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Prospectivity Of The Glen Innes Region

Molybdenum



Bismuth



Gold



Tungsten



Tin



Silver



Is Australia Really A Mature Exploration Target?

- Are there More Tropicanas Out There?
- Granite Gold: a New Mineral System Model.
- Spatial Data Modelling: New Targeting Tool.
- Results and Fieldwork.
- The Old: Kingsgate.
- The New: Seven Hills.
- Lessons
- Future Developments



Mineral System Compared to Deposit Model

- Current Deposit Models Focus on Differences Rather than Similarities, Weakness in Exploration Targeting.
- Mineral Systems Approach Adaptation of Petroleum Modelling, Allows Probabilistic Assessment.
- Requires Critical Parameters of Ore Formation to be Identified Related to :
 - Controls on generation and preservation of Ore
 - Processes that Cause Metals to be Mobilised from Source, Transport and Deposition into Traps.
- This Approach Allows for Multiple Ore Deposit Styles to be Realised in Single Mineral System.
- Need to Map Evidence for These Processes.



Ore Deposit Models Become One Mineral System





Granite Gold Mineral System





Granite Gold Setting and Examples





Pathfinder Metals Now Valuable In Their Own Right





These Systems Are Valuable Exploration Targets





Auzex Company History

- Incorporated:
- Public Company:
- IPO & ASX Listing:

29 Sep. 2003 7 July 2005 October 2005 (\$5.0M) (\$0.50 per share)

- ASX Code: AZX
- Shares on Issue:
- Ord. Fully Paid 24,745,605
- Unlisted Options 3,665,000
- Share Price: \$1.00 (as at 20 Feb 2007)





The Exploration Process Is All About Probability



The Practical Implication Of High Discovery Risk For Strategic Planning & Exploration Budgeting Is A Large Difference Between The Average Cost Of Exploration Success And The Level Of Funding Required To Ensure Success (e.g. - "World Class" Deposits) Discoveries Are Typically Made By The 5th-7th Person/Company Covering The Ground



Modelling Approach: WoE











a = total study area (e.g. 10,000 km) A = Unit Cell = 1 km² cell N(D) = number of deposits P(D) = prior probability N(T) = total area of study region N(B) = area of binary theme N(B) = area of binary theme not present N(T) = N(B) + N(B) (as long as no missing data)

$$W + = \ln \frac{P(B \mid D)}{P(B \mid \bar{D})} \qquad W - = \ln \frac{P(\bar{B} \mid D)}{P(\bar{B} \mid \bar{D})}$$

$$Ws + = \frac{1}{N(B \cap D)} + \frac{1}{N(B)}$$
 $Ws - = \frac{1}{N(\bar{B} \cap D)} + \frac{1}{N(\bar{B})}$

$$Cs = \sqrt{(Ws+) + (Ws-)}$$
 $StudC = C / Cs$

From: Bonham-Carter, G.F. (1994) "Geographic information systems for geoscientists".

N(B)/N(T)

C = (W+) - (W-)

Granite Gold Mineral System Source and Transport

- Source
 - I-type (crustal input, continental), Sub-alkalic,
 Metaluminous (to peraluminous) Felsic Rocks Au, Bi, Te,
 W, Mo, As and Sn Metals Present.
 - Map Rock Types and Mineral Occurrences.
- Migration
 - Hydrothermal Fluid from Fractionation Pegmatites, Miorilitic Cavities, Pipes, Aplite.
 - Map Rock Types Geochemistry and Alteration.



Granite Gold Mineral System Trap and Deposition

Trap

- Roof, Breccia, Vein Stockwork, Chemical, Mechanical Contrasts, Alteration - Feldspathic (Na>K), phyllic.
- Map Alteration, Structure, Rock Type, Scale from Geochemical Anomalism.
- Deposition
 - Au, Bi, Te, W, Mo, As and Sn
 - Reduced (no Mag-Hem), low sulfide (Po-Py-Apy)
 - Map Geochemistry, Fluid Type, Alteration, Grade from Drilling.



