



# Kempfield Polymetallic Project Discovering Rich New Horizons

**Mines and Wines, Orange NSW  
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## Capital Structure

ASX Codes	ARD, ARDO
Share price <sup>1</sup>	\$0.031
Option price <sup>1</sup>	\$0.009
Shares on issue	421.4 M
Listed options on issue <sup>2</sup>	117 M
Market capitalisation <sup>1</sup>	\$13.1 M
Cash <sup>3</sup>	\$2.03 M
ASX Listing	3 April 2008
Top 20 shareholders <sup>1</sup>	36.01%

1. As at market close 15 August 2017.

2. Listed options, \$0.10 strike price and 27 June 2019 expiry.

3. As at 30 June 2017

## Acknowledgements

NSWTI New Frontiers Cooperative Drilling

Prof. Ross Large

Prof. Tony Crawford

Dr. Jeff Steadman

Dr. Wally Herrmann

## Summary of Key Milestones

Kempfield Polymetallic Project

Volcanogenic Stratigraphy reviewed and revised

- Regional Stratigraphy
- Mine Sequence Stratigraphy
- Controls on Mineralisation

Greater Kempfield Mapping Project initiated

- Realistic limits of mineralisation extended
- Relationship with Distal Mineral Occurrences
- Kempfield South and West for completion

### Mineralisation

- Resource Infill to complement exploration drilling
- 3D Geological Model under construction
- Pyrite Study to complement geochemical vectoring to mineralisation
- Footwall Cu-Au exploration

### Feasibility

- Metallurgical testwork initiated
- Mine design and economic review to follow infill drilling

