# COMPANY AGM PRESENTATION

*Nov 26<sup>th</sup> 2020* 

DEVELOPING A WORLD-CLASS HALLOYSITE-KAOLIN PROJECT



METALS

ASX:ADN www.andromet.com.au







# **ANDROMEDA BOARD OVERVIEW**

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#### Rhod Grivas – Non Executive Chairman

- Geologist with 30+ years experience
- 20+ years of corporate/board experience
- Experience in resource discovery, feasibility studies, development and production
- Ex MD of Dioro Exploration (ASX/TSX listed) South Kal/Frogs Leg Gold Mines
- Chair of Golden Mile Resources Ltd (ASX.G88) and Okapi Resources Ltd (ASX.OKR)
- Non Executive Director Lexington Gold Ltd London Stock Exchange listed
- Director Blue Mountains Grammar School

#### James Marsh - Managing Director

- Over 30 years of industrial minerals experience including 15 years with the world's largest company
- Specialised in all aspects of the kaolin industry
- Previous first hand experience with the Poochera Project
- A qualified industrial chemist
- Wide experience in R&D, product development, operations and marketing/sales throughout Asia and Europe

#### Nick Harding - Executive Director

- Accountant and Company Secretary with +30 years mining and oil and gas experience in multiple commodities
- Extensive senior finance experience in commercial and resource project management at both corporate and operational levels, including 5 years as CFO for Olympic Dam Operations
- Fellow of both CPA and Finsia with tertiary qualifications in accounting, finance and corporate governance
- Graduate of WMC Resources Executive Development program and Newmont High Performance Leadership program

#### Andrew Shearer - Non Executive Director

- Experienced geologist/geophysicist and corporate advisor with 25 years experience in the mining and finance industries
- Currently a corporate and technical consultant and professional director
- Currently Non-Executive Director with Resolution Minerals (ASX:RML), Non-Executive Director with Investigator Resources (ASX:IVR) and Executive Director with Okapi Resources (ASX:OKR)

#### Joe Ranford – Executive Director

- First Class Mining Engineer with 26yrs experience in Open cut and Underground Mining
- Bachelor of Engineering in Mining Engineering, Fellow of the AusIMM, MBA, GAICD
- Previous experience in developing brown field exploration projects into production
- Global exposure to resource projects, R&D, rollout of new technology and change management in Australia, Africa, Asia and Europe



**ANDROMEDA ASSETS** 

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## WHAT IS HALLOYSITE-KAOLIN

## Standard Kaolin Product



Kaolinite Plates



Halloysite Tubes

The Great White Resource is a naturally occurring blend of tubes and plates





**KAOLIN USES** 

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# Andromeda GREAT WHITE KAOLIN PROJECT (75% ADN:25% MEP)

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## Primary Project Focus – Halloysite-Kaolin

 Great White – one of the world's largest known high-purity halloysite-kaolin Reserves & Resources 7

- Current total resources of well over 100Mt
- Located close to essential infrastructure
- Extremely robust Pre-Feasibility Study
- Multiple opportunities in Halloysite Nanotube Technologies
- High Purity Alumina (HPA) testwork continuing options under evaluation



# **GREAT WHITE PROJECT RESOURCES**

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- Great White 34.6Mt (Approx. 30% increase over PFS Resource)
- Hammerhead 51.5Mt
- Manta/Bronze Whaler/Tiger TBD



