

## Donald Minerals Sands Project - Mineral Separation

### Metallurgical Testwork Update

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#### KEY OUTCOMES

- Confirmation of the ability to produce a high quality Rare Earth Elements concentrate from a froth flotation technique, with total Rare Earth Elements (REE) of 51.2% with low impurity levels, at recoveries of up to 94.6% from HMC.
  - Achieved high quality zircon final product with low impurities ( $ZrO_2 > 66\%$ ,  $TiO_2 < 0.15\%$ ,  $Fe_2O_3 < 0.1\%$ ,  $Al_2O_3 < 0.1\%$ ), recoveries of zircon final products up to 90.8% from HMC, of which >80% is assay proven to be of premium specification.
  - Titania (titanium dioxide) product recoveries of up to 94.4% from HMC, with the potential to produce a 65% Ti concentrate.
  - Overall test results provide confidence in relation to the mineral separation process to be employed for final product separation of the finer, WIM-style materials, as well as confidence that commercial scale recovery of final products is achievable by the processes employed.
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**Astron Corporation Limited (Astron) (ASX: ATR)** announces the results of metallurgical test work relating to its Donald mineral sands project, located in regional Victoria. Pilot scale process work has been undertaken on 1,000 tonnes (t) of ore recovered from a test pit and subsequently produced a 24 tonne sample of heavy mineral concentrate (HMC) for purposes of pilot testing the processing of HMC into final product streams.

The metallurgical test work has been undertaken at facilities operated by Mineral Technologies. The test work and evaluation has included the production of zircon, a titania (titanium dioxide) concentrate, and a rare earth element (REE) concentrate. The work represents a key part of the work stream for the potential commercialisation of the Donald resource; one of the largest undeveloped mineral sands ore bodies globally.

The metallurgical test work forms an integral part of determining the full scope of the Donald mineral sands project, including: rare earth recovery; zircon and titania production stream and product specifications (suitable for customer testing and offtake arrangements); determination of concentrating and processing flow sheet and configuration on site; further pilot work and the move to a detailed feasibility study during 2021 to allow completion of project economics for determination of project funding strategies.

## **Donald Project – Background**

The Donald mineral sands project is located in the Wimmera region of Victoria, 60 kilometres from Horsham and near the township of Minyip.

Donald represents one of the largest known zircon and titanium ore bodies in the world and a potentially significant new source of global supply. Based on an Ore Reserve Update, as announced on 18 February 2021, the Donald project area holds Ore Reserves of 602 million tonnes (mt) of ore with an average heavy mineral (HM) grade of 4.8%. This equates to an approximate, in-situ ore body of 28.9 Mt of heavy minerals, comprised: 5.4 mt of zircon; 9.2 mt of ilmenite; 8 mt of higher titanium content products of rutile and leucoxene (Hi-Ti), as well as a significant REE component of 491 thousand tonnes (kt).

It is likely that the Donald project will produce three main product streams: a premium, ceramic grade zircon (expected to be 80% of total zircon, or ~95ktpa –100ktpa during Stage 1); a zircon 60 product (~20 – 25ktpa); a combined titania product, with a 65% titanium dioxide content (>200ktpa), suitable for slag production for both chloride and sulphate pigment production; and a REE concentrate (~15ktpa). Astron is now investigating a pit to final product on site, allowing the capture of the value-adding processing component within Australia (as opposed to offshore processing of HMC).

The initial stage of the planned Donald project will involve the mining and processing of the Ore Reserves contained within ML5532, located wholly within RL2002 (refer tenement map below). Mining operations are then planned to extend into the remainder of RL2002. The current Ore Reserves for the project encompass only RL2002; while a Mineral Resources is available for the entire area including RL2003.

## **Metallurgical Test Work – Background**

In 2019, Astron excavated and processed ore from a test pit and recovered a bulk sample suitable for the pilot production of a heavy mineral concentrate. 24 tonnes of HMC was produced from a pilot scale heavy mineral concentration plant. A 75kg batch sample was extracted from the HMC for confirmatory and optimisation testing to confirm the suitability of a hybrid processing approach.

Astron advises that the test results obtained have been satisfactory; and provide confidence that commercial scale recovery of final products is achievable by the process employed.

