11 September 2013

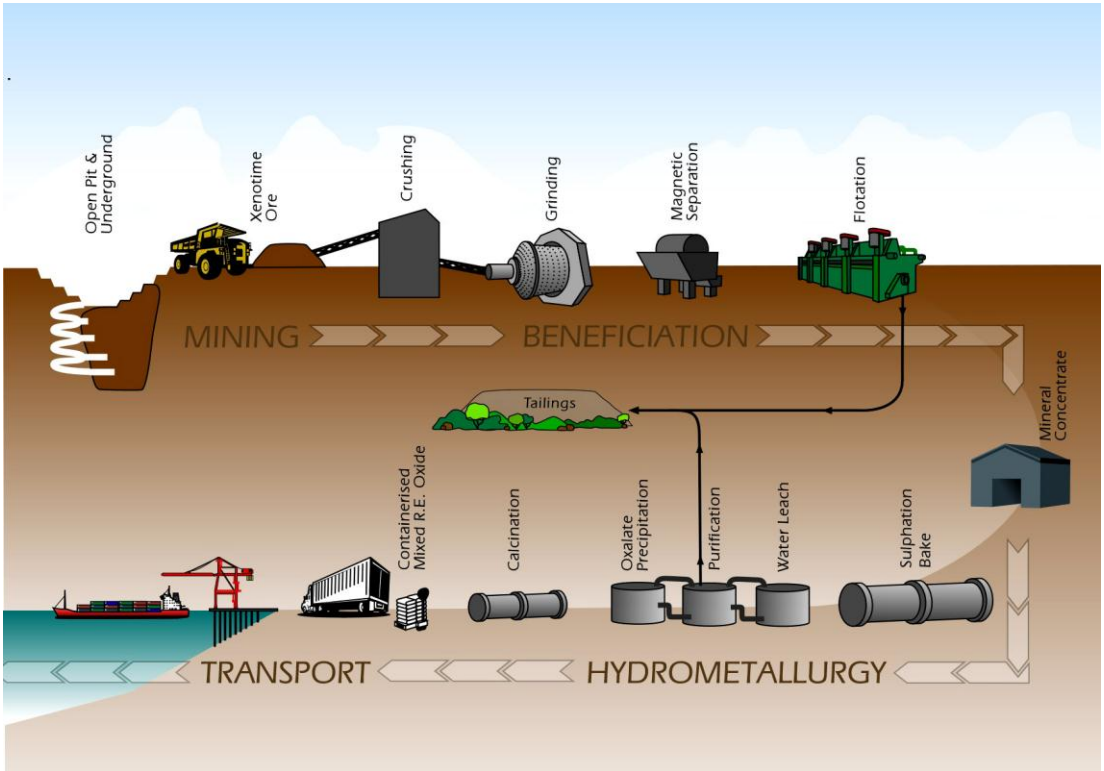
# Browns Range Project Development Update

**Highlights**

- Scoping Study remains on track for completion in December
- Optimisation testwork on beneficiation flowsheet achieves best recovery to date of 83%
- Successful bench scale semi-continuous run of the proposed hydrometallurgical flowsheet
- Purification step progressed with reduction of already low levels of thorium and uranium
- Planning underway for second beneficiation mini-pilot plant run
- Sterilisation and water supply drilling well advanced
- Drilling and trenching for 100 tonne bulk sample to commence this month
- Drilling completed for pit slope geotechnical assessment for Wolverine

Northern Minerals (ASX: NTU) is pleased to provide an update on its Browns Range Heavy Rare Earth Project (the "Project") following the progression of a range of activities to support the ultimate development of the project.

The strong momentum of the work programs completed in the first half of 2013 has continued, with positive developments in both metallurgical test work and pit slope geotechnical assessment.




***Browns Range Project –Mining and Processing Flowsheet***



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Northern Minerals Managing Director George Bauk said receipt of funding from the fully underwritten rights issue has supported the Company's planned work program, and it remained on track for first production in 2016.

"We are now fully funded for our current work program, and have continued to make excellent progress in terms of developing and de-risking the Browns Range Project over the past few months," Mr Bauk said.

"Our project development activities continue to deliver positive outcomes and reaffirm the key competitive advantages of the project. In particular, our metallurgical testing is reinforcing the benefits of our HRE rich xenotime mineralisation, which in combination with the mainly silica -host rock, provides a relatively simple and low cost processing path to a high value end product."

