

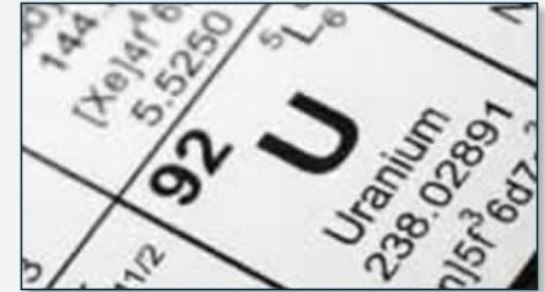


## Unlocking and enhancing the potential of major global surficial uranium deposits

*Commercialising a significant processing breakthrough: U-pgrade*



16 July 2013  
Murray Hill, CEO



# Disclaimer and Important Information



MARENICA  
ENERGY LIMITED

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# Corporate Summary



- Shares on issue: 748.1M\*
- Convertible notes: \$2M
- Options on issue: 37M
- Market capitalisation: \$3.0M\*
- Share price: 0.4c\*

\* 2-for-3 entitlements issue underway at 0.4c to raise up to \$2M

## Board & Management

- Robert Pearce, Chairman
- Murray Hill, Chief Executive Officer
- David Sanders, Non-executive Director
- Gavin Becker, Non-executive Director
- Douglas Buerger, Non-executive Director
- Nelson Chen, Non-executive Director
- Simon Yang, Non-executive Director



## Key Assets

- Marenica Uranium Project, Namibia (75%)
- New **U-pgrade** uranium processing technology

## Major Shareholders:

- Hanlong Energy Ltd 30.0%
- Areva NC 6.4%

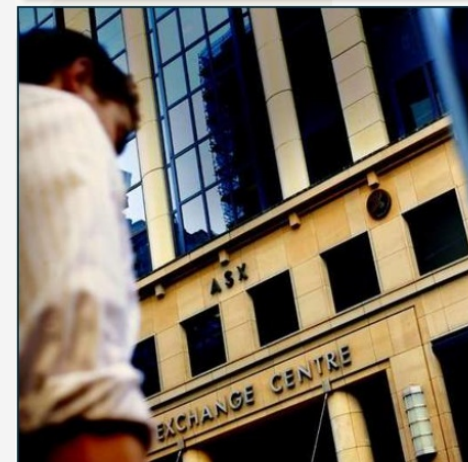


# Company Snapshot



MARENICA  
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- Specialist uranium explorer and developer (ASX: MEY)
- Focused on development and commercialisation of breakthrough **U-pgrade** technology:
  - *Applicable to large, low-grade surficial uranium deposits*
  - *Delivers substantial upgrade, improving economics by reducing CAPEX and OPEX*
- Next key phase of commercialization underway, including:
  - *Pre-Feasibility Study on Marenica Project, Namibia*
  - *Test work on other calcrete-hosted uranium deposits*
- MEY's strategy is to achieve growth by licensing and implementing the technology:
  - *Earn an interest in higher grade uranium projects*
  - *Become a low-cost uranium producer of the future*



**U-pgrade a game changer for MEY...and others**



- **U-pgrade** Process developed out of necessity, but creates an exciting global business opportunity
- Can be applied to other major calcrete-hosted uranium deposits
- Provisional patent in place
- Discussions underway with owners and operators of other similar uranium deposits in Australia and Africa
- Future opportunities exist in Europe, Asia and the Americas

**Other deposits where this technology may be applied (subject to mineralogy confirmation) include:**

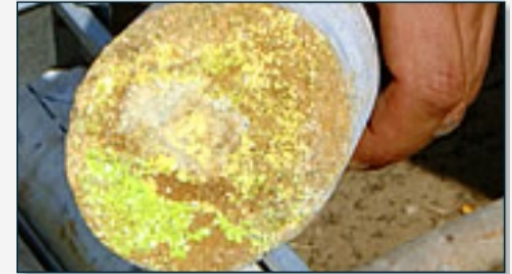
- **Trekkopje (Areva)** – 250Mt @ 105ppm  $U_3O_8$  containing 57Mlbs
- **Deep Yellow Namibian Resources** – ~72Mlbs of  $U_3O_8$  at a nominal grade of 300ppm  $U_3O_8$

