Regional geoscience and resource potential programs under the CORE initiative

Dot Close
precompetitive geoscience

- 4 target areas - identified as high resource potential &/or paucity of key geoscientific information
- Include basins with proven & high potential for both minerals & petroleum
- Tailor projects - address gaps in data & knowledge of geological framework, mineral & petroleum potential
Aileron Province: geological framework

• Continue to build a geological framework
• Depositional, metamorphic, structural and magmatic evolution
• Geodynamic setting
• Provide context for mineral system studies
Aileron Province: mineral potential

- Mineral systems approach
- Setting and style of mineralisation
- Alteration assemblages as vectors
- Identification of regional scale fluid flow: 1590-1570 Ma (Chewings Orogeny ≈ Olarian Orogeny)
Amadeus Basin: geological framework

- Completion of regional geophysical datasets
- COBRA project (CSIRO)
- Construction of 3D model based on potential field data
- Neoprot stratigraphy characterisation study
- 2nd edition mapping on Henbury 1:250k
- Interpretive geology 1:500k pre-Mesozoic
Arnhem Province: geological framework

- Continue to build a geological framework
- Depositional, metamorphic, structural and magmatic evolution
- Geodynamic setting
- Understand links to Pine Creek Orogen
- Basement to the McArthur Basin
greater McArthur Basin: geological framework

Construction of 3D model

• regional scale stratigraphic correlations and unconformities

• Provide structural architecture of the stacked basin evolution

• Regional scale depth and volume constraints on prospective horizons

• Provide a regional scale 3D model base for nested detailed models
greater McArthur Basin: geological framework

3D model challenges

• Input data and scale constraints
• Importance of petroleum industry data
• Limited subsurface constraints
• Maximising effect of new data to lead to new interpretations
greater McArthur Basin: geological framework

- geophysical structural interp pre new data acquisition
- Interpretation at depositional package scale resolution
- Major basin architectural faults from Palaeo-Mesoproterozoic = input constraint to 3D model
greater McArthur Basin: geological framework

• new regional data acquisition
• HyLogging of all key drillcore
• Acquisition & compilation of rock property data for major formations
• Forward modelling of new geophysical data (constrained petrophysically) – test 3D model
greater McArthur Basin: geological framework

- Reprocess legacy AEM data over Batten Fault Zone
- Model AEM to assess input value to 3D model
- Determine suitability of AEM techniques for conductive horizons in Walker Fault Zone
greater McArthur Basin: geological framework

- Stratigraphic characterisation of Mesoproterozoic formations across greater McArthur Basin
- Type/rep sections: U-Pb detrital zircon, Lu-Hf isotopes, whole rock geochem, outcrop & petrographic descriptions
greater McArthur Basin: petroleum potential

- Focus on Mesoproterozoic Roper Group (Beetaloo Sub-basin)
- Key data collection and analysis to understand shale gas potential
- Ongoing release of data
- Utilise regional scale surfaces from 3D model
- Deliver a resource assessment based on open file data
greater McArthur Basin: mineral potential

- Key collaborations: CSIRO
- Base metals systems McArthur Group in Batten Fault Zone (BFZ)
- Utilise high resolution gravity to interpret structure & stratigraphy in BFZ
- Tectonostratigraphic & biochemical controls on base metal mineralisation, middle McArthur Grp
- Deformation & fluid flow modelling
greater McArthur Basin: mineral potential

- Key collaborations: CODES
- Copper mineral systems in McArthur Group (Amelia Dolomite)
- Petrological study into textural and mineralogical relationships
- Carbon, oxygen and sulfur stable isotopes analysis of Cu mineralised zones to investigate large scale systems
CORE and Exploring for the Future

• **Geoscience Australia**
  major investment in precompetitive geoscience and resource assessment in northern Australia

• Targeted focus area from Mt Isa to Tennant Creek

• Investigating nature of crust at all scales

• Unprecedented data collection in NT

• Dovetails and compliments investigations under CORE
Geophysics and Drilling Collaboration program

- Co-funded greenfields exploration
- Round 9
  - 30 000 line km magnetic & radiometric data + 500 gravity stations: Aileron Province
  - 18 line km passive seismic + 3 x 200m DDH: Ngalia Basin
  - ~900m DDH testing SEDEX/VMS in Pine Creek Orogen
  - >800m DDH in West Arnhem Land
  - ~ 500m DDH in Tanami Region
  - ~ 2km DDH strat equivalents in McArther Group
  - ~800m DDH in Lawn Hill Platform
Geophysics and Drilling Collaboration program

Round 10

• Now open for applications
• Total value of program $750 000
• 50% of direct costs up to $100 000
• Data and report open filed 6 months after data acquisition
• Application closing date: April 26th
• Successful projects announced May 2017

www.minerals.nt.gov.au/collaborations
CORE : 2017/18 and beyond

• Complete current commitments in target areas under CORE
• Ongoing research and data collection in greater McArthur Basin through existing collaborations: CSIRO, Geoscience Australia, University of Adelaide, CODES, industry
• Scope innovative regional geoscience programs under a future initiative