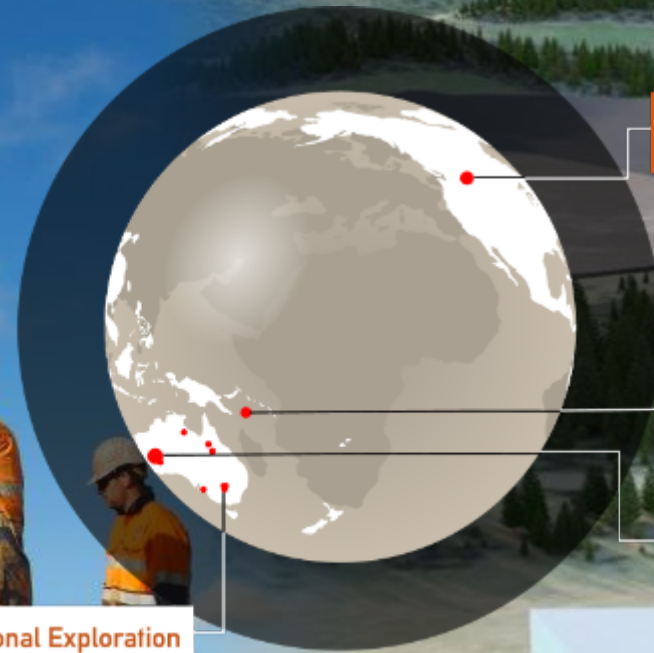





SANDFIRE RESOURCES NL



 Black Butte

WCB Resources

 DeGrussa  
Copper-Gold Mine

Regional Exploration

Pathfinder exploration techniques targeting porphyry and epithermal alteration systems in the Temora Copper-Gold Belt

*Hooper, Stephens and Peacock*

Discoveries in the Tasmanides : Mines and Wines 2017





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## Competent Person's Statement – DeGrussa and Monty Ore Reserves and Mine Plan

The information in this report that relates to Ore Reserves and Mine Plan is based on information compiled by Mr. Neil Hastings who is a Member of The Australasian Institute of Mining and Metallurgy. Mr. Hastings is a permanent employee of Sandfire Resources and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Hastings consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## Competent Person's Statement – DeGrussa and Monty Mineral Resources

The information in this report that relates to Mineral Resources is based on information compiled by Mr. Ekow Taylor who is a Member of The Australasian Institute of Mining and Metallurgy. Mr. Taylor is a permanent employee of Sandfire Resources and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Taylor consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## Competent Person's Statement – DeGrussa and Monty Exploration Results

The information in this report that relates to Exploration Results is based on information compiled by Mr. Shannan Bamforth who is a Member of The Australasian Institute of Mining and Metallurgy. Mr. Bamforth is a permanent employee of Sandfire Resources and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Bamforth consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## Competent Person's Statement – Temora Exploration Results

The information in this report that relates to Exploration Results at Temora is based on information compiled by Mr Bruce Hooper who is a Registered Professional Geoscientist (RPGeo) of The Australian Institute of Geoscientists. Mr Hooper is a permanent employee of Sandfire Resources and has sufficient experience that is relevant to the style of mineralization and type of deposit under consideration and to the activity which he is undertaking to qualify as Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Hooper consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

## Exploration and Resource Targets

Any discussion in relation to the potential quantity and grade of Exploration Targets is only conceptual in nature. While Sandfire is confident that it will report additional JORC Code 2012 compliant resources, there has been insufficient exploration to define mineral resources in addition to the current JORC Code 2012 compliant Mineral Resource and it is uncertain if further exploration will result in the determination of additional JORC Code 2012 compliant Mineral Resources.



# Sandfire – A Strong Platform for Disciplined Growth

- ▶ 2<sup>nd</sup> largest ASX-listed copper producer, \$1 Billion Market Capitalisation
- ▶ Consistent, low-cost copper production and strong cash-flows
- ▶ Debt-free and \$124 Million cash
- ▶ Company built off organic exploration success in May 2009:
  - New VMS discoveries in a region considered to be in its infancy
  - DeGrussa : Original Mine Plan **10.72Mt @ 5% Cu, 1.7g/t Au**
  - DeGrussa : Produced **360 Kt Cu in six years** : Current Reserve : **8.9 Mt @3.6 % Cu, 1.4 % Au**
  - Monty JV Reserve : **0.92Mt at 8.7% Cu, 1.4 g/t Au**
  - Ongoing \$28-30M per annum investment in exploration at Doolgunna and across Australia
- ▶ Actively pursuing growth and diversification opportunities to leverage our expertise, strong cash-flow and access to funding
  - Significant medium-term growth opportunity at 78%-owned Black Butte Copper Project, USA

Our vision is to be a significant mid-tier miner operating in the upper quartile of global performance benchmarks



# Australian Regional Exploration Projects

Targeting world-class discoveries in Australia's premier exploration provinces that can be developed



## EXPLORATION:

### Northern Territory

- ▶ Active drilling by JV partners in Borroloola tenements
- ▶ MMG drilling >20 diamond holes this season

## EXPLORATION:

### Queensland Base Metals

- ▶ 2,400km<sup>2</sup> in Mt Isa-Cloncurry province
- ▶ 100km strike length with potential for Broken Hill/Cannington-style and IOCG mineralization, masked under shallow cover
- ▶ Key targets for 2017 at Ionised, Strathfield, Breena and Cannington West

## EXPLORATION:

### NSW Base Metals

- ▶ 2,100km<sup>2</sup> in Lachlan Fold Belt
- ▶ Outstanding potential for porphyry mineralization,
- ▶ Major program at high priority 100% owned Temora Project, <70m cover



## Selection of Lachlan Fold Belt

- Targeted major Australian copper provinces, Lachlan FB one of three selected
- Potential for large scale gold and copper-gold projects
- Mines in NSW have low operating costs
- Shallow cover can mask significant deposits across the belt
- Access reasonable, local support for development

### Issues :

- Permitting and approvals for drilling and mining
- Access issues with some landowners
- OHS legislative issues
- Water

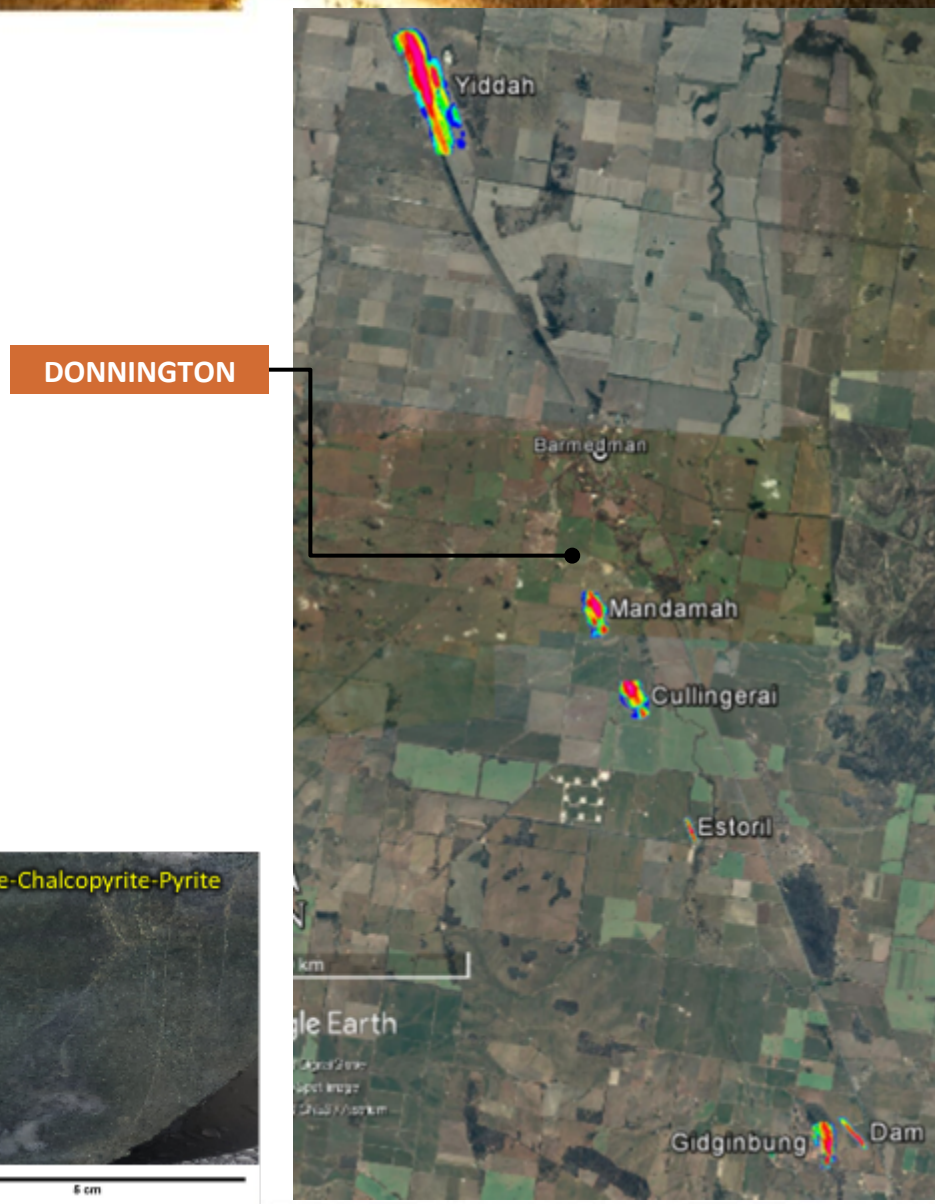
Deposit	Reserve	Cu %	Au g/t	Mine Type	Mining	Milling
	Mt	%	g/t		US\$/t	US\$/t
Cadia	1,500	0.28	0.48	Panel caves	4.2	9.3
Northparkes	102	0.60	0.26	Block caves	7.4	5.2
Cowal	116		0.85	Open Pit	7.0	2.7
Tomingley	4.3		1.80	Open Pit		
McPhillamy	73		0.9	Open Pit		