## **GREAT WHITE MINE PLAN**







## **GREAT WHITE PROJECT PROGRESSION**

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Mine Plan – Production Target	Updated SS	PFS	Change
From Measured Resources	4.2 Mt	11.2 Mt	+167%
From Indicated Resources	3.4 Mt	1.3 Mt	-61%
From Inferred Resources	0.0 Mt	0.2 Mt	Minimal
Total Production Target	7.6 Mt	12.7 Mt	+67%
Capital Costs			
Initial Capital Costs	\$13M	\$13M	No Change
Working Capital	\$16M	\$15M	-6%
Maximum Cash Requirement	\$29M	\$28M	-3%
Processing Plant Costs	\$35M	\$56M	+60%
Sustaining Capital Costs	\$11M	\$15M	+36%
Production Summary			
Mine life (years)	15	26	+70%
Processing rate of kaolinized granite (ktpa)	500	500	No Change
Stripping Ratio (Waste:Ore)	2.3	2.1	-9%
Annual Refined Kaolin Produced (ktpa)	227	233	+3%
Yield of Refined Kaolin (LOM average)	45%	46%	+1%
Project Economics			
Refined Premium Kaolin Price (AUD)	\$700/t	\$700/t	No Change
Revenue	\$2,379M	\$4,136M	+74%
AISC equivalent (LOM average)	\$374/t	\$354/t	-5%
EBITDA (LOM)	\$1,109M	\$2,058M	+86%
Pre-Tax Cashflow	\$1,049M	\$1,974M	+88%
Pre-Tax NPV (8% discount rate)	\$544M	\$736M	+35%
Pre-Tax IRR	175%	175%	No Change
After-Tax Cashflow	N/A	\$1,389M	New
After-Tax NPV (8% discount rate)	N/A	\$511M	New
After-Tax IRR	N/A	135%	New
Payback from start of site works	15 months	15 months	No Change



#### 👛 Camel Lake Halloysite Project 240,000m E 230.000m Track Lake, salt pan ELA 2019/00073 Roxby Downs Exploration licence Exploration Licence Application EL 6128 Great White Kaolin Project GREAT AUSTRALIAN BIGHT **Mt Hope Kaolin Project Camel Lake Project** Main road - Railway Town Lake Exploration Licence 100% ADN Great White IV Tenements - 6.660.000m t Exploration Licence Application 🔺 Andromeda METALS DOUTLY ALIGTDALLY CAMEL LAKE PROJECT Location of tenure Electron Micrograph of Camel Lake Halloysite

Highest Purity and most Consistent Halloysite Discovered

Purity of 99.6% Found Very Close to Surface





# **MOUNT HOPE PROJECT (100% ADN)**

### Mount Hope Resource

		PSD	Kaolinite	Halloysite
Domain	Mt	-45µm	%	%
Main	12.8	40.95	33.6	0.9
Halloysite	1.6	39.13	25.6	6.7
Ultra-Bright	3.7	44.37	38.0	0.7
Total	18.0	41.49	33.8	1.4









## **MOUNT HOPE**

MH20AC039 -45μm (45.7%) From 7m, 21m @ 85.2% ISO B'ness MH20AC040 -45μm (45.1%) From 7m, 41m @ 81.4% ISO B'ness



# **TEST RESULTS TO DATE**

## Fired Brightness off the Scale





## Out-Performs the World's Best Products

Grade	Mt Hope 70% <2um	Mt Hope 90% <2 um	Eckalite YMT	Supreme	Speswhite
Country	Australia	Australia	Australia	UK	UK
Brightness (%)	89.0	90.0	88.0	88.0	85.5
Yellowness (%)	4.5	4.1	4.5	3.8	4.7
Oil Absorption (g/100g)	52	56	50	46	42
<2 um (%)	73	92	-	94	80
<1 um (%)	54	75	-	80	60
Surface Area (m <sup>2</sup> /g)	15	17	-	16	14



# **NEW HALLOYSITE-KAOLIN APPLICATION**

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**Exciting New Applications in Construction Products** 







Halloysite-Kaolin Rheology Modifier being tested in a range of construction products



Addition levels as low as 1kg/m<sup>3</sup> of concrete show clear positive benefits in handling and strength



Australian Industry Standards certification was achieved on Nov 25<sup>th</sup> 2020



This opportunity represents a new huge high-value market with true global reach



HALLOYSITE RHEOLOGY MODIFIER

## **COMPLIANCE TEST REPORT No. 1**

Issue date: 25<sup>th</sup> November 2020

### AS 1478.1 – 2000 CHEMICAL ADMIXTURES FOR CONCRETE, MORTARS & GROUT

Part 1: Admixtures for concrete.

**PRODUCT NAME: HRM** 

#### ADMIXTURE TYPE: SN

Test conducted in conjunction with Cement Australia QLD NATA laboratory and Sunstate Cement QLD NATA laboratory and HPSC Services laboratory.