## **Summary of Results**

### *Rare Earth Recoveries*

- Flotation testing using a conventional re-agent produced a mixed rare earth concentrate stream containing 51.2% total REE with low impurities;
- using CeO<sub>2</sub> as a tracer, rare earth mineral recovery to final rare earth mineral concentrate was calculated to be up to 94.6% relative to HMC, using a wet process only;

- further separation to a light rare earth concentrate with mineral assemblage of 51.3% of light REE (La, Ce, Pr, Nd, Sm, Eu, Gd) and a heavy rare earth concentrate containing 26.1% heavy REE (Tb, Dy, Ho, Er, Tm, Yb, Lu, Y) was achieved.

#### *Zircon Recoveries*

- High quality zircon specifications with assemblage characteristics of  $ZrO_2 > 66.0\%$ ,  $TiO_2 < 0.15\%$ ,  $Fe_2O_3 < 0.1\%$ ,  $Al_2O_3 < 0.1\%$ , were achieved;
- optimisations of the downstream circuits has the potential to significantly improve  $ZrO_2$  recovery to 90.6% relative to HMC;
- recovery to high quality zircon was calculated to be 72.6% relative to HMC;
- an additional 18% of zircon is expected to report as a zircon product with  $>60\%$   $ZrO_2$ .

#### *Titania Product Recoveries*

- The metallurgical test work produced a combined titania concentrate with 64.9% titanium dioxide content ( $TiO_2$ );
- opportunities were identified to lower the silica content within the titania concentrate to enable direct processing in chlorinator slag plants.

**Figure 1. Astron's final product samples (REEC, zircon, non-magnetic concentrate, magnetic concentrate respectively)**



#### **Process Flowsheet**

A detailed process flow sheet is being developed, which is likely to contain the following main elements:

- a wet concentrator plant containing spirals for production of a heavy mineral concentrate
- a flotation circuit to remove the REE concentrate from the heavy mineral concentrate;
- wet high intensity magnetic separation ("WHIMS") for production of a magnetic concentrate (consisting of ilmenite) and non-magnetic (consisting of Hi-Ti and zircon) product stream;
- a gravity non-magnetic upgrade circuit containing spirals for further separation of the zircon products from the Hi-Ti products; and
- a mineral processing circuit, including electro-static separation, to produce a final zircon production stream.