# Marenica – An Abridged History

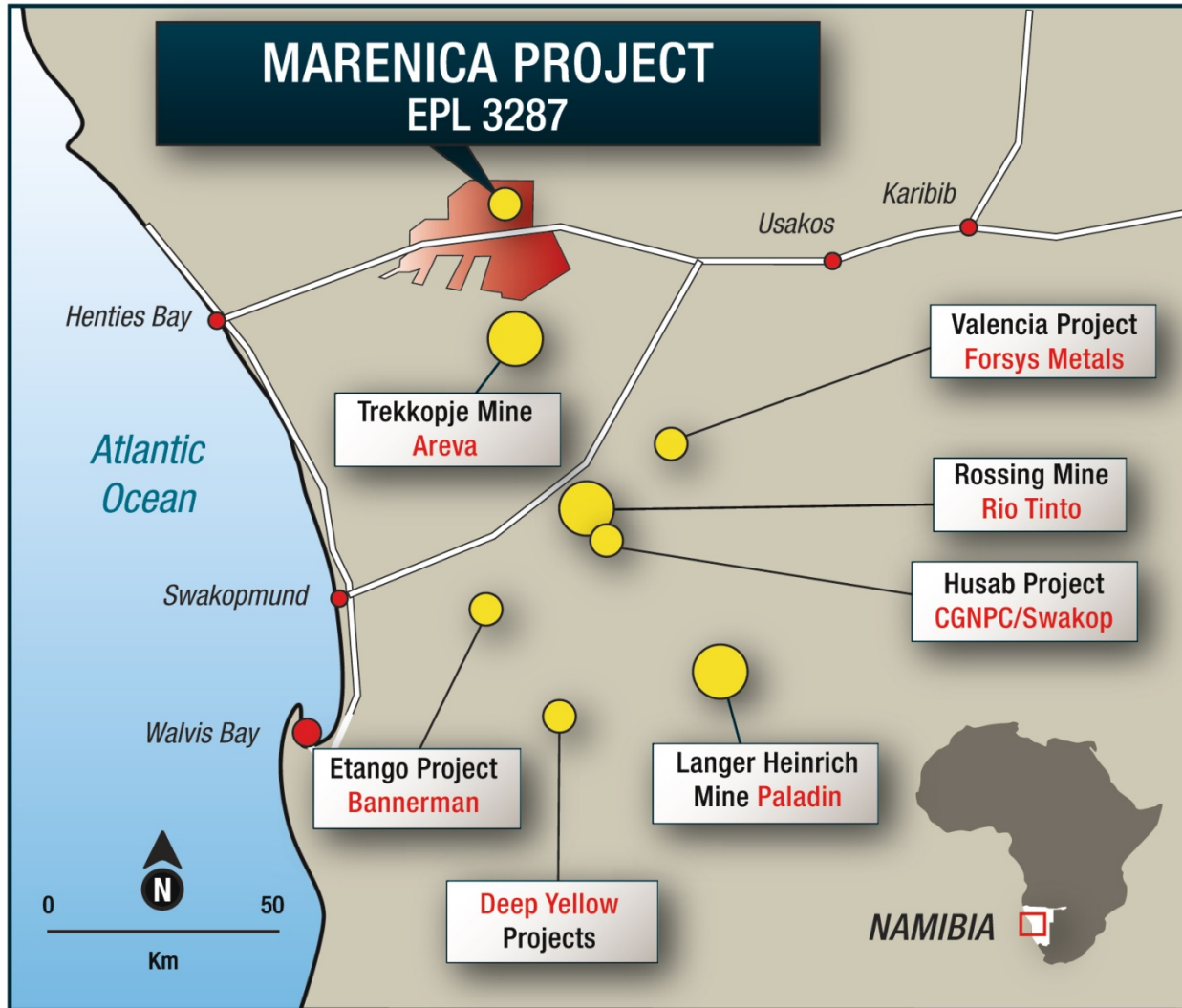


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- Acquired the Marenica uranium deposit in Namibia in 2006 – a large, low-grade project located in the emerging Damara uranium province
- Completed a Scoping Study based on a potential heap leach operation in 2011 – but unable to justify economic development
- New opportunities identified on processing by new technical Directors and consultants
- Technical review during 2012 led to an innovative approach to the metallurgical process employed
- New CEO, experienced metallurgist Murray Hill, appointed in May 2012
- Independent Technical Steering Committee established: driving new opportunities



# The Catalyst: Marenica Project



- Large-scale uranium deposit – \*276Mt @ 94ppm  $U_3O_8$  for 57Mlbs  $U_3O_8$
- Located in world-class Damara uranium province – world's 4<sup>th</sup> largest uranium producing region
- A technical review of the deposit has driven the development of a breakthrough processing technology