# Temora Project – Resources

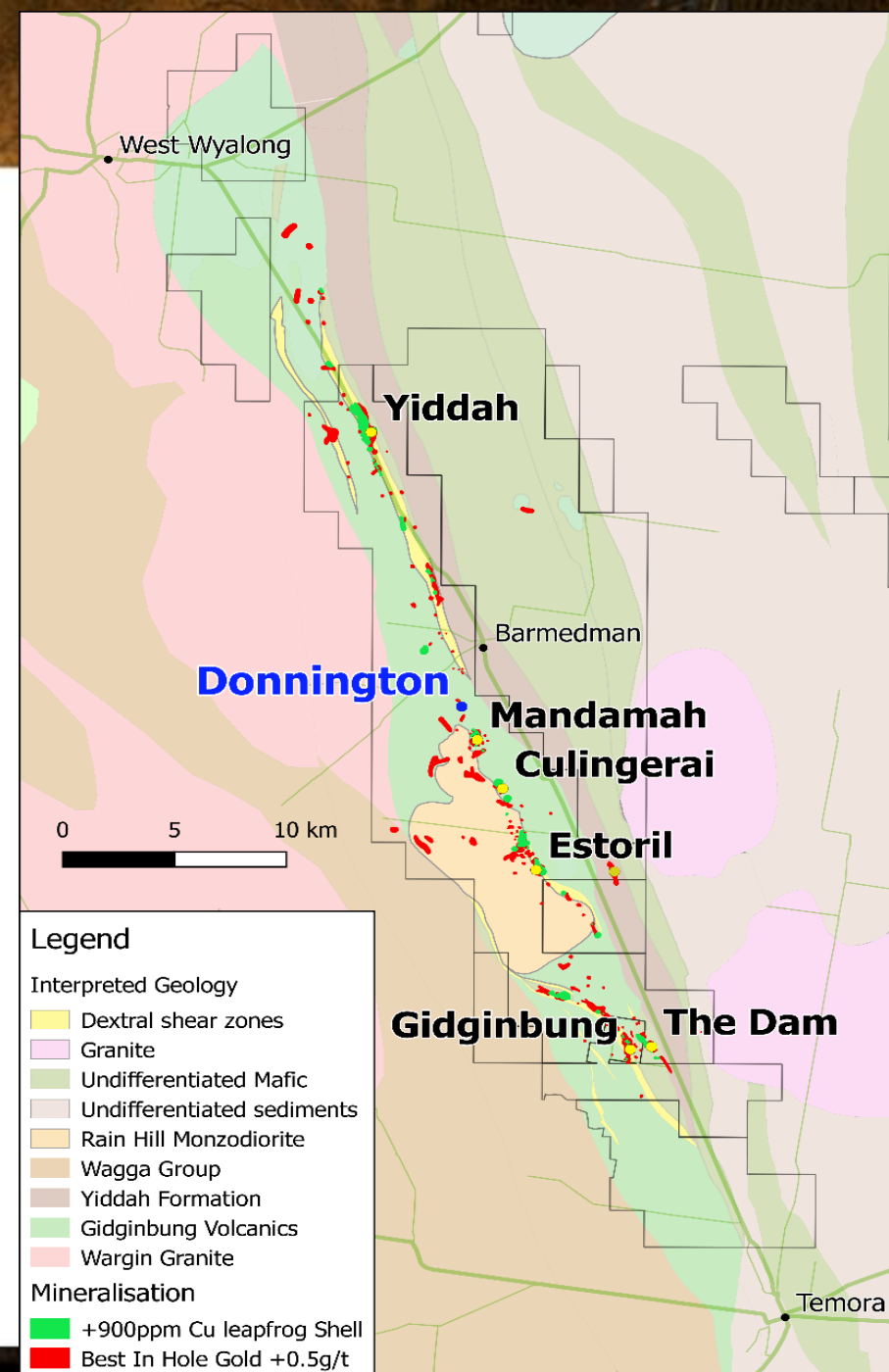
- ▶ Major mineralised belt over 60km long
- ▶ Old Gidginbung mine produced 0.7Moz Gold
- ▶ Five porphyry and epithermal deposits
  - ▶ Combined 240Mt @ 0.3 % Cu, 0.3 g/t Au
  - ▶ 0.73Mt Copper and 2.2Moz Au
- ▶ Potential for major open pits or block cave
- ▶ Shallow cover <70m masks deposits
- ▶ Recent success at Donnington prospect
  - **77m @ 0.44% Cu and 0.65 g/t Au from 349m – including.**
  - **24m @ 0.87 % Cu and 1.38 g/t Au from 402m**
- ▶ Drilling still open





## Detailed Interpretation of Belt

- Ordovician Volcanic Complex
- Major shear zone, strongly attenuated deposits at Yiddah etc
- High sulphidation and Porphyry systems within 3 km at Gidginbung-Dam
- Large Rain Hill Intrusive complex
- Major zones of highly anomalous  $> 0.5$  g/t Au and 900 ppm Cu
- Margins of Rain Hill intrusive complex show strong geochemistry from a number of fractionated intrusives
- Opportunity to use new techniques to discover the next high grade deposit
  - Short wave infra-red (SWIR) analysis
  - Multi-element geochemical signatures of typical systems
  - Reprocessing and interpretation of historical geophysics
  - New high current IP and close spaced gravity
  - Green rock analysis of alteration systems
  - Pyrite geochemistry
  - Sulphur isotopes
  - Detailed structural mapping of displaced systems
  - Target zones of high temperature in multiphase systems



