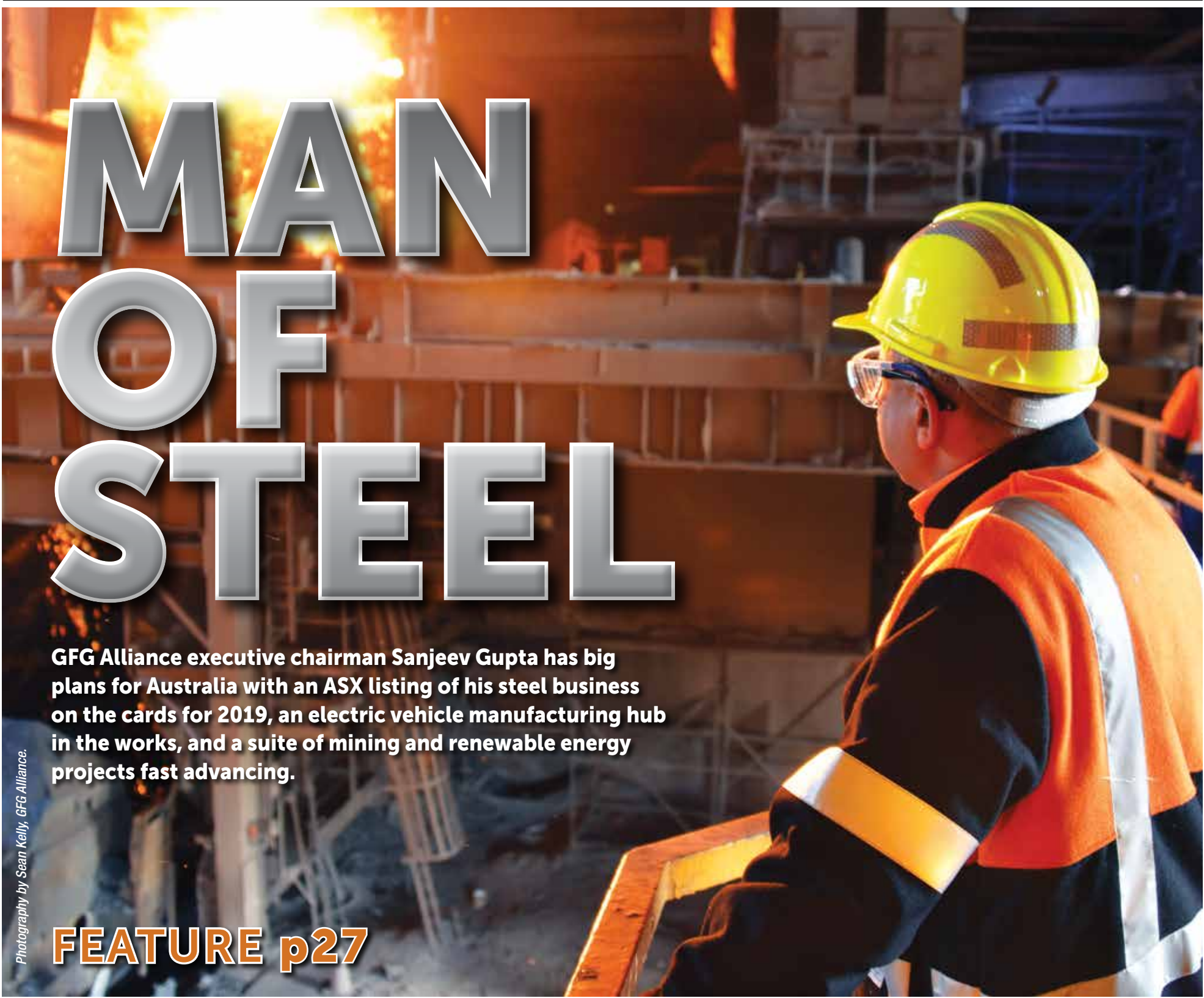


MAN OF STEEL

GFG Alliance executive chairman Sanjeev Gupta has big plans for Australia with an ASX listing of his steel business on the cards for 2019, an electric vehicle manufacturing hub in the works, and a suite of mining and renewable energy projects fast advancing.

Photography by Sean Kelly, GFG Alliance.

FEATURE p27





SMITH BROUGHTON AUCTIONEERS

WE ARE NOW CONSIGNING FOR UPCOMING AUCTIONS. TURN YOUR IDLE EQUIPMENT INTO CASH TODAY, CONTACT US TO DISCUSS YOUR OPTIONS.

WWW.SBAUCTION.COM.AU | 08 9374 9222 | SALES@SBAUCTION.COM.AU | MIDLAND, WA



NEWS

Commodities Snapshot	4
Explorers on the Move	10
The Contractors	12
Technology & Innovation	14
International	16
Commodity Focus: Copper	18

FEATURES

BHP Iron Ore	20
GFG Alliance	27
Millennium Minerals	32
Westgold Resources	34
Mining in Collie	36
OZ Minerals	40
Evolution Mining	45
Fuel Farms	46
Independence Group	48
Mount Gibson Iron	50
Heron Resources	52

INDUSTRY FOCUS

Companies Gearing Up	53
Blasting & Explosives	58
Confined Space Training	60
Copywriting & Technical Publication Services	61
Industrial Sheds & Shelters	62
Reverse Osmosis	64
Risk Management	65
Rust Prevention Solutions	66
Seals & Sealing Solutions	67
Specialised Welding	68
Vacuum Excavation	69



IN THE SPOTLIGHT:
CORE LITHIUM
MANAGING DIRECTOR
STEPHEN BIGGINS p70

GOLDEN OPPORTUNITIES



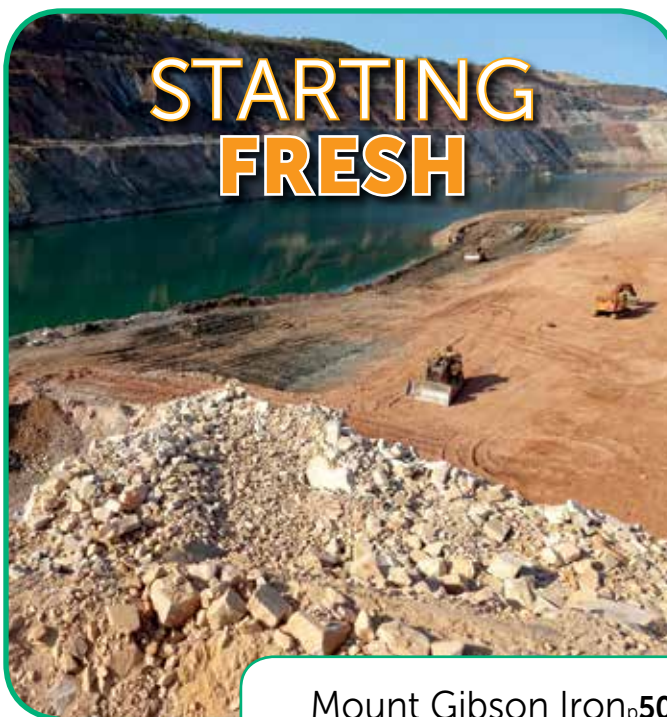
Westgold Resources p34

A STRONG FUTURE



Mining in Collie p36

STARTING FRESH



Mount Gibson Iron p50

PUBLISHED BY
ABN 28 112 572 433



A product of
**Publications &
Exhibitions Australia Pty Ltd**

GENERAL MANAGER

Brad Francis
brad@miningoilgas.com.au

MANAGING EDITOR

Elizabeth Fabri
elizabeth@miningoilgas.com.au

JOURNALISTS

Amy Blom
amy@miningoilgas.com.au

Jessica Cummins
jess@miningoilgas.com.au

GRAPHIC DESIGNER

Charlotte Lufino
charlotte@miningoilgas.com.au

SALES EXECUTIVE

Penny West, Biliana Harman

PRINTER

Rural Press

CONTACT US

P: (08) 6314 0300
F: (08) 9481 7322
160 Beaufort Street, Perth, WA 6000.
PO Box 8023, Perth BC, WA 6849.

E-mail the editor at
editorial@miningoilgas.com.au

For all other emails to staff, the standard convention is, first name (only) @miningoilgas.com.au

The Australian Mining Review is a free publication to all mine sites and mining companies in Australia. Its value is \$11 an issue. (Includes GST, postage and handling).

The copyright is vested in the Proprietors of The Australian Mining Review; neither whole nor any part of this issue may be reproduced without permission. The views expressed in this publication are not necessarily those of Miningoilgas Pty Ltd and its staff, but are those of the respective author who accepts sole responsibility and liability for them.

NOTICE TO ADVERTISERS:

The Trade Practices Act, 1974 came into force on the 1st October 1974. All advertisers and advertising agents are directed to carefully study the provisions of the Act, which contain strict regulations on advertising.

It can be an offence for anyone to engage, in trade or commerce, in conduct deemed "misleading or deceptive". Specifically s53 of the Act contains prohibitions from doing any of the following in connection with the promotion, by any means, of the supply or use of goods or services:

(a) falsely represent that goods are of a particular standard, quality, value, grade, composition, style or model or have had a particular history or particular previous use; (b) falsely represent that goods are new; (c) represent that goods or services have sponsorship, approval, performance characteristics, accessories, uses or benefits they do not have; (d) represent that the corporation has a sponsorship, approval or affiliation it does not have; (e) make a false or misleading representation with respect to the price of goods or services; (f) make a false or misleading representation concerning the need for any goods or services; or (g) make a false or misleading representation concerning the existence, exclusion or effect of any condition, warranty, guarantee, right or remedy.

PENALTIES:

For an individual — \$10,000 or six months imprisonment

For a corporation — \$50,000. It is not possible for this company to ensure that advertisements published in this newspaper comply with the Act and the responsibility must, therefore, be on the person, company or advertising agency submitting the advertising for publication. In case of doubt, consult your lawyer.



QUALITY SERVICE
SAFELY

www.hagstromdrilling.com.au





AUSTRALIA'S
**LARGEST
SPECIALIST
SHOTCRETE
AND CIVIL
CONSTRUCTION
CONTRACTOR**

**OUR EXTENSIVE
EXPERIENCE INCLUDE:**

- Underground/Tunnel Shotcrete Application
- Remote Area Concrete Supplier
- Zone 1 Hazardous Areas shaft lining services suitable for coal mines
- Laser scanning for shotcrete thickness measurement

CORE SERVICES:

- Underground Shotcrete Services
- High Wall Shotcrete Services
- Tele-remote shaft lining
- Underground and Surface Civil Construction

☎ 9270 1000 🌐 jetcrete.com.au
✉ tendering@jetcrete.com.au



**Integrated
INDUSTRIAL**
your complete supply solution



1300 787 995

+61 8 9373 1200

sales@intind.com.au

10 Hazelhurst Street, Kewdale WA 6105



Authorised Distributor of Castrol



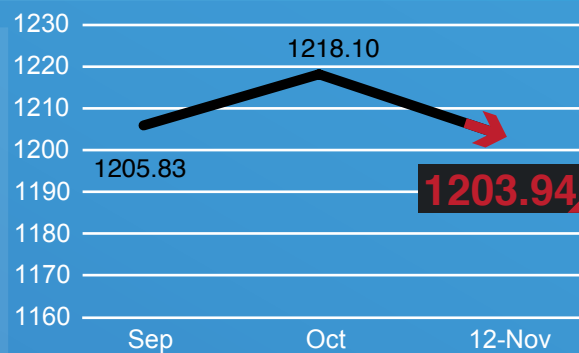
MAJOR COMMODITIES

SNAPSHOT

GOLD

\$US/oz

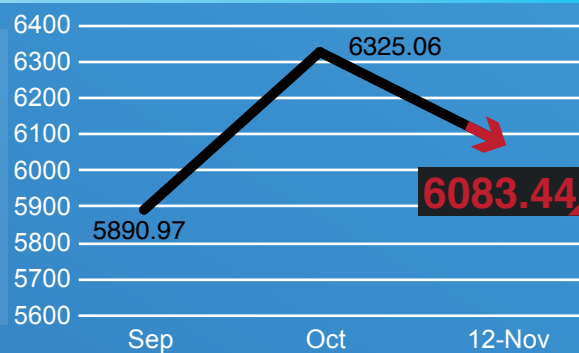
The gold price settled at its lowest in a month down 2 per cent for the week ending on 9 November while a slightly stronger US dollar kept pressure on gold prices.



COPPER

\$US/t
LME Price

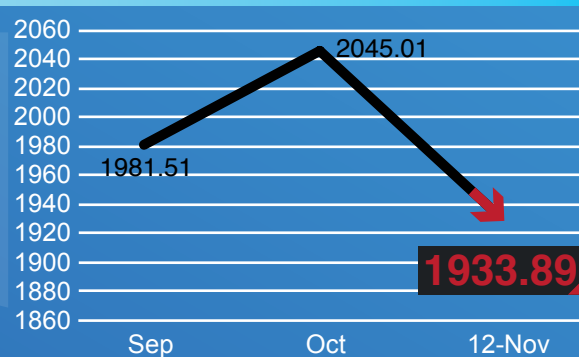
Copper prices dropped in early November, however are set to rebound in the New Year as strong demand fundamentals outweigh macro-economic concerns.



ALUMINIUM

\$US/t
LME Price

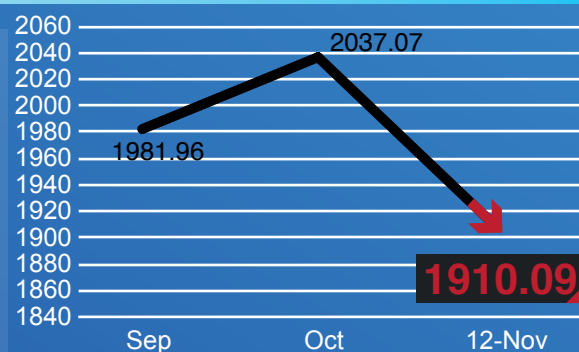
The market remains tight for aluminium with prices falling more than 10 per cent since hitting a three-month high in early October.



LEAD

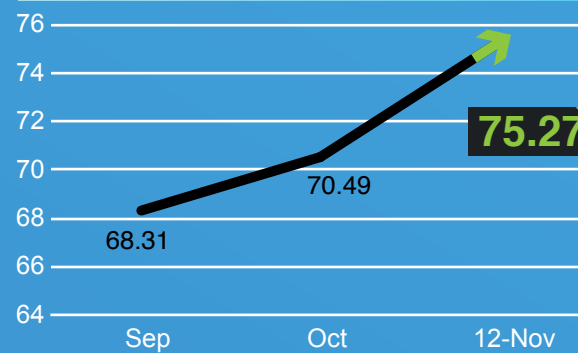
\$US/t
LME Price

The lead price surged from \$US1,900 on 7 November to \$US1955.85 on 9 November with analysts expecting the price to continue to rise to \$US2114 by the end of this quarter.



IRON ORE

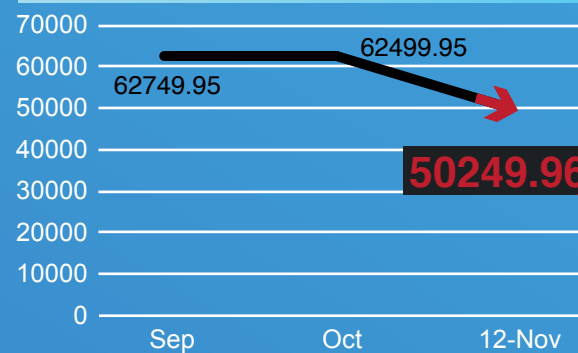
\$US/t
62% Fe CFR China



The price for benchmark 62 per cent fines jumped 2.4 per cent to \$US75.74 a tonne on 5 November following news of BHP's train derailling in WA, but eased to \$US74.95 a tonne by 9 November.

COBALT

\$US/t
LME Price



Cobalt stabilised in mid-November, but analysts feared recent illiquidity in the spot market could leave prices vulnerable to a move lower in coming weeks.

ZINC

\$US/t
LME Price



Zinc prices fell to a seven-week low on 9 November, on the back of expectations that a supply crunch would soon ease, though prices began to drift higher days later.

NICKEL

\$US/t
LME Price

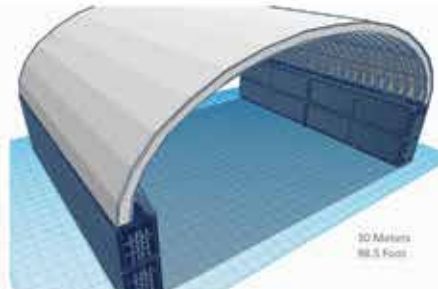


Nickel flat-lined in November, after a period of volatility characterised by an overall downward trend.

COMMODITY FOCUS > COPPER PG 18

Splash
SplashStructures.com

RELOCATABLE STRUCTURES SOLUTIONS



Global wholesalers • Design • Manufacture • Installation

Aussie Pumps **MADE FOR MINES**

BLASTERS TO 500 BAR

HEAVY DUTY TRASH PUMPS TO 6"

FREE EXTENDED WARRANTIES

AUSSIE MINE BOSS SERIES



Sold & serviced by
AUSSIE MINING PARTNERS
Call Fiona for your nearest depot

02 8865 3500

Australian Pump Industries
info@aussiepumps.com.au
www.aussiepumps.com.au

IN BRIEF

Kidman secures Mitsui offtake

WA

KIDMAN Resources has entered into a binding offtake heads of agreement with Japan's Mitsui & Co over lithium hydroxide production from its Mt Hollands project in WA.

The agreement is for an initial two-year term with the option for a two-year extension, and would equate to less than 15 per cent of Kidman's share of nameplate production.

The agreement followed Kidman's deal with Tesla back in May, and according to Kidman was "further evidence of the demand for the high-quality lithium hydroxide".

"Kidman continues to progress its strategy of entering into a limited number of significant offtake agreements to develop long term customer relationships," Kidman Resources chief executive Martin Donohue said.

Miners to foot rehab costs

QLD

MINING companies operating in QLD will be required to financially contribute to rehabilitation costs for abandoned mines under legislation passed in the State Parliament on 14 November.

The legislation removed taxpayer liability in cases where miners were unable to fulfil financial and environmental requirements at an operation and were forced to close.

Under the new laws, instead of a site-by-site approach, companies would be required to contribute to a pool of funding earmarked for rehabilitation should an owner be forced to close.

The legislation passed in spite of opposition from the Queensland Resources Council, the CFMEU and the mining industry.

Doray and Silver Lake to merge

WA

SILVER Lake Resources and Doray Minerals have entered into a binding Scheme Implementation Deed, which will see the two companies merge.

Subject to approval, the merger would see the group own two high-grade gold operations in WA with a mineral resource base of 4.6 million ounces, and FY19 pro-forma production guidance of about 240,000 ounces.

Doray said both companies recognised the challenges of being a significant producer in the gold business and this transaction would position them as a sustainable player.

"Doray has taken great care to find a partner with aligned growth ambitions...and Silver Lake fits that bill," Doray Minerals managing director Leigh Junk said.

Coal demand strong: report



Whitehaven coal train.

JESSICA CUMMINS
NATIONAL

DEMAND for coal will continue to grow through to 2040, according to the latest World Energy Outlook (WEO) report by The International Energy Agency (IEA).

The WEO estimated the growth in demand for coal in the Asia Pacific region would increase by 492 million tonnes of coal equivalent (mtce) within the next 22 years.

This included substantial growth in India and Southeast Asia, which counteracted projected falls in China and Japan.

Federal Resources and Northern Australia minister Matt Canavan said the IEA had forecast Australia's net exports of coal would grow by about 20 per cent to 430

mtce by 2040.

About half of those exports would be metallurgical coal.

Mr Canavan welcomed the IEA report and its positive outlook for the global coal sector.

"Our proximity to these markets means our coal industry is well placed to meet this growing demand," Minister Canavan said.

"These figures show a bright future for Australia's coal industry.

"They're also a short, sharp shock for those who have set out to destroy confidence in our world-class coal industry.

"Australia is the only exporting coal producer projected to significantly ramp up coal production over the period to 2040, supported by its strong resource base and

proximity to Asian markets."

Other positive results from this year's WEO included a growing international metallurgical coal market, especially in Asia, with Australia well positioned to meet demand.

Australia's production was also forecast to exceed that of the US by the late 2020s, with more than 40 per cent of coal produced in Australia expected to be sourced from new mines in 2040.

QLD Resources Council chief executive Ian Macfarlane said the report demonstrated "just how important QLD commodities will be under all scenarios modelled".

"Our resources sector is the industry of the moment and the industry of the future for Queensland," Mr Macfarlane said.

Arafura to build processing plant in NT

ELIZABETH FABRI
NT

NEODYMIUM and praseodymium explorer Arafura Resources has announced it will build a \$US80 million separation plant for its Nolans rare earths project in the Northern Territory as opposed to overseas.

The company has been determining the feasibility of the location of the plant for years, with the preferred site originally an industrial estate in South Korea.

NT chief minister Michael Gunner said the Government had been working with Arafura throughout the year to secure the plant for the Territory.

"Creating local jobs is the Territory Government's number one priority.

"This announcement is a significant vote of investor confidence in the NT and will contribute to the creation of around 500 construction jobs with 350-370 jobs during operations across the project.

"This is a game-changer for the Territory as it positions Central Australia as a leader in clean energy supply chains, plus it represents the first time industry will now have the capacity to value add processing to mineral resources."

According to Arafura, the plant will be built at its Nolans site, about 135km north of Alice Springs.

Arafura managing director Gavin Lockyer said the company was "very pleased to have settled on a site for the plant.

"This makes Nolans a 100 per cent



Image: Arafura Resources.

Pilot testing for the Nolans flowsheet at SGS's Malaga facility.

Australian domiciled project and unlocks significant value prior to product export," Mr Lockyer said.

"Nolans will soon represent a new long-term, secure supply of 3600 tonnes of NdPr oxide each year and building the Separation Plant

at the project site will bring additional benefits to the Northern Territory and in particular the Central Australian region."

A DFS for the Nolans project was due in the coming weeks, with a final investment decision due in 2019.

No matter which parts are needed for your screen, we are there for you!

This is how we make the big difference, the Metso Way.

When unplanned downtime strikes and parts are not readily available, the cost in lost production can add up quickly.

With Metso, you gain access to a complete range of parts along with our know-how, built up by experience gained from thousands of screen installations. Our experts will study your operation in detail to recommend the right parts, as well as point out improvement opportunities that can help you optimize your complete process.

Partnering with Metso means you gain a holistic view on your screening process and have genuine quality parts available when you need them.

Discover how our solutions can make the big difference at metso.com/VibratingSpares

#TheMetsoWay



 **DaRa**
Switchboards

Customised Switchboard Specialist

Any Switchboard for Any Mine

We understand that every mine is unique and we match that up with tailor made heavy duty switchboards for every mining application

- Temporary Power Boards
- Distribution Boards
- Control Panels
- Main Switchboards
- Motor Control Centers

Visit us
www.electricalswitchboards.com.au

Send your switchboard inquiries to sales@dara-switchboards.com.au or call **1300DARASW**

Ironbark mine gets approval

ELIZABETH FABRI
QLD

FITZROY Australia Resources has received the green light from the QLD Government to develop its Ironbark No. 1 coal mine in the Bowen Basin, QLD.

The 6 million tonne per annum (mtpa) underground longwall coking coal project, formerly owned by Vale and known as Ellensfield, was purchased by US-backed Fitzroy Australia Resources in November 2016.

With mining leases granted, the project was now scheduled to enter production in 2020, and operate for an estimated 20 years.

The project would be a “low impact development”, sharing major infrastructure with Fitzroy Australia’s nearby Carborough Downs mine.

Fitzroy Australia Resources chief executive Grant Polwarth said the approval enabled it to pursue its expansion in the region, and would provide ongoing local jobs – 160 during construction, and up to 350 positions once operational.

“Ironbark No. 1 will be a modern and innovative underground operation,” Mr Polwarth said.

“At Fitzroy, we pride ourselves on being a people business that mines coal, and the construction of Ironbark No.1 will see that vision continued.”

On 13 November, the company awarded NRW Holdings subsidiary Golding

Contractors an Early Contractor Involvement (ECI) contract for the project, which included detailed design, costing, and project scheduling for the civil and mining services.

Mr Polwarth said the agreement marked another “important milestone” for Ironbark No. 1.

“This agreement with Golding is an important step toward construction and ultimately realising our vision for a modern and innovative Ironbark No. 1 coal mine,” he said.

“The agreement follows the safe, efficient and highly successful Broadlea mining project and is a natural extension of the growing partnership between Fitzroy and Golding.”

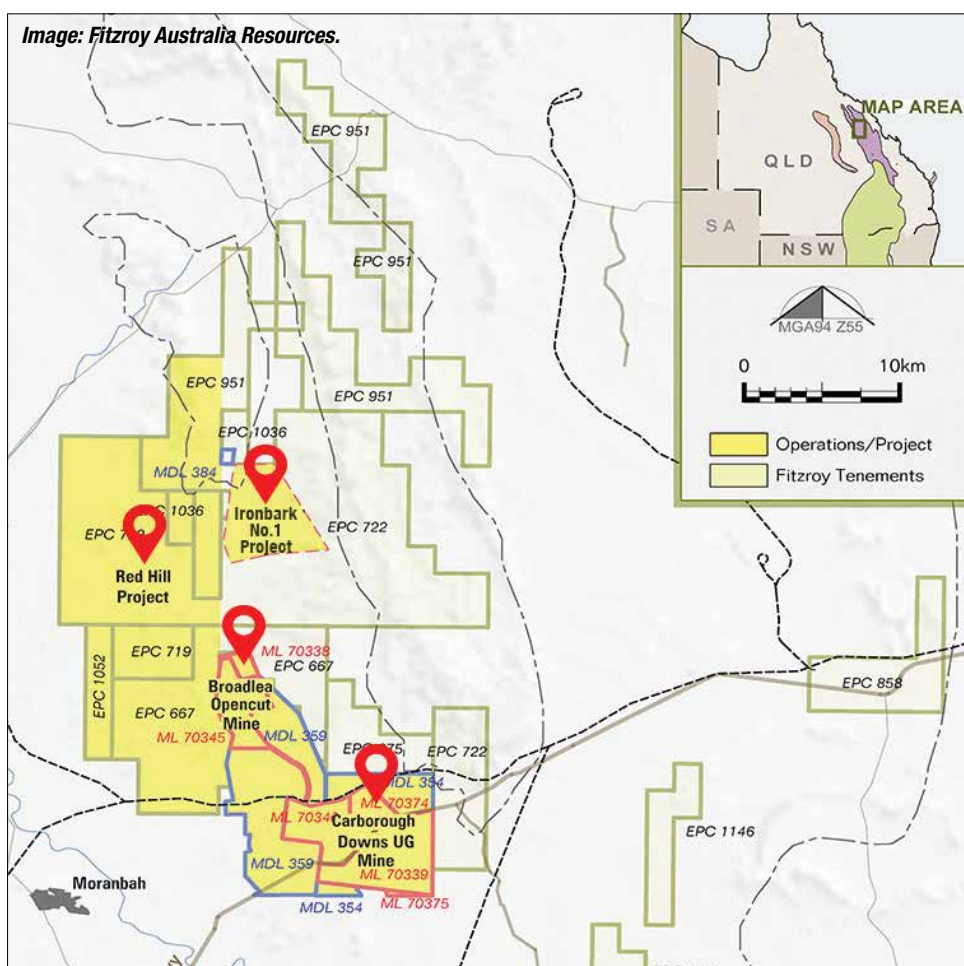
QLD mines minister Dr Anthony Lynham said most of the coal produced would be low-ash hard coking coal used in steel production.

“Ironbark No. 1 comes on top of the 13 committed resources projects in QLD with a combined capital value of more than \$9.4 billion across multiple commodities,” Dr Lynham said.

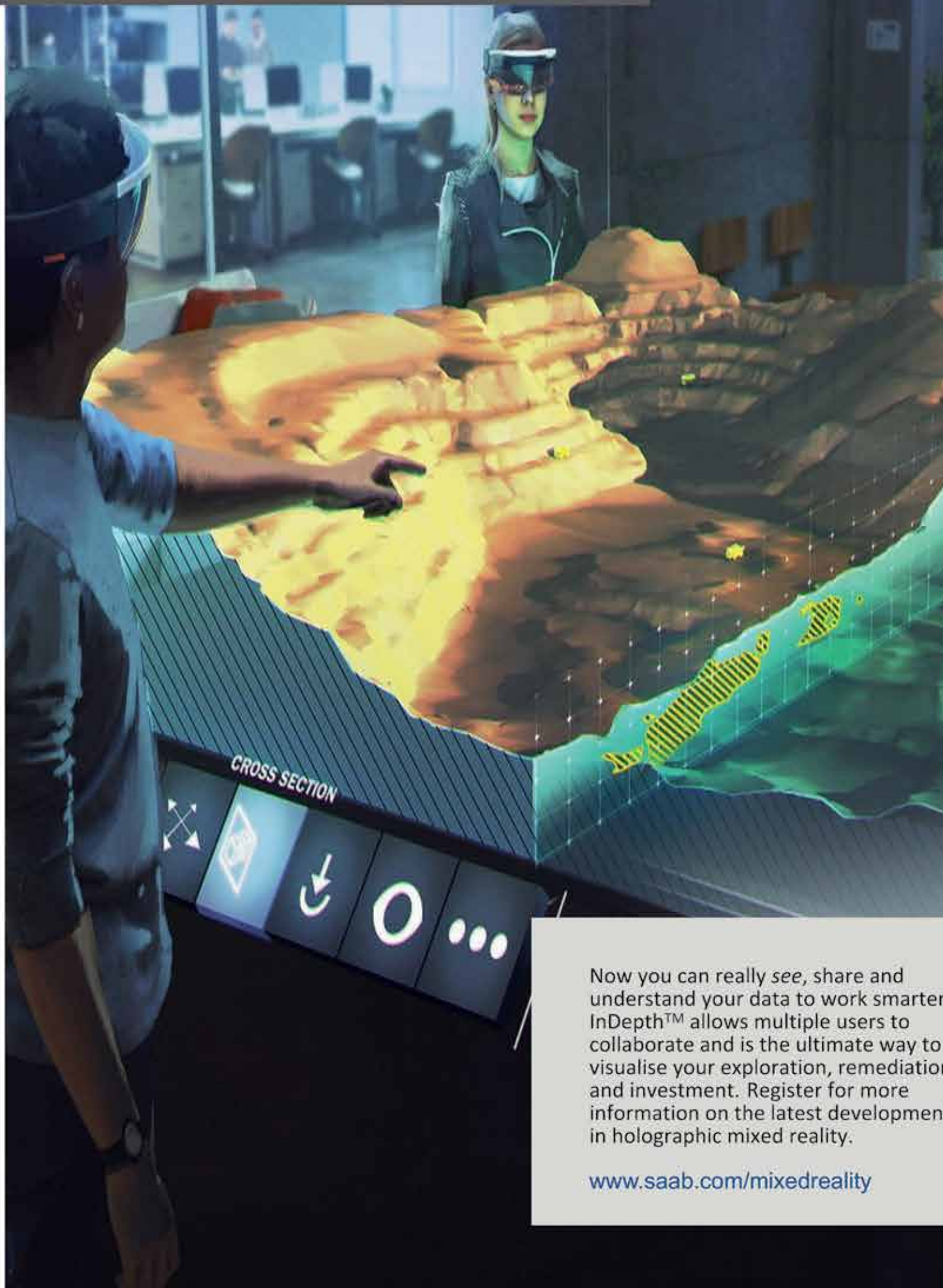
“Another 42 projects are at feasibility stage, with a combined capital value of more than \$65 billion, again, across multiple commodities.”