**Necessity is the mother of invention...a processing breakthrough.**

\*Indicated Mineral Resource of 26Mt grading 110ppm  $U_3O_8$  and an Inferred Mineral Resource of 250Mt grading 92ppm  $U_3O_8$  using a 50 ppm cut-off



## Marenica's metallurgical specialists...and innovators

- **Doug Buerger**, Chairman & MEY Director
  - *+40 years experience in exploration and project development (Namibian born)*
- **Gary Johnson** – Strategic Metallurgy
  - *Developed and commercialised Activox® nickel leach technology, ex Rossing*
- **John Farrow** – CSIRO
  - *Extensive industry experience and a world leader in fines processing*
- **Grenvil Dunn** – Hydromet (Pty) Ltd
  - *Extensive worldwide uranium experience; Consultant to UN and IAEA*
- **Gavin Becker** – MEY Director and CEO of Metallica Minerals Ltd
  - *+35 years experience in operations & project development, ex Yeelirrie & Mintek*
- **Murray Hill** – MEY CEO
  - *+28 years experience in operations, design and project development*
- **Gottfried Grobelaar** – MEY Geologist, Namibia
  - *Worked at Trekkopje prior to Marenica*
- **Elana Williams** – Metallurgical Consultant
  - *Extensive mineral sands processing experience (Richards Bay), ex Mintek*





## Technical partnership and support from Australia's CSIRO (Commonwealth Scientific and Industrial Research Organisation)

- Partnership and technical collaboration driven by John Farrow (CSIRO Perth)
  - *A member of the Technical Steering Committee (TSC)*
  - *World expert in fine-grained particle processing*
- Peter Austin (senior technical expert) available to the TSC
- CSIRO are industry experts and innovative thinkers
- State-of-the-art CSIRO testing facilities available in Australia (in particular Perth):
  - *Have played a key role in achievements to date*
  - *CSIRO will continue to play a major role in the next stage of commercialisation of the new process*

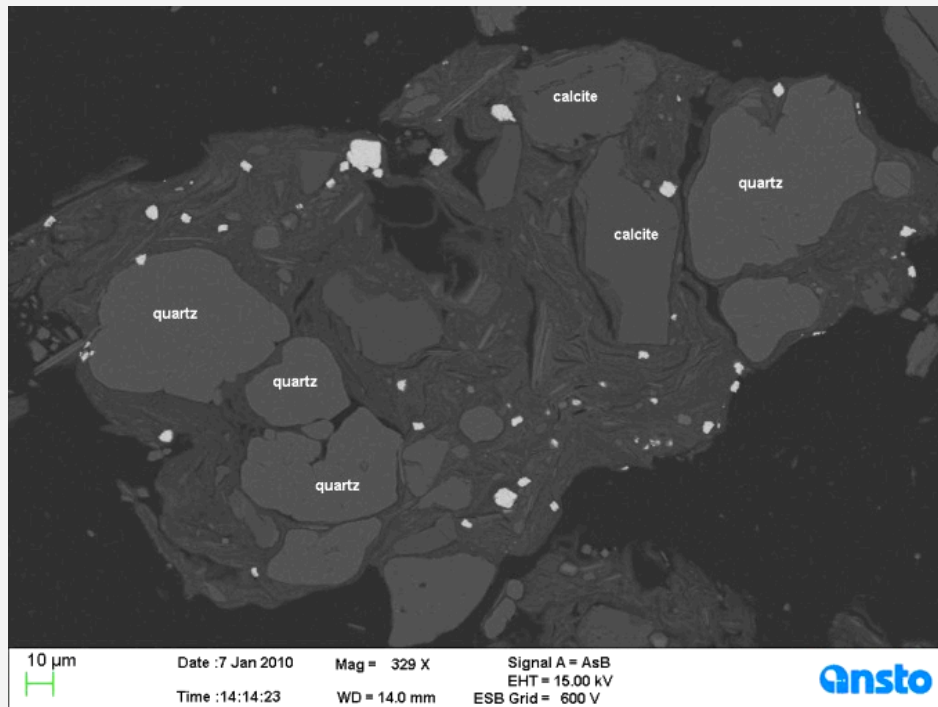
# The Technology: A Brief Overview



- Opportunity arose from the characteristics of the uranium ore at Marenica:
- Exceptional bench scale testwork outcomes achieved when applied to Marenica deposit:
  - *Grade of process leach feed is 60 times greater than mined ore*
  - *Plant feed grade of 94ppm  $U_3O_8$  increased to +5,500ppm  $U_3O_8$*
  - *99% of mass rejected (2,475tph), 1% of mass concentrated (25tph)*
  - *Potential annual production of 2.7-2.8Mlbs  $U_3O_8$*
- Low-cost concentration techniques used – well-established in other mineral industries
- Scalable to large-tonnage operations