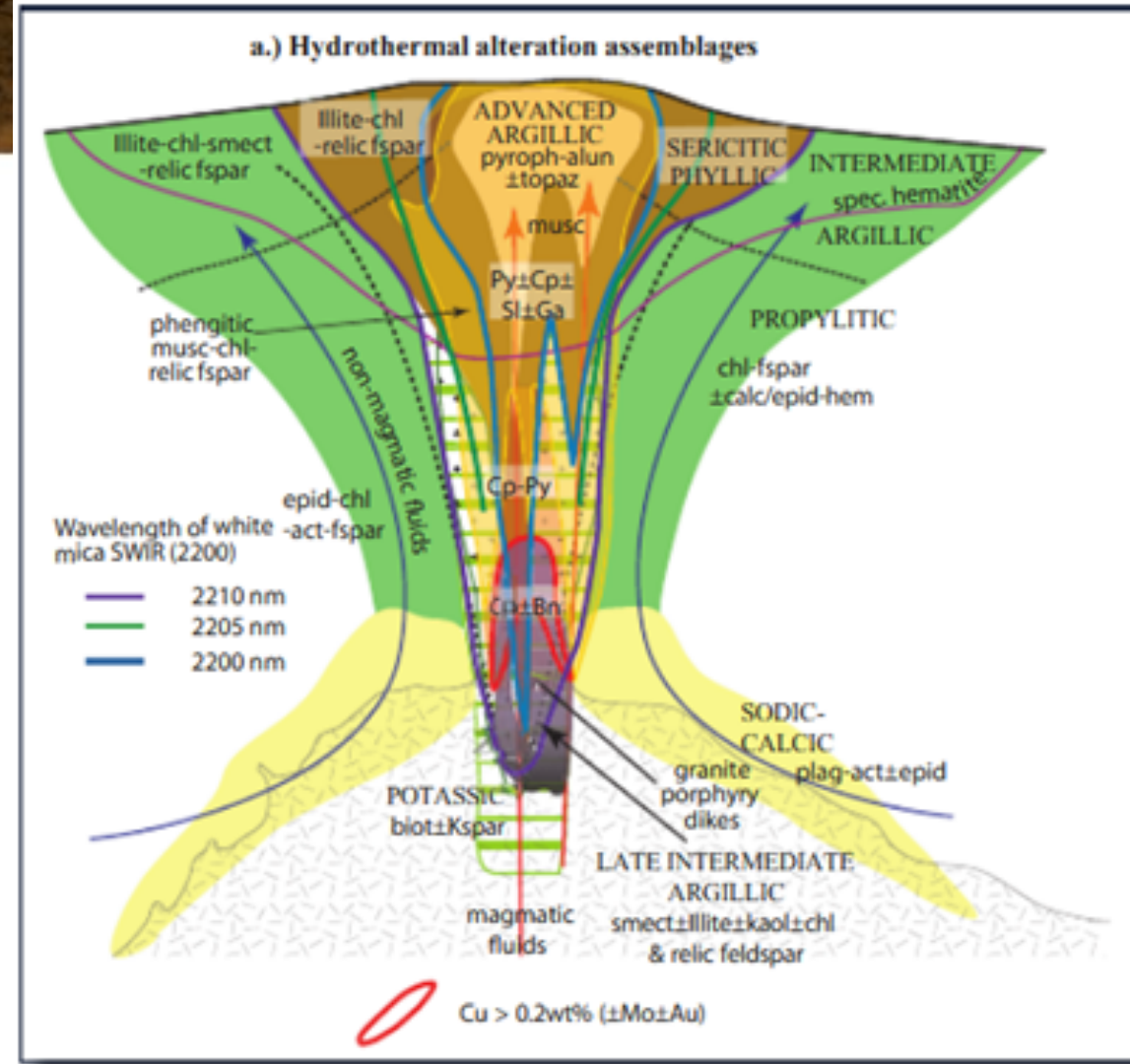


# Temora Project

- Short Wave Infrared (SWIR) analysis and re-logging of ~4,000 historical drill holes, both core and pulps
- Multi-element geochemistry on all aircore EOH
- Interpretation of the SWIR hydrous minerals' (e.g. micas, clays, hydrous sulphates) spectra and individual crystallinity,
- Lowest wavelength white mica 2200nm peak shows highest temperature
- The illite crystallinity is measured by calculating the depth of 2200nm absorption peak divided by the H2O absorption peak at ~1900nm. (Low water = high crystallinity)



Collection of ASD on Sandfire owned ASD machine in West Wyalong

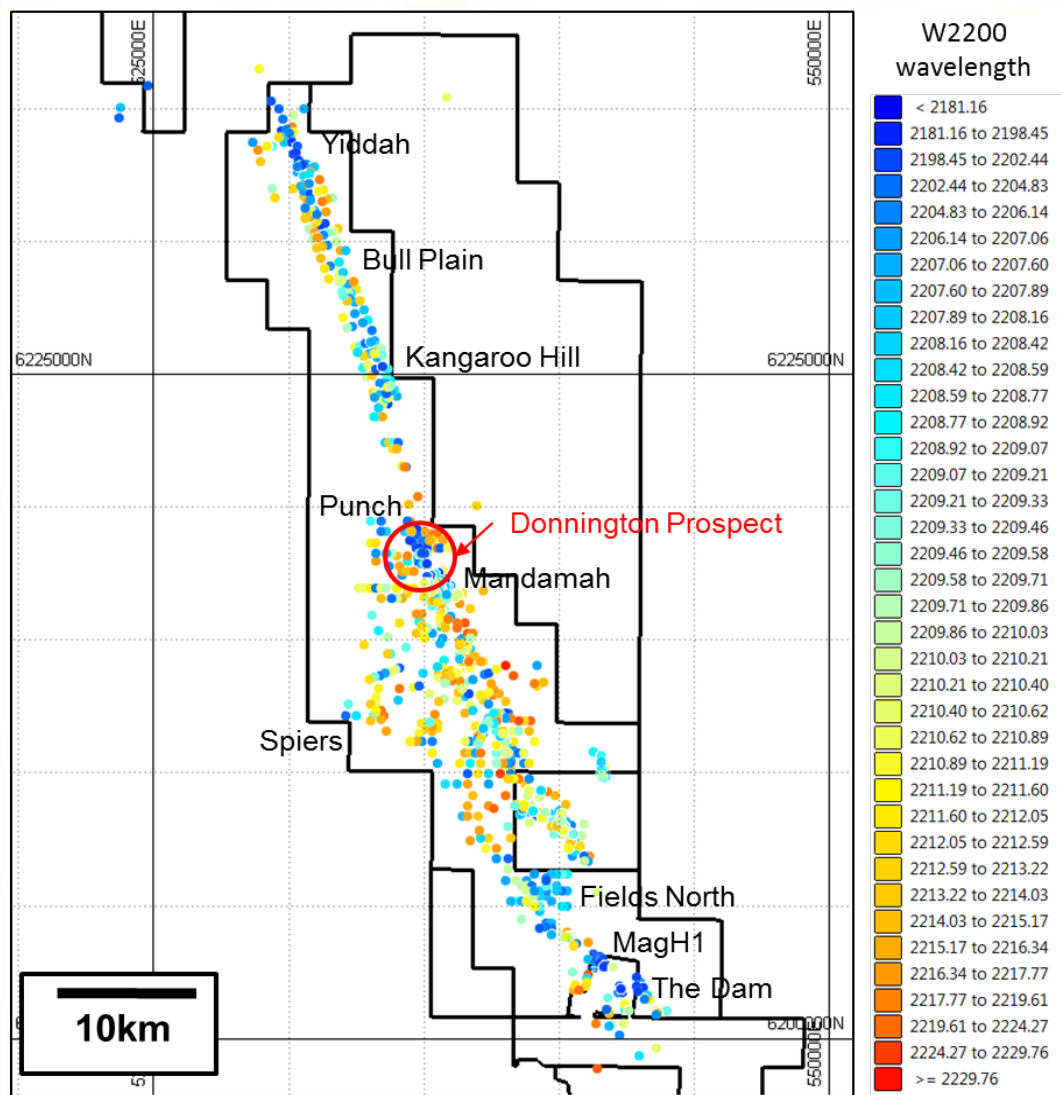


Vertical cross section of a typical porphyry Cu deposit showing distribution of hydrothermal alteration and sulfide minerals. Also shown are generalized contours of the 2,200-nm peak measured in SWIR instruments- from Halley et.al. 2015.

