

# George Bauk on the evolving heavy rare earths story of Northern Minerals

George Bauk, Managing Director and CEO of Northern Minerals Limited (ASX: NTU) (“Northern Minerals”) in an interview with InvestorIntel Senior Editor, Peter Clausi updates us on the Browns Range dysprosium rare earths project and his recent financing. Stating that mining is well underway and is expected to be completed by November, George adds that Northern Minerals “...fabrication is on track in China with a first shipment arriving in October.”...to access the complete interview, [click here](#)

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## Northern Minerals’ Looming Rare Earth Success

Over the last six weeks, the value of shares in Northern Minerals Ltd. (ASX: NTU) (“Northern Minerals”) has jumped by almost 40% in response to multiple positive developments; the company received, from three sources, around A\$48 million in financing, which, coupled with dramatically surging dysprosium prices and a fast-approaching first shipment to offtake partner Guangdong Rising Asset Management (“GRAM”), makes for a prospective fall portfolio addition.

With their Browns Range project in the northern territories of

Australia, Northern Minerals hoped to become the first significant producer of the heavy rare earth element dysprosium outside of China; a goal that has since become a near-certainty. Equipment for the pilot plant is currently under construction in Shanghai and is expected to hit the waves early next month. Preparation of the site is also well underway, and financing of the pilot plant phase is going extremely well indeed.

Just last month, the company received a A\$38 million R&D facility from a leading New York financier, a A\$2.6 million government rebate, A\$2.5 million through private placement, and a further A\$4.8 million from the Australian government's "Building Better Regions" fund; the fund aims to assist native people in securing meaningful employment through training-to-work programs, and Northern Minerals' new project has the potential to provide around 700 jobs to local residents over its 11-year mine life.

What makes me most confident about Brown's Range is the fact that offtake is 100% sourced; once the stuff is out of the ground and processed, it has already been sold. GRAM, via one of their subsidiaries, has agreed to take everything the project can produce at market prices. The last time this particular company got involved with an Australian miner, a \$1bn+ takeover bid followed shortly afterwards, and so this relationship is certainly one to keep a close eye on.

Production now looms in the very near future, and in my opinion, this is one of those projects that has significant appeal since it has always appeared to be a thoroughly well run operation. It has progressed incredibly smoothly, while receiving excellent state, institutional and retail support, and is fully prepared to offer maximum benefit to the environment, the local people and the markets that it serves. The pilot plant will run at 10% throughput for three years while improvements are made to the processing flowsheet, but dysprosium will be coming out of Australia anew very shortly.

Dysprosium is critical in the production of permanent magnets, and so is a key ingredient in electric vehicles, wind turbines and many other modern essentials. Not only are these markets just coming into their peak, but the value of dysprosium has experienced a dramatic surge of late as a result of Chinese crackdowns on illicit mining practices having seriously impacted supply. China still produces the vast majority of rare earth elements, but the government's new attitude towards pollutive industries is opening the door to others to supply the nation with the requisite ingredients of today's consumer electronics.

With investment coming in from all sides, time is running out to take advantage of Northern Minerals' impending success, and it's a rare thing indeed to find a project with near-guaranteed fruition that has not yet been overbought. If I were the type to give investment advice, I would be pointing a large flashing arrow sign towards Browns Range right about now.

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## **All Bulls on Northern Minerals' Dysprosium Outlook**

Ahead of Northern Minerals Ltd. (ASX: NTU) ("Northern") becoming Australia's newest producer of rare earth elements, I thought I'd take a look at what the future holds for the element of primary economic value to the company, Dysprosium. Quite enough analysts have already called 'bull' on the flagship resource, and it's about time to accept that its road to production is firmly cemented and peer down that path to see what we can reveal about its future.

Northern intend to stockpile extracted ore for three years during the initial phase of construction, but as the primary pilot plant stage is essentially a fully producing mine running at 10% output, material awaiting processing will be piling up from the very beginning. This is a sensible approach and allows the development of the project to incorporate effective troubleshooting along the way. Larger operations will almost always throw up significant technical gripes that, without the proper time to resolve, can derail many moons of hard labour. Crucially, this period will wait out the slump in rare earth prices that is expected to lift over the next few years, with many stating that the price of Dysprosium will double by 2020.

Rare earths provide such excellent permanent magnets that very little work has been completed over the last few decades on developing a replacement, and while a small number of teams are currently working on alternatives, Dysprosium remains a fundamental ingredient in motors with enough torque to suit a range of industrial applications from wind turbines to electric vehicles. With demand for advanced motor systems increasing year-on-year, now seems a perfect time to catch what could be the final couple of decades of high Dysprosium demand. Interestingly, modern military technologies such as the predator drone and advanced jet systems all currently depend on these rare earth elements, adding serious credence to the claim of rising future value as we move ever-further into an increasingly dangerous world.