**60 times increase in plant feed grade achieved through the application of proven concentration techniques...**





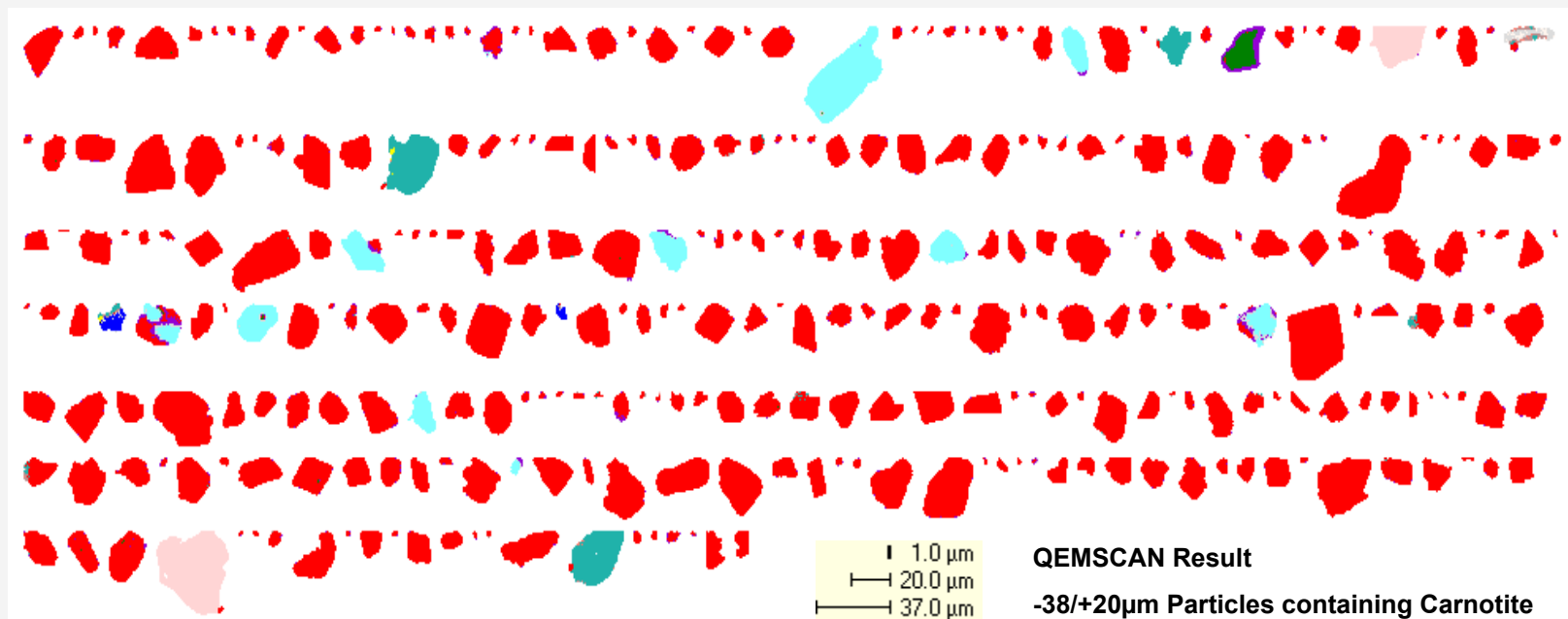
- **Carnotite** is the single uranium-bearing mineral (uranium oxide) at Marenica
- Well-formed carnotite crystals (white), typically in distinct size range = 5-125 $\mu$ m
- Generally occur as discrete particles within clay-mica matrix conglomerates – well liberated
- Scrubbing of conglomerate liberates carnotite

