

Ardea sizes up the prize

Andrew Penkethman sometimes wonders what all the fuss is about. Since he was appointed managing director of Ardea Resources Ltd almost four years ago, the critics have been lining up to tell him what is wrong with the Kalgoorlie Nickel Project (KNP) and why Australia's largest nickel-cobalt resource is unlikely to ever be developed.



Detractors of the KNP will often cite the country's chequered history with operating nickel laterite mines, including the purported lack of success with the HPAL processing technology required to successfully extract nickel and cobalt from laterite orebodies.

Even the sheer scale of the KNP is occasionally raised as a potential hinderance to project development, but none of the criticism appears to concern Penkethman, especially at a time when demand for new nickel supply has never been greater.

"Sometimes people will say to me, 'oh, the KNP has been around for 25 years', but therein lies a huge part of the value," Penkethman told **Paydirt**.

"We had a huge multinational in Vale-Inco working on the project in the early 2000s, they spent approximately \$35 million and did some very good work...but then the GFC hit and they were closing operating mines right around the world, so the last thing they were going to do was commit to a new mine development. It's really that simple.

"The knowledge we've gained from all that work over the years, the hundreds of thousands of metres of drilling that has been completed, the refinement of the geological model, the refinement of the flowsheet for the process development, it puts us in an incredibly strong position.

"We haven't been rushed like some projects, because if you're rushed, you're more likely to overlook something or make a mistake. So we think that having that time on our side

and that history puts us in an even stronger position. I know I'm very grateful for what's happened because otherwise I wouldn't be sitting here today having this discussion."

Ardea is on the cusp of entering the most pivotal period in its short five-year history with the KNP with an updated PFS on a proposed 3.5 mtpa operation due by the end of the March quarter next year.

In 2018 – one year after being spun out of Heron Resources – Ardea published robust PFS-level economics for both a 1.5 mtpa and 2.25 mtpa operation based around development of the high-grade resource at Goongarrie Hub.

The larger 3.5 mtpa operation will be comprised of two 1.5 mtpa HPAL trains, supplemented by a 500,000 tpa atmospheric leach circuit. Penkethman insisted there would be nothing new or novel about the processing technology often raised as a point of conjecture for project development.

"We know what has succeeded, particularly here in Australia, but equally where the challenges are," he said.

"HPAL technology has been around since the 1960s with Moa Bay in Cuba. That was generation one, we're now up to the fifth generation of the technology. You've got huge companies like Sumitomo who developed Coral Bay in the Philippines, ramping up both of their autoclaves in under 12 months. We've seen recent HPAL developments in Indonesia, reportedly ramping up to nameplate capacity within 3-4 months, which is just outstanding and demonstrates



Ardea boasts a total landholding of more than 4,200sq km in the Eastern Goldfields

it can be done, and it certainly will be done with the Goongarrie Hub.

“Technology just evolves so much and now we’ve got a great team with the relevant experience to ensure our project succeeds.”

Penkethman acknowledged that while nickel laterite mines do not have the best of reputations with Australian investors, there have been some notable turnarounds in the past decade, namely Murrin Murrin and Ravensthorpe.

A seasoned geologist, Penkethman was working on the RAV8 nickel sulphide mine when BHP Ltd built the original Ravensthorpe operation now owned and operated by TSX-listed First Quantum Minerals Ltd.

“I saw firsthand how BHP went about it and they got the difficult part of the plant right and that was the hydrometallurgical circuit – the HPAL and the atmospheric leach circuit – but there was some relatively simple mistakes made on materials handling, like the gradient of conveyors,” Penkethman said.

“When BHP made the decision to put the project on care-and-maintenance, the nickel price crashed and they didn’t ramp up the project to nameplate capacity as quickly as they had planned to. First Quantum got a bargain and they’re operating the project quite profitably now after they were able to make those improvements in the materials handling circuit.”

Penkethman said it was a similar story for Murrin Murrin, which is now run by Glencore following the spectacular failure of Andrew Forrest’s Anaconda Nickel business.

“Again, they did several hundred million dollars of supposed value engineering but used substandard materials in construction, it was really that straightforward,” Penkethman said.