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# HALLOYSITE & NANOTECHNOLOGY USES

## Most researched clay mineral in the world Use only constrained by supply shortage

>8000 Papers and 100's of Patents Granted Great White Project halloysite is being tested in numerous emerging and existing applications

The Andromeda Metals/Minotaur Exploration 50:50 joint R&D company Natural Nanotech along with partners are funding a \$1.5 million pilot production plant for Carbon Capture product



Hydrogen Storage and

Transport



Medical Delivery of Drugs



Construction



Batteries and Super-Capacitors



Carbon Dioxide Capture/Storage and Conversion to Fuels



Polymers and Coatings



Water Purification



Agriculture/Delivery of Herbicides & fertilisers



Remediation of contaminated





# **CARBON CAPTURE IS LEADING THE WAY**

Professor Ajayan Vinu : Global Innovation Centre for Advanced Nanomaterials

..."the Great White halloysite-kaolin has been successfully synthesized to create advanced nanomaterials to specifically adsorb  $CO_2$  from a mixture of gases, up to 1.1 tonne of  $CO_2$  per tonne of material has been achieved and we are working at capturing two tonnes of  $CO_2$  per tonne of material.

We are now constructing a pilot plant to make larger quantities of material for commercial scale testwork including converting the captured  $CO_2$ into methanol. If we can get this right, and install it in  $CO_2$  producing power plants and cement works, we can significantly reduce  $CO_2$  emissions and create a new Australian industry with global application"...





## **COMMERCIALISATION PROGRESS**

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Research Team: University of Newcastle Global Innovation Centre Advanced Nanomaterials

Activated Carbon

(MWCNT)

Multiwalled Carbon nanotube

Mesoporous Carbon nitride (MCN)



747

250

232

3.71

5.60

5.63

#### BY DAMON CRONSHAW

A \$1.5 million pilot production plant will be established at the University of Newcastle to develop nanomaterials that capture carbon dioxide, giving fresh hope to humanity's need to tackle climate change.

Professor Ajayan Vinu said the aim was to adsorb carbon emissions from coalfired power plants and the environment and convert it to clean fuel.



# **CURRENT HIGHLIGHTS**

## **Great White Project PFS**

- 12.5Mt Ore Reserve\*
- High Halloysite component 9.7Mt
- NPV of A\$736m (pre tax / 8% discount rate)
- EBITA (LOM) A\$2.06B
- 26 year mine life (@500ktpa)
- 15 month payback
- IRR of 175%

## Mid Term

- Concrete application developments
- High purity halloysite
- Ultra high-purity kaolin evaluation
- Nanotechnology commercialisation
- High Purity Alumina

\* Andromeda ASX Announcement July 10 2020 – 'Maiden Ore Reserve for Carey's Well Deposit'



## **MARKET VALUE OVERVIEW**

A\$700/t Premium Ceramic Grade A\$1000/t Premium Coatings Grade

**Expected Profit: 50%** 

Cost of Extraction & Processing 50%

Ceramic Porcelain Market (as per PFS)

A\$1,000/t - A\$5,000/t (depending on purity) Halloysite-Kaolin into Concrete and high – purity halloysite applications

80%

**Expected Profit** 

Cost of Extraction & Processing 20%

New Markets

Halloysite Nanotechnologies

Cost of Extraction and Processing N/A

**A\$ Millions per Tonne** 

**Expected Profit** 

**Very Significant** 

(1) Project economics have been established on market research provided by First Test Minerals a world authority on clay materials. The high grade, rare halloysite-kaolin product commands a US\$500/t (Ã\$700/t price) in the ceramics industries of China, and a number of countries throughout Asia, the Middle East, and Europe.

Not to scale



## **KEY TAKEOUT**

Andromeda is a low capex, short payback period, large scale potential Halloysite- Kaolin miner 2

Halloysite-kaolin is much more valuable version of standard kaolin which you already use every day



Global supply of high-quality halloysite-kaolin is reducing – Offtake LOI's for almost 1 million/tpa



Andromeda aims to be the largest supplier of Halloysite-Kaolin and a world leader in associated nanotechnology



# SO WHAT'S NEXT?

IN PROGRESS	2020/2021	
<ul> <li>Great White Definitive/Bankable Feasibility Study</li> <li>Mining lease approvals</li> <li>Ceramic customers approvals for binding offtakes</li> <li>Concrete and mine backfill application testing</li> <li>Negotiations with an HPA alliance/collaboration partner</li> <li>Halloysite nanotechnology research and commercialisation</li> <li>Recommissioning of Streaky Bay Pilot Plant</li> </ul>	<ul> <li>Additional halloysite-kaolin and ultra-high purity kaolin resources</li> <li>Customer offtake agreements for multiple applications</li> <li>High-purity halloysite resources</li> <li>Hammerhead and Mount Hope studies</li> <li>Evaluation of additional industrial mineral opportunities</li> </ul>	