**Carnotite – a readily-liberated uranium mineral. Unique characteristics make it amenable to simple beneficiation.**

# Carnotite Particles

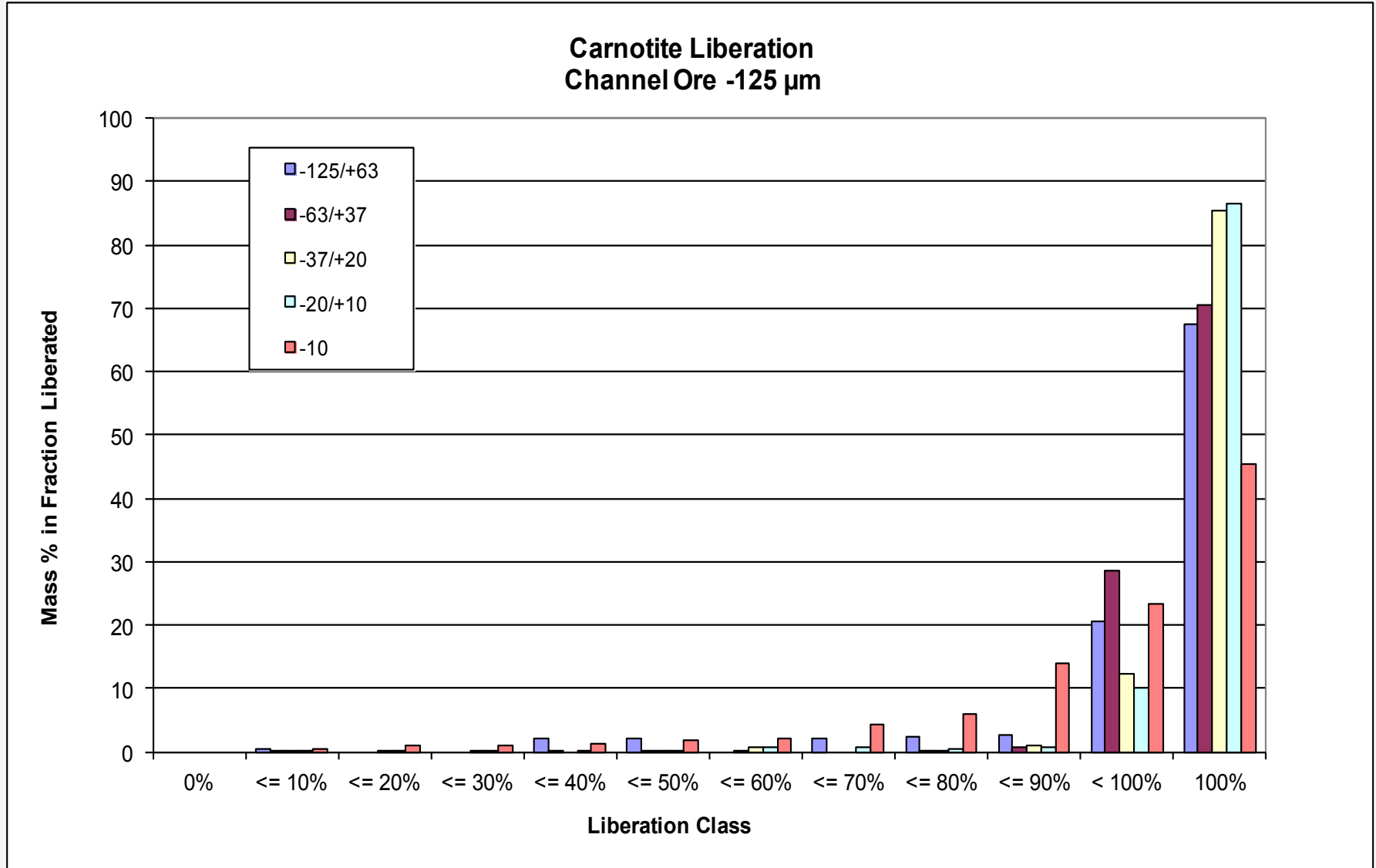


- Carnotite (shown as red) is generally very well liberated from waste (shown as blue or green)
- Carnotite particle size 5-125 $\mu\text{m}$
- These characteristics underpin the unique opportunity to upgrade