QLD Resources Council chief executive Ian Macfarlane said the approval was an example of the QLD Government’s commitment to developing the State’s rich minerals province.

He said the State’s sector now provided one



Explore, collaborate,
understand with InDepth™



Now you can really see, share and understand your data to work smarter. InDepth™ allows multiple users to collaborate and is the ultimate way to visualise your exploration, remediation and investment. Register for more information on the latest development in holographic mixed reality.

www.saab.com/mixedreality

SAAB, SAAB TECHNOLOGIES, InDepth & griffen device are registered trademarks of Saab AB. All names, logos and trademarks and all related product and service names are trademarks, registered trademarks of Saab AB, licensors or joint venture partners and are the property of any of these companies.



SAAB

IN BRIEF

Tandarra license secured

VIC

JOINT venture partners Navarre Minerals and Catalyst Metals have been granted a 10-year retention license at their Tandarra gold project in Victoria.

The license received the tick of approval from the Victorian Department of Economic Developments, Jobs, Transport and Resources, following the acceptance of the Mineralisation Report in August 2018, which confirmed significant gold mineralisation had been discovered.

The project, 60km north-west from Kirkland Lake Gold's Fosterville mine, was a gold discovery under shallow cover in the Whitelaw Gold Belt.

A Joint Venture agreement for the project was in the final stages of preparation.

Another discovery at Golden Mile

QLD

AUSMEX has found a fourth historic high-grade gold mine at its Golden Mile project in QLD following reverse circulation (RC) drilling at The Falcon.

Assay results from Falcon West Reef turned up best results of 4 metres at 18.93 grams per tonne (g/t) within 8m grading at 10.55g/t, while Falcon East Reef turned up 5m at 7.23g/t within 10m at 3.78g/t.

Ausmex managing director Matt Morgan said the company was only half way through its maiden drilling program, with up to an additional five known historic high-grade mines still to be drill tested.

Coburn resource increased

WA

STRANDLINE Resources has increased its mineral resource estimate at the Coburn mineral sands project in WA by 64 per cent.

As part of the company's Definitive Feasibility Study, the new resource has been changed to 1.6 billion tonnes containing 19.6 million tonnes of heavy mineral, from 979mt at 1.3 per cent containing 12.3mt of total heavy mineral.

Strandline managing director Luke Graham said Coburn was undeniably a world-scale mineral sands resource.

"Adding an extra 7mt of in-situ heavy mineral (now totalling 20mt) highlights the potential to further extend mine life, which already stands at 19 years," Mr Graham said.

Yandal Resources' IPO hopes



Image: Yandal Resources.

Yandal Resources Flinders Park South outcrop.

JESSICA CUMMINS
WA

GOLD explorer Yandal Resources hopes to be listed on the ASX by December this year after launching a \$5 million initial public offering (IPO).

With a suite of high-quality gold projects in the Yandal greenstone belt in WA, the miner hoped to raise funds to retest and extend upon historic exploration work.

Yandal Resources managing director Lorry Hughes said the company had received a "fantastic" response from investors to date.

"We expect to have a very big first half of the year next year where we will be looking to conduct major drill programs on our projects," Mr Hughes told *The Australian Mining Review*.

Among the company's four projects included Ironstone Well and Barwidgee gold projects, about 85km south of the Northern Star owned Jundee mine.

Its third project, Mt McClure, contained 20km strike of shear related mineralised trends about 1km south of Echo Resources' Orelia gold deposit, and its fourth project, Gordons Gold, was 16km north of Northern Star's Kanowna Belle gold mine.

"Our strategy is twofold – firstly we have

some fantastic greenfields targets within our tenements, which are underexplored and we want to make a new discovery," Mr Hughes said.

"Secondly, we want to go back to known gold deposits and look to retest them because we know we are going to have the best success there.

"The potential of our projects has attracted interest from strategic investors and this is due to the presence of major gold bearing structures within our project."

Yandal's initial goal would be to fast-track mining, and haul ore to third-party processing plants.

Best ever grade gold for Marmota

AMY BLOM
SOUTH AUSTRALIA

MARMOTA has announced a significant high-grade gold intersection from drilling at its Aurora Tank project, about 50km northeast of WPG Resources' Challenger gold mine in South Australia

Assay results turned up best results of 4 metres at 72 grams per tonne (g/t) gold, 36m from the surface, following reverse circulation (RC) drilling in September.

Marmota chairman Colin Rose said it was the explorer's best ever gold drilling intersection.

"We are delighted with the new numbers from Aurora Tank, particularly as they are from a new zone, located some 200m to the west of the previous best intersection," Mr Rose said.

"It is also very pleasing that we have obtained our best intersection to date from our smallest drill program to date, in number of holes."

The previous best intersection was found on 2 August, turning up results of 4 metres at 40g/t.

Marmota recorded first visible gold at the project back in March, with wider intersections including 10m at 6g/t and 5m at 13g/t.

According to Marmota, the September RC drilling also uncovered a new zone of potential mineralisation about 500m north



Image: Marmota.

Gold drilling was recently completed at Marmota's Aurora Tank project.

of the Goshawk gold deposit, which Marmota would continue investigating.

Marmota was also exploring options

to bring Aurora Tank into production by low-cost open-pit mining, including toll treatment and heap leach methods.

BROONS

Square up your haul roads

www.broons.com > info@broons.com > (08) 8268 1988



Water | Wastewater | Sewage

With over 20 years of experience in the design, manufacture and maintenance of water treatment plants, MAK Water can supply a system exactly tailored to your needs. We offer a wide range of standard and customised water, industrial wastewater and sewage treatment solutions to all industry sectors.

We are experts in:

- Design
- Project Management
- Procurement
- Manufacturing
- Installation
- Commissioning
- Operation
- Service and Maintenance
- Consumables
- Spare Parts
- Equipment Hire

MORE THAN 4,000 SYSTEMS INSTALLED THROUGHOUT AUSTRALIA AND THE WORLD!



The Smart Water People

For expert advice of custom water treatment plants, talk to The Smart Water People makwater.com.au

IN BRIEF

Barminco secures Nova extension

WA

BARMINCO will continue works at Independence Group's Nova nickel mine under a \$240 million four-year contract extension.

The contract included underground mining services such as development and production mining, with the option of a further two-year extension.

Barminco said it would be establishing a technology committee that will aim to drive efficiencies at the mine.

The company has also secured a \$US375 million underground mining services contract at AngloGold Ashanti's Obuasi project in Ghana.

TNG appoints SMS Group

NT

TNG Limited has contracted engineering group SMS Group to begin Front-End-Engineering and Design (FEED) and all other project work for its Mount Peake project in the Northern Territory.

TNG managing director Paul Burton said it was "extremely pleased" to have inked a deal with SMS, including a comprehensive mandate to produce a fixed-price EPC proposal for the development and construction of the entire project.

"Having SMS also assume technical and product guarantees under the resulting fixed-priced EPC arrangement significant de-risks the project," he said.

Thiess awarded FMG work

WA

GLOBAL mining services provider Thiess has won a contract to install autonomous haulage system technology at Fortescue Metals Group's Christmas Creek operations in the Pilbara.

Under the 18-month contract, Thiess will convert a minimum of 65 haul trucks, along with various sub-component installs to allow machinery to autonomously operate at Fortescue's Chichester Hubs.

The work would see the installation of the system onto Fortescue's Komatsu 930E and Caterpillar 789D.

Thiess managing director Douglas Thompson said the company was pleased to continue working with Fortescue to deliver autonomous systems to its mining fleet.

Sedgman picks up \$100m contracts



Image: Sedgman.

ELIZABETH FABRI
NSW/QLD

CIMIC Group subsidiary Sedgman has secured new contracts with Mach Energy and QCoal to operate and maintain their respective Mount Pleasant and Byerwen coal handling and preparation plants (CHPP).

The two contracts included a three-year \$75 million work program at Mount Pleasant in NSW, and \$25 million one-year contract at Byerwen in QLD.

CIMIC Group chief executive Michael Wright said the contracts had a combined value of \$100 million and highlighted the company's strength in end-to-end mineral

processing solutions.

"Sedgman has a strong track record of reliably operating and maintaining CHPPs," he said.

Sedgman managing director Grant Fraser said the company had worked with QCoal since 2007, and had been closely involved throughout all stages of the Byerwen project.

In February this year, Sedgman was awarded \$98 million worth of contracts at Byerwen to undertake two engineering, procurement and construction contracts to deliver a stockpiling and train load-out facility and coal handling and processing plant.

Mr Fraser said the company was now

"pleased to be completing the cycle by operating the plant," with commissioning now underway.

He added the Mount Pleasant site will begin operating at the end of 2018.

"At Mount Pleasant we are building on CIMIC Group's long established partnership with Mach Energy and drawing on our relationship with Thiess, also a member of CIMIC Group, to deliver a seamless service that will maximise the value from the site," Mr Fraser said.

The Hunter Valley mine was in the final stages of construction, with first coal sales from the 600 million tonne resource expected in the coming months.

GR Engineering wins Thunderbird deal

AMY BLOM
WA

SHEFFIELD Resources has awarded a \$366.3 million contract to GR Engineering at its Thunderbird mineral sands operations between Broome and Derby in WA.

Under the contract, GR Engineering will design, procure and construct a 7.5 million tonne per annum mineral processing plant and associated facilities at Thunderbird.

The project was expected to take two years, beginning in the second quarter of 2019, after the wet season.

GR Engineering would also deliver engineering design, procurement, construction, commissioning and testing of all process and non-process infrastructure for the project, including a wet concentrate plant, mineral separation plant, low temperature roasting plant, administration buildings, bore fields and high voltage power distribution, in addition to all civil scope items.

GR Engineering managing director Geoff Jones said the contract represented an important milestone in the development of the world-class Thunderbird project.

"GR Engineering has welcomed the opportunity to contribute towards bringing the project to an advanced pre-execution phase and is now committed to progressing its safe and successful delivery for Sheffield," Mr Jones said.

Sheffield previously engaged GR



Image: Sheffield Resources.

The village at Thunderbird was under construction as part of Sheffield's approved early works.

Engineering as its preferred contractor to progress early works on the project in October 2017.

The miner also secured a \$240 million seven-year loan from Taurus Funds, which would be used to reduce Sheffield's operating costs by at least \$7.5 million every year over a 42-year mine life.

Sheffield managing director Bruce

McFadzean said the agreements were a tremendous result for shareholders as they would substantially de-risk Thunderbird and put the company in a strong position to move into construction.

"Thunderbird has now secured \$335 million of loan facilities to enable the project to proceed, including long tenor infrastructure loans from the Federal Government," Mr McFadzean said.

ENTERPRISE SECURITY ENTERPRISE SOLUTIONS

SECURITY OFFERINGS

- Security Awareness
- Cyber Security Review
- Penetration Testing
- Social Engineering

SOLUTIONS OFFERINGS

- Intranet (SharePoint)
- Data Management (SQL)
- Enterprise Reporting (Power BI)
- E-forms and Workflows
- ... and more

✉ info@ES2.com.au

🌐 www.ES2.com.au



VACS THAT GO WHERE YOU DO.

Conquer a wide variety of jobs from spills and debris to soft excavation with the powerful line of Ditch Witch® truck vacs. When the jobs get tough, the tough get Ditch Witch equipment.

WE'RE IN THIS TOGETHER.



Australia // 1300 ELB EQU

New Zealand // 0800 4ELBNZ

 **Ditch Witch®**
elbquip.com

©2017 The Charles Machine Works, Inc.



IN BRIEF

VR training boost for minerals sector

SOUTH AUSTRALIA

THE University of South Australia will establish a new immersive virtual reality education and outreach program to help attract a new pool of talent into the sector.

The program – Project LIVE-MM (Learning through Immersive Virtual Environments for Minerals and Mining) – will enable students to become a geologist for the day, and gain an insider’s perspective of geoscience in action.

“People will be able to interact with 3D models to achieve a particular goal, progressively unpacking the information provided to make sense of it,” Associate Professor Raimondo said.

“So, it will function like a series of mini games or tasks within the virtual environment.”

Australian Mines enters research partnership

INTERNATIONAL

ASX-listed Australian Mines has launched its second major scandium research partnership, with the Amrita Centre for Research and Development in India.

Under the partnership, Australian Mines will collaborate with the Centre of Excellence in Advanced Materials and Green Technologies, which was assessing the potential of high capacity scandium-magnesium ternary alloys for next generation nickel metal hydride batteries and hydrogen storage applications.

The research followed a partnership entered with UK-based Metalysis earlier this year.

LIT to develop silicon anodes

QLD

LITHIUM Australia has agreed to develop advanced anode materials which have the potential to significantly increase the energy density and performance of lithium-ion batteries.

The company said it planned to establish facilities for the development of graphite/silicon anodes and would make full use of its VSPC plant in Brisbane.

“This new arrangement – the perfect adjunct to our existing cathode technology – will target higher-performance products with a more sustainable production profile,” Lithium Australia managing director Adrian Griffin said.

The first stage of the development program would begin immediately.

‘Game-Changing’ technology



A predictive conveyor monitoring system could remove the need to physically walk along conveyor belts and listen for faults.

AMY BLOM
NATIONAL

A PREDICTIVE conveyor monitoring system for the mining industry, which could effectively pinpoint roller failure in advance from an offsite control centre, is set to be launched early next year.

The system would revolutionise the monitoring of conveyors, which was still most commonly conducted by physically walking along the conveyor, observing and listening to the sound for faults.

Australian research organisation Mining3 developed the conveyor monitoring system in collaboration with its members and through funding by the Australian Coal

Association Research Program (ACARP).

On 2 November, Mining3 announced it had partnered with the Ava Group to deliver the final stages of the system to the Australian market in Q1 2019.

The technology would then be rolled out across international markets towards the second half of 2019.

Mining3 chief executive Paul Lever said the new technology was an industry game changer that would benefit the global mining industry.

“It delivers significant cost savings, productivity gains and safety by reducing the need to physically ‘walk the belt’ to audibly detect faults,” Mr Lever said.

The sensing element of the system was

a fibre optic cable run along the length of a conveyor structure.

Identified acoustic signals from the fibre would be transported back to a sophisticated software program, developed by Mining3 over three years, which would provide a clear visual representation of the state of all the bearings simultaneously.

Maintenance crews could be dispatched against a predetermined maintenance program, which would eradicate the problem of early or late change out of rollers.

The data collected could also be used to optimise maintenance strategies.

While Mining3 researched and developed the technology, the Ava Group was identified as a final stage technical development and marketing partner.

Autonomous drone startup raises \$3.5m

ELIZABETH FABRI
QLD

DRONE technology developed by CSIRO Data61 spinoff Emesent has received a \$3.5 million boost to bring its autonomous prototype, Hovermap, into the mainstream market.

The technology, which draws on 10 years of research by CSIRO’s Robotics and Autonomous Systems group, was designed to automate the collection of data in underground areas that were too dangerous or difficult for people to survey or navigate, including stopes or ore passes.

Emesent’s Hovermap can be integrated with drones to enable them to be deployed in GPS-denied environments without a human controller to create 3D maps, images, videos or record gas readings.

“Hovermap enables the mining industry to safely inspect inaccessible areas of underground mines, while improving the type and quality of data collected to unlock new insights,” Emesent co-founder and chief executive Dr Stefan Hrabar said.

“This includes comparing the stope design to the actual post-blast shape to detect over-break and under-break, identification of geotechnical structures and accurate post-blast volume reconciliations.



The Emesent team.

“The data we gather improves a mine’s productivity and provides a better understanding of conditions underground, all without sending surveyors and miners into potentially hazardous areas.”

Hovermap completed the world’s first autonomous beyond line-of-sight drone flight at an underground mine in WA in 2017.

The technology was already being used commercially by some early adopters in Australia, the US, Japan, China and Canada.

Dr Hrabar said the raising would enable

him to grow the team from seven to 25, and commercialise the product.

CSIRO chief executive Larry Marshall said Emesent was an example of a company that had “hit the innovation sweet spot” combining deep domain experience in mining with digital expertise.

“This has been harnessed by the environment we have created at CSIRO where deep science combines with innovative ideas and agile minds to create game-changing technologies,” Dr Marshall said.

BE AT THE FINGERTIPS OF EVERY MINESITE OPERATOR AUSTRALIA WIDE

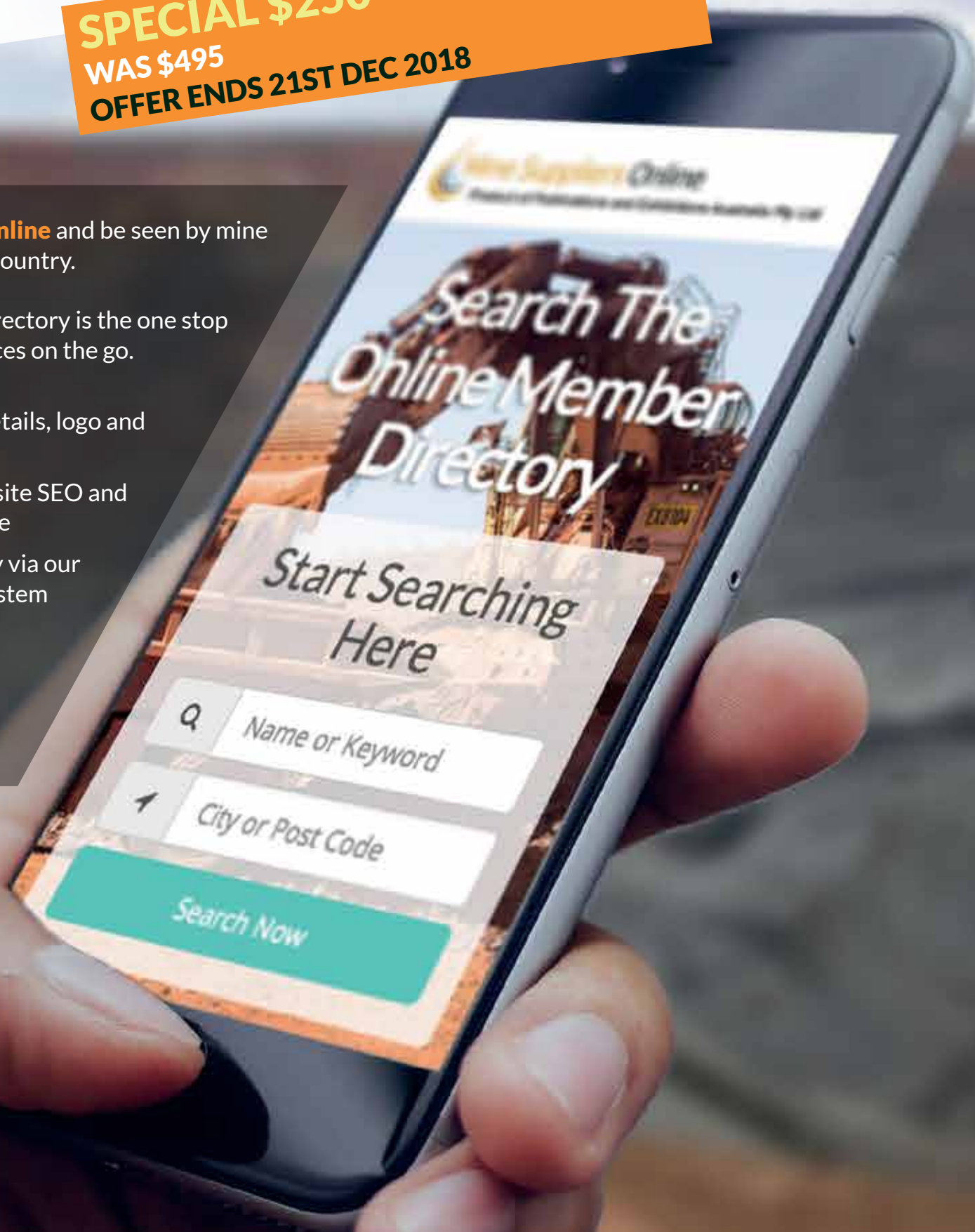
SPECIAL \$250 + GST
WAS \$495
OFFER ENDS 21ST DEC 2018

Join **Mine Suppliers Online** and be seen by mine operators all over the country.

Our comprehensive directory is the one stop when looking for services on the go.

- › List your company details, logo and services
- › Boost your own website SEO and expand your presence
- › Be contacted directly via our instant messaging system
- › Expand your online presence

Get a listing today!



BHP faces multi-billion dollar lawsuit

AMY BLOM
BRAZIL

MINING giant BHP Billiton is facing a £5 billion (\$9 billion) lawsuit over the Samarco Dam failure, after an Anglo-American legal firm launched proceedings on the third anniversary of the disaster, which killed 19 people in Brazil.

SPG Law filed the class action suit in the High Court in Liverpool on 5 November on behalf of 240,000 survivors, including several Brazilian municipalities, the Roman Catholic Archdiocese of Mariana and members of the Krenak indigenous community.

It was one of the largest claims ever filed in a British court.

On 5 November 2015, the Fundão tailings dam burst destroyed the village of Bento Rodrigues, along with 1429ha of riparian forest, and caused catastrophic environmental damage to the Rio Doce river basin.

SPG Law partner Glenn Phillips said BHP Billiton PLC was liable for the damage caused by the disaster because Brazil's laws provided both for strict liability for environmental torts and for parent companies to be liable for the acts and omissions of their subsidiaries.

BHP owned half of Samarco Mineiracao, the dam's operator, with Brazilian company Vale owning the remaining half.

The three companies had already paid out millions to bankroll compensation and remediation programs.

While the miner had not yet released a statement on the suit, BHP chief executive Andrew Mackenzie addressed the Samarco Dam failure and the subsequent repair, restoration and construction programs currently being undertaken by the company at its AGM in Adelaide on 8 November.

"Through 2018 we've made considerable progress on the recovery and redevelopment of the communities and the eco-system that were affected by the dam failure in 2015," Mr Mackenzie said.

"There does remain a significant amount of work to do, but we remain determined as ever to do the right thing."

Mr Mackenzie said all resettlements were expected to be completed by 2020, while Renova, a non-profit organisation established in the wake of the tragedy, had distributed more than 10,000 financial assistance cards.

He said the next 3000ha of a 40,000ha environmental rehabilitation program would be completed in the next calendar year.



Image: BHP.

Doce River at Barra Longa - Minas Gerais has been rebuilt since the dam collapse.

BHP was also facing legal action in Australia on behalf of its shareholders.

In August this year, BHP reportedly agreed to settle a US class action claim

relating to the dam failure.

The miner agreed to pay plaintiffs \$US50 million, though the agreement came with no admission of liability.

FMG signs MOUs with Chinese steel mills

JESSICA CUMMINS
CHINA

FORTESCUE Metals Group (FMG) has signed eight Memoranda of Understanding (MOUs) with major public and private Chinese steel mills at the inaugural China International Import Expo.

The mills included Baowu Steel Group, the largest steel group in China and recipient of FMG's first cargo of ore 10 years ago and its Echeng subsidiary; as well as Hebei Iron and Steel Group, China's second largest steel group.

FMG also planned to sign MOUs with Rizhao Iron & Steel; Minmetals Yingkou Medium Plate Co; Lingyuan Iron and Steel, Baotou Steel (Group) Co; and Anyang Iron and Steel.

FMG chief executive Elizabeth Gaines said the MOUs reaffirmed its commitment to customers and significant market presence in China.

"As the lowest cost supplier of seaborne iron ore into China, Fortescue has enjoyed strong relationships with customers since our first shipment of iron ore a decade ago," Ms Gaines said.

"As the One Belt, One Road initiative continues to grow, the openness and mutual understanding established by our bilateral trade relationships will be critical to its success.

"Australia's significant strategic partnership with China is built on the importance of trade and is a fundamental pillar in our relationships across the Asian region."

Newcrest progresses Chilean project



Image: Newcrest Mining.

The Altazor gold project comprises about 22,900ha of exploration claims 20km south of a paved road that connects northern Chile and Argentina.

JESSICA CUMMINS
CHILE

NEWCREST Mining has entered into the farm-in stage of its agreement with Mirasol Resources' Altazor gold project in Chile.

The two companies first signed an option and farm in agreement in November 2017, which saw Newcrest set to acquire up to 80 per cent of the project by completing a series of exploration and development milestones.

After completing an aggressive exploration program comprising systematic soil sampling,

detailed geological mapping, magnetics and electrical geophysics last year, Newcrest presented an exploration budget totalling \$US3.3 million for this season's exploration program.

Exploration works would be focussed on a maiden drilling program, subject to obtaining applicable permits and permissions.

Mirasol president and chief executive Stephen Nano said the company was pleased Newcrest had exercised the farm-in option for Altazor, which had triggered a \$US500,000 payment to Mirasol.

"The next stage of the earn-in represents

a substantial financial investment from one of the world's largest gold miners to advance exploration at Altazor," Mr Nano said.

"We look forward to the results for the second season's work program, including the planned maiden drill test of some of the key targets defined to date at the project."

Drilling would begin in the second quarter of 2019, once permitting had been completed.

The farm-in followed Newcrest's decision in November to withdraw from a joint venture with Australian explorer Alice Queen over its Mendooran project in NSW.



Embracing innovation
and leading change for the future

*We are optimising our
workforce and
enhancing customer
experiences by driving
digital transformation
throughout our group of
companies.*



Ph 1300 487 837

W linxcc.com.au



linx cargo care group

OLD AGE **VALUES,** NEW AGE **TECHNOLOGIES**

OUR SERVICES

- Field Service and Workshop repairs
- Workshop pre-assembly and installations
- Work teams for small expansion projects
- Thermal Imaging of Rotating components, Electrical components and switchboard, Piping and Valves
- Vibration analysis
- Laser alignment – Shaft, Bore and Geometric
- Non-Destructive Testing (Crack Detection) via Magnetic Particle Testing and Eddy Current Array
- Crusher rebuilds and installs
- Mill Installs and maintenance
- Line boring, Bore welding, Bore facing and alignment



cmitech.com.au

GET IN
TOUCH

Zeb Ogilvie

Managing Director, Australia & Global

☎ +61 407 888 098

✉ zeb.ogilvie@cmitech.com.au

Garry Shipard

Services Manager, West Africa

☎ +61 447 373 592

✉ garry.shipard@cmitech.com.au

Taylor Lockhead (Onsite Machining)

WA Area Manager, Australia

☎ +61 448 844 274

✉ taylor.lockhead@cmitech.com.au



CMI
TECHNICAL SERVICES

ASX-PLAYERS MAKING MOVES

• **BHP (ASX: BHP)** is planning a potential \$2.1 billion expansion of its Olympic Dam mine in South Australia, with a decision expected by 2020. BHP has also earned an 11.2 per cent stake in Solgold, which owns the Cascabel porphyry copper-gold project in Ecuador.

• **Newcrest (ASX: NCM)** produced 25,000t of copper in the September quarter; up 49 per cent on the September 2017 quarter. The miner has recently completed a PFS into an expansion at Cadia, which examines increasing the plant to 33mtpa.

• **OZ Minerals (ASX: OZL)** is in the final stages of the construction phase at its Carrapateena copper project in South Australia, with first concentrate production on track for late 2019.

• **Cassini Resources (ASX: CZI)** has partnered with OZ Minerals to develop its West Musgrave copper-nickel project in WA. In October, OZ Minerals fulfilled requirements to earn a 51 per cent interest in the project, and was currently advancing a PFS.

• **Havilah Resources (ASX: HAV)** continues to implement its *Copper Strategy- Enhanced by Cobalt*. The miner has advanced exploration in the Mutooroo region, and determined a 100 million tonne maiden ore reserve at Kalkaroo, also in South Australia.

• **Hammer Metals (ASX: HMX)** recently purchased two exploration permits that cover the Sunset and Black Rock prospects in QLD. It also has a 75 per cent interest in the Millennium deposit and 51 per cent stake in the emerging Jubilee project.

• **Minotaur Exploration (ASX: MEP)** has begun drilling at its newly acquired Highlands copper project in QLD. Drilling will test strong ground EM anomalism contained within broader VTEM targets, Gospel and Coolibah.

• **Artemis Resources (ASX: ARV)** has made a significant upgrade to the copper and zinc resources at its Whundo mine in the Pilbara, WA.

THE BIG PICTURE

Like many of its base metal peers, copper has had a challenging couple of months with its price plummeting more than 15 per cent in the wake of trade tensions between the US and China. However strong mid to long term demand for the red metal – particularly in the burgeoning electric vehicle market – has analysts optimistic for the year ahead. Will prices recover soon? **Elizabeth Fabri** spoke with KPMG Copper Commodity leader **Maritza Araneda** who shares her outlook.

Q. Describe how copper has been faring and reasons for its volatility in recent months?

Copper prices are sensitive to shifts in the global economic outlook and in times of uncertainty, prices are volatile.

This has certainly been the case over recent months, with the copper price being dragged down by geo-political uncertainty.

The threat of additional US tariffs on Chinese goods has fuelled volatility on Asian stock markets, which has in turn provided an uncertain price outlook for copper.

Copper prices began the year strongly, carrying strong momentum from 2017, which saw prices increase by 30 per cent when compared to 2016.

Fears of supply disruptions due to labour contract negotiations at mines in Chile coupled with a Chinese ban on scrap imports, due to pollution concerns, helped copper prices remain high during the first half of 2018.

Prices reached \$US3.30/lb on renewed optimism about growth in China, the threat of supply disruptions and a weaker US dollar.

However, the second half of 2018 saw prices fall sharply, with significant volatility experienced during this period.

The red metal currently sits at \$US2.80/lb, representing a year to date drop of about 15 per cent.

The volatility has been fuelled by concerns of a trade war between the US and China combined with a stronger US dollar.

Copper, which is a US dollar denominated commodity has become more expensive, which has a direct impact on demand.

This has been the result of US Fed monetary tightening which has strengthened the US dollar.

Q. What's your outlook for copper into 2019?

Current indications are that the US will go ahead with its threat to increase tariffs of Chinese goods in 2019.

This will hurt an already slowing manufacturing sector in the country. China is responsible for nearly half the world's copper consumption and as such, the red metal's prospects hinge largely on steady demand from China.

Notwithstanding a slowing manufacturing sector, reductions in inventories levels at LME warehouses would still point towards robust copper demand in China and a further surge in imports.

While global uncertainty will continue, I still believe that supply and demand fundamentals for the industry remain solid.

I believe the market will end 2018 in a deficit (undersupply) position, meaning that prices should not drop below current price levels of \$US2.80/lb.

My expectation is that copper prices should average \$US3.10/lb in 2019 as the deficit widens.

Q. South Australia has traditionally been the copper State, however has seen slowed growth in exploration and discoveries. Are you confident the State will discover another Olympic Dam-style deposit in the near future?

History would suggest that when copper prices are high and long term market fundamentals are strong, miners will be more aggressive on exploration opportunities.



Image: BHP.

BHP Olympic Dam operation in South Australia.



Over the last 12 months we have seen mining companies pull back on exploration expenditure as the focus has been on expansions or production efficiencies at existing facilities.

This has certainly been the case in South Australia, as evidenced by Olympic Dam and Carrapateena.

Having said that, the South Australian government has put out its intention to triple South Australian copper production by 2030 and will do so by accelerating exploration, discoveries and developing innovative infrastructure, services and research.

All of which are positive steps to assist in incentivising future exploration.

Q. The electric vehicle market is set to be the big driver for copper's growth in the next decade, what other markets are emerging for copper?

In my view the three key markets or growth opportunities in the next decade are: electric vehicle consumption, renewables/power grid investment and infrastructure.

All of which will have China at its core.

In terms of the EV market, copper is a key component of the lithium-ion batteries used in the electric vehicles, as well as power inverters and in the charging infrastructure needed to keep them running.