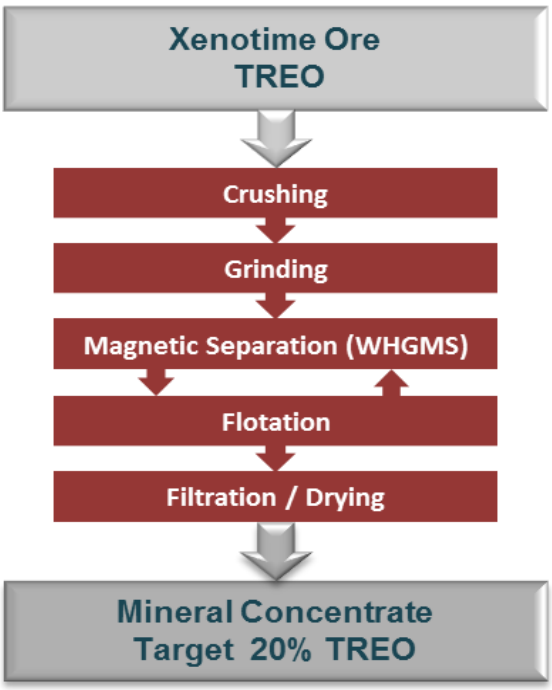
"Our project development team is now in full swing as we move towards a significant upgrade of our JORC compliant resource by October and the completion of a Scoping Study before the end of 2013."

**Metallurgical Test Work**

One of the key features of the Project is its xenotime mineralisation in combination with the silica dominant host rock, enabling the use of well established processing methods to beneficiate the ore to a high grade mineral concentrate.

The Company has been focused on optimising this beneficiation process, with work continuing on the two preferred routes: whole of ore flotation, and a combination of wet high gradient magnetic separation (WHGMS) followed by flotation cleaning. Recovery improvements at the target grade have been achieved for both routes during recent optimisation work.

***Beneficiation Flow Sheet***




The whole of ore flotation flowsheet optimisation has recently focused on the cleaning circuit, with preliminary testwork undertaken and Mineral Liberation Analysis underway on four size fractions. Initial cleaning tests obtained the target 20% Total Rare Earth Oxide (TREO) concentrate grade at an overall 80% recovery - the best result to date using whole of ore flotation.

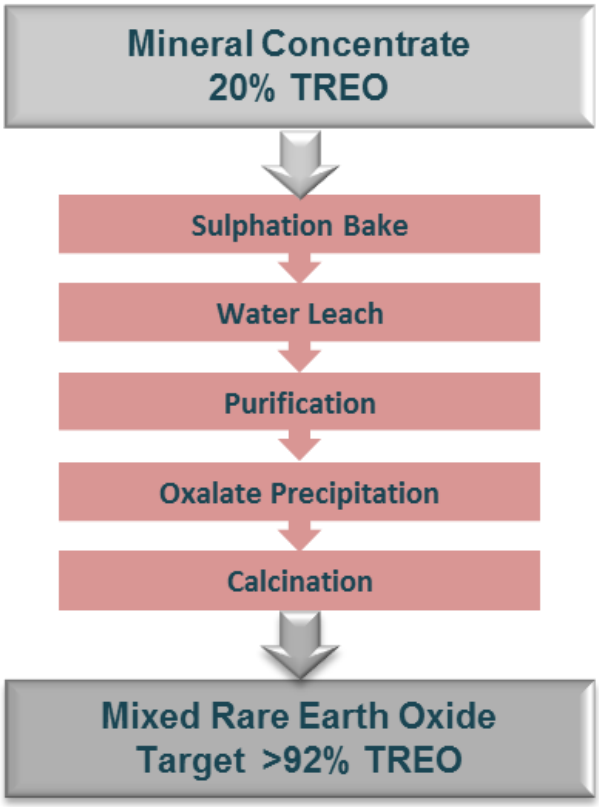
WHGMS testwork produced a combined rougher /scavenger magnetic concentrate containing 3.5% TREO from a 0.63% TREO head grade with a recovery of 86%. This product was cleaned via flotation to obtain the target mineral concentrate grade of 20% TREO while delivering a cleaner recovery of 97%. This achieved an overall circuit recovery of 83%, the best result to date from all beneficiation testwork to achieve the target mineral concentrate grade.

Ongoing test work will determine which route is optimal for recovery and mineral concentrate grade. This will be included in the Pre-Feasibility Study to determine the most efficient and cost effective process and design of the beneficiation stage.