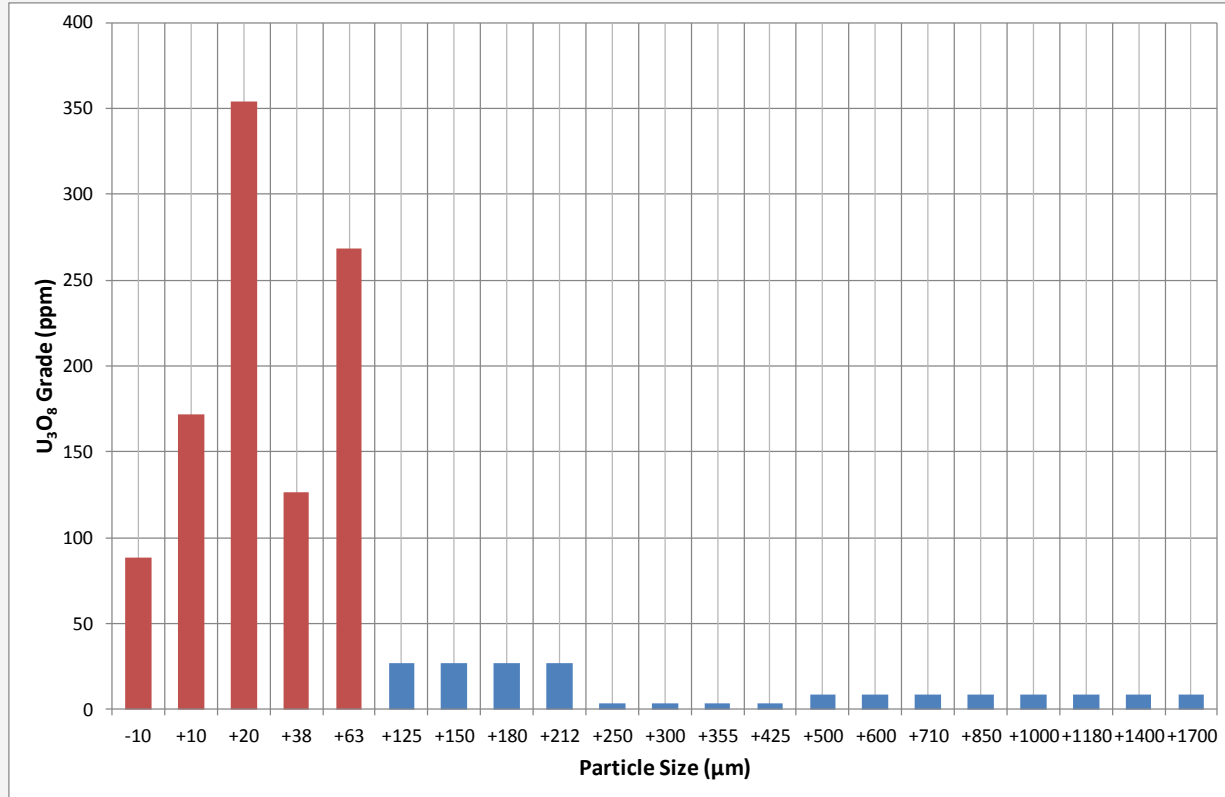


**Carnotite is extremely well liberated...making it amenable to *U-grade*!**

# Uranium Liberation (-125µm Particles)



# Uranium in Distinct Size Band (Post Scrubbing)



- Very low uranium grades in coarse size fractions >125µm
- Concentration of uranium in <125µm fractions
- Very high distribution of uranium in <125µm fractions

Potential to concentrate from distinct size band...

# Upgrade by Heavy Media Separation



- -125+63 $\mu$ m size fraction
- TBE (tetrabromoethane) Heavy Media Separation (SG 2.97)
- High distribution of uranium in heavies confirmed high degree of Carnotite liberation
- Results confirm propensity of Carnotite to upgrade

Product	Weight Dist. (%)	U Assay (ppm)	U Dist. (%)
Heavies (SG >2.97)	1.1	14,900	93.5
Middlings (SG ~2.97)	1.6	100	0.9
Lights (SG <2.97)	97.3	10	5.6
<b>Total</b>	<b>100.0</b>	<b>174</b>	<b>100.0</b>

**Bench-scale heavy media separation testwork was undertaken to confirm the liberation and upgradeability of the ore. The results clearly confirmed the ability to upgrade the Carnotite using Marenica's proprietary U-pgrade process.**

# Upgrade Options



Process	Comment
Wet Scrubbing	Wash conglomerates
Screening	Separate low grade coarse
Gravity Separation	Carnotite SG 4.2 compared to bulk of gangue minerals at 2.5-2.7
Flotation	Carnotite in size range for flotation or float gangue minerals
Upflow classification	Possible exploitation of SG variance
De-sliming (Ultrafines Rejection)	Limited Carnotite in ultrafines
Magnetic Separation	Remove magnetic gangue

**Several unit upgrade operations available...  
all existing, proven technologies.**





- ***U-pgrade*** bench scale work completed in Perth tap water (similar to Namibian desalination water)
- Water represents about 30% of process OPEX
- Comparative ***U-pgrade*** tests completed in sea water
- Sea and Perth tap water produce similar upgrades and recoveries
- Use of sea water significantly reduces process OPEX

