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From kicking rocks to PFN, the exploration and the technology, UXA's approach to finding uranium

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Managing Director

The AusIMM, Sydney Branch
16 February 2011

www.uxa.com.au
ASX: UXA

What differentiates UXA from other junior explorers?

- The Technology– GAA Wireline
  - Geohysical borehole wireline logging company operating in Australia and the United States of America
  - Ownership of unique uranium logging technology – PFN
  - Managed separately from exploration
  - Business model - excess cash generated to support exploration programs

- The Rocks - Diversified Exploration Portfolio
  - Uranium - REE exploration projects in NT and WA
  - Base metal exploration SA and NSW
  - Important uranium JV with Reliance Industries

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GAA WIRELINE – The Technology

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GAA WIRELINE *(formerly Geoscience Associates Australia)*

- Geophysical borehole logging company purchased by UXA in October 2009
- State-of-the-art logging technology with clients in the coal seam gas, coal, iron ore, geothermal and uranium sectors
- Fleet of borehole logging trucks servicing the domestic mining & exploration industry
- Operates as an independently managed contracting business from Mt Barker SA
  - Workshop and technicians at Mt Barker to service and build probes
  - Base in Rockhampton to service SE Queensland coal –c.s.g. industry
- Prompt Fission Neutron (PFN) technology purchased by UXA January 2010 – specialised uranium logging tool
- US logging business purchased December 2010

GAA WIRELINE

PROMPT FISSION NEUTRON (PFN)

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- Unique borehole logging tool provides immediate and fool-proof uranium analysis within the borehole by using neutron activation to measure ^{235}U
- Overcomes problem of uranium disequilibrium prevalent in sandstone-hosted U deposits extracted by in-situ leach – **accounts for 36% of world U production**
- PFN used in discovering Australia's most recent uranium mine – Beverley – and the Four Mile mine development in South Australia and is in daily use at a number of uranium projects in the USA
- **PFN technology is owned 100% by UXA and is available from GAA Wireline, an independently managed borehole logging company, a wholly owned subsidiary of UXA**

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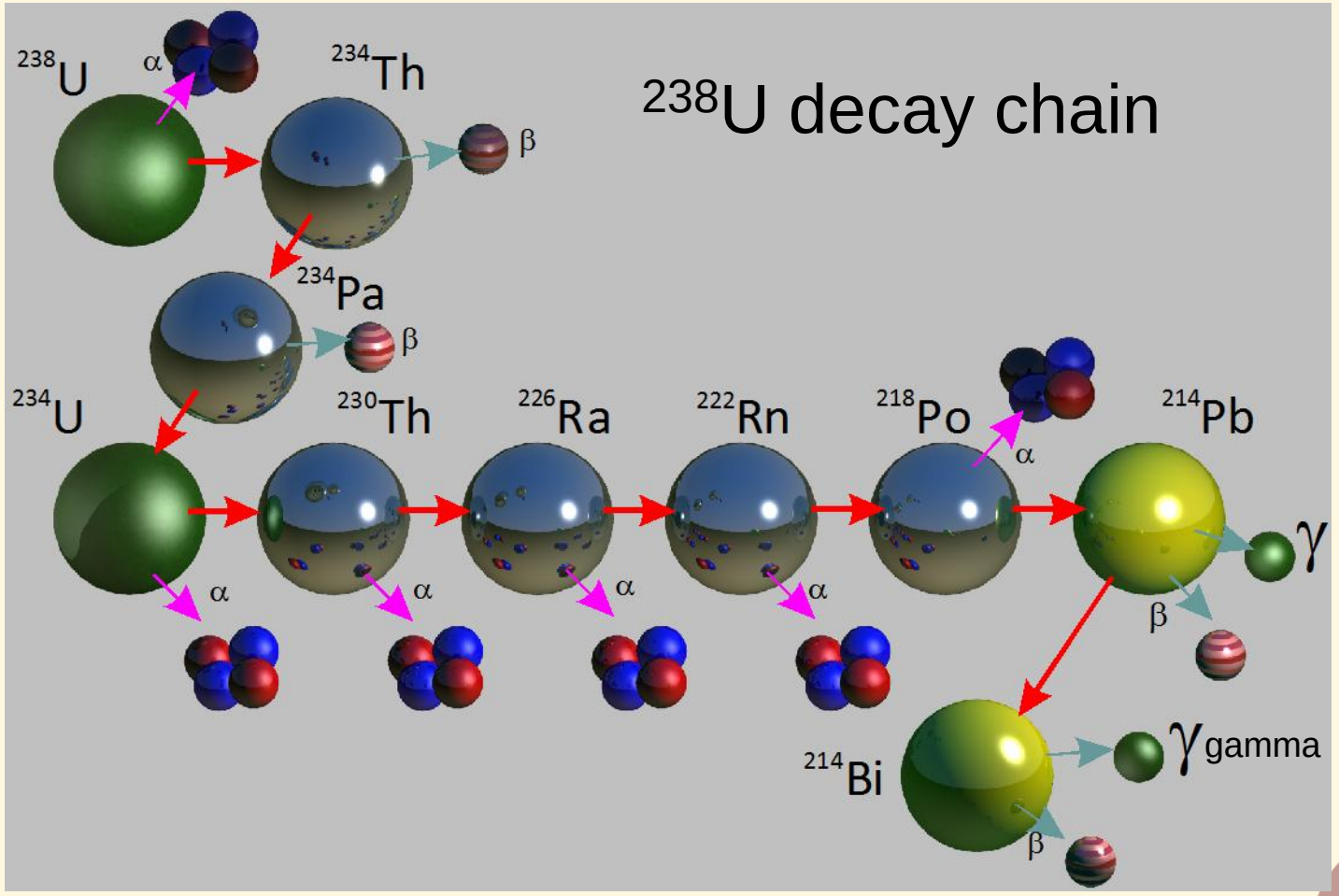
Conventional Gamma logging detects daughter products



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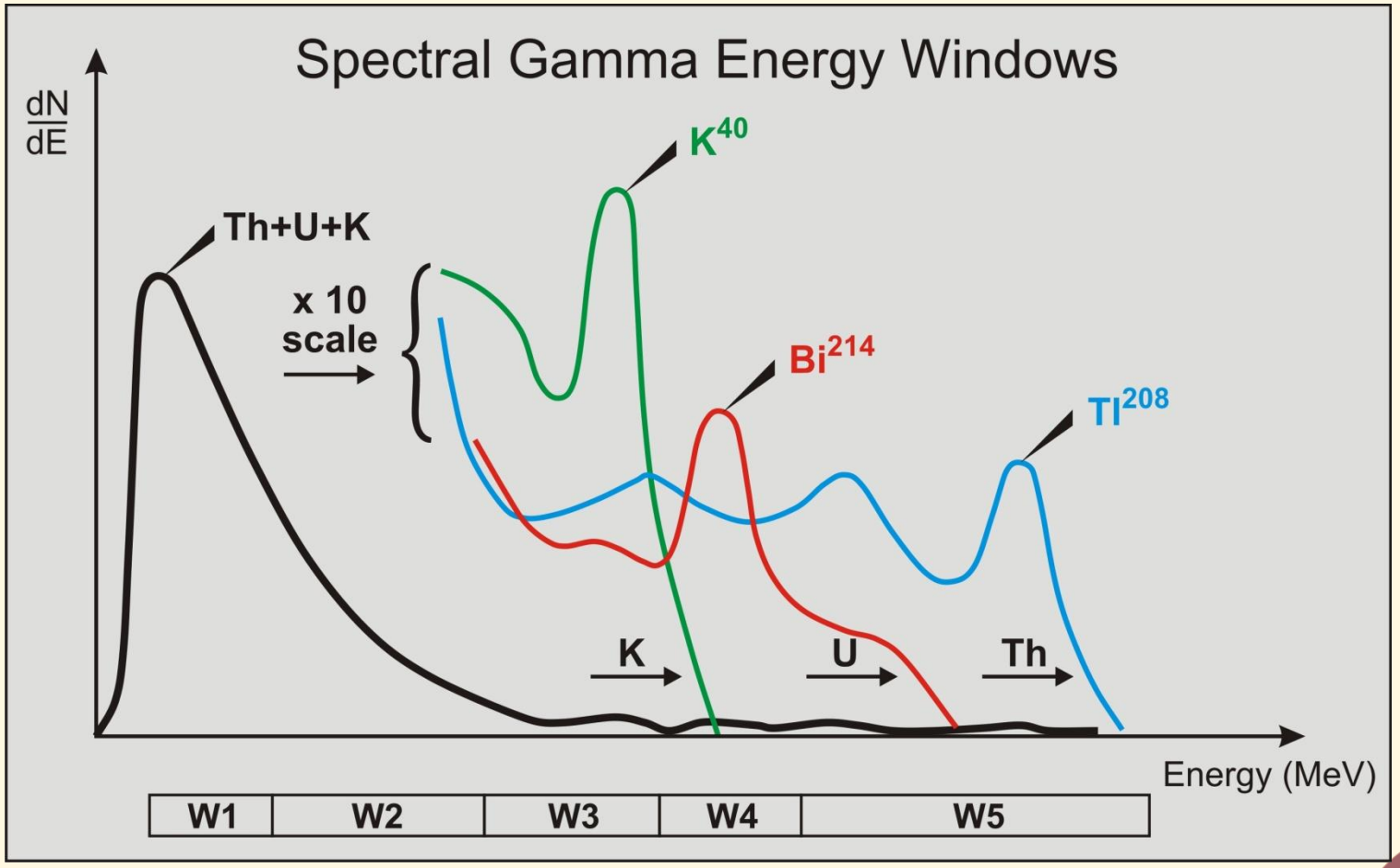
Spectral Gamma Logging



Spectral gamma energy windows typical of airborne radiometric surveys, hand-held spectrometers and downhole gamma tools

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Gamma Logging

- Total Gamma includes gamma radiation derived from the decay of isotopes of Potassium, Thorium, Lead and Bismuth
- Spectral Gamma uses energy windows to differentiate the origin of each gamma particle: e.g. most airborne radiometric surveys
- Spectral Gamma tools measure the daughter products of the decay chain of ^{238}U to determine Uranium grade
- Both Total Gamma and Spectral Gamma tools suffer from **disequilibrium** inherent in some types of uranium deposits, principally Sandstone-hosted U deposits, which account for 36% of world U production.

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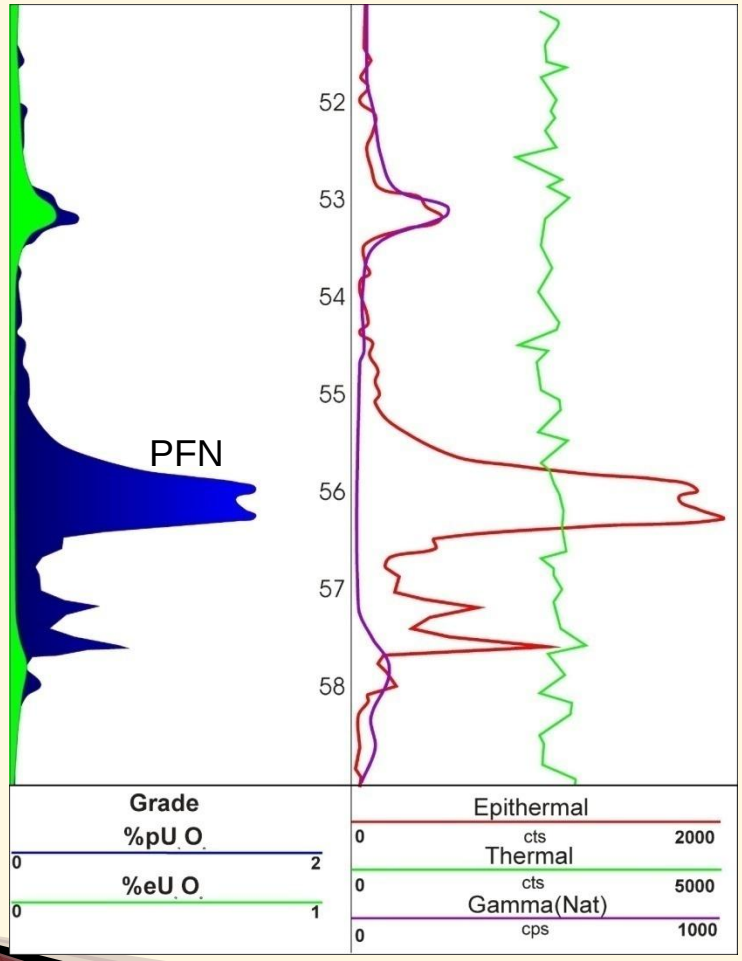
PFN and Gamma logging
The Disequilibrium Problem



Many uranium deposits are too young for the gamma emitting daughter elements to be in equilibrium with uranium (rule of thumb: *7 half lives of the longest living daughter element = 560,000 years*)

Uranium may also have migrated away from its daughter elements by chemical action – moving ground waters

Gamma, in this example, “misses” a significant zone of uranium

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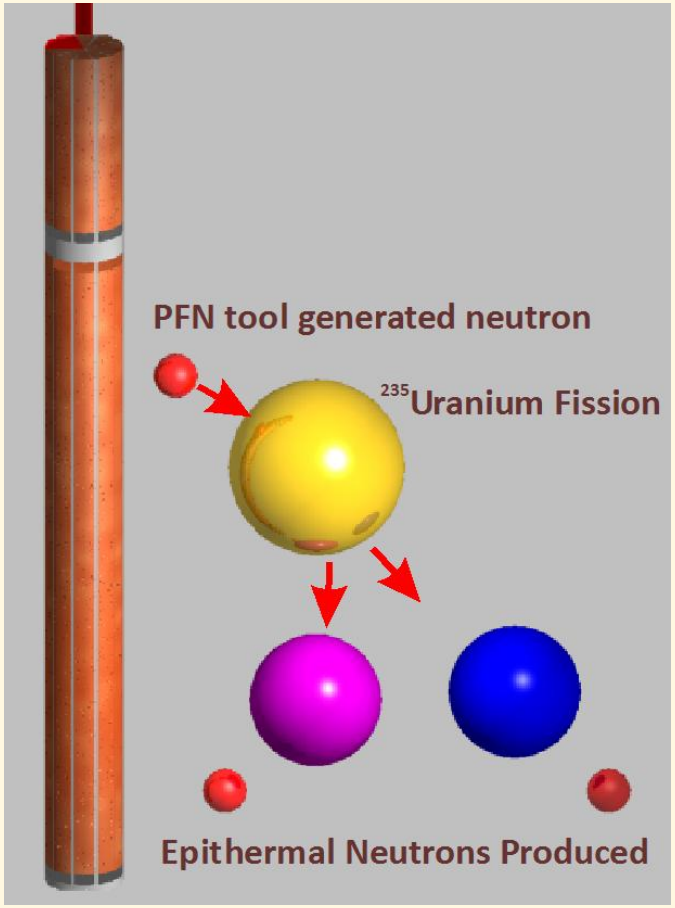
PFN tool uses neutron activation