Northern Minerals successfully completed processing a sample of just over one tonne of mineralised material from the Wolverine deposit through a mini-pilot beneficiation plant. This produced 23kg of 20% TREO mineral concentrate for further hydrometallurgical testwork. A second beneficiation mini pilot is planned to produce approximately 70kg of mineral concentrate from four tonnes of Wolverine mineralised material which will be processed through a crush, grind and flotation circuit. The circuit will be scaled up to operate at 150kg/hr compared to the 50kg/hr rate in the previous mini-pilot plant run.

The Company has also advanced the next stage of the hydrometallurgical testwork program with the successful operation of a bench scale semi-continuous run of the proposed flowsheet.

***Hydrometallurgical Flow Sheet***




The sulphation bake step of the 20% TREO mineral concentrate was carried out on a batch basis, with the baked material fed into a continuous water leach, purification and oxalate precipitation process. The rare earth oxalates were collected for subsequent batch calcination.

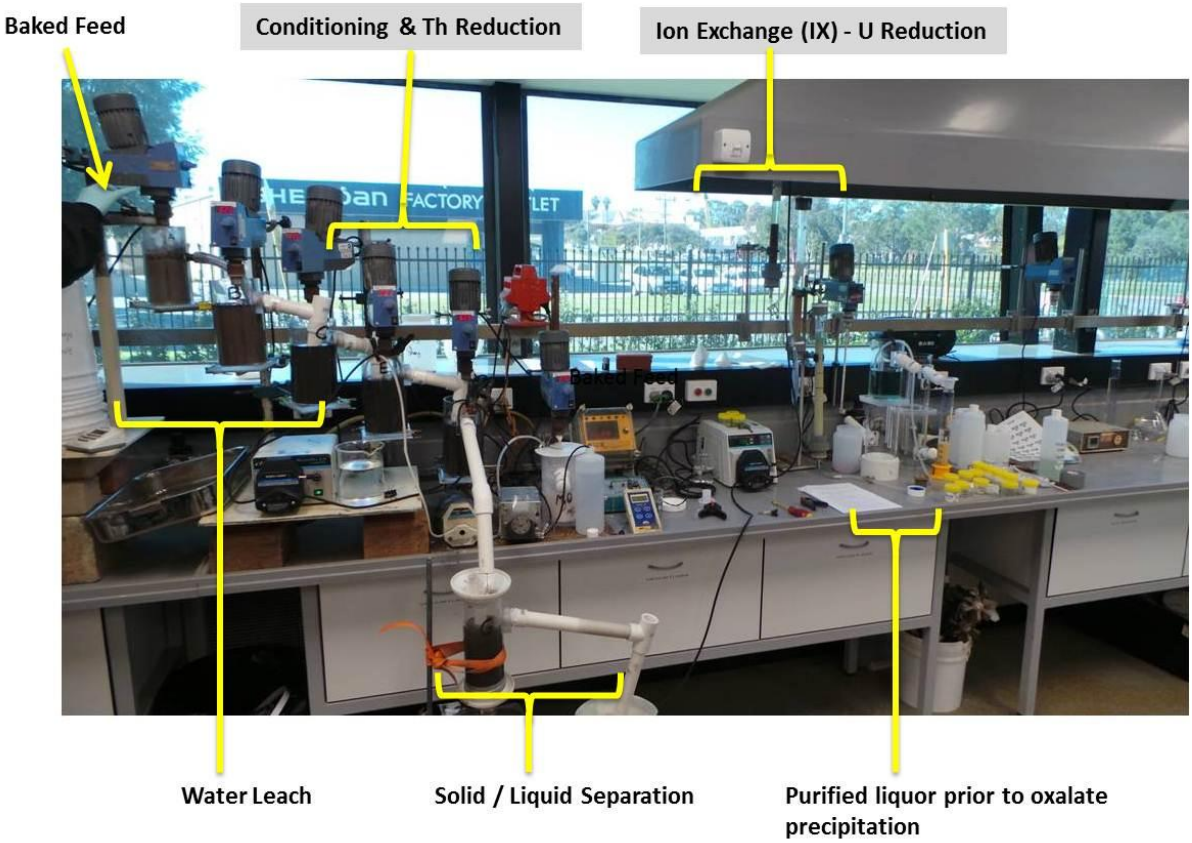
The bench scale test work achieved a full simulation of the integrated semi-continuous system, with efficient recovery of rare earths as oxalates achieving an oxalate grade of 45.3% TREO. Calcination of the oxalates will produce a mixed RE oxide of >90% TREO.