**Lack of sensitivity of *U-pgrade* to water quality significantly reduces OPEX**



- ***U-pgrade*** flowsheet developed on low sulphate ore representing >85% of Marenica resource
- High sulphate ore can be up to 100% of some resources
- Up to now high sulphate ores have not been able to be processed due to:
  - *Sulphate consumes alkali*
  - *Calcite consumes acid*
- Initial testing of high sulphate ore indicates that both sulphate and calcite are rejected
- More detailed testing of high sulphate ore in progress
- This presents another opportunity for application of ***U-pgrade***

Rejection of sulphate and calcite provides process route for high sulphate content calccrete ores.

# Concentrate Treatment Options



Process	Comment
<b>Conventional approach for high carbonate ores</b>	
90°C Alkali Leach	- Necessary due to high acid consumers in host rock
<b>Options for concentrate</b>	
Acid Leach	- Rejection of acid consuming gangue in <b><i>U-pgrade</i></b> - Massively reduced mass for leaching
Offsite Leaching through Concentrate Sale	- Leaching off site reduces environmental impact - Low mass of solids to transport, akin to base metal concentrator

**Successful upgrading of Carnotite presents leach opportunities and significantly reduced operating cost potential.**

**A comparison of the new *U-grade* process compared with conventional heap leach and tank leach processes....**

Description	Unit	Heap Leach	Tank Leach	U-grade Process
Mining Rate	ktpa	20,000	20,000	20,000
Leach Feed	ktpa	10,000	3,000	200
	U <sub>3</sub> O <sub>8</sub> Grade	170	470	>5,500
U <sub>3</sub> O <sub>8</sub> Production	klb/a	2,850	2,800	2,700
Total U Recovery	%	69	68	65
Leach Method		Alkali	Alkali	Acid



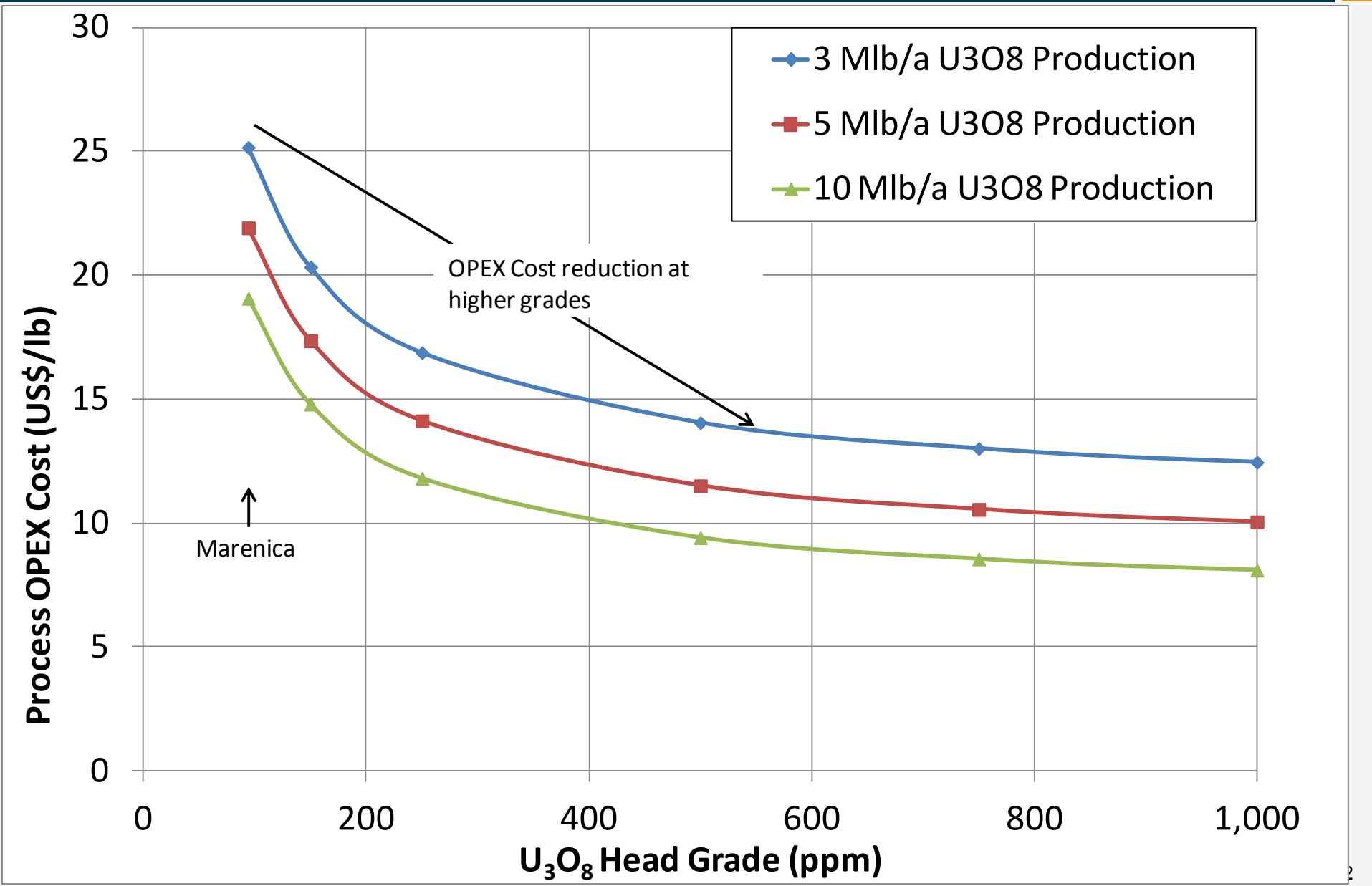
The new *U-grade* Process delivers a significant improvement in potential project economics...