- PFN tool creates very fast neutrons (14MeV) and fires 10^8 neutrons per second
- Neutrons are slowed (Thermal) by collisions with the rock
- The generated neutrons collide with ^{235}U and splits the atom (Fission)
- Fast (Epithermal – 2MeV) neutrons are produced
- PFN measures the ratio of epithermal(fast) and thermal(slow) neutrons

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Uranium Isotopic Equilibrium

- ^{235}U is the only fissile material in the natural environment
- The Ratio of Epithermal to Thermal Neutrons is proportional to ^{235}U
- Uranium is in Isotopic Equilibrium
  - 0.72% ^{235}U
  - 99.27% ^{238}U
- Therefore % U_3O_8 may be deduced from PFN results directly

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Quantum Physics and ^{235}U

- How does a thermal neutron "find" ^{235}U, only 0.7% of uranium atoms?
- At different thermal energies (speeds) the "size" of the target nucleus varies:
  - ^{235}U is "seen" as up to 10^6 times larger than the ^{238}U nucleus
    - *Analogy – the size of the target changes depending on the speed of the arrow fired at it.*

  - Cl is "seen" as 5 times as big as U – which explains the problem with PVC piping and very saline ground waters

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PFN Calibration

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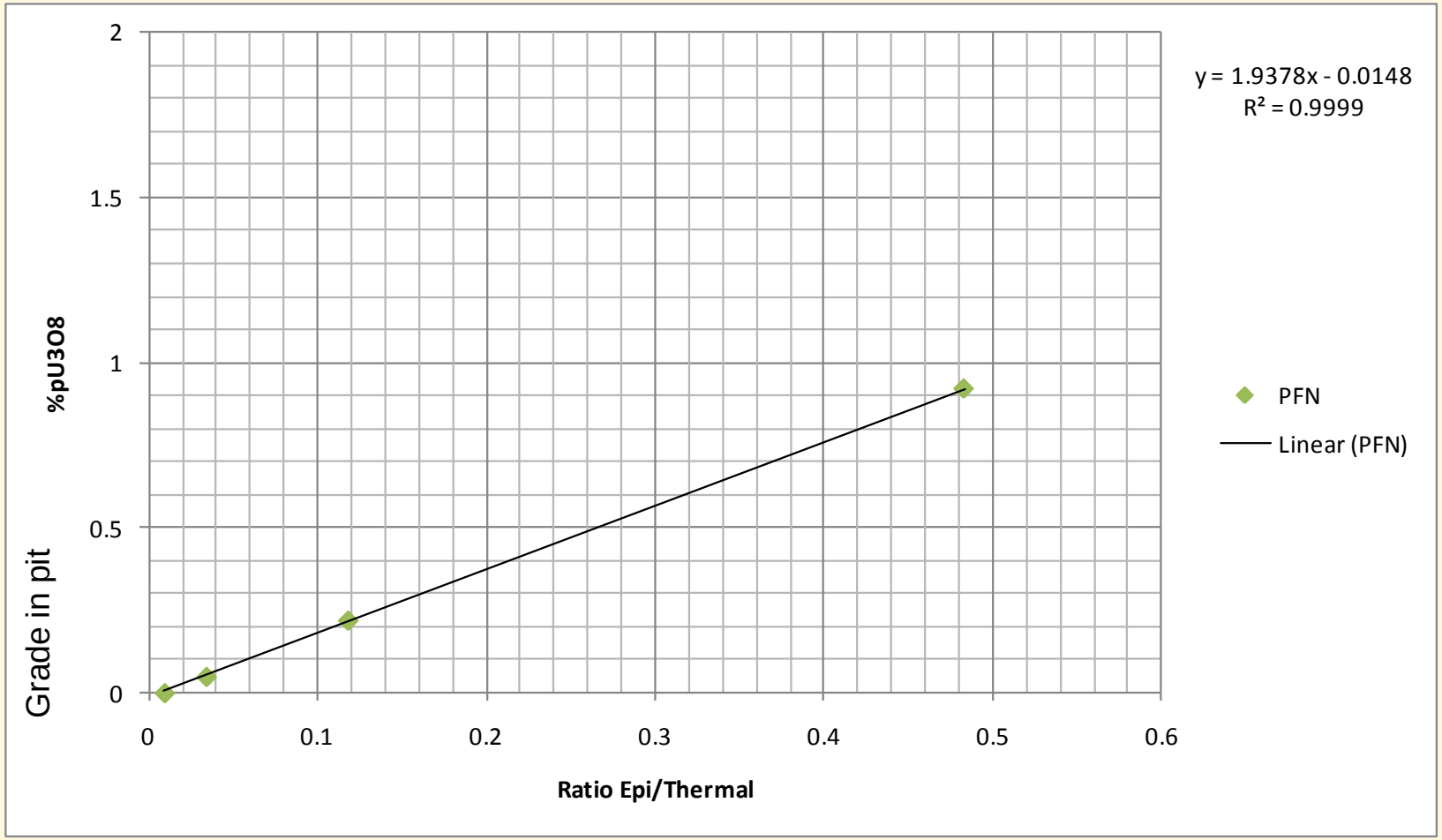
- Calibration at AMDEL facility run by DWLDC in Adelaide
- Three pits of various grades of U_3O_8
- Barren zone also recorded
- Hole Correction Pit – calibration for three different hole diameters
- Both Gamma and PFN components of the tool are calibrated in these pits

Many mine sites have their own calibration pits

PFN Calibration – GRADE U_3O_8



- Multiple runs are used to check repeatability and ascertain a ratio of epithermal/thermal for a particular known grade of U3O8

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PFN Calibration

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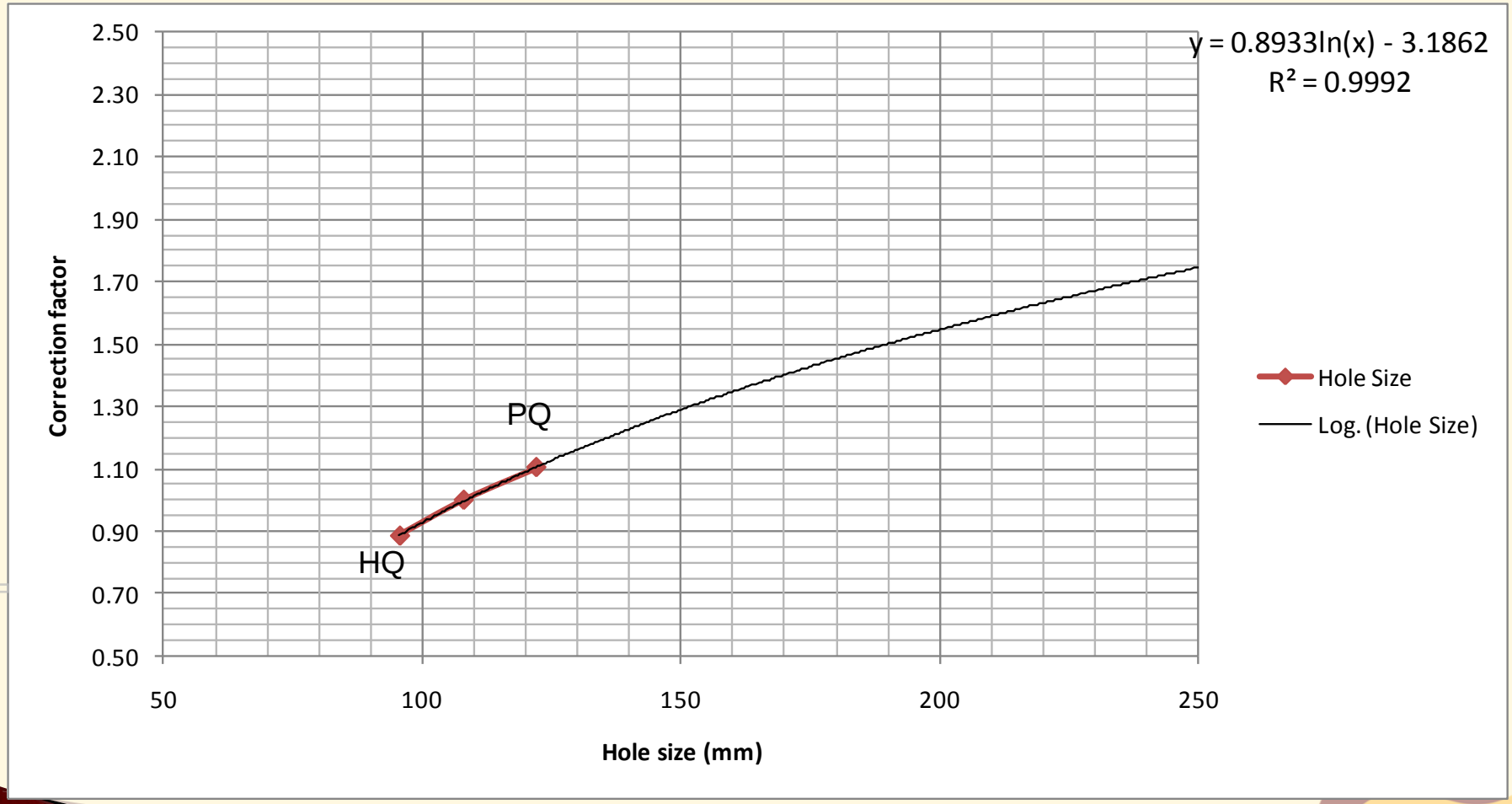
- Corrections for wet/dry hole situations
  - Dry holes decrease correction factor. Difficult to provide quantitative results due to hole rugosity
- Aquifer fluid correction factor
  - Higher salinity – higher correction factor
- Porosity
  - Higher porosity = higher aquifer fluid
- Drill hole size correction

PFN Calibration – Hole Size Correction



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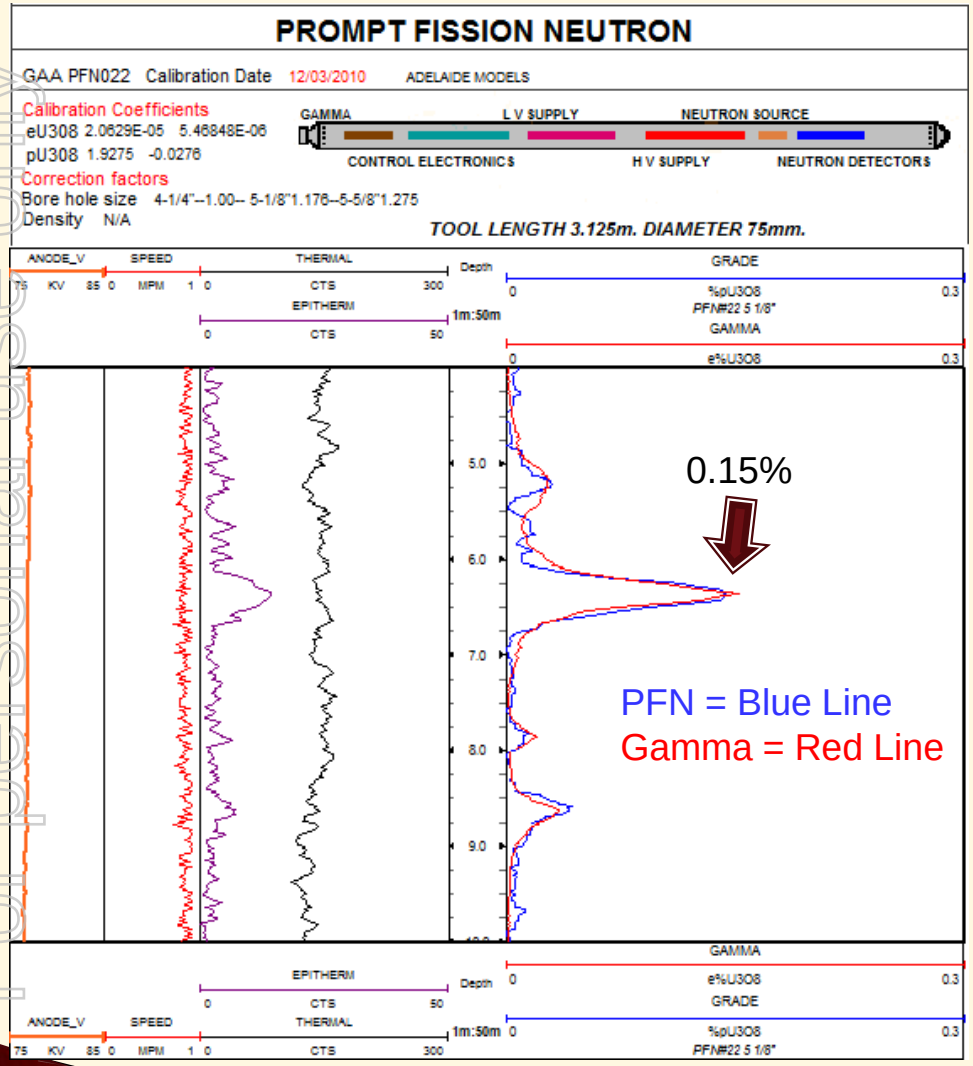
Log of U in Equilibrium



In this example, Uranium and its daughter products are in Equilibrium

U Grade from gamma logging is denoted as “% eU3O8”

U Grade from PFN logging is denoted as “% pU3O8”

