

# Analyst says Northern Minerals best positioned to ride the wave of revived rare earth interest

In a sectoral coverage note we wrote several years ago called the “March of the Lemmings” in August of 2011 we aired the proposition that only a couple of handfuls of Rare Earth companies would survive the years to come. Things got way worse than even we predicted and yet the couple of handfuls proved correct. We got some of the survivors wrong but the one we said would survive and has was Northern Minerals Limited (ASX: NTU), that was the only rare earth element (REE) stock in the Model Mining Portfolio through the whole “Valley of Death” period which began in 2011 and to some extent is still with us in the form of low Rare Earth prices.

## **Xenotime**

Back in the veritable blizzard of conflicting TREOs, REEs, LREEs and HREEs of the first Rare Earth boom investors were truly boggled by science. Xenotime ( $\text{YPO}_4$  – Yttrium Phosphate) was thus a welcome arrival on the scene, and that only one company, Northern Minerals, cottoned on to its attractions helped in blocking out the static from the heaving masses of other REE wannabes.

The beauty of Xenotime is the mix of REE in the mineral. The lanthanide content is typical of “yttrium earth” minerals, and runs about two-thirds yttrium, with the remainder being mostly the heavy and medium lanthanides, where the even-numbered lanthanides (such as Gd, Dy, Er, or Yb) each being present at about the 5% level, and the odd-numbered lanthanides (such as Tb, Ho, Tm, Lu) each being present at about the 1% level.

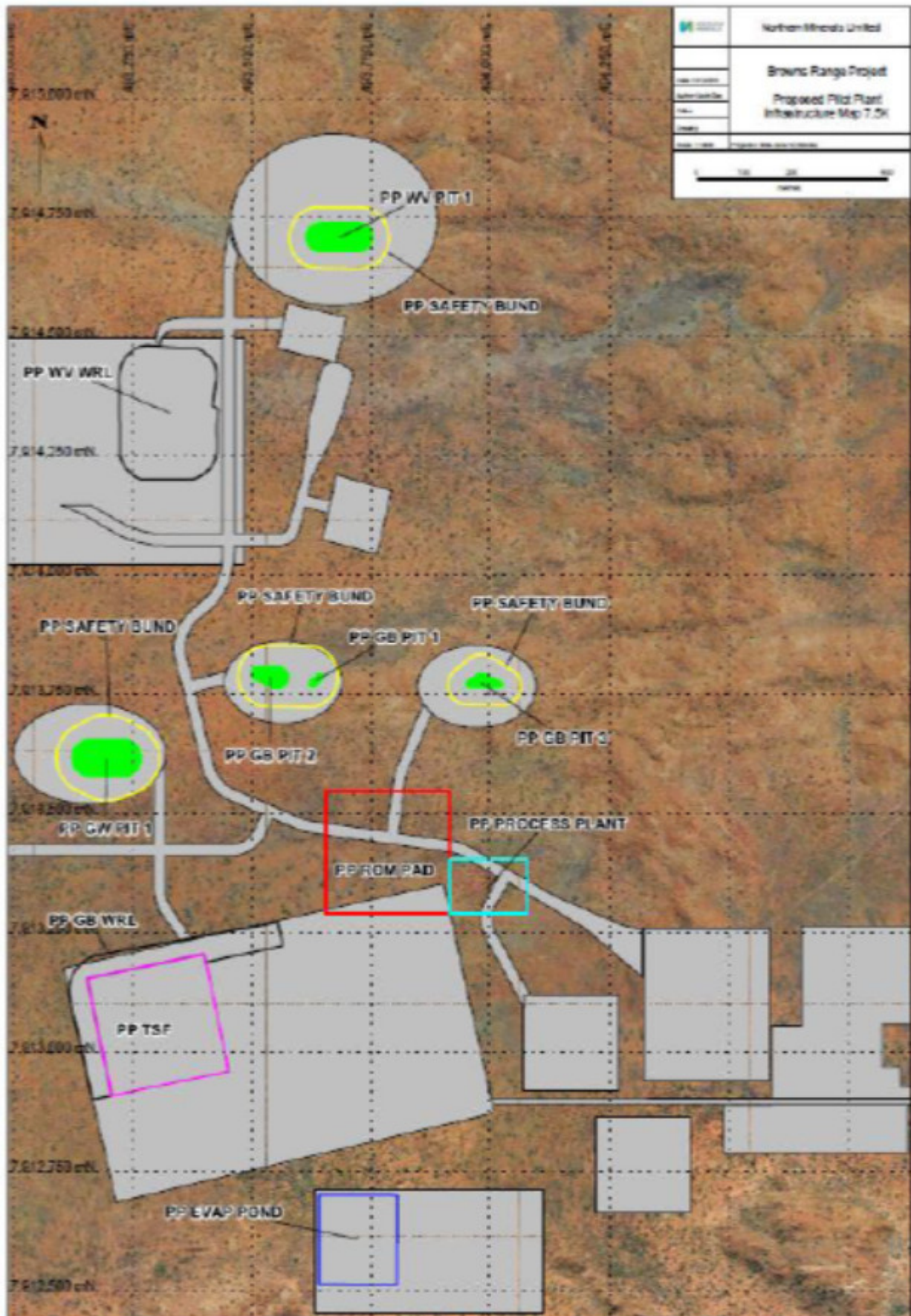
Dysprosium is usually the most abundant of the even numbered heavies, and holmium is the most abundant of the odd numbered heavies.