Most notably, Dysprosium is featured in control rods in the generation of nuclear power, and groups such as MIT have repeatedly called for an expansion of global nuclear energy output to provide the electricity necessary to fuel the world's new technologies without negatively impacting the atmosphere with excessive carbon emissions. All in all, Dysprosium-dependent applications are undergoing significant expansion worldwide, and while China currently fills this

massive void, the degradation of its rare earth containing clays from years of over-mining is starting to show. Moreover, a significant portion of this is thought to be occurring illegally due to the extremely dangerous nature of the cyanide-containing clays. Increased regulation throughout China, combined with the effects of years of illegal extraction, is impacting output in such a manner as to trigger the search for overseas supplies of heavy rare earths.

Perhaps this is exactly why Northern already have an offtake agreement in place with a major Chinese player, featuring a A\$10m advance payment to help fund the construction of the processing plant and mine. China filled the supply gap left when Molycorp went under, but their collapse, coupled with increasing demand and the uncertainty of China's future in the rare earth space, leaves plenty of room for Northern to become a serious player in an industry whose troubled times have killed-off uncountable explorers.

Brown's Range is expected to produce the equivalent 148.2 tonnes of Dysprosium in the first three years of operation in a total of 1,719 tonnes of rare earth oxide. Groundwork is due to commence next month under the labouring hand of Maca, who were awarded the A\$6m contract for mining this year. The pilot plant is already being constructed in China, and will be shipped to the site in around September to begin full operations. It's safe to say that technology will never cease changing, and so we should expect that the distant future will hold a multitude of alternatives to the rare earth element applications of today, but for at least the next decade, Northern are looking more and more like a real rare earth success story!

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# Northern Minerals ramping up to be the next heavy rare earth supplier outside of China

Northern Minerals Limited (ASX: NTU) ("Northern Minerals") is focused on the delivery of the heavy rare earth (HRE) element, dysprosium. The company owns a significant landholding in Western Australia and the Northern Territory that is highly prospective for this commodity. Through the development of its flagship project, the Browns Range Project (the Project), Northern Minerals aims to be the world's first significant producer of dysprosium, or any heavy REEs for that matter, outside of China.

Per the Definitive Feasibility Study (DFS), the full scale operation will use a combination of open pit and underground mining methods to extract 585,000t @ 0.66% total rare earth oxides ("TREO") per annum, which will be treated through a beneficiation and hydrometallurgical plant. The project's current mineral resource supports an eleven-year mine life, and with significant scope to expand this through further exploration, the project's future is indeed promising.

A hydrometallurgical process will then further treat the 16,700tpa of mineral concentrate to produce 279,000kg of dysprosium per annum. The pilot plant is to feature a modular design where possible; a common solution chosen by smart companies who want to scale their operations with less risk than having a full and permanent processing facility anchored to their property. A modular plant has the ability to be scaled both up and down as needed, not to mention shipped off to other sites for additional benchmarking and such.

Stage one includes the construction of a three year, 60,000tpa pilot plant operation at the Browns Range site. It will consist of an open cut mining operation, with processing via a beneficiation and hydrometallurgical pilot plant to produce 49,000kg dysprosium per annum, this state is intended to fully de-risk the operation by testing the process over time; it is important to thoroughly understand and improve knowledge of grade control, and the project's specific geology, to ensure that full future production goes ahead as smoothly as possible.

Northern Minerals is already working alongside government regulators in relation to utilising current project approvals to execute stage one, and construction is expected to take around nine months once product offtake and funding is in place.

Stage two involves developing the project to Bankable Feasibility Study level based on the DFS completed in March 2015. The results of the studies, announced on 27 August 2015, are aimed at reducing mining costs, boosting production, producing a premium product and increasing the Ore Reserve. The final stage involves taking the project to full scale production based on the successful outcomes of stage one and two. Once at full scale, Browns Range will process 585,000tpa to produce 279,000kg of dysprosium, contained within 3,098,000kg TREO per annum, in a mixed RE carbonate, before going through a process of yttrium rejection.

The rejection of yttrium during the hydrometallurgical stage is intended to significantly reduce costs further downstream. Removing around 90% of the yttrium at this stage results in a less mixed carbonate. With current market signals indicating that sale of the yttrium oxide is likely to be limited for the foreseeable future, this step will increase the percentage of the dysprosium in the mixed RE carbonate product from 9% to around 20%, creating a premium product and gaining the company a decent edge.

Completion of initial test work at ANSTO Minerals has indicated that removal of yttrium, lanthanum and cerium can be achieved through a relatively simple addition to the hydrometallurgical process. Further developmental studies will be completed subject to additional funding.

The pilot plant will be supported by a fly-in rota, and the workforce will be accommodated through an expansion of the existing twenty-person exploration camp to forty-room capacity. The plan to progress stage one to development is already well underway. Discussions are advancing nicely with several potential offtake partners and strategic investors, showing that it shouldn't be long at all before Australia adds another resource to its shipping roster. In addition to this, should Northern Minerals engagements with government regulators result in existing approvals for stage one being authorised, the Browns Range project will proceed very swiftly indeed.