Description	Unit	Heap Leach	Tank Leach	U-grade Process
Mining Operating Costs	US\$/t ore	2.15	2.15	2.15
	US\$/lb*	15	15	16
Process Plant Operating Costs	US\$/lb*	67	64	26
Total Operating Costs	US\$/lb*	82	80	42
Project Capital Cost	US\$M	779	605	391

\*US\$/ recovered pound

Estimates are based on Scoping Study reports and management estimates

# Estimated Process OPEX Costs



Marenica would like to acknowledge the following companies for their support in providing samples for ***U-pgrade*** proof of concept testing

- Areva – Trekkopje (Namibia) ore samples
- Deep Yellow – Australian ore samples
- Deep Yellow – Namibian ore samples

# Commercialisation of *U-pgrade*



- **Stage 1:** 6-month test work programme ready to commence following capital raising
- Aimed at de-risking and increasing confidence level in the success of ***U-pgrade*** and optimising the flowsheet:
  - *Flowsheet optimisation work on Marenica bulk samples*
  - *Conduct testwork on other ore sources*
- **Stage 2:** Pilot plant testwork programme ready to commence early-mid 2014
- Aimed at demonstrating ***U-pgrade*** technology on a larger scale







- The ***U-pgrade*** process includes unit operations that are commonly used in the greater mining industry and are scalable to large tonnage operations
- The high mass rejection produces a low mass concentrate that opens up opportunities:
  - *Satellite deposits can be upgraded*
  - *The low mass concentrate can be trucked or pumped to a central leach/refinery*
  - *The low mass concentrate could be sold*
- Processing of high sulphate content calcrete ores that up to date have not been able to be processed

Opportunities abound



- ***U-pgrade*** process produced the following results
  - *Leach feed grade 60 times greater than mined grade*
  - *Plant feed grade of 94ppm  $U_3O_8$  increased to +5,500ppm  $U_3O_8$  for leaching*
  - ***U-pgrade*** rejects 99% of mass prior to leach
  - *1% of ***U-pgrade*** feed leached*
- Water quality has no impact on ***U-pgrade*** performance
- Potential to process high sulphate content calcrete ores that up to date have not been able to be processed
- ***U-pgrade*** applicable to Marenica ore and potentially many other surficial ore sources around the world

**U-pgrade very successful in concentrating carnotite for leaching**

# Our Vision: the Future



MARENICA  
ENERGY LIMITED

- Finalise development and commercialisation of breakthrough ***U-pgrade*** technology
- Complete Pre-Feasibility Study on Marenica Project using new ***U-pgrade*** technology
- Complete Pre-Feasibility Study on ***U-pgrade*** technology
- Apply the technology to higher grade resources
- Earn an interest in higher grade uranium projects
- Achieve growth by licensing and implementing the technology
- MEY to become a low-cost uranium producer of the future



***U-pgrade*** the game changer



## Unlocking and enhancing the potential of major global surficial uranium deposits

*Commercialising a significant processing breakthrough: U-pgrade*



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