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MINING, EXPLORATION & GEOSCIENCE ADVICE RESPONSE

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Dear Brittany

Project: Ginkgo Mineral Sands Mine Extension
Stage: Advice on Modification and provide a Resource and Economic Assessment
Development Application: DA251-09-01-MOD14

I refer to Mining, Exploration and Geoscience's (MEG) previous correspondence dated 11 December 2020 providing preliminary comments on the Ginkgo Mineral Sands Mine Extension (the Project) submitted by Tronox Mining Limited (the Proponent).

The relevant units internal to MEG have been consulted in generating this advice. The Department of Planning, Industry and Environment – Energy, Resources & Compliance Division and the Proponent should be aware that matters concerning subsidence, subsidence management, mine operator, safety, rehabilitation and environmental impacts of final landform design are not assessed by MEG and advice should be sought from the Resources Regulator.

MEG has completed a review of resource and economic data supplied by the Proponent and provides the following detailed advice:

Advice overview

MEG considers that the Project will likely:

- extend the life of mine by two years from 2023 to 2025.
- provide an appropriate return to the NSW Government including;
  - $2.9 million royalties (current dollars)
  - $120 million total revenue (current dollars)
- support employment for around 260 operational jobs until such time as the approved Atlas-Campaspe Mine becomes operational.
- be an efficient use of resources.

In a typical year at full production, the NSW Government would expect to receive about $1m in royalties from the Project.

Project capital investment is about $2m.

Without the Project there is a risk of production and employment discontinuity between the cessation of the approved Ginkgo deposit operations and commencement of Atlas-Campaspe Mine operations.

Resource and Economic Assessment

Tronox Mining Australia Limited (Tronox) is the owner and operator of the Ginkgo Mineral Sands Mine (Ginkgo Mine), which is located approximately 85 kilometres (km) north-east of Wentworth and approximately 170 km south-east of Broken Hill in western New South Wales (NSW). The Ginkgo Mine operates under Development Consent (DA 251-09-01).

The project proposes an Extension of approved mining path within ML1504, to include Pod 3 which will, extend the mine life from 2023 to 2025. The Project will mine, low grade HMS mineralisation along strike to the southeast of the existing mine path targeting Ilmenite, Leucoxene, Monazite, Rutile and Zircon.

In view of the constraints outlined in the Proponent's EIS and based on the information currently available, MEG considers that the Project is consistent with the objects of the *Mining Act 1992.* In addition, in relation to clause 15 of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, the Project represents an efficient development and utilisation of minerals resources which will foster significant social and economic benefits.

The proposed mine design and site layout have evolved during the study stages of the Project but should achieve satisfactory resource extraction. The proposed mine site infrastructure is not expected to significantly sterilise any resources. MEG is satisfied that, should the operational outcomes be achieved, the proposed mine design and mining method submissions adequately recover resources and will provide an appropriate return to the state.

The resource utilisation, recovery and economic benefits assessment undertaken by MEG is addressed in Attachment A.

The requirement for a mining authorisation and royalty liability

The requirement for a mining lease

Ilmenite, Leucoxene, Monazite, Rutile, Zircon are listed as prescribed minerals under the *Mining Act 1992.* The Proponent is required to hold appropriate mining authority(s) allowing for mineral extraction, such as a mining lease, from MEG to undertake mining. The grant of a mining lease gives the holder the rights to prospect and mine for specified minerals, carryout primary treatment operations and carry out any ancillary mining activities.

MEG notes that the Project ,as it currently stands is located within the existing operations area of Mining Lease 1735 and Mining Lease 1735 (Act 1992). Based on current information, the Proponent holds the appropriate titles for mining operations under the *Mining Act 1992*. Proposed mining operations are allowable within existing surface exceptions and/or depth restrictions.

It should be noted that Mining Lease 1735 (Act 1992) (Crayfish deposit) currently allows for Ilmenite, Rutile and Zircon only. Should the operator wish to extract Leucoxene and Monazite within this authority in the future, as per ML 1504, an application to add additional minerals must be sought.

Biodiversity offset assessment

MEG requests that the Proponent consider potential resource sterilisation should any future biodiversity offset areas be considered. The Proponent must consult with MEG and any holders of

existing mining or exploration authorities that could be potentially affected by the proposed creation of any such biodiversity offsets, prior to creation occurring. This will ensure that access to prospective land for mineral exploration or potential for the sterilisation of mineral and extractive resources is appropriately considered.

Summary of review

MEG considers that, should the project be approved, efficient and optimised resource outcomes can be achieved.

MEG requests that it be provided an opportunity to review the draft conditions of approval before any granting of development consent.

For further enquiries and advice concerning this matter, please contact Scott Anson, Manager Assessment Coordination Unit, Resource Assessments on 02 4063 6972 or scott.anson@planning.nsw.gov.au.