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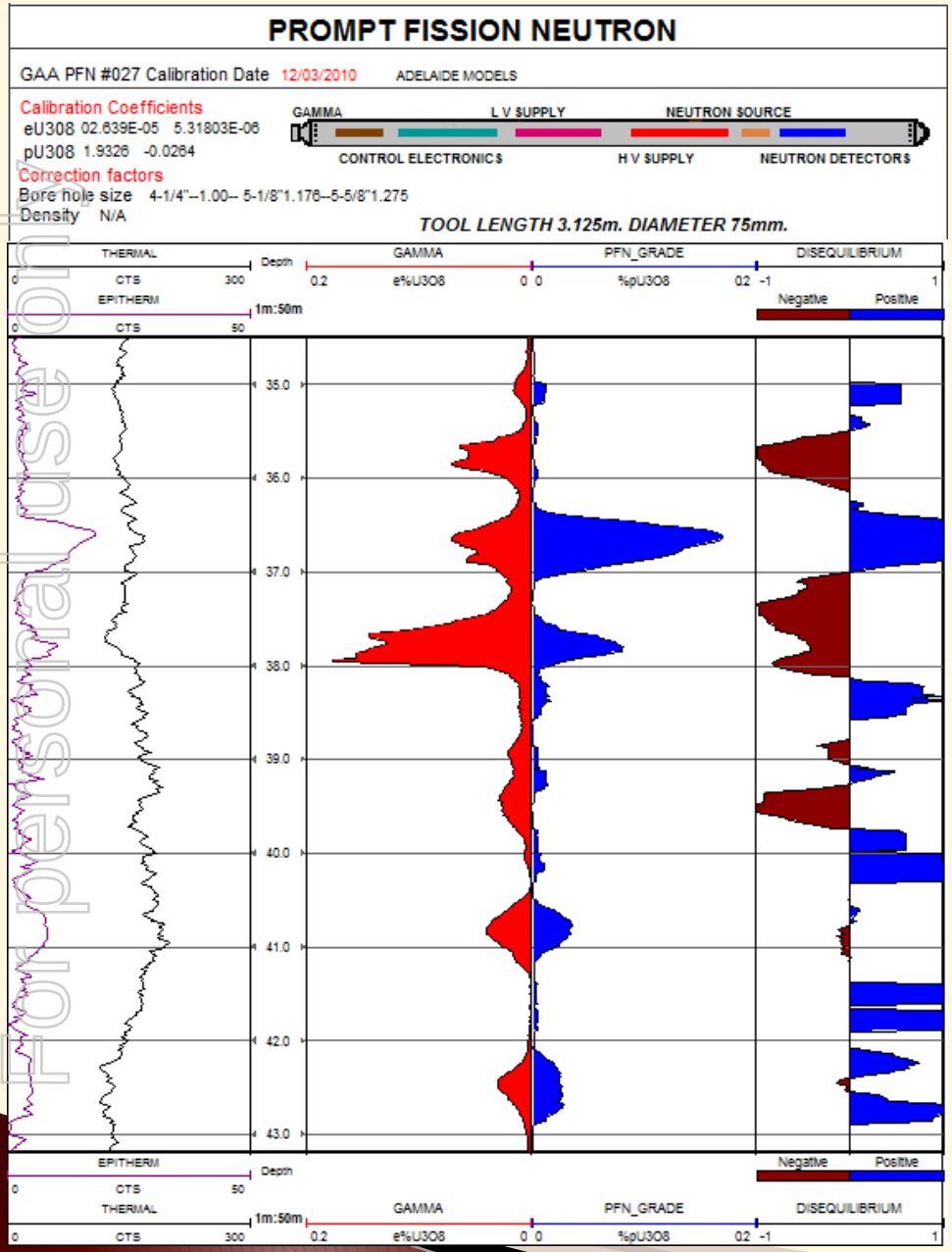
Log of U in Disequilibrium



An absence of Uranium occurs at a gamma peak at 35.8m

This log demonstrates the necessity of PFN in defining uranium, and in quantifying the amount of uranium.

Note the “Negative” or “Positive” Disequilibrium in the right hand column

PFN = Blue Line
Gamma = Red Line

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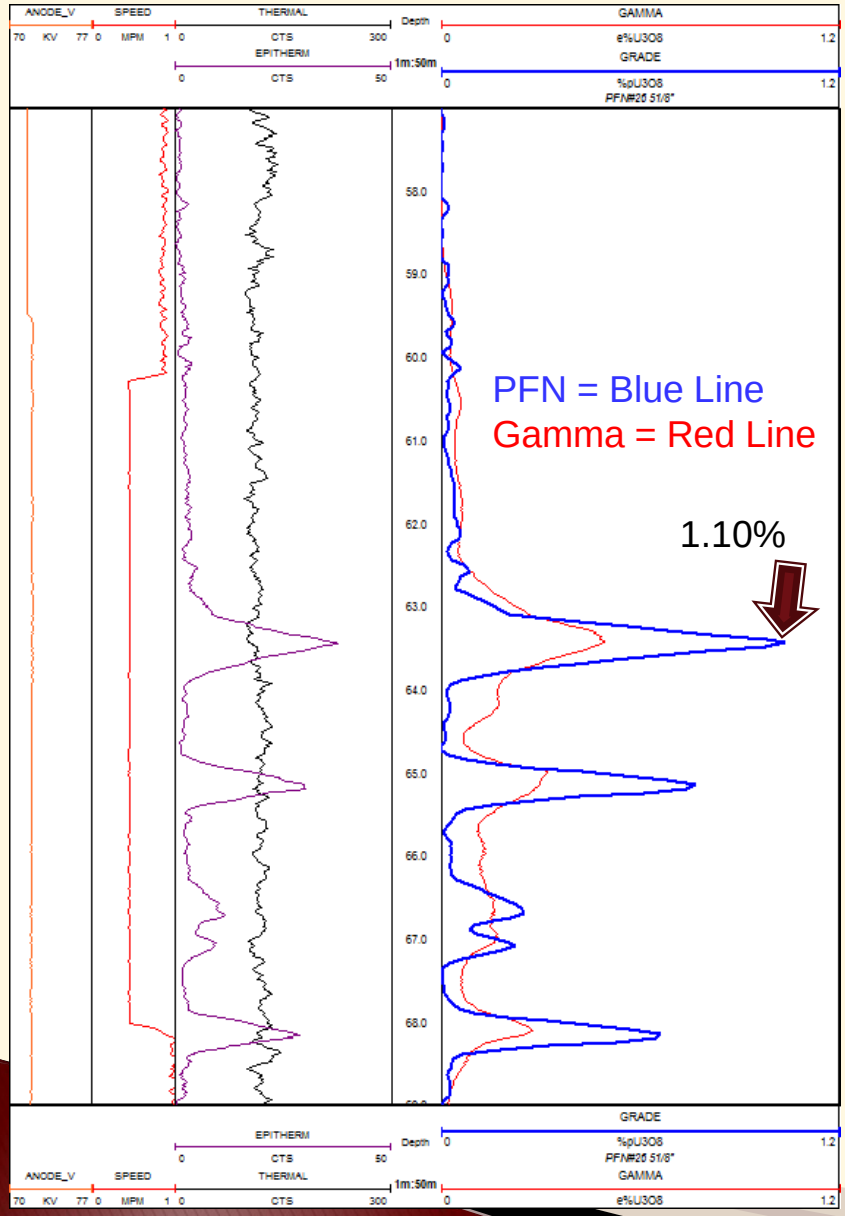
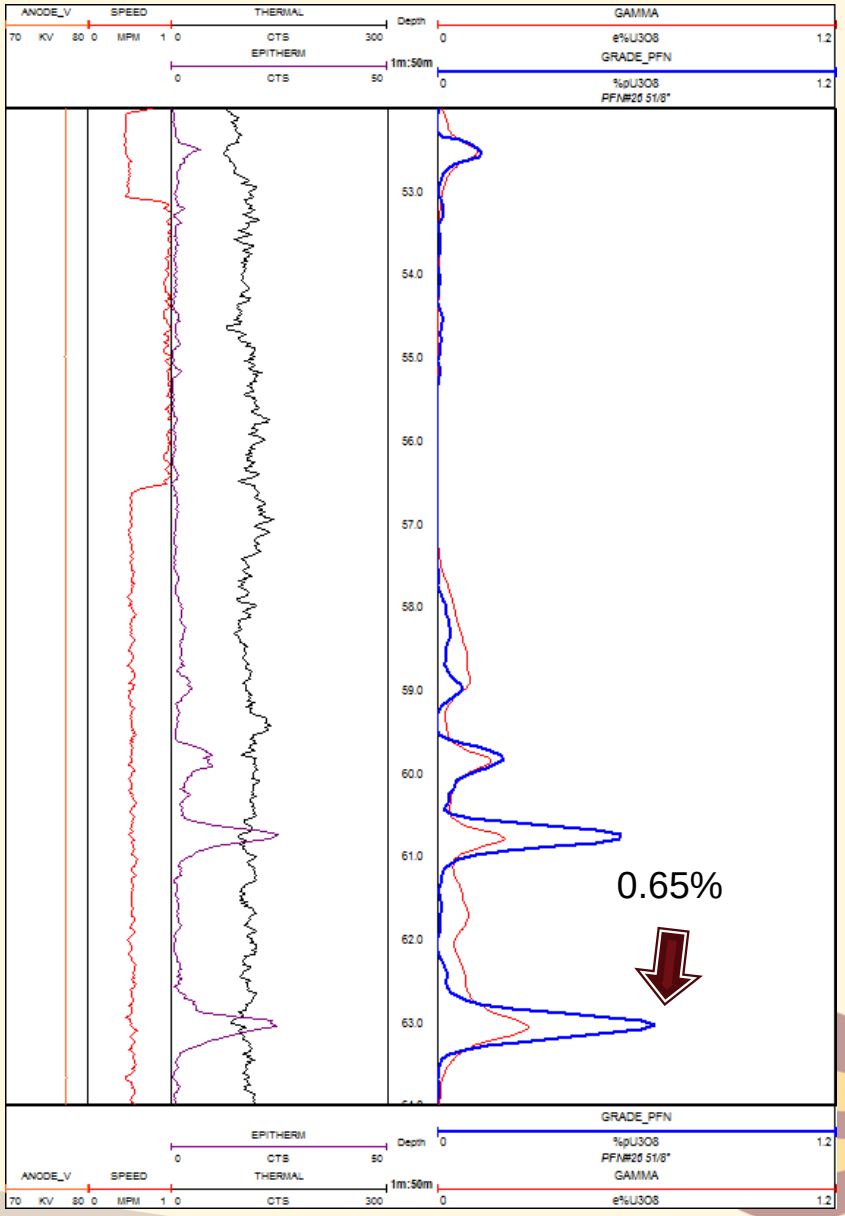
High Grade Results (~1% U_3O_8)





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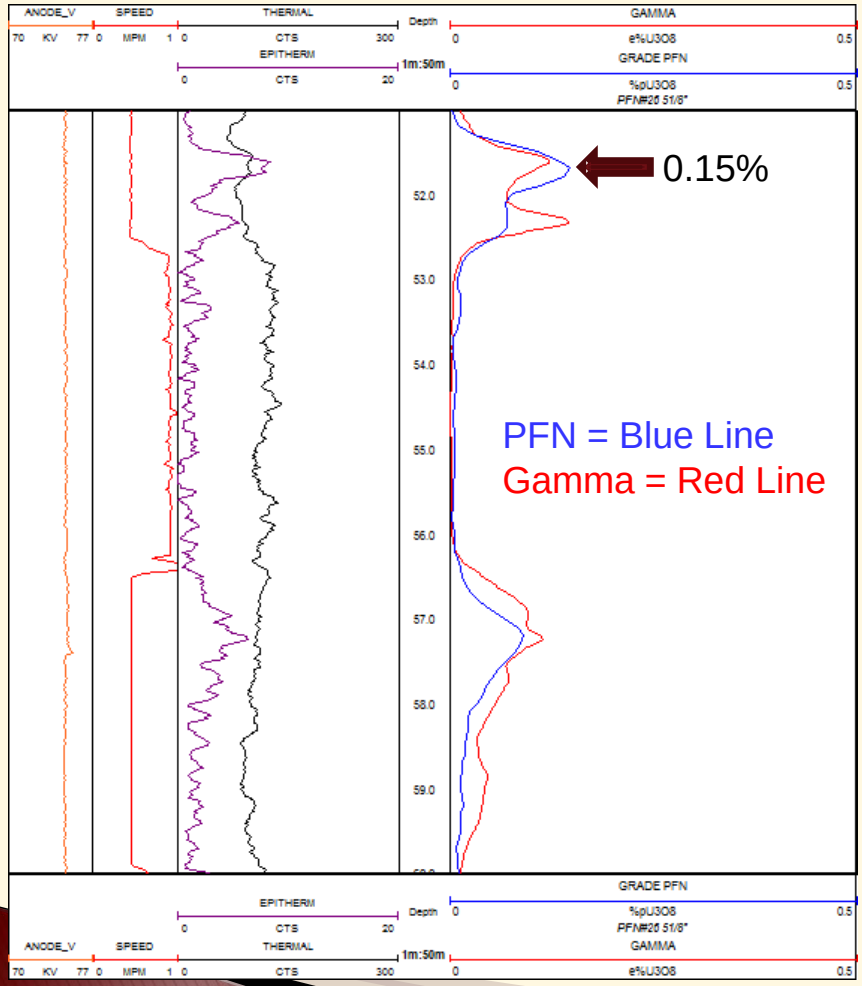
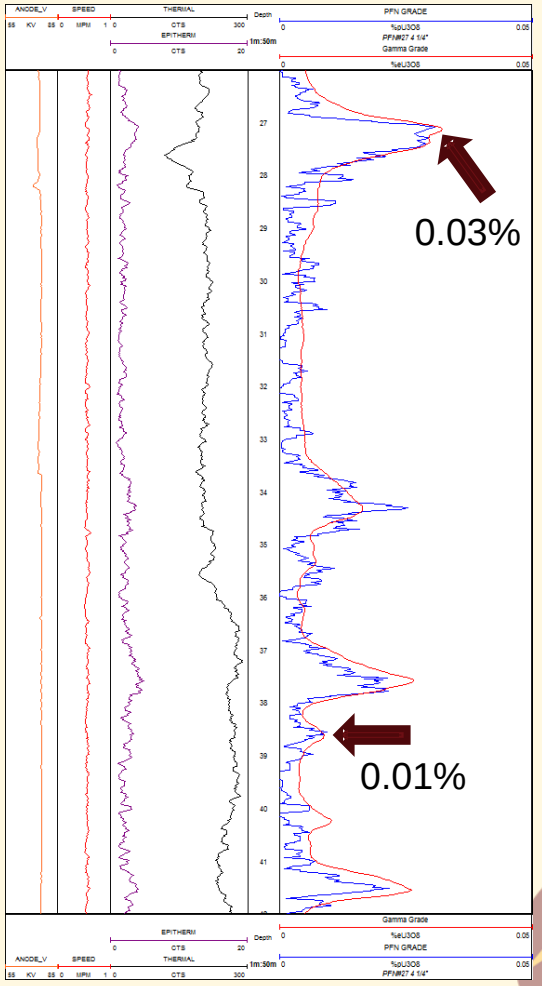
Low U Grade – PFN Performance

