



COMMODITY SPOTLIGHT

ILUKA RESOURCES' JACINTH-AMBROSIA MINE IN WESTERN AUSTRALIA.

THE SHIFTING OF THE SANDS

AUSTRALIA IS PROVING THAT THE HEAVY MINERAL SANDS INDUSTRY IS ANYTHING BUT DRIED UP WITH A SERIES OF EXCITING PROSPECTS. EWEN HOSIE REPORTS.

Mineral sands is probably not the first image the general public will conjure when asked about mining, but it is an important source for several materials found in daily life.

It is also a sector in Australia that is on the verge of an uptick in activity, which combined with improving prices will lift its profile in 2019.

Iluka Resources, the owner-operator of the world's largest zircon mine, Jacinth-Ambrosia in Western Australia, is a prime example of a mineral sands miner experiencing these changing market fundamentals.

The company's weighted average zircon price increased by 41 per cent in 2018, while rutile was up by 21 per cent.

Iluka is winding down production at the Jacinth deposit as it moves activity further towards the Ambrosia deposit to stimulate zircon supply.

At the same time, the company is preparing to launch the \$275 million Cataby project 170 kilometres north of Perth.

Cataby is expected to produce 200,000 tonnes of synthetic rutile, 50,000 tonnes of zircon and 30,000



SHEFFIELD RESOURCES MD BRUCE MCFADZEAN PANNING AT THE THUNDERBIRD SITE.

tonnes of natural rutile a year over an initial 8.5-year mine life.

The project will provide synthetic rutile continuity for existing customers, while also delivering benefits to the local regions of Dandaragan and Capel.

Australia also has other mineral sands companies developing promising projects, including Sheffield Resources, Melior Resources, Image Resources, Strandline Resources, Diatreme Resources and Kalbar Resources.

As Iluka slows down at the Jacinth deposit, Sheffield looks set to fill

a possible market opening with its highly prospective Thunderbird site in the Kimberley region of Western Australia.

With a potential mine life of 42 years and a mineral resource of 3.2 billion tonnes at 6.9 per cent heavy minerals, the shovel-ready development is one of the most promising heavy mineral sands projects in the world, with 100 per cent of its stage one offtake agreements already secured.

Sheffield has pencilled in production for 2020 and plans to employ 280 people in full-time

positions, opening up regional work opportunities (the company is not using FIFO workers at Thunderbird).

In January, the company signed an energy supply deal with Woodside Energy and Energy Developments for delivery of liquefied natural gas (LNG) to the site.

Over the last year, zircon and rutile prices have been ascending due to a tightening global supply and Australian sites like Thunderbird look set to meet a growing need in the market.

Sheffield managing director Bruce McFadzean says the zircon supply deficit is even attracting interest for stage two offtake of its premium product.

"In stage one we have about 50,000 tonnes a year of premium and 50,000 tonnes of zircon concentrate, and when we go into stage two that pretty well doubles," says McFadzean.

"The important part to understand about zircon is that it's not driven by spikes in demand out of China or anywhere else — it's driven by the fact that the supply is declining so fast.

"It's hard to see where the developers will come from as there's been a lack of success in investment and exploration, and I think with



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SHEFFIELD RESOURCES MD BRUCE MCFADZEAN WITH THUNDERBIRD RANGER TERRY MARSHALL.

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Thunderbird it's not just the size of the bubble around [the project], it's actually the fact that it's a new mineral sands province.”

For zircon to be classified as premium, it needs to have a zirconia content of over 66 per cent. Zircon concentrate is the remaining concentrate that does not fall into this category, which is sold for around half the price of premium zircon.

Grade decline has also been cited as an issue in the mineral sands industry, not just for Australia, but globally as heavy mineral content in operating mines decreases.

Iluka chief financial officer Adele Stratton says this leaves producers with a choice between producing technically challenging deposits in familiar jurisdictions, or seeking out new deposits in unfamiliar regions.

“Looking ahead, grade decline is a key issue that challenges the industry globally,” Stratton tells *Australian Mining*. “Australia is not immune from this, with ore bodies that are maturing and the valuable heavy mineral content in operating mines decreasing.”

The company acquired the Sierra Rutile operation in Sierra Leone in 2016 and is progressing plans to expand its production there. In Australia, the company has developments like the Fine Minerals project in Victoria and the Balranald project in New South Wales.

Stratton says these newer Australian deposits are “technically challenging”, but they could provide potentially significant evolutions for the industry.

“Iluka is experiencing tight market conditions and we observe a structural deficit emerging between supply and demand for both zircon and high-grade titanium feedstocks,” says Stratton.

“The company's purpose is to deliver sustainable value and we will

continue to take actions that support this and our position as a responsible industry leader.”

Products developed from heavy mineral sands provide the building blocks for many items.

The primary materials recovered from heavy mineral sands (HMS) are ilmenite, zircon, and rutile.

HMS is also a source for garnet and rare earth minerals such as monazite and xenotime, though these have less commercial value.

Geoscience Australia senior commodity specialist Adrian Hitchman says Australia is a world leader when it comes to HMS production.

“Australia's economic demonstrated resources of rutile and zircon are the world's largest, and

Australia's ilmenite resources are the world's second largest after China,” he explains.

“As a producer, Australia ranks number one for rutile and number two for ilmenite and zircon, after South Africa. Australia is a reliable source of heavy mineral sands and a world leader in ethical mineral supply.”

Ilmenite hosts titanium ore, which is highly sought after due to its low weight and high strength. It can also be chemically modified to produce synthetic rutile by drastically reducing the iron oxide content within the ilmenite to around 10 per cent.

Rutile is primarily composed of titanium dioxide and titanium metal and is usually less abundant than ilmenite in HMS deposits.

Titanium dioxide is used as a whitening pigment and opacifier in myriad materials, including paint, inks, paper, plastic, toothpaste and certain foods, particularly sweets. Its ability to effectively absorb ultraviolet (UV) radiation also makes it useful for sunscreen lotions.

Titanium that is extracted for pigments usually goes through one of two processes: a sulphate process

that uses sulphuric acid or a chloride process that uses chlorine, with more modern plants tending towards the latter method.

Titanium metal is, meanwhile, employed as an alloy due to its strength and heat resistance, making it useful in aircraft construction. It is also a popular metal in the medical industry for joint replacements, such as knee and hip implants.

Zircon ore, like rutile, is sought as an opacifier and white pigment and is most commonly used in pottery and ceramics, such as tiles, sanitaryware and kitchenware, which represent around 50 per cent of the industry.

Zircon prices previously spiked in the days following the 2008 global financial crisis, which prompted an increase in production that led to eventual oversupply. This oversupply eventually caused zircon prices to bottom out by 2016.

Since that time, Asian demand (particularly from China), as well as Europe and the Middle East has driven zircon prices upwards again, especially as mines have matured and grades have continued to decrease over the past few years. ■



A VIEW OF SHEFFIELD'S THUNDERBIRD SITE IN WESTERN AUSTRALIA.