

International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle: Exploration, Mining, Production, Supply and Demand, Economics and Environmental Issues

## **Reguibat surface uranium project, Mauritania**

**Beneficiation upgrades and rapid leaching**

**A new paradigm for “calcrete” uranium projects?**

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**Aura Energy Ltd**

**June 2014**

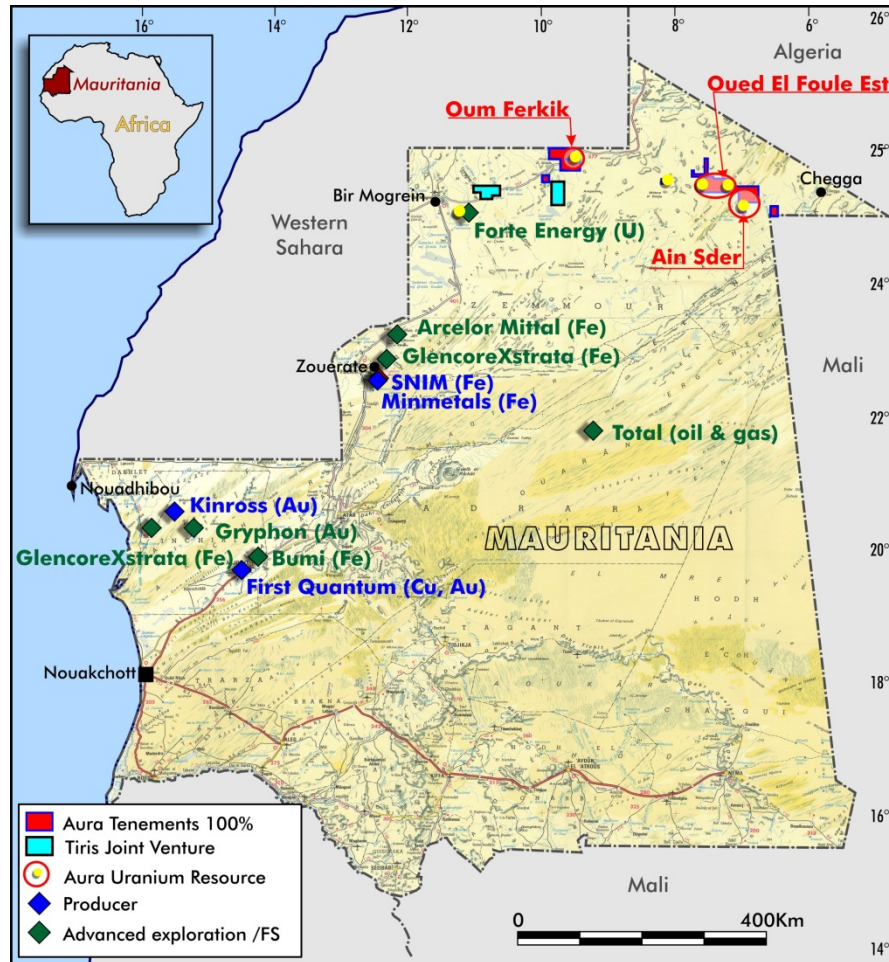
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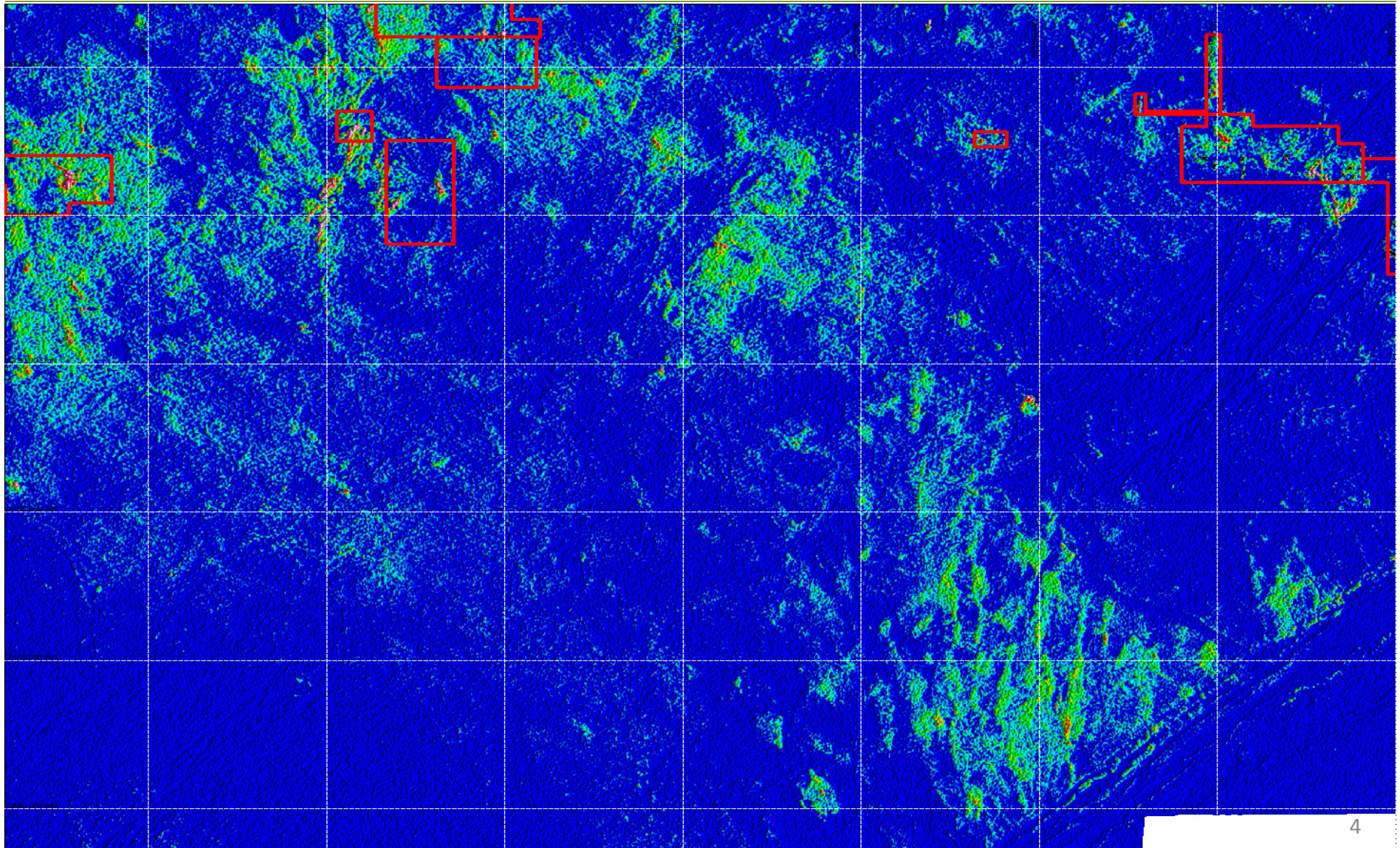
# Mauritania



- Mauritania - country with a long history of mining
- Iron ore, gold, copper
- Glencore recently committed to \$900 million iron ore investment
- Uranium mineralisation demonstrated in the 1970s, but no serious exploration

