



METALS

**SA Explorers  
Conference 2018**

***Andromeda Metals***  
***A New Direction in Industrial Minerals***

ASX:ADN



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# Outline

1. The Andromeda transformation
2. The Poochera Project
3. Geology, drilling and defined resource
4. Kaolin and halloysite mineral properties
5. Product and Target Markets
6. Marketing & offtake agreements
7. Bulk sampling and processing trials
8. Existing Infrastructure
9. Resource model update
10. Mine Plan
11. Processing Options
12. Summary



# The Andromeda Transformation

## Vision

- From a gold/copper explorer to a sustainable industrial minerals producer

## Primary Project Development Focus

- Poochera Halloysite-Kaolin Project JV with Minotaur Exploration

## Exploration Portfolio

- Projects covering 6,102 km<sup>2</sup>
- 22 exploration licences
- Located in SA, QLD, WA and the NT

## Other Projects – minimising holding costs and maximising value

- Drummond (Gold) – JV with Evolution Mining
- Moonta (Copper) – JV negotiations at advanced stage
- Wudinna (Gold) – JV with Lady Alice Mines
- Rover (Gold) – Seeking JV
- Pilbara (Gold) – Native Title agreements being negotiated

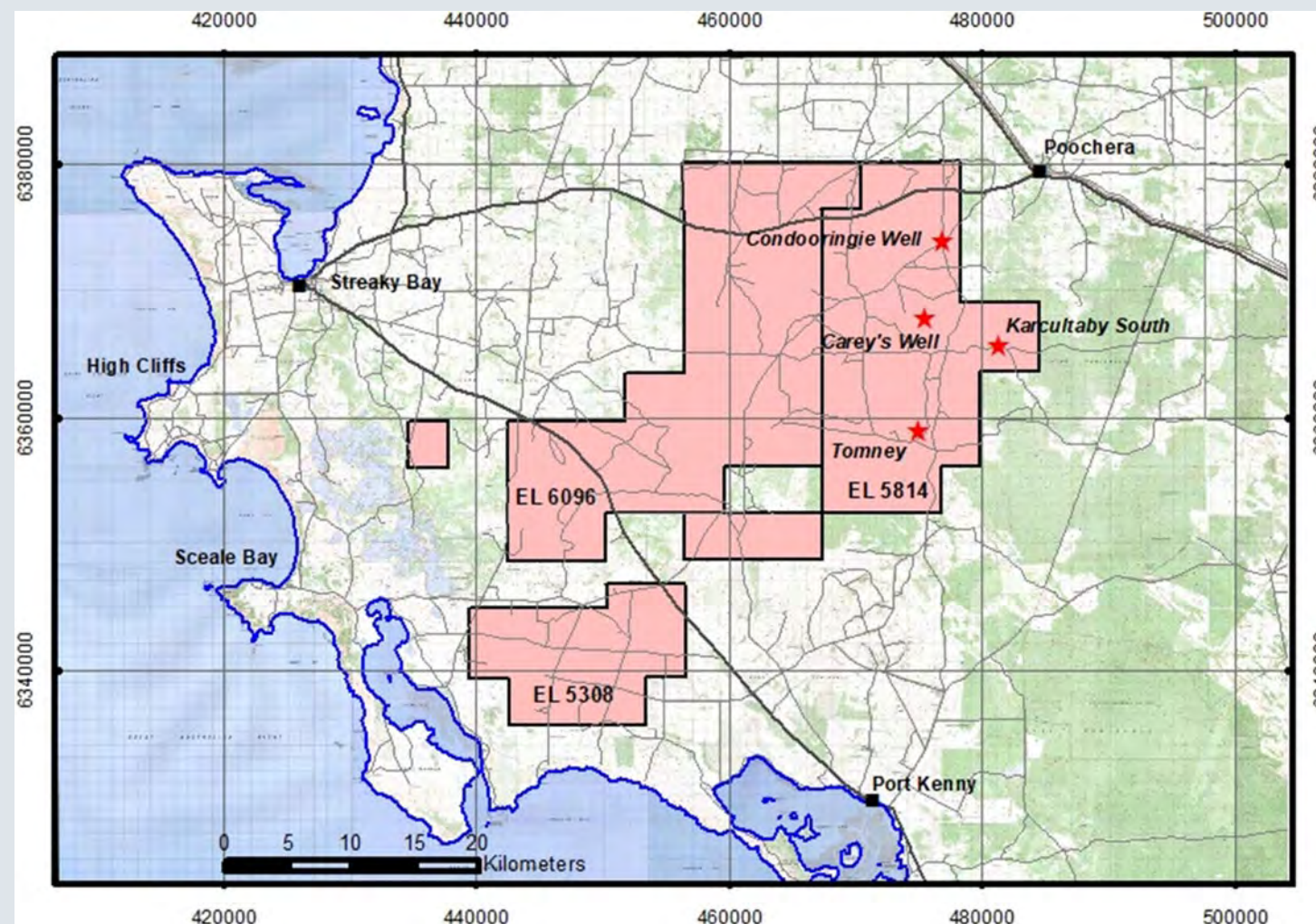




# Poochera Project

## Overview

- World class halloysite-kaolin deposit
- Estimated short timeframe to production
- Long mine life
- Indicative off-take agreements with Chinese companies (>200,000 tpa processed product)
- Commercial scale approval trials planned for direct shipping ore
- Testwork proved a 99.99% (4N) High Purity Alumina (HPA) feedstock
- Opportunities in emerging for halloysite nanotechnology applications

