



**Thor Mining PLC** - THR Pilot Mountain Scoping Study  
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**THOR MINING PLC**  
**TWELVE YEAR OPEN PIT LIFE FOR DESERT SCHEELITE**  
**PILOT MOUNTAIN SCOPING STUDY**

The Board of Thor Mining Plc ("Thor" or the "Company") (AIM, ASX: THR) is pleased to announce results of Scoping Study for the Pilot Mountain tungsten project in Nevada USA.

***Scoping Study Parameters - Cautionary Statements***

*This Scoping Study has been undertaken to determine the potential viability of an open pit and/or underground mining and processing plant operation constructed onsite at the Pilot Mountain Tungsten Project and to form a view of the order of magnitude potential and a basis on which to complete further studies. The Scoping Study has been prepared to an accuracy level of  $\pm 35\%$ . The results should not be considered a profit forecast or production forecast.*

*The Scoping Study is a preliminary technical and economic study of the potential viability of the Pilot Mountain Tungsten Project. In accordance with the ASX Listing Rules, the Company advises it is based on low-level technical and economic assessments that are not sufficient to support the estimation of ore reserves. Further evaluation work including infill drilling, metallurgical testwork, and other appropriate studies are ongoing and they will contribute to our ability to estimate any ore reserves or to provide any assurance of an economic development case. This study does not warrant that reserves will be reported.*

*The total production target for Desert Scheelite is based on Indicated resource with minor quantities of Inferred mineralisation and unclassified mineralisation, while that for Garnet is based upon inferred resources. The Company has concluded that it has reasonable grounds for disclosing a production target.*

*The Scoping Study is based on the material assumptions outlined elsewhere in this announcement. These include assumptions about the availability of funding. While Thor considers all the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Scoping Study will be achieved.*

*To achieve the range outcomes indicated in the Scoping Study, additional funding will likely be required. Investors should note that there is no certainty that Thor will be*

*able to raise funding when needed. It is also possible that such funding may only be available on terms that dilute or otherwise affect the value of the existing shares in Thor Mining. It is also possible that Thor could pursue other 'value realisation' strategies such as sale, partial sale, or joint venture of the Project. If it does, this could materially reduce the Company's proportionate ownership of the Project.*

*The Company has concluded it has a reasonable basis for providing the forward-looking statements included in this announcement and believes that it has a reasonable basis to expect it will be able to fund the development of the Project. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.*

### **Scoping Study Highlights**

- Desert Scheelite operational life of 12 years with open pit mining over 11 years and one additional year to complete processing;
- Total Desert Scheelite forecast open pit production of 7.5 million tonnes;
- Annual throughput of 650,000 tonnes from the Desert Scheelite open pit, producing scheelite concentrates and copper silver concentrates, plus zinc silver concentrates;
- Preliminary analysis also suggests some potential for economic mining and processing from the higher grade Garnet deposit (inferred resource), supplementing production from Desert Scheelite;
- Pre-tax profit expectations from initial open pit operations ranging from US\$125m base case from Desert Scheelite, up to US\$317m, which includes improved Scheelite recovery, reduced mining costs at greater throughput volumes and the potential inclusion of Garnet mine production;
- Study outcomes support a decision to commence a more detailed Pre-Feasibility Study to progress the project along the development pathway; and
- No current primary tungsten production in USA where tungsten is classified as a "Critical Mineral"

### ***Mick Billing, Executive Chairman of Thor Mining, commented:***

*"I am delighted to release the results of the Scoping Study for the Pilot Mountain project showing potential for at least a medium term life on one, and potentially two, of the four tungsten deposits at 100% owned Pilot Mountain."*

*"Closed circuit metallurgical testwork on Desert Scheelite ore has commenced which will, hopefully, upgrade the results of open circuit work previously conducted, which achieved 72% recovery of scheelite and saleable quality concentrates. The impact of any improvement is outlined below in this report."*

*"The Pilot Mountain project hosts four known deposits, and it is anticipated that each of these has potential to contribute further as we continue to explore their potential."*

*"With no US domestic production, and tungsten classified by the US Department of the Interior as a Critical Mineral, our objective is to re-start United States commercial mining and tungsten concentrate production after a significant break."*

*"We look forward to providing regular updates on this project as material developments occur."*

### **Pilot Mountain Scoping Study**

In late 2017, Thor commissioned Andrew Vidale Consulting Services (AVCS) to prepare a Scoping Study for the Pilot Mountain tungsten project in Nevada USA to gain an understanding of the potential viability of the project to sustain mining and processing. The study terms of reference for AVCS were subsequently refined to cover the Desert Scheelite deposit only.

