



# Panda Hill Niobium Project Tanzania

Africa Down Under Presentation  
August 2013

# What is Niobium?

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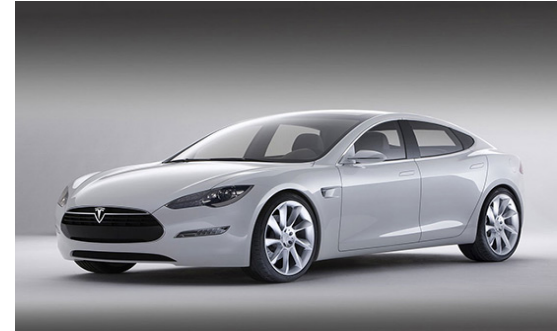
**Niobium (Nb)** is a ductile transition metal which is used mainly in high strength, low alloy steels (HSLA)

## **Niobium Properties:**

- Strengthens steel and lightens
- Corrosive resistant properties
- High temperature tolerance

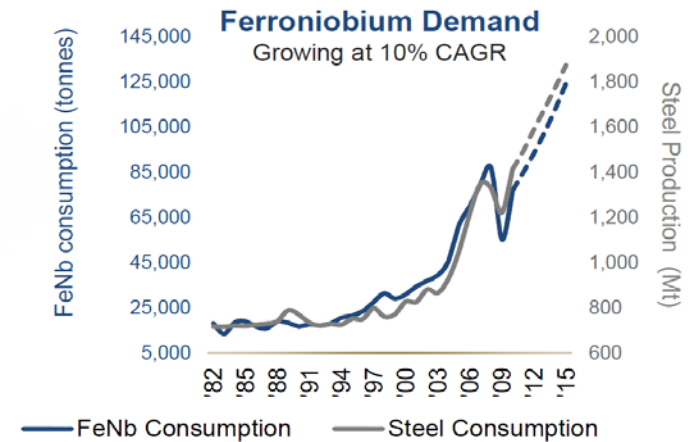
## **Main growth industries :**

- Automotive
- Construction
- Gas pipelines

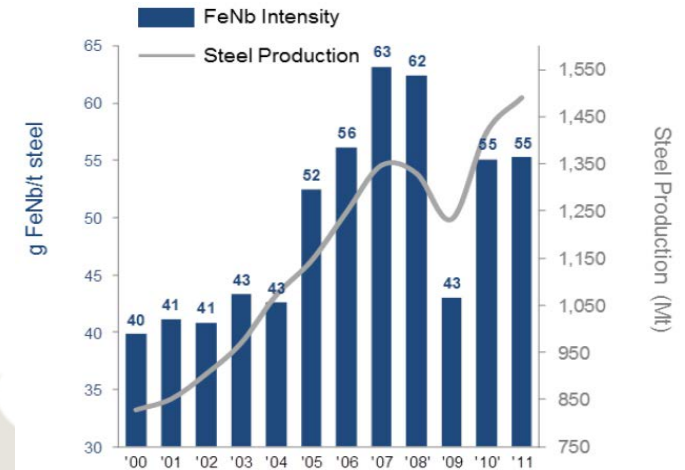


# Niobium Demand

- Solid demand growth is expected over the next ten years
- Growth will be due to:
  - General growth in steel volumes
  - Increased Nb concentration in steels
- 20% of steel produced in developed countries is HSLA; compared to only 10% in developing countries



Source: Roskill World Steel Association



Source: IAMGOLD

# Niobium Supply

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- Three existing producers (CBMM, IAMGOLD, Anglo American)
- No new producers since 1976 (although market has grown substantially)
- No greenfields supply under construction; no new projects with demonstrated feasibility
- Undeveloped Niobium deposits are characterised by low grade, difficult metallurgy and/or high capital costs
- The two leading rare earths projects do not have Niobium credits

*Most Niobium deposits discovered in the 1960s*

# The Opportunity

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Panda Hill compares favourably to IAMGOLD's Niobec mine (an existing Niobium producer):

- Niobec – 46 Mt at 0.53%  $\text{Nb}_2\text{O}_5$  – underground (mineable)
- Panda Hill – 56 Mt at 0.50%  $\text{Nb}_2\text{O}_5$  – open pit
- Panda Hill – targeting first 10 years at 0.7%  $\text{Nb}_2\text{O}_5$
- Lower mining costs at Panda Hill due to low strip ratio (1:1)
- Processing and other costs are likely to be similar
- In 2012 Niobec's EBITDA was US\$72 million (2 Mtpa throughout)

# Project Management Team

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- Grant Davey Managing Director
- Russell Bradford Project Study Consultant
- Keith Bowes Project Director
- Neil Inwood Resource Geologist
- Nick Castleden Exploration Geologist
- Craig Burton Corporate and Strategy