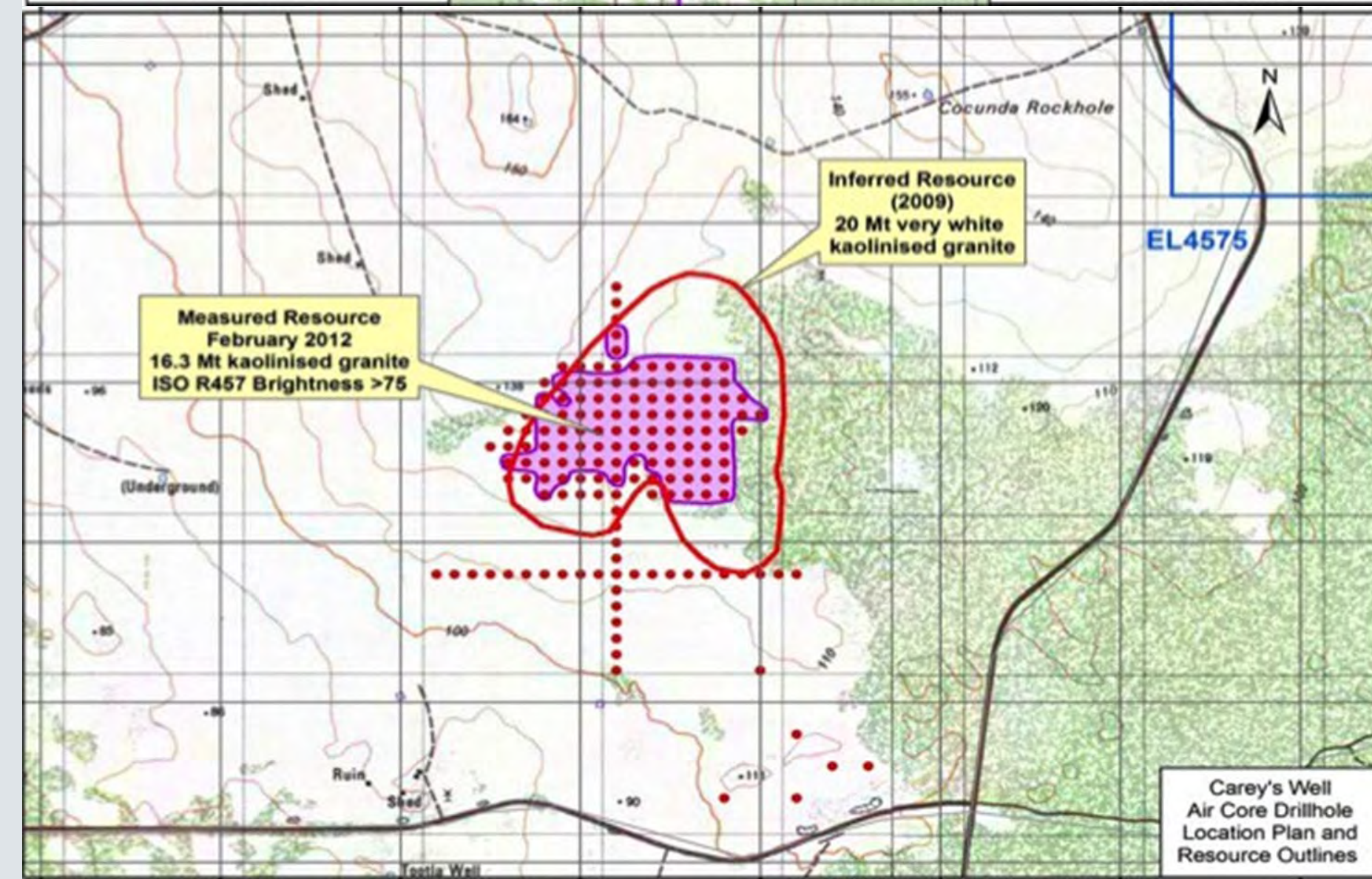
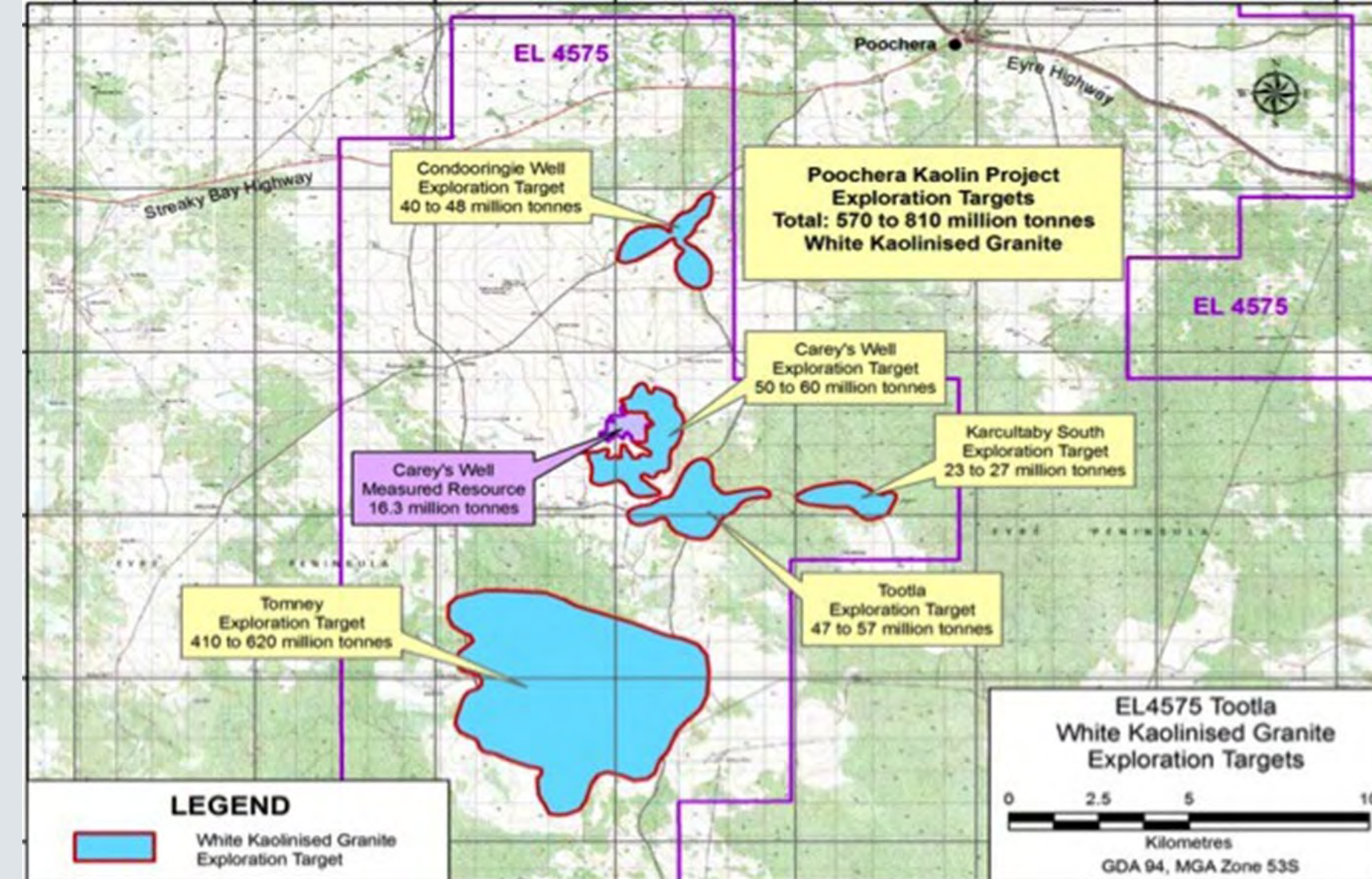




# Defined Resource

- JORC 2012 Resource estimate for Carey's Well
- Total 23.9Mt of "bright white" kaolinised granite
- ISO Brightness R457 cut-off of 75 (< 45 micron product)

The Carey's Well material is a naturally occurring hybrid blend of halloysite and kaolin

