New World Metals in South Australia

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Geological Survey of South Australia

New World Metals Conference
11-12 December 2019
Perth, Western Australia
New World Metals in South Australia

- Mineral resources context
- Existing new metal strengths
- Exploration – potential & support
New World Metals in South Australia

• Mineral resources context
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Percentage energy generation from renewable sources, 2018

Tasmania
South Australia
Victoria
Western Australia
New South Wales
Queensland

Source: Clean Energy Council
Clean Energy Australia Report, April 2019
Hornsdale Power Reserve

• World’s largest lithium ion battery
• Expansion to 150 MW capacity
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Uranium

- Largest resource: Olympic Dam
- In situ leach operations in Frome Embayment
- 2018 production: >5000 t U3O8
- Total ~73 per cent of national output
Copper project pipeline in South Australia

**EXPLORATION**
(positive drilling intercepts, assays or anomalies)

$39.2 million
copper exploration in 2018
130 companies with
400+ EXPLORATION LICENCES for copper

**ADVANCED PROJECTS**
(JORC resource, feasibility studies underway)

$2 billion
potential capital expenditure - 8 projects

**MAJOR MINES**
(producing and exporting copper cathode & copper in concentrate)

270,524t
$2.2 billion
in 2019

Olympic Dam | Prominent Hill | Kanmantoo | Carrapateena

Copper contained resource (tonne)

- Less than 10 000
- 10 000 - 99 999
- 100 000 - 999 999
- 1 000 000 - 9 999 999
- Greater than 10 000 000

Current 14 June 2019

- Major copper mines (approved)
- Developing copper projects
- Copper occurrences
- Tenements under exploration for copper
Rare Earth Elements

REE at Olympic Dam

- REE-fluorocarbonates – fine grained bastnäsite and synchysite.
- Locally concentrated within REE-mineral-rich pockets
- 0.18 wt% La$_2$O$_3$, 0.27 wt% Ce$_2$O$_3$, 0.06 wt.% Nd$_2$O$_3$
- Not currently recovered

REE prospectivity in IOCG systems
Mineral sands: zircon, titanium

2018 figures

Eucla Basin: world class zircon province

Jacinth – Ambrosia of Iluka Resources
Graphite

- Eyre Peninsula: Largest flake graphite resources in Australia
- Widespread graphite occurrences in metamorphosed sediments
Kalkaroo Deposit

- 100 Mt Ore Reserve from independent PFS.
- **Upside**: Substantial Inferred resources, orebody open in all directions, nearby prospects with ore grade intercepts, cobaltian pyrite in tails.
- Ownership of Kalkaroo Station secures land access.
- Example of copper belt replacement style sulphide mineralisation in the Curnamona Craton.

Copper 1.1 Mt  Cobalt 23.2 Kt  Gold 3.1 Moz
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Oak Dam West discovery
IOCG mineralisation
Announced by BHP, Nov 2018

425m @ 3% copper, 0.59 g/t gold + U + Ag
Inc. 180m @ 6% copper, 0.92 g/t gold

Encouraging second-phase results - significant widths of copper, including copper grade zones over 4%, announced BHP, Oct 2019
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Previous drilling near misses
Exploration-related geoscience

- New geological concepts
- New geophysical data acquisition
- New geological mapping, drilling
- Government co-funding support for exploration
The spectrum of IOCG alteration:
Expanding the search space

High T Ca-Mg albite-amphibole Oorlano Metasomatite

High T K-Fe Kspar-magnetite Cairn Hill mine

Mag-hem transition Mag-hem-ccp-py Hillside deposit*

Low T K-Fe Hematite breccia Olympic Dam mine

Deposits / Targets

Epithermal

Hematite-group IOCG
Cu-Au-Ag-REE-U-Mo-PGE ...
Olympic Dam type
+ Albitite-hosted U

Polymetallic skarns in IOCG
Cu-Pb-Zn-polymetallic
Mag-to-hem-group IOCG
+ Albitite-hosted U

Magnetite-group IOCG
Cu-Au-Co-Bi...
Cloncurry type (+Carajas)

IOA Magnetite-apatite
Fe, P, V, Th, REE
Kiruna type and affiliated iron oxide-specialized metal deposits

New exploration search space for South Australia

• V, Th, REE
• Co-Bi

• Coupled with Cu-Au-U in IOCG & related systems


High T Ca-Mg albite-amphibole
Oorlano Metasomatite

Corriveau et al. 2016 Econ Geol
Magnetotelluric surveys – plumbing systems for mineral systems

Olympic Domain Infill MT Survey at 2 km

Electrical resistivity at a depth of 30 km, derived from AusLAMP MT
Gawler Craton Airborne Survey

- Magnetics, radiometrics, laser altimetery
- 294,000 sq. km.
- 200 metre line spacing
- 60m ground clearance
- 1.67M line kilometres
- Acquisition complete
- Value add: enhanced images and magnetic source-depth models being released

[energymining.sa.gov.au/minerals/gcas]
New interpreted basement geology

Comparison...

- Interp. efficient due to increased resolution of GCAS.
- More confident location of boundaries

Pre-GCAS

GCAS + 2019 interpretation

Pawley and Wilson, GSSA
National Drilling Initiative

Delamerian Orogen

- Copper, copper-gold (+moly+cobalt?), lead-zinc, mineral sands prospectivity
- Stratigraphic drilling – tectonic architecture, structural geology, mineral potential

Py-cpy in gt-and schist, Hillgrove Resources’ Kanmantoo mine
Explore SA: the Gawler Challenge

- Global crowd-sourcing competition
- Opens in 2020
- Partnering with Unearthed
- Melds capabilities of global innovators and data scientists
- Generate new models and new exploration ideas
ACCELERATED DISCOVERY INITIATIVE

$10 Million over 3 years

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- Drilling
- Geophysics
- Technologies
- Aboriginal employment
- Logistical support
- Water

$10 Million over 3 years

ACCELERATED DISCOVERY INITIATIVE

2 Stage Online Process:

- Expression of Interest open now
- Invited proposal applications

Open to: explorers, researchers, collaborations, innovators

$10 Million over 3 years

New World Metals in South Australia

- Community appreciation of renewable energy and new metals
- Excellent geological potential
- Collaborative geoscientific culture
- Government support – Accelerated Discovery Initiative now open

IOCG mineral systems workshop, South Australian Drill Core Reference Library, December 2019
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