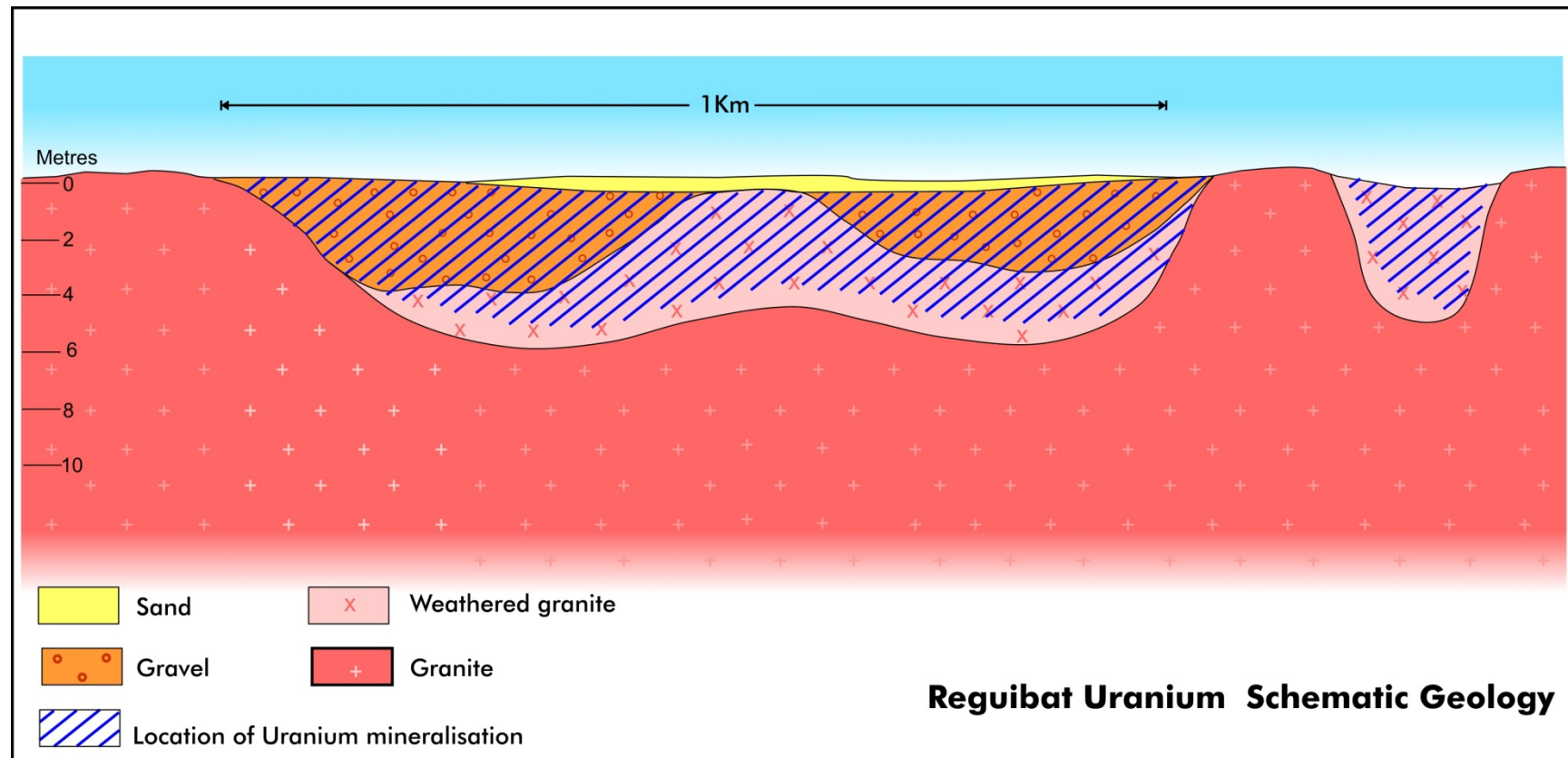


# Major advance – aid-funded airborne radiometrics



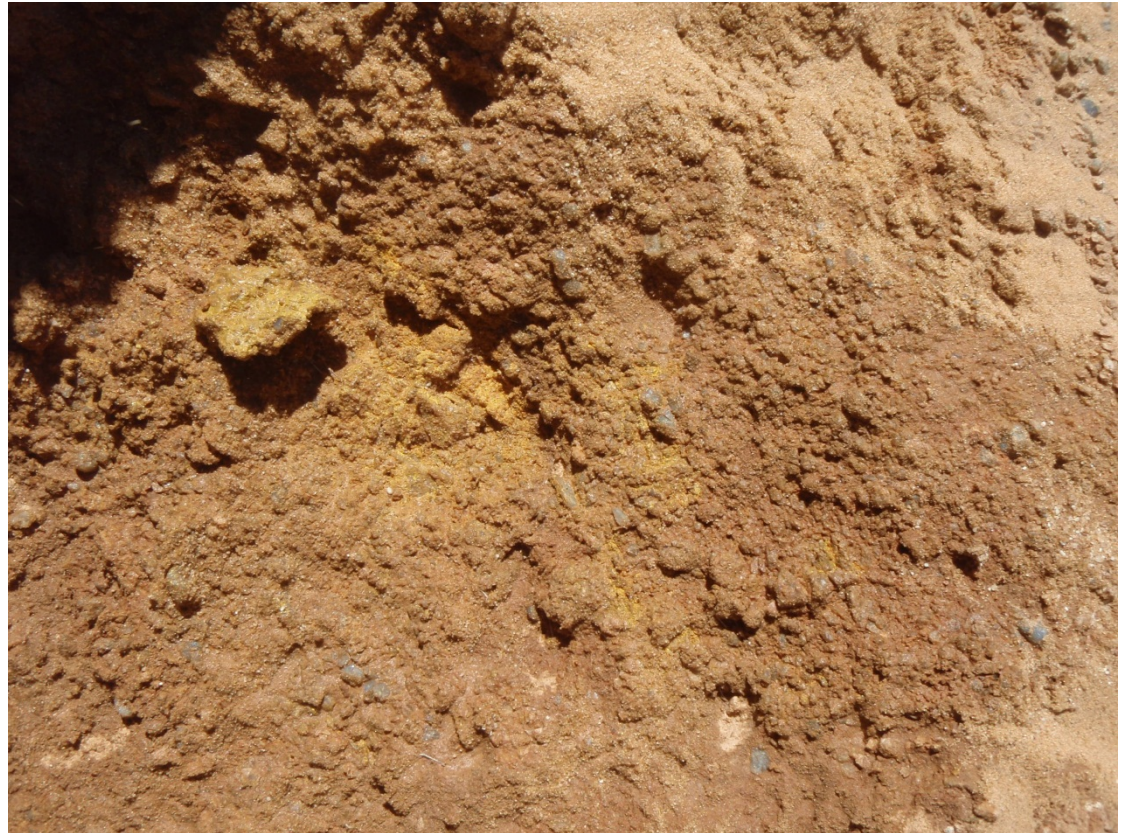


# Uranium mineralisation occurs within gravels and weathered granite within a few metres of the surface



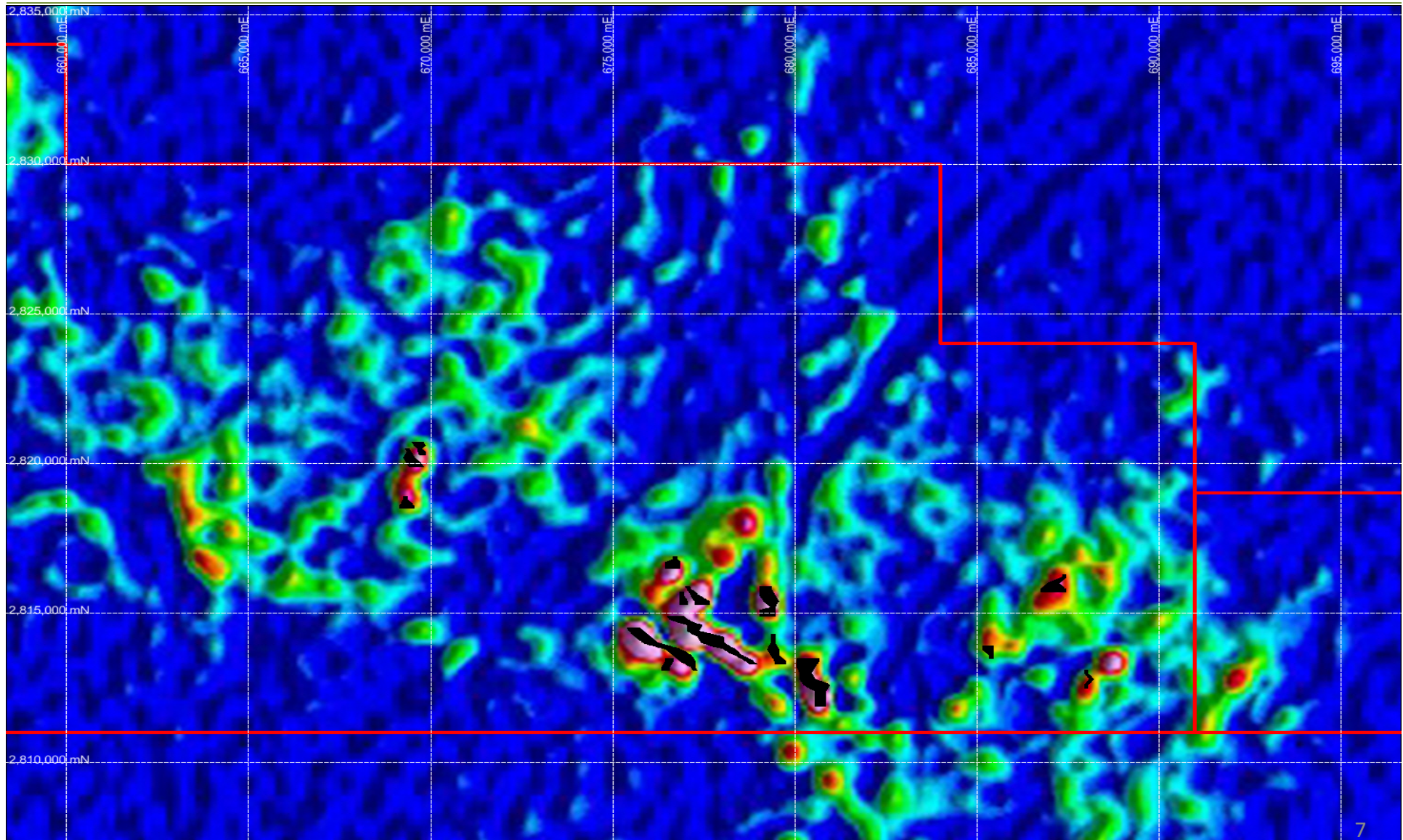
# Surficial uranium deposit

- Uranium mineral is yellow carnotite
- Host rock of weathered granite in this photo
- Locally very rich patches of mineralisation





# Resource zones associated with strong radiometrics



# Initial exploration

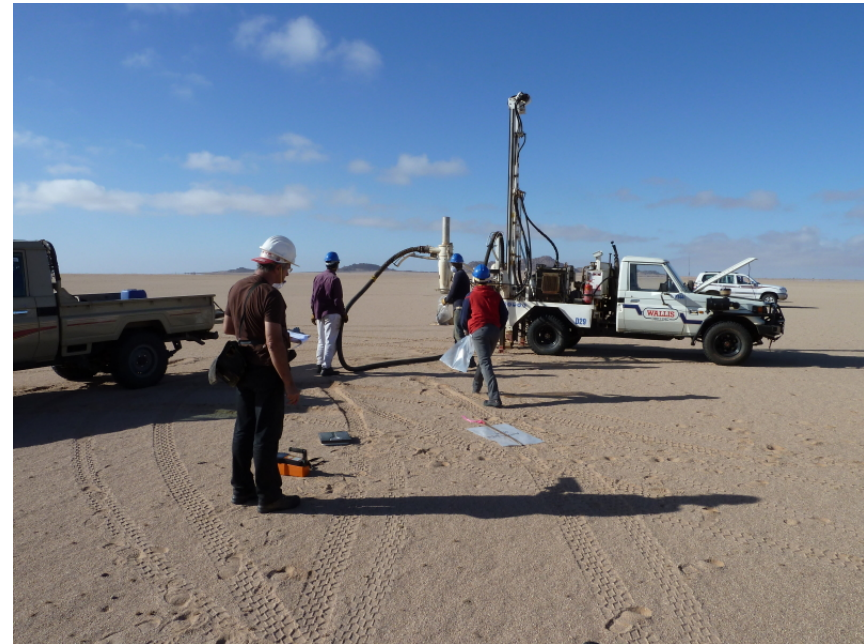
- 2008 discovery by reconnaissance and pitting
- Carnotite mineralisation at surface
- Or thin cover of wind-blown sand
- High grades of uranium in initial samples





# Drilling

- Three phases of drilling
- Aura has drilled 3,363 holes in the Project
- The majority of these are 5 metres or less in length because of the at surface nature of the mineralisation



# Many high grade intersections



*Examples of eight high grade intersections from Oued el Foule Zone A*

Hole ID	Easting	Northing	Intersection (m)	Grade (ppm U <sub>3</sub> O <sub>8</sub> )
10FEACA043	677009	2814805	2.5	1787
10FEACA142	680401	2812801	4	1409
10FEACA107	676901	2813402	3	1344
10FEACA046	677095	2814597	3	1341
10FEACG009	646398	2819198	3	1312
10FEACA024	679303	2815601	3	1193
10FEACA145	680394	2812597	3.5	1186
10FEACA078	676606	2813798	2	1081