In fact, EV are estimated to use as much as 30 per cent more copper.

China is the leader in the supply of and demand for EV, followed by the US, which is also expected to be a significant consumer.

The \$4 trillion One Belt One Road initiative is seeking to open channels between China and its neighbours, mostly

through infrastructure investments that will require large quantities of copper.

This drove significant optimism in long term fundamentals.

Thirdly, a significant portion of the copper that is consumed by China is used in its renewables/power sector.

As China and other emerging countries such as India and continue to move to renewables energy systems, demand for copper will continue to surge. Copper usage averages up to five times more in renewable energy systems than in traditional power generation.

Curtin continues to rank amongst the world's best.

Curtin University is ranked second in the world for mineral and mining engineering in the QS World University Rankings by Subject 2018. The results reflect our long-standing reputation for high-quality teaching and research in the mining industry.

curtin.edu.au

BE THE INNOVATOR



Image: BHP

ORE-SOME START

Mining giant BHP is on time and on budget to deliver its multibillion dollar South Flank project, having taken off with a flying start in July.

AMY BLOM

SOUTH Flank has made a rapid start in its first three months of construction, according to project director Simon Thomas.

Speaking at a WA Mining Club lunch in Perth on 25 October, Mr Thomas said BHP already had more than 600 people working on the project, with local contractors such as NRW, Clough, CPB and Decmil mobilised to site.

He said September quarter highlights included an expansion of the Mulla Mulla village facilities comprising 756 operational rooms and central facilities, new mining facilities, expanded infrastructure at Mining Area C process facilities, and the relocation of more than 20 million tonnes of waste from the footprint of the expanded rail loop.

The company has also awarded two large civil and earthworks contracts, and a stockyard machines contract.

BHP conducted the first blast at its South Flank project in September and was advancing construction with the aim of delivering first ore in 2021, followed by a three-year ramp up.

The project, in WA's Pilbara region, had an expected 25-year mine life and would replace the ageing 80 million tonne per annum (mtpa) Yandi mine.

South Flank In Detail

Mr Thomas said the \$US3.6 billion project would be the single largest annual production iron ore mine BHP had ever developed, and the largest iron ore mining



Image: WA Mining Club.

South Flank project director Simon Thomas provided an update to the WA Mining Club in October.

and processing facility built in more than 50 years of iron ore mining in the Pilbara.

"The South Flank deposit itself is huge, it's 26km long, 2km wide and requires significant mining infrastructure and operations," Mr Thomas said.

"For example, it includes two main mining areas, each supported by a 40mtpa primary crusher."

There was also about 23km of overland conveyors, in addition to usual conveyors, coarse ore stockpile, product screening buildings, and a new train load-out facility and rail loop duplication.

The MAC stockyard was set to be expanded, and according to Mr Thomas, the new stockyard machines would be among

the largest in the world.

Mr Thomas said the mine was spread over a large geographical distance with multiple work fronts, however the proximity of the South Flank deposit to the Mining Area C hub would enable BHP to further maximise the existing infrastructure and achieve economies of scale by processing ore through a larger central hub.

"It will create a mining infrastructure hub within reach of several billion tonnes of high-grade iron ore over its 25-year production life," Mr Thomas said.

"This means what we're building for South Flank will be integrated into the existing Mining Area C brownfields operating environment.

"This is where the integrated project team will execute both construction and operational readiness activities and our single team approach will ensure a safe, streamlined integration and handover with reduced risk to schedule."

According to Mr Thomas the 80mtpa project would not just sustain the current level of iron ore production from BHP's Pilbara mines, it would also allow the mining giant to increase the quality of its products by increasing the amount of lump.

Iron ore is crushed and split into lump and fines components, with lump product generally being richer in iron and lower in other minerals.

As an outcome of South Flank, BHP would increase the lump in its product suite from 25 per cent to 35 per cent.

"This will satisfy rising demand of high-grade fines and lump with the structural improvement of steel margins and more stringent environmental standards," Mr Thomas said.

"The shift towards increased demand for higher quality materials driven by successful China steel side reform, positions the South Flank product to be in high demand by our customers."

South Flank was expected to create 2500 jobs during construction and about 600 ongoing operational roles, with more than 9000 people expected to be involved over the life of the project.

The project would also have a strong focus on local contractors, with BHP expecting to award about 85 per cent of the South Flank spend to Australian companies, 90 per cent of which would likely be completed in WA.

(CONTINUED ON PAGE 22)



Industrial Solutions for the mining industry

Wagon unloading stations

With more than 100 years of experience our customers benefit from a unique know-how in the field of bulk materials handling. We offer complete wagon unloading stations from single discharge tipplers to quadruple car dumpers with fully automated side arm chargers. Contact us at sales-is-australia@thyssenkrupp.com

www.thyssenkrupp-industrial-solutions-australia.com

engineering.tomorrow.together.



thyssenkrupp

(CONTINUED FROM PAGE 20)



“The shift towards increased demand for higher quality materials driven by successful China steel side reform, positions the South Flank product to be in high demand by our customers.”

Image: BHP

South Flank mining operation.

BHP has already awarded 177 contracts worth more than \$1.5 billion with \$1.2 billion going to WA-based companies.

BHP reported that as at 30 September South Flank was 15 per cent complete, on schedule and on budget.

South Flank would eventually account for about 28 per cent of BHP's future WA iron ore production and about 8 per cent of its overall EBITDA.

The deposit is about 130km north-west of Newman and about 8km south of BHP's existing Mining Area C operation.

Adapting To Change

Beyond the production and output, Mr Thomas hoped South Flank would set the standard for how BHP develops major projects in the future, as it continued to adapt to the changing mining landscape.

Changes included a simplified portfolio with a focus on owning and operating large, long-life, low cost, expandable upstream assets diversified by commodity, geography and market.

As part of the move to simplify its investments, BHP announced the \$US10.8 billion sale of its shale assets in July.

Mr Thomas said South Flank was a sustaining opportunity for BHP that ticked all the boxes.

“With BHP operating different, and operating in different markets, the way we approach major project investment must also be different,” Mr Thomas said.

“We've changed our model at BHP for Western Australian iron ore major projects.

“What we're doing with South Flank is all about bringing that operating model to life and setting us up for the future of projects.”

Mr Thomas said at the heart of the operating model was a collaborative environment with its contracting partners, free of the traditional layers of management that had previously existed



Image: BHP

BHP conducted the first blast at its South Flank project in September.

on past projects.

The approach to recruitment and employment at South Flank would also stand as a point of difference, with a greater focus on a more representative and diverse workforce by offering greater flexibility and redesigning work to allow for more entry level pathways.

On 25 October, BHP announced it had already achieved a 35 per cent female workforce on the front line of the projects.

According to Mr Thomas there had also been a greater focus on technology and the move to automation.

“We see South Flank as an opportunity to build on our strategic investment in technology to drive further improvements across our mining value chain,” Mr Thomas said.

“And as we move to highly automated operations across the Pilbara, we have an opportunity to more fully integrate our

supply chain from resource to market.

“We want to build on our success and drive automation further back, into our drill and blast, and load and haul operations, bringing the safety and productivity benefits we've seen across our fixed plant.

“We see South Flank as an opportunity to advance our efforts to become a fully integrated and highly automated business by 2025.”

The Bigger Picture

When completed, South Flank will join BHP's Eastern Ridge, Whaleback, Mining Area C and Jimblebar mines, which form its Western Australian Iron Ore (WAIO) system, along with Yandi.

Yandi was expected to ramp down in the mid-2020s, in line with South Flank's ramp up.

WAIO also consisted of four processing hubs, Newman, Yandi, Mining Area C and Jimblebar.

BHP reported strong numbers in its September quarter operational review, with total iron ore production increasing by 10 per cent to 61 million tonnes (mt) or 69mt on a 100 per cent basis.

Guidance for FY19 remained unchanged, standing between 241mt and 250mt, or between 273mt and 283mt on a 100 per cent basis.

At WAIO, increased volumes were supported by record production at Jimblebar and improved reliability across BHP's rail network and port operations.

At its AGM in London on 17 October, BHP chairman Ken MacKenzie signalled the company would remain cautious in the face of market volatility and predicted price declines, though he confirmed the company had so far been unscathed by global uncertainties.

“We all know success is never assured; we work in an uncertain world and that's why it's important BHP is well-positioned to weather any challenge,” Mr MacKenzie said.

“We closely monitor the external environment, in particular, the market volatility triggered by current global trade tensions.

“While we haven't seen a material impact on our business, we remain cautious in the near term.”

According to the Department of Industry, Innovation and Science, the iron ore price was forecast to decline to \$US51 a tonne in 2020 as a result of an expected decline in steel production in China and a well-supplied seaborne iron ore market.

Meanwhile, Mr Thomas poured water on local fears of a looming skills shortage that could hurt new projects such as South Flank, saying BHP had already taken the potential challenge into account and that it had not surfaced as much as the company may have feared initially.

RELIABLE ENERGY FOR MINING

Power that Goes Above and Beyond — Even Underground



GNB® Industrial Power - a division of Exide Technologies serves the efficient energy storage systems for both Motive Power and Network Power customers. Network Power installations include standby power for electric utilities; telecommunications systems; alarm/security systems; renewable energy systems; railway systems; uninterruptible power supply (UPS). A safe and solid uninterruptible power supply is the key component in mining as it is one of the most challenging work environments. The well-known Sonnenschein, Marathon and Absolyte batteries from GNB® Industrial Power ensure a reliable and optimized energy supply for your application.

Direct e-mail: jo.volpe@exide.com
Phone Inquiries: 08 6188 8005

www.gnb.com





More information can be found at www.thyssenkrupp-industrial-solutions-australia.com or by emailing: sales-is-australia@thyssenkrupp.com.

thyssenkrupp technology increases efficiency

NATIONAL

THE coal terminal at the port of Caofeidian is a major hub for supplying power plants in the south of China.

Coal from the mines in the north of the country has been brought by train to the port for onward shipping.

In the past few years thyssenkrupp has supplied Caofeidian with eight ship loaders and two quadruple rail car dumper stations for speedy unloading.

Each of these two new dumper stations can unload four 80-tonne capacity coal cars at a time.

The four cars were positioned in the dumper so that they rotate around their coupling axis and at the same time discharge their loads into the silo below.

The positioning of the full train and emptying of the next four cars has been controlled by a positioner (indexer) to ensure fast and reliable unloading.

The positioner travels parallel to the track and indexes the entire train.

The car couplers themselves were rotary couplers, so it was not necessary to uncouple the cars from the train.

The positioner pushes the entire train with a total of 204 cars and four locomotives; the locomotives are not required to move or slow down the train at any point in the unloading process.

As soon as all the cars have passed through the dumper and discharged their contents, the locomotives take over again to move the emptied train out of the port.

In this way a quadruple dumper was

capable of handling 8640 tonnes of coal per hour, which means an entire train can be unloaded in just two hours.

Each of the dumper stations was fitted with a dust collector, fresh air ventilation, and a water sprayer for dust control.

Vibrators on the dumper barrel ensure all coal residues are removed from the cars.

Camera systems have been installed to allow monitoring of the entire unloading process.



More information can be found at www.whittensgroup.com.au.

Leaders in construction and maintenance

NATIONAL

AS a specialist construction and services contractor, Whittens has 15 years of experience in delivering end-to-end construction and life cycle services to the mining, infrastructure, oil and gas, and defence sectors across every stage of construction and maintenance projects.

Whittens has been involved in some of

Australia's largest resources projects in regional and remote areas of Australia.

Projects included BHP WAIO operations, the Sino iron ore project, Ichthys LNG project, Pilgangoora lithium-tantalum mine, GEMCO, Gorgon LNG project, Caval Ridge, Dugald River mine, Mount Pleasant operation, Roy Hill, and the recent Carrapateena project.

Whittens offer a complete package of

skills and resources in delivering minor projects and maintenance capabilities in civil, structural, electrical and water management, delivered safely, and with quality workmanship.

Whittens' technical expertise and understanding of the industry, together with its resource management capability and team of multidisciplinary experts, provides clients with a reliable, one stop shop contracting force, with the capacity

to carry out all maintenance needs.

Whittens' national team offers mobility and flexibility, delivering responsive turnkey solutions focussed on driving results for clients.

With a comprehensive suite of services, Whittens offers fully integrated, cost-effective, low-risk solutions that are tailored to suit each client's specific operational requirements.

WHITTENS

A RELIABLE, "ONE STOP SHOP" CONTRACTING FORCE TO DELIVER YOUR MAINTENANCE NEEDS



WHITTENS SERVICE OFFERING INCLUDES:

- Bulk and detailed earthworks, drainage and road construction
- Civil concrete construction, including complex and high-volume concrete works
- Water management services including HDPE pipelines, dam construction and maintenance, trenching, firebreaks and vegetation clearing
- Structural, mechanical, and piping services
- Electrical, plumbing and building refurbishment and general maintenance
- Non process infrastructure and maintenance services, including shutdowns
- Civil and structural remedial and ancillary works

Investigations continue into Pilbara derailment

AMY BLOM
WA

INVESTIGATIONS are continuing into what caused a BHP iron ore train to travel more than 90km without a driver, before being deliberately derailed in WA's Pilbara region.

The incident happened in the morning of 5 November, when the fully loaded train, spanning four locomotives and 258 wagons continued moving, after the driver left the train to inspect an ore car.

According to a BHP spokeswoman, the train was intentionally derailed near Turner.

It had been travelling from Newman to Port Hedland.

Dramatic images of the mangled wreckage emerged later that day.

About 1.5km of track was also destroyed.

The BHP spokeswoman said no one had been injured as a result of the runaway train, and operations restarted on 10 November.

"The wreckage from the site was cleared from the tracks on Friday and track repair is progressing well," the spokeswoman said.

"Rail operations recommenced last night with additional controls in place to ensure safe operations."

BHP put in place controls ahead of the rail operations recommencement to ensure operations would be safe, however the miner did not elaborate on what those controls were.

The mining giant would also not be



Image: Aussie Write offs.

Footage posted on social media revealed the extent of the damage to the runaway train after it was deliberately derailed.

drawn on the cost or possible cause of the incident while it was under investigation by the Australian Transport Safety Authority.

However, during its AGM on 8 November, BHP chief executive Andrew Mackenzie said the company would still

fulfil its contracts to supply iron ore.

Coincidentally, a second iron ore train was derailed in WA within a week of the BHP incident.

On 11 November, about 30 empty Mineral Resources iron ore wagons derailed south of Norseman while travelling

from Esperance to its Koolyanobbing Operations, 50km north of Southern Cross.

Mineral Resources managing director Chris Ellison said initial investigations suggested the derailment was caused by heavy rainfall and flash flooding the day before washing away a section of the track.



Mentis

AUSTRALIA



Mentis Australia fabricates steel products, specialising in grating and handrail for the mining industry, since 2000 in WA. Mentis is a Global leader in this industry, established in 1950 the South African plant is still in operation. Recently Mentis acquired Rhino Grating in Brisbane, Sydney, Melbourne and New Zealand.

Mentis Australia has built a strong reputation based on Quality, Service and Innovation through partnering our clients of all sizes and on many projects. Over the past 18 years Mentis has supplied projects for BHP, Rio Tinto, FMG, Roy Hill, Newmont Mining and the WA Government Perth Children's Hospital just to name a few.

OUR MOST RECENT PROJECTS INCLUDE:

- MSP Tianqi Lithium Hydroxide Processing Plant in Kwinana for Pacific Industrial Company.
- 10,132 metres of Handrail fabrication including surface treatment.
- 4,686 sqm of Grating fabrication including surface treatment.
- 1,867 each of fabricated stair treads including surface treatment.
- MSP Talison Lithium CGP2 expansion project in Greenbushes for RCR Resources.
- 4,635 metres of Handrail fabrication including surface treatment.
- 3,917 sqm of Grating fabrication including surface treatment.
- 1,124 each of fabricated stair treads including surface treatment.

08 9434 1961 | sales@mentis.com.au | mentis.com.au



MACA is an integrated services contractor specialising in:

- Mining
- Crushing
- Civil Construction
- Infrastructure Maintenance
- Mineral Processing

We are a team of over 1,600 dedicated and highly skilled people across our Australian and International operations. The way we do things is underpinned by our **CAN DO** spirit.

MACA.NET.AU

CanDo



GFWA is a specialist contractor for geotechnical and civil engineering activities providing a comprehensive range of geotechnical solutions for application throughout Australia. The expertise of GFWA in deep foundations and all grouting techniques are as follows:



- Diaphragm walls • Large diameter bored piles • CFA Piles • Micropiles
- Ground Anchors and Soil Nails • Slurry cut-off walls • Permeation and Jet Grouting

**Build
on us**

113 Radium St, Welshpool WA 6106
(08) 9251 1050
gfw@gfw.com.au

GFWA
A SUBSIDIARY OF SOLETANCHE FREYSSINET

Image: GFG Alliance.
Photography: Sean Kelly.

BLAZE A TRAIL

It's been another big year for British billionaire Sanjeev Gupta and his global powerhouse GFG Alliance, with expansions in Australia, the US and Europe cementing the company as a leader in steel manufacturing and renewables. Moving into 2019, the company's Australian division will accelerate further with an ASX listing on the cards, and plans underway to develop an electric vehicle manufacturing hub.

ELIZABETH FABRI

THREE years ago GFG Alliance executive chairman Sanjeev Gupta made headlines for his rescue and revival of a number of distressed metals, mining, engineering and power generation operations in the UK.

The acquisitions came at a time when the UK had largely lost faith in its struggling steel industry in the midst of high energy prices, weak global demand and oversupply from China.

Many were of the view the UK's steel industry was beyond repair but Mr Gupta had bigger plans.

His hallmark GREENSTEEL vision – designed to secure a competitive, low-carbon future for metal manufacture through recycling, use of renewable energy and vertical integration – not only saved thousands of jobs, it also would quadruple the UK's steel-making capacity over the next five years to 5 million tonnes per annum (mtpa) from 1.1mtpa.

The terms “steel tycoon”, “saviour of steel” and “man of steel” were all used to describe Mr Gupta's successes, with a number of industry accolades to boot.

And while his attention was publically directed towards the UK and US at the time, GFG's executive chairman also had eyes on the Australian market.

“Australia had actually been on the radar for a long time,” Mr Gupta told *The Australian Mining Review*.

It wasn't until the Arrium deal was on the table that GFG made its grand entrance into the country.

Arrium – which had been in the hands of administrators for about a year – had struggled to maintain a profitable business with debts of \$4 billion.

In August 2017, the Group – comprising industrial and metals business Liberty, shipping infrastructure, mining, energy and commodities business SIMEC, financial services group Wylands, and property



“It's game changing – it launched us into the mainstream in Australia, and now leads into multi-billion-dollar, once-in-a-generation investments.”

GFG Alliance executive chairman Sanjeev Gupta.

business Jahama – announced Liberty would buy the troubled mining assets for an estimated \$700 million.

Under the deal, the newly formed Liberty OneSteel would make a further \$1 billion commitment to upgrade the Whyalla steelworks in South Australia; outdoing a Korean consortium that also made an offer.

The landmark acquisition mirrored the deals Mr Gupta had made in the UK with all the essential elements; a distressed seller, a tired industrial asset and room to grow.

Under the deal, GFG Alliance inherited the 1.2mtpa Whyalla steelworks and its 10mtpa iron ore mining operations in South Australia's Middleback Ranges; Whyalla port and rail; the OneSteel steel

Scrap Recycling business; 4mtpa OneSteel secondary steelworks; Australian Tube Mills; and OneSteel Reinforcing, ARC and OneSteel metal centres.

At the time, GFG Alliance was less well-known by the Australian resources and business community, however was welcomed with open arms.

Mr Gupta was again labelled a “saviour”; this time of Whyalla's struggling steel industry, where hundreds of jobs were on the line.

“We saw the Arrium assets as a perfect fit and therefore the perfect opportunity to invest in Australia,” Mr Gupta said.

He added the months leading up to the acquisition were an “emotional

rollercoaster”.

“But it's also when I fell in love with Australia, so it was clearly worthwhile,” he said.

“It's game changing – it launched us into the mainstream in Australia, and now leads into multi-billion-dollar, once-in-a-generation investments.”

Mr Gupta said he and his family had been based in Sydney since he acquired the Australian assets last year.

“My intention has always been to stay for two years until the business was well established, so we are planning on going back to the UK in July-August,” he said.

(CONTINUED OVER)



(CONTINUED FROM PAGE 27)

GFG Alliance has made a wave of investments in the Whyalla region since 2017.

Spending Big

Since the acquisition, Mr Gupta's GFG Alliance has amassed a huge portfolio in Australia comprising the Arrium assets, and the former Glencore-owned Tahmoor coking coal mine in NSW, which would de-risk an important feed for the Whyalla steelworks.

GFG had also purchased a majority stake in battery storage and solar power company ZEN Energy, which marked its entrance into the Australian renewable space and subsequent project commitments in solar and pumped hydro, as well as plans to build

the world's largest battery storage facility in Port Augusta.

In February, GFG Alliance's SIMEC ZEN Energy committed \$1.7 million towards pre-feasibility studies for its Middleback Pumped Hydro project.

Middleback would be a key plank in the Group's plan to establish 1 Gigawatt of additional dispatchable renewable energy generation in South Australia for the Whyalla steelworks and other industrial and commercial users.

In August, SIMEC ZEN Energy announced it would build a large 280

megawatt (MW) solar plant in South Australia next year that would generate 600 gigawatt hours of power per year.

On top of its Australian investments, European acquisitions in recent months had also put the company on the map further.

In January, GFG Alliance announced it would pay \$US500 million for Rio Tinto's Aluminium Dunkerque smelter; the group's first significant step into continental Europe.

In May, GFG's Liberty Engineering business also picked up AR Industries (ARI); the last remaining French manufacturer of

aluminium wheels.

Then the big one; GFG's Liberty's announcement it would buy ArcelorMittal's major integrated steel works at Galati in Romania and Ostrava in the Czech Republic, along with rolling mills at Skopje in Macedonia and Piombino in Italy.

The deal, once approved, would double GFG's Liberty global metal manufacturing capacity.

Over in the US, GFG had also recently restarted operations at the Georgetown steelworks in South Carolina, which had been out of action for almost three years.



Gadaleta
GSF
Steel Fabrication



Gadaleta Steel Fabrication has been providing solutions for energy producers, transport, construction, mining and minerals processing clients for 20 years. As an industry Leader and one of Australia's most highly regarded Steel Fabricators, we provide guaranteed solutions for building anything in steel.



PREMIER STEEL
FABRICATION



- Steel Fabrication
- Cranage and Rigging
- Scaffolding
- Dump Truck Tray Rebuilds
- On Site Maintenance, Installation and Plant Removal
- Pre-assembly of large modules

We cater for any job size, large or small.

Plant includes: Computer cutting, Large Roller and Press.

Offsite fabrication includes: Structural steel, pipe work, ductwork, access platforms, machine guarding and vessels of all shapes and sizes.



Transforming Whyalla

Mr Gupta has made it no secret that his core business strategy is to own and manage as much of the supply chain as possible – adding value at each stage.

His swift and clever business decisions saw him take home the ‘21st Century Icon’ prize at the ELITE London Stock Exchange Group awards in London during September.

“This is a great honour for all of us in the worldwide GFG family and I’m thrilled for us to be recognised in a program that specifically sets out to inspire future

generations,” he said.

Mr Gupta said his central focus in the coming years was to transform the Whyalla operations, which would see an investment of more than \$2 billion.

“This transformation will include increasing the production of our primary steel operations to 2 million tonnes and beyond; increasing our product capability by introducing new products; establishing an overseas customer base for export steel products; increasing our iron ore reserves; and further unlocking our large-scale magnetite potential,” he said.

“It also involves exploring

opportunities to develop the Whyalla Port into a world-scale, multi-user facility; establishing ~1GW of renewable energy generation and storage; all while exploring other opportunities such as copper, banking and electric vehicles.”

In Australia, GFG’s mining and port operations were operated under GFG’s SIMEC Mining and SIMEC Infrastructure business, while the steelworks and OneSteel assets were operated under the umbrella of Liberty OneSteel.

SIMEC Mining’s projects included the Iron Baron, Iron Knob and South Middleback Ranges mines, which produced hematite

and magnetite iron ore that was respectively railed and piped to Whyalla.

This year, SIMEC also received approval for two mining leases to develop the Iron Sultan mine, which would provide 600,000 tonnes of ‘cheap’ iron ore to the steelworks, and the Iron Warrior mine, capable of exporting up to 1.5mtpa.

“Warrior is already in production, while the Sultan timing will be dependent upon upcoming decisions relating to the Whyalla Steelworks Transformation Project,” Mr Gupta said.

(CONTINUED ON PAGE 31)



Tahmoor coal employees celebrating at the launch of its operations under GFG ownership.

Electrical quality

NATIONAL

AQUEST Electrical is a leading electrical contractor with more than 30 years of electrical experience.

Having successfully delivered technical solutions to clients throughout regional and remote Australia, the business is highly skilled at operating in the energy, heavy industry, mining, construction, major outage and maintenance markets.

Aquest's team has demonstrated experience in, quality, scheduling, risk management systems and safety on every project with the proven ability to successfully provide repairs and maintenance services across a broad range of operating environments and multi-disciplines projects.

The company offers workshop and site-based delivery, project management, inspection, testing, fabrication and installation services.

Additional services include telecommunications, VSD installation, power quality analysis, automation and control, as well as refrigeration and air conditioning installation and maintenance and a 24/7 emergency response service.

Aquest has shown the ability to work safely and collaboratively alongside its clients and other contractors on remote



More information can be found at www.aquest.com.au.

brownfield sites on many occasions.

Currently, Aquest are participating in the delivery of several projects including the installation of a Danieli Inline measurement system, E&S roller straightener, and coke ovens hot car upgrades to improve the quality and output for GFG Liberty OneSteel.

While working on projects, Aquest also continues to provide constant support to GFG's SIMEC mining operations around the clock.

The business has recently completed the installation of an algae harvester and processing plant for BASF, along with the upgrade of capstan winches and

cathodic protection for the Department of Planning, Transport and Infrastructure located on the Port Bonython jetty.

Aquest look forward to strengthening and growing its presence within the industry, recognising that its employees are the backbone of Aquest's success.

QUALITY DELIVERED MINING | ENERGY | HEAVY INDUSTRY

10+ years of quality delivered technical electrical, communication and refrigeration solutions to clients across the mining, energy, and heavy industry sectors throughout regional and remote Australia.



WHAT WE OFFER

- Shutdown/Outage planning and Project Management
- Electrical Construction
- Technical fault finding and diagnostic
- Preventative, predictive and routine maintenance
- Inspection, testing and reporting
- Specialised communication system installation, repair and maintenance, CCTV for Process Monitoring
- Remote location maintenance crews
- Relief plant operator maintainers
- Heavy Duty Air-conditioning Solutions

WHAT WE DO

- Mobile and fixed plant repair, refurbishment and maintenance
- Thermography inspections and preventative maintenance reports
- Hazardous area installation and maintenance & Certification.
- HV Installation, Terminations & Switching
- Mobile and fixed operation power installation and maintenance
- Communications, data and telecommunications including fibre
- Mobile, fixed and base station radio programming, repair and installation
- Energy saving solutions
- Power quality analysis
- Off grid power solutions

AQUEST
ELECTRICAL

www.aquest.com.au
service@aquest.com.au
p: 08 8644 2244



(CONTINUED FROM PAGE 29)
GFG Alliance purchased Glencore's Tahmoor coal mine in April.

SIMEC was also completing due diligence into the commercial potential of Havilah Resources' Grants and Maldorky projects in South Australia, which were conveniently positioned near GFG's Whyalla operations.

Mr Gupta said "It's still too early to speculate" on the outcome of the due diligence, however earlier this year Havilah Resources' chief executive Walter Richards said SIMEC could potentially be "the perfect partner" for its iron ore assets.

The next phase of Sanjeev's Whyalla expansion was a listing on the Australian Securities Exchange (ASX).

GFG Alliances' initial plan was to list on the New York Stock Exchange, but given

recent movements in South Australia, it had a change of plans.

"We're currently planning to list Liberty Steel Australia on the ASX for now, with a target of either May or November next year," Mr Gupta said.

It is understood GFG will consider listing all divisions, with no plans for an entire group listing.

Going Electric

In parallel, Mr Gupta was also in the planning stages of establishing an electric vehicle manufacturing hub in Australia.

In February, rumours circled that the

group had approached General Motors to buy assets from the closed former Holden factory; a proposal that was reportedly rejected by the car giant.

Mr Gupta said the company still remained "100 per cent committed to electric vehicles in Australia."

"As far as a location, we are still open to options," he said.

It is understood the hub would be built within the next two to three years, and would manufacture a modern lightweight electric 'people's car', inspired by Formula One racing, which would cost much less than the Tesla S model.

The operations would be small-scale

producing about 30,000 units annually.

In light of GFG's vertical integration model, Mr Gupta said the group was open to diversification into other minerals that were key ingredients in the electric vehicle manufacturing process.

"We are currently working on and investigating copper opportunities, including the possibility of a copper smelter at our Whyalla operations," he said.

Mr Gupta said the business was also open to other acquisitions and opportunities across its divisions.

"Australia is a key focus for this type of activity, both organically and inorganically," he said.



ELECTRICAL CONSTRUCTION, SHUTDOWN AND MAINTENANCE SERVICES



ICE Engineering and Construction is a remote area electrical and instrumentation construction company that specialises in the development of Greenfields and Brownfields oil and gas and mining operations across Australia.

With more than 2,500,000 hours LTI free working in remote sites, we know how to get the job done safely.

Our core skills include:

- Turnkey Multi disciplined Project delivery
- E&I Construct and Maintain
- Labour Hire -Backfill & Shutdowns
- Installation, termination and testing of LV and HV power and distribution equipment
- Calibration and installation of field instruments
- Installation of switch rooms and general lighting and power equipment
- Hazardous area accredited
- TRIFR = 0.0
- Part of the local community since 2001



Adelaide — Head office
Level 1, 33 Richmond Rd.
Keswick, SA, 5035
P: 08 8159 9547

Whyalla — Branch
14-16 Keith St.
Whyalla Playford, SA, 5608
P: 08 8644 2333

Moomba — Cooper Basin Branch
Contractors Yard
Moomba, SA, 5343
P: 08 8678 4399 M: 0408 423 364

Roxby Downs — Northern Areas Branch
Lot 718, Olympic Way
Roxby Downs, SA, 5725
M1: 0438 739 932 M2: 0447 666 087

iceengineering.net.au

REACHING MILESTONES

Millennium Minerals chief executive Peter Cash speaks with *The Australian Mining Review* about reaching its 100,000 ounce per annum run rate and what else lies on the horizon.

All images: Millennium Minerals.

JESSICA CUMMINS

MILLENNIUM Minerals' flagship Nullagine gold project in the heart of the Pilbara comprises six mining centres along a 40km corridor.

Hosting a total resource base of 1.1 million ounces of gold in the underexplored Mosquito Creek Belt, the project has produced 400,000oz since operations commenced in 2012.

Gold production has averaged at between 75,000 and 80,000 ounces per year within the 264km mining tenements.

During the September quarter the company reached its 100,000ozpa run-rate target at Nullagine three months ahead of schedule.

Millennium Minerals chief executive Peter Cash said while the company felt enormous pressure to demonstrate its growth initiatives would deliver in the long run, reaching this goal was a massive milestone for the company.

"It has been a key element of our growth strategy for the past 12 months," Mr Cash said.