The purification step was also progressed during the test work, in particular the reduction of thorium and uranium towards meeting product specifications. The outcomes included the following:

- Lowering of the thorium concentration in the pregnant liquor solution (PLS) to below 1 mg/L without significant losses of RE.
- Removal of uranium in the PLS to <0.05 mg/L by the two stages of ion exchange (IX) without significant losses of RE.

Following the success of this bench scale semi-continuous testwork program, the Company will now undertake further optimisation testwork on the process, in particular the bake/water leach step and the purification steps, in preparation for the larger scale pilot plant planned for early 2014.






***Bench Scale Semi-continuous Run – Integrated System***

**Bulk Sample for Metallurgical Testwork**

A bulk sample of approximately 100 tonnes of mineralised material is required to undertake the large scale hydrometallurgical pilot plant. A combination of trenching and large diameter diamond drilling at the Wolverine and Gambit West prospects will be undertaken to extract the sample.

A close spaced drilling program has been completed over the near surface mineralisation at these prospects to delineate areas for the bulk sample extraction, with large diameter diamond drilling set to commence on 15 September at Wolverine.

**Sterilisation Drilling**

A program of sterilisation drilling has commenced over the proposed infrastructure areas of the Project, with RC drilling to 50m depth completed at the proposed process plant location. Sterilisation drilling will now continue in the proposed tailings storage facility and airstrip areas.

**Water Drilling**

A water supply and dewatering assessment drilling program is underway at the Project. The objective of the program is to test potential groundwater supply targets in the Project area and also to determine if dewatering of the prospects will be required during mining. Drilling depths in the water supply areas was targeted at 150m and stretched to 200m when targeting the dewatering requirements at the prospects.

Three of the six water supply targets intersected significant water yields of good quality. These three bores, which are within 15km of the proposed process plant site, will now be developed and pump tested to establish the sustainable yield from these bores. Of the four prospects (Wolverine, Gambit, Gambit West and Area 5) targeted for dewatering assessment, only Area 5 intersected a water yield significant enough to warrant developing and pump testing.

**Geotechnical Assessment**

The Company has engaged AMC Consultants to undertake a pit slope geotechnical assessment of the proposed Wolverine pit. To complete this assessment, nine diamond core holes have been drilled and logged, with samples of waste rock selected from this drilling currently undergoing geotechnical tests at a laboratory in Perth.

A preliminary assessment indicates the pit slope angles used in the previous scoping level mining studies at Wolverine could be steeper, which would result in a reduced strip ratio and lower mining cost.

**Environmental Approvals and Stakeholder Engagement**

The environmental approval process is underway with the Environmental Protection Authority (EPA). As previously announced, the level of assessment set by the EPA is an Assessment on Proponent Information (API). A number of baseline environmental surveys and studies are now nearing completion (such as groundwater, background radiation and invertebrate fauna) and preliminary impact assessment studies have commenced in the areas of flora and vegetation, fauna and short range endemic fauna for discussion with the EPA.

The extensive community engagement program undertaken in May has resulted in increased interest and enquiry in the Browns Range Project. Discussions with the Shire of Halls Creek and State Government in regards to road infrastructure have been progressed and assistance with local community initiatives has been continued.

Northern Minerals Managing Director, George Bauk, also recently chaired the Chamber of Minerals and Energy, Kimberley Regional Council in Halls Creek where a number of the mining companies operating and/or with interests in the Kimberley Region came together to discuss infrastructure planning and development, the Kimberley Workforce Development Plan and community development.