# Resources

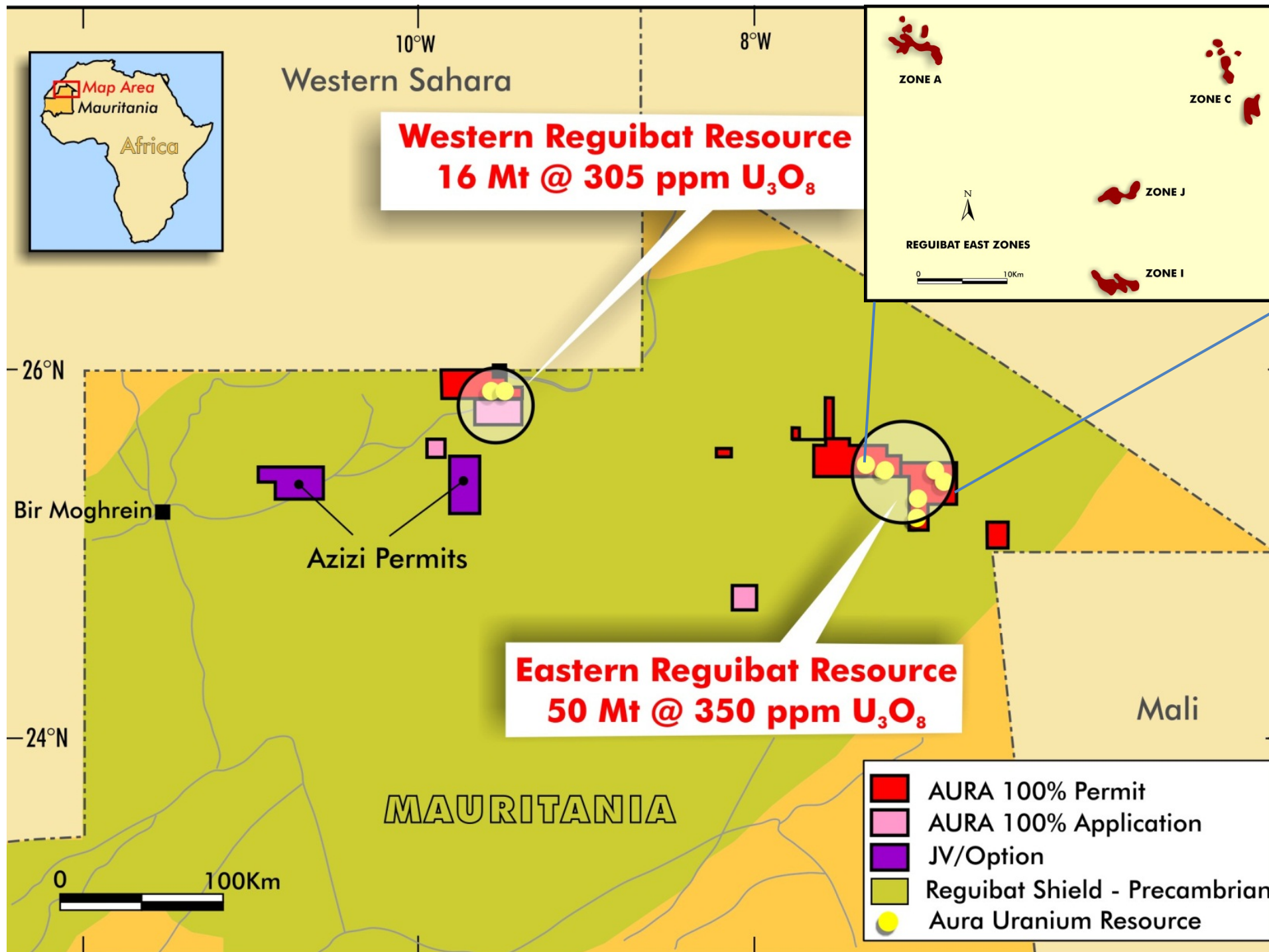


## *Indicated and Inferred Resources for the Reguibat Project at a 100ppm U<sub>3</sub>O<sub>8</sub> cut-off grade*

	Cut-off grade	Tonnes	Grade (ppm)	Mlbs. U <sub>3</sub> O <sub>8</sub>
<b>Total Indicated &amp; Inferred</b>	100	66	334	49
<b>Indicated</b>	100	2	300	2
<b>Inferred</b>	100	64	335	47

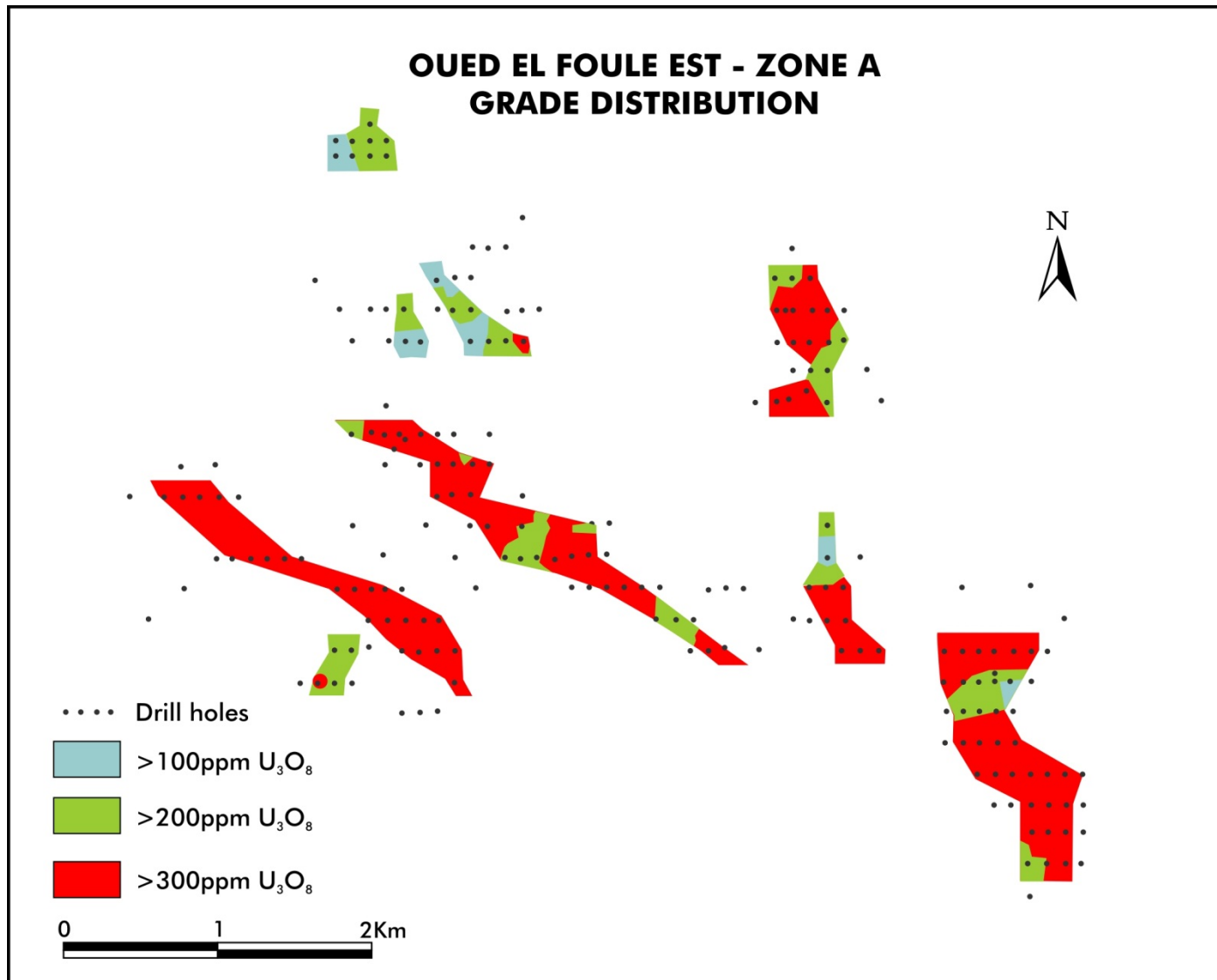
## *Indicated and Inferred Resources for the Reguibat Project at a 300ppm U<sub>3</sub>O<sub>8</sub> cut-off grade*