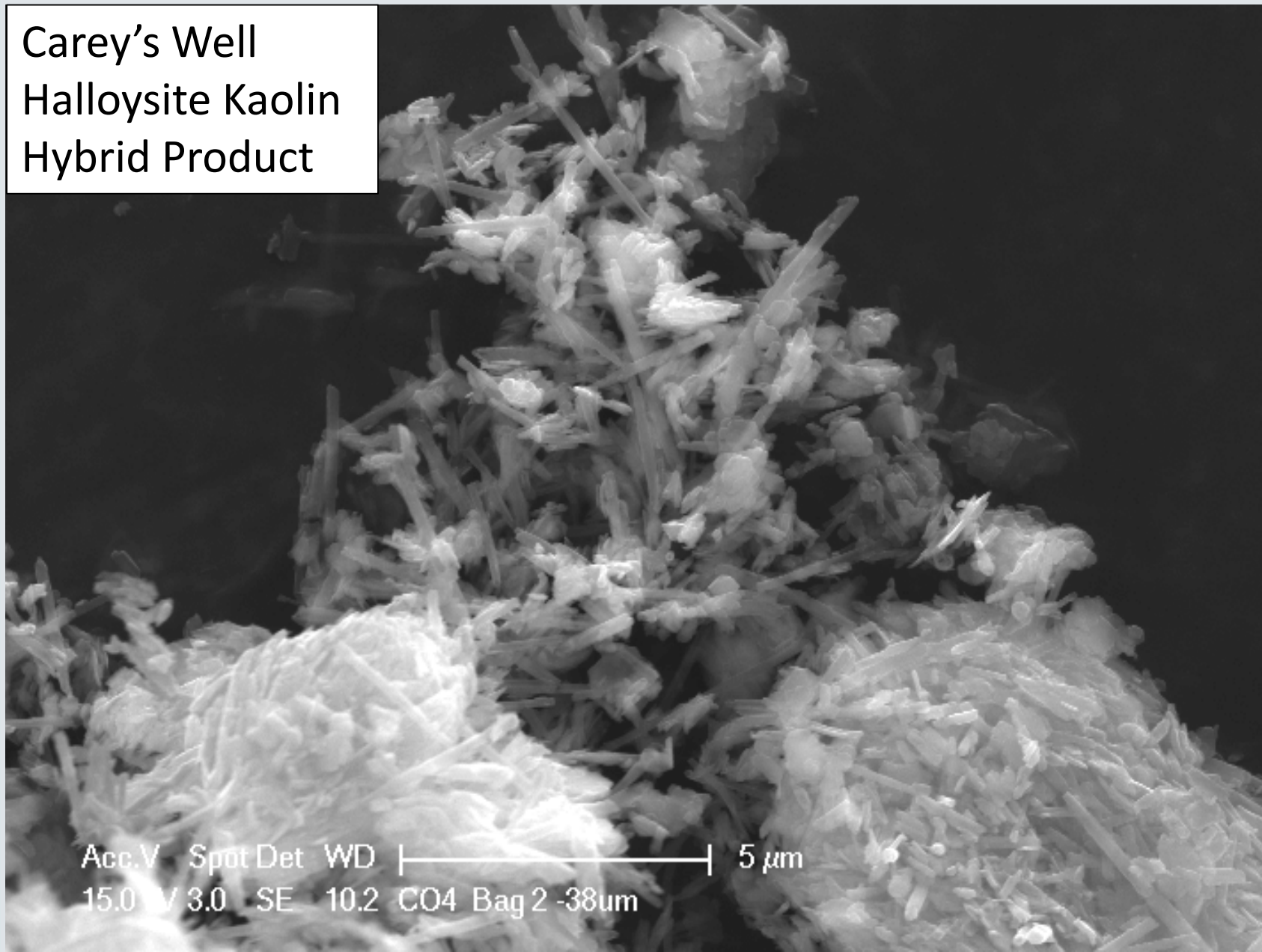




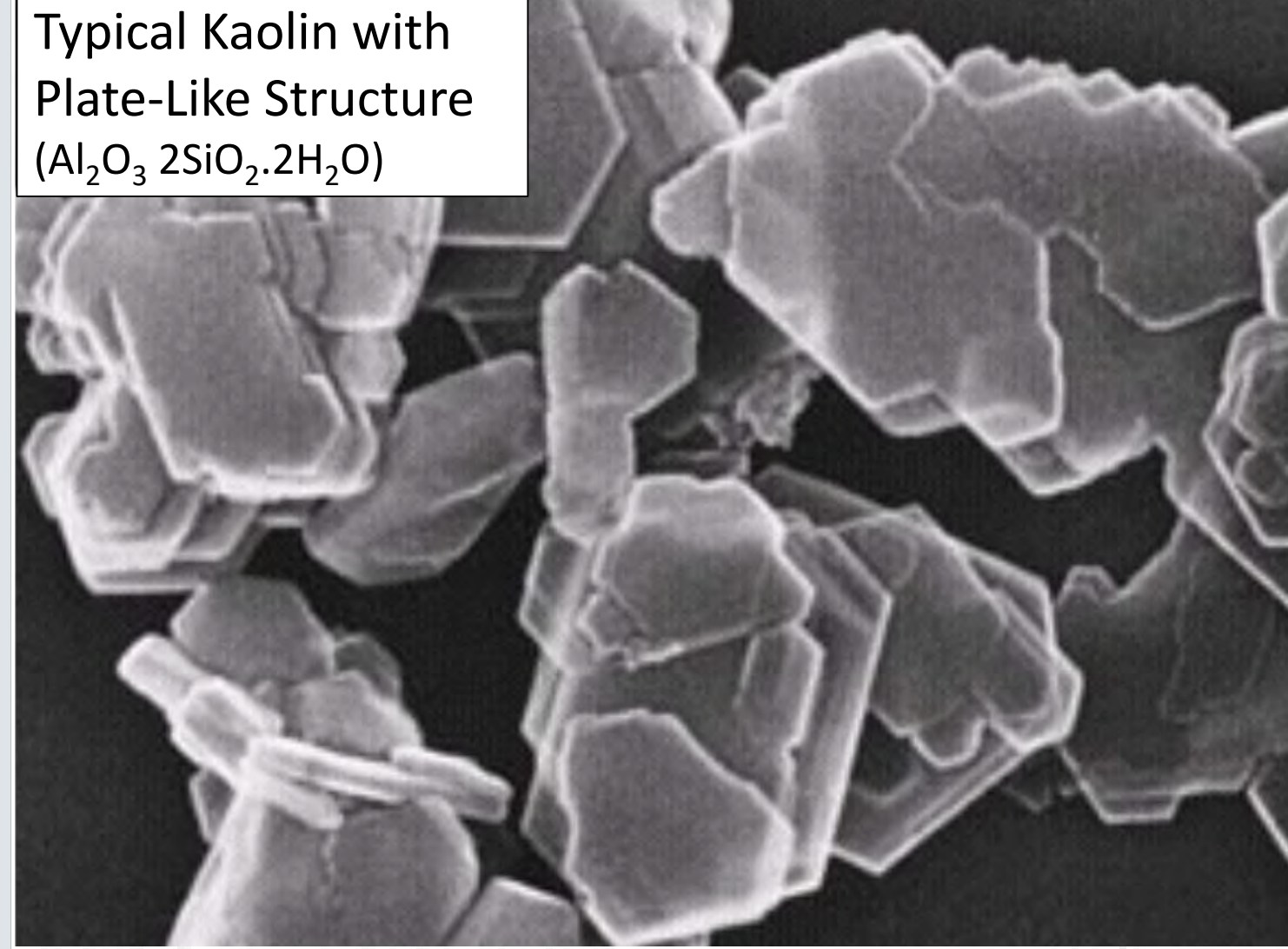
# Mineral Properties

<b>Main Constituent:</b>	Kaolinite/Halloysite Blend
<b>Minor:</b>	Mica, Quartz, Feldspar
<b>Aspect Ratio:</b>	8/1 - 100/1
<b>Specific Gravity:</b>	2.6
<b>Refractive Index:</b>	1.56
<b>MOH Hardness:</b>	2.5