"Putting all the necessary foundations in place to achieve this goal – the exploration programs, the capital development initiatives, and the sulphide expansion study – meant that we had to navigate some pretty tough periods where our gold production was relatively low and our operating costs were high.

"We remained really focussed – we were confident that once we had the right foundations in place we would be much better positioned to deliver stronger, more reliable and lower cost gold production.

"And that work really paid off – our growth initiatives combined to deliver improved head grade, stronger mining rates and significantly increased mill throughput during the September quarter.

"There was an enormous sense of excitement and relief amongst the team when we clicked over the 100,000ozpa run rate, and the excitement continued to build as we became more and more certain that we were operating at a sustainable level and we could maintain 100,000ozpa well into the future."

Exploration & Growth

The company's exploration strategy has remained focussed on multiple deposits at Nullagine, including the Golden Gate and Five Mile mining centres to progress the project's mine life.

Mr Cash said its recent discovery at Golden Eagle South was an exciting development that could be a "genuine game-changer" for the company.

"It was the result of a major new review we've commenced into all the historical exploration datasets that we've collected at Nullagine – including spectral, magnetic, surface geochemistry and radiometric survey data – and specifically looking for areas where two or more datasets converge to show potential anomalism," he said.

"When we commenced this review, Golden Eagle South West was one of the first such areas we identified – with 3D magnetic inversion, structural analysis and soil geochemistry data all indicating compelling exploration potential.

"It was a greenfields target with no previous exploration conducted so it represented our first real test to see whether our new exploration targeting program had merit."

Mr Cash said while the first drill hole returned a low grade of 12m at 0.87 grams per tonne (g/t) gold, there was proof gold mineralisation was in the area.

"We then drilled a second hole 80m to the north-east that intersected two significant zones of high-grade gold mineralisation, the first returning 1m at 34.00g/t gold and the second returning 5m at 17.86g/t gold, including 2m at 42.35g/t gold," he said.

Once Millennium confirmed the presence of high-grade gold within the region, Mr Cash said the company prioritised the region for further follow up work starting with gravity surveys.

"Now that we also have confirmation that our data review can successfully deliver new exploration targets, we're actively interrogating this data for additional opportunities," he said.

The company's extensive exploration program also targeted the potential for

new discoveries at depth given the limited drilling below the shallow deposits, including Bartons, Hope Town, All Nations, Junction, Little Wonder, Central and Round Hill.

Bartons has paved the way for the first underground mine at Nullagine with first ore expected to be delivered to the processing plant in December.

The company has now replicated the same process at Bartons to Shearers and Golden Gate with the potential of future underground mining.

Room For Potential

Within the far north-eastern corner of the miners landholding at Nullagine was Millennium's Golden Gate mining centre, which was being assessed as its second potential underground development after Bartons.

Mr Cash said it contained three separate gold deposits – ABC Reef, D Reef, and Harrier.

"To complete this assessment we're currently undertaking mining studies and calculating a maiden ore reserve to determine the economic and technical merits of the proposed mine development," he said.

"We expect these assessments will be completed towards the end of 2018, which will enable us to make a decision on whether to proceed with the mine development in early 2019."

To date, the company has conducted deep drilling below four of Nullagine's 30 known gold deposits with positive results.

"We believe there is really strong potential for deeper gold mineralisation to be discovered at Nullagine, we just need to get the drilling done," he said.

"Obviously it's hard to tell exactly where the 'next big thing' will be found, but deep drilling is certainly a core component of our exploration strategy going forward and we believe it will be an important source of new discoveries in the region."

Sulphide Resources Expansion Plan

In April, the company announced its plan to expand the Nullagine gold project to process

the sulphide mineral resource at a cost of \$15 million.

Previously, the company had never had the ability to extract gold from the ore through its existing carbon-in-Leach processing plant.

"As part of our efforts to increase our production profile and extend the mine life at Nullagine, we commenced studies on how we could capitalise on this large sulphide mineral resource inventory," Mr Cash said.

"Our initial studies were based on a plant configuration comprising an integrated carbon-in-leach and flotation circuit.

"However in February this year we delivered a major breakthrough, with studies indicating we could deliver a much more cost-effective solution by simply adding a small modular concentrating circuit to the tail-end of the existing CIL plant."

He said preliminary financial estimates indicated the new processing option had the potential to substantially reduce the \$40-\$46 million projected capital cost of the original flotation circuit pathway to now be in the order of \$15 million.

"We've now commenced ordering key items to complete the processing plant upgrade with the planned commencement of construction in December 2018 and commissioning targeted to commence late Q1 2019.

"The ability to process sulphide ore also opens up new exploration opportunities for Millennium, with a number of very compelling historical sulphide intercepts never previously followed-up due to the lack of a processing option."

Moving Forward

Now that Millennium has achieved its 100,000ozpa run rate, Mr Cash said the next component of its growth strategy was aimed at expanding its mine life to more than five years.

"Based on our existing ore reserves we have a current mine life of around three years, so over the coming 12 months we will be focussed on completing the sulphide plant expansion and continuing our exploration program to deliver new discoveries," he said.

"I am very hopeful that by the end of next year we will be well on the way to achieving our five year mine life."

On the fast track with Ausenco



Ausenco was able to take Millennium's concept for its Nullagine sulphide expansion project and turn it into reality.

WA

MILLENNIUM Minerals' Nullagine sulphide expansion project is being successfully fast-tracked thanks to Ausenco's flexibility and project management expertise.

The project, which involved the expansion of the processing plant at Millennium's Nullagine gold operations about 185km north of Newman in WA, is now in construction with commissioning on schedule for Q1 2019.

Millennium had approached the engineering, construction and project management company with a concept, having wanted to boost production and lower costs.

Ausenco Manager, Studies APAC-Africa Scott Brindley said the company was able to take that concept and put it into reality, while supporting Millennium through a fast tracked design and build.

"We used our years of engineering experience to take Millennium's concept flowsheet and turn it into a well-structured

and costed design, which we are currently implementing," Mr Brindley said.

Ausenco has continued to be well-recognised for its process capability, as well as its experience and expertise in designing and building efficient process plants.

As part of its work with Millennium, Ausenco is undertaking engineering procurement and construction management, which included evaluating options for the processing plant, followed by conceptual studies and then a detailed

design of the preferred option.

Like previous projects, its design and engineering was fit for purpose, with no unnecessary engineering or costs.

Because Ausenco is able to fast track the design and build, it provides savings and efficiencies and will enable the commissioning of the project well before the industry norm.

Ausenco has developed a strong and ongoing relationship with Millennium and looked forward to the two companies working together in the future.

Ausenco

Challenging what's possible

We fast track projects to drive rapid realisation of value

- Ausenco's unique approach to design, engineering and development results in:
- Lower capital and operating costs
 - Reduced construction time
 - A more efficient plant and
 - Optimum metal recovery.

www.ausenco.com

All Images: Westgold Resources.

GOLDEN OPPORTUNITIES

Westgold has remained undeterred by lower than expected production and higher costs, instead looking to big opportunities still on the horizon.

AMY BLOM

DESPITE suffering some setbacks, Westgold Resources was on the way to achieving its goal of becoming a long-life gold producer, having confirmed Big Bell underground was on track for first production before the end of 2018.

According to Westgold's September quarter report, Big Bell had advanced significantly towards production with drilling defining a new ore position to the south, which would enable modest, but early production from the mine in the December quarter.

In its annual report released on 26 October, Westgold chair Peter Newman said Big Bell would continue to be the gold miner's major initiative going forward.

"This will become our trophy mine, a mine that will add a further 100,000 ounces per annum to our profile with a life of more than 10 years," Mr Newman said.

Big Bell, 24km north-west of Cue in WA, was owned and operated by Harmony Gold when it closed in June 2003 after gold prices plummeted to \$500 per ounce.

Westgold eventually took over the historic mine in 2011 following a series of acquisitions, with Big Bell coming under its Cue gold operations.

The gold miner began dewatering and refurbishing the mine more than two years ago, aiming to restart the development by the end of 2018 and begin ore drives early in 2019.

The mine was expected to reach full production by the end of the 2020 calendar year, with the potential to fill the Tuckabianna processing hub in its own right.

Big Bell was the centrepiece of Westgold's goal to increase annual production to 350,000oz per annum.

Westgold, the sixth largest domestic gold producer in Australia, currently produced about 275,000oz per annum.



Big Bell would add 100,000oz to Westgold's profile.

Major Milestones

In the last financial year, Westgold's output was 253,210oz at a cash cost of \$1273 per ounce and an All-In-Sustaining Cost (AISC) of \$1462 per ounce.

Westgold took several hits early in FY18, including the disruption of operations at Meekatharra gold operations in the March quarter due to a freak storm.

The plant at the Higginsville operations also caused disruptions with issues associated with its age causing significant downtime with the crushing circuit and fine ore bin.

This caused remedial actions to be taken, including contract crushing and major maintenance repairs to the fine ore

storage system.

Mr Newman said production in FY18 had been slightly below expectations, while costs had been marginally higher, but this paled into insignificance against the progress made in the big picture.

"In our 2018 financial year, our first full year since the demerger from Metals X, we have made major milestones towards our objective of building a long-life gold producer with its assets firmly planted in WA," Mr Newman said.

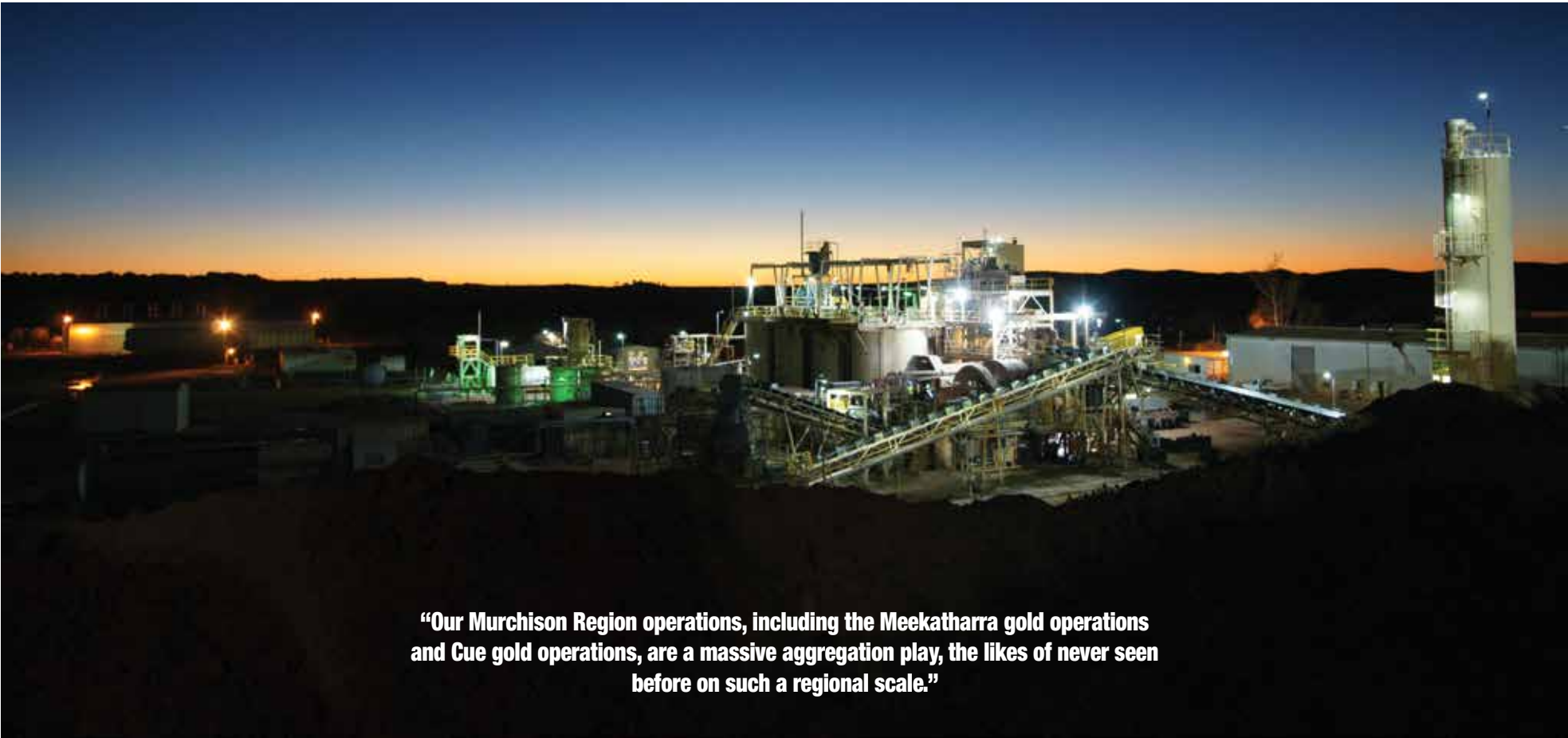
"Our Murchison region operations, including the Meekatharra gold operations and Cue gold operations are a massive aggregation play, the likes of never seen before on such a regional scale.

"The renovation and re-invigoration of the projects in the Murchison have set the company up for a long future."

Mr Newman said during the year, the company had started five new underground mines, five new open pits, and completed the refurbishment and re-commissioning of two treatment plants – Tuckabianna and Fortnum.

Following the start-up of the Tuckabianna plant, the previous central Murchison gold project was split into two operations based around two hubs.

The northern section and Bluebird processing hub became the Meekatharra gold operations, while the southern section and Tuckabianna processing hub became the Cue gold operations.



“Our Murchison Region operations, including the Meekatharra gold operations and Cue gold operations, are a massive aggregation play, the likes of never seen before on such a regional scale.”

Production rose marginally at Fortnum in the September quarter.

Mr Newman said to top that off, Westgold absorbed ownership and management of Australian Contract Mining, and internalised mining processes.

“We completed three other acquisitions with that of Polar Metals from S2 Resources; a 14.3 per cent interest in Cue region neighbour, Musgrave Minerals; and divested our toughest project, the South Kalgoorlie Operations,” Mr Newman said.

“All in all, it was a busy year.

“A year in which we invested over \$176 million into capital to establish these projects for the long-term.”

Results

By the September quarter, Tuckabianna was tracking well, having increased gold production by 40 per cent to 12,557oz as plant capacity reached target levels in its second full quarter of production after commissioning.

Ore feed during the quarter continued to be a blend of Comet underground mine ore, existing tailings and low grade ore stocks.

Open pit mining began at the Day Dawn open pit group of Great Fingall, Yellow Taxi and South Fingall.

A small amount of this ore began to be blended late in the September quarter

and would replace the low grade tailings ores in the next six months as planned in the project ramp up, filling the gap until the Big Bell underground mine production started.

Meekatharra gold operations had a steady output in the September quarter of 25,298oz in line with the June quarter.

Its cash costs reduced by 13 per cent to \$1188/oz, while AISC reduced to \$1389/oz.

Ore processed for the quarter was 366,787 tonnes, down by about 8 per cent on the previous quarter as the contract secondary crushing installation was removed.

According to Westgold, the new permanent secondary circuit would be installed by the end of the year, which would provide for increased plant throughput, especially for the harder ores as production from underground mining increased.

Fortnum gold project’s quarterly output rose marginally from 13,390oz in the June quarter to 13,394oz at a cash cost of \$1312/oz and an AISC of \$1444/oz.

Higginsville gold operations has remained problematic for Westgold as operating costs continued to rise in the September quarter.

Cash operating costs were \$1773/oz taking the rolling 12 month average to \$1638/oz, which Westgold attributed to

the low margin and higher costs of the Mt Henry open pit ores.

Meanwhile, quarterly gold output was 13,189oz, with 3400oz of that being attributable to toll processing, which consumed 40 per cent of plant capacity.

Despite the difficulties, Westgold remained optimistic about Higginsville, with the expectation that the Baloo deposit, which was in the approvals process, would be ready to mine by the end of 2018, which would improve operational outcomes.

Overall quarterly gold output across Westgold’s operations was steady at 61,037oz, which was marginally lower than the 61,461oz produced in the June quarter.

The miner’s quarterly gold operations generated EBITDA of \$11.9 million.

Exploring Future Options

Mr Newton said in the year ahead, Westgold would continue its ramp up to full production at its Murchison projects, while continuing to rebuild and improve the profile of Higginsville.

He said the company would also continue to focus on its core objective of becoming a pure-play Australian gold producer.

“This may mean the divestment or spin-off of our remaining base metal and

lithium assets,” Mr Newton said.

Westgold retained significant exploration rights and royalties when it sold its South Kalgoorlie Operations to Northern Star for \$80 million in March, including two royalties over the northern extent of the Mt Marion lithium mine.

However, Westgold considered its lithium assets as non-core to its business.

Meanwhile, on the exploration front, Westgold discovered what appeared to be an interesting Volcanogenic Massive Sulphide (VMS) mineral deposit in the Bryah Basin stratigraphy at Fortnum.

VMS deposits are base metal-rich deposits, which can also contain lesser amounts of precious metals.

Its ores could be major sources of zinc, copper, and lead, with gold and silver by-products.

While gold would remain the focus of Westgold at Fortnum, the miner intended to devote time and resources to understand what it considered to be a possibly significant opportunity to add value, in what has historically been an underexplored terrain.

Exploration at Westgold’s projects would also continue this quarter at its newest underground mine, South Emu-Triton in Meekatharra, after initial ore development defined extensions of the western lode, which was not previously considered in the mine plan.



The Tuckabianna mill has increased gold production by 40 per cent in its second full quarter of production after commissioning.



The Tuckabianna mill services Westgold's Cue operations.



MP Mick Murray at Premier Coal mining operations in Collie.
Image: West Australian Government.

A STRONG FUTURE

Surrounded by an abundance of national parks, forests and manmade waterways, WA's only coal mining town, Collie, has a long history, and continues to generate a large proportion of WA's energy needs.

JESSICA CUMMINS

LIKE many mining towns, Collie has had its fair share of booms and busts dating back to the first development of its coal fields in the late 1800s.

Shire of Collie chief executive David Blurton said before the commodity was discovered in Collie, the State was relying heavily on imported coal, and the Government offered incentives for the discovery of a local energy source.

"The period between 1930 and 1960 in particular was a time of great prosperity and growth for Collie [until] a significant coal mining operation in Amalgamated Collieries closed its doors unexpectedly," Mr Blurton said.

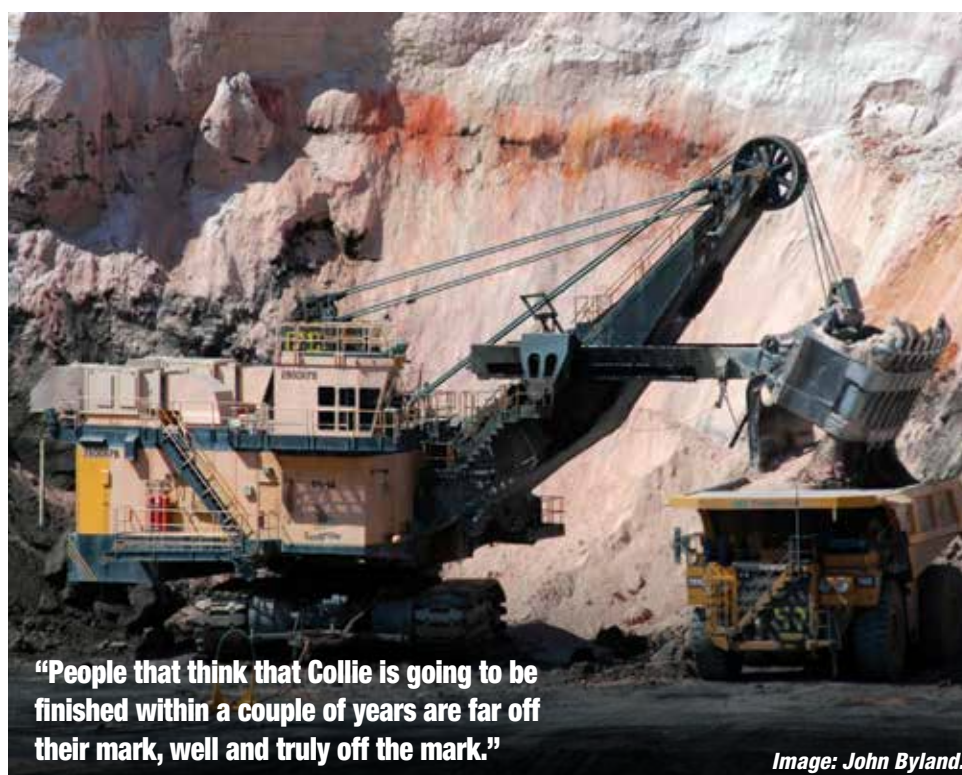
"This led to a 41 per cent decrease in the coal mining labour force, which saw many families leave town [causing] much economic, psychological and emotional stress."

While many workers were redeployed on government projects, including the construction of Muja Power Station in 1962 to lessen the impact on the local economy, Collie experienced a period of stagnation.

"Over the next 10 years many houses and shops remained empty.

"In 1983 the signing of a 20-year contract by Premier Coal to supply 26 million tonnes of coal to Western Power until 2003 provided security to their workforce of 800 and the community."

The 1990s were marked by extreme pressure on companies to reduce expenses, which led to the decision by Premier Coal to "completely close underground coal mining in 1994."



"People that think that Collie is going to be finished within a couple of years are far off their mark, well and truly off the mark."

Image: John Byland.

"The shift from underground mining to open cut required the use of larger machines and was less labour intensive, which resulted in job losses of 239 employees at the Premier operation," he said.

While periods of uncertainty had led to businesses closing down and a decrease in demand, Mr Blurton said boom periods on the back of construction projects had attracted more residents to the region.

Today, mining companies such as Premier Coal and Griffin Coal, played a significant role in the town.

Mr Blurton said in addition to coal mining and power generation activities, Collie also hosted the Worsley Alumina refinery, which was the largest single employer in the shire.

"The refinery underwent a \$US2.2 billion expansion project in 2008 and this project, coupled with the construction of the Bluewater's PowerStation in 2009 was a significant boom era on the back of these construction projects," Mr Blurton said.

"This saw house prices increase significantly [as well as its] population - however the population has since returned to pre-boom levels."

Regional Challenges

Fast forward to present day and Collie still had its ups and downs.

"Unlike the eastern seaboard where coal is exported, Collie coal is consumed by the local market in WA and [is] the only coal mining community in the State," Mr Blurton said.

In April this year, *The West Australian* reported on the struggling profitability of both Premier Coal and Griffin Coal under State contracts.

Collie-Preston MLA Mick Murray said Synergy produced "quite a large lump of Western Australia's power" which was supplied by Premier Coal.

"But that's where the nervousness starts because there are contracts due and we don't know what the targets are going to be both federally or by State," Mr Murray said.

"There is some nervousness - there are about 750 direct jobs in coal mining and about 400 in power generation and under that is contractors that do the work."

Despite chatter around contracts, Premier Coal was charging ahead with new developments at the Premier mine, including a complete machine rebuild of some of its major mining equipment in house.

"[We are] utilising our own workforce and workshop facilities - so far we have successfully overhauled trucks, dozers and graders, which has proven to be extremely successful," Premier Coal investor relations and corporate affairs general manager James Rickards said.

(CONTINUED ON PAGE 38)



More information can be found at www.colliehills.com.au.

Collie Hills Village accommodation

NATIONAL

WITHIN the picturesque Collie River Valley, only 4km from the town centre, sits the Collie Hills Accommodation Village.

About 200km from Perth, the village hosted a variety of rooms to suit, from king single to double rooms and disabled access rooms which all have individual

en-suites.

Having provided tailored accommodation solutions for more than 10 years, the business provides both short and long term bookings with up to 200 self-contained units available.

A few larger rooms come complete with a double bed, mini kitchenette, lounge area and ensuite bathroom.

The village is suited for individual bookings or small groups, as well as for large work groups or shut down teams.

The village has excellent indoor and outdoor recreational facilities, including a large games and separate TV room, fully equipped gym, half basketball court and BBQ, as well as a 24-hour laundromat.

The dining facility provides a range of

high-quality, buffet-style healthy food.

Options are available for an all-inclusive breakfast, takeaway crib lunch and dinner in the room price.

The standard room features modern soft furnishings with a private ensuite and amenities such as a television, refrigerator, desk, wardrobe, split reverse cycle air conditioning and free wifi.

Collie Hills Accommodation Village

IDEAL FOR LARGE PROJECTS AND SHUTDOWNS UP TO 200 ROOM CAPACITY

- Picturesque, Tranquil Location
- Great Value, Comfortable Accommodation
- Competitive Rates for Singles, Couples or Groups
- Complimentary Internet
- Fully Catered Buffet Dining Facility (Breakfast, Crib Lunch, Dinner)
- Recreation Rooms • Gymnasium
- BBQ Facilities • Outdoor Recreation Area
- Laundry Amenities • Plenty of Onsite Parking

To book your 'Comfort in the Hills' call now **08 9780 2888** or visit www.colliehills.com.au | collie@numans.com.au

CollieHills

ACCOMMODATION VILLAGE

www.colliehills.com.au

(CONTINUED FROM PAGE 36)

Image: Collie River Valley Marketing Group.

“Our proposition is to develop job opportunities around ‘new to’ Collie industries, building on a backbone of expanding local renewable capacities.”

The Premier Coal mine in Collie.

“As part of our commitment to ensure reliability of supply of coal to our customers we are [also] scheduled to take delivery of a new Liebherr 996 excavator in March 2019 and a Liebherr 9400 in 2020.”

Mr Rickards said the company had implemented various fleet and shift efficiencies to improve production and crew operations, while continuing to consider new mining areas given ongoing market challenges.

Mr Murray said the government, however, was working on a ‘transitional’ plan for when coal would eventually be replaced by other energy sources.

“The plan is still being worked on as to where, how long and how much this would cost – we are still waiting on some direction forward, which makes it very difficult.”

Mr Blurton said the Shire had long called on the State government to provide direction and a timeline on the changing energy mix in WA.

“This direction is critical to the town’s future given the current reliance on coal mining and coal-fired power as our foundation industries,” Mr Blurton said.

However, Mr Blurton said the shire expected coal to continue to be an important part of the State’s energy mix for the foreseeable future.

“During this time, it is important for us to begin transitioning our economy and support the growth of alternative industries to ensure the long-term sustainability of our town,” he said.

Mr Murray said private contracts such as Blue Waters and Griffin Coal still had some years left on their agreements.

“It’s not like the government can interfere,” Mr Murray said.

“People that think Collie is going to be finished within a couple of years are far off their mark, well and truly off the mark.

“I do see Collie has a future and a good one, it’s just a matter of working on bringing other industries into the town to make sure that continues.”

Mr Murray said if it had not been for coal fired power stations, the State would have been in a worse situation than it was after the Varanus Island gas plant explosion in 2008.

The gas pipeline from the island to

*Image: John Byland.*

Premier Coal is Western Australia’s largest coal producer, mining about 4 million tonnes a year.

the Pilbara exploded in June 2008 and subsequently cut WA’s domestic gas supply by about a third for more than a month.

“The incident cost the State around \$2 billion but it would have been double that if we didn’t have coal in place,” he said.

“There are some security measures that have to be answered to by the government at the same time.”

New Horizons

In recognition of Australia’s evolving energy mix, Mr Blurton said the shire was in the middle of forming an economic development plan for the town to minimise the impact of economic changes.

“We are working hard to support the development of new non-traditional industries in Collie such as tourism, intensive agriculture and alternative energy supply industries as well as working with the state to explore alternative uses for coal,” Mr Blurton said.

Mr Blurton said the town was prepared for industrial expansion with the

development of the Shotts and Coolangatta industrial parks and its expanding light industrial area.

“These strategic land parcels position us well to capitalise on any future mining expansion and positions to attract alternative heavy industrial development,” he said.

LandCorp had been developing the Shotts Industrial Park, 7.5km east of Collie, strategically between three major power stations and associated coal mines.

The development was set to attract large-scale industries, which would add value to Collie’s existing energy and coal production.

“We have accessed an abundance of water which is set aside for industrial use, [we have] access to a rail network, and we are in proximity to the Port of Bunbury, so Collie is well positioned to capitalise on the next wave of industrial development.”

In August 2018, Perth-based computing company DC Two also announced plans to build a behind-the-grid-data centre in partnership with energy supplier Hadouken.

DC Two subsidiary D Coin co-founder and general manager Michael Whitehorn said unless new processes could be found to reduce CO2 emissions from coal, Collie as a town “might disappear” with the abandonment of local power generation.

“Our proposition is to develop job opportunities around ‘new to’ Collie industries, building on a backbone of expanding local renewable capacities,” Mr Whitehorn said.

The data centre was planned to sit alongside a \$16 million, 20MW solar farm in Collie, which obtained planning permission in April.

“It would be the first of its kind in Australia and involves the development of a data-processing facility with a focus on crypto currency mining and data storage, which is energy intensive,” Mr Blurton said.

“The project has made headlines internationally and [will provide] the town with a new industry.

“It’s a good example of an alternative industry, which will help diversify our economy.”

WA's largest coal producer

NATIONAL

PREMIER Coal has a proud history of mining in WA's Collie coal basin, stretching back more than 65 years.

Within that time Premier quickly became the most advanced coal mine in the State and has produced more than 100 million tonnes from 1950 to 2016.

With its outstanding combustion characteristics as well as low ash and sulphur, Premier's coal has been suitable for many applications including power generation, cement making, and direct heat reduction.

Its location has served a number of advantages including close proximity to transport corridors such as conveyor, road, rail and shipping.

Generating the bulk of WA's power supply, its modern cut operation has a 240 tonne truck and large shovel fleet as well as state-of-the-art crushing, blending, and train and truck loading facilities.

Continually looking for improvement, the mine has been illustrated by dramatic productivity with a crushing capacity of 1200 tonnes per hour.

The State's power generator, Synergy, purchased about 80 per cent of the coal mined at Collie for use in its power stations at Muja and Collie.

Collie coal has had several industrial uses over the course of its time including on site power generation and steam



Premier Coal hosted a family open day in November, which allowed visitors to take a bus tour of the mine's lookout points.

raising at South 32's Worsley Alumina refinery.

The miner has engaged with the community and its stakeholders to understand and build local aspirations

into planning processes as well as share information about its operations.

Last year the company moved to a more structured approach to community support, which involved major

partnerships and a Community Support Program.

It's committed to being a valued and welcomed member of the Collie and South West community.



Premier Coal is WA's largest Coal producer and our history mining in Collie stretches back more than 65 years.

We are a proud contributor in the Collie community spending around \$100,000 on local community charities and projects each year.

Premier Coal employs about 370 people with approximately 75% coming from the local Collie community.



Carrapateena airstrip.
All images: OZ Minerals.

A YEAR OF DELIVERY

On the back of a productive year, OZ Minerals remains focussed on developing one of Australia's largest copper gold resources, Carrapateena, with first concentrate scheduled in 2019.

JESSICA CUMMINS

AS the Adelaide-based miner moves its Carrapateena project towards production, a number of key activities remain on the table.

After injecting \$85 million into the project during the September quarter, the miner saw the completion of its first ventilation raisebore and commenced development on the crusher level.

OZ Minerals chief executive Andrew Cole said flights to the site had begun and construction of all 556 rooms at the Tjungu accommodation village were also completed.

"The mineral processing plant

and non-processing infrastructure construction is continuing as per schedule, with first concrete poured in late August," Mr Cole said.

"Bulk earthworks and concrete works in the processing area are nearing completion and engineering is largely complete with major equipment deliveries set to ramp up during Q4."

For the remainder of the calendar year, works at the site would be focussed on ongoing decline development, additional ventilation raisebores from surface, process plant construction and borrow pit works.

Mr Cole said construction would commence at the tailings storage facility, northern wellfield bore fit out, as well

as improvements to the Southern Access road.