	Cut-off grade	Tonnes	Grade (ppm)	Mlbs. U <sub>3</sub> O <sub>8</sub>
<b>Total Indicated &amp; Inferred</b>	300	35	423	32
<b>Indicated</b>	300	1	389	1
<b>Inferred</b>	300	34	424	31

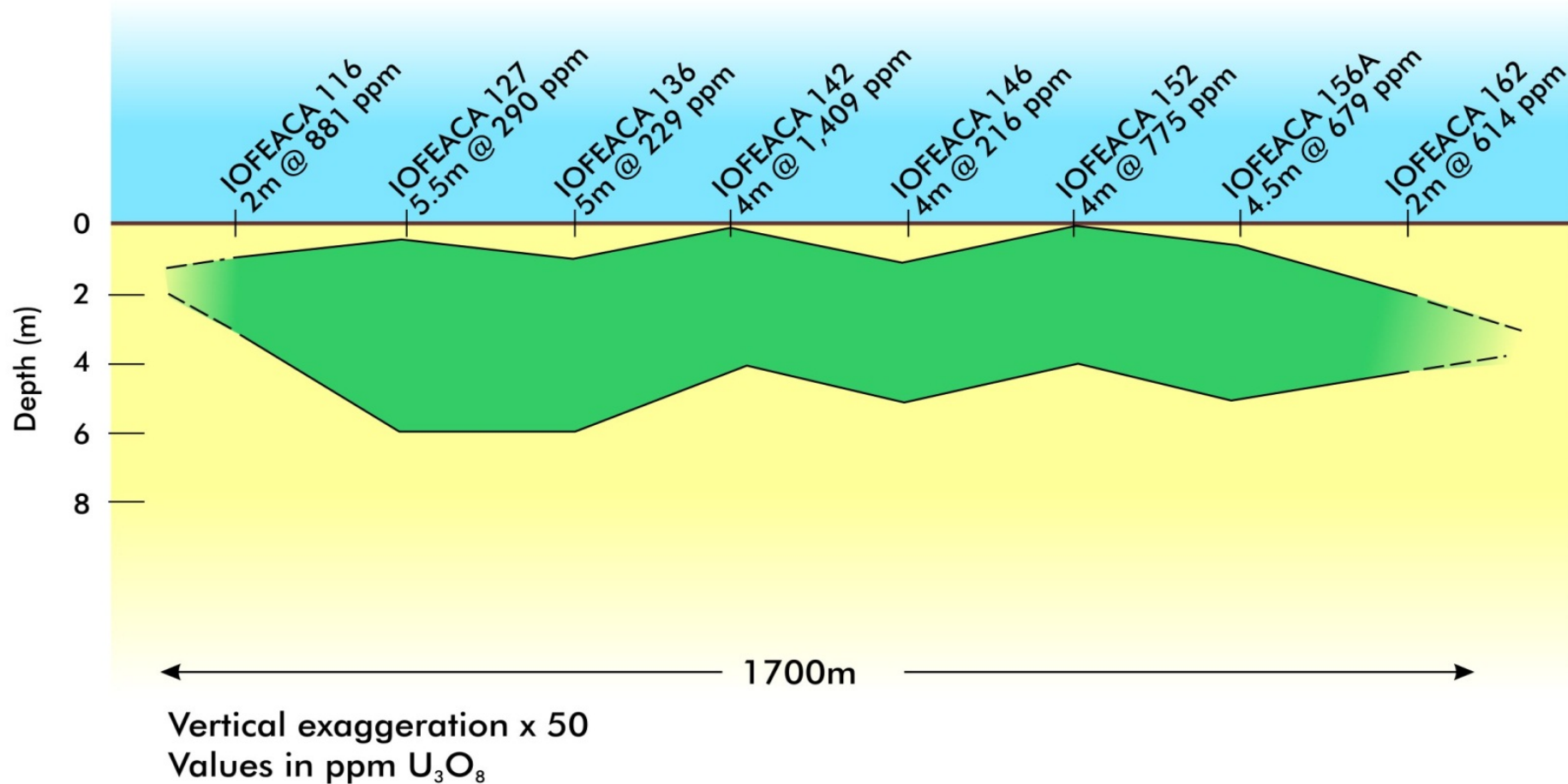




# Consistent areas at higher cut-off grades



# Local areas of high grade will give much higher head grade in first few years



**NE-SW SECTION, PART OF OUED EL FOULE ZONE A**

# Mineralisation at surface



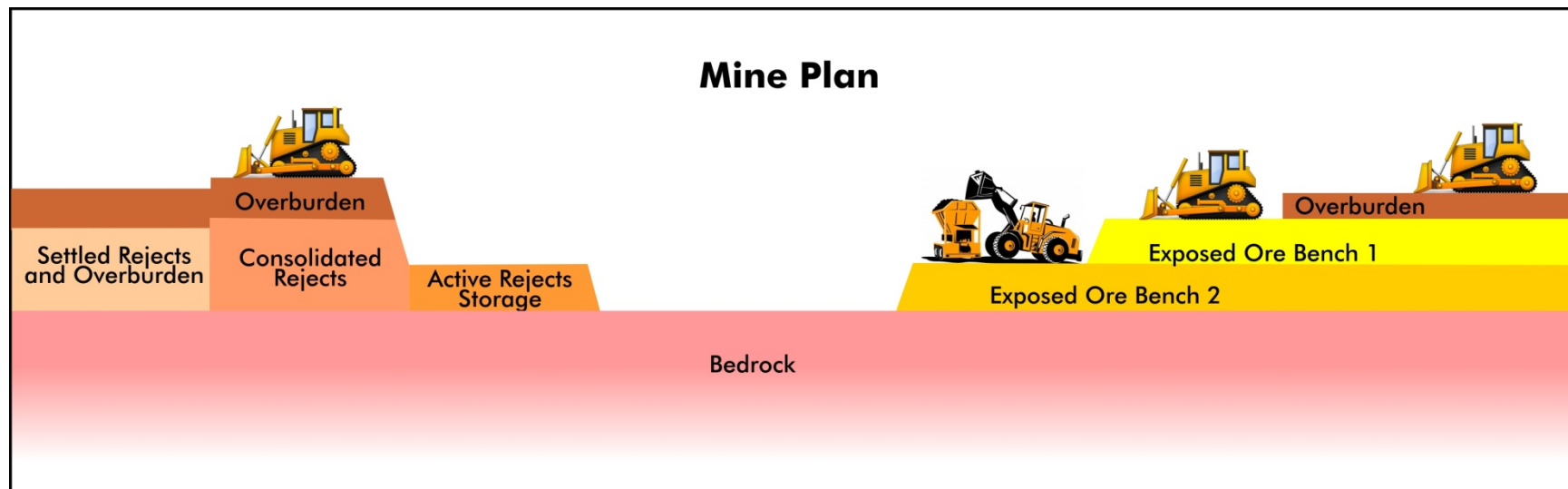
Free dig truck  
and shovel  
mining

Uranium Mineralisation  
- Carnotite



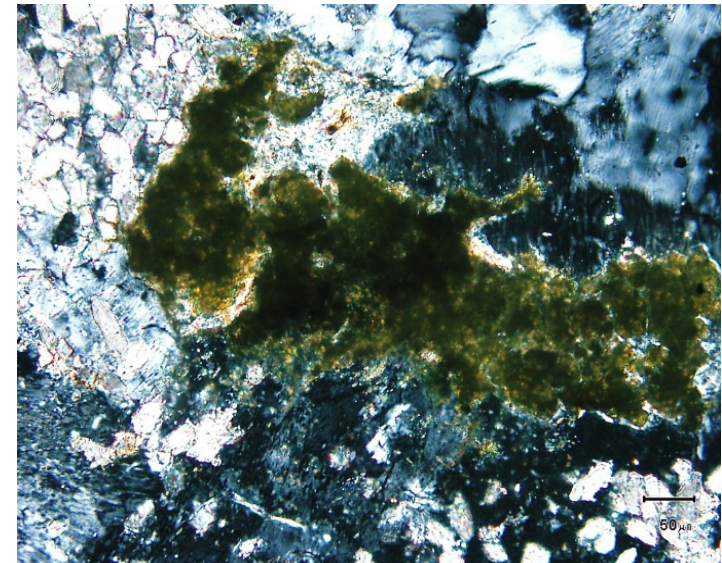
# Simple mine plan

## Rejects back in the pit

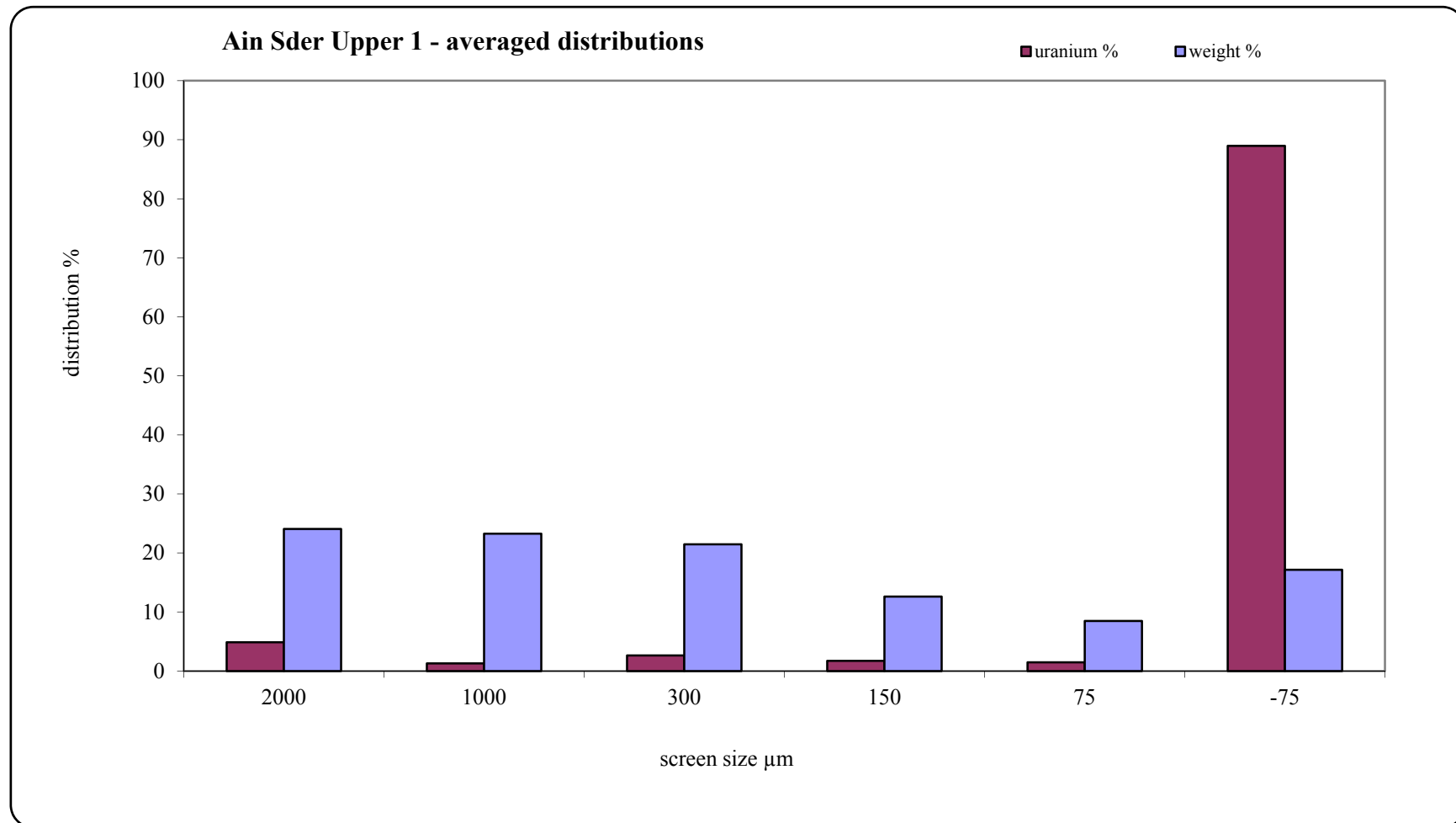


# Simple beneficiation increases the grade of the mineralisation by up to nine times

- Simple scrubbing and screening tests to remove coarse fractions of samples
- Exceptionally successful because of the very fine grain size of the uranium mineral carnotite and the coarse nature of the host rock
- 89% of the mass could be rejected, while retaining 86% of the uranium
- The average concentration of the product was 2,476ppm  $\text{U}_3\text{O}_8$ .
  - This represents an upgrade factor of 7
- Detailed mineralogy demonstrates that the carnotite occurs as extremely fine, liberated grains.
- The sulphate mineral content of the fine fractions was low.