Uranium from a Tertiary Basin deposit



Low grade Uranium in a hard rock environment



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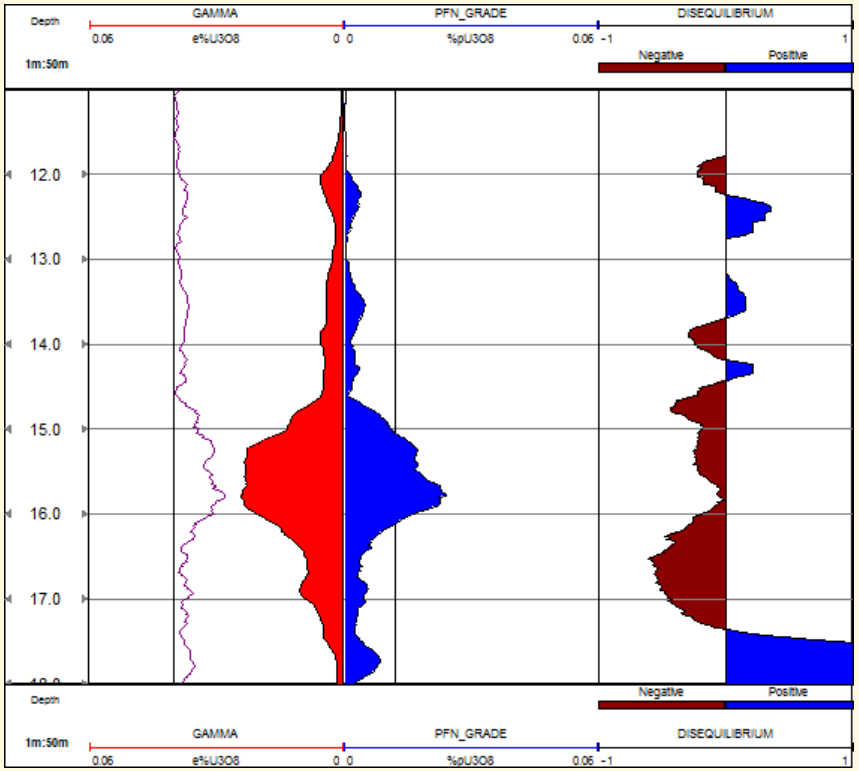
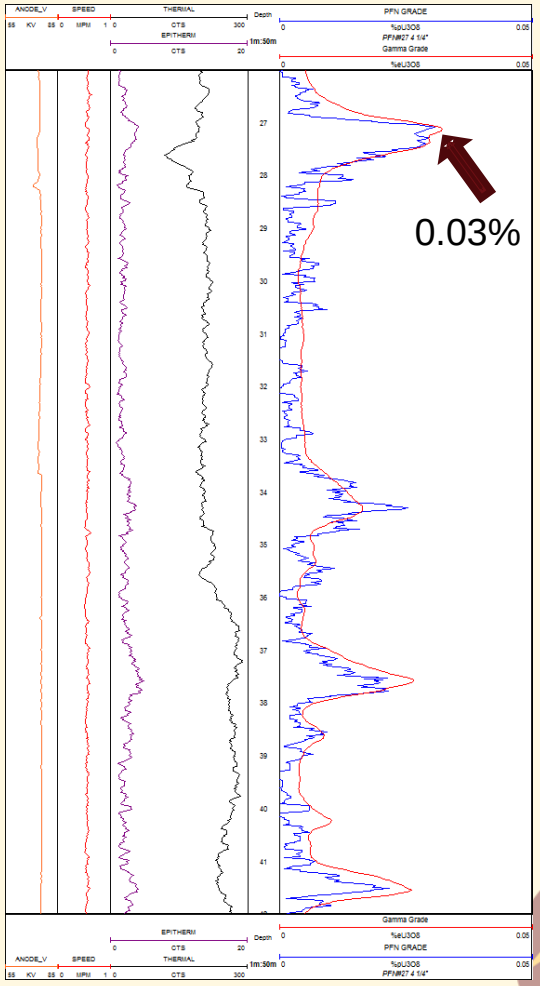
Various Geological Environments

Uranium from a calcrete hosted deposit
Fluctuating groundwater causes disequilibrium



Low grade Uranium in a hard rock environment - equilibrium



PFN = Blue Line
Gamma = Red Line

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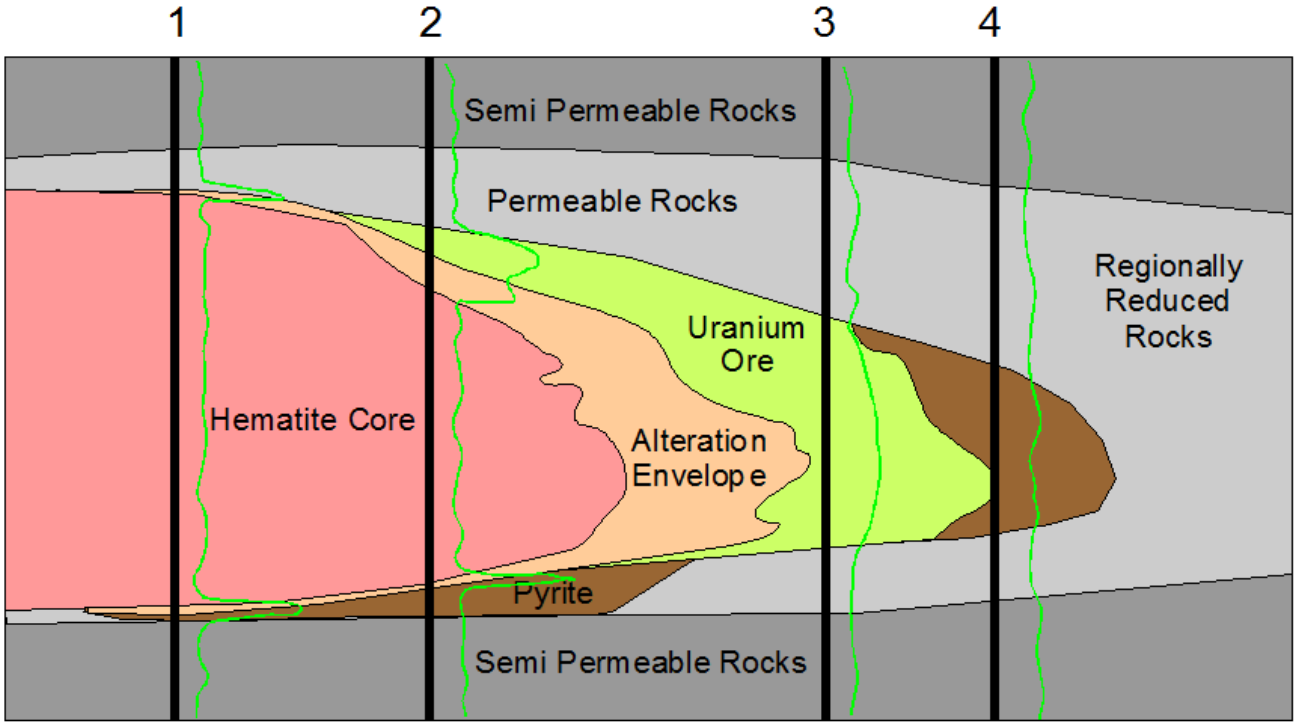
Roll Front Geology Gamma Log



Gamma log alone does not reveal a true picture of U distribution

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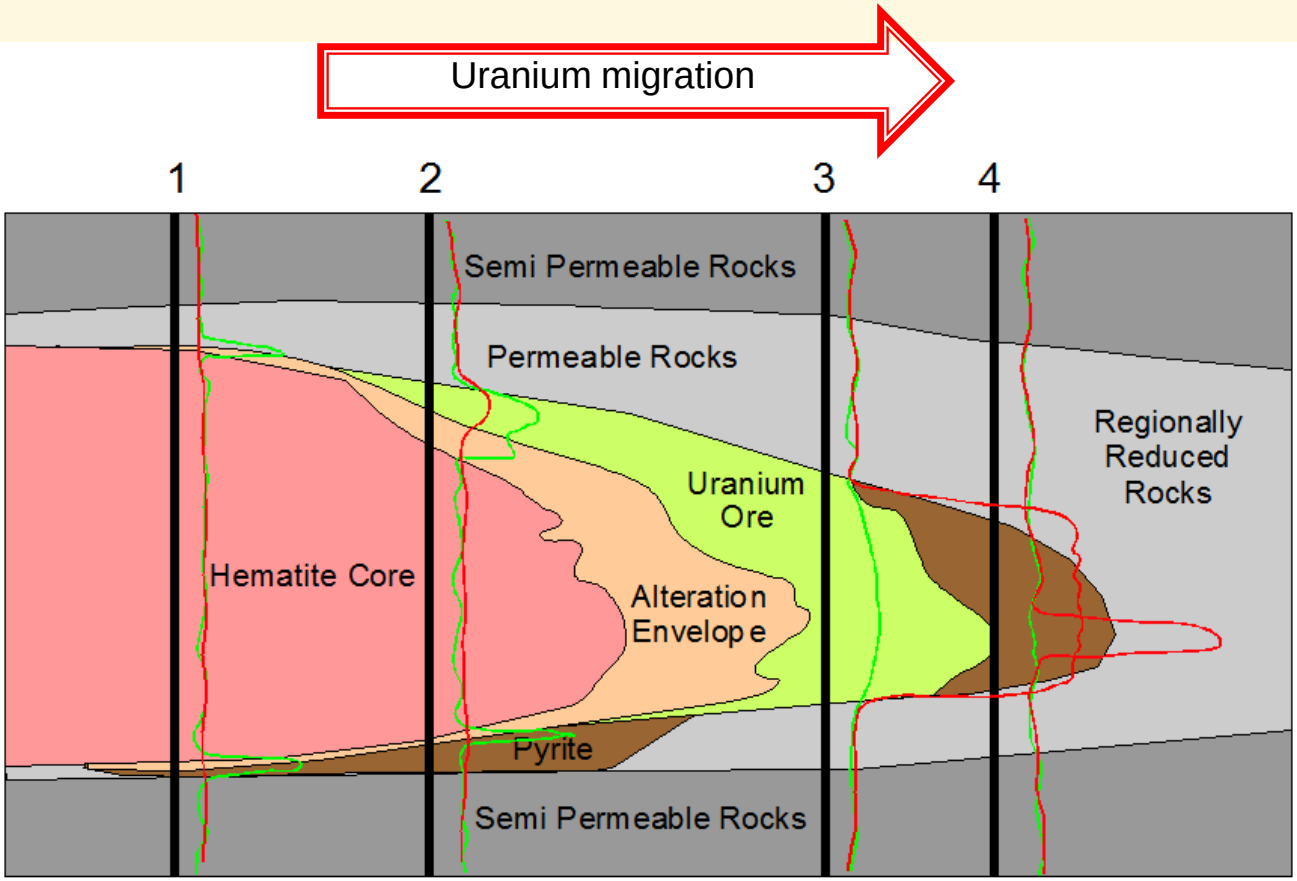
Roll Front Geology PFN Log



PFN (red) shows the strong disequilibrium with little uranium in the “wings” of the deposit