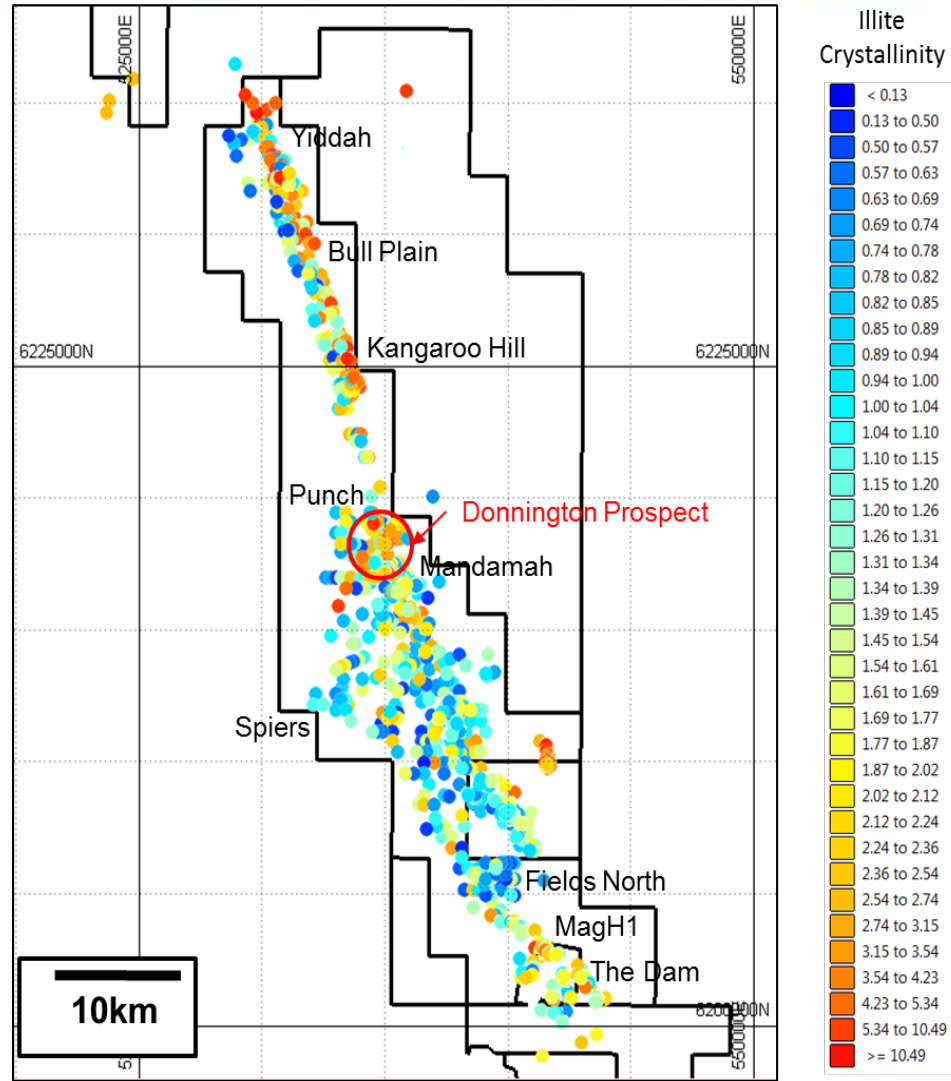




# Temora Project



Plan showing spatial distribution of the 2200nm wavelength absorption peak associated with white micas over Temora tenements

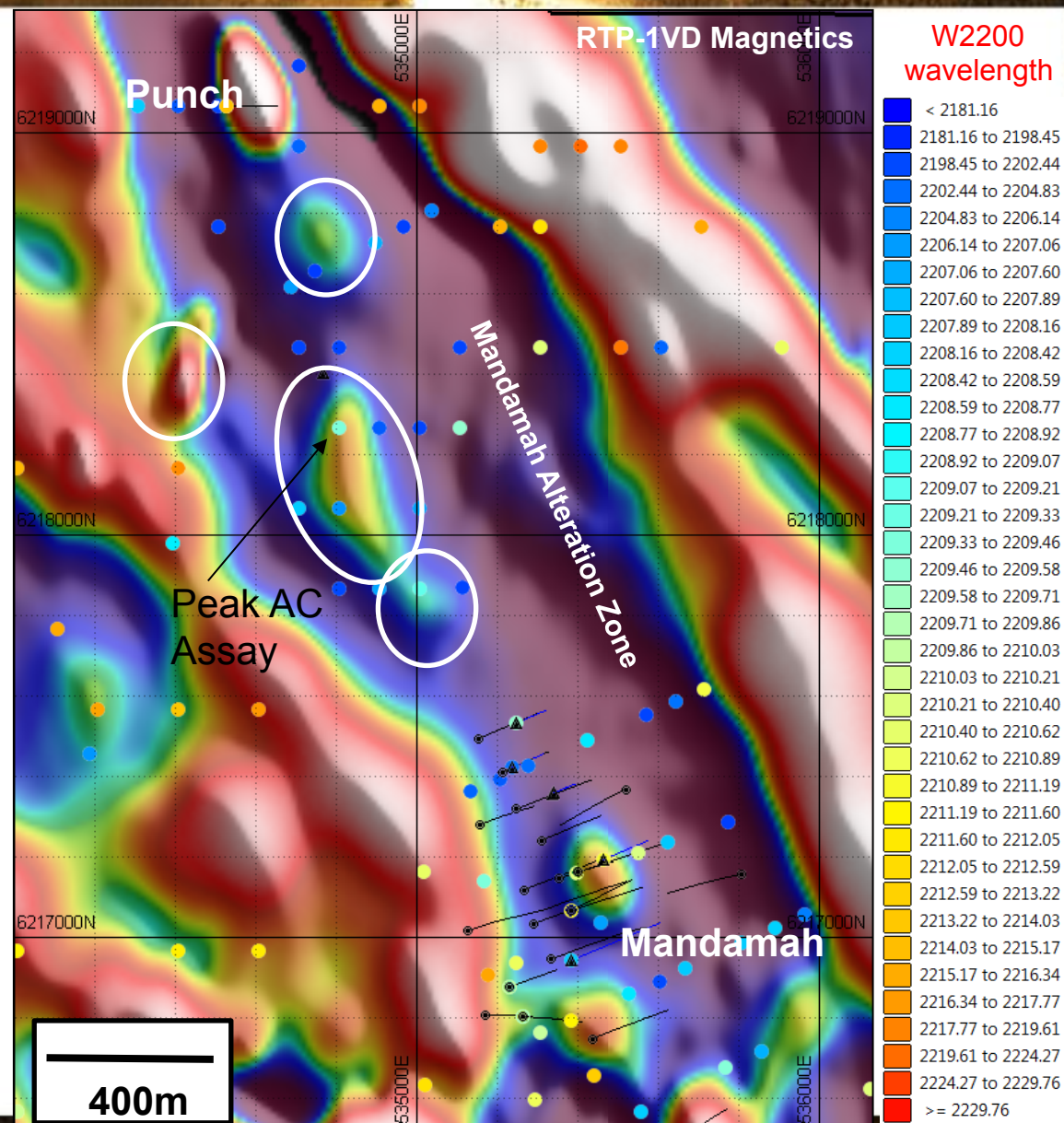


Plan showing Illite Crystallinity over Temora tenements.



# Donnington Prospect

- Newly defined prospect from Sandfire appraisal
- Untested by RC or DDH;
- Intense/proximal phyllic alteration defined by shortest W2200 wavelength.
- Intense phyllic alteration is coincident with major NW-trending magnetic low corridor (*Mandamah Alteration Zone*).
- Circular to ovoid magnetic anomalies with similar signature to Mandamah (31Mt @ 0.3g/t Au & 0.3% Cu) and Punch within the MAZ;
- Main central magnetic anomaly coincident >0.1g/t max in hole AC Au anomaly
- Significant EOH AC Anomalism
  - *33m @ 0.10% Cu (EOH) incl. 8m @ 0.43g/t Au, 0.06% Cu & 18ppm Mo*
- Coincident IP chargeability anomaly indicative of pyrite shell and intense proximal phyllic alteration.