# Concentration of uranium in the -75 micron fraction





# Rapid leaching of uranium concentrate

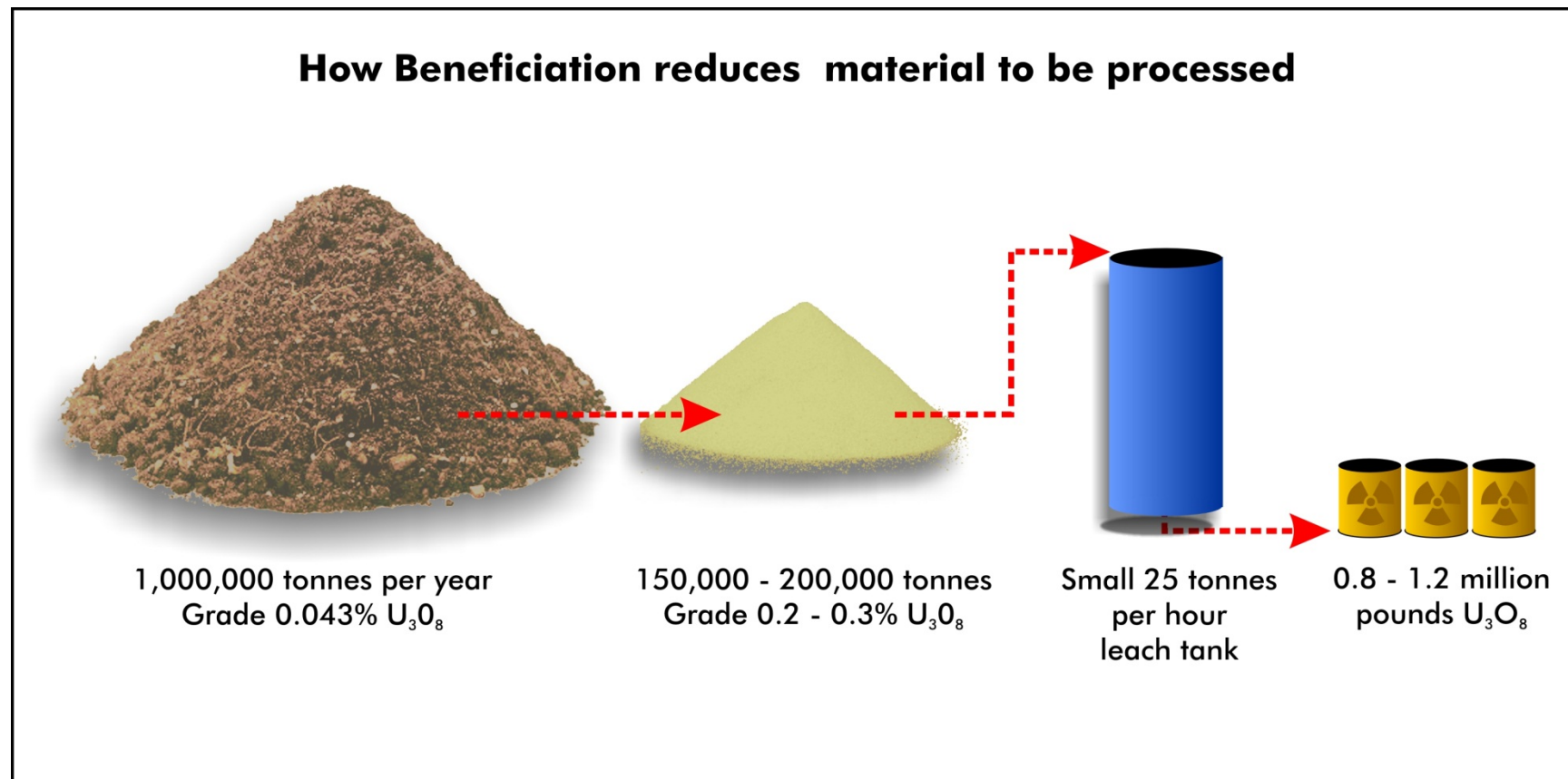
The beneficiated Reguibat material was leached independently at ANSTO Minerals using atmospheric alkaline leaching typical of industry conditions.

The first leach tests provided excellent results as follows;

- 94% uranium extraction within 4 hours
- Moderate reagent consumption given high feed grade of material
- Performed on a coarse composite sample of - 300 $\mu$ m
- Finer size fractions may see improved leach results
- By comparison Paladin's Langer Heinrich Project testwork indicated 92% extraction in 36 hours pre-development, and Lake Maitland 24 hours



# Simple process flow sheet concept



# Scoping Study nearing completion

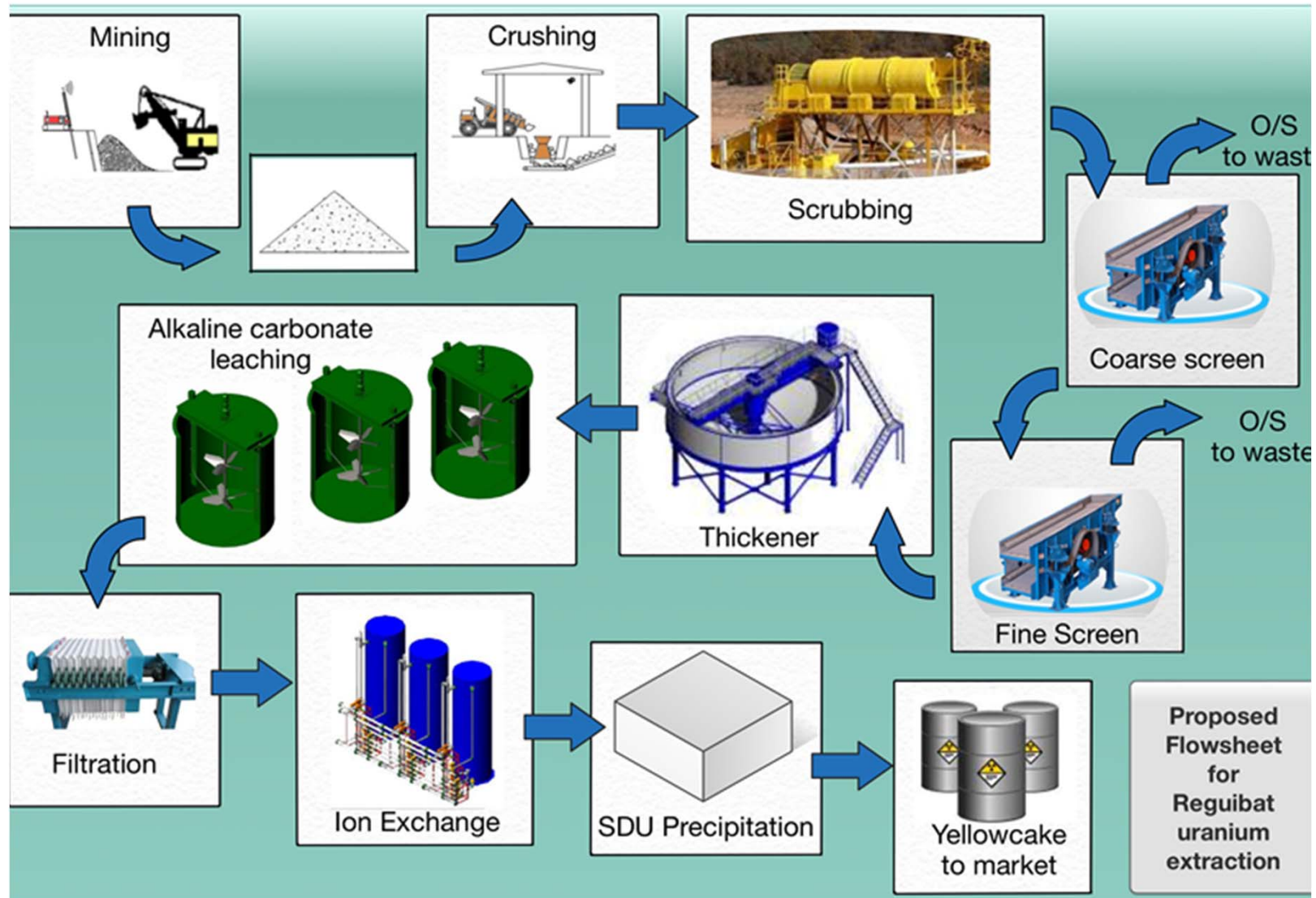
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- Tenova Mining & Minerals: Process flow sheet, capital cost, and operating costs validation
- ANSTO Minerals: Leach testwork
- Metcon Ltd: Beneficiation
- Coffey Mining Ltd: Mineral resources
- Golder Associates: Water supply
- Ian Wark Institute: Mineralogy
- Pontifex and Associates: Mineralogy