Yours sincerely

Sima Williamson
Acting Executive Director Resource Operations
Regional NSW – Mining, Exploration & Geoscience
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Ginkgo Mineral Sands Mine Extension (SSD DA251-09-01-MOD14)

Resource & Economic Assessment

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More information

Assessment Coordination Unit, Resource Assessments – Mining, Exploration & Geoscience

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Executive summary

Mining, Exploration and Geoscience(MEG) assessed the Ginkgo Mineral Sands Mine Extension (SSD DA251-09-01-MOD14) Project (the Project). MEG has formed the following view:

- The Project would promote the efficient and economic recovery of additional mineral sands resources while maximising the use of Tronox's established facilities and associated returns on existing financial investment.

- The Project would allow for the complete extraction of the approved Crayfish deposit resource at the Ginkgo Mine.

- The Project would allow for the continued employment of approximately 260 Tronox employees and contractors at the Ginkgo Mine until the commencement of operations at the Atlas-Campaspe Mine.

- The Project would allow Tronox to continue to supply its downstream operations (including the MSP) and other customers with mineral concentrate until the commencement of production from the Atlas-Campaspe Mine, avoiding disruption to existing supply chains.

- The recovery of this additional mineral sands resource would be conducted in a manner that minimises environmental impacts through the implementation of the Environmental Management Strategy (Section 1.1.2) and other measures (Section 6).

- The WSC has provided in-principle support for the Project.

The Ginkgo Mine integrates with Tronox's other mineral sands mining and processing operations located in western NSW:

- Broken Hill Mineral Separation Plant (MSP);
- Snapper Mineral Sands Mine (the Snapper Mine); and
- Atlas-Campaspe Mineral Sands Project (the Atlas-Campaspe Mine).

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 an Environmental Impact Assessment/Modification Report (EIS/MRT).

This Resource & Economic Assessment (REA) conducted for the Ginkgo Mineral Sands Mine Extension (SSD DA251-09-01-MOD14) Project by MEG assessed:

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

The objects in section 3A of the *Mining Act 1992* are *to encourage and facilitate the discovery and development of mineral resources in NSW having regard to the need to encourage ecologically sustainable development, and in particular* (relevant to this REA):

- *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 in relation to this REA is Clause 15 (Resource Recovery) which requires that resource recovery is efficient, optimised and minimises waste.

Project overview

Tronox Mining Australia Limited (Tronox) is the owner and operator of the Ginkgo Mineral Sands Mine (Ginkgo Mine), which is located approximately 85 kilometres (km) north-east of Wentworth and approximately 170 km south-east of Broken Hill in western New South Wales (NSW). The Ginkgo Mine operates under Development Consent (DA 251-09-01) issued under Part 4 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) in 2002.

Mineral concentrates produced at the Ginkgo and Snapper Mines are currently processed at the MSP. Production from the approved Atlas-Campaspe Mine (once operational) will progressively replace Snapper and Ginkgo Mine production as the feed material for the MSP. The commencement of Atlas-Campaspe Mine production has been rescheduled to 2022 due to delays in construction activities associated with the coronavirus disease (COVID-19) pandemic. There is a risk of production and employment discontinuity between the cessation of the approved Ginkgo deposit operations and commencement of Atlas-Campaspe Mine operations.

Tronox has conducted a review of exploration test work and mine planning to identify options to extend mining operations and maximise resource recovery of the Ginkgo Mine. The review identified an additional economic resource to the south of the approved Ginkgo deposit mine path within Mining Lease (ML) 1504. This Project includes an extension of the approved Ginkgo deposit mine path and associated supporting infrastructure to allow for the development of this additional resource (Figure ES-1).

The Project would include:

• extension of the existing/approved Ginkgo deposit mine path and associated supporting infrastructure within ML 1504;

• development of temporary overburden emplacements and soil stockpile areas adjacent the Ginkgo deposit mine path;

• extension of the existing/approved site water management system to incorporate the Ginkgo deposit mine path extension;

• a change to the location of the approved Ginkgo deposit final depressions to reflect the mine path extension;

• extension of the approved Ginkgo Mine life from March 2023 to December 2025; and

• relinquishment of an undisturbed portion of the approved surface development area that could be avoided.

The Project would not change the following approved Ginkgo Mine components:

• Crayfish deposit mine path;

• mining rate or mining method;

• mining fleet;

• mineral concentrate processing;

• mineral concentrate transport;

• process waste management;

• water management, supply or demand;

• electricity supply; and

• other supporting infrastructure.

Size and quality of the resource

The project proposes an Extension of approved mining path within ML1504, to include Pod 3 which will, extend the mine life from 2023 to 2025. The project will mine, low grade HMS mineralisation along strike to the southeast of the existing mine path. South Pod 3 (<7,300mN on local grid) has been drilled to 100m x 20 m centres. All drilling results and the results of a further 23 mineralogical samples were analysed.

Ginkgo South Pod 3 is estimated to contain a JORC compliant “Measured Resource” containing 20.9Mt at 2.1% Heavy Minerals (HM) and 1.6% Slimes for 433kt of HM.