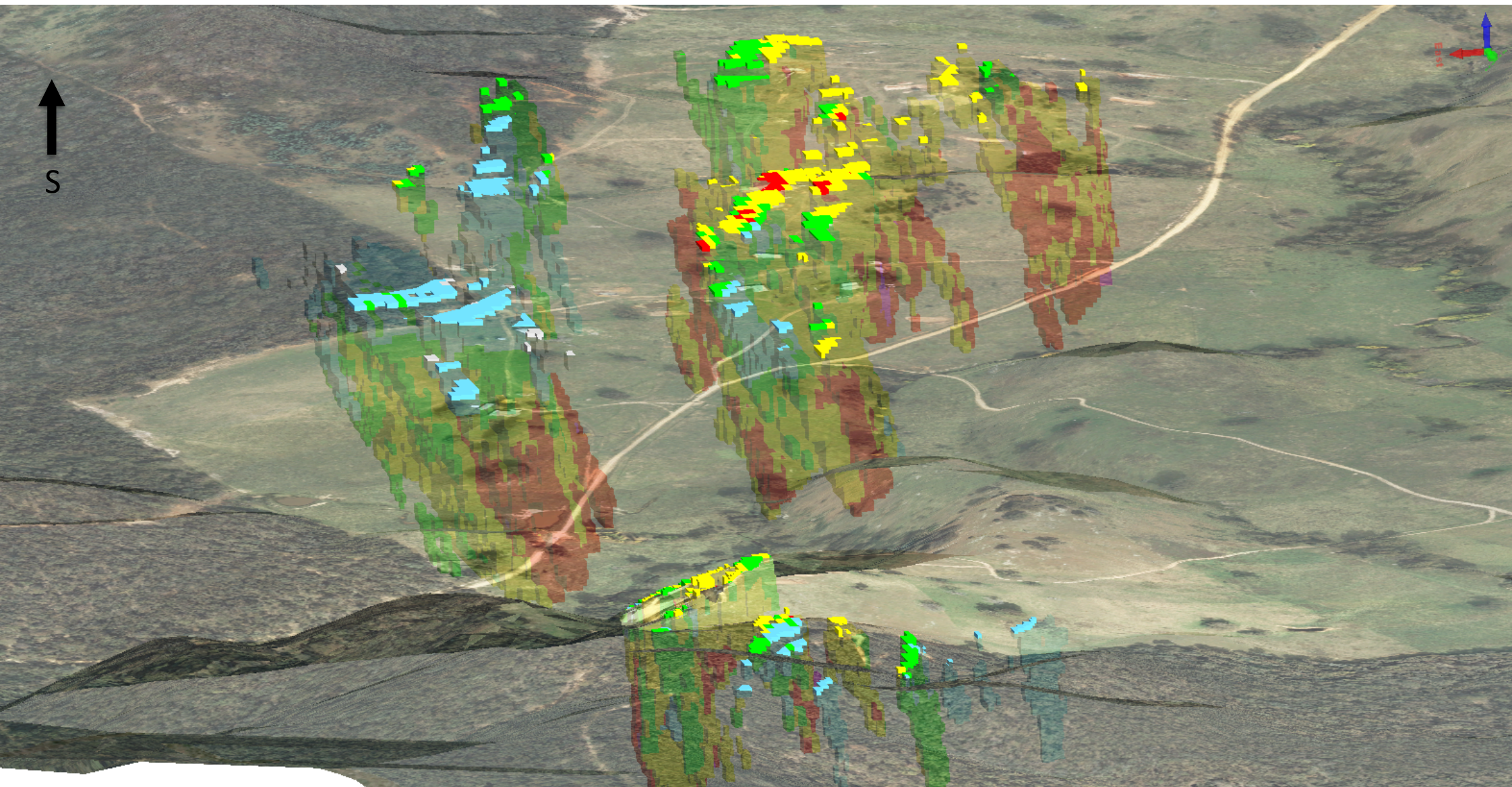


# KEMPFIELD POLYMETALLIC PROJECT



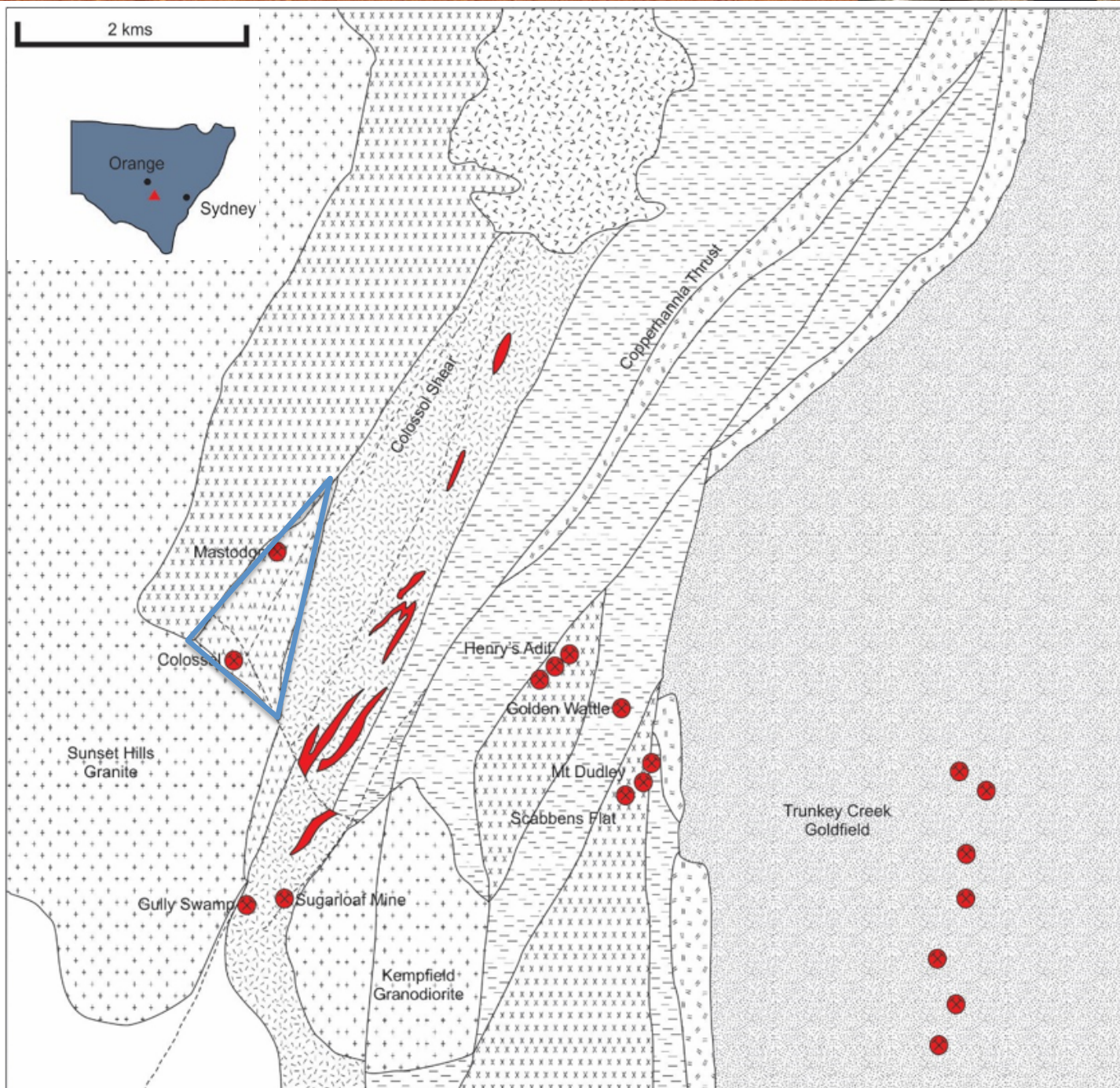


# 3D MODEL





# REGIONAL GEOLOGY



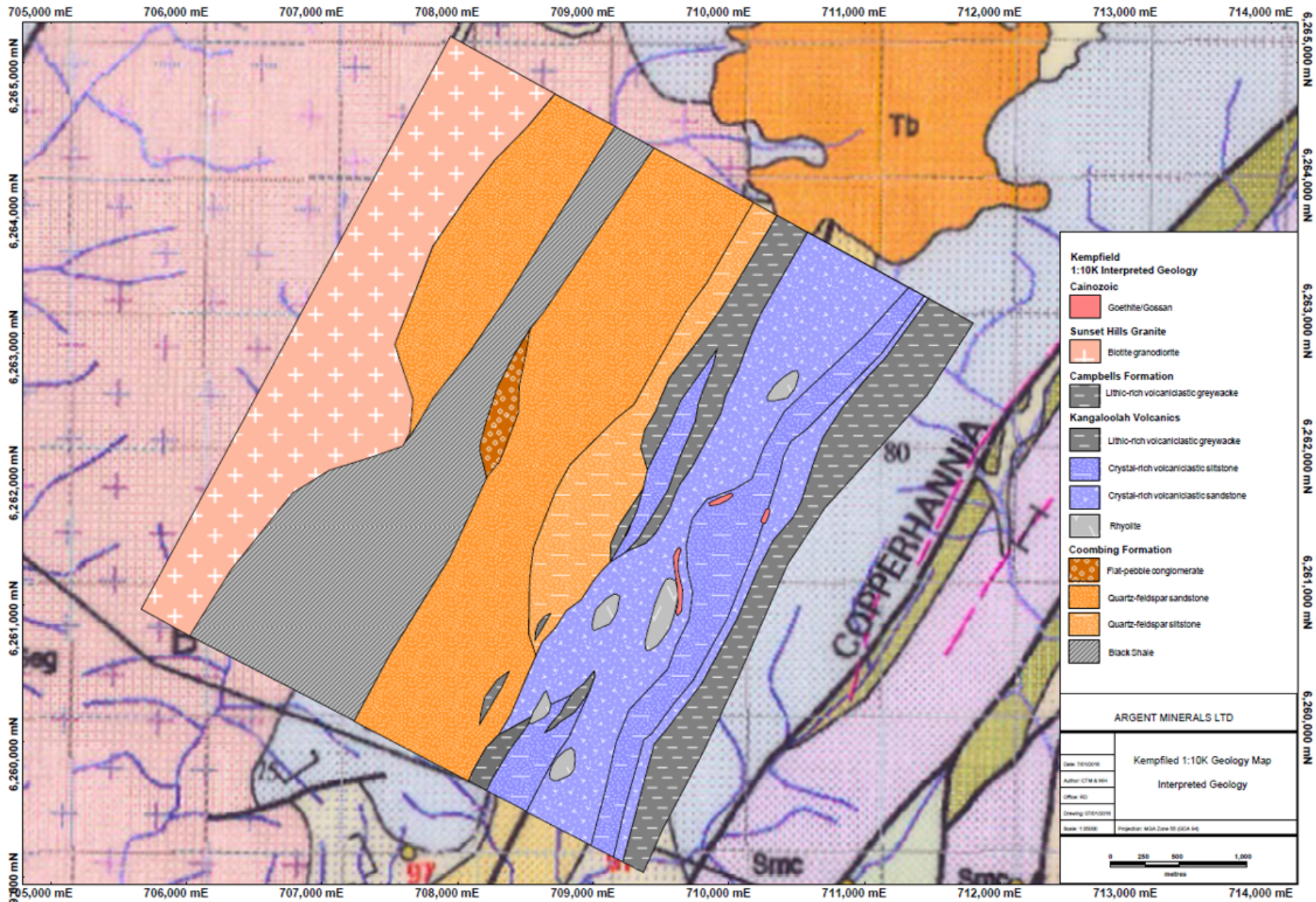
## Legend

- Fault
- ⊗ Old Workings
- ⊕ Granite
- CAINOZOIC Basalt
- DEVONIAN siltstone, volcaniclastics, andesite (*undiff.*)
- SILURIAN basic volcanics (Box Ridge Volcanics)
- siltstone, shale, limestone, volcaniclastics (Campbells Formation)
- volcaniclastics, rhyolite (Kangaloolah Volcanics)
- Kempfield Silver - Barite lode horizons
- ORDOVICIAN volcaniclastics, basalt (Byng Volcanics?) ←
- siltstone, sandstone, meta-basalt (Coombing Formation)

Revised with Crawford 2017 (modified from Timms and David 2011)