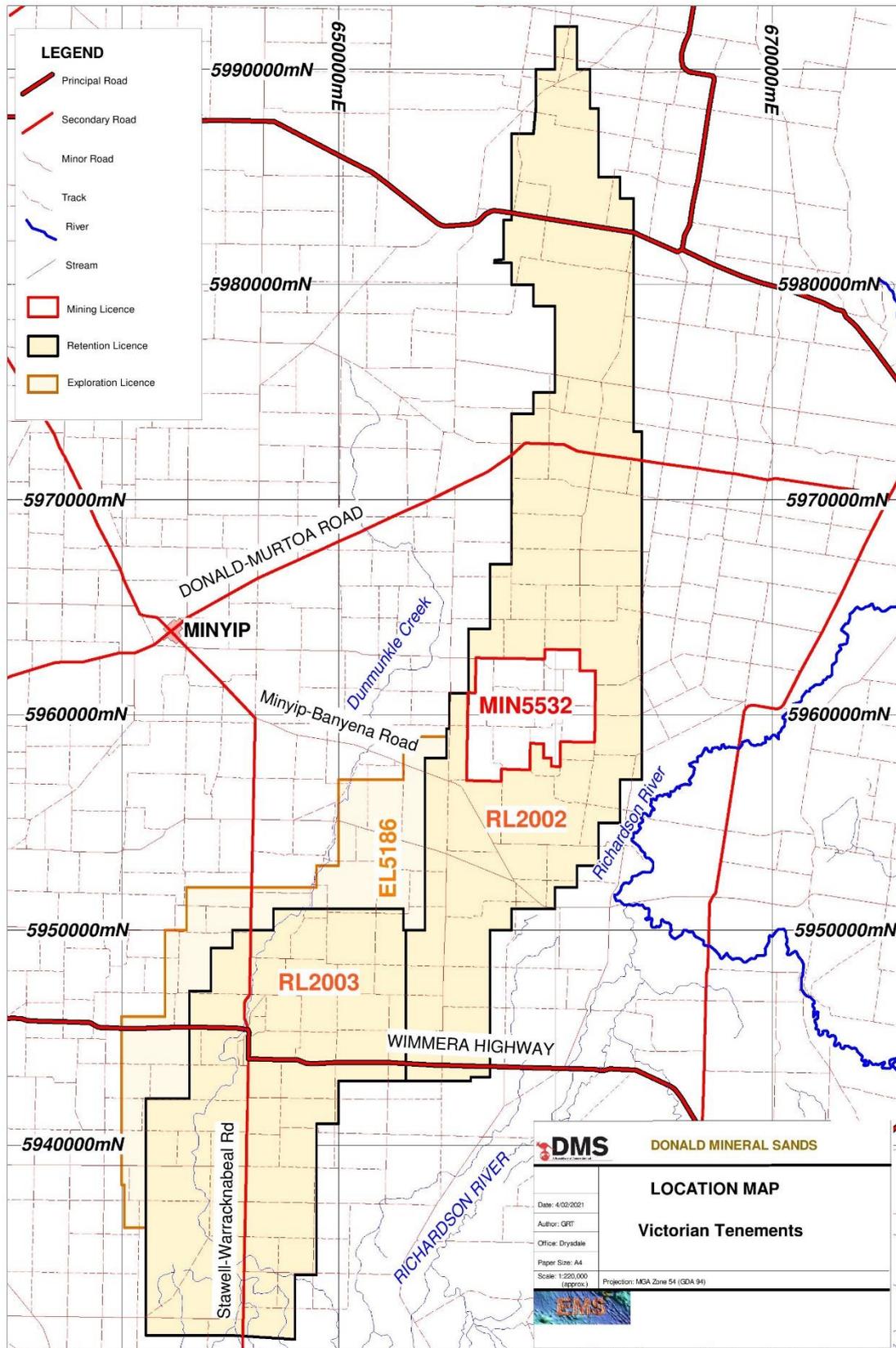
## **Key Findings**

- Associated with the removal of the REE prior to separation of the mineral sands constituents of the HMC, the subsequent concentrate had a natural radioactivity of under 9 becquerel/gram (Bq/g), meeting export regulatory requirements;
- The recent scope of works confirms the practicality of conducting downstream final product mineral separation in Australia, and Astron intends to investigate opportunities for an integrated mining, concentrating and final product separation concept locally for the Donald project; and
- given test results were achieved via a small scale, batch process, it can be anticipated that on a continuing operating basis, further improvements in recoveries and grades may be expected.

## **Future Areas of Technical and Market Investigation**

- Following this test work, Astron will move towards final conceptual design considerations, as well as consecutively engaging in definitive pilot scale processing work;
- Astron has conducted opacification tests on its premium zircon product (at its own laboratory test facilities in Yingkou, China) and plans to release the results of these tests shortly, these results are integral to potential customer engagement and off-take discussions; and
- Astron intends to commence the process of providing product samples of both the titania and zircon products to selected customers for testing and as part of these product off-take discussions.

**Figure 2 Donald Project Tenement Map**



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This announcement is authorised for release to ASX by the Board of Directors of Astron

**About Astron Corporation Limited**

Astron Corporation Limited (ATR: ASX) is an ASX listed company, with extensive (30 years+) experience in mineral sands processing, technology and downstream product development, as well the marketing and sale of zircon and titania (titanium dioxide) products, most notably in China. Astron conducts a mineral sands trading operation based in Shenyang, China and operates a zircon and titanium chemicals and metals research and development facility in Yingkou, China. The company's prime focus is upon the development of the large, long-life and attractive zircon assemblage Donald mineral sands deposit in the Murray Basin, Victoria. Donald has the ability to represent a new major source of global supply in mineral sands. Astron is also the owner of the Niafarang mineral sands project in Senegal, West Africa. Niafarang is a high-grade coastal mineral sands deposit, planned to be developed using simple dredge mining and processing methodology.

**COMPETENT PERSONS STATEMENT**

The information in this report that relates to Exploration Results and Mineral Resources for the Donald Project is based on information first reported in previous ASX announcements by the Company, as listed in this announcement. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the original announcements continuing to apply and have not materially changed. The information in this document that relates to the estimation of the Ore Reserves is based on information compiled by Mr Pier Federici, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy and Australian Institute of Geoscientists. Mr Federici is a full-time employee of AMC Consultants Pty Ltd and is independent of DMS, the owner of the Donald Project Mineral Resources. Mr Federici has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. The information in this document that relates to the estimation of the Mineral Resources is based on information compiled by Mr Rod Webster, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy and Australian Institute of Geoscientists. Mr Webster is a full-time employee of AMC Consultants Pty Ltd and is independent of DMS, the owner of the Donald Project Mineral Resources. Mr Webster has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of

Exploration Results, Mineral Resources and Ore Reserves'. The Company confirms that the form and context in which the Competent Persons' findings are presented have not materially modified from the relevant original market announcement.

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