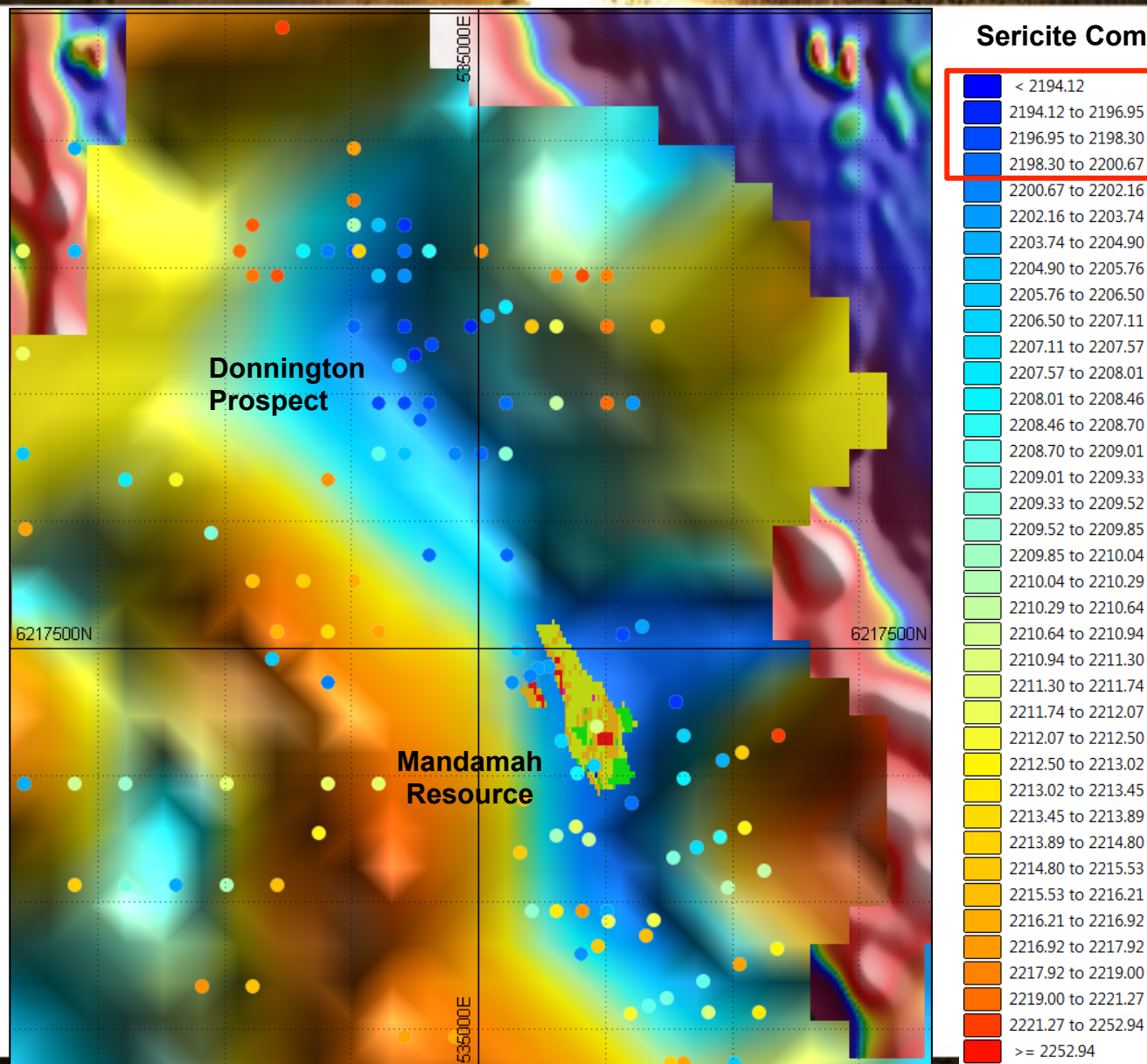
W2200 wavelength on 50m RTP-1VD Aeromag



# Donnington Prospect

## Trace Element Geochemistry

- In unaltered rocks divalent elements Mn and Zn substitute for Fe in amphiboles and pyroxenes;
- In phyllic/advanced argillic zones where all hornblende is altered to chlorite and then sericite, all Mn and Zn are stripped from the rock.
- On the margins of the acid alteration where there is some relict feldspar to neutralise the acid a doughnut of Mn and Zn enrichment forms.



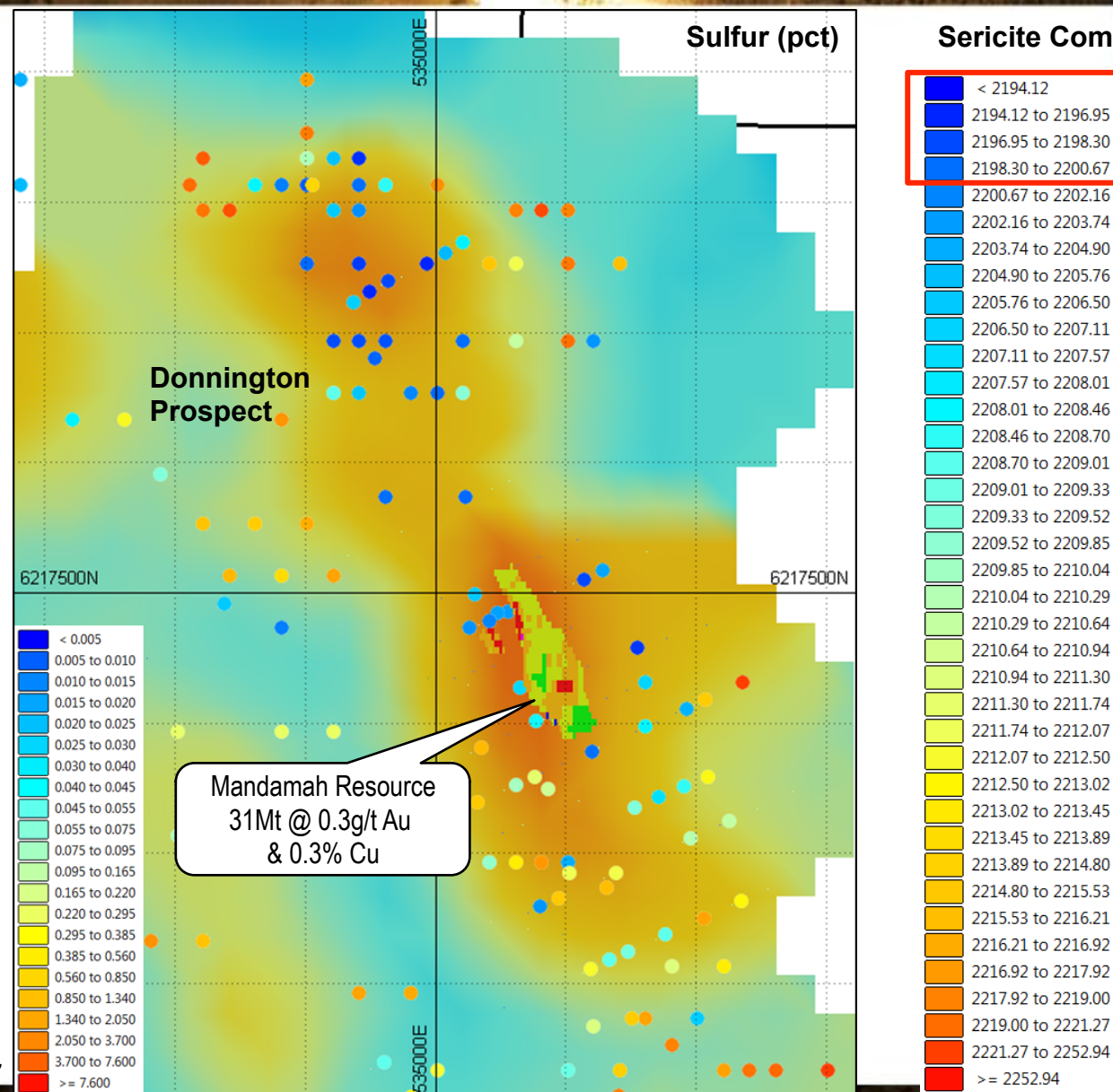
Gridded Historic Assay Pulps - Manganese