An assessment by US based consultants Practical Mining LLC has indicated possible additional open cut and underground potential from the Garnet deposit nearby.

The results of these studies show:

### **Desert Scheelite**

- A twelve year life of processing ore from open pit operations at Desert Scheelite;
- Contract mining over 11 years to deliver forecast mine production to the proposed processing plant;
- Annual forecast throughput of 650,000 tonnes from Desert Scheelite, generating approximately 1,000 tonnes of scheelite in concentrate per annum;
- Capital Expenditure range of US\$30 to US\$35 million
- Project payback of 36 months on the base case, reducing to less than 18 if metallurgical testwork, currently under way, is successful in improving recovery to 85% or above.

#### **Cautionary Statement:**

The Desert Scheelite mining inventory does include minor quantities of Inferred Resources and unclassified mineralisation that have resulted from the formation of a SMU (Selective Mining Unit) and/or inclusion of edge dilution across the Indicated Resource block boundary. 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 itself will be realised.

### **Garnet (based on Inferred resources)**

- Initial open pit transitioning to small scale underground,
- Supplementary ore feed averaging 120,000tpa;
- Reduction in project payback to less than 18 months

#### **Cautionary Statement:**

The Garnet deposit resource estimate is categorised as Inferred. 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 itself will be realised.

The scoping study assumes the simultaneous exploitation of both the Desert Scheelite and Garnet operations. For the purpose of the study, project infrastructure and processing plant requirements have been based on the production estimates of the larger Desert Scheelite deposit with the additional ore feed from Garnet assumed to be supplementary and not requiring plant nor infrastructure expansion, nor significant additional capital expenditure.

The scoping study has been prepared by Thor Mining PLC using data and information supplied by third party consultants and suppliers for key components, including:

Resource Estimates	Resource Evaluation Services
Desert Scheelite Scoping Study	AVCS Pty Ltd
Desert Scheelite Mine Planning	AVCS Pty Ltd
Capital Costs	AVCS, Thor
Operating Parameters & Costs	Mining costs NA Degerstrom Inc, other costs Thor
Metallurgical Processes & Outcomes	Guangzhou Research Institute of Non-Ferrous Metals
Garnet Evaluation	Practical Mining LLC

While the consultants involved can be considered as independent, a portion of the Report, including the economic analysis, has been authored by the Company. The work as a whole is not considered independent.

### **Commodity Outlook**

**Tungsten** (chemical symbol W) is a vital mineral with multiple applications & few substitutes and is considered a strategic commodity in the USA, China & the European Union. It is used in manufacture of hard metals, steels, alloys and mill products.

In February 2018 the United States Department of the Interior confirmed that tungsten remains on the Federal Register of commodities classified as critical by the United States Government.

The outstanding & unique physical properties of tungsten (melting point/hardness/tensile strength) and lack of substitutes, makes tungsten critical in industrial, oil & gas, mining and agricultural applications.

Tungsten is typically priced according to metric tonne units (mtu) of APT (Ammonium Para Tungstate), where one mtu is equal to 10 kg of  $WO_3$ . APT and concentrate prices are mainly based on quotations published twice weekly by London's Metal Bulletin, Argus Metals and other trade journals.

### **Mining**

Contract mining at Desert Scheelite is planned using conventional open cut mining methods; drill & blast, followed by excavation and haulage. A series of pit cutbacks is scheduled to deliver the forecast mine production.

An average pit slope of 45° currently provides for a waste to ore ratio of 7.3:1. No geotechnical work has been carried out in respect of the deposits to date, and this work will be carried out during the pre-feasibility stage.