*A strong, capable team with the right experience to drive the feasibility and development work*

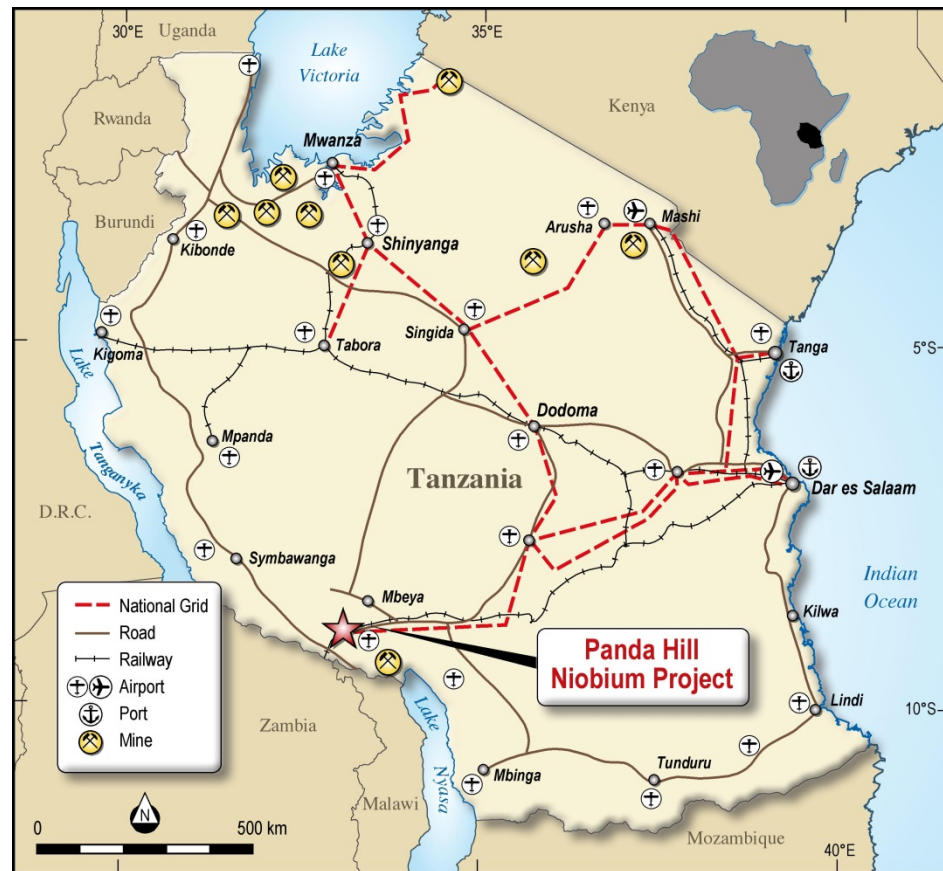


# Panda Hill Niobium Project

- Located in Mbeya region, Tanzania
- Excellent local infrastructure (grid power, roads, rail)
- 160 holes drilled from 1950 – 1990s