“It’s not rocket science but for some people, it’s simply easier to say that laterites don’t work or the HPAL technology doesn’t work. That’s completely incorrect.

“Laterites have been developed successfully in many other jurisdictions around the world, and they also will be in Australia. We’re seeing with the battery revolution that it’s just not going to be possible without laterites being developed. We need every known resource developed to ensure there’s sufficient battery mineral supply, especially those in great locations like the Eastern Goldfields of WA.”

Goongarrie Hub (561mt @ 0.68% nickel and 0.044% cobalt containing 3.8mt nickel and 248,000t cobalt metal) includes the Highway, Siberia and Ghost Rocks satellite deposits and forms the nucleus of the larger KNP resource of 830mt @ 0.71% nickel and 0.046% cobalt containing 5.9mt nickel

“We know what has succeeded, particularly here in Australia, but equally where the challenges are.”



Andrew Penkethman

and 384,000t cobalt metal.

Advancing large resource projects with potentially challenging processing requirements is nothing new to Penkethman, who was integral in the discovery and development of the Husab uranium mine in Namibia.

Penkethman described the skills and experience gained from his time with Extract Resources, which was snapped up for \$2.2 billion by China General Nuclear Power Group in 2012, as “incredibly relevant” to what Ardea is looking to achieve with the KNP.

“Husab was the third largest uranium deposit in the world and that was a greenfields discovery, whereas the KNP has the added advantage of most of the resource definition work being done and a lot of good work undertaken in the past, but still remains a very globally significant project in the nickel-cobalt-scandium space,” he said.

“Both projects involve a hydrometallurgical flow sheet, but obviously you’ve got a huge range of logistics, water, power, etc to consider. Husab is located in the Namib Desert and the discovery was made in the Namib-Naukluft National Park, so extensive stakeholder engagement and permitting was required. In some respects, the

KNP is easier but it is a mega project and we need to make sure we’ve got a quality team working with us.

“I reflect regularly on the Extract experience and for me it was custom-made for what we’re setting out to achieve here at Ardea. It’s all well and good doing more post grad studies, but for me the best experience you gain is working with good people and learning on the job, and I was able to get that in spades through Extract.”

All of the Goongarrie Hub tenements subject to the upcoming PFS are on granted mining licences. Located just 70km north of Kalgoorlie, the project also benefits from a plethora of existing infrastructure, including the sealed Goldfields Highway, rail links to both Esperance and Fremantle deep sea ports and a gas pipeline just 30km to the east.

A key milestone in KNP’s storied history occurred earlier this year when Major Project Status was awarded by the Federal Government. It means the project is now recognised across all tiers of Australian government, having previously been included in the critical minerals prospectus compiled by Austrade and Geoscience Australia, as well as being independently ranked by the Geological Survey of WA as

Geology superintendent Darren Howe shows Petra Capital's Colin McLelland and newly appointed general manager exploration Matt McCarthy some core from the Emu Lake nickel sulphide discovery



“It’s not rocket science but for some people, it’s simply easier to say that laterites don’t work or the HPAL technology doesn’t work. That’s completely incorrect.”

the State’s – and country’s – largest nickel-cobalt resource.

Penkethman said the award of Major Project Status had opened several doors for Ardea with potential export credit agencies from Japan, Korea, Europe and the US, while moving the company a few steps closer towards landing a coveted strategic partner for the KNP.

“Any of our key trading partners and allies – all friends of Australia – they look upon that [Major Project Status] very favourably,” he said.

“We’re very proud to be able to work with both the state and federal agencies. We’re proud of the KNP, we’re proud of being here in WA and we are part of Team Australia. We want to see the KNP Goongarrie Hub developed to the benefit of all our stakeholders, including the local communities, and sourcing as many of our consumables

as possible in country, plus all those positive flow-on effects in regards employment and training for as many local people as possible.”

Despite the swell of customers seeking to lock away new sources of nickel, particularly for emerging markets such as battery manufacturing for EVs, Ardea is yet to sign any offtake agreements.