# Detailed flow sheet



# Reguibat Project Concept

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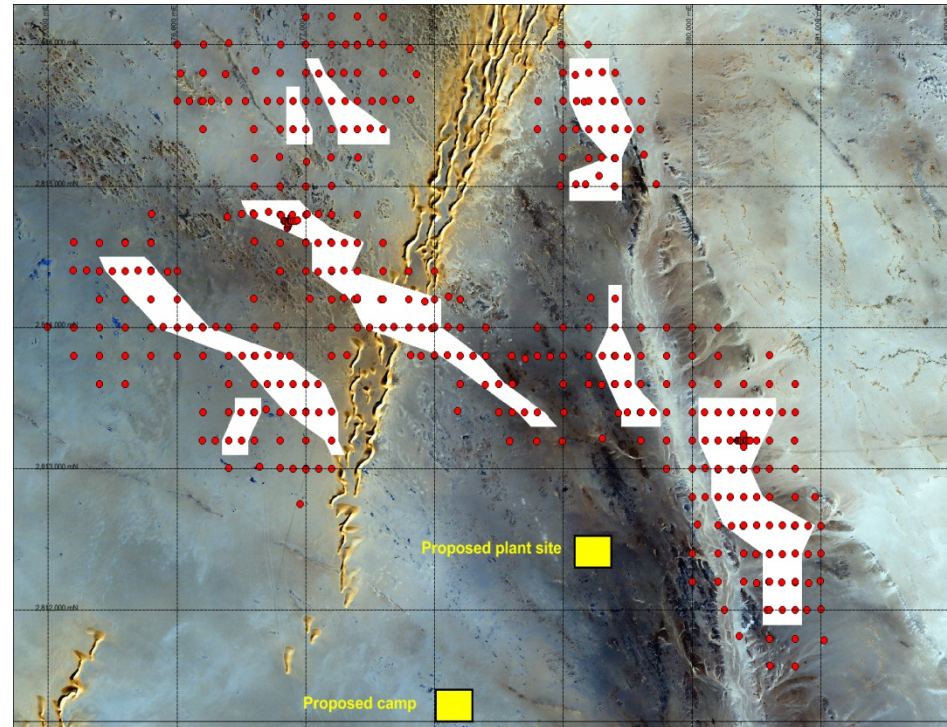


- High volume shallow mining potentially using trucks and shovels
- Approx. 120 tph (1.0 Mtpa)
- Small relocatable beneficiation plant
- Small central leach facility ~ 25 tph
- Mined grades of ~430ppm  $U_3O_8$  for 15 years
- Processed grade ~2,600ppm  $U_3O_8$
- Produce 0.7-1.3 Mlbs  $U_3O_8$  per year
  
- Maintain smallest possible project footprint
- Minimise water use with dry sizing if possible
- Explore processing beneficiated material elsewhere

# Capital costs minimised for this flow sheet



- Simple and well tested technologies
- No grinding
- Small leach plant
- Target <\$50 million capex
- Comparable capital cost to ISL operations of a similar scale

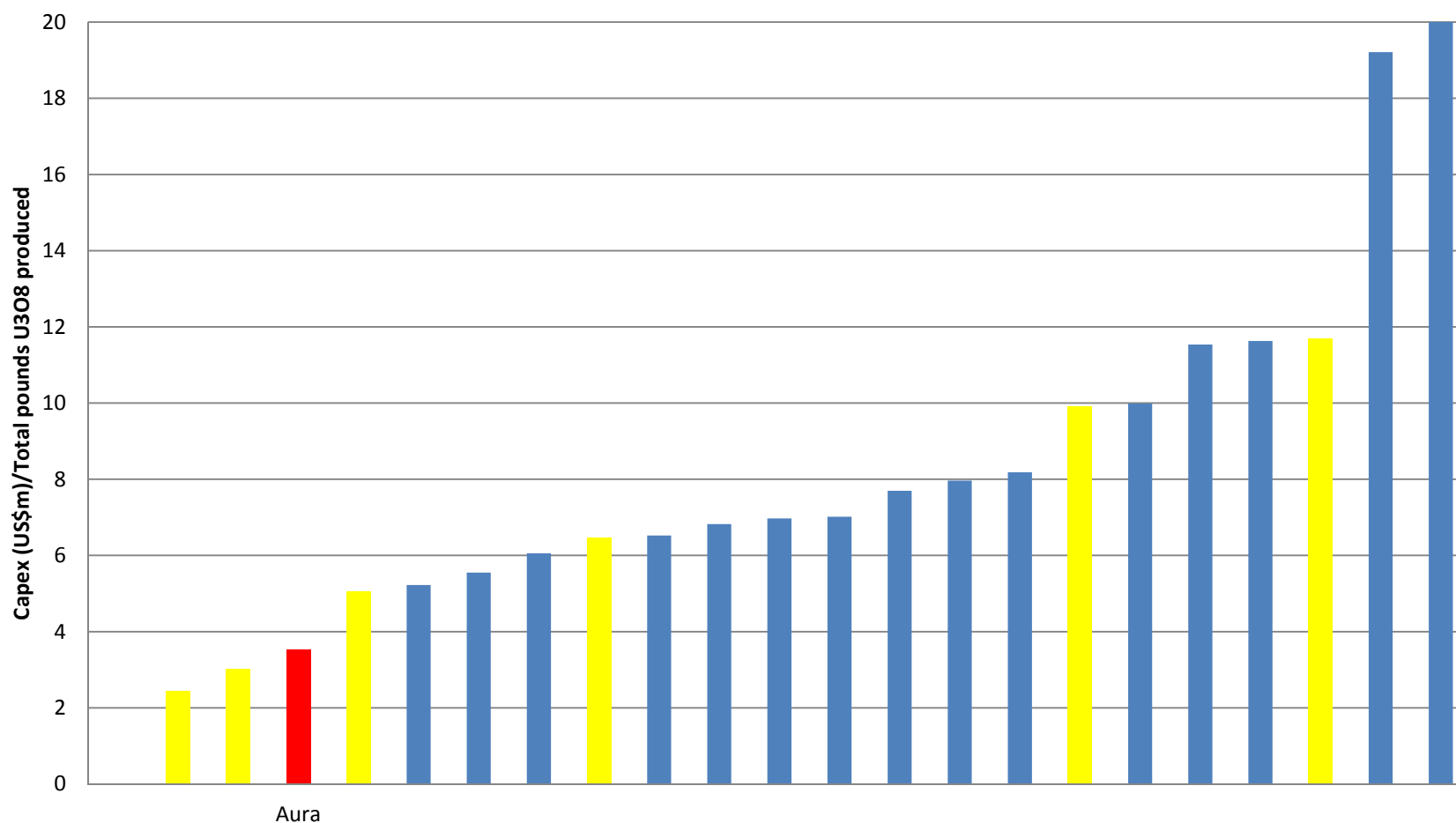




# Target capital cost to proposed ISL operations of a similar scale assuming a \$50m capex



Initial capital cost per pound of LOM production



# Future of the Project

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- Scoping Study completed in the next two weeks
- Moving into Feasibility Studies
  - Measured and Indicated resources
  - Detailed beneficiation testing
  - Leach testing of uranium concentrates
  - Water drilling
  - Commence process for Exploitation Permit
- Decision to mine in 12-18 months subject to funding
- Target production early 2017
- Convert known anomalies to achieve a 100Mlb uranium resource

# Reguibat Project, Mauritania