Panda Hill, Mbeya



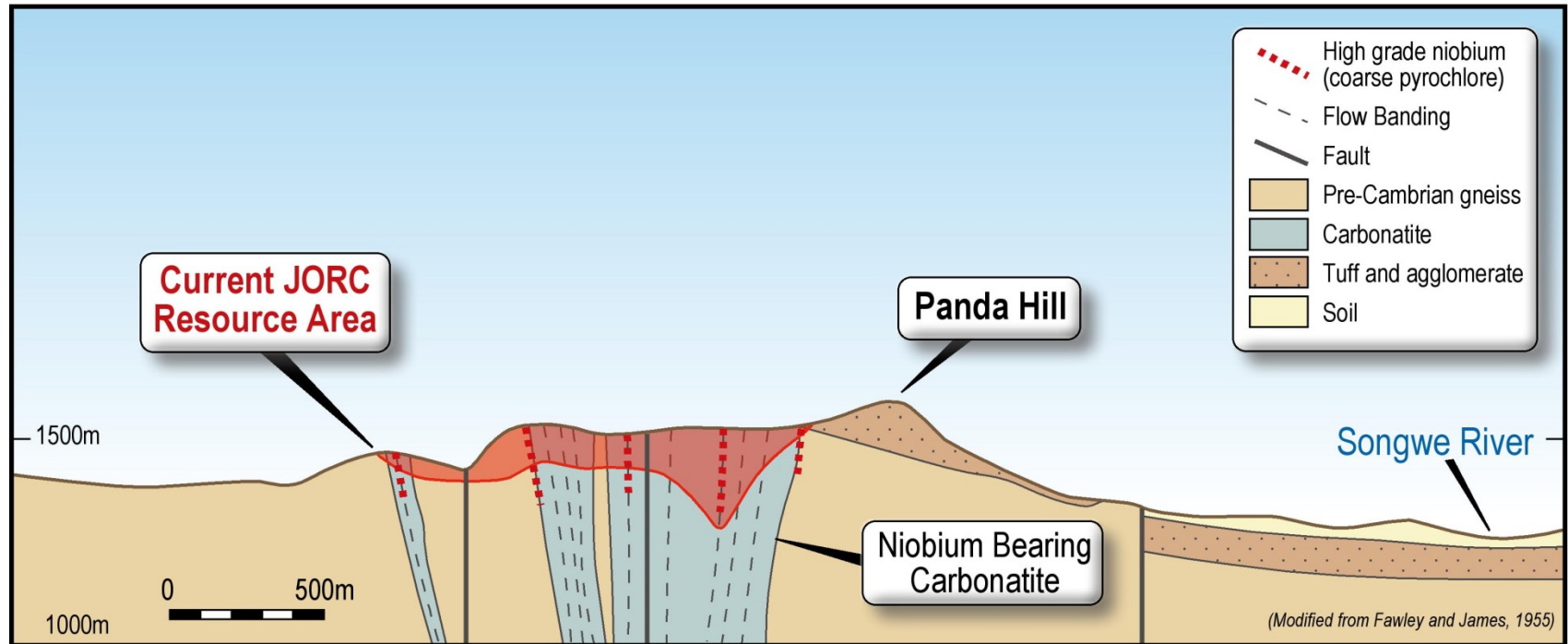
# Coffey JORC Inferred Resource 2012

Lower Cut-off Nb <sub>2</sub> O <sub>5</sub> %	Tonnage (Mt)	Grade (Nb <sub>2</sub> O <sub>5</sub> %)	Nb <sub>2</sub> O <sub>5</sub> Content (KT)
0	76.0	0.43	327
0.2	71.6	0.45	322
<b>0.3</b>	<b>56.0</b>	<b>0.50</b>	<b>280</b>
0.4	37.9	0.58	220
0.6	12.7	0.77	98
0.7	6.9	0.87	60

Note: Figures have been rounded. Ordinary kriged estimate using 2m down hole composites. Coffey Mining are the CP for the estimate and classification. Verona Capital are the CP for the database and data quality.



# Conceptual Cross Section



# Scoping Study

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Commenced a scoping study July 2013

- 2 Mtpa operation
- Confirmatory and extensional drilling
- Metallurgical test work (SGS Lakefield)
- Capital and operating costs estimates (Lycopodium)
- Social and environmental plan
- Resource update and mining study (targeting first 10 years at 0.7% Nb<sub>2</sub>O<sub>5</sub>) (Coffey)

***Q1 2014 delivery for US\$1.6 million***

# Extraction Process

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Well known, simple extraction process:

- Two stage flotation to produce a concentrate (~55% Nb<sub>2</sub>O<sub>5</sub>)
- Then a converter (mini-roaster) to produce FeNb (~66% Nb)
- The above process is used by all existing Niobium producers
- FeNb is marketed directly to steel mills as a direct feed in the steel alloy process
- Panda Hill ore has simple metallurgy and initial test work is positive (targeting 65%+ recovery vs 58% Niobec recovery)

# Cradle's Competitive Advantage

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- Niobium is listed as a “strategic” and “critical” metal due to its lack of substitutes and limited availability
- Only 3 Niobium producers worldwide, all highly profitable – customers looking for diversification
- No greenfield Niobium projects are under construction or have demonstrated feasibility at current price
- No other undeveloped Niobium deposits with Panda Hill's characteristics
  - ✓ high grade (current schedule - first 8 years at 0.69%)
  - ✓ excellent recovery (simple metallurgy)
  - ✓ open cut (low strip ratio) - lower cash costs
  - ✓ long mine life expected (25+ years)
- Strong board and management

# Disclaimer and Competent Person

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The information in this document that relates to Exploration Results is based on information compiled or reviewed by Mr Neil Inwood who is a Fellow of The Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Geoscientists. Mr Inwood is a full time employee of the Company. Mr Inwood 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 2004 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’. Mr Inwood consents to the inclusion in this document of the matters based on his information in the form and context in which it appears.

Certain data in the presentation has been sourced from publically available documents. Portions of this data may not have been independently verified.

The competent person for the Resource estimate and classification is Ms Ellen Maidens who is a Member of the Australian Institute of Geoscientists. Ms Maidens is a full time employee of Coffey Mining and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which she is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’. Ms Maidens consents to the inclusion in this document of the matters based on the information in the form and context in which it appears.

*JORC Disclaimer: Historical grade estimates referred to are not JORC compliant and should only be considered as conceptual in nature. It is uncertain as to whether any future exploration will result in the definition of a Mineral Resource or confirm the presence of economic mineralisation.*



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