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Disequilibrium Vectors

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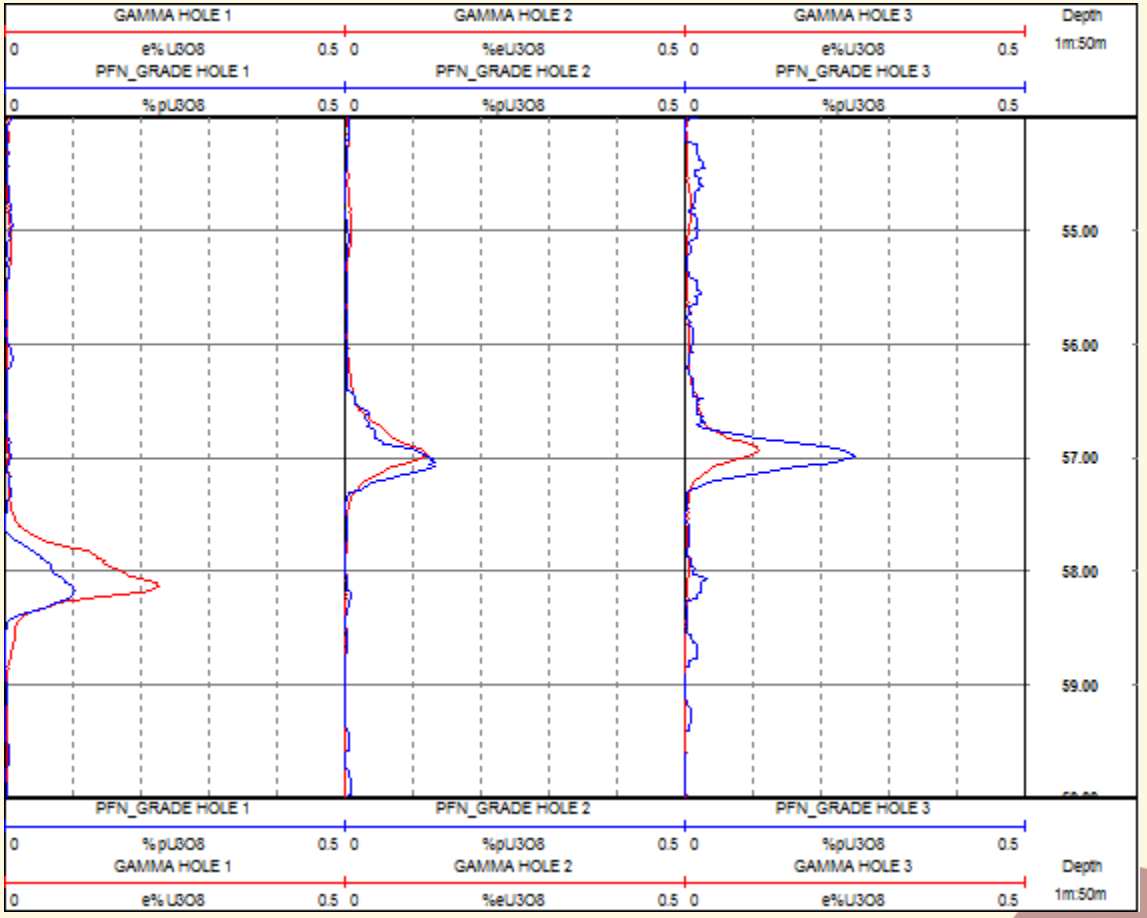
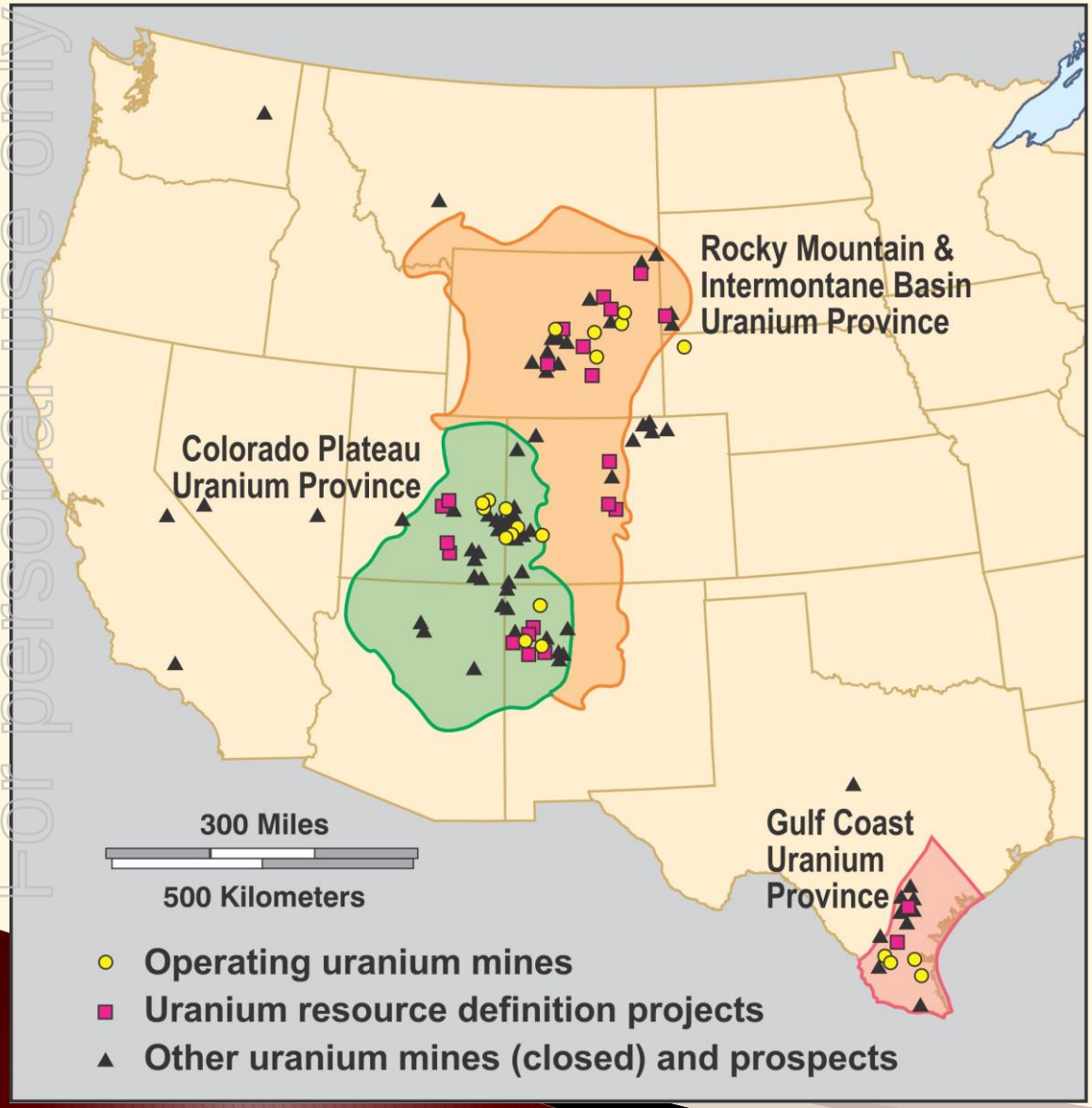
The PFN tool can be used to guide exploration by following disequilibrium vectors to find the displaced uranium

<u>It is dangerous to assume that a “disequilibrium %factor” calculated from a small number of holes can be applied to a whole deposit as the % disequilibrium can be expected to vary across a deposit</u>



PFN = Blue Line
Gamma = Red Line

GAA WIRELINE in the USA



Sandstone-hosted uranium provinces of the US

Many operating mines and development projects offer significant potential for PFN logging contract work

PFN is already in use at 6 projects and uranium disequilibrium issues are progressively being revealed.

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GAA WIRELINE in the USA

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UXA completed the purchase of the business and assets of GeoInstruments Logging LLC in December 2010 for US$1.875m.

Purchase of the logging business has given GAA Wireline instant access to:

- Operating licences
- Logging trucks and tools
- Logging staff
- Existing logging contracts in Wyoming and Texas

UXA has been approached by a major international uranium company to provide PFN logging at all of its mines & exploration projects world wide. The company has significant projects in USA requiring PFN and work on this project is expected to start in March 2011

PFN logging in Wyoming (January 2011)

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THE ADVANTAGES OF THE PFN TOOL

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- Gain certain knowledge of the presence and amount of Uranium downhole as opposed to measuring ^{214}Bi and ^{214}Pb with gamma
- Provides instant results to aid drill program adjustments instead of waiting for geochemical analysis
- Analyses a larger mass of host rock than core or cuttings (up to 700mm diam.)
- Reduces analytical costs – (reduce labour cost from collecting, handling and transporting radioactive substances and in geochemical assay costs and storage)
- Reduces drilling costs (no need to core)
- Available in Australia and U.S.A. and potentially elsewhere

The Rocks – Uranium and Base Metal Exploration Projects

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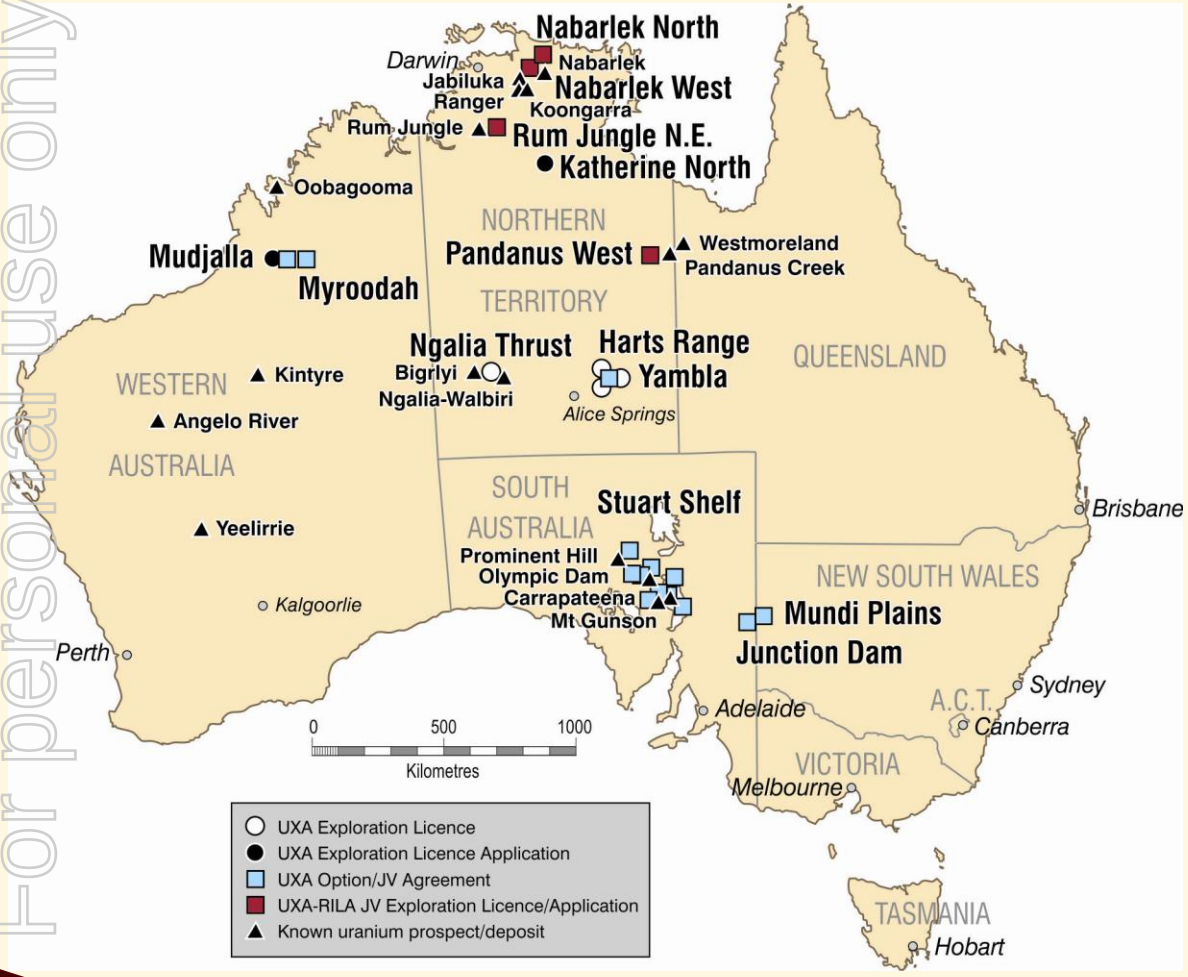


JV with Reliance Industries (India's largest public company) to explore for U in Northern Territory,

Nabarlek tenements - granted in late October 2010,

Pandanus West – grant expected April 2011

WA, new Sandstone-hosted Uranium Projects in the Canning Basin

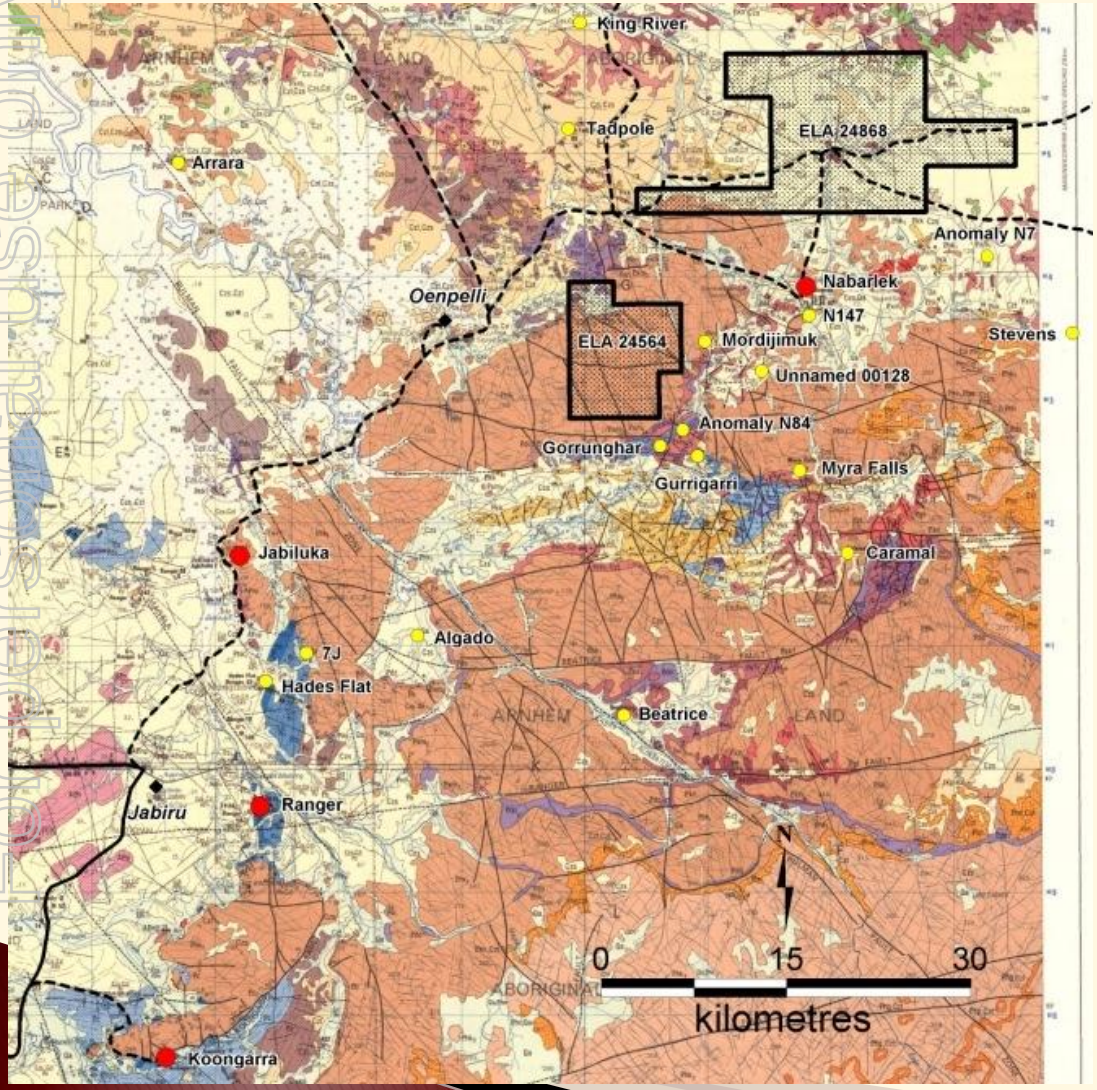
NT, Yambla – U-REE exploration, granted tenements