Mr Cole said Carrapateena expansion studies were also continuing with an expected maiden resource estimate for the Fremantle Doctor prospect due in Q4 of calendar year.

"Diamond drilling has also commenced on the Punt Hill project, approximately 50km south of Carrapateena and an update on the expansion desktop studies will be provided in Q1 2019," he said.

The installation of its main communications network and high voltage powerline began during the second quarter of 2018, with completion scheduled for Q4 of calendar year.

"Installation of the main

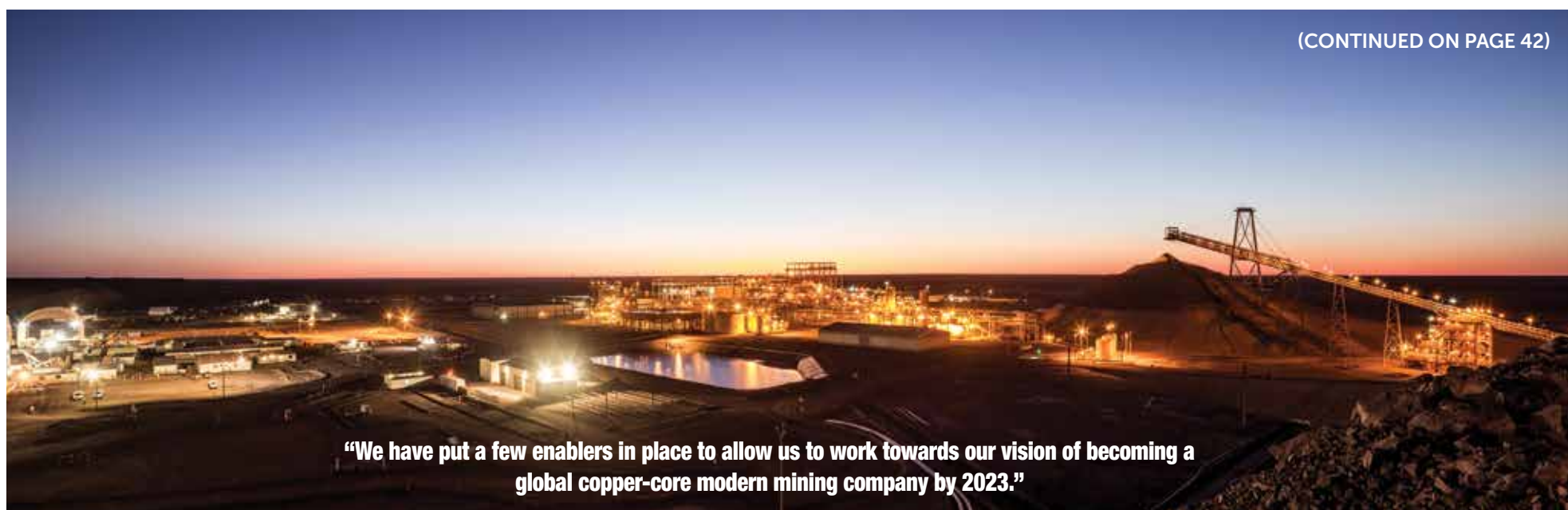
communications fibre optic cable network and high voltage powerline is progressing well, with over 100 kilometres of cable installed from the Woomera Telstra Exchange to site," Mr Cole said.

"The associated Mount Gunston ElectraNet Sub Station is nearing completion while earthworks and concrete infrastructure for the ElectraNet Pernatty South substation is well-advanced."

Exploration

In October OZ Minerals met its \$22 million spending commitment to acquire a 51 per cent stake in Cassini Resources' West Musgrave project in WA.

(CONTINUED ON PAGE 42)



"We have put a few enablers in place to allow us to work towards our vision of becoming a global copper-core modern mining company by 2023."

Prominent Hill mine.



(Left) David Gallery – Project Director, KBR and (Right) Robert Gerrard – Deputy Project Director, KBR



The core skills we bring to PMO include:

- Contracting strategy – delivering the most advantageous commercial execution model to ensure delivery
- Collaborative behavior – delivering integrated teams to work with customers to deliver a solution best for the project
- Risk management – full and open discussion on all threats and opportunities to help ensure certainty of outcome
- Interface management – acting early to de-risk the main issues
- Data centric management – helping ensure real time information, entered once, trusted and reused many times
- This is supported by our appropriate skills and resources in: Project management, Project Controls, Quality, HSE, Information management, Business transformation and training, Technical/ engineering teams, Construction and commissioning, Logistics management.

KBR supports OZ Minerals to deliver Carrapateena copper-gold project

Since 2017, KBR has been working in collaboration with OZ Minerals for project management services in the development of its Carrapateena copper-gold project. The mine is one of Australia’s largest undeveloped copper deposits and located 160km north of Port Augusta in South Australia ’s far North Region. Commissioning is scheduled for the 4th quarter of 2019 after which the project will ramp up to steady state production.

David Gallery works for KBR and is the Project Director for Carrapateena. He has been leading the project for the past year. David caught up with *The Australian Mining Review* to talk about the work KBR has done in collaboration with OZ Minerals.

How has KBR supported the Carrapateena project?

David: KBR’s role has been providing professional project management services for the execution phase of the project as part of an integrated project team office. Previous to the project starting KBR had been supporting OZ Minerals to finalise its early contractor involvement strategy and associated feasibility study activities.

In total 60 employees are working on the project and this is split 70% KBR employees and 30% OZ Minerals. As an integrated team, KBR and OZ Minerals are delivering in excess of 30 separate work packages including:

- > Minerals processing plant
- > 550-bed accommodation village
- > 1.6km Aerodrome designed to accommodate 100 seat jet aircraft
- > Various infrastructure projects such as 132 kV regional power supply via a BOOM contract with ElectraNet, large tailing storage facility (TSF), water supply network and the 1st phase of underground materials handling infrastructure.

What makes KBR stand out?

David: What makes KBR stand out is that we can draw on an extensive resource talent pool of individuals who have extensive and substantial large project delivery experience and capability across a broad spectrum of industries. This talented team not only have excellent project management and technical abilities but they also fit seamlessly into the OZ Minerals lean and agile culture which has been built on a foundation of How We Work Together.

What capabilities does KBR offer in PMO?

David: KBR has a wide range of offerings in the project and construction management space. KBR brings to the project, robust project management processes with a primary focus on safety through to contract, cost management and quality assurance. These capabilities enable KBR to deliver successfully projects of any size and scale anytime, anywhere, and in any environment.

Why should a client choose to work with KBR?

David: What makes KBR stand out in the PMO space is three things. The first is safety. It’s always at the heart of everything we do. We strive for zero harm and believe everyone deserves to work in a caring and safe environment. Secondly, we’re focused on delivering projects on time and under budget through positively challenging each other, to supply value for money, while having the highest standards of quality assurance. Thirdly, we are passionate about creating great teams, we put a lot of time into developing individuals to ensure they go on to be the best leaders they can be, founded on the right principals and values and focused on delivering the right outcomes for our clients.

Contact: Alan MacKintosh – Director, Utilities, Infrastructure Services Australia
+61 2 8284 2014 alan.mackintosh@kbr.com

www.kbr.com

(CONTINUED FROM PAGE 40)



“Opportunities that attract us are ones that are aligned to our strategy, meet internal requirement and are value accretive. Our targeting criteria is based on resource quality – quality of resource and bottom of cost curve.”

A Pre Feasibility Study was currently underway for the project, which was scheduled to be complete in the second quarter of 2019.

OZ Minerals still has the option to increase its stake further and earn up to 70 per cent by investing an additional \$14 million towards Nebo-Babel studies and regional exploration.

“The pace with which OZ Minerals have met the earn-in hurdle is significant as it shows the partners desire to progress rapidly through the study stage and the potential of the project,” Cassini Resources managing director Richard Bevan said at the time.

Mr Cole said the company’s confidence in the West Musgrave project continued to grow.

“Positive progress has been made across resource geology and recent metallurgical test work has produced encouraging early results with improved recoveries for both copper and nickel,” Mr Cole said.

“Early metallurgical test work on master composites, which represent different time periods of the current mine plan, has shown a material improvement in copper and nickel recoveries and an increase in copper concentrate grade, while nickel recovery remains in line with the further scoping study.

“We will know more once results from the test work are provided following the completion of metallurgical test work on variability samples from different geological domains in Q1 2019.”

Mr Cole said the 2018 resource drill program for West Musgrave was nearing completion, and because the company had been encouraged by the results decided to push the 2019 drill work forward.

Mr Cole said the company took a “province approach” to its operating mines, construction sites, and exploration projects.

“What this means is, rather than simply seeking to develop a single new mine, or single new opportunity, we look for copper rich provinces where initial or existing investments can serve as a launching platform or hub for other opportunities,” he said.

“In the Musgrave province, we have the West Musgrave and East Musgrave projects.”

The East Musgrave prospect is about 500km east of the West Musgrave project.

“In addition to the work in West Musgrave, we also have an earn-in agreement with Woomera Exploration Limited to explore for magmatic nickel and copper sulphides in the Eastern Musgrave province,” he said.

“We are currently looking at innovative application of the Vector Residual Magnetic Intensity (VRMI) technique, traditionally used in iron ore and gold exploration, to resolve prospective anomalies at East Musgrave.

“This exploration joint venture targets magmatic nickel-copper sulphide systems like those of the Nebo Babel deposits in West Musgrave.”

Acquisition

OZ Minerals has also been active in the M&A space gaining 100 per cent of Avanco Resources in a \$418 million acquisition in August.

Mr Cole said the acquisition was consistent with the company’s strategy to become a multi-asset, copper core modern mining company.

“It also gave us the second largest land position in the highly prospective, world-class Carajas copper province – and the largest land position in the Gurupi greenstone gold belt in Brazil,” he said.

The package included one operating asset, two well progressed development projects and numerous high priority brownfield and regional exploration targets.

“The acquisition allowed us to immediately contribute copper tonnes to our production profile and offered significant additional new growth options as well as a meaningful footprint in the highly prospective Carajás province,” he said.

“The acquisition provides us with the potential of seeing seven mines up and operating within the next six years.”

Outlook

Mr Cole said the company had made significant progress on its growth strategy in 2018, and 2019 would follow in the same path.

With multiple projects fast tracking through the build and study phases, Mr Cole said OZ Minerals’ portfolio was what a healthy mining company should look like.

“We have put a few enablers in place to allow us to work towards our vision of becoming a global copper-core modern mining company by 2023,” he said.

“One of these enablers is our devolved model - which is more important than ever now that we have operations in Brazil, as it will empower our business to make decisions to achieve outcomes that they are accountable for delivering.”

**PAUL
WRIGHT
CONTRACTING**

**FIRE SERVICE
CONTRACTORS**

**PROUD TO BE
ASSOCIATED
WITH OZ
MINERALS**

0402 676 004
fireextinguisherguy
@bigpond.com

Leading supplier of valves and piping systems

NATIONAL

SINCE 2003, FC Mechanical and Mining Services has supplied high-quality valves and piping systems to the mining and fire protection industries in South Australia and the Northern Territory.

The company is a subsidiary of family owned business Firecorp; a one-stop-shop for all facets of fire protection.

Featuring the right knowledge and expertise, FC Mechanical and Mining Services has established a wide range of mining related products from some of the best manufacturers and importers in Australia.

Its partners and suppliers included big brand names such as Victaulic, BFI, Presto, Viking, Promat, Emerson, Ridgid, Wolf and Bermad, which were associated with providing high-quality valves, piping systems, and fire protection products.

Each product, such as the new range of Victaulic “Refuse to Fuse” HDPE couplings, included advanced testing and carried all relevant Australian Standard approvals, technical data and manufacture support.

Fully stocked warehouses centrally located in Adelaide and Darwin contained more than 5000 products, which could be delivered to any location within Australia.

“The Refuse to Fuse product joins HDPE pipe and fittings together in a 10th of the time compared to the standard welding and fuse systems,” FC Mechanical & Mining Services managing director Jerry Tanner said.



FC Mechanical and Mining Services have offices in South Australia and the Northern Territory.

“The flexibility this product now brings to installing underground HDPE services is remarkable.”

FC Mechanical and Mining Services stock a complete range of valves, RG couplings, and pipe-fittings, cabinets, hanging equipment,

risers, adaptors and pipes.

It also supplied pipe fire rating and pipe fire penetration sealing material and collars.

Other services included high-quality stainless steel and mild steel pipe

fabrication.

A 24-hour call in service was also available as well as professional local advice and tailored customer services to suit individual business needs.

REFUSE-TO-FUSE™

THE FASTEST WAY TO JOIN HDPE PIPE – NO IFS, ANDS, OR BUTTS.

10X INSTALLS UP TO 10X FASTER

Join HDPE pipe in half the time it takes to fuse a joint. Forget the fusion equipment. Gone are the days of waiting for plastic to heat up just to cool down. Installing in tight or vertical spaces has never been easier; the Refuse-to-Fuse system goes where no fusion machine has gone before. That's time savings you've never seen before.

INSTALLATION IS WEATHER INDEPENDENT

Whether it's rain, shine, or just downright frigid and fierce, Refuse-to-Fuse products can be installed. No need to check the weather forecast and worry about protection for fusion equipment or project delays any longer.

MEETS OR EXCEEDS PRESSURE RATINGS OF HDPE PIPE

If you thought your fused joint was tough, check out Refuse-to-Fuse product performance. Small diameter solutions call for dual rows of razor-sharp teeth that sink into the O.D. of HDPE pipe, forming a sealed hold that never lets go. Bringing out the big guns? Large diameter solutions enlist a rugged double groove to seal the deal. Push it, pull it, and drag it to the max; treat it the same way you would treat fused pipe.

INSTALLS WITH SIMPLE TOOLS

No need to set up your fancy fusion machine because all you will need with the Refuse-to-Fuse system is a simple socket wrench. If you want to get crazy, a cordless impact driver will do the job, too! Don't worry about training certificates or learning how to use fusion equipment, just stick with the basics.

Refuse-to-Fuse™ Transition Coupling for HDPE Pipe

- Designed to provide a single transition from plain end HDPE pipe (SDR 7 – SDR 21) to grooved steel sized piping system components
- Sizes from 2 – 8" IPS HDPE to 2 – 8" DN50 – DN200 grooved steel
- Sizes from 63 – 225 mm ISO HDPE to 2 – 8" DN50 – DN200 grooved steel

Refuse-to-Fuse™ Fittings for HDPE Pipe

- Available in SDR 7, SDR 11, and SDR 17
- Sizes from 2 – 8" IPS and 63 – 225 mm ISO
- Full flow fittings
- Compatible for use with Style 905 and 907 HDPE couplings

Adelaide
6 Myer Crt Beverley 5009
Ph: 08 8244 8748
E: sales@firecorp.net.au

Darwin
8 Willes Road Berrimah 0828
M: 0477 734 099
E: salesnt@firecorp.net.au

MECHANICAL AND MINING SERVICES

firecorp.net.au

Ausenco partners with OZ Minerals to deliver at Carrapateena

SOUTH AUSTRALIA

AUSENCO, together with joint-venture partner Downer, is partnering with OZ Minerals to deliver a capital and operationally efficient plant on the Carrapateena project.

The Carrapateena copper-gold project, about 160km north of Port Augusta in South Australia's highly prospective Gawler Craton, has been acknowledged as one of Australia's largest undeveloped copper deposits, with an estimated mine life of 20 years.

Construction of Carrapateena is underway and commissioning is scheduled for Q4 2019 after which the project will ramp up to steady state production.

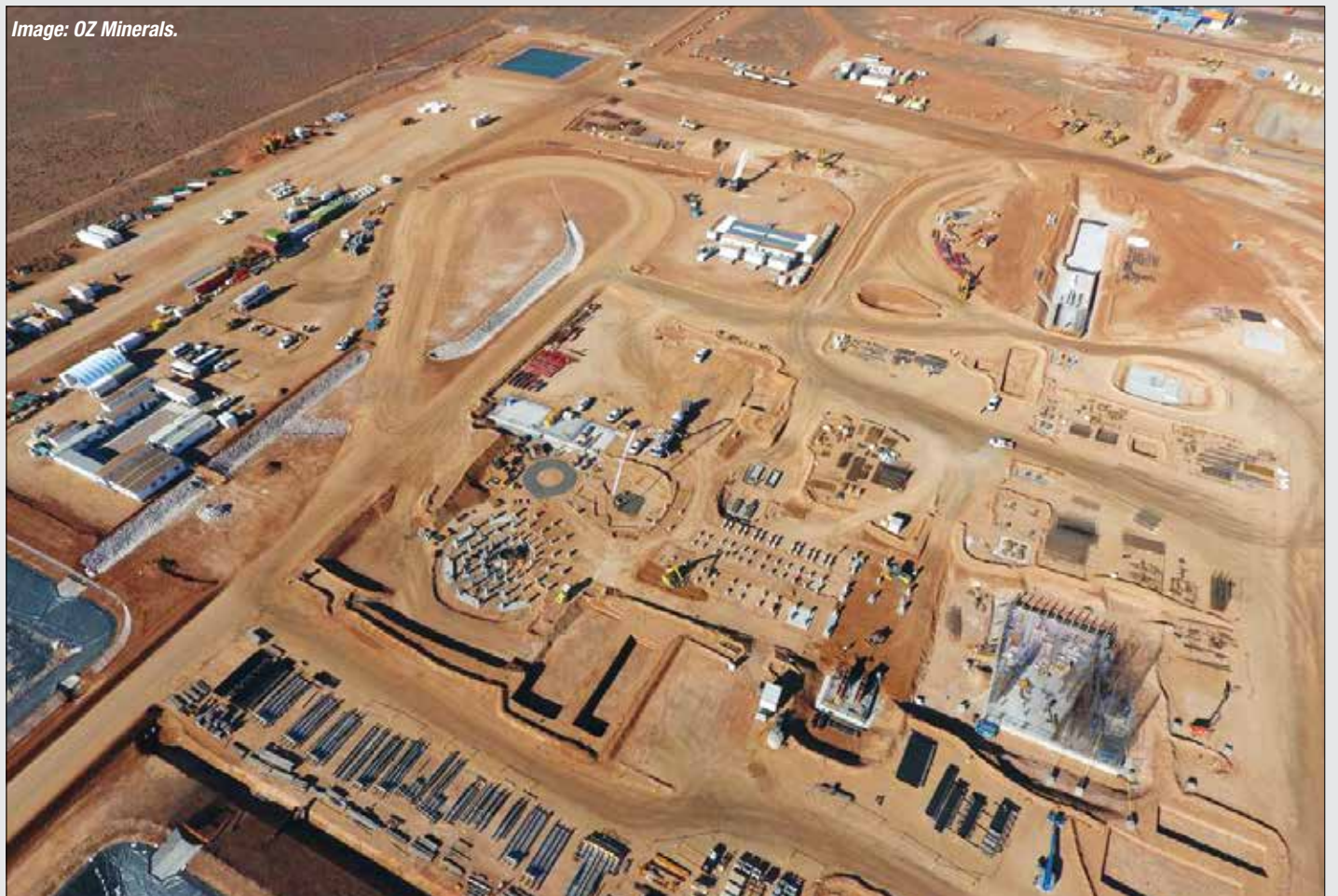
As part of its work on the project, Ausenco provided a number of innovative solutions including optimising the plant footprint, creating an effective equipment layout, and aggressively pursuing reductions in quantities.

Ausenco also minimised vehicle and pedestrian traffic, which increased safety; reduced roads and minimised distances between process steps, which increased efficiency; reduced capital and maintenance costs; and found constructability efficiencies to reduce man-hours on site.

As in previous projects, Ausenco's design and engineering was fit for purpose, with no unnecessary engineering or costs.

On the Carrapateena project, the joint venture with Downer has allowed Ausenco to draw on Downer's successful and focussed construction expertise.

Image: OZ Minerals.



Construction of the Carrapateena processing plant is underway.

Ausenco executive vice president, global project delivery Ron Douglas said building the joint venture into a seamless single delivery structure and execution in a relatively remote area was not without its challenges.

"Fortunately, Ausenco has many

years of experience in delivering complex projects in similar locations, so we were able to use this project management expertise to ensure the successful delivery of the project as planned," Mr Douglas said.

Ausenco has developed a

well-established reputation around the design and supply of copper concentration plants, such as that at Carrapateena.

The company has continued to be flexible and to work with its clients to support them throughout their projects.

Ausenco

Redefining what's possible

We add value by
significantly reducing
process plant
footprint and cost

Ausenco's unique approach to design, engineering and development results in:

- Lower capital and operating costs
- Reduced construction time and
- Improved plant operational efficiencies.

www.ausenco.com



Image: IMARC.

AHEAD OF THE CURVE

Evolution Mining executive chairman Jake Klein had a clear message for delegates at the recent *International Mining and Resources Conference* (IMARC) in Melbourne: the industry was experiencing a “cognitive bias” towards gold prices, with lack of sufficient returns rolling in for gold investors.

ELIZABETH FABRI

EVOLUTION'S Mr Klein – who has steered the mid-tier miner's growth since its inception seven years ago – questioned how many gold projects across the country delivered on what was promised in feasibility studies, shedding light on the industry issue of whether there is sufficient returns for investors.

“I started in the gold industry 25 years ago and gold prices were around \$US250 an ounce and gold companies were able to make money. So, what has happened?” Mr Klein told delegates at IMARC.

“While we operate in a cyclical sector, I think we suffer from a cognitive bias in that we think the gold price is going to go up.

“In reality that is not a very good strategy, because the only thing we really know about the gold price in 12 months' time is that it is going to be different.

“We hope it will go up but often it is lower.”

In early November the gold price was hovering around the \$US1226 per ounce mark compared to \$US1355/oz back in January.

Mr Klein said in light of the commodity's uncertain trajectory, a good strategy for miners was to consider the challenges facing the industry, acknowledging that his company's path to success hadn't always been conventional.

Mr Klein said maintaining a mid-tier position was a deliberate strategy and its board looked at portfolio opportunities through two lenses: will it improve the quality of its portfolio, and second will it be accretive to its shareholders.

“In the space of a mid-tier you really are able to generate enough money to fund yourself so you aren't dependent on capital markets and you are able to generate growth, and that combination has delivered throughout the sector better than any other space,” he said.

“Fundamentally as a gold producer looking at creating a sustainable business, the only thing we can do is to produce gold at a low cost.”

And that Evolution had achieved; in the September quarter the miner produced 200,218 ounces of gold at an All-In Sustaining Cost (AISC) of \$885 per ounce – making it one of the lowest cost producers globally.

Mr Klein said the next phase of its approach was understanding what to do with the dollars

Q1 HIGHLIGHTS

Gold production of 200,218 ounces at an AISC of \$885 per ounce.

○

Regulatory approval granted to increase Cowal plant throughput by 31 per cent from 7.5mtpa to 9.8mtpa.

○

Cowal Float Tails Leach project on schedule to be commissioned in December 2018 quarter.

○

Board approval received for Mt Carlton underground mine development.

○

A \$12 million investment in Castle Hill restructure provides extension to Mungari mine life.

○

JV agreement signed over Andromeda's 520sqkm Drummond exploration project in QLD.

earnt.

“You can invest in an exploration find if there are more ounces. If there are not more ounces you can spend as much money as you like, you are not going to find them,” he said.

“We need to get more comfortable telling investors it is better not to spend money if that asset is going to run out [of ounces].”

Expansions

In Evolution's case, the miner had a strong asset base with plenty of opportunities to expand within.

The company currently owned and operated five mines — Cowal in NSW; Mt Carlton, Mt Rawdon, and Cracow, in QLD; and Mungari in WA; as well as an economic interest in Glencore's Ernest Henry mine in QLD.

After a solid start to the FY19 year, Evolution had its sights set on further growth, and was eyeing expansions at its Mt Carlton and Cowal mines on the east coast.

In early October its Cowal gold project obtained regulatory approval to increase the plant processing rate by 31 per cent from 7.5 million tonnes per annum (mtpa) to 9.8 mtpa.

The \$45 million expansion involved implementing a secondary crushing circuit at the processing plant, and the development of an Integrated Waste Landform (IWL) to facilitate storage of tailings over the life of mine.

Mr Klein said the approval to increase the processing plant was “a significant step” towards achieving its objective of increasing Cowal's annual production rate to more than 300,000 ounces per annum.

Cowal currently had a mine life through to 2032 with drilling activities set to extend mine life at ore bodies outside of the main E42 pit, including E41, E46 and Galway/Regal.

A Float Tails Leach project, which was expected to increase recoveries by between 4 and 6 per cent, was also on schedule for commissioning in the December 2018 quarter.

Evolution had also subsequently green lit a \$60 million underground development at the Mt Carlton mine, which included a Stage 4 pit cut-back and plant modifications.

Mt Carlton already had a mine life to at least 2025, and an expansion would allow production from a higher grade Link zone to be brought forward.

Mr Klein said he was “highly confident” that the initial underground reserve could be expanded, with additional drilling to be undertaken once the underground development was in place, to follow up on several promising drill intersections that were not currently included in the underground reserves or resources.

“Mt Carlton is a very high margin asset which has been a standout in Evolution's portfolio,” he said.

“The mine has generated over \$100 million in net mine cash flow in each of the last three years. The underground development of the Link zone ensures the continued production of high margin ounces.”

The company was currently awaiting regulatory approval for the project, with first ore scheduled from the underground in FY21.

Evolution was also undertaking an earn-in JV into Andromeda's Drummond early stage gold project in northern QLD, 50km southwest of Mt Carlton.

Under the deal, Evolution could earn a 51 per cent interest in the project by making a cash payment of \$300,000 and spending \$2 million on exploration over two years.

At the completion of this first stage, Evolution could earn a further 29 per cent by making a cash payment of \$200,000 and spending \$4 million on exploration over two years.

Looking Ahead

With a busy year ahead, Mr Klein said the company's focus remained on prioritising margins over production growth.

In FY18 the company produced 801,187 ounces of gold at an AISC of \$797 per ounce and in FY19 was scheduled to produce between 720,000 and 770,000 ounces at an AISC in the range of between \$850/oz and \$900/oz.

“We are a relatively young company and we are building one that we believe is both unique and distinct,” Mr Klein said.

“In the seven years since our inception the company has grown a reputation as a transparent, consistent and reliable gold producer.

“Our balance sheet is strong, our assets are generating substantial cash flow and our business is now well positioned to prosper through the cycle.”

Image: Newcrest Mining.

FUELLING ADVANCEMENT

Emerging technologies may be set to change the way Australian mines are powered, but diesel fuel and large-scale fuel farms are likely to remain key to many operations for years to come.

AMY BLOM

RENEWABLE energy and the concept of the electric mine have been touted as among the biggest changes ahead in mining, and while many miners have begun to adopt these technologies, researchers were also looking to diesel-powered automation that could change traditional fuel farms.

The remote nature of most mines meant access to reliable power was a challenge for most, making up a large portion of overheads on a mine.

To overcome this issue, many miners have developed large-scale fuel farm facilities on site.

However, many Australian mines, such as Rio Tinto, were now moving to automated systems, including autonomous trucks, with new fuelling technologies emerging to fully integrate automation on mines.

Among the new technologies being examined were automated or robotic refuelling, which would be performed by a robotic arm that would open the vehicle's flap, unscrew the cap, pick up the fuel nozzle and insert it into the tank opening.

This would remove the need for any manual intervention, freeing up the operator to complete other tasks.

It would also make the process of refuelling safer, and could increase productivity and reduce costs by allowing miners to construct fuelling stations closer to operations.

In one example, Roy Hill has been trialling an in-pit robotic re-fueller since 2016 to reduce the amount of time spent going to and from fuelling stations.

Speaking to *The Australian Mining Review*, Queensland University of Technology Professor and Mining3 automation program technology leader Michael Milford said robotic maintenance was also being examined.

He said automation and automated refuelling agricultural projects that have been undertaken by researchers at QUT could also have applications in mining,

given the amount of technological crossover between the two sectors.

"The big appeal of robots is in dull, dirty and dangerous conditions," Professor Milford said.

"Mine sites often fulfil two or three of those criteria simultaneously.

"Refuelling is obviously potentially quite hazardous, so that's an area which is under active research in terms of automating it."

Impact of Electric

Professor Milford said other technological advancements, such as the move from traditional fuel-based mines to electric mines could theoretically do away with the need for fuel farms altogether, however that was a long way from becoming a reality.

"There's this whole concept of the future electric mine, which may or may not have people in it at all," he said.

"I imagine that would have an effect on the propulsion systems, because if you can make a mine entirely electric you can do away with fuel completely, but that doesn't sound like that's anywhere near on the horizon.

"A large infrastructure-reliant industry, it doesn't just have to be mining, will take a long time to transition over, and that is probably especially true when mining is filled with very large-scale vehicles.

"A lot of the move to electric vehicles in other areas, like consumer cars, has involved small, neat, clean, light cars, which have the kind of requirements that electric nicely meet, but that doesn't necessarily carry over to mining."

Professor Milford said much of the technology being examined and rolled-out now, was still largely dependent on diesel fuel, including his own research project, which involved developing new technologies to improve the capability, efficiency, or even the cost of systems such as autonomous positioning systems for autonomous vehicles on mine sites.

The project was in partnership with Caterpillar, Mining3, and the Queensland Government.

One example the team were trying to develop were systems that were primarily dependent on cameras as the sensors that would go on autonomous vehicles, as opposed to traditional laser or radar-based systems.

The systems could be retrofitted on vehicles.

"In a lot of these new automation technologies, they're just an automation kit that gets bolted on, on top of the truck or vehicle," Professor Milford said.

"In that case, the underlying propulsion system wouldn't change at all."

Case Study: Cadia

On the ground, miners such as Newcrest Mining have been exploring a number of innovative ways to power mines, but challenges with electric and autonomous vehicles have meant fuel farms would still be necessary for the foreseeable future.

In November 2018, Newcrest announced it had commenced studies on a solar farm for its operations at Cadia, 20km south of Orange in NSW.

Newcrest head of investor relations and media Christopher Maitland said energy represented about 20 per cent of Cadia's operating costs, and given the rising costs of electricity on the east coast of Australia, the miner had deemed it prudent to invest time and money to better understand renewables.

"The farm under study is targeted to supply approximately 5 per cent of Cadia's electricity," Mr Maitland told *The Australian Mining Review*.

However, Newcrest would continue operating fuel farms for diesel at Cadia and Telfer, which was in the Pilbara region in WA.

Newcrest had previously examined using automation at its mines but found it did not increase productivity.

"Back in 2013, Newcrest trialled

automated underground loaders at its block cave mine, Ridgeway mine, just outside of Orange in New South Wales," Mr Maitland said.

"The trials were technically successful, yet the autonomous loaders were found to be significantly slower than manned vehicles.

"The technologies to automatically dig and haul at Ridgeway's high performing manned rates, were not advanced sufficiently to compete.

"As a result, it took longer for the autonomous loaders to perform each load cycle than what human operators could achieve."

Mr Maitland said large battery electric loaders were currently in development by equipment suppliers, with smaller battery electric loaders becoming available now.

However, commercially available cable-based electric loaders were not suitable for Cadia's cave layouts.

Increased Safety

Aside from automation and renewable energy, fuel farms have already become safer and more effective in recent years, with the rise of self-bunded tanks, according to WA Department of Mines, Industry Regulation and Safety director of Dangerous Goods and Petroleum Safety Ross Stidolph.

"In the past, the spill containment of some above ground fuel installations has not been maintained properly, resulting in poor spill containment if there was to be a fuel spill," Mr Stidolph told *The Australian Mining Review*.

"However, the last 10 to 15 years, has seen the introduction of self-bunded tanks, tanks with integrated spill containment, into the mining industry.