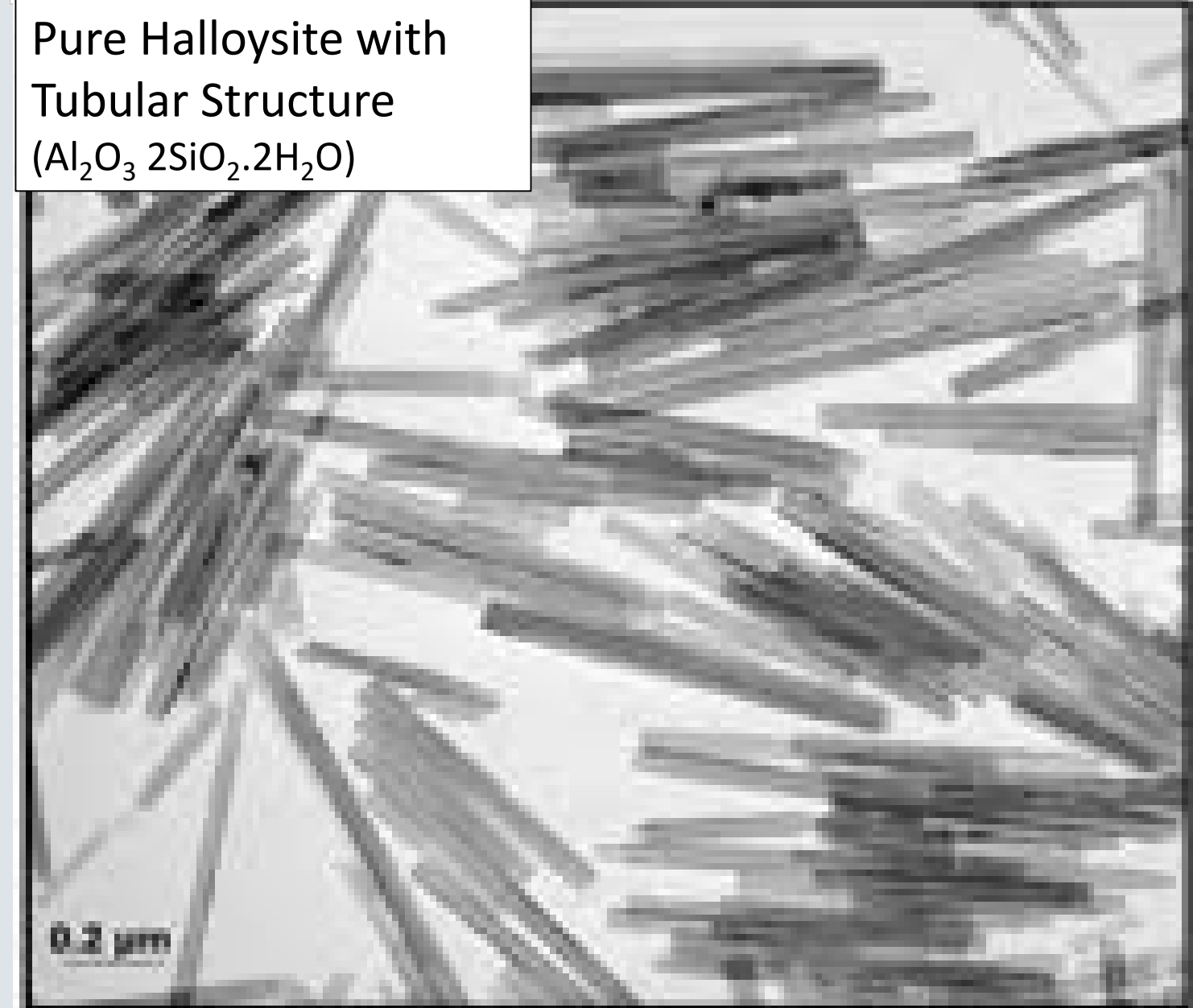
Carey's Well  
Halloysite Kaolin  
Hybrid Product



Typical Kaolin with  
Plate-Like Structure  
( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ )



Pure Halloysite with  
Tubular Structure  
( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ )





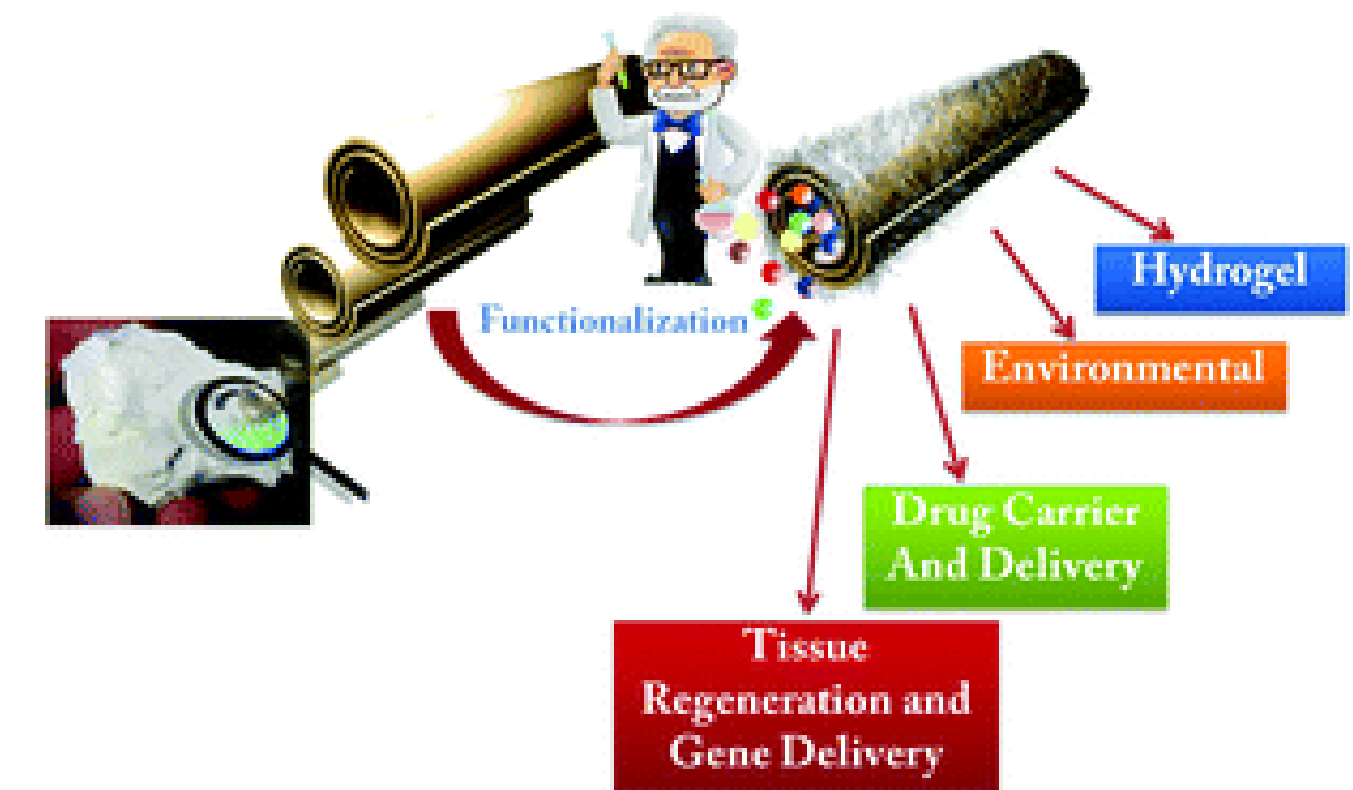
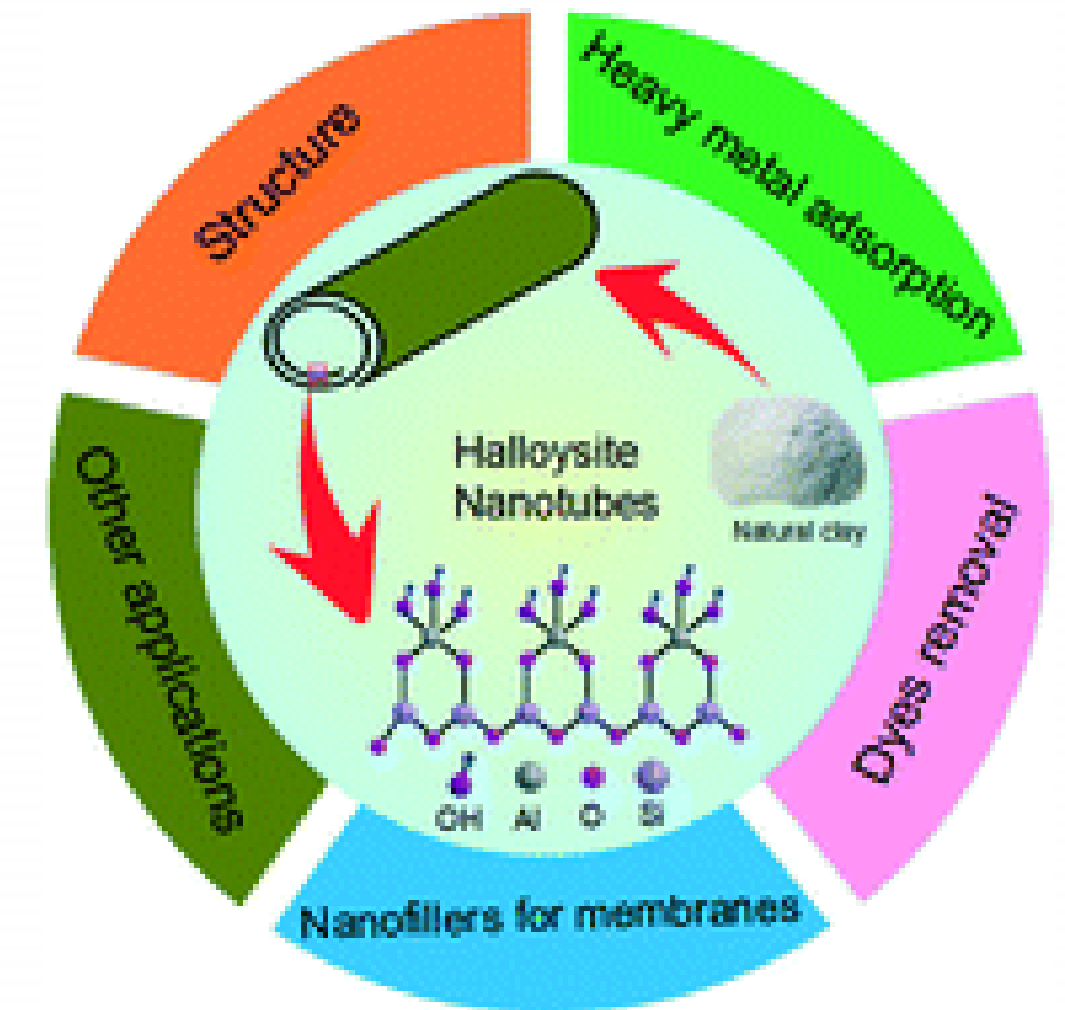
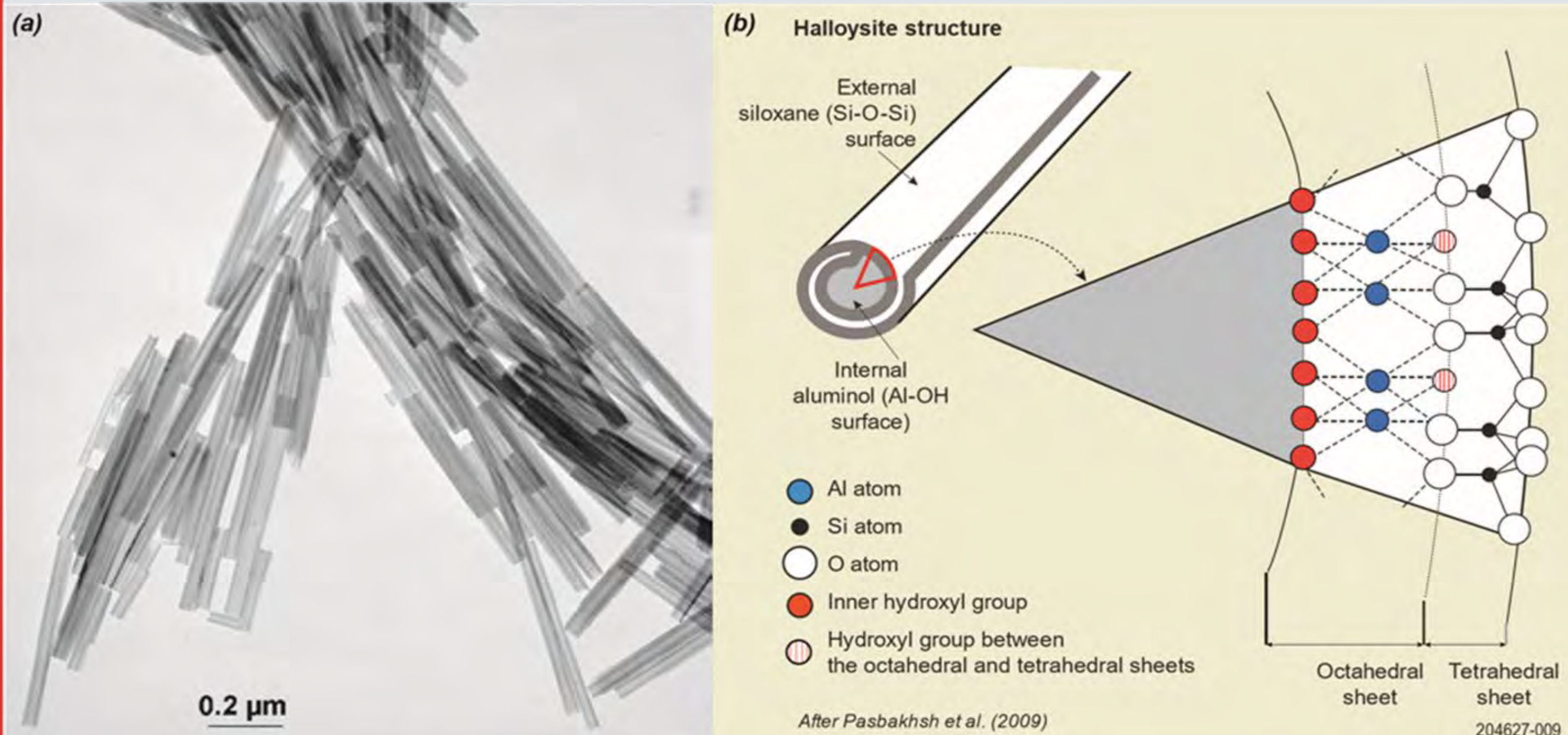
# Halloysite