Mining cost estimates were provided by US based mining contractor NA Degerstrom Inc, on the basis of a 500,000 tpa operation. It is expected that some savings may be achieved at the higher rates used in this study.

### **Processing**

Mineral processing testwork to date has been carried out by the Guangzhou Research Institute of Non-Ferrous Metals in Guangdong province in China who conducted open circuit testing in 2013, producing a scheelite concentrate, and a copper/silver concentrate with the most successful trial using Wet High Intensity Magnetic Separation (WHIMS) and flotation with recoveries of 72.2% for scheelite, and 57.9% and 35.8% for copper and silver respectively.

A subsequent series of locked circuit testwork has recently commenced at this facility with the objectives of improving these recoveries, and providing sufficient information to allow flowsheet development, plus equipment sizing and specifications to pre-feasibility level.

Processing cost estimates were derived by Thor using benchmarks developed in the recently announced definitive feasibility study for the Molyhil tungsten project in Australia's Northern Territory, adjusted for known local issues.

### **Project Infrastructure**

Pilot Mountain is situated in central-western Nevada, USA, approximately 200km SE of Reno.

The project is relatively well serviced with services and infrastructure, being linked by a good gravel road (~34 km) to the township of Mina on highway US95 (intrastate highway 362) thence a little over 50km to the town of Hawthorne (pop. 3,000).

A low capacity power line runs within 14 kilometres of the site, and discussions with local power authorities are in progress for the supply of mains power to the project.

Water supply would be sourced from a closed basin immediately to the east of the project area. This aquifer has previously supplied water for the project. Initial indications are that the aquifer has sufficient capacity to supply a proposed treatment plant and that there are no competing demands. Further test work is required.

### **Capital Costs**

Capital costs for the proposed development have been estimated by AVCS using cost optimizer Sherpa™ at US\$25million. In addition, Thor have been provided with a preliminary estimate by a US power utility with a budget level estimated for the establishment of a power line & associated infrastructure for the site in a range of between US\$4.0million and US\$6.0 million.

Mining equipment capital expense is included in the budget estimate for mining costs by mining contractor NA Degerstrom Inc.

### Project Permitting

Initial flora and fauna studies were carried out in 2013, with no adverse findings. The Company is finalising scopes of work for the balance of all environmental and other regulatory approvals with the US Federal Bureau of Land Management, and the Nevada Department of Environmental Planning.

**Table A. Desert Scheelite Key Assumptions**

<b>Capital Costs</b>		
Mining plant & equipment	n/a	Included in mining contractors estimate
Provision of Power supply	US\$4.0M to US\$6.0M	Preliminary advice from a US utility
Processing plant & associated infrastructure	US\$25M to US\$30M	AVCS using cost optimizer Sherpa™, and Thor
<b>Mining Costs</b>		
Ore Mining	US\$3.40/tonne	Estimate from US mining contractor based on 500ktpa ore. May reduce at these 30% higher levels
Waste Mining	US\$2.06/tonne	
<b>Processing + G &amp; A</b> (inc any notional by-product credit for Cu / Ag / Zn)	US\$122/mtu	Thor Mining estimate adjusted for known project specific conditions, including by-product credits. Compares with US\$115/mtu at Molyhil before molybdenum credits
<b>Scheelite Recovery</b>	72%	Recovery achieved with open circuit testwork in 2013. Compares with 76% recovery by Union Carbide in 1970's.
<b>Tungsten Concentrate Price / mtu</b>	US\$350/mtu	Thor Mining estimate
<b>Average feed grade</b>	0.22% WO <sub>3</sub>	AVCS for Desert Scheelite only
<b>Operating throughput</b>		
Milling/Flotation etc	650,000 tpa	Thor Mining est' for Desert Scheelite only

### Garnet Scheelite Deposit

A separate assessment of the Garnet Deposit suggests the potential to supplement production from Desert Scheelite with up to 120,000 tonnes pa, from both open pit and underground activities, which would increase the throughput at the processing plant and provide additional scheelite and other concentrates.

For the purposes of this study, Thor has assumed open pit mining with a waste to ore ratio of 7:1 with mining and processing costs consistent with those for Desert Scheelite.