# LOCAL GEOLOGY

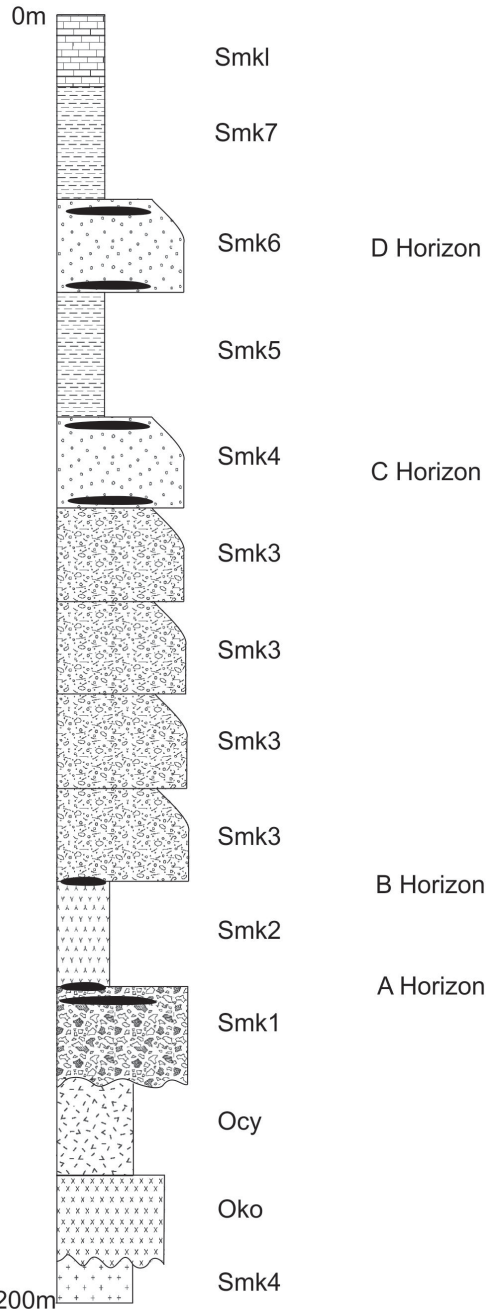


McGilvray  
and  
Herrmann  
(2015)

The distal to proximal approach – evaluating strike development of lithologies and alteration



Kempfield Stratigraphic Column



## Kempfield Geology - Resedimented and reworked volcanogenics

Smk7 – Volcaniclastic Greywacke – Fine grained, fine bedded, well-sorted, lithic rich volcaniclastic greywacke with domainal chlorite alteration interbedded with ash-rich volcaniclastic siltstone with domainal sericite alteration

Smk6 – Volcaniclastic Conglomerate/ Barite Sand – Normally graded, moderately to poorly sorted, framework to matrix supported pebble conglomerate with intensely silicified rounded to sub-rounded clasts hosted within a sandy, baritic and calcareous matrix grading into volcaniclastic sandstone and siltstone units.

Smk5 – Volcaniclastic Greywacke – Fine grained, fine bedded, well-sorted, lithic rich volcaniclastic greywacke with domainal chlorite alteration interbedded with ash-rich volcaniclastic siltstone with domainal sericite alteration

Smk4 – Volcaniclastic Conglomerate/ Barite Sand – Normally graded, moderately to poorly sorted, framework to matrix supported pebble conglomerate with intensely silicified rounded to sub-rounded clasts hosted within a sandy, baritic and calcareous matrix grading into volcaniclastic sandstone and siltstone units.