Halloysite is a rare 'tubular shaped' derivative of kaolin that has a wide variety of industrial uses

Relative Commercial Values

- Pure Kaolin - approx. \$200/t
- Kaolin/Halloysite Hybrid - approx. \$500 - \$1000/t
- Pure Halloysite - approx. \$3000/t upwards

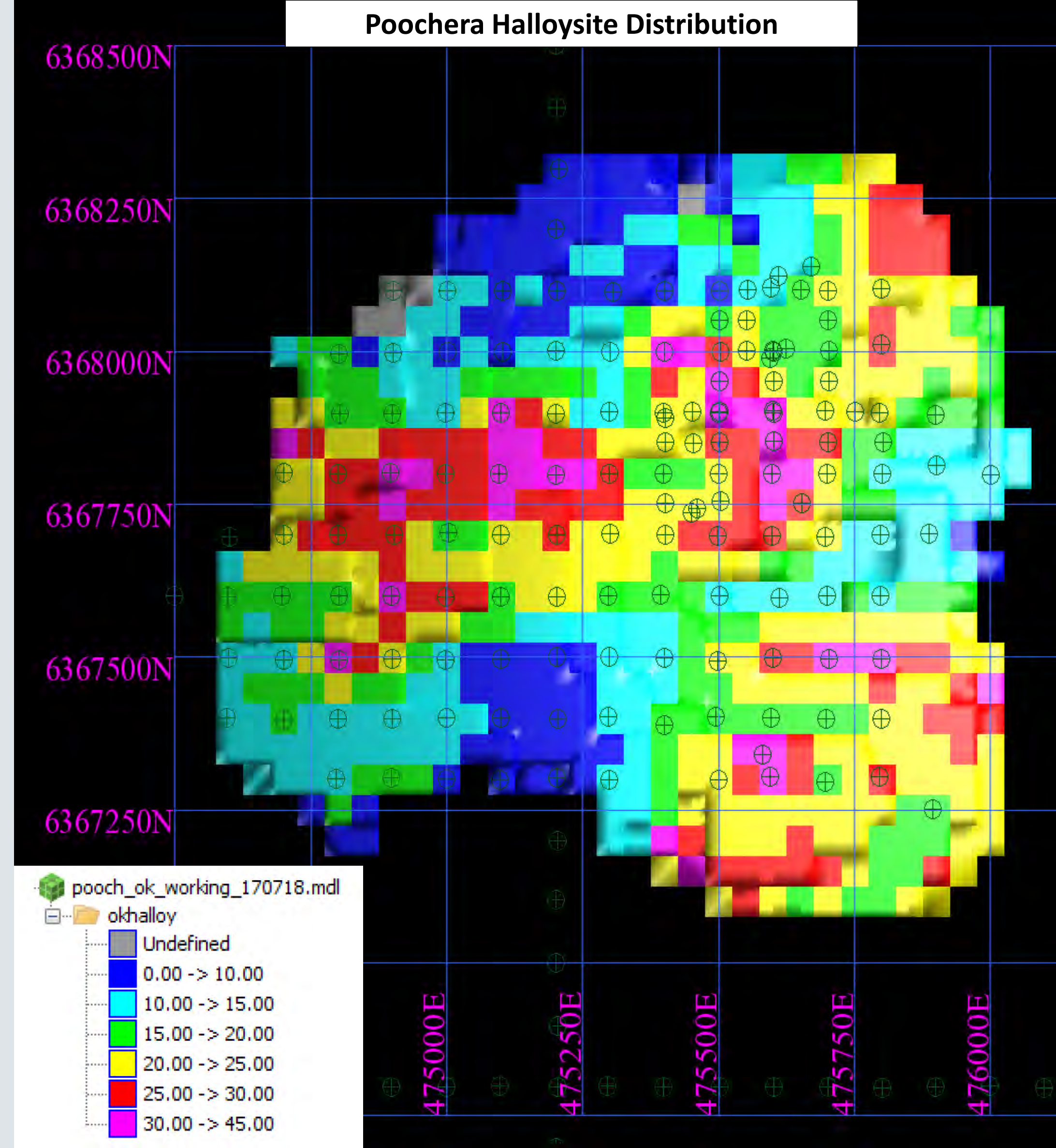
Halloysite Kaolin with Tubular Structure





# Resource Model

- Resource model update
- Characterise the halloysite component
- Exploration drilling of high purity halloysite regions





# Product & Target Markets

for the halloysite kaolin market

## Main Mature Established Markets

- Ceramics - for high-quality porcelain
- Catalysts - for Fluid Catalytic Cracking (FCC)