Data And Information



- Integrated and assessed
- 79,000 mineral occurrences.
- 9,324,000 rock data.
- 21,912,000 SS data.
- 26,360,592 soil data.
- 109,000 drill holes.
- $2,537,522 \text{ km}^2$ of geological data.



International Scale Model – Search Area Reduced





Major Project Locations





Portfolio Approach





Glen Innes Region Particularly Prospective

- Modelling Critical in Land
 Acquisition Process, Minimising
 Costs.
- Prospects Ranked By Probabilities.
- Work Planned from Missing Data.
- Lack of Predictive Data for Trap and Deposition Parts of System. Little
 Prospect Scale Mapping, Especially
 Alteration Data, Geophysics,
 Detailed Geochemical Data, Drilling.

No Substitute for Fieldwork.



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The Old: Kingsgate Mo-Bi +/- Ag, Au









Kingsgate Mo-Bi+/- Ag-Au

- 20km east of Glen Innes,
- Second Largest Producer of Mo+Bi in Australia
- 54 pipes to 20m Diameter Worked to 50 m depth. In Roof and Contact of Granite.
- 94 Mo-Bi Pipes Mapped Along a 5km
 N-S Trending Belt.
- Sampling of the Pipes, Including Drilling, Returned Grades up to 7.3% Mo, 2.2% Bi, 2.0 g/t Au and 100 g/t

Ag.





Kingsgate Mineralisation











Chargeability Map Over the IP Survey Area





Geological Interpretation of Pipes Tested





Trial Mining Completed Successfully

- Confirmed High Grade Nature of Pipe Mineralisation.
- Grade Control Drilling Returned Average Grade of 0.34% Mo & 0.64% Bi.
- Additional Pipes Found that were not Anticipated
- Much Higher than Expected Bismuth Grades





For the Miners – Kingsgate Scoping Study

- Kingsgate Project High Grade Operation, Low Processing Rate, Mine Life 5-10 years and Operating Cost of \$60.33t.
- Capital Estimated to be \$39.76M.
- Head grade of 0.23% Mo and 0.23% Bi Targeted.
- Based on a 250,000 tpa Processing Operation, Total of 911t Mo and 698t of Bi concentrates produced annually.
- Represents Revenue of \$158.12 per tonne of Ore at US\$22/lb Mo and US\$13/lb Bi concentrate prices.
- Not Counting Ag and Au Credits.
- Started Feasibility Mining Mid 2009???



For the Explorers the New: Seven Hills Gold

- No Modern Exploration or Historical Reports of Gold.
- Anomalous Gold Geochemistry -3500m x 1500m.
- Initial results: RAB 13m @ 8.55
 g/t Au and RC 8m @ 2.8 g/t Au
- The Problem, no Outcrop or No Detailed Geological Data.
- Mineralisation Controls and Continuity not Understood.





Seven Hills Mineralisation

- Fresh Mineralisation is Hydrothermally Altered
- Host Medium to Coarse Grained, Biotite Greisenised Leucogranite.
- Muscovite-sericite, with associated quartz, minor chlorite and sulphides and a trace of rutile.
- Geochemical Association is Au, As, Pb, Bi, Ag and Te.
- As and Pb not Typical of a Granite Gold System.





The Problem – Where is the Trap Requires Detailed Mapping, Geophysics and New Ideas!





Lessons And The Future

- Prospectivity Modelling Works Well as a Regional Targeting Tool, Saves Time, Focuses Exploration, Cuts Costs.
- Modelling has to Conform to Mineral System Model.
- The Lack of Prospect Scale Geological Data Means these Techniques are Less Effective at More Detailed Scales.
- New Research Ideas and Targeting Techniques Can Open New Areas in Australia for Exploration.
- Importantly these Areas are not Under Significant Depths of Cover Representing Low Cost Exploration targets.
- The Recent Rise in Metal Prices Also Means that Exploration Can be Applied for a Range of Metals.
- Discovery of Gold Greisen Association may be a New Variant of the Granite Gold Model.



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Disclaimer or Trust Me I'm a Geologist!!!

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