"Use of these tanks has ensured that spill containment for these fuel facilities are of a high standard."

He said there were currently about 200 fuel storage depots in WA alone, and about half of them were in the mining sector.



FES' range of self-bunded tanks come in sizes from 1000 to 110,000 litres, including Grande 68 – 68,000L self-bunded tank.

Fuel equipment specialists for every project

NATIONAL

AS an Australian-owned and operated company, FES Tanks has developed a strong reputation for its ability to service the unique requirements of the mining and industrial markets within Australia.

Founded in 2013 by three veterans of the Australian fuel and construction industries with more than 50 years combined experience, the team at FES believe fuel is “liquid gold,” which is not

to be wasted or treated with complacency.

The company have also long understood the critical nature and responsibility, both financially and environmentally, each end user of fuels and lubricants has to their stakeholders and the community as a whole.

This is why FES has continued to ensure its products not only meet, but exceed, relevant Australian Standards through constant improvements, learning from its own experiences and the

experiences of its business partners - the end users.

In every project, FES has worked closely with its distributors and their customers to design and build an efficient and cost-effective solution to managing and controlling what can potentially be a financially and environmentally damaging part of business, in a way that ensures its customers were able to meet their responsibilities.

FES has created practical and efficient

large scale fuel storage solutions to all industries including mining, industrial, agricultural, aviation, and vehicle fleets.

FES and its distributors has available a comprehensive range of fuel and lubrication dispensing equipment including self-bunded storage tanks, flow metres and fuel transfer pumps, spill kits, and other fuel accessories.

More information can be found at: www.festanks.com.au, or by calling 1300 651 391.



YOUR LOCAL DISTRIBUTORS
BRISBANE, CAIRNS, DARWIN AND PERTH
FES TANKS is an Australian wide network ensuring access to an extensive product range and knowledge base.



NEED FUEL FARM FACILITIES?

LEAVE IT WITH US. THAT'S WHAT WE DO.

SO YOU CAN GET ON WITH GROWING YOUR BUSINESS.

But, I hear you ask...

- We're in a remote location: "Not a Problem"*
- We need ???? litres capacity of storage: "Not a Problem"*
- We need fuel management systems: "Not a Problem"*
- We need full compliance with 'Australian Standards: "Not a Problem"*
- We want to be sure the tanks will last: "Not a Problem"*

Visit our website for details
festanks.com.au/fuel-tank-farms/



GET IN TOUCH TODAY
1300 651 391
info@festanks.com.au

POWERING AHEAD

All images: Independence Group.

After celebrating one year since its Nova mine entered commercial production in September, Independence Group has its sights firmly set on key metals used in renewable energy technologies and electric vehicles, with further expansion and exploration projects across WA and the Northern Territory on the horizon.

AMY BLOM

INDEPENDENCE Group (IGO) would continue to prioritise exploration work at its Nova operation and the surrounding Fraser Range, following a strong start to FY19.

According to its September quarterly report released on 29 October, IGO increased net cash to \$62 million and achieved metal production guidance at Nova, about 160km northeast of Norseman, and at Tropicana gold mine, 330km northeast of Kalgoorlie.

The WA-based miner had a 100 per cent interest in Nova, which began production in June 2017, and a 30 per cent interest in Tropicana, with AngloGold Ashanti holding the remaining 70 per cent.

Mr Bradford said first quarter results for the 2019 financial year demonstrated the quality of the two assets, which underpinned the funding of its exploration program to drive future growth.

“Our ongoing \$51 million commitment to discovery in FY19 is targeting metals important for renewable energy and electric vehicles,” Mr Bradford said.

“This work prioritises exploration at Nova and the Fraser Range with the objective of finding additional nickel-copper-cobalt discoveries like Nova.

“Our exploration team has successfully stepped up our activity level in line with increased commitment to exploration in FY19 and the excitement of the team, fanned by the prospect of discovery, is infectious.”

The Nova mining lease has been the subject of the largest 3D seismic program ever undertaken in Australia, with Mr

Bradford describing the Fraser Range as “extremely fertile.”

According to IGO, a preliminary review of data earlier this year identified numerous targets that warranted further investigation and drilling at Nova.

More targets were expected to be identified as the data integration and interrogation continued, while two targets were advanced to drill status, with the first of these to be drilled in Q2 FY19.

Further greenfields exploration was carried out across the Fraser Range, including Widowmaker and Andromeda during the quarter, with assay results pending.

The SpectremAir airborne EM survey at Lake Mackay in the NT continued during the quarter, including the ‘high priority’ Blaze prospect area,

The airborne survey was expected to be completed in Q2 FY19, including an area funded by the NT Government under the geophysics and drilling collaboration program.

On 25 October, IGO and Prodigy Gold announced a farm-in and exploration joint venture for the Lake Mackay project, triggered by IGO completing its initial \$6 million earn-in expenditure, with IGO holding a 70 per cent interest.

Prodigy Gold managing director Matt Briggs said the establishment of the JV offered both companies the opportunity to build on an already strong relationship focussed on delivering a significant new mineral discovery.

“This focus is further underlined by an inaugural JV budget of \$4.6 million for the remainder of FY19, which provides

for our largest-ever commitment to RC drilling on the project,” Mr Briggs said.

“Exploration during the quarter continues to provide encouragement.

“Eight new geochemical anomalies were identified plus 39 airborne EM anomalies for on-ground EM follow up.

“The EM results build on the surface work already undertaken allowing the exploration team to prioritise targets for follow-up investigation which can only increase our chances of making a major discovery.”

Lake Mackay was considered prospective for gold and base metals, as well as nickel sulphide mineralisation.

Adding Value

In addition to its exploration programs, IGO was working to further evolve the downstream processing potential from its broader Nova assets to produce nickel and cobalt sulphates for electric vehicle (EV) batteries.

Speaking at 2018 Australian Nickel Conference in Perth on 23 October, Mr Bradford said the strategy could deliver IGO the potential for higher payability, premier prices and higher concentration recoveries.

“EV lithium ion batteries cathodes with higher nickel content are the key to enabling higher energy density, and that broadens our opportunity for Nova to emerge as a stable supplier of minerals critical to clean energy storage,” Mr Bradford said.

According to IGO’s September quarter report, strong gold production from Tropicana was also expected to continue

through upgrades to processing capabilities, which Mr Bradford said were on track to be completed by the end of 2018.

“The value enhancement activities at Nova and Tropicana were progressed broadly in line with plan,” Mr Bradford said.

“This includes the Nova nickel sulphate pre-feasibility study, as well as the installation of the second ball mill at Tropicana and the pre-feasibility study for the Boston Shaker underground at Tropicana, both of which are on track for completion this quarter.

“IGO is a business which can achieve transformational organic growth over the coming years through the potential for both downstream processing and discovery.”

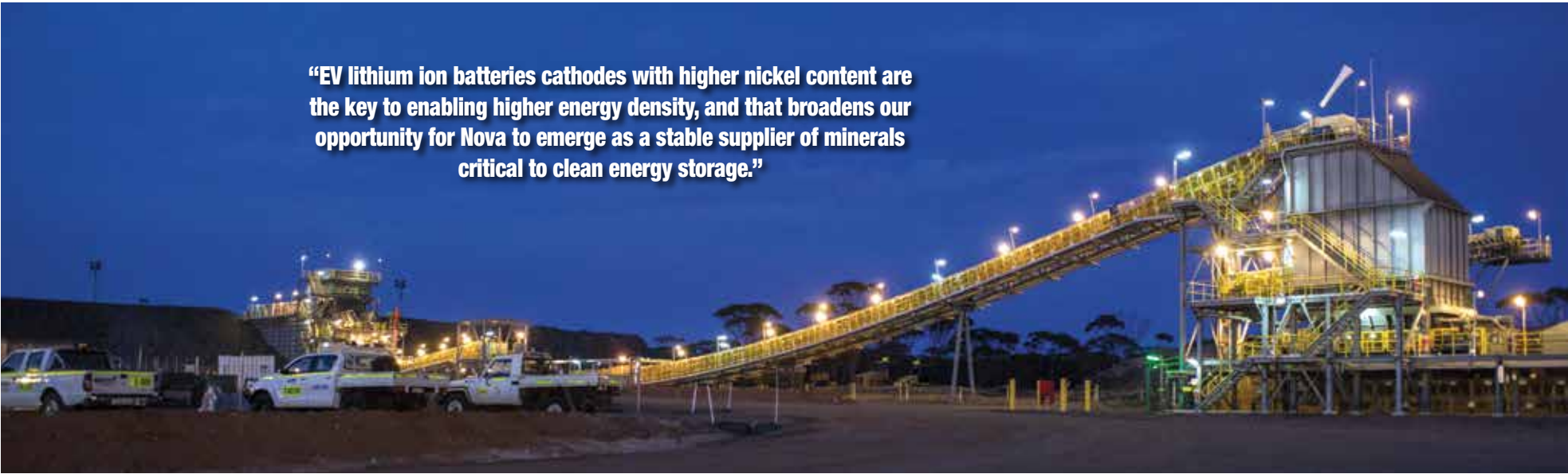
Design and civil works on the second ball mill have been completed and mechanical installation was progressing.

Structural mechanical and piping installation was well underway, with the majority of plant tie-ins completed during the scheduled October shutdown.

The new ball mill would enable processing throughput rate to be increased by about 5 per cent and gold recovery to be improved by up to 3 per cent to about 92 per cent.

Improved gold recovery would be achieved by the additional milling capacity allowing a finer grind, which would result in better liberation, and therefore, a better gold extraction rate.

At Nova, IGO completed a number of trade-off studies during the quarter to determine the final process flowsheet to be carried forward into engineering as part of the pre-feasibility study.



“EV lithium ion batteries cathodes with higher nickel content are the key to enabling higher energy density, and that broadens our opportunity for Nova to emerge as a stable supplier of minerals critical to clean energy storage.”

Nova at night.

It also completed a plant trial to produce an optimal, high-grade nickel concentrate feed for downstream processing.

According to IGO, the trial was successful, allowing the miner to collect three tonnes of higher-grade nickel concentrate with reduced sulphur content, specifically optimised for the downstream processing project, which would be used for additional pre-feasibility and feasibility metallurgical test work.

The September quarter also saw IGO executing key strategic contracts at Nova, including renewing and extending Barminto's underground mining contract for four years with a two year extension option.

On 23 October, IGO announced it had finalised an agreement with Zenith Energy to construct a solar photovoltaic (PV) facility at Nova, which Zenith would build, own and operate.

First power supply from the facility was

expected in the Q1 FY20.

It would be the first fully integrated commercial hybrid diesel/solar PV facility in Australia.

Mr Bradford said IGO believed in the green energy future and was committed to renewable energy sources as it strove to reduce its carbon footprint.

“The development of this innovative hybrid solution will also improve our cost structure with targeted renewable power insertion of up to 50 per cent demand via the solar PV facility,” Mr Bradford said.

Financial Results

Mr Bradford said while cash costs at Nova had been higher than guidance, this was impacted by lower metal produced and lower by-product metal pricing.

“We expect cash costs to trend lower in subsequent quarters on the back of higher

quarterly metal production,” Mr Bradford said.

Nova nickel production for the quarter was 6854 tonnes, while its copper production was 2019 tonnes.

Gold production on a 100 per cent basis at Tropicana was 125,100oz, while gold sold at IGO's 30 per cent share was 35,143oz.

Despite higher nickel concentrate sales from Nova and higher Tropicana gold sales, total revenue for Q1 FY19 was lower than the previous quarter at \$167.4 million due to softer base metal prices and lower copper concentrates sales.

Revenue was also impacted by the Long operation going into care and maintenance in the previous quarter, and the sale of the Jaguar operation.

However, net cash was higher than the prior quarter at \$108.1 million, largely as a result of strong cash generation from Nova and Tropicana.

In more good news for IGO, confidence in Australia's nickel sector was on the up, according PCP Capital Group principal Liam Twigger.

Speaking at the 2018 Australian Nickel Conference, Mr Twigger said there had been a continuation of improvement in sentiment for the Australian nickel sector over the last 12 months, and that value seemed to be building.

“This is in addition to further consolidation opportunities in the Kambalda region and Fraser Range, and a continued strong push into the battery metals space by the likes of Nickel West with its nickel sulphide strategy, Western Areas with its MREP, and Independence Group with nickel sulphate hexahydrate,” Mr Twigger said.

“The Australian nickel sector remains in great shape, not only for today, but also for the future.”



AMS

Adroit Mining Services

- Surface & U/G Infrastructure
- Installations • Service Work
- Quality Labour Hire
- General Fitting/Machining
- Fabrication • Poly Welding

08 9027 3851

admin@adroitms.com.au

All images: Mountt Gibson Iron.

STARTING FRESH

The rebuild at Koolan Island is now 90 per cent complete and on track for completion in March next year, less than five years after Mount Gibson Iron was forced to close it following extensive flooding. Amy Blom spoke with incoming Mount Gibson Iron chief executive Peter Kerr about the rebuild and what else lies on the horizon for the miner.

Q. WA's Koolan Island closed in 2014 following extensive flooding. What led to the decision to rebuild the seawall?

Mount Gibson approved the rebuild of the seawall in April 2017 after two years of comprehensive feasibility assessment which identified a safe and viable engineering design for the seawall and confirmed very compelling economic fundamentals using conservative base case assumptions.

Since that time, the economics have continued to improve. In April this year we increased total ore reserves by more than 60 per cent to 21 million tonnes (mt) grading 65.5 per cent iron.

Koolan will be Australia's highest grade direct shipping hematite iron ore operation when sales commence next March.

Meanwhile, there has been a fundamental shift in the pricing differential for low and high grade iron ores over the last couple of years – with 65 per cent iron material attracting a premium and currently worth at least 25 per cent more than material grading 62 per cent iron.

At our conservative base case assumptions – 62 per cent iron price of \$US55 per dry metric tonne (dmt) cost and freight (CFR), AUD:USD of 0.75, and high grade premium of 10 per cent – the project has an estimated pre tax net present value (NPV) of \$250 million and internal rate of return of 37 per cent.

Those estimates are inclusive of total investment costs of about \$175 million prior to the start of sales – comprising \$100 million in restart capital and \$75 million on pre-production activities such as mine pre-stripping – and also include estimated eventual closure costs of circa \$28 million, which would have to be spent whether we reopened the mine or not.

If you use recent spot pricing (62 per cent iron of \$US75/dmt, AUD:USD of 0.71, and high grade premium of 25 per cent), the



“Our immediate focus remains on completing the Koolan restart project on schedule and resuming ore sales in March next year.”

project would have a pre-tax NPV of over \$900 million and internal rate of return (IRR) of over 90 per cent.

So it really is a unique opportunity for Mount Gibson.

Q. Can you detail what the rebuild involved and how far along the project is now?

The first step was the completion of the feasibility study work to confirm the engineering, technical and economic viability of the project.

Once we'd completed this work and approved development, the next step was to rebuild the seawall embankment by filling the breach with waste rock.

This was completed in August 2017, after which we were able to commence construction of the impermeable seawall barrier within the embankment.

The barrier is a cement “curtain” 1.2m

wide, 470m long and up to 44m deep which sits within the seawall embankment.

This was the longest and most complex task, and was completed in mid-July 2018, and required engaging a specialist contracting firm experienced in this type of construction.

The barrier is made up of about 190 panels, each excavated separately in an alternating pattern, and filled with a cement bentonite mix.

Ahead of panel excavation, holes were also drilled either side for the injection of a cement grout to reduce the seepage of wet cement into the rock-fill.

We have also installed numerous sensors and monitoring instruments that allow us to monitor any movement in real time.

The cement seepage barrier, which extends down to bedrock, is the key difference between this new seawall and the one that was originally installed, which instead had a core of dense clay as

the main water barrier and which didn't extend all the way down to bedrock.

Once the seepage barrier was completed in July 2018, we installed heavy duty dewatering pumps and in early August commenced dewatering at a rate of about 1500 litres per second, or about one Olympic-sized pool every half hour or so, to remove the 21 million cubic metres of water in the pit.

As we reported in the quarterly, by mid-October the project was just under 90 per cent complete, with over 8.5 million cubic metres of water having been removed from the main pit, in line with our schedule to start mining by the end of the year and to commence ore sales by the end of March 2019.

In tandem with the dewatering, we are also refurbishing the main pit footwall (the “inland” side of the pit) by using a barge-mounted shotcreting machine to cover areas where required, and installing avalanche mesh to catch any loose debris.



Re-profiling the central section of seawall.

Activities are currently running to our schedule and the wall is performing as expected.

Q. What were some of the challenges involved in the rebuild and how were they overcome?

Getting the right design, by a group of leading expert engineering firms, was the first task which required a detailed understanding of how and why the original seawall failed.

Three groups of technical engineering experts were selected, each with defined scopes and review roles.

We also needed to engage a contractor able to install the seepage barrier, which is a relatively common method for reclamations and refurbishing old earthen dams.

More generally, working in a remote island location such as Koolan also represents its own challenges as virtually everything has to be trucked to Derby and then barged 140km to the island.

Cement was delivered direct by ship.

Working in a remote tropical location can also be challenging for those who aren't prepared, especially during the humid wet season from November through to March.

The challenges of working at Koolan Island are something we're well accustomed to managing, given we mined and exported over 20mt of ore from the operation in the seven years we operated the mine prior to the main pit flooding in late 2014.

In addition, our dedicated care and maintenance crews did an outstanding job leading up to our restart decision, ensuring that the existing infrastructure and mobile mining fleet remained in good condition.

Q. Koolan mine is expected to restart as iron ore prices continue to climb. How confident are you in the iron ore market at the moment and Koolan Island's ability to deliver a predicted rise in demand?

We are very confident in the outlook for Koolan's unique high grade products, given the changes apparent within China, notably with regard to rationalisation of the steel industry into bigger, more profitable steel producers, and the Chinese Government's efforts to reduce pollution.

These factors have been central to what we see as a structural change in pricing for high and lower grade iron ores.

While we expect the price differential between different grades of iron ore to pinch and swell over time, we don't expect them to return to historical levels when high grade ores received little premium, and discounts on lower grade ores were relatively modest.

Regardless, Koolan does not depend on current pricing to be a compelling investment.

As I noted, even using our conservative base case assumptions – an average Platts 62 per cent iron price of \$US55 per tonne, a high grade premium of 10 per cent and an AUD:USD exchange rate of 0.75 (versus current price of \$US75 per tonne, premium of 25 per cent and exchange rate of 0.71), Koolan promises excellent returns.

The reality is this mine should generate attractive operating margins in all but the most pessimistic pricing environments, given its estimated life of mine cash breakeven price, including development capex and closure, of around \$US40 per tonne CFR – Platts 62 per cent iron price.

Q. How will the restart of the Koolan Island mine benefit both Mount Gibson Iron, and the community?

From a company perspective, Koolan Island promises another five to six years of excellent cash-flow generation that will further bolster our financial position and our ability to invest in new opportunities to create value for our shareholders.

From the perspective of our employees and contractors, it also means stable long-term employment for more than 300 people who will be needed at the island.

We are also very proud of our positive long term relationship with the Dambimangari People, the traditional owners of Koolan Island, with whom we have always worked closely, including opportunities for indigenous training and employment.

The restart of Koolan Island will also have a significant benefit to the economy of the west Kimberley, especially the Derby region.

And the State Government will no doubt appreciate the substantial mineral royalties that Koolan's high grade ore will generate.

Q. Beyond Koolan Island, what were some of the highlights for Mount Gibson Iron in the last quarter?

The solid performance of our mid-west business, from an operating, financial and safety perspective, was a highlight, especially as it is now in the final stages of what has been very successful 15 year presence for Mount Gibson in the mid-west region.

Our Extension Hill operation just passed five years without recording a lost time injury (LTI), while our Geraldton port operations recently passed nine years without an LTI.

This is a safety performance of which our teams can be very proud.

Meanwhile, despite the continued heavy discounts on ores grading below 62 per cent iron – such as our mid-west

products – the business generated positive operating cash flow of \$18 million in the quarter, while cash costs continued to fall to \$37 per tonne Free on Board (FOB).

Q. What else is on the horizon for Mount Gibson Iron?

Our immediate focus remains on completing the Koolan restart project on schedule and resuming ore sales in March next year, and also successfully completing mining and sales from the mid-west, before transitioning the Extension Hill site to closure in the first quarter of 2019.

But we are also continuing to actively seek and evaluate potential new resources investment opportunities, both within and outside the iron ore sector, with a view to life after Koolan Island in six or so years from now.

Our strong balance sheet and cash reserves give us significant capability in this regard, though it is important that we remain disciplined when it comes to assessing such opportunities.

Q. Anything else to add?

We firmly believe that the resumption of sales from Koolan Island should enable a significant market re-rating of Mount Gibson's share value, which in our view continues to trade at a substantial discount to the company's underlying value.

Mount Gibson is the only ASX-listed stock that offers investors direct exposure to the market for premium quality direct ship hematite iron ore.

The company is debt free, has substantial cash reserves for investment, and has a record of paying dividends – since late 2011 Mount Gibson has returned almost \$230 million in fully franked dividends to shareholders.

All images: Heron Resources.

IN FULL GEAR

Heron Resources has a lot to celebrate, with underground mining now underway at its flagship Woodlawn zinc-copper project, and commissioning on track to begin by the end of this year.

JESSICA CUMMINS

HERON'S high-grade Woodlawn project in NSW is a highly prospective zinc-copper deposit, 50km northeast of Canberra.

Following the completion of its Feasibility Study in mid-2016, underground mining began at the project in September, with commissioning expected to commence within the next couple of months and first shipment marked for the first quarter of 2019.

The high-grade, long-life mine is well placed to participate in a zinc market facing a significant supply shortfall, producing on average 40,000 tonnes of zinc in concentrate annually, and by-products such as copper, lead, gold and silver.

Heron Resources chief executive and managing director Wayne Taylor said the key focus for the company at the moment was operational readiness.

"We are getting all of our operation personnel on board as well as all of the supplies that will allow us to meet the demands the project puts on us for consumables and other bits and pieces," Mr Taylor said.

"Also the supporting systems that ensure we have the right training in place and support infrastructure to make sure that it holds together."

Project Developments

During the September quarter, the miner received the final assay results for its extensional and infill drilling program of its shallow G2 Lens.

"The results are quite exciting to us and are typically a little bit higher in precious metals," Mr Taylor said.

"In fact we have received some of the highest precious metal grades that the project has ever seen.

"The reason we like those is because it does report through to the concentrates and makes the value of the concentrate considerably more than what they would a standard specification – it's a nice sweetener."

Located adjacent to the planned route

"This is the year in which we have made the transition from junior explorer to developing our first mine at Woodlawn,"



IsaMill key fine grinding equipment installed.

of the decline at 120m to 150m below the surface, the G2 lens represented the first underground production source that would be processed through the plant.

"Our decline is currently close to 50m so we are almost halfway there in terms of depth already – it will take us a couple more months of declining to get to that position but it is very shallow," Mr Taylor said.

"For a former operation to have material that high up is very unusual and we are certainly very thankful that it is there."

The 14-hole 2411 metre program defined the limits of the G2 area and the results provided Heron with the assurance of the boundaries and structure of the mineralisation.

"The completion of the G2 Lens drilling program is an important step for the early production schedule of the mine in 2019," he said.

"While structurally complex, the often high-grade nature of the lens should provide a good source of early underground ore to the processing plant; furthermore this mineralisation is in addition to the published reserves for the project."

New Processing Facility

The company has also started building its new state-of-the-art processing facility.

"We have the opportunity to put in brand new equipment which has benefit from the evolutionary steps that, over time, people have found ways to improve," he said.

"So it's more efficient and it's more effective – the other part is the installation of the IsaMill – it's a piece of technology that wasn't around during the previous operations.

"It's all about fine grinding and that grinding liberates the different minerals so we can separate them more effectively."

Mr Taylor said the IsaMill was one of the best examples of the advances made in sulphide processing technology since Woodlawn closed down in 1998.

Regional Exploration

Heron has a strategic exploration ground holding within its 1200km tenement

package over the prospective Silurian volcanic rocks around the Woodlawn mine.

"Our focus aside from Woodlawn is still somewhat Woodlawn - we want to deliver this project and we don't want to be distracted by too many other things at this time but we will be undertaking some activity on those regional tenements," Mr Taylor said.

"There are some very high ranking prospects there that have the potential to deliver a satellite production source for the Woodlawn plant down the track."

The company's exploration strategy was on known mineralisation with comparable metallurgy to Woodlawn and within trucking distance of the Woodlawn concentrator.

On The Horizon

"One of the interesting things about the zinc space is we don't have many pure zinc peers at present and there are still very few that are financed to get into development," Mr Taylor said.

"So I can't see our peer group expanding that much - that said amongst the current peers our studies suggest that we will be very competitive on a cost basis and that was and always has been one of the significant draw cards of Woodlawn.

"Its high-grade mineralisation means that we are able to operate at the right end of the global cost curve, so we think we will remain very competitive."

While it was coming up to an exciting time for the company he said the project would see the realisation of plans that were set many years ago.

"There is quite a bit of internal satisfaction in seeing this all materialise – we see ourselves coming into production at a time when the zinc market is still showing significant signs of strength – we continue to see the stocks drawn.

"Right now our focus remains on the delivery of Woodlawn but beyond that we have our regional exploration program which is all organic growth."

INDUSTRY SPOTLIGHT

COMPANIES GEARING UP

Kubota trash pump leads way

NATIONAL

AUSTRALIAN Pump Industries (Aussie Pumps) has introduced a new, robust six-inch trash pump.

The heavy duty trash pump, powered by Kubota's 24.8 horsepower (hp) water cooled, three cylinder diesel engine has the ability to produce up to 4200 litres per minute.

Apart from its high flow capability, the big advantage of the Aussie QP60TD/D1105 is its simplicity in design.

Wet prime trash pumps are relatively inexpensive and have less operating costs compared to dry prime pumps.

"Wet priming trash pumps allow portability and independency from a designated power source and the ability to be placed right at the water's edge," Aussie Pumps product manager Brad Farrugia said.

The best conditions for wet priming pumps where the suction lift is less than 8 metres vertically are open pit and sumping applications.

The Aussie QP60TD/D1105 can also be used for bypass pumping when there is sufficient retention time to allow for the pump to prime.

With features such as its big non-clog style impellers, manufactured from high SG cast iron, dirty water pumping and pumping solids in suspension is not an issue.

The hydraulic design of the impeller and volute obtains the best result in flow pressure, while the pump passes solids up to 40mm in diameter.

The pump's six inch inlet and outlet



Ideal for site dewatering in mines and quarries, Aussie's new Kubota powered six inch trash pump can be mounted on a trailer or transported by utility vehicle.

ports allows for easy adaption of camlock or bauer style fittings, while its cleanout port is easily accessed by releasing four

toggle style hinged levers.

The pump's face plate can hinge open, making it easy for operators to clean out

the bowl or service the impeller without dismantling the body or pipework.

Left over sediment can be flushed out easily with a readily accessible separate drainage port.

For long, trouble free operation, even in trash laden or muddy liquid applications, an oil bath mechanical seal is provided made of tungsten carbide.

The engine powering the pump set is a three cylinder Kubota D1105 and has a number of features including low oil, high temperature shutdown, plus an emergency stop button.

Aussie Pumps offers a free extended five-year warranty on all its range of poly pumps.

"This is a testament to the product and being powered by a high-quality Kubota powered diesel engine ensures the customer has complete piece of mind," Mr Farrugia said.

The Aussie QP60TD/D1105 is mounted on a sturdy skid steel base, has a 60 litre long range fuel tank incorporated into the skid.

The long range fuel tank allows the unit to run up to 10 hours when running at maximum speed.

An integrated centre mounted lifting bar is also supplied.

The unit's compact design, in spite of its high performance characteristics, allows the unit to be easily trailer mounted or transported by utility vehicle when necessary.

More information can be found at Aussie Pumps or authorised distributors throughout Australia.

Heralding new projects in switchboards

NATIONAL

WITH the iron ore markets looking up, mining companies have embarked on augmentation of exports and are gearing up to facelift harbour facilities.

Given the right conditions, BHP has begun its onshore and offshore outer harbour development project with the sole aim to bolster its export capacities.

From the stockyards to the jetty, new facilities were being added at Finucane Island and Nelson Point, propelling the demand for power infrastructure for its expansion projects.

DaRa Switchboards, an ISO9001-2015 company known for its reputation as a preferred manufacturer in mining boards, is the vendor for major mining companies in Australia.

The IP66 switchboards supplied were made to withstand the onshore and harsh marine weather conditions in stainless



More information about DaRa Switchboards can be found at: www.electricalswitchboards.com.au.

steel to last for the full project life cycle.

DaRa Switchboards has achieved remarkable acceptance and experience from a diverse range of industries,

specialising in mining switchboards complying with the latest switchboard and safety standards.

Those looking for a purpose-made

mining duty electrical switchboard should give DaRa Switchboards a go.

Inquiries can be sent to info@da-ra-switchboards.com.au.



All images: Metso.

Q & A ON GRINDING TECHNOLOGY

Metso sat down with a panel of experts from its business, Alan Boylston (AB), Suzy Lynch-Watson (SLW), Håkan Ståhlbröst (HS) and André Vien (AV), to discuss some of the trends and challenges facing mining producers of today. The goal: to find out how new grinding equipment and technologies can impact the industry.

METSO

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

AB: One main challenge we see for our mining clients in today's markets is how to balance the increased production needed to meet a rising demands for metals, with the fact that ore grades around the world continue to fall.

What this means is that to even maintain current levels of production, mines need to process more and more raw ore, which requires additional energy as they ramp up production.

It also translates in many cases to higher investments in equipment and higher operating costs.

In order to be profitable, mines have to really zero in on ways to improve operational efficiency.

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

AB: The big trends are related to looking at the many options that can help to lower energy costs as production demands increase.

It becomes important to look at improvement opportunities across the entire process to find ways to drive down costs.

On the equipment side, there is more openness to looking at new applications for older technology.

For example, High Pressure Grinding Rolls (HPGR) have been around a long time in limestone, cement and kimberlite operations, but applications involving hard ores are relatively new.

With their higher energy efficiency, HPGR's are getting a second look as an alternative to more traditional grinding in certain applications.

The Metso HRC3000, launched in 2015, represents a significant technological leap for the mining industry with its simple yet robust design that maximises energy efficiency, availability and reliability.

Process improvement is also what we are hearing more and more about from our customers.

Mines are looking at things like improving blasting practices at the mine face to reduce feed size to the primary crushers as well as optimizing mill liners for longer service life and energy savings.

We are also seeing the trend towards digitalisation with many mines using advanced process controls to make their operations more efficient and to reduce energy consumption.

All these approaches are focused on improving operational efficiency and making better use of energy to drive down costs.

HS: I would also add that there is a trend to replace small and medium-sized mills by fewer but significantly larger mills to handle the high capacities required.

Large mills require fast and safe maintenance, something we will continue to improve.

However, large mills also require large amounts of energy to operate, so I believe that the focus on efficiency will increase.

Energy is expensive and in many areas becoming more so with time.

Q. What technical improvements has Metso launched in terms of grinding technology?

HS: Traditional horizontal mills are generally not particularly energy efficient.

Only a very small part of the energy is transformed into efficient grinding, with the remaining energy channeled into liner and media wear, heat and noise.

In terms of technology, there is not much that can be done with the mill itself except for the engine and drive, but it is often possible to control the process better.

As an example, mills with variable speed controls allow you to run the mill as fast as needed and in combination with a control system that automatically adjusts speed and feed based on parameters such as mill weight and noise within the mill.