It appears that position is unlikely to change anytime soon. If anything, the rapidly evolving electrification thematic has only strengthened that position, with Penkethman remaining steadfast in his view that any offtake deal must be linked to project finance for the KNP.

“There’s only one KNP and we only get once chance to select a quality strategic partner, so we’ve got to make sure that any offtake deal that gets done is in the best interests of all stakeholders,” he said.

“We’ve never seen more interest in the project than we’re currently receiving. With the US bringing in the Inflation Reduction Act in recent times, we’ve seen even stronger interest because some companies that were producing from just Indonesia, well that production can no longer go into the North American market.

“It’s been really pleasing the level of interest we’re receiving, but we’re respectful to everyone that approaches us and we will continue those discussions. When we feel it appropriate, we will have a quality partner, or partners, working alongside us.”

One country which has emerged as a potential consumer is India. Prior to the Australia Nickel Conference in Perth early last month, Penkethman joined an Austrade delegation on a dedicated “critical minerals” visit to the world’s fifth largest economy by nominal GDP.

"It really blew my mind...some of their large-scale infrastructure projects, their willingness to embrace electric vehicles, plans for a low carbon future, better air quality, cleaner environment,"

"One company over there is already importing their lithium-ion batteries and assembling battery packs in their own factory for electric scooters, which by all accounts are selling at a rapid rate. They've also got plans to develop their own EV fleet. I was lucky enough to see a research and development lithium-ion battery facility over there and I'm quite confident we're going to continue to see a whole lot more of that in India in the years to come.

"I think most of the commentators looking at future demand for nickel are overlooking the impact and demand from India. They desperately need raw materials for the gigafactories they want to build in country, and that will continue to accelerate at a rapid rate."

While development of the KNP remains the company's No.1 priority, Ardea continues to generate interest in its Emu Lake nickel sulphide project within the Kalpini Hub, about 70km north-east of Kalgoorlie.

Ardea has completed more than 5,000m of drilling, as well as downhole EM surveys and detailed logging, at Emu Lake since making the initial breakthrough discovery in January.

Penkethman said the company would have plenty of processing options to con-



Penkethman stresses Ardea would not be where it is today without the calibre of people representing the company. He is pictured here (centre) alongside McCarthy, Howe, chairman Mat Longworth and process engineer Mike Miller

“Most of the commentators looking at future demand for nickel are overlooking the impact and demand from India.”

sider should the discovery at Emu Lake continue to stack up.

"One option we do have is we can blend any sulphide ore with the laterite ore [through the proposed KNP plant] at a ratio of approximately 95% laterite to 5% sulphide."

"We anticipate that the sulphide ore, when you put it in the autoclave, naturally provides sulphur and generates its own heat, so it would be expected to result in lower operating costs, which would be a very viable option for us.

"Emu Lake is only one prospect. We've got layered mafic complex targets at prospects like Black Range, we've done limited exploration on other targets like Jump Up Dam, Aubils and Bulong. We're currently updating our target ranking system but I can confidently say we will continue to under-

take nickel sulphide exploration. We want to reward the market with blue sky exploration success and we feel with our tenement package, there will be more success to come from that side of the business."

What once may have been considered a very ambitious pipedream is now moving ever closer to becoming one of the largest mining operations in the Eastern Goldfields. For Penkethman, it all comes down to having belief in both the project and the people you work with.

"In our industry, when the times are good, everyone's job seems just that bit easier and there's an element of that rising tide lifting all boats, but you've always got to have genuine belief, you've got to keep working incredibly hard and be working alongside some very good people to ensure that success will come," Penkethman said.

"Everything we're seeing with that demand for nickel, it's just going to continue to grow exponentially. I've always had a lot of energy but I'm definitely getting out of bed these days with an extra spring in the step. With what's happening around the world, that push for supply chain security and sourcing of ethical and sustainable minerals, there's rarely been a better time to be involved in the nickel sector.

"I really enjoy working with the Ardea team, I really enjoy my job and I'm incredibly motivated to see the company succeed and add as much value as we can for all of our stakeholders."

– Michael Washbourne



Ardea has undertaken extensive resource definition and metallurgical test work in a bid to unlock the processing challenges associated with the KNP