2022

• Commencement of operations at Great White - Early 2022



# **IN SUMMARY**

Andromeda has one of the world's largest resources of high purity halloysite-kaolin



Simple business model with low impact mining



This is a high value industrial mineral selling into a low-volatility market



Andromeda is well positioned to become the world's leading producer of this mineral



Global demand is increasing, and supply is decreasing



Huge potential in new applications including concrete, nanotube technologies and HPA



Low capex project with a short timeline to operation



Opportunities to build a diversified industrial minerals business

# THANK YOU

## James Marsh Managing Director james.marsh@andromet.com.au



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#### **Cautionary Statements**

The preliminary feasibility study (Pre-Feasibility Study, PFS) referred to in this announcement has been undertaken to study a range of options to produce high-quality halloysite-kaolin product from the Kaolin Resource at Poochera in South Australia in order to provide Andromeda Metals with a basis for more detailed Definitive Feasibilities Studies for the Project. It is a technical and economic study to identify preferred mining, processing and infrastructure requirements but it has not finalised these. The PFS work has advanced assessments of environmental and socio-economic impacts and requirements but these are also not finalised. The estimation of ore reserves is yet to be done. The Production Target referred to in this announcement is based on this PFS and supported mainly by Measured and Indicated Resources and only minor Inferred Resources. Andromeda Metals has concluded that it has reasonable grounds for disclosing a Production Target, however there is no certainty that the Production Target or the economic assessment will be realised.

The PFS is based on the material assumptions outlined elsewhere in this announcement. These include assumptions about the availability of funding. While Andromeda Metals considers all of 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 PFS will be achieved.

To achieve the range of outcomes indicated in the PFS, funding in the order of A\$28M, inclusive of working capital, is likely be required. Investors should note that there is no certainty that Andromeda Metals will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Andromeda Metals' existing shares. It is also possible that Andromeda Metals could pursue other 'value realisation' strategies to provide alternative funding options.

Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the PFS.

This announcement includes forward looking statements. For further information on forward looking statements please refer to the end of this release.

#### **Forward Looking Statements**

Some of the statements contained in this report are forward looking statements. Forward looking statements, include, but are not limited to, statements concerning estimates of tonnages, expected costs, statements relating to the continued advancement of Andromeda's projects and other statements that are not historical facts. When used in this report, and on other published information of Andromeda , the words such as 'aim', 'could', 'estimate', 'expect', 'intend', 'may', 'potential', 'should' and similar expressions are forward looking statements. Although Andromeda believes that its expectations reflected in the forward-looking statements are reasonable, such statements involve risks and uncertainties and no assurance can be given that actual results will be consistent with these forward-looking statements. Various factors could cause actual results to differ from these forward looking statements include the potential that Andromeda's project may experience technical, geological, metallurgical and mechanical problems, changes in market prices and other risks not anticipated by Andromeda. Andromeda is pleased to report this summary of the Study in a fair and balanced way and believes that it has a reasonable basis for making the forward-looking statements in this announcement, including with respect to any mining of mineralised material, modifying factors, production targets and operating cost estimates.

This announcement has been compiled by Andromeda from the information provided by the various contributors. All financial assumptions and estimates are quoted in Australian Dollars ('A\$' or 'AUD') only, unless indicated otherwise.

#### **Competent Person's Statements**

Information in this announcement has been compiled by Mr James Marsh a member of The Australasian Institute of Mining and Metallurgy (AusIMM). Mr Marsh is an employee of Andromeda Metals Limited who holds shares and options in the company and has sufficient experience, which is relevant to the style of mineralisation, type of deposits and their ore recovery under consideration and to the activity being undertaking to qualify as Competent Persons under the 2012 Edition of the 'Australasian Code for reporting of Exploration Results, Mineral Resources and Ore Reserves' (JORC Code). This includes Mr Marsh attaining over 30 years of experience in kaolin processing and applications. Mr Marsh consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.