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Snapper Mine Northern Extension (MP06_0168-Mod-7)

Resource & Economic Assessment

Division of Resources & Geoscience

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Executive summary

Determination

The Division of Resources and Geoscience assessed the Snapper Mine Northern Extension. Project (the Project or Modification) submitted by Tronox Mining Australia Limited (Tronox or the Proponent).

The Division determined the Project will:

- ensure continued operations at Snapper Heavy Mineral Sands Mine (Snapper Mine) for one year until 2021.
- without the Project the existing Snapper Mine would cease operations in 2020 and would not allow a smooth transition to the Atlas Campaspe operation which is due to commence in late 2021.
- improve resource recovery and be an efficient use of resources.
- ensure an appropriate return to the NSW Government including;
 - \$2.3 million royalties (current dollars)
 - \$98 million total revenue (current dollars)
- provide continued employment for the current workforce of 200 full-time-equivalent personnel at the existing Snapper Mine until 2021.
- extract an additional 8.5 million tonnes (Mt) ore and to produce approximately 170 kilotonnes (kt) of heavy mineral concentrate.

The project

Tronox through MP06_0168-Mod-7 seek a northern extension to the existing operations at Snapper Mine that will:

- extend the existing, approved, mine path and associated supporting infrastructure into a new mining area.
- develop temporary off-path overburden emplacements.
- provide additional soil stockpile areas.
- reduce the number of final depressions (voids) from two to one.
- relinquish approved surface development areas no longer required, resulting in a net reduction in surface development area.

The Project will use the existing mine workforce, equipment and approved management systems.

Introduction

State significant development is regulated under the *Environmental Planning and Assessment Act 1979*, which requires a proponent to apply to the Department of Planning, Industry and Environment for development consent, supported by a Modification Report (MRT).

This Resource & Economic Assessment (REA) conducted for the Project by the Division assessed:

- the social and economic benefits to NSW including royalties, capital investment, revenues and jobs.
- the resource/reserve estimates stated in the proponent's MRT.
- if the Modification is an efficient development of the resource, that resource recovery is optimised and waste minimised.
- if the Modification will provide an appropriate return to NSW.

The objects of the *Mining Act 1992* are to encourage and facilitate the discovery and efficient development of mineral resources in NSW.

Of particular relevance to this REA are Section 3A Objects:

- to recognise and foster the significant social and economic benefits to NSW that result from the efficient development of mineral resources.
- to ensure an appropriate return to the State from mineral resources.

The relevant section of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 is Part 3, Clause 15: Resource Recovery requires that resource recovery is efficient, optimised and minimises waste.

Project overview

Current mine history and ownership

Snapper Mine is an open cut mineral sands mine located about 85 kilometres northeast of Wentworth in southwestern NSW. Tronox (ex-Cristal) processes Heavy Mineral sands to produce various heavy mineral concentrates, for transport to their mineral separation plants in Broken Hill and/or Bunbury WA.

The Snapper Mine has operated since 2007 concurrently with Ginkgo Mine which commenced in 2004 and operates under DA 06_0168 (as modified 6 times). The approval currently allows for mining operations at Snapper Mine until 10 July 2026, producing 14 million tonnes per annum (Mtpa) of ore. Based on the current mining schedule and resource, mining operations will cease in the existing mining area by 2020. Based on this current scheduling, there is a risk of production and employment discontinuity between the cessation of Snapper Mine operations and commencement of Atlas-Campaspe Mine operations.

The proposed Snapper Mine Northern Extension Project

As of 2018 the measured resource (pre-mined) for Snapper Mine is 113 million tonnes (Mt) at an average grade of 5.4% Heavy Mineral (HM) representing 6 Mt of contained HM. Along with amenable market conditions, the identification and recognition of these beneath about 55 m of cover is the basis of this Modification.

The identification of additional, comparatively high-grade mineralisation would enable the two dredges at Snapper to extract of an additional 8.5 Mt and to produce approximately 170 kilotonnes (kt) of heavy mineral concentrate and extend mine life (extraction operations) by about ten months. This would maintain production during the start-up phase of the Atlas/Campaspe operations. The Modification includes an extension to the existing/approved mine path to extend operations at the Snapper Mine within the approved total mine life and without increasing the size of the approved surface development area.

The Project will use the existing mine workforce, equipment and approved management systems. No change to mining methods or production rate are proposed.

The Division notes that this Resource & Economic Assessment has been undertaken in accordance with commercial-in-confidence resource and mine schedule data supplied by the proponent.

Geological background

The Snapper deposit is a 13 km long northwest-striking strand-line deposit consisting of multiple old beach deposits. Various facies are stacked along the ancient beaches and have strike lengths of up to tens of kilometres. Shorter channels and embayments occur along, and sometimes cut the beach

facies. Six main mineralised domains (each with different heavy mineral grades and assemblages) are present. Mineralisation in the Snapper North deposit is mainly comprised of Domains 1, 6 and 20. Domain 1 is very high-grade and appears to represent a high-grade beach location with a high-grade dune developed above and over the back of the beach. Domain 6 is a series of ancient beach and dune deposits developed on the northeastern side of the deposit.