# Donnington Prospect

## Trace Element Geochemistry

- Broad sulfur anomaly correlates well with disseminated pyritic sulphide at Donnington;
- Sulfide abundance is associated with intense strong/proximal phyllic alteration;
- Sulfur highlights pyrite shell to the Mandamah resource and correlates well with historic IP survey;



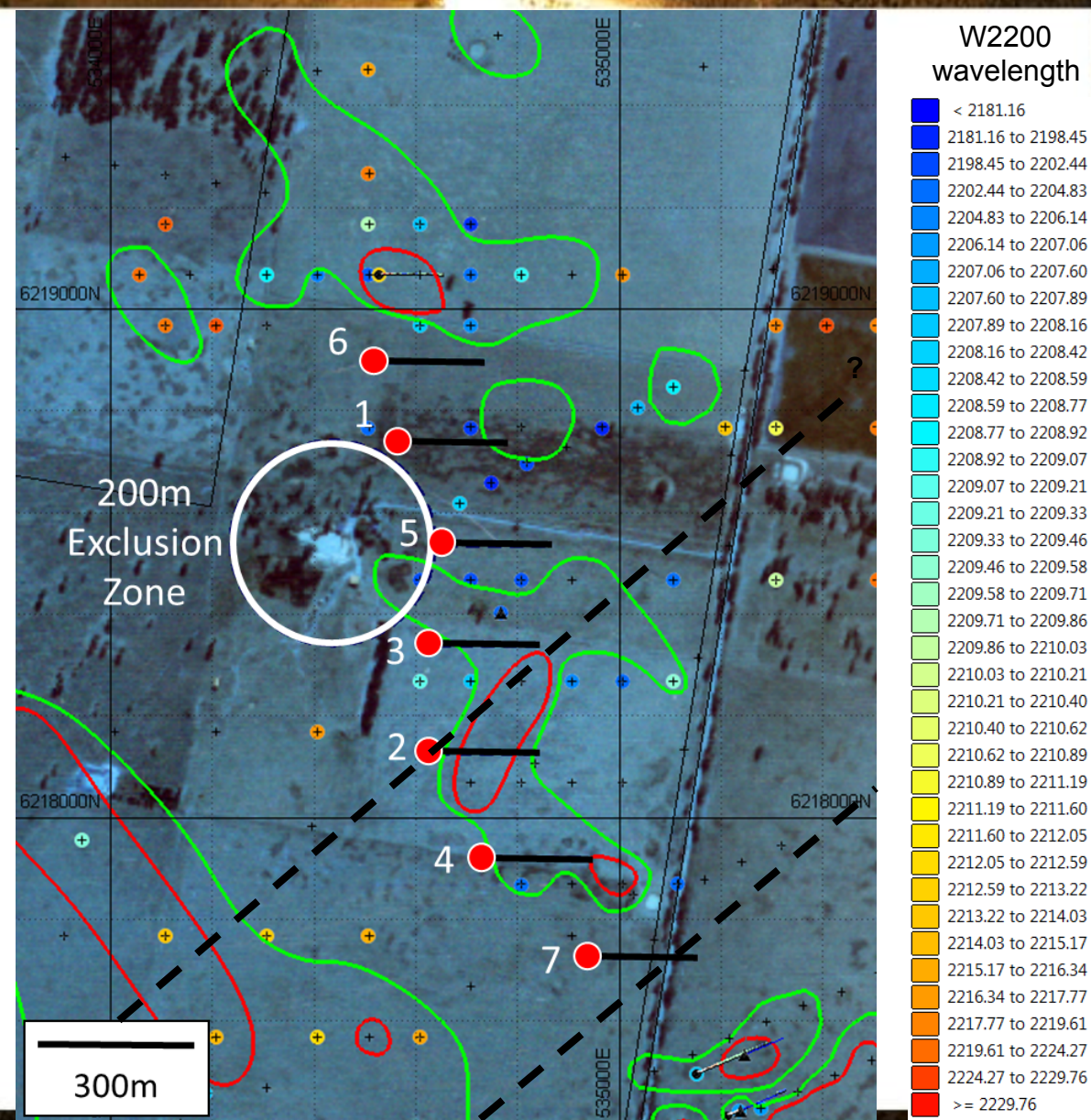
Sericite Composition on Gridded Historic Assay Pulps - Sulfur



# Donnington Prospect

## Proposed Drilling

- Proposed drill program aimed to provide a complete test of the 1.5km strike length of Donnington Prospect between Mandamah and Punch.
- Aircore infill, New IP survey.
- Summary of Proposed Targets
  - Circular magnetic intrusions;**
  - Surrounding magnetite destructive alteration of wallrock;**
  - Coincident Au-Cu-Mo geochem;**
  - Intense phyllic alteration;**
  - Intense/proximal porphyry W2200 signature;**
  - Strong Illite Crystallinity;**
  - Strong sulphur abundance present as disseminated pyrite.**
  - No drill testing beneath interpreted alkalic lithocap;**





# Donnington Prospect, Temora

- ▶ 8 holes to date – 1.2km mineralised strike
- ▶ Mineralisation extended along strike, down- dip to >700m and up-dip
- ▶ Significant results include:

TMRC06: 125m @ 0.32% Cu, 0.46g/t Au

**including 44m @ 0.41 % Cu, 0.62 g/t Au**

TMMRD011: 77m @ 0.44% Cu, 0.65g/t Au

**including 24m @ 0.87% Cu, 1.38 g/t Au**

TMMRD014: 40m @ 0.26% Cu, 0.36g/t Au

36m @ 0.25% Cu, 0.24 g/t Au

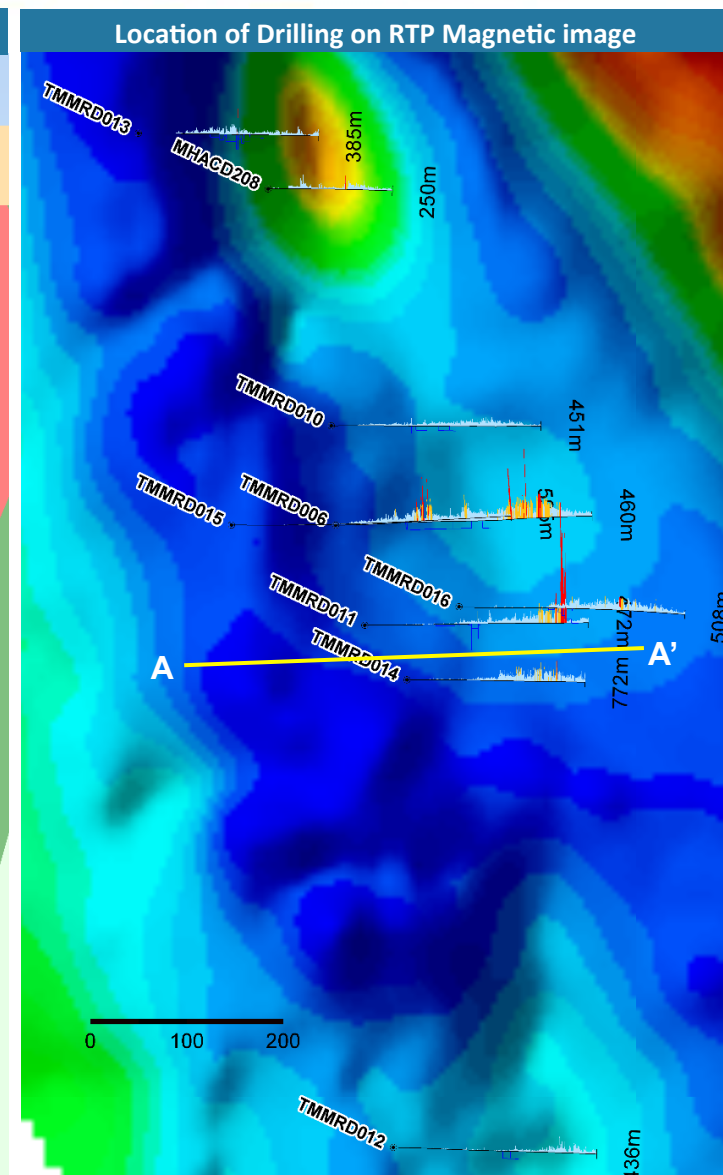
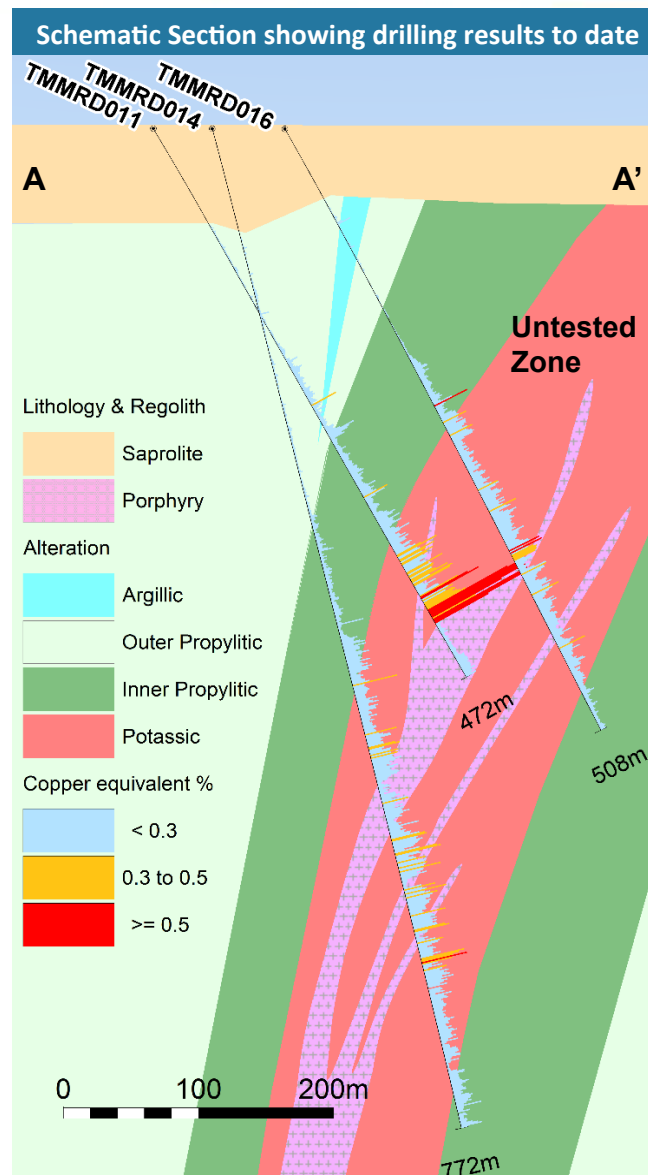
TMMRD015: 25m @ 0.31% Cu, 0.48g/t Au

22m @ 0.24% Cu, 0.39 g/t Au

TMMRD016: 48m @ 0.21% Cu, 0.20 g/t Au

21m @ 0.24% Cu, 0.21 g/t Au

Refer Appendix Table 5 for full Donnington results  
Refer ASX announcement “Sandfire June 2017 Quarterly Report” dated 28 July for JORC report

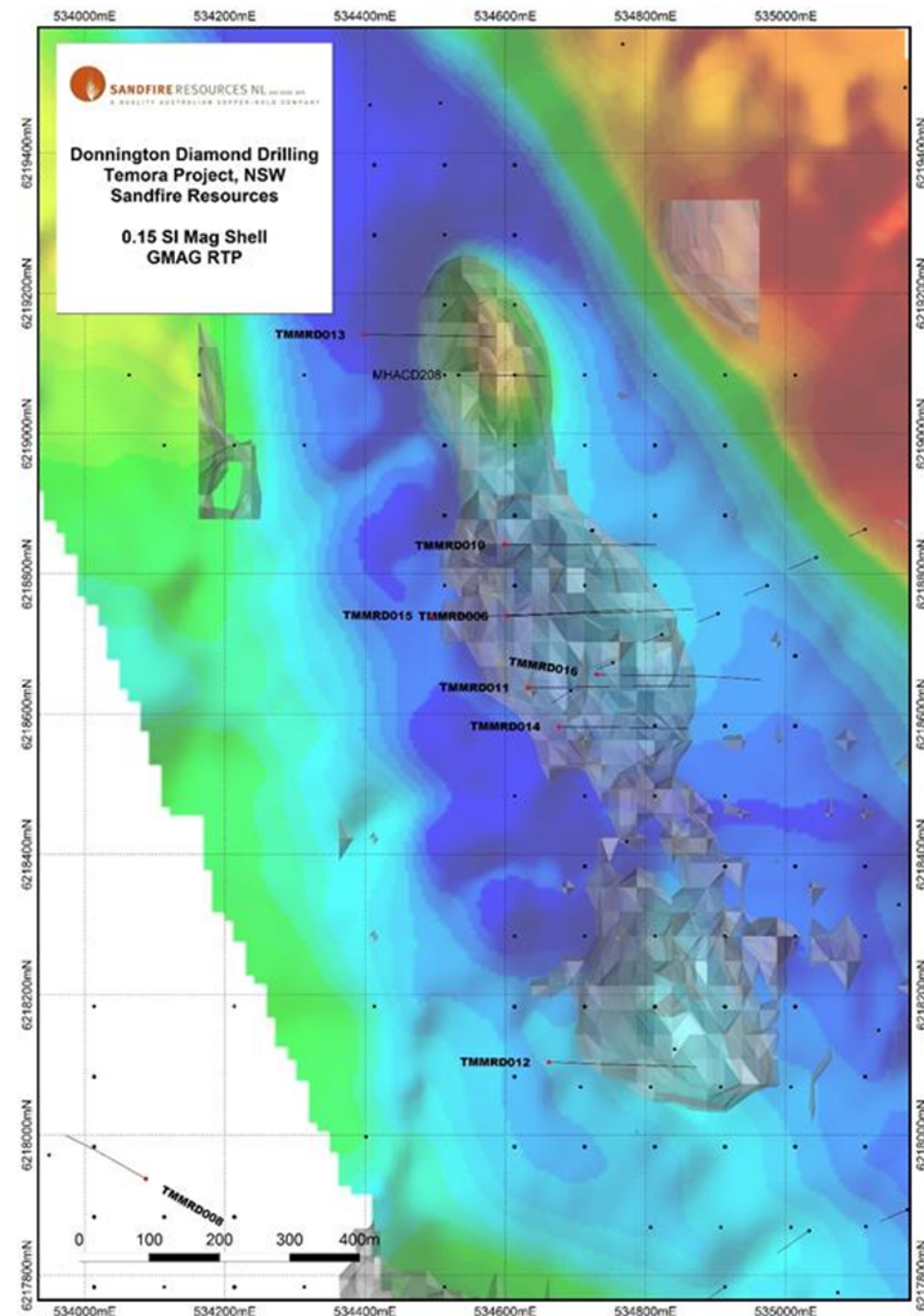
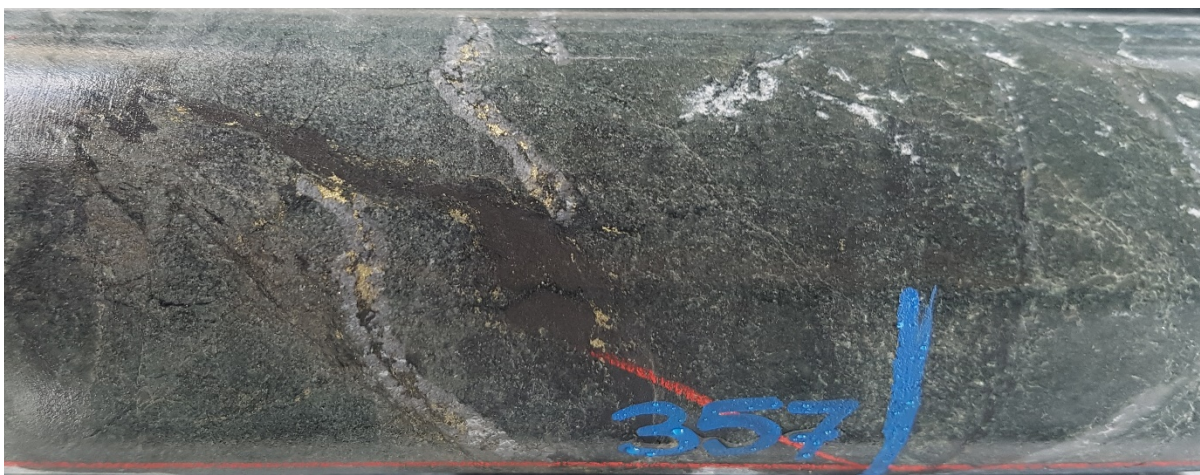