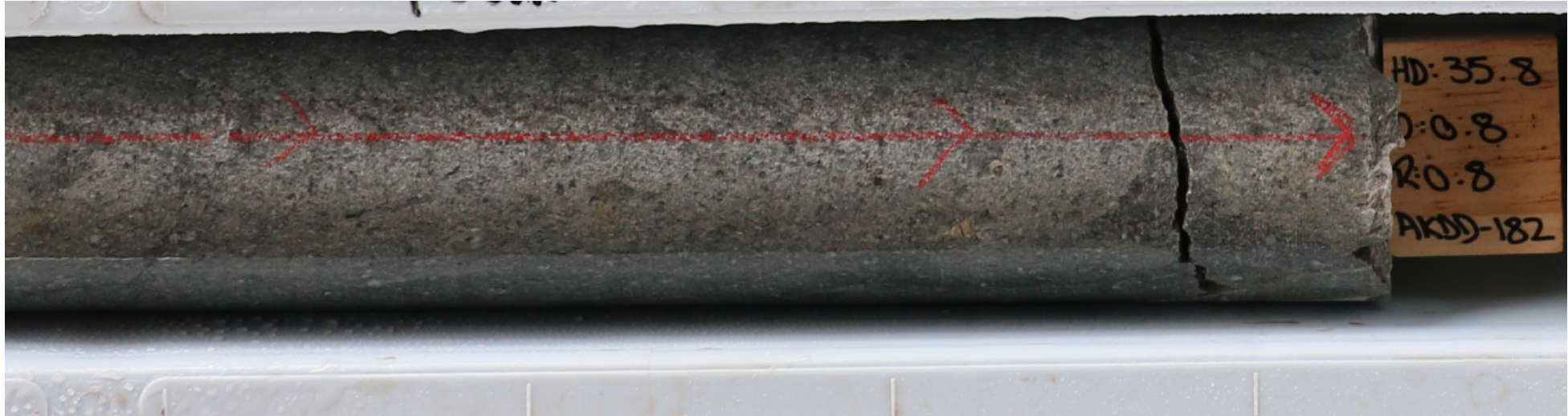
Smk3 – Epiclastic Breccia – Normally graded, poorly to well sorted, mass flow epiclastic breccia composed of framework to dominantly matrix supported sub-angular to sub-rounded clasts of volcaniclastic mudstone to sandstone, quartzite and rhyolite hosted within a sandy to silty matrix.

Smk2 – Volcanic tuff – Fine-grained, amphibole- and magnetite-phyric ash and lithic rich, pervasive chlorite altered mafic tuff and basalt flows.

Smk1 – Volcanic Breccia – Poorly sorted, matrix-supported volcaniclastic sedimentary rocks ranging from sandstone to pebble-breccia with a silty to sandy matrix and angular to sub-angular polymictic clasts. The detrital grain population was originally dominated by lithic clasts of formerly glassy felsic lava with common quartz and feldspar phenocryst detritus. The silty matrix is interpreted as comminuted glassy, vitroclastic material however intense hydrothermal alteration has obliterated shard or bubble-wall textures. Strongly foliated, formerly glassy, quartz- and feldspar-phyric rhyolite or rhyodacitic lavas/domes are encompassed within this member.



## Smk1a – Volcanic Breccia



AKDD182 – HQ3 from 35.5m to 35.8m – Volcanic Breccia – angular, ragged, monomict, glassy, rhyolite juvenile clasts hosted in a crystal-rich, quartz-dominated, volcanoclastic sandstone matrix

AKDD189 – PQ3 from 39.0 to 39.2m – Volcanic Breccia – Subangular, curvi-planar and tabular, monomict rhyolite clasts hosted in an ash-rich, volcanoclastic siltstone matrix