NSW/SA – Option agreement with Teck – Mundi Plains MVT zinc discovery at Dome 5

SA - Stuart Shelf – deep Iron Oxide Copper Gold (IOCG) targets

- Straits can earn 70% by spending $10m on exploration over 7 years,

Nabarlek North & West



World class potential – close to Ranger Uranium Mine

Key elements of prospectivity for Unconformity style Uranium

- Stratigraphy – units below Kombolgie Sandstone (brown on map)
- Myra Falls Metamorphics Cahill Formation
- Structure – NW EW orientations
- Mafic intrusions e.g. Oenpelli or Zamu Dolerite
- Geochemical signature – polymetallic (e.g. Coronation Hill), Uranium only (e.g. Nabarlek)

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Nabarlek North & West

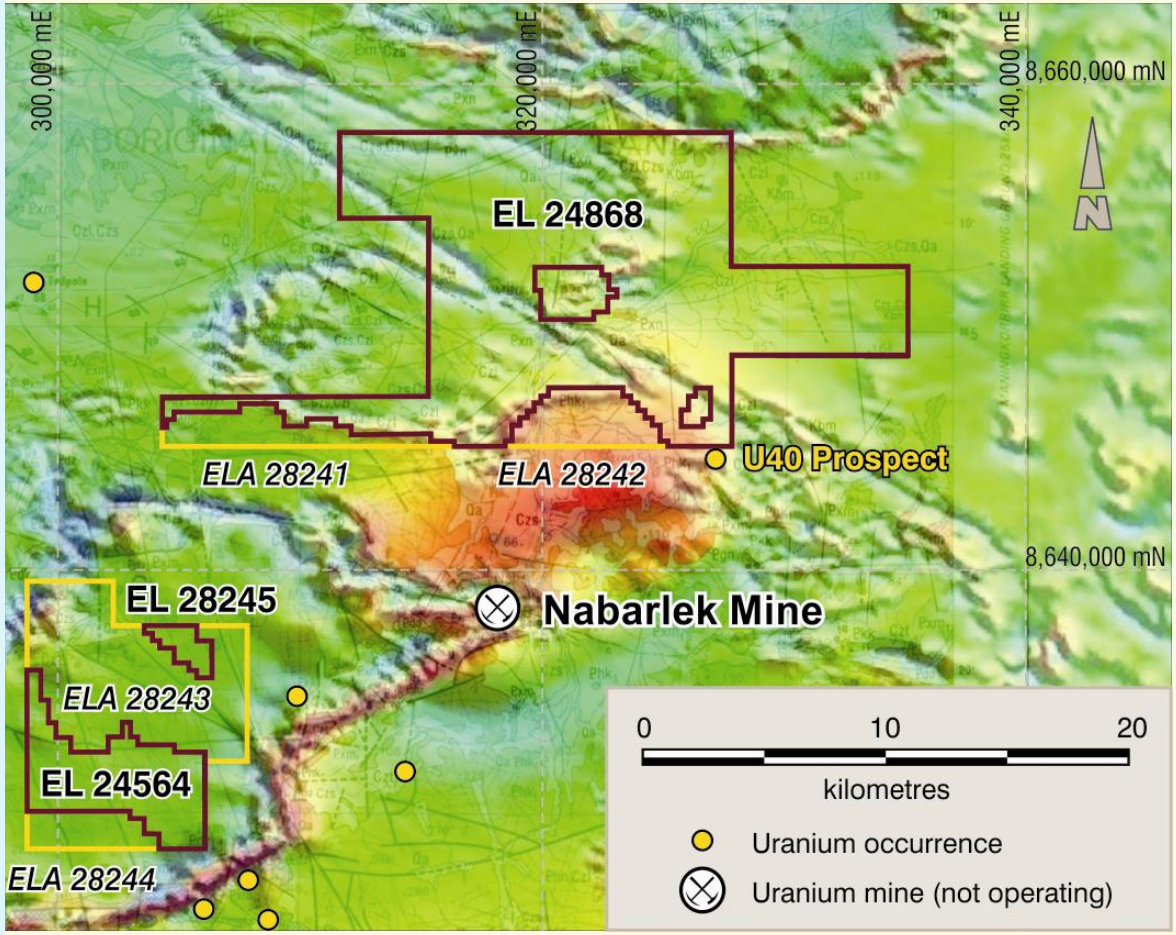
Only Kombolgie Sst outcrops
Search for U/c style Uranium below the unconformity at the base of Kombolgie - presence of dolerite and structures?

Old Nabarlek U mine and U40 Prospect– small high grade structurally controlled

U40 polymetallic signature

How to explore through cover?

Airborne EM and Mag
Geochemical auger sampling
Radon gas sampling?
Drilling (2011)



Regional aeromagnetics over geology

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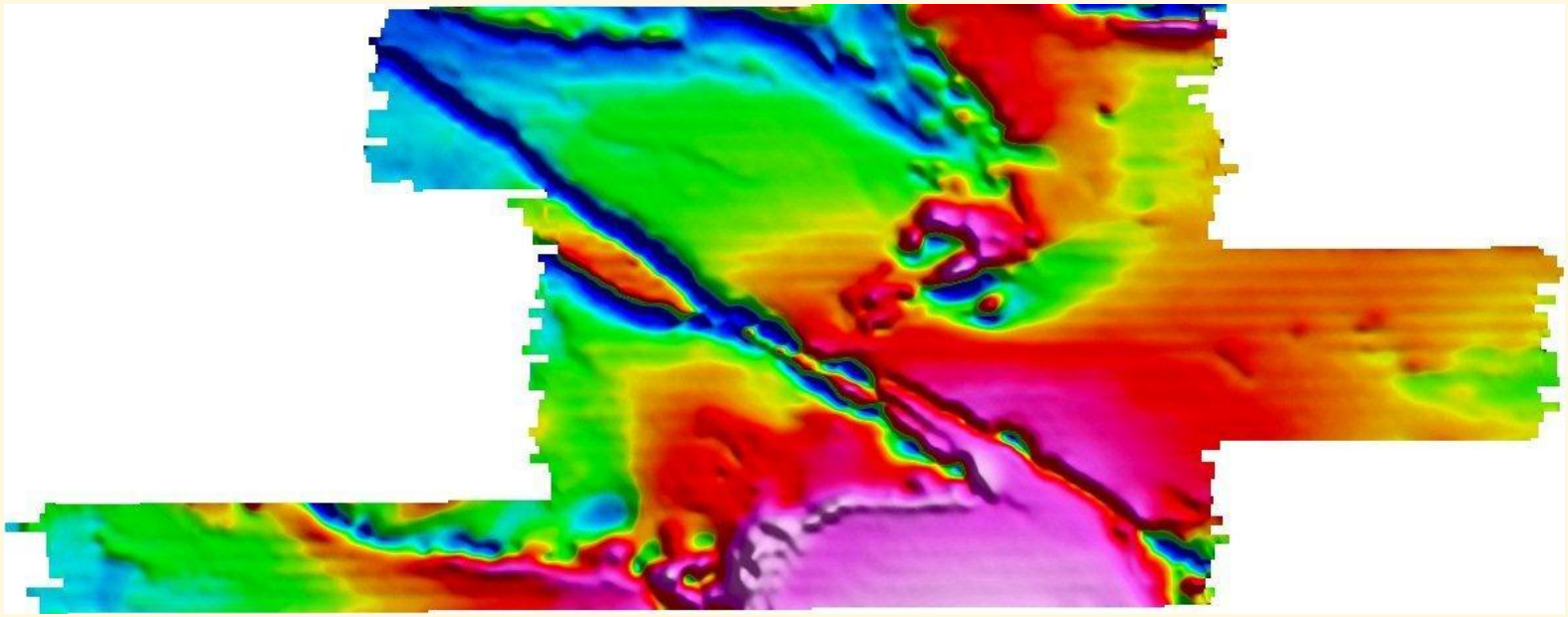
Nabarlek North

New aeromagnetics flown November 2010 by Fugro



U40 Prospect

Details prominent NW trending structure – target for uranium mineralisation – preliminary mapping shows area has transported cover

U40 drill intersections up to 6.8m @ 6.71% U3O8 (Uranium Equities Ltd ASX announcement 16 December 2010)

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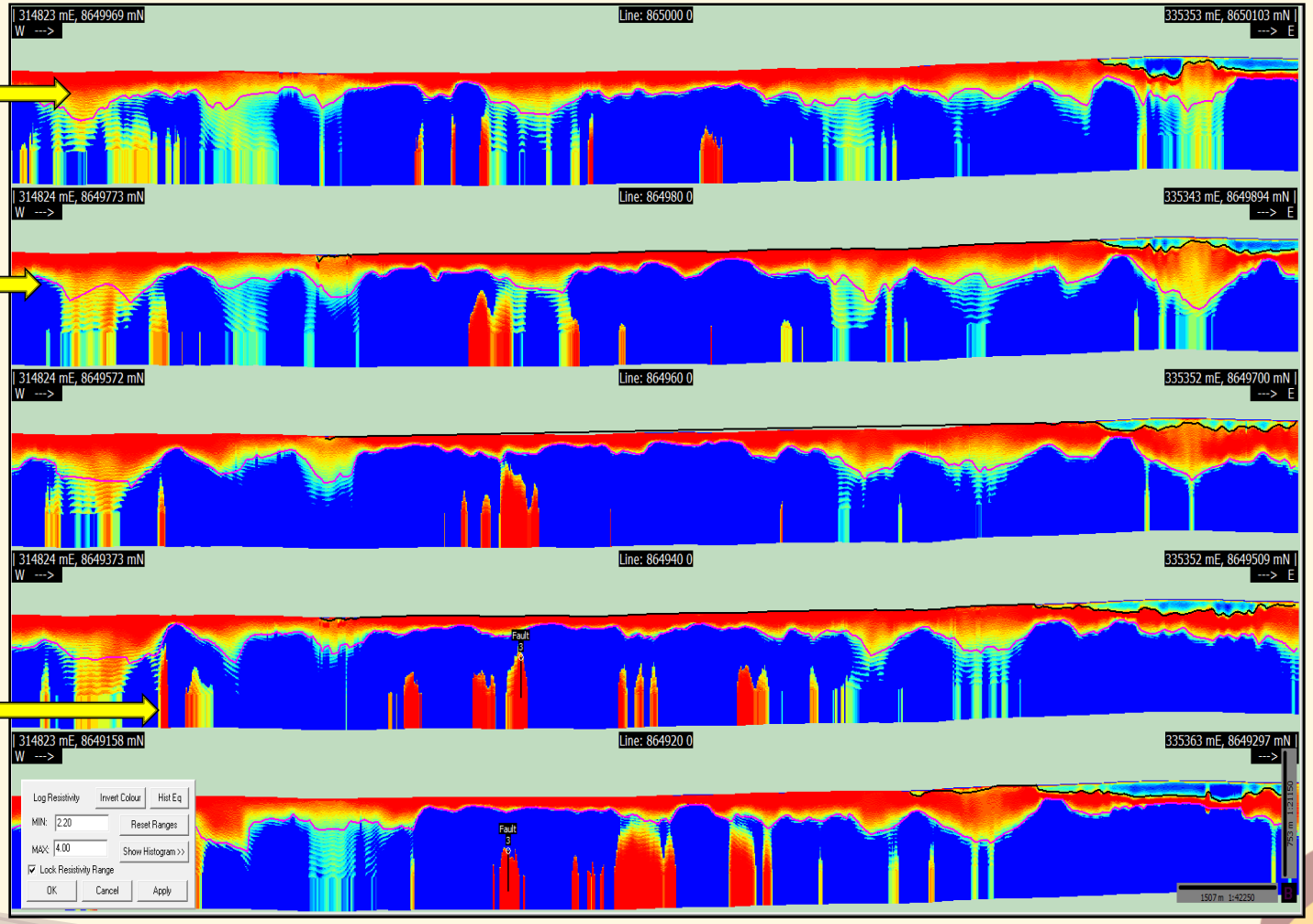
Nabarlek North Airborne EM

Near surface conductor

Top of resistive basement

Conductive features in basement "faults"