**Drilling and Resource Update**

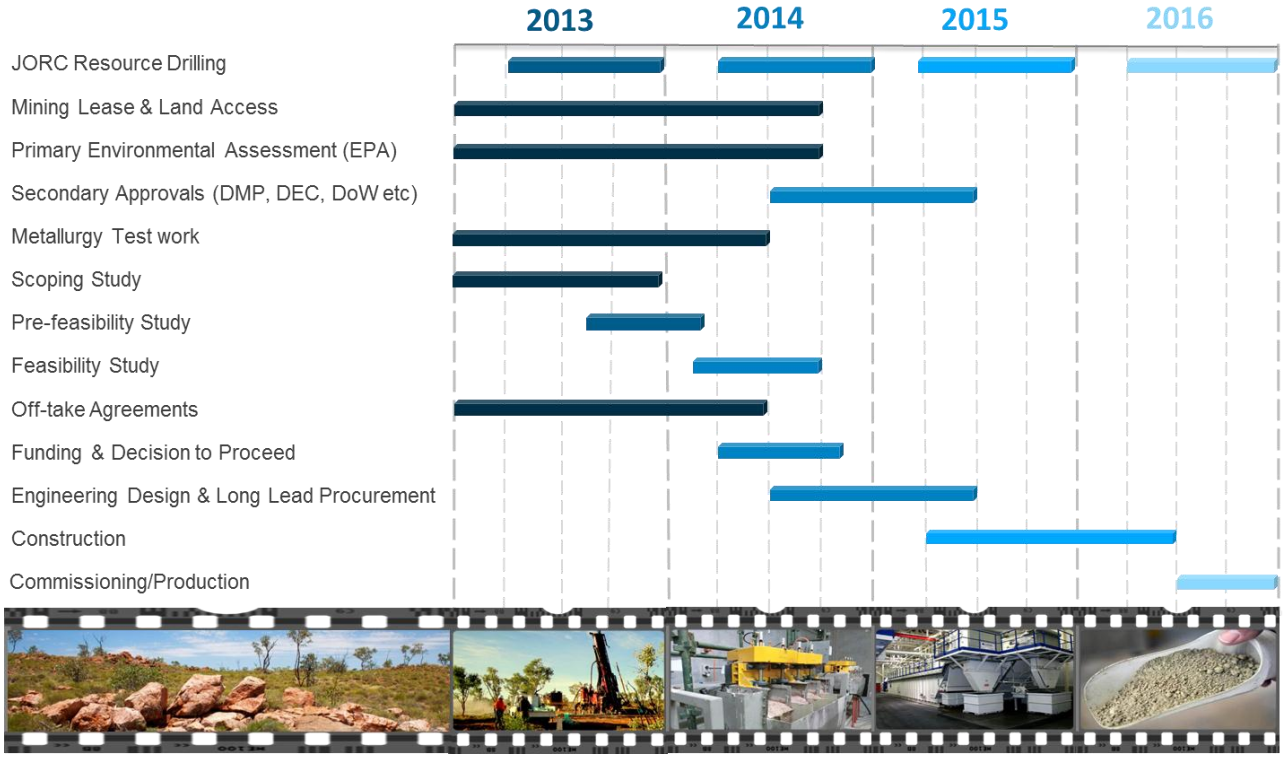
Following completion of a significant drilling program in the first half, Northern Minerals has released a number of outstanding drill results during the past three months (see previous ASX announcements). The drilling program has targeted a resource extension at the Wolverine deposit, as well as maiden resources for the Gambit Central, Gambit West and Area 5 prospects. An updated JORC resource estimate is expected to be released in October.

The drilling program also identified exciting new zones of mineralisation at Wolverine, which are now the subject of further drilling (see ASX announcement 10 September, 2013). Results from this program are expected to contribute to further upgrades in resources in the future.

**Scoping Study**

The Browns Range Scoping Study is expected to be completed in the final quarter of 2013, and work is now well advanced toward delivering this. The Study will incorporate the proposed updated in JORC compliant resource planned for next month. Planning and preparation work is also underway for the Pre-Feasibility Study, in line with the pathway to production below.

**Browns Range – Pathway to Production by 2016**




## Competent Persons Declaration:

*The information in this report accurately reflects information prepared by competent persons (as defined by the Australasian Code for Reporting of Mineral Resources and Ore Reserves). It is compiled by Mr R Wilson, an employee of the Company who is a Member of The Australasian Institute of Mining and Metallurgy with the requisite experience in the field of activity in which he is reporting. Mr Wilson has sufficient experience which is relevant to the style of mineralisation and the type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent person as defined in the 2004 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr Wilson consents to the inclusion in the report of the matters based on his information in the form and context in which it appears*

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**About Northern Minerals:**

Northern Minerals Limited (ASX: NTU) is focused on development of rare earth elements (REE), with a large and prospective landholding in Western Australia and the Northern Territory. The Company's flagship project is Browns Range, where it has a number of prospects with high value HRE in xenotime mineralisation. In particular, the mineralisation includes high levels of dysprosium and yttrium, which are in short supply globally and expected to be increasingly sought after as world economies stabilise and recent trends in urbanisation and technology diffusion, particularly in Asia, accelerate. Following outstanding results from its drilling and metallurgical programs in 2012, the Company has delivered its maiden JORC resource, advancing Browns Range toward production, using a relatively simple and low cost processing flowsheet to produce a high grade mixed Rare Earth oxide. Northern Minerals also has a HRE exploration program underway at the geologically similar John Galt project. For more information www.northernminerals.com.au