## New and Emerging Markets

- High Purity Alumina production (HPA)
- Halloysite Nanotube Technologies



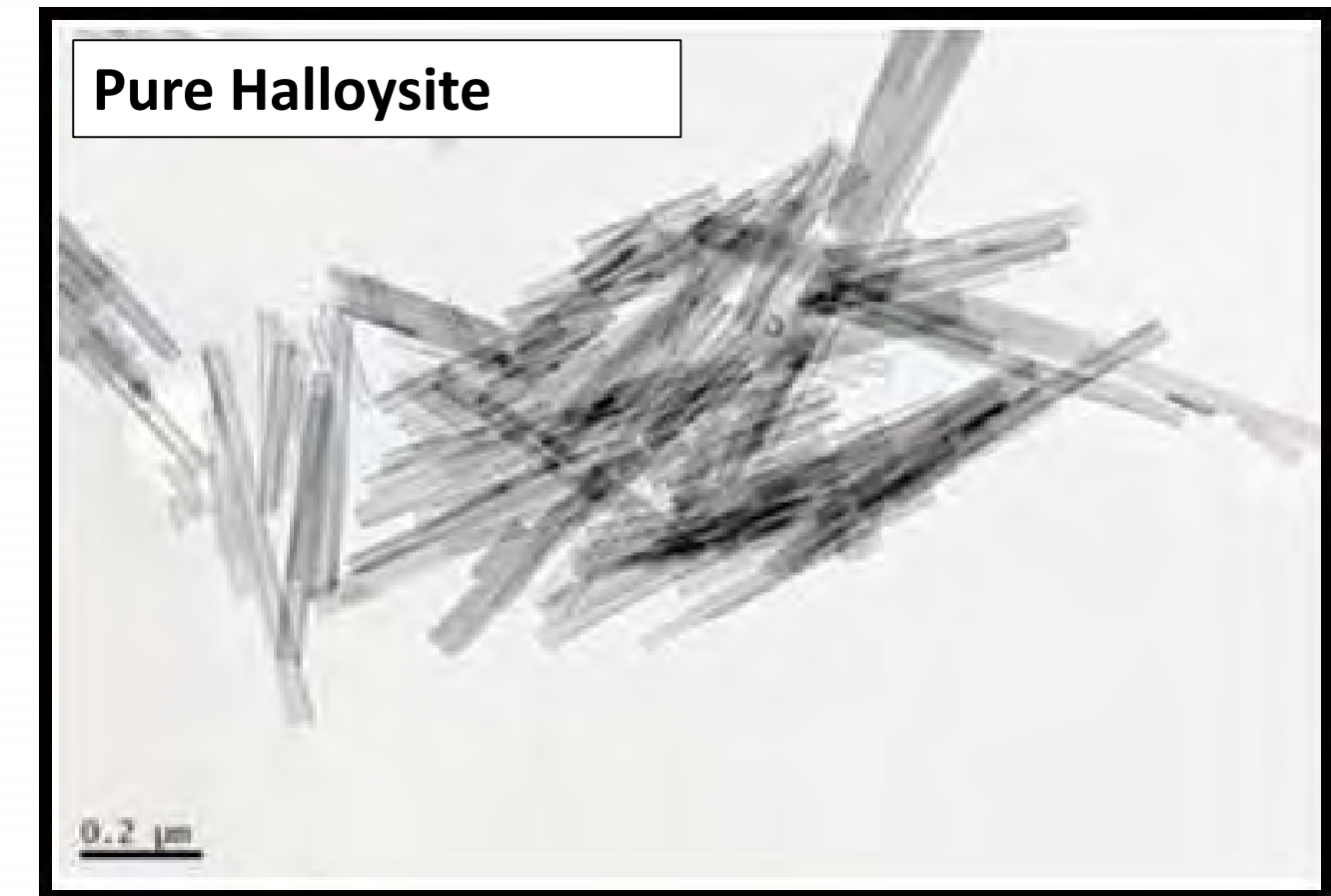


# Nanotechnology Applications

The Global Innovative Center for Advanced Nanomaterials (GICAN) industry hub at the University of Newcastle is using Carey's Well pilot plant material in halloysite nanotube technology research

## Emerging Applications

- Micro-containers for delivery of drugs, biocides and pesticides
- Manufacture of carbon nanostructures - batteries, superconductors, water purification
- Coatings - flame retardants and nucleating agents
- Carbon dioxide capture, storage and conversion to fuel





# Marketing Strategy

## Opportunities

- Significant and increasing demand for:
  - Direct Shipping Ore
  - Beneficiated ore
- Market to petrochemical industry - catalytic cracking
- Premium HPA feedstock

## Technical Approval

- High quality ceramic customers





# Bulk Sampling & Processing Trials

## Bulk Sampling

- 210t bulk sample taken in October 2018

## Commercial Processing Trials

- Full scale dry processing – December 2018
- Full scale wet processing – Q1 2019
- Full-scale commercial application trials – ceramics

## Commercial Agreements

- Legally binding agreements following outcomes of processing trials

## Analysis of Samples

- Preliminary XRF testing has shown the bulk sample material to be of truly world class purity

Bulk Sampling  
at Carey's Well





# Mine Plan

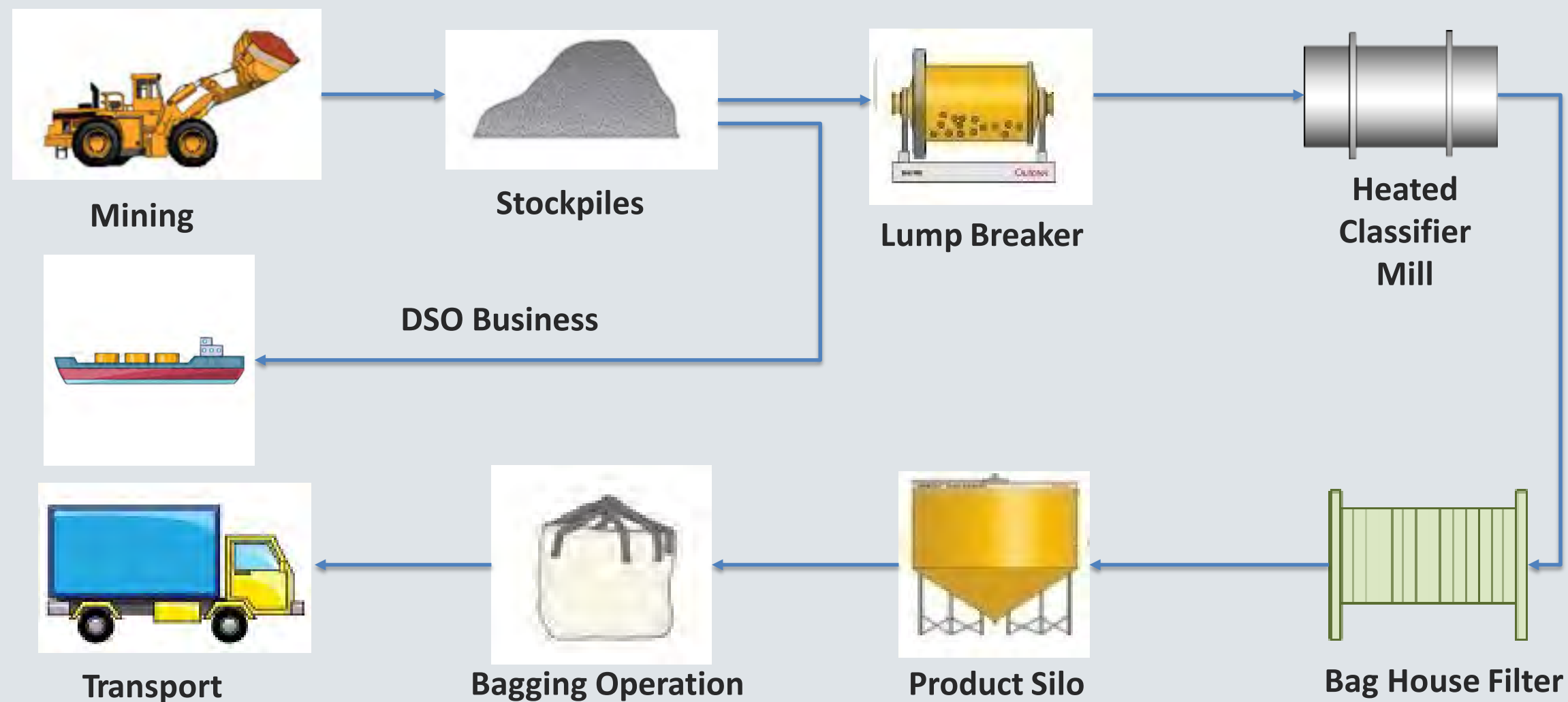
- Open cut quarry
- Low stripping ratio
- Campaign mining using contractors
- Stockpile at site and/or near port facility
- Pit backfill and progressive mine rehabilitation





# Processing Options

- Commence direct shipping ore business
- Second stage production plan to remove 50% waste (sand)
- Transport cost reduced by half
- Potential to give a market ready product with much higher value
- Contract toll production of fully refined product for export business