Ginkgo South Pod 3 contains a JORC compliant “Proved Reserve” containing 17.1Mt at 1.8% HM and 1.2% Slimes for 305kt of HM which contains 42.5% Ilmenite, 13.2% Rutile, 14.0% Leucoxene and 13.6% Zircon. This constitutes approximately 130,815 t of ilmenite, 40,630 t of rutile 43,092 t of leucoxene and 5,525 t of zircon (See Resource Recovery section for further discussion).
These have not been publicly announced, but have been completed by Mr Alan Hepinstall, a competent Person under the JORC code 2012, who has completed numerous previous resource/reserve statements for Tronox’s predecessor companies (Cristal, Bemax). South Pod is lower grade than much of the Ginkgo mine and has approximately similar mineral assemblage.

Resource recovery

Pod 3 extends 3.5km's to the south of the end of Pit 1. It is between 300 to 700 m in width, up to 40 m in thickness, and is covered by 25 to 80m of overburden. Pod 3 Ore will process using the existing wet concentrator and blended with some of the higher-grade ore from Crayfish by dry mining. An additional 11.3 million tonnes (Mt) of ore producing approximately 188 kilotonnes (kt) of mineral concentrate product would be recovered from the Ginkgo Mine utilising Tronox's existing western NSW operations.

- Mineral recoveries and yields

Mining and wet plant	
Ilmenite	81.1%
Rutile	83.5%
Zircon	94.5%
Leucoxene	70.4%

Dry mill	
Ilmenite	93.4%
Rutile	97.7%
Zircon	99.8%
Leucoxene	89.1%

HMC quality = 94%

- Commodity prices

Ilmenite	AUD180/t
Rutile	AUD800/t
Zircon	AUD1200/t
Leucoxene	AUD368/t

The above recoveries vary little compared with recent years. Slightly lower grades than overall for Ginkgo are possible given 1) blending with higher grade ore from Crayfish, and 2) increased downstream production of synthetic rutile, particularly by the chlorination process at their Western Australian facility.

The extension of production at Gingko until about 2025, along with Crayfish, will provide continuity of operations until the Atlas deposit (Prungle district) can be brought into production.

Economic benefits of the resource

Over the life of the Project MEG has estimated that the value of the minerals sands (rutile, zircon, ilmenite and leucoxene) produced would be around $120 million in current dollars, with the net present value of this revenue stream at around $87 million at a real discount rate of seven percent.

Some of the products produced from the Project would be exported and some used in manufacturing processes within Australia. If approved, the additional export income from the Project would contribute to the around $6 billion of metallic and processed metal exports annually from NSW in 2019/2020.

The Project, if approved, would provide around 260 full-time operational jobs from early 2022 to end-2025. These jobs are at the currently operating Ginkgo mine and no new jobs would be created due to the Project. The Project would extend Ginkgo for the period mentioned above and hence would ensure that there would be no disruption to current employment of the highly skilled workforce at Ginkgo. This workforce will be required for the already approved Atlas-Campaspe Project. The Atlas-Campaspe Project has been delayed due to COVID-19 related issues, hence the request for this Project.

Capital investment for the Project has been estimated at around $2 million.

Royalty calculation

The Project is a proposed extension to an existing mineral sands mine. A royalty rate of four percent applies to all production. The Project (if approved) would produce rutile, zircon, ilmenite and leucoxene. For minerals sands operations deductions are allowable on the price received and include: onsite treatment expenses, realisation expenses, onsite administration and depreciation. The net value after these deductions is called the ex-mine value; the four percent royalty rate is applied to the ex-mine value.

One of the most important assumptions in the calculation of future royalty is the estimates of the future prices of the minerals to be produced over the life of the project. The Proponent has supplied estimates for the minerals to be produced from the Project. MEG is of the opinion that these prices are reasonable and has used the same prices in its calculations.

Another important aspect of future royalty calculation for a proposed mineral sands project is estimation of future annual production. MEG has estimated that if the Project is approved, around 190,000 tonnes of mineral concentrate product would be able to be economically mined from the Project. After a rigorous analysis of the available geological information MEG is of the opinion that this is achievable.

Using the above parameters, MEG has calculated that the State will receive around $2.9 million in current dollars, and around $2.1 million in NPV terms (at a real discount rate of 7 percent) in royalty from the Project. In a typical year at full production the NSW Government would receive around $1 million in royalties from the Project.

Departmental Assessment

Assessed by	Unit	Branch
Assessing Officer: Dr David Forster Senior Geoscientist - MRA	Mineral Geoscience Assessment & Advice (GAA)	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 Phillip Blevin A/Director Strategic Geoscience Assessment & Advice	Signed in CM9	17/12/2020
Approving Officer: Dr Minh Ho A/Director Resources Planning & Programs	Signed in CM9	17/12/2020
Endorsing Officer: Sima Williamson A/Executive Director Resource Operations		21/12/2020