### **All in the Phasing**

We could go on forever about the dynamics of the REE space and its pricing but in reality the trigger for uplift in Northern Mineral's price will be in the progress towards production as this will carve the company away from the rest of the players.

The **Stage One** involves the construction of a 60,000 tpa pilot plant operation at the project. However this is a pilot plant on a grand scale. The three-year operation would consist of both a beneficiation and hydrometallurgical process to produce 49,000kg dysprosium, in 590,000kg TREO contained in a mixed rare earth carbonate (REC) per annum. Construction of this first phase is estimated to take twelve months once funding is in place.

# Full scale operations with pilot plant overlay



The mining operation would consist of an open-pit mining campaign over five months from relatively shallow pits at the Wolverine, Gambit West, Gambit Central and Gambit East deposits. A total 172,080t of mineralised material @ 1.19% TREO, containing 2,047,000kg TREO would be mined and stockpiled ready to be fed into the pilot plant. A 1.19% TREO grade is achieved as a result of higher grade ore near surface of the deposits to be mined and will have minimal impact on the ore grade when the operation is developed at full scale.

It is estimated that of the 2,047,000kg TREO to be mined and processed through the pilot plant, 75% will be from within the Probable Ore Reserve and 25% will be from Inferred Mineral Resources, which is material that will be carried with the ore within the mine designs. There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the determination of Indicated Mineral Resources or that the production target will be realised.

The ore that will be mined and processed for the pilot plant represents a small portion of the DFS Ore Reserve, at 3,750,000t ore containing 26,375,000kg TREO, and the balance from the Mineral Resource Estimates.

The pilot plant would consist of all the processing steps detailed in the Definitive Feasibility Study (DFS) shown above, however will be downsized to a capacity to process 60,000tpa of ore at 1.19% TREO through the beneficiation plant, and 3,200tpa of xenotime concentrate at 20% TREO through the hydrometallurgical process. Previous offsite testwork has shown that these two processes are capable of delivering superior recoveries of 90% and 92% respectively.

The processes will be modularised and containerised for the pilot plant where possible to facilitate a compressed site construction period and allow for the pilot plant to be transported to undertake testwork at other projects if

required.

The existing road network will be used to transport equipment and materials during the construction phase, and reagents, consumables and product during the operational phase via Wyndham or Darwin port.

The **Stage Two** involves developing the project to BFS level with the inclusion of the results from the studies aimed at reducing mining costs, boosting production, the production of a premium product and increasing the Ore Reserve.

The **Stage Three** consists of the construction of the full-scale project based on the successful outcomes of the previous stages, and the DFS completed in March 2015.

## **Funding**

All this would remain a pipedream if it wasn't for the fact that it has lined up the funding for the first phase and has also achieved an offtake agreement (with that most elusive of unicorns in the REE space, an upfront payment component). Under the Sales Agreement, in early 2018, Lianyugang Zeyu New Materials Sales will make a pre-payment to Northern Minerals of AU\$10 million. The prepayment covers approximately 15% of the expected value of production during the Pilot Plant phase, with the remaining 85% to be paid to Northern Minerals over the course of the agreement based on volumes delivered.