You can ensure that the mill is always running in the most efficient manner which helps to decrease energy consumption.

New and faster simulation tools also allow us to ensure that the mill feed contributes to increased grinding efficiency.

Previously simulations took a long time, but now we simulate almost all designs for larger mills.

If the grinding is as efficient as possible, you consume less energy per ton.

SLW: Metso is always looking to make improvements that will impact the grinding process and help clients meet their goals of increasing equipment availability and lowering operating costs.

One recent advance in mill lining that has received a lot of attention is the Metso Megaliner made from polymet and steel.

The liners can use less material than previously since we use a 'skip row' design, where the liners now have only two-thirds of the number of lifters as before.

Using this design, we can still achieve the same lift and charge trajectory but with less liner weight.

The lower weight can make it possible to load more in the mill and together with an optimised design, you can produce more tons and in some cases, increase efficiency.

Looking beyond products, we have also made technical improvements by combining our many services offers to find solutions that help clients achieve lower energy and

higher production levels.

This involves looking at our products and using our process, instrumentation and controls expertise to come up with the best combination of services to meet the clients' objectives.

For example, when our team is asked to assess why a particular grinding circuit is underperforming, we try to take a more holistic view.

Questions such as 'are the drill and blast practices optimised' and 'is there a large variance in the characteristics of the ore coming into the plant' are also important.

Of course, the grinding mill itself needs to be assessed but the process steps before and after the mill all play a part in driving the overall performance of the circuit.

Q. Do you see any trends in the way equipment is designed and used, especially as throughput tonnages continue to increase?

SLW: One thing that we have seen is plants looking at different options in terms of equipment selection to keep energy costs in check as production demands continue to increase.

For example, we are seeing interest in Metso Vertimill stirred milling technology, particularly in cases where a plant needs extra milling capacity or wants to achieve a finer grind.

In the past, plants would invest in a second ball mill to run in parallel with their current one to add the additional capacity, but this is not always an energy efficient way of tackling the problem.

Recent research by Malcolm Powell and Sam Palandiandy at the JKMRC showed that using a tertiary vertimill to increase circuit capacity can be 25 per cent more energy efficient compared with adding extra ball milling capacity in a secondary grinding service.

The conclusion was that looking at the performance of a single mill or piece of equipment is not always the right approach.

You really need to look at how all the different pieces of equipment in the circuit work together to find the most energy efficient combination.

It comes down to finding the right approach to the right application.

Q. What does Metso see in its field operations as poor grinding practices and how this can be overcome?

AV: One key thing to remember is that even with the most modern and up-to-date equipment, performance in the field is still dependent on how the equipment is operated.

Our global Process Optimisation group has visited hundreds of concentrator plants, looking at the comminution circuits, assessing how things are set up and looking for improvements in terms of energy efficiency or throughput.

Most of the process bottlenecks we run into are not caused by the machines themselves but rather have resulted from the way the comminution equipment has been configured or is operated.

The four most common issues encountered revolve around the grinding media used in the mill, how the mill speed and liner angles are paired, relying too heavily on rules of thumb related to production, and finally a lack of communication between the mine and the plant.

Q. Can you walk us through a few examples?



AV: Well, looking at grinding media we run into situations where the media is too large for the expected grind.

The result ends up being high wear rates to both the liners and the media and a very inefficient use of energy.

You can also run into poor quality media that splits or else wears in a way that results in disk shaped media that does not roll as it should within the mill.

This media consumes mill volume and power but the grinding is very inefficient due to the motion of the charge.

All of these factors add up to inefficient use of energy. The solution to this would be to conduct ongoing calculations to ensure the optimal size of grinding media is used and to keep a close eye on media quality.

In terms of incorrectly paired mill speeds with the liner angles, what you often have is media that becomes overthrown causing damage to the liners and to the media itself.

The way to monitor for problems would be to try to get a better picture of exactly

what is happening inside the mill.

This can be done in several ways.

One method would be to monitor the noise levels within the grinding mill using Acoustic technology such as Metso SmartEar OCS which measures steel on steel impacts within the mill.

By measuring the noise levels within the mill, you can adjust the mill speed to compensate and bring things back in line, resulting in more efficient grinding and energy usage.

We also run into situations where a plant is relying too heavily on rules of thumb or general assumptions without going one step further.

For example, we often think of increased power draw being tied to greater throughput.

But what if the problem is not with the mills tumbling speed but there is a slurry pooling problem? In this case it is not a question of an issue with tumbling efficiency but rather with pumping efficiency.

To correct this, converting a radial

discharge to a curved discharge could be a solution, increasing throughput in the mill for the same energy due to the higher discharge capacity of the pulp discharge system.

Finally, a lack of communication between the mine and the plant can be classified as a poor grinding practice.

A plant needs to have good visibility on incoming feed materials, in particular the ratio between coarse and fine run of mine ore, which can vary significantly.

Without good visibility, the plant may not be able to react quickly enough to adjust its operating parameters and therefore lose efficiency and overall performance.

HS: Sometimes it all comes down to not looking at the whole process.

Many companies are just trying to accomplish one thing at a time, lowering the price or increasing equipment longevity instead of considering how to improve the efficiency of its entire grinding process and reduce the cost per processed ton.

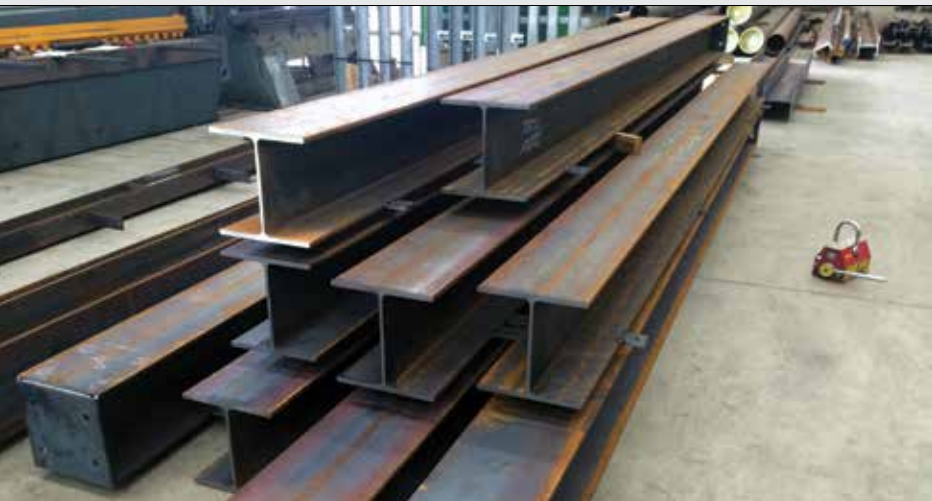
It's all about helping the customer to increase efficiency based on the conditions that exist.

In some cases, investments may be required, such as a new liner handler, to maximize liner size/weight and reduce maintenance time.

Changes in the process or equipment to solve problems or achieve set objectives may be required.

There really is no one size fits all solution and as a team we work on finding the right mix of equipment and services to help our clients meet their business goals.

Over the years, our clients have come to expect results and that is what we try to deliver.



More information about Hard Bakka can be found at www.hardbakka.com.au.

For all structural steel projects

NATIONAL

OPERATING under an ethos of going above and beyond the expected level of service to create a lasting impact, Hard Bakka has established itself as one of NSW's most successful steel fabricators.

Specialising in heavy engineering and construction, the multi-disciplinary company boasted a highly talented workforce that outstripped industry standard SME employment figures in the last financial year.

Hard Bakka's large and experienced workforce has enabled it to deliver full customer satisfaction for every project it

has taken on.

With more than 20 years' experience in the steel fabrication and welding industry, Mona Hwalla and Aladdin Bakka founded Hard Bakka just four years ago.

In 2018, Hard Bakka tripled in size and began operating from a 1000sqm, fully equipped warehouse in Fairfield East, NSW.

The extensive space enabled Hard Bakka to fabricate and deliver more than 30 to 40 tonnes of structural steel to projects across NSW and QLD every week.

For a free quote, Mona can be contacted on (02) 9796 7888 or by email at projects@hardbakka.com.au.



THE PREFERRED STEEL FABRICATOR FOR MINING

HARD BAKKA is an Australian steel fabrication company with a 30-year tradition. The qualified team pride themselves on delivering reliable, world-class steel services to the industrial and resource industries across Australia.

CONTACT US TODAY FOR A FREE QUOTE

(02) 9796 7888
sales@hardbakka.com.au



Embracing innovation and leading change

NATIONAL

MACHINE learning and Artificial Intelligence (AI) are at the forefront of LINX Cargo Care Group's (LINX CCG) technology mission for enhanced customer experiences into 2019 and beyond.

Technology has continued to play an increasing role in the organisation's future as a service provider in supply chain and logistics – for its sustainability, its people and its customers.

LINX Cargo Care Group IT general manager Thomas Gianniodis said the business opportunities using technology were endless, providing LINX CCG with the visibility into the supply chain it needs to achieve sustainable, people-led improvements for the ultimate benefit of its customers.

"Our organisation is gearing up for the years ahead by researching and implementing technology, such as machine learning and AI, to optimise our workforce and enhance the customer experience," Mr Gianniodis said.

"We have introduced new technologies, such as cloud infrastructure and data platforms, to begin driving digital transformation throughout our entire group of companies.

"This work is enriched when coupled with our partnerships with Microsoft and Samsung, to ensure we work in alignment with the next cutting-edge perspectives and technological advancements.

"The bottom line is that technology and innovation can enhance the logistics



More information can be found at www.linxcc.com.au.

workforce, as long as people are brought along on the journey through good leadership.

"Our people underpin our ability to succeed and the adage 'to win in the marketplace you must first win in the

workplace,' rings truer than ever in today's age of technological disruption."

LINX CCG continues its focus on customers and its ability to best support them through whatever industry or global disruptions occur.

Whether disruptions or developments include more flexible operations, increased service levels and or data insights, LINX CCG is prepared and responsive to help its customers adapt and continue to thrive.

WE KNOW COMPRESSED AIR

Need a compressed air solution for your project?
We know everything there is to know about compressed air.

Offshore and pipe drying rental equipment specialists for all mining and gas applications

- 100% Oil Free Compressors & Desiccant Dryers
- Zone 2 & Rig Safe
- Short & Long term hire available

Branches & Support Australia-wide



1800 247 769
www.airpoweredservices.com.au



Optimise project delivery with Consulcad

NATIONAL

CONSULCAD helps organisations optimise project delivery through alignment of strategy and delivery.

The company does this by leveraging ‘out of the box’ project management frameworks and award-winning software.

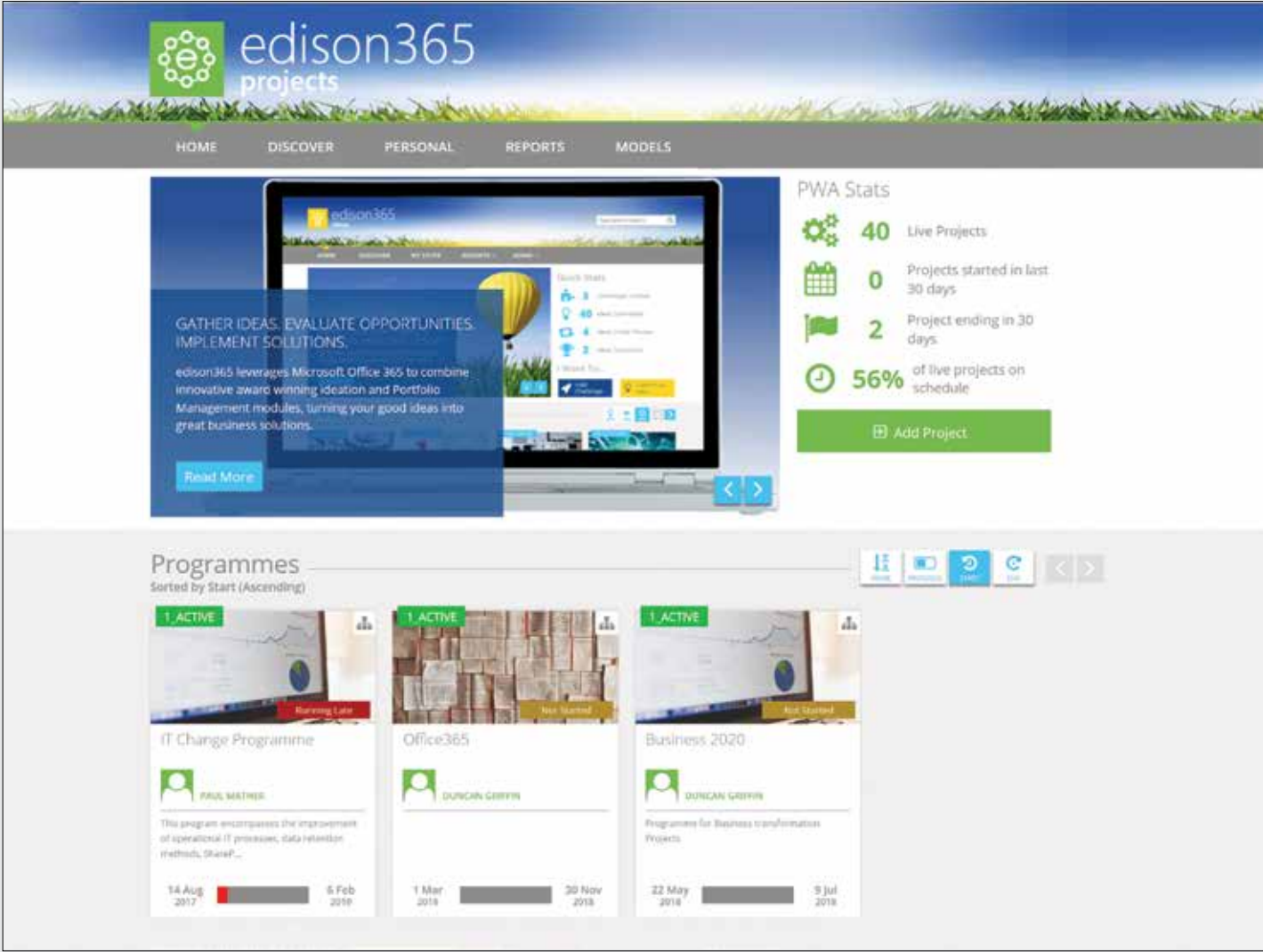
With edison365projects, Consulcad has changed the way organisations manage their projects and resources, providing them with the technology and management tools that drive success.

Consulcad managing director Simon Sands said the company often works with organisations that are rapidly expanding, which brings with it challenging and complex project portfolios.

“Customers want us to optimise project delivery to ensure the right outcomes are achieved in the shortest time possible,” Mr Sands said.

“That’s why we work with edison365, which is an award-winning platform that can be deployed with our project management frameworks in days.”

Mr Sands said edison365projects enabled organisations to seamlessly execute projects through an intuitive, sleek interface built for Microsoft Office 365, built for the way people operate



Consulcad works with award-winning platform, edison365projects.

today using laptops, tablets and mobile devices.

“Our customers are clear that they need powerful solutions that are easy to use and accessible from wherever they operate – edison365 meets that requirement.”

It means organisations can rapidly mobilise project delivery capability and see measurable outcomes to strategic and operational challenges in the short term.

With 30 years’ experience working on portfolios, programs, projects and project

management offices, Consulcad knows what it takes to deliver.

Consulcad adopts a holistic approach that considers the technology, people, and processes required for genuine and sustained change.



Manage tasks and implement ideas through an easily deployed, intuitive interface built on your existing Office 365 and Microsoft Project Online investments. Turn your organisation's ideas into visible, actionable plans and deliver measurable results.

Insight and control to empower your teams

edison365projects is the 2018 award-winning Microsoft Project Online solution used by thousands of users across the globe in every sector.

edison365projects extends the capabilities of Microsoft Project Online providing your teams with an easy to adopt end-to-end Project and Portfolio Management (PPM) solution to help drive success.

Gain clear insight into your employees' performance, use it to make the right decision for your project and your business, and turn good ideas into great solutions.

Key functions for your users include:

- Portfolio Modelling
- Management Reporting
- Finance Management



Gain insight to portfolio performance



Take control of resources and expenditure



Make more informed decisions



Get information at your fingertips



Maximise resources



Enable more effective collaboration



Contact Consulcad info@consulcad.com | www.consulcad.com

THE AUSTRALIAN
MINING REVIEW

PROFILES FOR JANUARY 2019

4WD Training
Access Restriction Solutions
Auctioneers
Catering Services
Centrifugal Separators
CNC Machining
Communication Solutions
Cranes & Lifting Solutions
Data Management Services
Dredging Solutions
Dump & Haul Trucks
Dust Control
Excavators and Earthmovers
Industrial Flooring & Coatings
Lighting Towers
New Residential Homes
Personal Protective Equipment
Plastic Fabrication
Process Plant Refurbishment
Ice Dispensers
Wear Repair & Resistance

CALL US TO BOOK YOUR
PLACEMENT TODAY
BOOKING DEADLINE: **November 23rd 2018**

BRAD FRANCIS

☎ (08) 6314 0303 ☎ 0405 345 312
✉ brad@miningoilgas.com.au



**ARE YOU HAVING
TROUBLE
BALANCING YOUR
EXPLOSIVES
MAGAZINES?**

Magman provides you with a
paperless & accurate explosive
magazine stock management
system.

**THE BENEFITS OF THE
MAGMAN SYSTEM INCLUDE:**

- A user friendly interface
- Paperless stock control
- Improved magazine compliance
- Instantaneous magazine stock levels
- Data is backed up to your cloud site

Magman – the innovative, intuitive
and intelligent Explosives Stock
Control System.

Phone Rodney 0427 273 150
or Daniel 0419 286 144

enquiry@magman.net.au

magman.net.au



Maxfield Drilling specialises in production blast hole drilling.

Delivering every possible solution

NATIONAL

FOR the last 30 years, Maxfield Drilling has strived to achieve world's best practice in blasthole drilling, through the provision of surface drilling and blasthole drilling services to the mining and quarrying industries.

The drill specialist has operations in Tasmania, NSW and WA, and has just completed a large scale operation in North Queensland.

It is contracted to miners including Alkane Resources, Metals X and Tasmania

Mines.

The company's managing director Mick Maxfield has experience with copper, gold, iron ore and coal.

Maxfield's state-of-the-art fleet is equipped with hole navigation systems for surveying accuracy and cost savings, and SmartROC for fuel reduction savings.

Maxfield was awarded an innovation award in 2006 for its contribution to the design, conversion and operation of two remote controlled Atlas Copco ROC L8 drills.

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



At Maxfield Drilling our desire is to be the drilling company of choice, which drives us to set and reach high environmental and safety standards. We deliver to our customers the highest quality of service and our professionalism is second to none.



**MAXFIELD
DRILLING**

P: (03) 6427 8240 | F: (03) 6427 0963 | E: info@maxfielddrilling.com.au

www.maxfielddrilling.com.au

YAHUA AUSTRALIA'S GROUP OF BUSINESSES



DRILLING AND BLASTING



We offer professional drilling and blasting services to the Quarry, Mining and Construction Industries. With a team of expertly-trained and experienced drill operators, shot firers and maintenance crew, we have a wealth of experience to meet individual customer needs.

info@drill.com.au | www.drill.com.au

HEAD OFFICE: 07 3807 3708

SAFE & EFFECTIVE
DRILLING & BLASTING IN
MINING, QUARRYING &
CIVIL CONSTRUCTION



Call 9225 5122
trainingcourseexperts.wa.edu.au

MONDAY OR THURSDAY



Senior First Aid
(All day)

TUESDAY



FIRE FIRST ATTACK
Morning



WORK SAFELY AT HEIGHTS
Afternoon

WEDNESDAY



ENTER AND WORK IN CONFINED SPACES
Morning



GAS TEST ATMOSPHERES
Afternoon



**TRAINING
COURSE EXPERTS**

**SITE READY
3 Day PACKAGE**
only
\$700!
(GST Free)

RT0 52355

“ Site Ready Package ”
Book now for your
3 DAY
Site ready package



**Original
commentary
and analysis**



**Cutting edge
technology,
products & services**



**Interviews,
Breaking news
and in-depth
company & project
profiles**

WE'RE FOR THE MINING STORIES THAT MATTER.

Published monthly – in hardcopy and digital – The Australian Mining Review is a feature-based publication covering one of the nation's most significant economic powerhouses.

Every edition features:

- Original commentary and analysis
- Exclusive Interviews
- In-depth company and project profiles
- New technology, products and services

1 year (12 issues)

\$120 (+GST)

Australia only.

Subscribe today

Visit

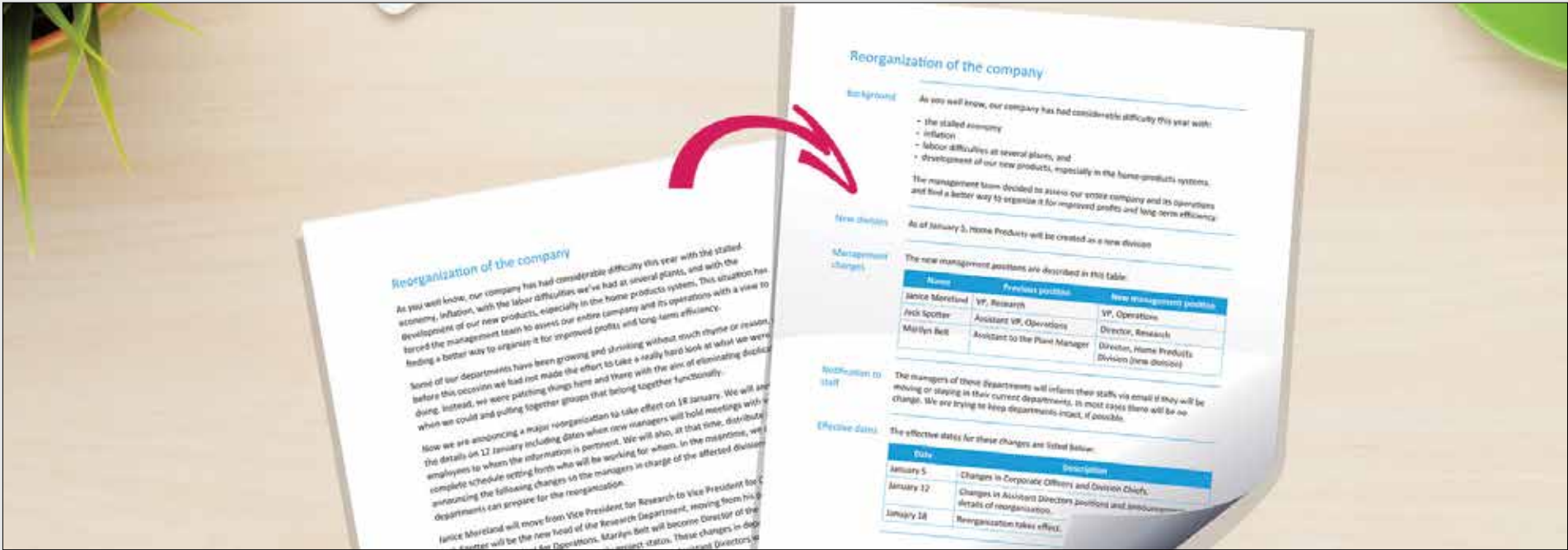
<http://australianminingreview.com.au/subscribe/>

or contact us

accounts@miningoilgas.com.au

(08) 6314 0301

THE AUSTRALIAN
MINING REVIEW



More information can be found at www.infomapping.com.au.

Creating effective documents

NATIONAL

MUCH written communication doesn't flow, uses inconsistent layouts, different writing styles and overly long sentences.

This makes it difficult or time-consuming for the reader to understand what the writer is trying to say.

Writers find it especially hard to produce documents or training materials when the information is technical or complex, difficult to organise, requires

frequent revisions or has to serve the needs of multiple audiences.

Features of effective documents

Effective communications convey a crystal-clear message in as few words as possible.

They are reader-focussed and obtain the desired results.

Organisations want information that is accurate, clear, concise, complete and timely.

Compliance and Safety want production to adhere to a quality standard that ensures consistency and control.

They want (and need) documentation that can support this.

Managers are looking for reports that they can easily consolidate and summarise.

What is information mapping?

The Information Mapping (IM) method was developed to assist writers to provide

these features.

It is based on research into how people read and absorb information.

It has been used successfully by Australian and international companies for more than 40 years to create better documents.

Key to its success is its simplicity which means it can be learned by anyone who needs to write as part of their job.

A two-day course equips participants with the skills to achieve highly effective written communications.

Information Mapping Australia – Your Partner for Clear Concise Documents

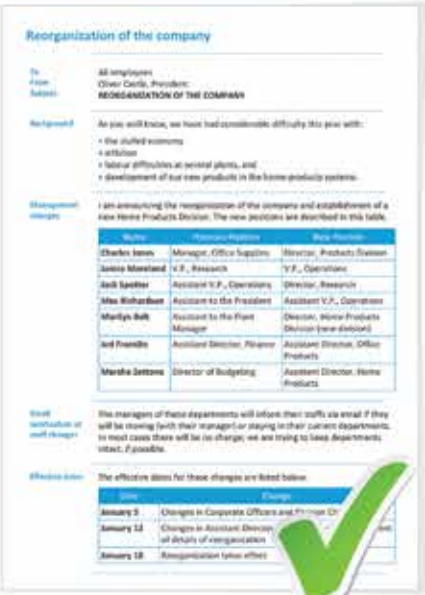


Let us help you produce effective

- Technical reports
- Work instructions
- Policies and procedures
- Training materials
- Tender responses
- And more.

We offer writing tools and techniques via

- face-to-face public courses
- inhouse training including your examples
- eLearning
- FS Pro 2020 productivity software
- consulting services.



Companies using the Information Mapping method report that writers spend 50% less time producing materials, error rates are reduced by up to 50% and usage is increased by 38%.

1300 728 441
sales@infomapping.com.au
infomapping.com.au

Quick structure solutions

QLD

SPLASH Structures has specialised in the design, manufacture, sourcing and marketing of portable fabric structures and EPS panel structures since 2003, across a diverse range of sectors including the mining industry.

Its portfolio includes a diversified range of arch shelters, industrial tents and flat pack panel structures including pop up folding shelters, flat pack containers and steel folding containers.

The company also produces a growing number of innovative fixed and portable solutions.

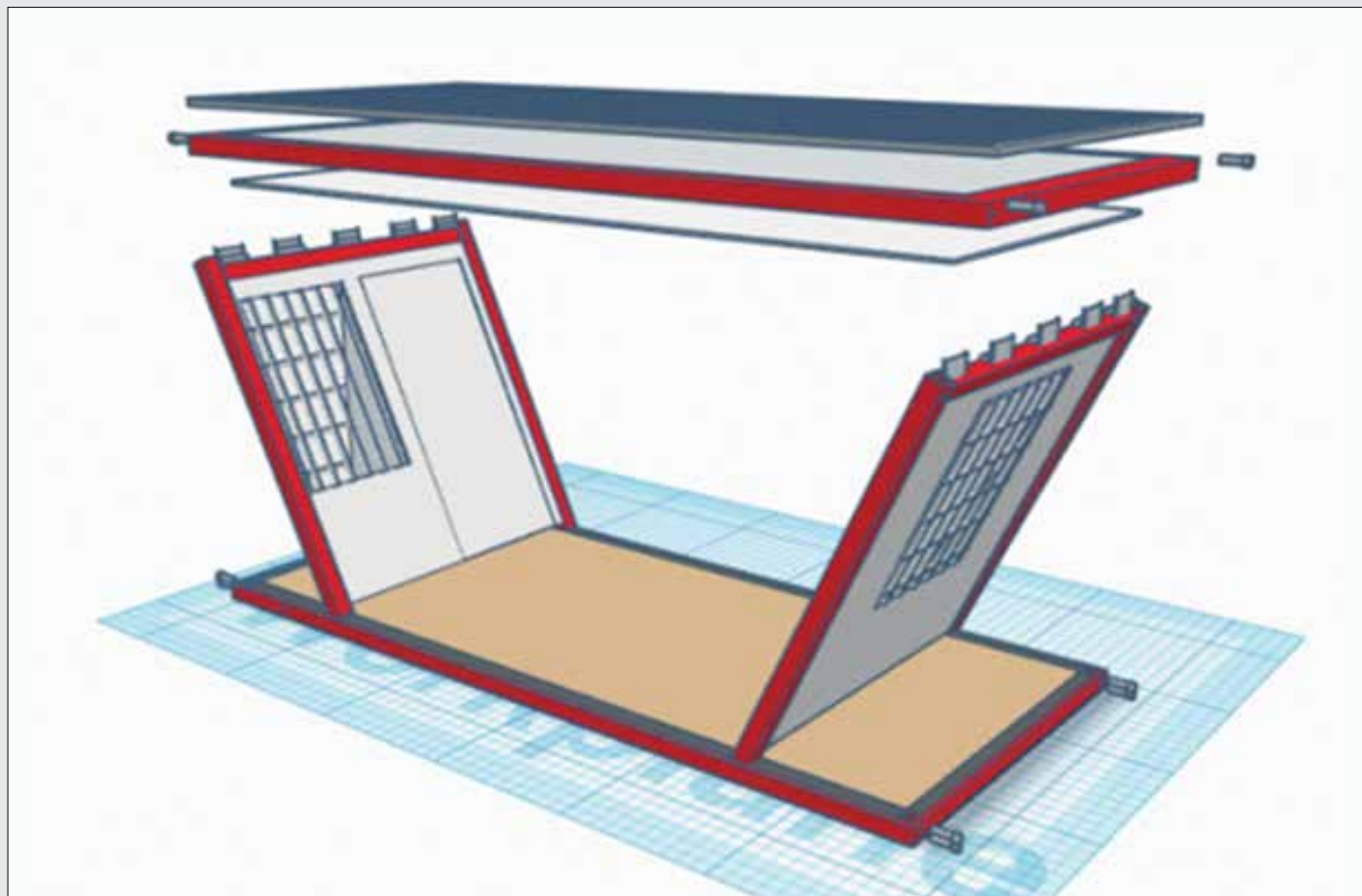
Splash flat pack and EPS panel structures are a series of portable and fixed pre-fabricated buildings that are shipped as a kit for on-site assembly.

Structures ranged from simple folding steel containers and insulated flat pack containers to steel frame panel buildings that could be small or massive.

Among the key benefits of Splash hard top structures were factory direct savings.

Modular flat pack container structures could be joined and stacked into small or larger complexes and a host of add-ons enabled customers to create the building or complex they required.

Splash also guaranteed no dangerous or toxic materials were used, while everything was NATA Laboratory or equivalent tested.



Splash Structures provides a wide range of fixed and portable structure solutions.

Cyclone and quake rods were also included in the EPS panel structures.

With Pauline Douglas at the helm, Splash included an entourage of factories, engineers, international sales

consultants and installation partners.

She said overheads were kept “lean and mean” to ensure she could pass on the best prices to customers.

Structures were also shipped all around the world directly from factories, removing the need for middlemen.

More information can be found by visiting www.splashstructures.com.

THE AUSTRALIAN
MINING REVIEW

FEATURES FOR JANUARY 2019

Aeris Resources
Arafura Resources
Bald Hill Lithium Mine
Beacon Minerals
Blackham Resources
Coolgardie Minerals
Coppabella Mine
Doray Minerals
Fitzroy Australia Resources
GEMCO
Greenbushes Mine
Looking Under Cover (3D Geological Modelling)
Mining in the Surat Basin
Newmont's Tanami Mine
Panoramic Resources
Rosebery Mine
Silver Lake Resources
St Barbara Ltd



CALL US TO BOOK YOUR PLACEMENT TODAY

BOOKING DEADLINE: **November 23rd 2018**

BRAD FRANCIS

☎ (08) 6314 0303 📞 0405 345 312

✉ brad@miningoilgas.com.au

HIGHLINE

QUALITY • STRENGTH • VALUE

Highline's enviable reputation for quality, strength and value exists Australia-wide



➤ Heavy Vehicle Workshops



➤ Warehousing



➤ Commercial Projects

45Yrs Experience in assisting Clients with new Building Projects from Sheds in Kit form to full turn key projects. Highline is here to help.