Stacked display of flight lines Fugro Geotem

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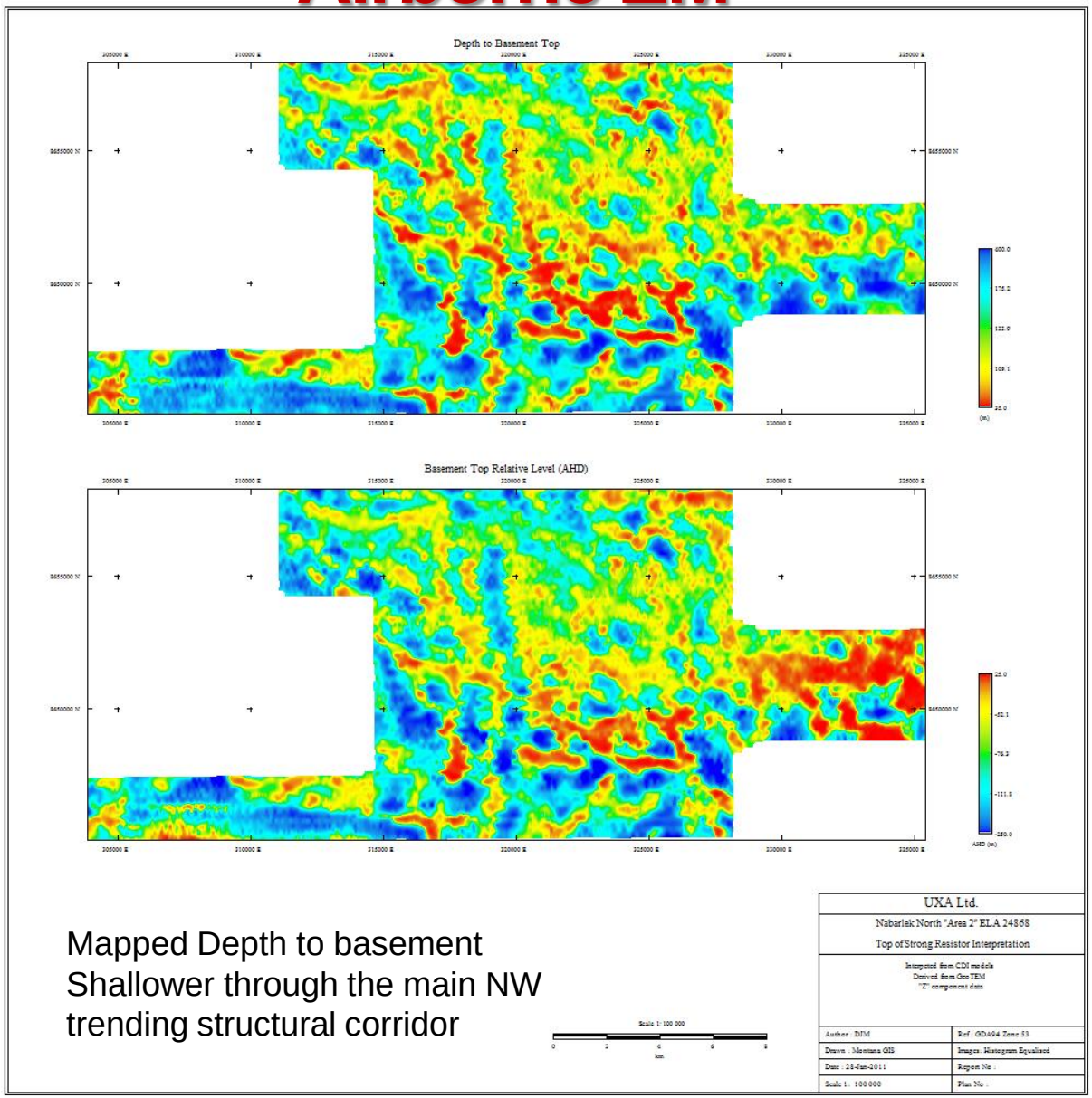
Nabarlek North Airborne EM



Mapped Depth to basement
Shallower through the main NW trending structural corridor

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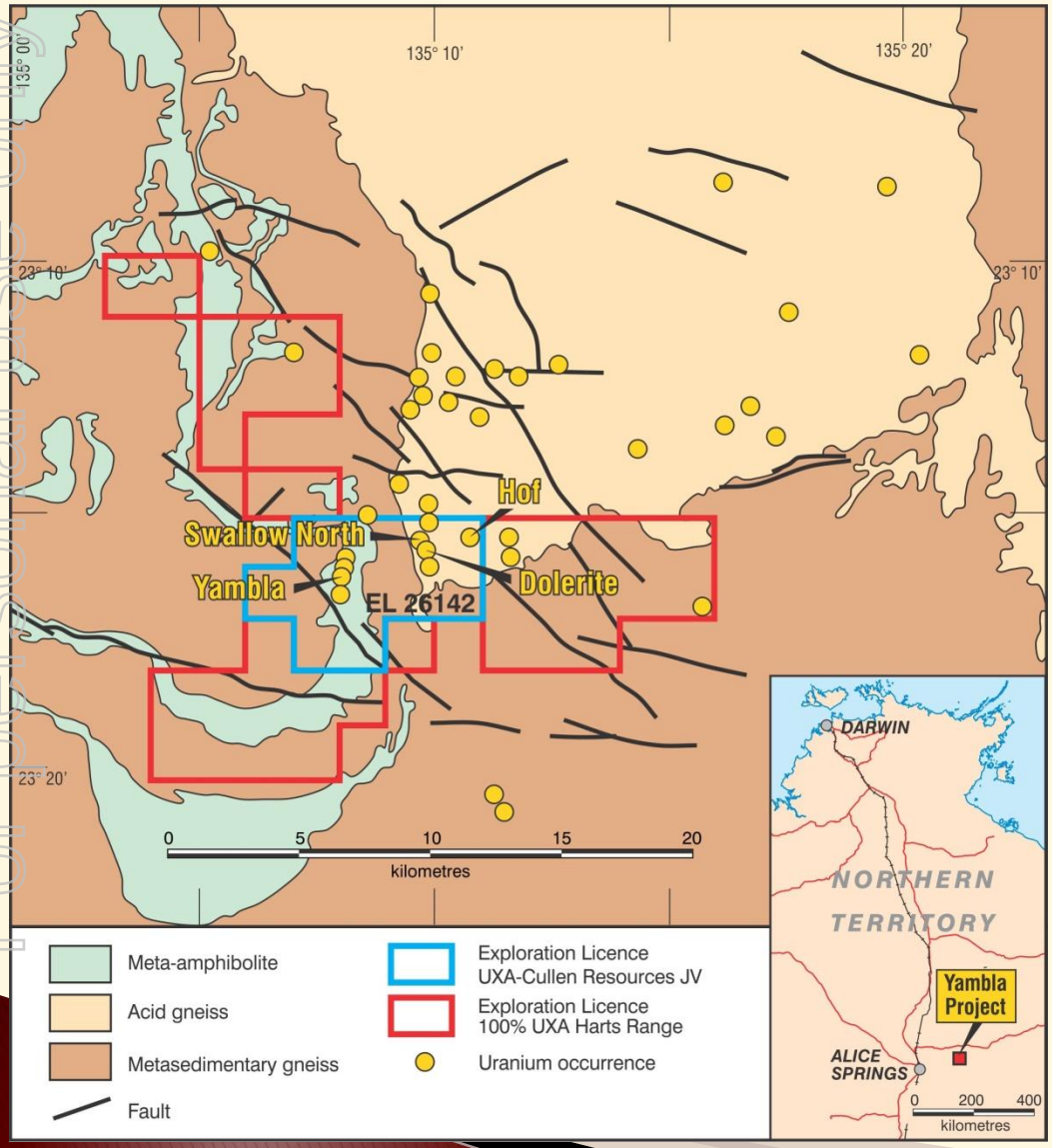
Yambla – Harts Range, U - REE



Yambla JV with Cullen, UXA right to earn 80% in granted EL 26142.
Harts range 3 granted tenements 100% UXA

Rock chip sampling has found :

- Uraninite eggs – up to 13.8% U3O8 weathering from amphibolite,

- Pegmatite with anomalous U and Heavy Rare Earth ("HREE") elements. e.g.
  - *Dysprosium up to 2,4000ppm.*

Known Entia pegmatite field

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Yambla – Harts Range U_REE stream sediment sampling results

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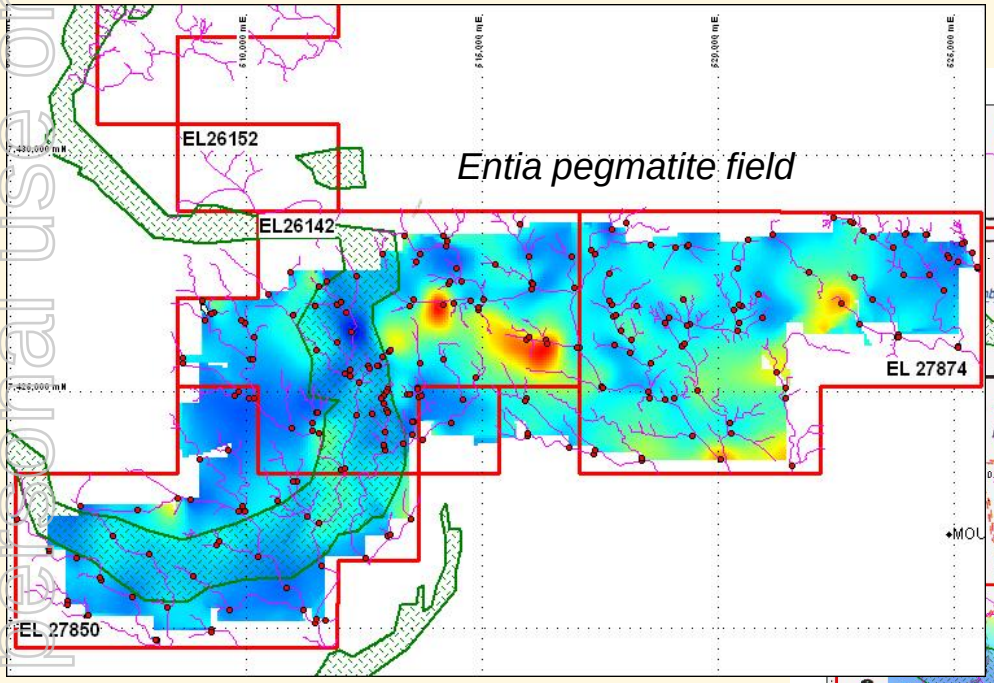
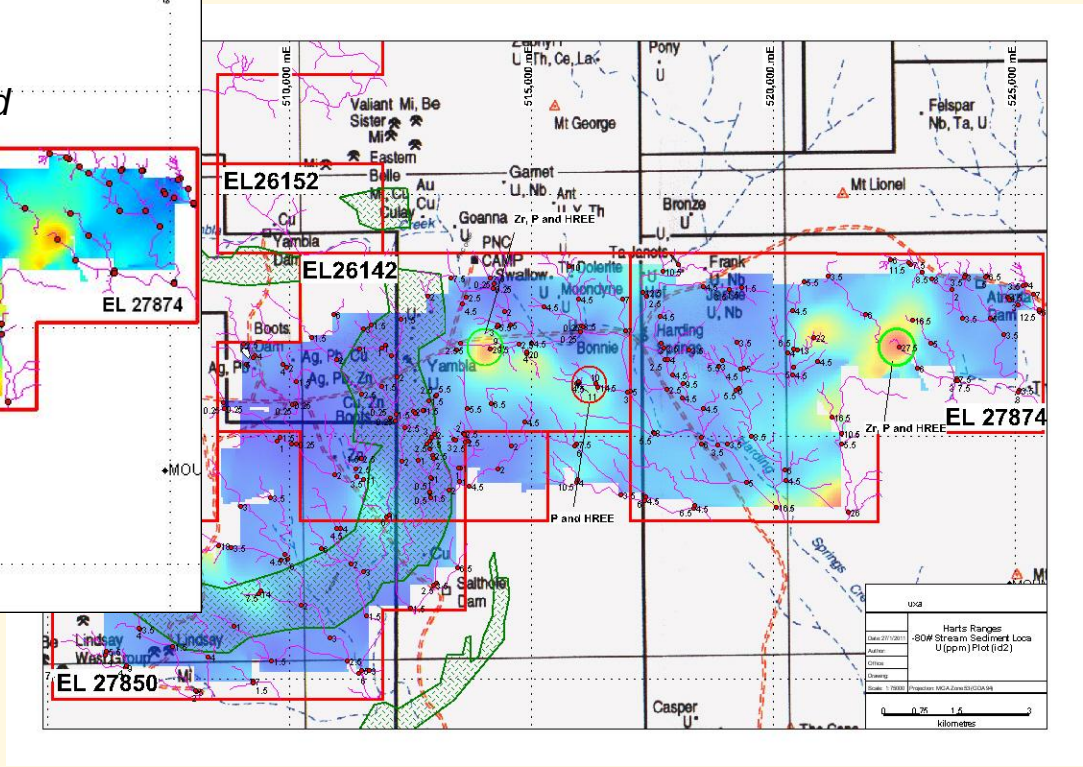


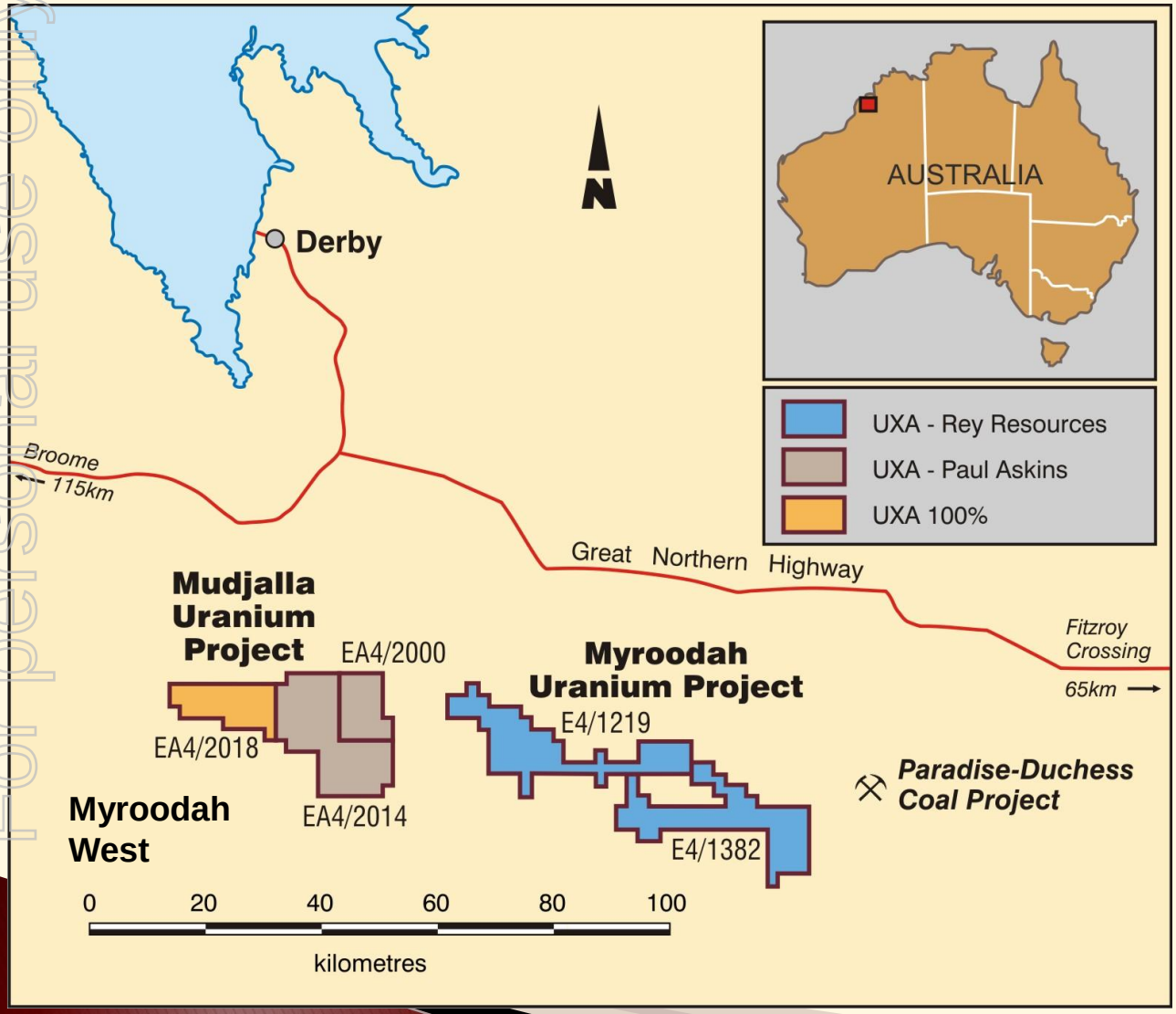
U (raw) in -80# stream sediments
Up to 29ppm U



HREE in -80# stream sediments includes Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu

Results largely confirm previous rock chip sampling and provide target areas for follow up in 2011 field season (April on....).