As for strategic shareholders, in August 2016, the company announced that it had entered into a \$30 million equity funding agreement with Chinese companies Huatai Mining (part of Chinese coal trader Shandong Taizhong Energy) and Taizhong Energy Australia to continue on its development path. Due to the rather random capital exit rules that the Chinese government imposed the funds have been trickling in rather than coming in a substantial payment. However, the full amount has nearly been banked by Northern.

## **Conclusion**

While we keep reiterating the much thinned ranks of rare earth players to the point of tedium, this will be the key consideration when the REE tide definitely turns. There are so few survivors that one can number them virtually on ones fingers. This implies a scarcity value to begin with. However, only a few of the dwindled band are in conditions to move forward their projects swiftly to capitalize on any resurgence of interest. We reiterate again that the race will go to the swift and the unprepared, by definition, can be neither swift nor winners. Northern Minerals has soldiered on through the grim times and now is one of the best positioned to ride the wave of revived REE interest.

Northern Minerals is very advanced with its production plans. Having firstly come up with a DFS in 2015, it has now nuanced this with a three phase plan, with the third phase being the move to full production and the first phase being a “pilot plant” that to all intents and purposes is fully-fledged production. The second phase interposed between them is a study of the results of the first phase to justify the third phase. Thus it has the potential (financing permitting) to jump to the front of the queue and be ranked as most likely project to reach production.

We reiterate the Long attractions of Northern Minerals and Hallgarten’s twelve-month target price of AUD 38 cents...to access the Hallgarten & Company report, [click here](#)

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# **Northern Minerals passes on**

# **\$26M offer to maintain control**

Northern Minerals ('Northern', ASX: NTU) has decided not to sell an AUD\$ 26 million minority interest in its Browns Range heavy rare earths project in Western Australia. This is actually good news and it suggests that Northern's management is very confident in its future and the rare earths market. The minority interest in question concerned a 16% interest in Northern's Browns Range project to the Australia Conglin International Investment Group (ACIIG). The ends of the negotiations over the deal have in no way hampered the close ties between ACIIG and Northern; the former shall remain Northern's main shareholder. ACIIG has a large stake in an AUD\$ 5.4 million placement completed this year. Northern Minerals is pleased to announce it will raise \$5.3 million for its Browns Range Heavy Rare Earth (HRE) project in northern Western Australia. That placement adds to the AUD\$ 6.5 million already in Northern's coffers, easing the path to completion.

Northern feels that the placement will be sufficient to support the Browns Range project toward production stage, expected to be reached after the current feasibility study phase some time in 2016. Northern's confidence boost comes from the fact that metallurgical tests and an increased JORC resource and upgraded beneficiation flowsheet, noted during the scoping studies, have placed Northern's position and its project at a higher level than when the sale of a minority stake had been considered. In both cases, the sale of the stake and now the reconsideration of that sale, Northern's goal was to maintain flexibility. Having secured the funding to complete the feasibility study, it has managed to keep full control of any additional funding mechanisms with a view toward the larger capital costs as the project edges toward production.

The current resource estimate for the Browns Range project now stands at 4.13-million tons of at 0.68% (or 28,084 tons TREO) while the pre-feasibility study for Browns Range should be issued sometime this summer. The Browns Range project, therefore, offers very promising economics, especially in view of the fact that it is expected to being able to deliver a high percentage of the critical and much in demand heavy rare earths (HREE) such as dysprosium – up to 82%. Such is the concentration of ‘heavies’ that Northern could survive on the production of dysprosium alone. Northern also noted that it has faced little difficulty in extracting the xenotime (the mineral containing the rare earths) from the host rock.

The context in which Northern will be operating has also become more favorable. China’s concern with pollution and its efforts to curb toxic waste and emissions will curb production, helping to improve prospects for rare earth miners everywhere else. One of the likely tools to achieve this, in respect of the World Trade Organization’s demand that China lift export quotas, will be in the form of special export taxes to be imposed on rare earths; such a measure is sure to increase prices. Chinese authorities have already targeted illegal miners, and have realized that environmental pollution has become a very politically sensitive issue, one that if left unaddressed could provide the spark for social unrest on a scale unseen since the events leading to “Tiananmen Square” exactly 25 years ago. Chinese authorities may actually go as far as demanding environmental compliance certificates for exports. The unregulated production of rare earths in China has been blamed for generating such noxious substances as fluorine; cadmium has also been found in wastewater: both cause cancer. Meanwhile, considering much of China remains rural, the damage to agricultural land caused by acid leaching has become a major issue.