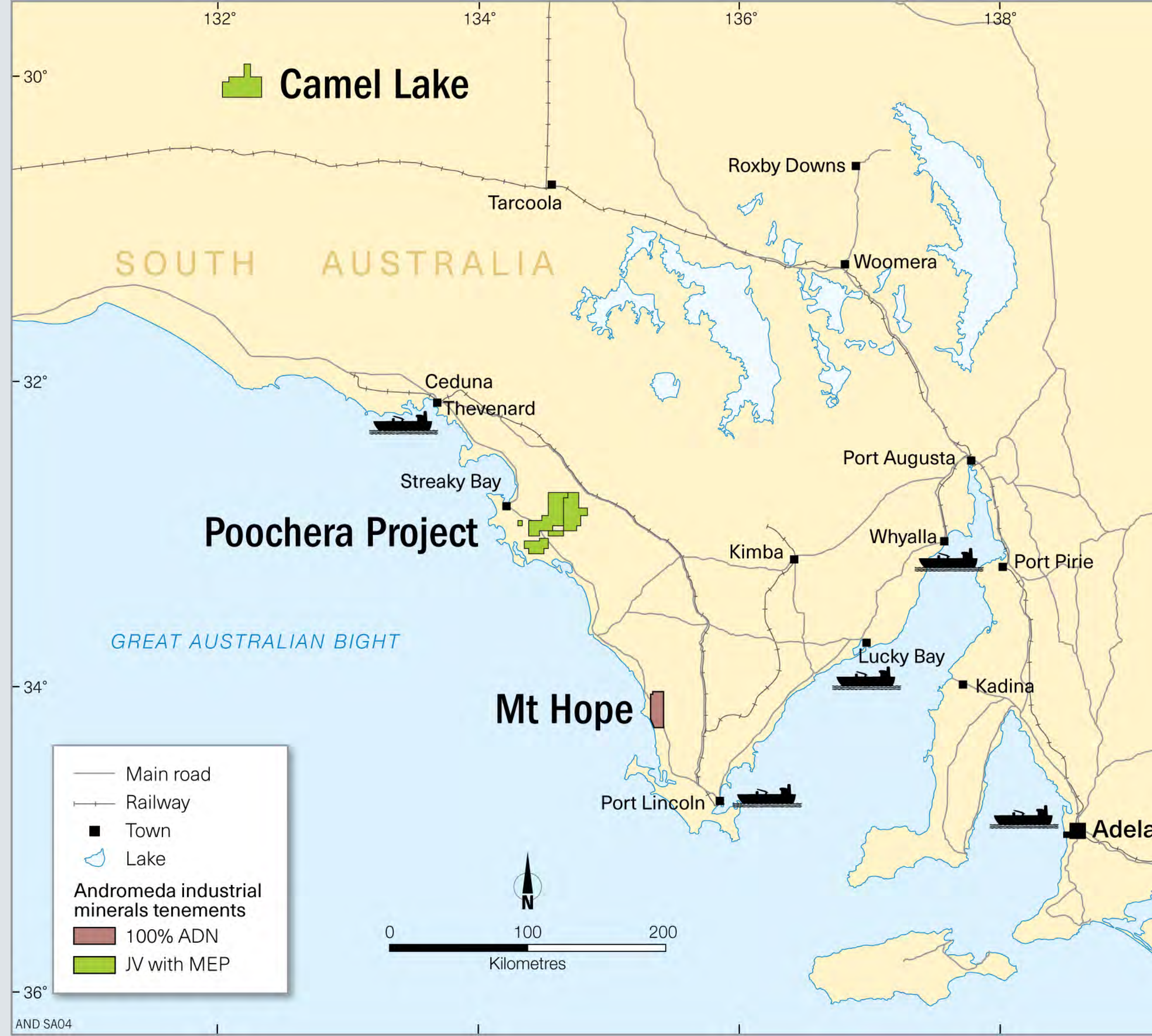
Streaky Bay Pilot Plant





# Existing Infrastructure

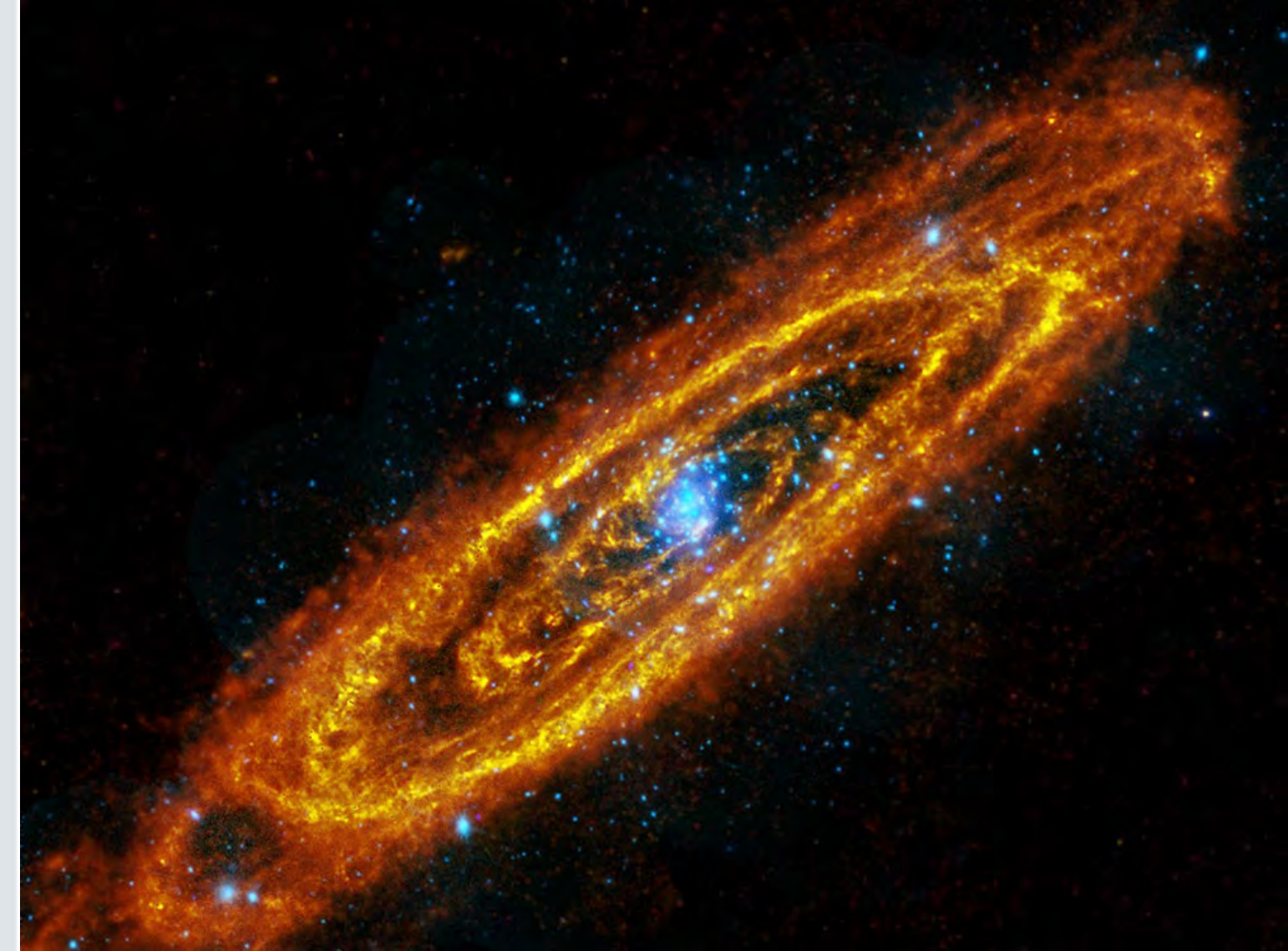
- Adjacent to Streaky Bay, SA
- Highway access to ports at Ceduna, Lucky Bay and Port Lincoln





# Summary

- South Australia has probably the world's largest resources of halloysite kaolin
- This is a relatively high value industrial mineral
- Global demand is increasing
- Global production has decreased significantly
- Pure halloysite is an even more extreme example of that
- Andromeda is well positioned to become one the world's leading producers of these materials



**Thank You**