Canning Basin U Projects WA



3 Project Areas

Under-explored sandstone-hosted uranium province

Myroodah – UXA right to earn 80% in uranium rights from Rey Resources

Mudjalla – UXA option to acquire 80% in all minerals from Paul Askins

Myroodah West (EA4/2018) – 100% UXA
$100,000 WA Govt co-funded exploration grant to test U in coal measures

Native Title access under negotiation – drilling program 2011 field season

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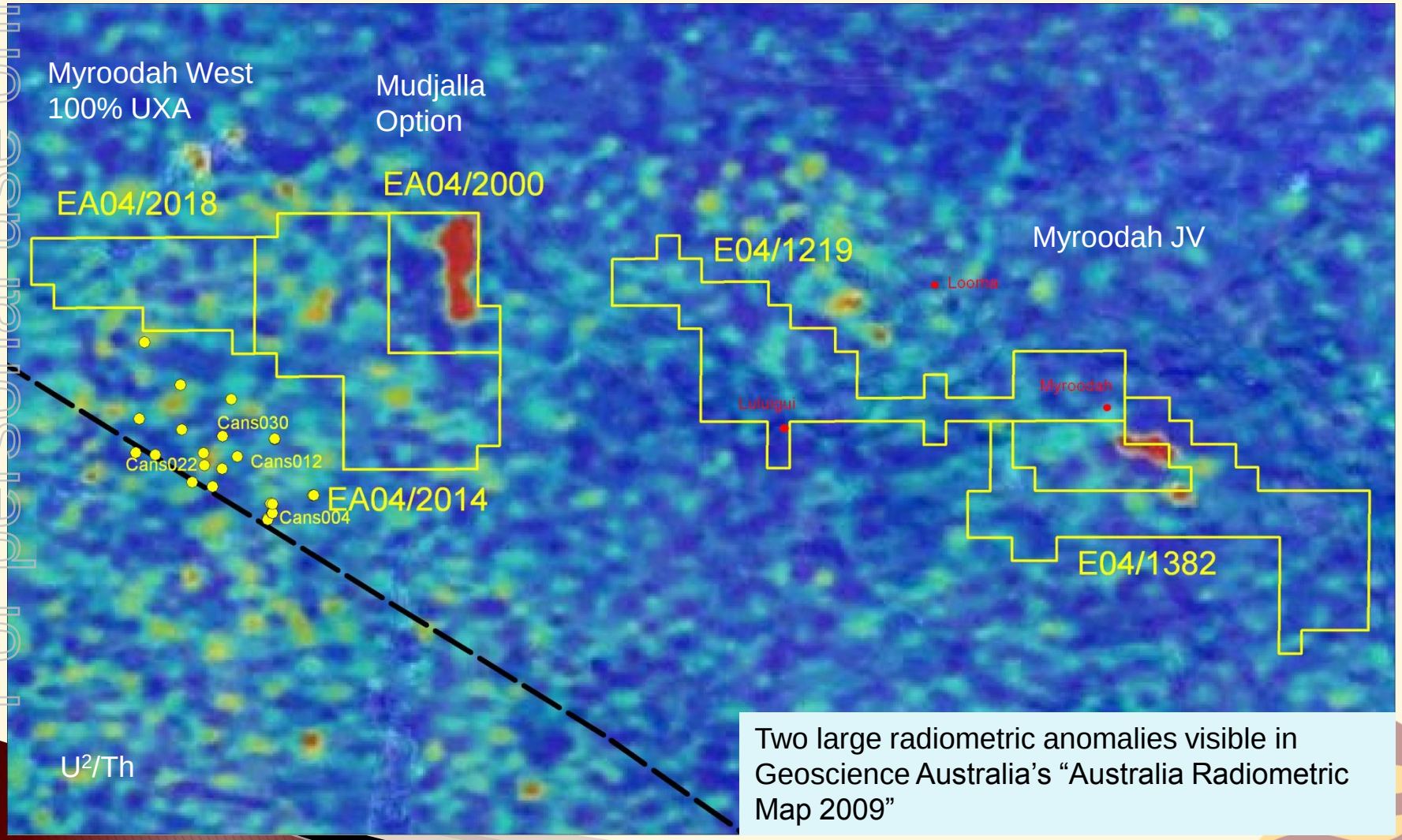
Canning Basin U Projects WA



Two large radiometric anomalies visible in Geoscience Australia's "Australia Radiometric Map 2009"

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Canning Basin U Projects WA

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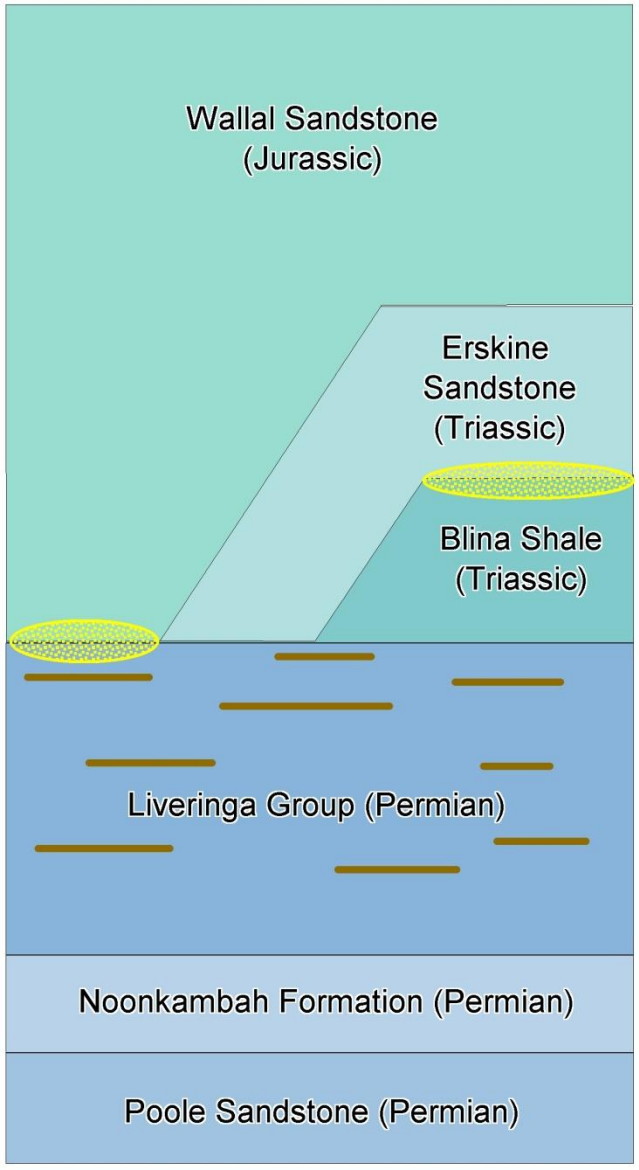


Uranium hosted by 2 sandstone units –

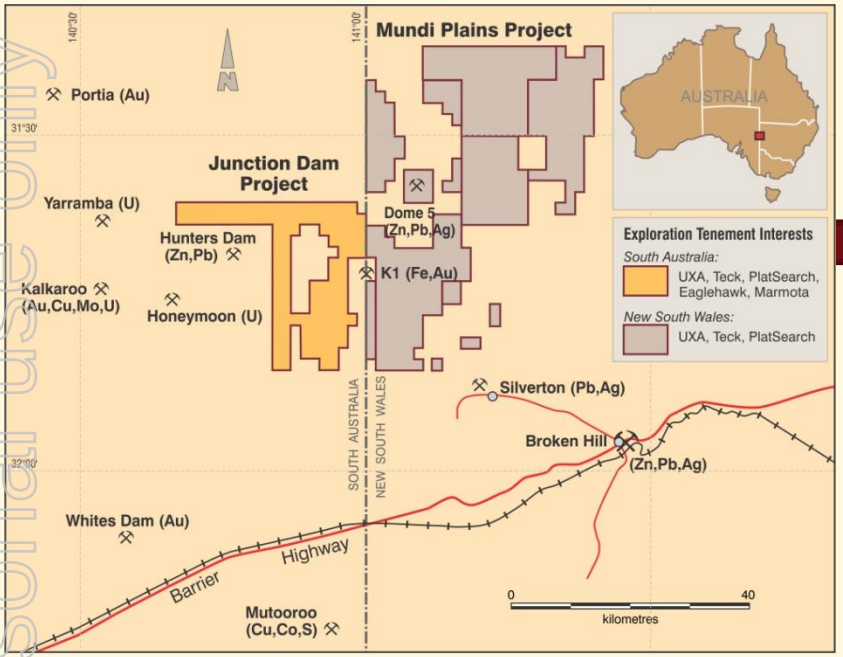
- ❑ Triassic Erskine Sandstone at Myroodah – restricted marine/estuarine
- ❑ Jurassic Wallal Sandstone at Mudjalla – fluviatile/aeolian

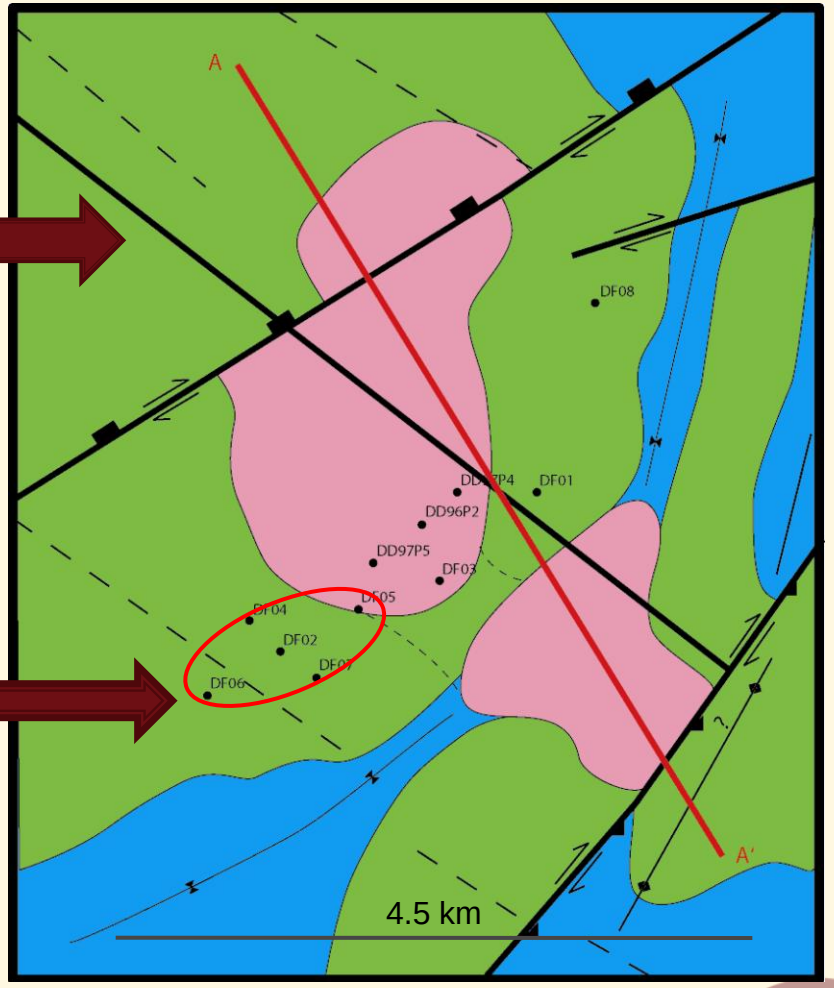
Potential uranium host in Permian Coal Measures?

- ❑ $100,000 WA Govt. drilling grant

Ideal projects for use of PFN logging technology

Mundi Plains/Junction Dam Zn-Pb-Ag





Target area of high grade MVT zinc-lead-silver mineralisation discovered at Dome 5, 320m depth, flat-lying, open in 3 directions

Upcoming drilling program (when it dries out)!

Potential for IOCG Cu-Au deposits (e.g. Kalkaroo)
- Untested geophysical targets

Teck Option Agreement signed Sept 2010

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Legal Statements

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Acknowledgements

UXA Resources Limited (UXA) thanks Teck Australia Pty Ltd, Google Earth, Fugro Airborne Surveys, the Northern Territory Department of Regional Development, Primary Industry, Fisheries and Resources and Geoscience Australia for information and images upon which the diagrams presented herein have drawn extensively being compiled, diagrammed and mapped where appropriate by UXA's employees and/or consultants.

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Competent Persons Statement

Technical Information in this report is based on information compiled by Dr Russell Penney who is employed by UXA Resources Limited and who is a Fellow of The Australasian Institute of Mining and Metallurgy. Dr Penney has sufficient exploration 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' ("JORC 2004"). Dr Penney consents to the inclusion in this release of the matters based on his information in the form and context in which it appears.

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