#### **Cautionary Statement:**

*The Garnet deposit resource estimate is categorised as Inferred. 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 itself will be realised.*

**Table B: Desert Scheelite production supplemented with 120,000 tpa from Garnet, and improved recovery and cost factors**

		Net Pre-Tax Income (US\$ million)	Opex - US\$/mtu produced	Payback Period
<b>Base Case</b>		<b>US\$125</b>	<b>242</b>	<b>36 months</b>
Add Contribution from Garnet	120,000tpa ore	US\$202	215	18 months
Scheelite Recovery improvement plus Garnet	85%	US\$297	182	15 months
Mining costs lower with higher volumes	15%	US\$317	171	12 months

**Table C: Desert Scheelite Scoping Study Sensitivity Analysis**

		Net Pre-Tax Income (US\$ million)	Opex - US\$/mtu produced	Payback Period
<b>Base Case</b>		<b>US\$125</b>	<b>242</b>	<b>36 months</b>
Revenue	+10%	US\$172	242	21 months
	-10%	US\$77	242	45 months
Scheelite Recovery	75%	US\$141	233	12 months
	85%	US\$197	206	<12 months
Operating Costs	-10%	US\$153	218	21 months
	+10%	US\$97	266	450months
Capital Costs	+10%	US\$124	242	42 months
	-10%	US\$124	242	33 months

The information contained within this announcement is deemed to constitute inside information as stipulated under the Market Abuse Regulations (EU) No. 596/2014. Upon the publication of this announcement, this inside information is now considered to be in the public domain.

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**Competent Persons Statement**

The information in this report that relates Technical Assessment and Valuation of Mineral Assets reflects information compiled and conclusions derived by various consulting practitioners referred to earlier in this report. This report has been reviewed by Richard Bradey who has found it to be based on and fairly reflects the information and supporting documentation prepared by the practitioners. Mr Bradey holds a BSc in applied geology and an MSc in natural resource management

and is a Member of The Australasian Institute of Mining and Metallurgy. Mr Bradey is an employee of Thor Mining PLC. He has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking 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'. Richard Bradey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

#### About Thor Mining PLC

*Thor Mining PLC (AIM, ASX: THR) is a resources company quoted on the AIM Market of the London Stock Exchange and on ASX in Australia.*

*Thor holds 100% of the advanced Molybdenum tungsten project in the Northern Territory of Australia, for which an updated feasibility study in August 2018<sup>1</sup> suggested attractive returns.*

*Thor also holds 100% of the Pilot Mountain tungsten project in Nevada USA which has a JORC 2012 Indicated and Inferred Resources Estimate<sup>2</sup> on 2 of the 4 known deposits. The US Department of the Interior has confirmed that tungsten, the primary resource mineral at Pilot Mountain, has been included in the final list of Critical Minerals 2018.*

*Thor is also acquiring up to a 60% interest Australian copper development company Environmental Copper Recovery SA Pty Ltd, which in turn holds rights to earn up to a 75% interest in the mineral rights and claims over the resource<sup>3</sup> on the portion of the historic Kapunda copper mine in South Australia recoverable by way of in situ recovery.*

*Thor has a material interest in USA Lithium Pty Limited, an Australian private company with a 100% Interest in a Lithium project in Nevada, USA.*

*Finally, Thor also holds a production royalty entitlement from the Spring Hill Gold project<sup>4</sup> of:*

- *A\$6 per ounce of gold produced from the Spring Hill tenements where the gold produced is sold for up to A\$1,500 per ounce; and*
- *A\$14 per ounce of gold produced from the Spring Hill tenements where the gold produced is sold for amounts over A\$1,500 per ounce.*

#### Notes

- <sup>1</sup> Refer ASX and AIM announcement of 23 August 2018
- <sup>2</sup> Refer AIM announcement of 22 May 2017 and ASX announcement of 23 May 2017
- <sup>3</sup> Refer AIM announcement of 10 February 2016 and ASX announcement of 12 February 2018
- <sup>4</sup> Refer AIM announcement of 26 February 2016 and ASX announcement of 29 February 2017

