

A man with grey hair, glasses, and a mustache, wearing a dark suit, white shirt, and dark tie, is sitting on a city street. He is looking directly at the camera. The background shows a city street with palm trees, a building, and a white car parked on the side. The street is wet, suggesting it has recently rained.

## Sheffield keeps Thunderbird on course through BFS

When former gold bug Bruce McFadzean joined Sheffield Resources as managing director, he was quickly impressed by the size, scale and potential of the company's 100 per cent-owned Thunderbird minerals sands project.

**As a mining engineer with more than 35 years' experience in the industry, McFadzean has led the financing, development and operation of numerous mines around the world.**

He chalked up 15 years with the majors, both BHP Billiton and Rio Tinto, holding a variety of positions, but is probably best known for his four years as MD of Western Australia gold miner Catalpa Resources, which he took from a market capitalisation of \$10 million to \$1.2 billion on the back of a merger with Evolution Mining (ASX: EVN).

"I was a bit apprehensive when Sheffield first approached me to become part of the team, however that was short lived once I sat down and actually had a good look at the project and what it has to offer,"

McFadzean told *The Resources Roadhouse*.



"I took on the role, with one small proviso being that I be paid a relatively low salary, but with exposure to equity in the company.

"The reason for that is because I think these times necessitate that management teams align themselves more with investors.

"Now the entire management team is remunerated along the same structure, with the equity we receive subject to shareholder approval."

For those who may have come in late - the Thunderbird mineral sands project is located on the Dampier Peninsula about 60 kilometres west of Derby in the north of Western Australia.

The project's main driver is the amount and quality of zircon that has already been established by Sheffield, making up some 59 per cent of forecast revenue.

Backing this up is a healthy amount of both high-grade sulphate ilmenite and HiTi leucoxene.

"This is a project that – metallurgically - has never gone backwards," McFadzean said.

"As the test work has progressed with more samples – larger samples – it has either stayed the same or improved.

"That is a great technical attribute for a project – and we think there is still more improvement to come – especially on the ilmenite side.

“On the zircon side we have 80 per cent of our product being premium grade, which is around 60 per cent of our revenue stream.”

Sheffield boasts that the high proportion of zircon in the product suite sets Thunderbird apart from many of the world’s operating and undeveloped mineral sands projects, which are predominantly dominated by lower value ilmenite.

The Thunderbird deposit is the first major mineral sands deposit to be discovered in the Canning Basin and one of the largest mineral sands deposits to be discovered in the last 30 years.

“One over-arching thought that emerged from my personal assessment of Thunderbird was that, no matter if you are a producer or consumer of minerals sands, you really do have to take notice of this project,” McFadzean said.

Sheffield completed a Pre-Feasibility Study (PFS) on Thunderbird in October 2015, which demonstrated the project to have an impressive 40 year mine life and is anticipated to eventually ramp-up to an 18 million tonnes per annum throughput, at which time it will become one of the world’s largest dry mining mineral sands operations.

Sheffield quickly moved to commence a Bankable Feasibility Study (BFS), appointing lead engineering group Hatch to undertake the task.

With just on \$6.7 million in the coffers, Sheffield is well financed to complete the BFS before the end of 2016.

“We appointed Hatch because they are probably the world’s leading pyrometallurgy and engineering consultants, which is a great opportunity for us with further improvements to the quality of our ilmenite anticipated,” McFadzean said.

“If we can improve the ferric-ferrous ratio of our ilmenite, we will have one of the highest grade ilmenites in the marketplace.”

In January Sheffield released a maiden Ore Reserve for Thunderbird, coming in at 683 million tonnes at 11.3 per cent heavy mineral (HM), which not only fully supports the PFS outcomes, but also confirmed Thunderbird as one of the largest undeveloped zircon-rich mineral sands deposits in the world.

“The release of the maiden Ore Reserve basically closed out the Thunderbird PFS, allowing us to progress to the BFS,” McFadzean explained.

During the BFS, Sheffield will be examining all opportunities to improve the Thunderbird project’s financial returns.

The study will particularly focus on where the company can make capital and operating expenditure reductions and savings, which it anticipates will be identified through engineering and sourcing avenues.





#### **TWO MAIN PRODUCTS IIMENITE ZIRCON**

It will also examine where optimisations can be made in the area of project definition in order to provide the best outcomes in terms of CAPEX, OPEX and risk.

The BFS will also look at process design, focusing on increasing processing efficiency, as well as product quality and recoveries.

The study is currently undertaking metallurgical test work and flowsheet development to confirm the PFS outcomes on a larger, 30-tonne sample using full scale equipment, materials handling, thickener design and tails co-disposal studies, and to provide market offtake samples.

“In concert with the preparation for the BFS, we are continuing Native Title negotiations and are making excellent progress towards securing environmental approvals,” McFazdean continued.

“The long-life nature of Thunderbird has resulted in the project being designated ‘Lead Agency’ status with the Western Australian Department of Mines and Petroleum.

“This is a huge vote of confidence in the project and supports its significance and the long-term benefits we believe it will deliver to the state and the communities of the Kimberley.”

Sheffield recently added to the value of the Dampier mineral sands project with the discovery of the Night Train mineral sands deposit just 20km to the southeast of Thunderbird and within 2km of the proposed Thunderbird haul road.

Recent scoping level metallurgical test work undertaken on a drill sample composite from the mineralised zone at Night Train demonstrated the existence of high-quality zircon, which meets ceramic grade specifications, can be produced using conventional mineral sands processing techniques.

The tests show the Night Train heavy minerals to be low in iron contamination with zircon able to be produced without an enhancing leaching stage.

The grain size of the zircon and HiTi products are fine to medium grained with a D50 of 79 microns.

The composite sample averages from Night Train returned 4.7 per cent HM containing a high 17.4 per cent of zircon in the heavy mineral assemblage.

The results have encouraged Sheffield to carry out further work at Night Train, which will include follow-up exploration drilling and more detailed metallurgical test work.

“We are very excited about the early results we have been able to achieve at Night Train,” McFadzean said.

“Producing high quality zircon from the initial scoping metallurgy using conventional processing techniques was an ideal outcome, which provides confidence to proceed with follow-up drilling and further test work during the coming dry season.

“Night Train is a significant new discovery for Sheffield as it emphasises the excellent exploration potential of the Canning Basin.

“Thunderbird, without a doubt, remains our primary focus, however a new discovery such as Night Train demonstrates that by targeting additional zircon-rich deposits we can underpin shareholder growth while supporting our long-term product supply strategy for this exciting new mineral sands province.”

## **Sheffield Resources Limited (ASX: SFX)**

### **...The Short Story**

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