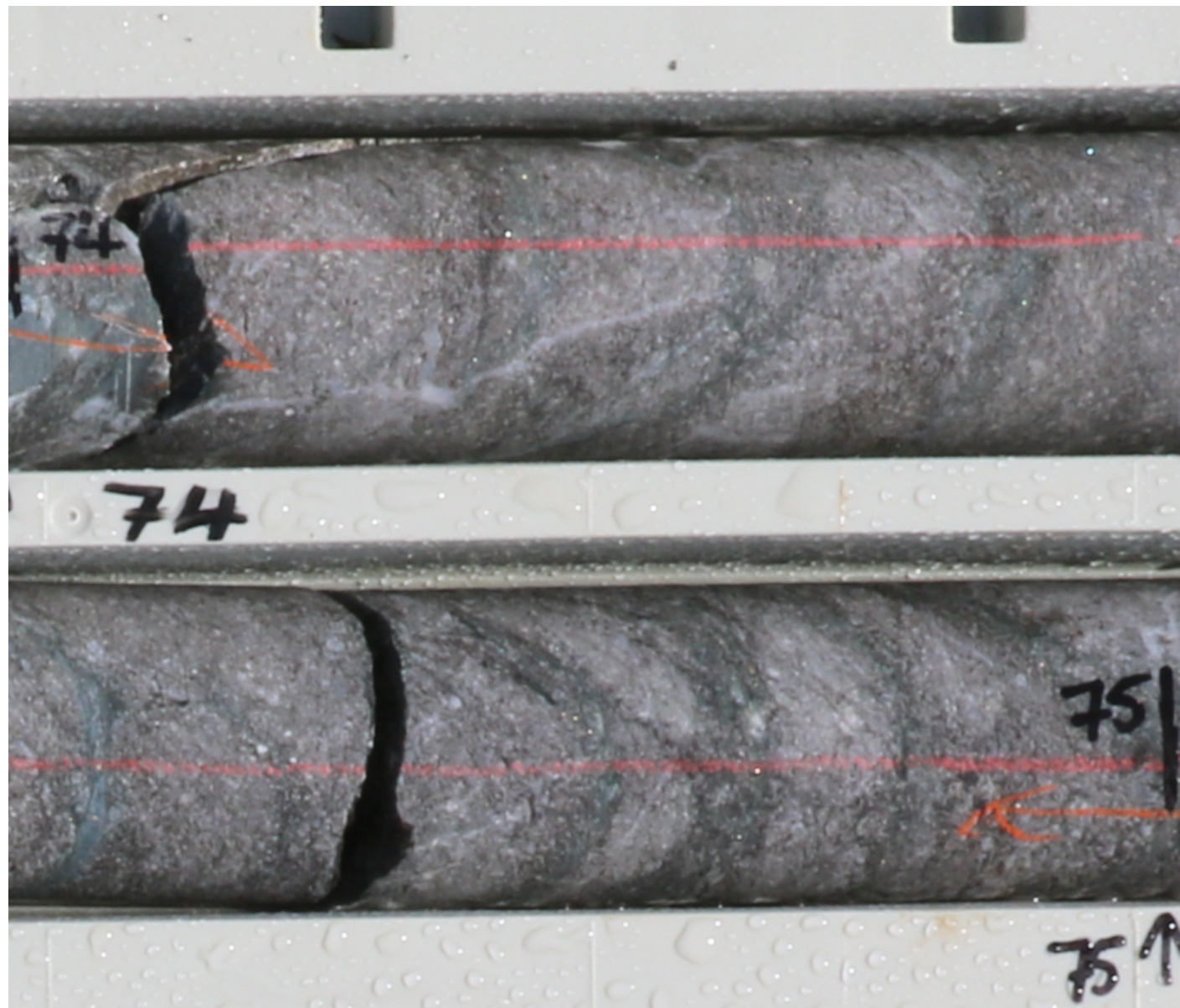






## Smk1b – Rhyolite

AKDD189 – HQ3 from 74.0m to 74.2m & 74.8m to 75.0m – Rhyolite – Massive feldspar- and lesser quartz-phyric, coarse grained, rhyolite, possibly autoclastic.