#### **Annexure A:**

##### **Pilot Mountain Resource Summary 2017 (Reported on 21 May 2017)**

Resource			WO <sub>3</sub>		Ag		Cu	
			Grade %	Contained metal (t)	Grade g/t	Contained metal (t)	Grade %	Contained metal (t)
Garnet	Indicated		-	-				
	Inferred	1.83	0.36	6,590				
Sub Total		1.83	0.36	6,590				
Desert Scheelite	Indicated	8.41	0.27	22,700	21.3	179	0.14	11,800
	Inferred	1.49	0.23	3,430	9.07	13	0.17	2,500

	Sub Total	9.90	0.26	26,130	19.39	192	0.14	14,300
Summary	Indicated	8.41	0.27	22,700				
	Inferred	3.32	0.30	10,020				
	<b>Pilot Mountain Total</b>	<b>11.73</b>	<b>0.28</b>	<b>32,720</b>				

#### Notes

- Thor Mining PLC holds 100% equity interest in this resource.
- Mineral Resource reported at 0.1% WO<sub>3</sub> Cut-off
- Minor rounding errors may occur in compiled totals.
- The Company is not aware of any information or data which would materially affect this previously announced resource estimate, and all assumptions and technical parameters relevant to the estimate remain unchanged.

#### **Annexure B: Forward Looking Statement**

The announcement may contain certain forward-looking statements. Words "anticipate", "believe", "expect", "forecast", "estimate", "likely", "intend", "should", "could", "may", "Target", "plan", "potential" and other similar expressions are intended to identify forward-looking statements. Indication of, and guidance on, future costings, earnings, and financial position and performance are also forward-looking statements.

Such forward looking statements are not guarantees of future performance, and involve known and unknown risks, uncertainties, and other factors, many of which are beyond the control of Thor Mining PLC, its officers, employees, or agents and associates, which may cause actual results to differ materially from those expressed or implied in such forward-looking statements.

Actual results, performance, or outcomes may differ materially from any projections or forward-looking statements or the assumptions on which those statements are based.

You should not place any undue reliance on forward-looking statements and neither Thor nor its directors, officers, employees, servants or agents assume any responsibility to update such information.

The stated production target is based on the Company's current expectations of future results or events and should not be relied upon by investors when making investments decisions. Further evaluation work and appropriate studies are required to establish sufficient confidence that this target will be met.

This announcement has been prepared in compliance with the JORC Code 2012 edition and the current ASX Listing Rules.

#### **Annexure C: Reasonable Basis**

Thor believes that it has a reasonable basis for making the forward-looking statements in this announcement, including with respect to the production target and forecast financial information.

The following information is specifically provided in support of the Board's belief:

1. The Scoping Study has been prepared to what the Company considered equal or better than a Scoping Study level of accuracy of  $\pm 35\%$ . Furthermore, the Company believes that the level of detailed work carried out for this study meets or exceeds what is required/expected at a Scoping Study level.
2. The production targets referred to for the Desert Scheelite deposit, are based on Mineral Resources which are predominantly classified as Indicated with only minor quantities of Inferred Resources and unclassified mineralisation.
3. The production targets referred to for the Garnet deposit, are based on Mineral Resources which are classified as Inferred, and these comprise 15.5% of any production targets expanded to include the Garnet deposit.
4. The Mineral resource estimates for the Pilot Mountain project were updated and published on 21 May 2017, and the material assumptions used in these estimates continue to apply and have not changed.



5. All the mineral claims and licences for Pilot Mountain are confirmed to be in good standing and the Company has access agreements in place with all stakeholders authorising exploration activities.
6. AS declared in this document, the Company is advancing towards a Pre-Feasibility Study (PFS). The results of the PFS will be released to the market on completion.

#### **Annexure D: Project Risks**

Key risks identified during the Scoping Study work include, but are not limited to:

- Adverse movements in commodity prices, particularly the price of tungsten concentrates;
- Conversion of existing Mineral resources to Ore Reserves;
- Access to project funding;
- Timely approval by Government authorities of the various licences and permits required;
- General global economic conditions that may adversely affect the Company's growth and future prospects; and
- Results of future Pre-Feasibility and Definitive Feasibility Studies.

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