# Donnington Prospect

- ▶ Strong correlation with magnetic anomaly
- ▶ Mineralisation is associated with potassic altered narrow porphyry dykes and quartz-magnetite-chalcopyrite and pyrite
- ▶ Quartz-magnetite-feldspar-pyrite-chalcopyrite veins are associated with a chlorite-magnetite-carbonate alteration.
- ▶ A later quartz-sericite-pyrite alteration postdates the mineralisation

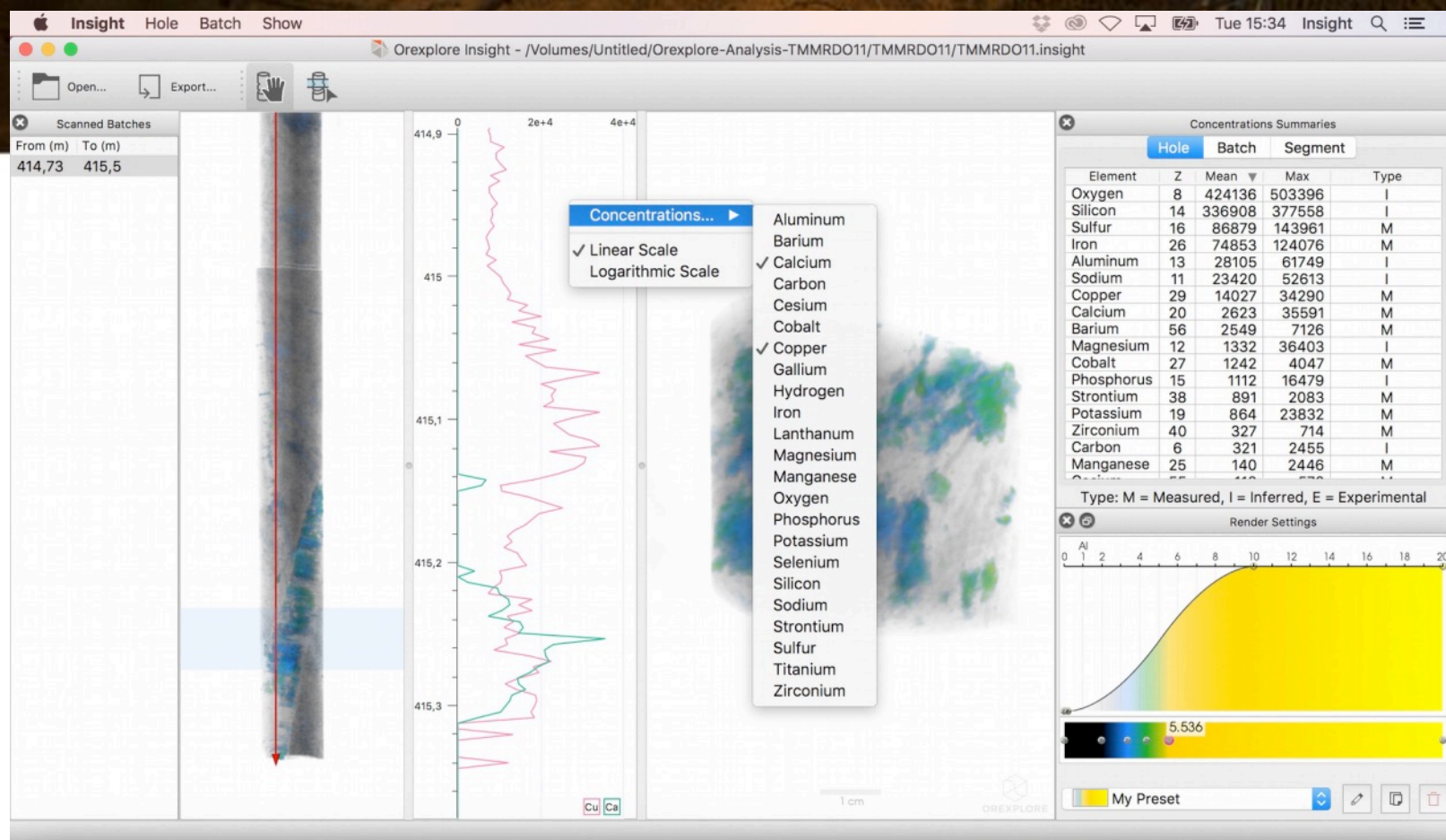
**TMMRD011 Quartz and magnetite veining with magnetite-chalcopyrite centreline**





# Orexplora

- ▶ New tool being developed in Sweden, supported by Swick Drilling
- ▶ Detailed Photography
- ▶ XRF scanning of whole core on 8mm basis
- ▶ Detailed analysis of multi-element
- ▶ X-ray Computed Tomography
- ▶ Like a x-ray bone scan
- ▶ Highlight variable 'density' minerals









# Conclusion

- ▶ Prospective belt acquired
- ▶ New technology utilised on historical data
- ▶ Success in defining new mineralised system in first year of program
- ▶ Donnington open with potential for increased grade and size
- ▶ Number of further high priority targets
- ▶ Margins of Rain Hill Intrusive highly prospective
- ▶ Significant known resources to be unlocked
- ▶ New techniques to continue working on
- ▶ Access to all prospective ground important



Follow-up diamond drilling underway at the Donnington porphyry copper-gold prospect, Temora Project, NSW





# Donnington, NSW Intercepts table

**Table 5 – Donnington Drill holes**

Prospect	Hole Number	Easting (m)	Northing (m)	total depth (m)	azimuth	dip	Depth From (m)	Interval (m)	C (%)	Au (g/t)
Donnington	TMMRD006 <i>including</i> <i>and</i>	534602	6218740	460	90	-60	287	125	0.32	0.46
							314	44	0.41	0.62
							364	28	0.39	0.61
	TMMRD010	534598	6218842	451	90	-60	325	2	0.24	0.18
	TMMRD011 <i>including</i>	534633	6218638	472	90	-60	349	77	0.44	0.65
							426	24	0.87	1.38
	TMMRD012	534662	6218104	436	90	-61	385	11	0.2	0.21
	TMMRD014	534676	6218582	772	91	-75	395	26	0.19	0.22
							468	34	0.24	0.28
							517	17	0.19	0.25
							540	40	0.26	0.36
							587	34	0.25	0.33
							628	36	0.25	0.24
							641	5	0.51	0.38
	including	748	8	0.15	0.26					
	TMMRD015 <i>including</i>	534495	6218740	595	91	-61	389	25	0.31	0.48
398							16	0.36	0.59	
420							12	0.36	0.62	
491							22	0.24	0.39	
including	499	9	0.3	0.52						
TMMRD016	534730	6218657	508	102	-60	245	21	0.24	0.21	
						301	48	0.21	0.2	
						354	15	0.3	0.22	
						387	10	0.24	0.27	
Punch	MHACD208	534533	6219084	250	90	-60	64	15	0.11	0.32
	TMMRD013	534398	6219141	385	90	-60	196	10	0.17	0.23

Reported Mineralisation at >0.3 % CuEq (Cu x 0.55 Au), including at >0.5 % CuEq with up to 3m internal dilution. Intercepts <10 m excluded  
Hole collars at 236mRL in MGA94 zone 55.