Size and quality of the resource

The mineral resource and ore reserve estimate have been completed in accordance with the Australasian Joint Ore Reserves Committee (JORC) Code for reporting of Exploration Results, Mineral Resources and Ore Reserves are by Mr Alan Hepinstal — a competent Person as defined in the 2012 Edition of the JORC Code.

The resource estimation is based on 100 m by 20 m centres for a total of 136 holes for 10,414 m (2019). Mineralisation occurs beneath approximately 55 m of overburden, the depth of cover being the main reason for the northwestern limit of the original mine path.

The Snapper North deposit is estimated to contain a JORC compliant Indicated Resource of 3.4 Mt @ 6.7% Heavy Minerals (HM) and 2.1% Slimes for 231 kt of HM.

The Snapper North deposit also includes a JORC compliant Probable Reserve of 9.8 Mt at 1.9% HM and 2.4% Slimes for 190 kt of heavy mineral sands which contains 47.9% Ilmenite, 19.6% Rutile, 11.8% Leucoxene and 10.2% Zircon.

The combined (inferred) resources and (probable) reserves contained total about of 13.2 Mt for 414 000 t of total HM.

The 8.5 Mt of ore to be mined exclusively from the Project area will include portions of the resource and reserve, with much of the resource estimated at an 'indicated' confidence level only.

Key data, including mineralogy, slimes, oversize and trash minerals have been submitted by the Proponent for the Division's assessment.

Comment

The stated probable reserve of 9.8 Mt @ 1.9% HM is a substantially lower grade than for other similar deposits, even for dry mining (e.g. Crayfish). Whereas at 6.7% HM the indicated resource is about double the average grade at Snapper and has a good mineral assemblage (including rutile of 9.1%).

Selective mining of the higher-grade portions deposit will be necessary to produce 8.5 Mt. This has been standard practise over the life of mine at the Ginkgo and Snapper operations.

Resource recovery

Table 1: Snapper mine, life of mine schedule

Year	OB (bcm)	Ore Tonnes	Ore grade	HMC
2019	4 M	1.7 M	2.59%	12,446
2020	18.9 M	11.9 M	2.58%	247,131
2021	5.9 M	9.9 M	2.95%	225,020

Mining is scheduled to commence in February 2021 and continue for ten months. Almost all production in 2021 will be from the Project area (Figure 1).

Mining will include:

- Topsoil/subsoil as per tractor scrapers,
- Overburden removal via Truck and Shovel,
- Ore removal via dredging.
- Some dredging of saturated overburden.

The existing two dredges will be in operation, with the 13.2 Mt of ore identified at Snapper North, about 8.5 Mt will be recovered. The remainder will not be recovered due to their depth/strip ratio.

Induration and competency information (both of critical importance) have been provided. Neither are likely to be significantly different to that already mined.

While HM grades are variable, and mineralisation will be left behind, the Proponent has demonstrated capacity to mine the deposit with the proposed extension Modification effectively representing bonus mineralisation. After examining the proponent's MRT, the Division considers the Project an efficient development of mineral resources that provides an appropriate return to the State, within the mine footprint, giving due consideration to the constraints of the location.

Economic benefits of the resource

Over the life of the Project the Division has estimated that the value of the products produced would be around \$98 million in current dollars. The Project would extend the life of the existing Snapper mine for one year to 2020/21. This extension by one year allows the Proponent continuity from their existing operations and to then transition to their new site, the Atlas/Campaspe operation. Without the Project production would dip significantly in 2021.

Approximately 200 personnel would be directly employed during operations of the Project at Snapper and in downstream operations. Without the Project these ongoing jobs would be at risk in 2021.

There would be minimal new capital investment if the Project is approved.

The Proponent has estimated that without the Project the gap in production would create a potential revenue loss of A\$21m in NPV.

Royalty calculation

The Project is an extension to an existing mineral sands operation therefore a royalty rate of four percent applies. This rate is applicable to the net mineral value. Net mineral value is the price received per tonne (the mineral recovered value) minus any allowable deductions.

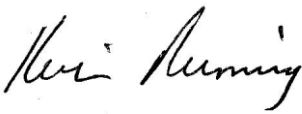


The estimated prices to be received for each of the products from the Project were obtained from the Proponent. The products are expected to be mined from the Project in the 2020/21 financial year.

Using the Proponents prices and tonnages it is estimated that total royalty from the Project will be of the order of A\$2.3m in current dollars.

Departmental Assessment

Assessed by	Unit	Branch
Assessing Officer: Dr David Forster Senior Geologist	Mineral Resource Assessment – Strategic Resource Assessment & Advice	Geological Survey of NSW
Assessing Officer: Bryan Whitlock Senior Resources Analyst	Resource Economics	Resources Policy, Planning & Programs
Assessing Officer: Adam W. Banister Senior Advisor	Assessment Coordination Unit – Resource Assessments	Resource Operations

Approvals

Approved by	Signature	Date
Approving Officer: Dr Kevin Ruming Director Strategic Resource Assessment & Advice		16/12/2019
Approving Officer: Tamsin Martin Director Resources Planning & Programs		16/12/2019
Endorsing Officer: Dr David Blackmore Director Resource Assessments		18/12/2019