HIGHLINE – proudly celebrating 45 years strong in 2018

✉ sales@highline.com.au 🌐 highlinesheds.com.au

☎ 1300 088 725 or call Steve on 0425 336 666



Rotech recently completed an installation at Western Areas' Cosmos mine.

Rotech Water provides unrivalled service

WA

ROTECH Water has been a successful WA family-owned and operated business specialising in reverse osmosis and associated technologies since its formation in 2000.

Throughout that time, the company has maintained its focus on providing its customers with unrivalled service, excellent value for money, and the highest quality product available.

Rotech has designed, manufactured and serviced new systems, as well as optimising, modifying and maintaining existing equipment across a range of sectors, with the resources sector having been a major component of its client base for a number of years.

The company has continued to maintain a 'low overheads' approach, ensuring its pricing was competitive without compromising the quality of its product.

Rotech was quick to recognise and react to trends in its industry and the requirements of its customers.

The team at Rotech aimed to approach all its projects in the same way, from the smallest reverse osmosis system for an exploration camp with a mobile staff of three, to a full scale mine where the water not only provides potable water for mine personnel, but supplies the water for the all-important mineral process.

Among Rotech's recent projects was an installation at Western Areas' Cosmos mine.

More information about Rotech Water can be found at: www.rotechwater.com.au.

World-class water treatment

NATIONAL

ESTABLISHED in 2003, MAK Water has developed into a leading Australian water treatment system manufacturer over the last 15 years.

MAK Water has a wide selection of available technologies and the ability to produce customised water, industrial wastewater and sewage treatment solutions to meet individual client requirements.

In 2013, MAK Water expanded with the market and purchased industrial water equipment manufacturer, Clearmake, adding oil separation, clarification and water recycling to its portfolio of in-house plant designs for desalination and wastewater treatment.

As a combined entity, the business has been successfully operating for more than 20 years, employs more than 50 people across Australia, offering nationwide coverage, and has installed in excess of 4000 systems throughout Australasia and SE Asia and Africa.

Headquartered in Malaga, WA – MAK Water's fabrication facility is fully equipped, boasting a skilled workforce, including qualified plumbers, electricians, welders and mechanical fitters compounding in complete mechanical and electrical fabrication capabilities.

Experts in the most technologically



MAK Water Sea Water Reverse Osmosis (SWRO) plant.

advanced method of purifying water – reverse osmosis – MAK Water design and manufacture custom systems to allow the end-user to utilise local water supplies, such as groundwater, surface water or sea water, to produce industrial or potable water for human consumption.

Mak Water's technical sales team leader Michael Hartnett said to ensure the highest levels of productivity gain, equipment longevity and improved water recovery, the company works closely with clients in the beginning phases to establish water analysis, treated water quality or end use, flow rate, and containerised or skid mounted options.

At Rotech Water, Reverse Osmosis desalination and the associated technologies are our focus.

With experience across the resources, commercial and industrial sectors, we **design, construct and deliver** on time and on budget.



Call us today on (08) 9433 3060

admin@rotechwater.com.au | rotechwater.com.au

rotechwater

Best in risk control software

WA

OPERATING an efficient critical control verification process can be a real struggle.

The month to month grind of completing verifications and compiling results on even small sites consumes precious time.

For multi-site miners, keeping sites aligned and on-time with results correlated and aggregated often requires dedicated resources.

But thanks to the industry-proven, cloud-based solution Meercat RiskView, efficiency gains are only a small part of the benefit available.

After managing the rollout of a bowtie-driven critical control verification process across almost 100 Dyno Nobel sites in its Asia-Pacific Operations, Dyno Nobel senior risk manager for the Americas Andrew Cunningham realised a new approach was needed in the US to achieve economies of scale for the additional 100 sites there.

“Having one global framework that supports local, regional and divisional requirements, reduces duplication of effort and data inconsistency and ensures that our bowtie-driven critical control verification process continues to drive visibility and understanding of how our critical controls are performing, is vital to our business,” Mr Cunningham said.

“Being able to streamline these processes is also saving our site personnel and HSE staff tremendous amounts of effort in manually recording and updating records in



Meercat RiskView marshals field operations and maintenance staff to drive critical control verifications, delivering efficiency with transparency.

multiple repositories.”

Meercat founder Alex Apostolou said all of the company’s clients were facing unique challenges as they attempted to adopt standardised methodologies, including ICMM, and implement them, in many cases, across geographically, culturally and technologically diverse operations.

“Like IGO, Mt Gibson, Tronox, Sandfire and many of our other clients, Dynos are a great example of continuous improvement,” Mr Apostolou said.

“Year on year, they identify the next set

of challenges to be addressed and then we work with them to condense those learnings into Meercat RiskView to further simplify and optimise the risk and assurance process.

“And under our subscription model every enhancement is shared, so in a sense, Dynos are driving best-practice across the industry.

“For example, we’re just finishing a 28 site greenfield roll-out for an energy generator covering over one thousand critical engineering controls, and leveraging those learnings has delivered around 80

percent in savings.

“They are already developing targeted improvement plans for every asset, a major step in improving their operational integrity.”

Meercat RiskView is cloud-based, runs on both desktop and mobile, supporting both on- and off-line access, and supports the full risk and assurance life-cycle with real-time analysis and visualisation.

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

Critical
Control
Verifications
running
efficiently?



To see what best-practice looks like
call Tysun Chan on 08 6468 5351

meercat.com.au

Meercat RiskView is the proven, fast &
cost-effective way to embed bow-tie
driven critical control management

Meercat RiskView is a cloud-based solution available on annual subscription. Operates on mobile and desktop, on-line and off-line. Used by some of the biggest names in high-hazard management for over 10 years. Complies with ICMM & ISO 33000, ISO 15000.

Avoid rust with the best kept secret

NATIONAL

JUST because something has always been done one way, does not mean it is the best way, according to Fluid Film and its customers.

For years there have been rust and corrosion products, which promise a lot and do not deliver.

At the other end of the scale there have been products that do deliver but do not have high levels of brand awareness.

The comparison shown in the image pictured has demonstrated Fluid Film's long-term corrosion control economy.

In addition, the surface adherence of its lanolin-based formula has been self-healing in cases of scoring or similar damage and it remains soft and flexible, does not wash away or crack.

While most products of its kind contain between 70 and 90 per cent solvent, Fluid Film contains none, except for the propellant in its aerosol cans.

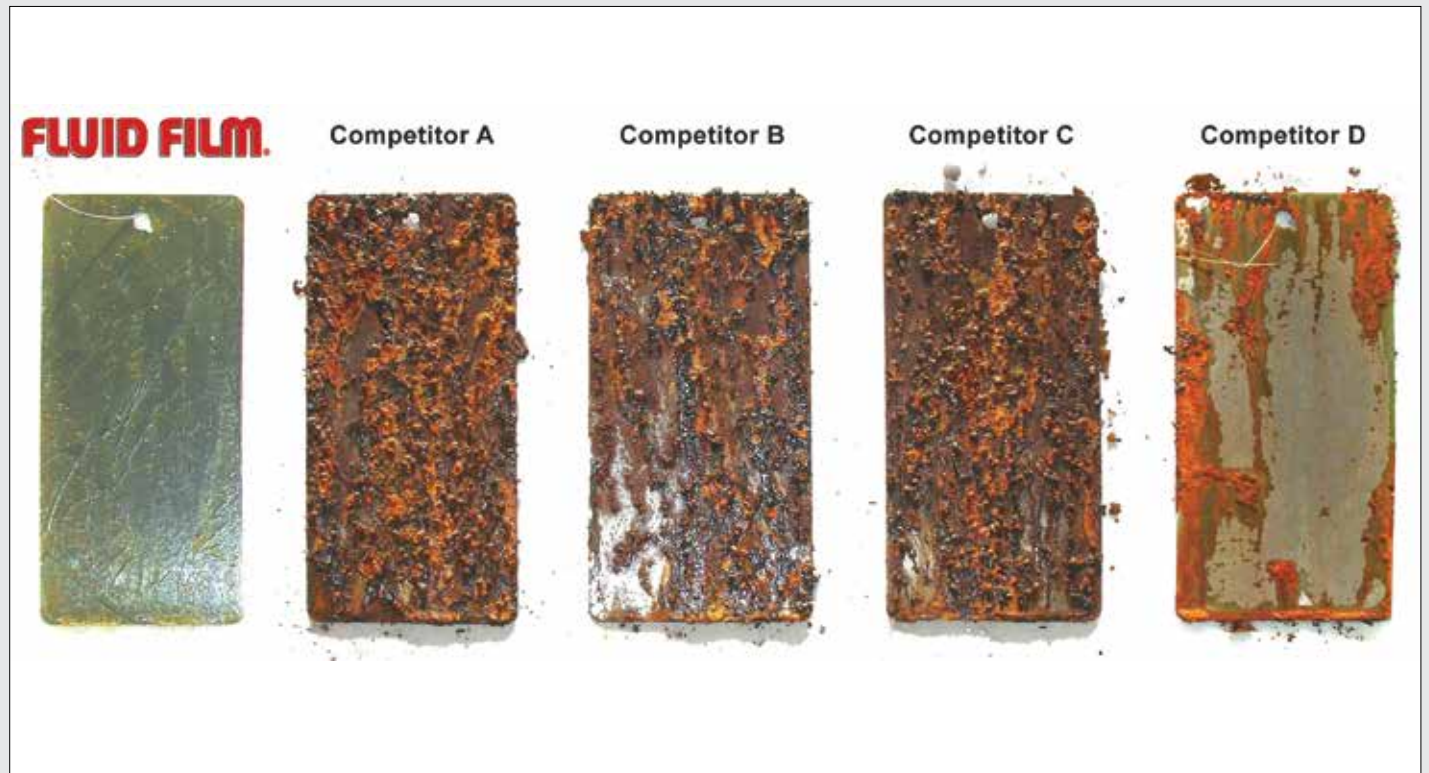
This has meant that only 10 to 30 per cent of competing products have usable corrosion control materials.

The rest evaporates, contaminating the atmosphere and is useless to the user.

Fluid Film penetrates into metal, blocking off the oxygen and moisture that cause rust and corrosion.

Made from naturally occurring lanolin, it forms a barrier, seeping into the pores of metal.

Fluid Film really has been perfect for



In independent tests Fluid Film consistently outperforms other products.

all areas in mining.

It can be used on air tools, battery connections, chains, conveyor belt rollers, as well as cranes and lifts.

Fluid Film has also been successful on door guides and mechanisms, hinges, drain pans, drill bits, chucks and presses.

Exposed gears and machined surfaces, hydraulic cylinders, internal pump preservative, wire rope preservation,

mould releasing agent, nuts, bolts and studs, pin locks, and pipe threads have also had the benefit of Fluid Film.

From a work health and safety perspective, Fluid Film has been a great choice for the mining industry because it is classified as non-toxic and non-hazardous.

Fluid Film does not contain solvents, phenols, heavy metals, arsenic, pcb's, pc's, tedd's or other dioxin related substances.

It has been manufactured using an all-natural lanolin base.

Fluid Film has been used consistently in Western Naval Forces, who have all done their due diligence, ensuring it meets MIL-SPEC.

Fluid Film has performed for sustained periods of time, clinging tenaciously to metal surfaces, stopping or preventing corrosion and providing silky slick lubrication.



Use the solution that ensures this doesn't happen to you

- ☒ SAFER FOR YOU & YOUR TEAM
- ☒ NON-TOXIC & NO SOLVENTS
- ☒ REDUCE MAINTENANCE & DOWNTIME
- ☒ EXTEND THE LIFE OF EQUIPMENT
- ☒ PERFECT FOR THE MINING INDUSTRY

**UNLOCK POWERFUL PROTECTION
TO STOP RUST**

visit **fluidfilm.com.au**
to get your **FREE** sample

Provider of industrial sealing technology

NATIONAL

EAGLEBURGMANN is one of the leading international manufacturers of industrial sealing technology.

The business group has manufactured a broad range of high-quality products from technically advanced customer-specific solutions to large-batch products for pumps, compressors and agitators.

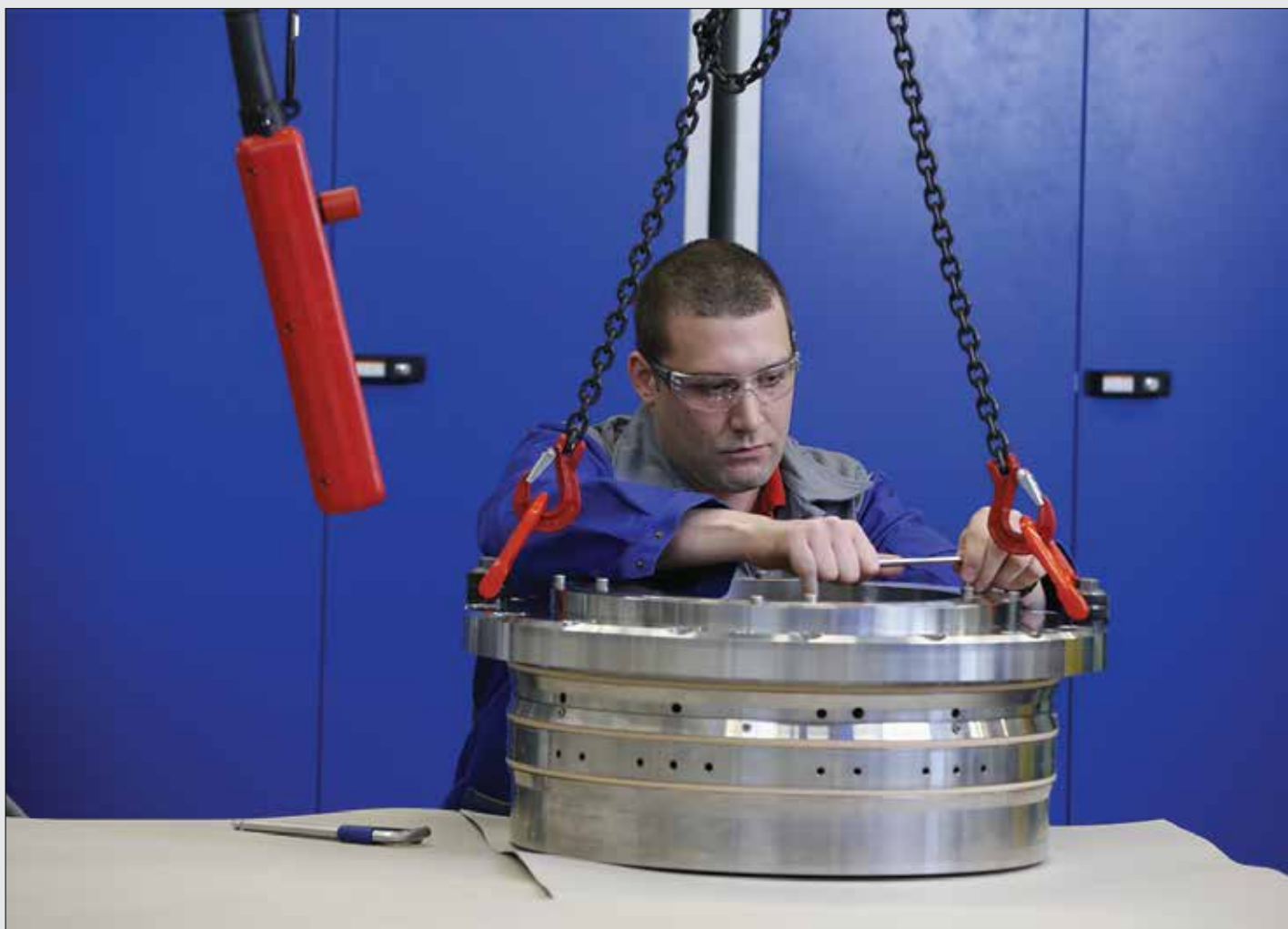
EagleBurgmann's products have been extensively used in areas where safety and reliability are of the utmost importance.

These included industries such as oil and gas, chemical, pharmaceutical, energy, food, paper, water, shipbuilding, aerospace and mining.

A comprehensive sales and service network throughout Australia and New Zealand ensured continuous availability.

Products included liquid and gas-lubricated mechanical seals and seal supply systems, magnetic couplings, carbon floating rings, dry gas seals and an extensive range of expansion joints.

In addition to the global resources these products were supported by local engineering teams in Sydney and



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

Auckland that can assist with product design, repair and root cause analysis and customer training.

EagleBurgmann has the support of both parent companies EKK and Freudenberg, which have a combined revenue of 10 billion Euro and more than 50,000 employees globally.

With a strong focus on innovation and value, EagleBurgmann was able to offer a range of engineering and maintenance services through to individually tailored service contracts.

Extremely rugged EagleBurgmann seals had a proven track record in their range of applications, including the

production of aluminium oxide and nickel processing in Australasia.

Its products have met the most exacting demands thanks to intensive research and development activities, as well as a comprehensive quality management system and in-house testing facilities.

DiamondFace technology: Unbeatable performance for mechanical seals

DiamondFace by EagleBurgmann is the solution for difficult mechanical seals applications. Wherever poor lubrication, partial dry running, abrasive media or electrochemical corrosion leads to high wear, DiamondFace offers the most robust solution.

EagleBurgmann Australasia Pty. Ltd.
16 Stennett Road, Ingleburn, NSW 2565 Sydney, Australia
Phone: +61 2 9605 0600, Fax: +61 2 9829 6958
info@au.eagleburgmann.com, <http://eagleburgmann.com.au>

a member of **EKK** and **FREUDENBERG**

EagleBurgmann®
Rely on excellence

Fabrication of structural components

WA

PRIVATELY owned Perth-based company Regal Engineering has more than 20 years industry experience servicing the mining, oil and gas and marine industry.

With its extensive knowledge in areas such as structural steel, piping systems, installation of mechanical equipment, general fabrication and welding (carbon and exotic materials), the company can meet all project requirements.

From boiler making, pipefitting and coded welding in-house and on local and remote sites, Regal Engineering has a fully equipped workshop capable for completing projects large and small up to 20 tonnes a single item.

Regal Engineering has always made safety its main concern because the only way to produce quality work is to have a safe and happy workforce.

The company has Hydro Testing with NATA signatory and mobile on site line boring capabilities.

Recent projects included Bin Isolation Gates for BHP, refurbishment and re certification of Flarebooms for AME Offshore Solutions, and the construction of Retractable Workover Platforms for Fluidline Services.

The company has the confidence and skills to produce high-quality fabrication of various types of structural steel components for the onshore and



Sand Silo.

offshore oil and gas, mining and local industries.

Its structural steel experience

has been based on previous and past fabrications of pipe rack systems, offshore rated lifting frames and

baskets, spreader beams, platforms and skidding systems to meet client specification.



REGAL ENGINEERING

MARINE • MINING • OIL & GAS
SPECIALISED FABRICATION & WELDING

28 Poletti Road Cockburn Central WA 6164

PO Box 5081 South Lake WA 6164

T. (08) 9414 1011 | F. (08) 9414 7431 | E. admin@regaleng.com.au

DryVac game changer

NATIONAL

FORCE One Australia introduced DryVac technology Australia-wide in 2015 and has established a strong client base since.

Successfully working for resources companies such as Santos, Shell, QGC, and Origin, Force One has the ability to safely excavate material through air power up to 150 metres horizontal or 40 metres vertical.

The process involves removing excess material around buried services or utilities by means of high volume air flow, as well as surface cleaning and many other applications.

When using DryVac technology, no water or slurry waste is generated, which means less road miles and the material excavated could be reused on site.

The process generates a lot of benefits which means 50 per cent would be saved on down time costs with no waste disposal, travelling or backfill costs.

It also excavates between existing infrastructures in a non-invasive way and with features such as its hydrostatic



Force One DryVac technology.

self-drive systems, DryVac technology could be up to 10 times faster when excavating compared to a hydro or jet vac machine.

When it comes to site maintenance and shutdowns the DryVac can reduce costs and shut down times and works on all sort of material from rail ballast rocks,

gravel, slugs, bricks, coal, boulders, water and everything in between.

More information can be found at www.forceoneaus.com.au.

NEW TECHNOLOGY EUROPEAN SUCTION EXCAVATOR DRYVAC



**LARGE EXCAVATIONS,
RE-GRIND PUMP BOXES,
SLUDGE PONDS, SILOS, TANKS,
PIPE AND RAIL TRACKS
CLEANING AND MUCH MORE!**



Call to find out how we can half the time of your site's shut down by performing all kinds of vacuum jobs and more!

Excavations in hard to reach places. No man entry.

100% environmentally friendly and safe.

Proven productivity and safety.

forceoneaus.com.au

**WE TRAVEL ANYWHERE IN AUSTRALIA
CALL 0438076606**

FORCE ONE
PROVIDING SAFE EFFECTIVE SOLUTIONS FOR AUSTRALIA

CORE LITHIUM MANAGING DIRECTOR STEPHEN BIGGINS

Core Lithium — formerly Core Exploration — will soon make the transition from explorer to producer with its highly prospective Finniss lithium project set to come online by the end of 2019. Jessica Cummins spoke with managing director Stephen Biggins about recent highlights and the company's name change.



Q. Why did you decide to change the company name from Core Exploration to Core Lithium?

With a clear path to production at Finniss, Core is evolving as a business and so we felt it was right that the name of our company should reflect that evolution.

We are on the verge of becoming Australia's next lithium producer. So it made sense for us to replace the 'Exploration' from our name in place of 'Lithium' as we steadily work towards transitioning from explorer to producer next year.

Q. Core has been working hard at becoming the Northern Territory's first lithium producer. What have been some of the major highlights for the company to date?

We had been quietly working away on developing the Finniss lithium project for a long time before we released the Pre-Feasibility Study on the project in June, and that alone was a huge milestone for us.

But as we were getting closer to releasing that report we came to the realisation that A) given our timeline to production (late 2019), there really isn't any other lithium project in Australia that is due to come online between now and then, and B) we are at the forefront of putting the Northern Territory on the map as a region of the country that is rich in lithium resources.

So we're quite proud that we're able to say we will be the first lithium producer out of the NT, assuming everything goes according to plan.

The project has also attracted the attention of two significant Chinese customers who are not only committing to a large amount of

the offtake from Finniss but are also set to provide enough financial support that this project will be fully funded into production.

Q. Core announced a 42 per cent increase in the Grants lithium resource late October. Describe the significance of these results?

This is just the latest in a series of testaments this year to the quality of the larger Finniss project and how it's going to shake up the Australian lithium sector.

We've been monitoring the public forums as we've progressed the Grants deposit since we released the PFS, and there was certainly some exciting chatter amongst shareholders after we announced the 42 per cent increase. But it's important to remember that while Grants is shaping up, there is also the BP33 prospect and a few other smaller prospects that together are going to all add up to a major boon for us when we release the Definitive Feasibility Study (DFS) in late November.

The 42 per cent increase means we will have a much larger resource to mine and will be able to do so over a longer period of time at Finniss.

Q. When do you hope to begin construction and first production?

We're at the 11th hour of completing our Definitive Feasibility Study on the Finniss project, so we'll have some more definitive timeframes to reveal then, but we're expecting construction to begin around the middle of the 2019 calendar year.

We've been saying for a while now that we'll be in production before the end of 2019 and we expect to meet that deadline.

Q. The Finniss project is set to be one of the least capital intensive and cost-competitive spodumene operations in the country – what is your strategy for lowering costs?

Whatever strategy we have developed has stemmed from the amazing economics Finniss holds right off the bat; the project's close proximity to Darwin Port, to grid power, gas and rail infrastructure, and of course local employment capabilities to name a few.

These have all contributed to the project's minimal capex needs.

In particular, our decision to operate in a Direct Shipping Ore capacity – coupled with the close trucking distance to Darwin Port – both lowers costs and makes Finniss an attractive supplier of lithium to Asian buyers as Darwin Port is arguably the best route between the two continents.

Q. How was the offtake process progressing?

The offtake process has been relatively smooth for us to-date; our offtake and \$US20m Prepayment Agreement with YaHua has been locked in for a while now, and we are finalising binding documents with RuiFu currently, so having those two agreements in place has created a huge layer of financial and investment security over this project.

Q. Describe some of Core's other exciting exploration projects?

Outside of Finniss, Core has a number of copper, zinc and lead projects scattered

across the Northern Territory and South Australia, as well as two uranium projects in the same areas.

We recently revealed a resource re-estimation for our Napperby uranium project in the Northern Territory so that it follows the JORC 2012 Code guidelines, which is timely given the fact that the uranium spot price has increased by about 40 per cent over the past year.

We've been holding discussions with a number of interested parties with a view of potentially selling or partially selling Napperby. Those discussions are currently happening but it's still early days.

With Finniss due to come online and start producing before the end of next year, our focus is really on that core project right now so it makes sense for us to realise value from some of these other assets that have considerable potential; they're just not our immediate priority at this stage.

Q. What are your projections for the global lithium market?

In the context of recent year-on-year growth of electric vehicle sales in US of 65 per cent, China 44 per cent and Europe of 42 per cent, Core is well placed to be the next high-quality lithium concentrate producer in Australia in 2019.

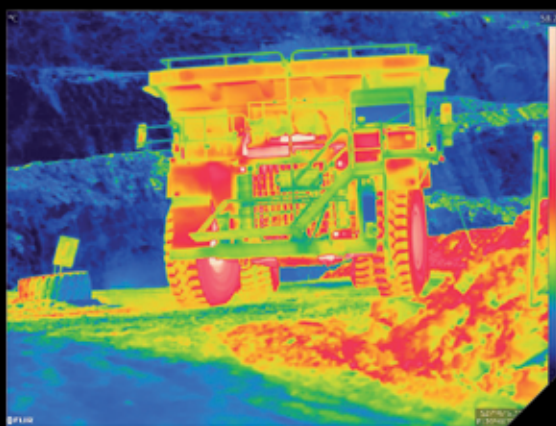
Forecasters are continuing to revise upward the uptake of EV sales globally as technology efficiencies rapidly improve lithium batteries efficiency and EV prices. Accordingly, the forecast short-term and long-term aggressive demand growth for lithium batteries and outlook for spodumene is very strong.



FLIR **T1K**TM

HD Thermal Imaging Camera

THE ULTIMATE IN INFRARED PERFORMANCE

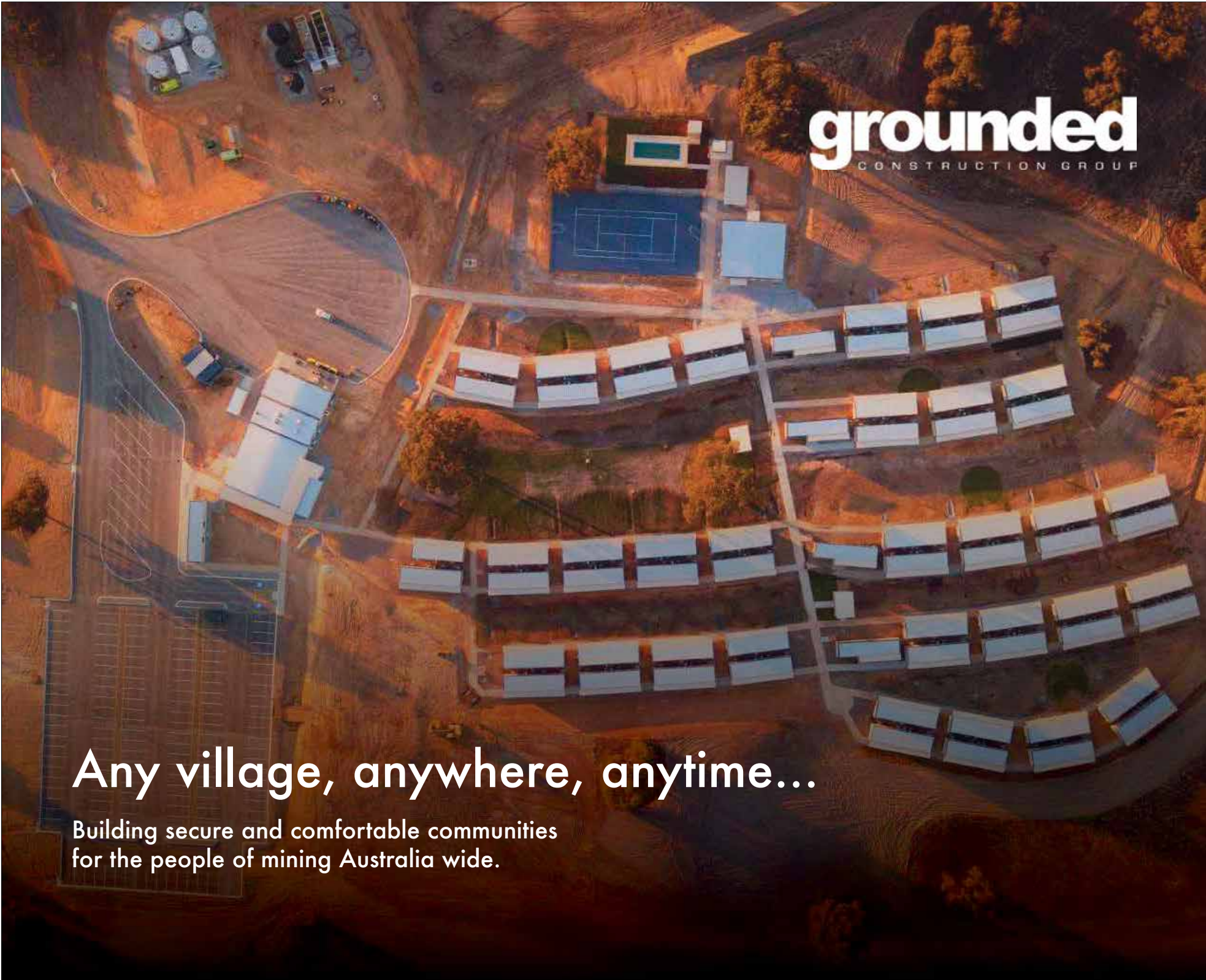


- Outstanding image clarity with a resolution of 1024 x 768 (786,432 measurement points)
- High resolution viewfinder to make surveys easier in bright sunlight
- Optical block rotates 120° allowing to see any target in comfortable viewing range
- Measure accurate temperatures from twice the distance using FLIR's OSXTM Precision HDIR optical lenses
- Exceptional thermal sensitivity of <0.02°C at 30°C and a temperature range to 2000°C
- Up to 3.1 MP outstanding thermal image with FLIR UltraMaxTM and MSX[®] technology
- Easy to use Interface, touch screen technology and FLIR's industry-leading 2-5-10 warranty

With advanced Thermography technology, the FLIR T1K thermal camera can make scanning mining equipment easier and quicker whilst providing the maximum efficiency, versatility and safety.

Please visit www.flir.com.au/t1k
or call 1300 729 987 for more information





Any village, anywhere, anytime...

Building secure and comfortable communities for the people of mining Australia wide.

Grounded Group cover every aspect of project management for mining villages and civil projects.

We deliver ahead of schedule and within budget.

We have completed work for major mining projects including Iluka Resources' Cataby Mineral Sands Project.



CONTACT US

☎ 08 9321 3398

✉ admin@groundedgroup.com.au

🌐 groundedgroup.com.au