## Smk2 – Tuffaceous volcanoclastics and basalts

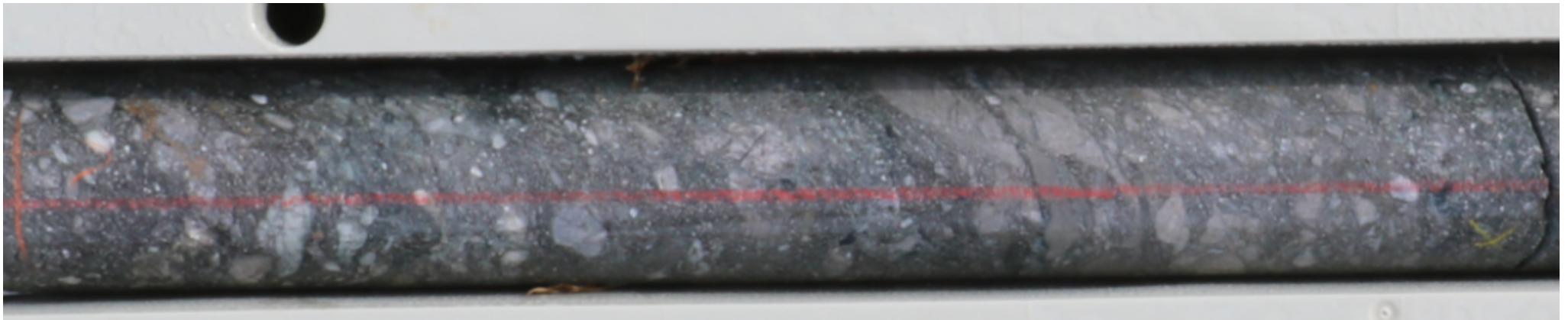


AKDD189 – HQ3 from 227.3m to 227.8m – Thinly bedded, fine grained, amphibole-phyric, magnetite bearing, ash-rich, volcanoclastic tuff with domainal chlorite alteration

Note: Assays typically 0.1% Ni; 0.2% Cr & 100ppm Co.



## Smk3 – Mass Flow Epiclastic Breccias



AKDD189 – HQ3 from 198.3m to 198.5m – Mass flow epiclastic breccia– Normally graded, angular to sub-rounded, polymict, breccia composed of dominantly crystal and lithic clasts with a formerly vitriclastic volcanoclastic sandstone matrix.



## Smk4 – Volcaniclastic Conglomerate



AKDD183 – HQ3 from 105.5m to 105.9m – Volcaniclastic Conglomerate – Normally graded, sub-rounded to rounded, monomict conglomerate composed of dominantly crystalline chert clasts with a formerly vitriclastic volcaniclastic sandstone to siltstone matrix.



AKDD183 – HQ3 from 144.2m to 144.5m – Volcaniclastic Conglomerate – Normally graded, sub-rounded to rounded, monomict conglomerate composed of dominantly crystalline chert clasts with a formerly vitriclastic volcaniclastic sandstone to siltstone matrix (1.2m @ 2.95% Pb; 0.33% Zn; 80g/t Ag; 0.2g/t Au & 0.001% W)



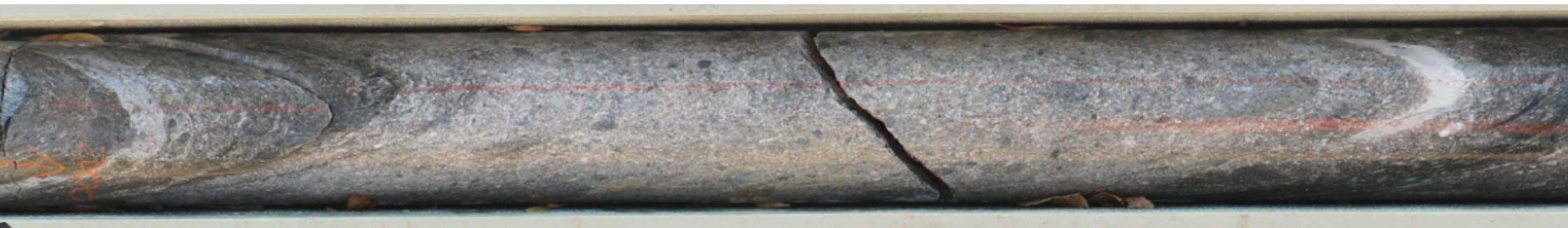
## Smk5 – Volcaniclastic Greywacke



AKDD184 – HQ3 from 177.2m to 177.5m – Volcaniclastic Greywacke/Siltstone – Fine grained, well sorted, rhythmic, planar interbedded volcaniclastic crystal-rich siltstone and lithic-rich greywacke.



## Smk6 – Volcaniclastic Conglomerate / Baritic Sandstone



AKDD184 – HQ3 from 200.0m to 200.4m – Volcaniclastic Conglomerate – Normally graded, sub-rounded to rounded, monomict conglomerate composed of dominantly crystalline chert clasts with a formerly vitriclastic volcaniclastic sandstone to siltstone matrix (1.0m @ 0.8% Pb; 3.12% Zn; 29g/t Ag; 0.2g/t Au & 0.00% Ba)

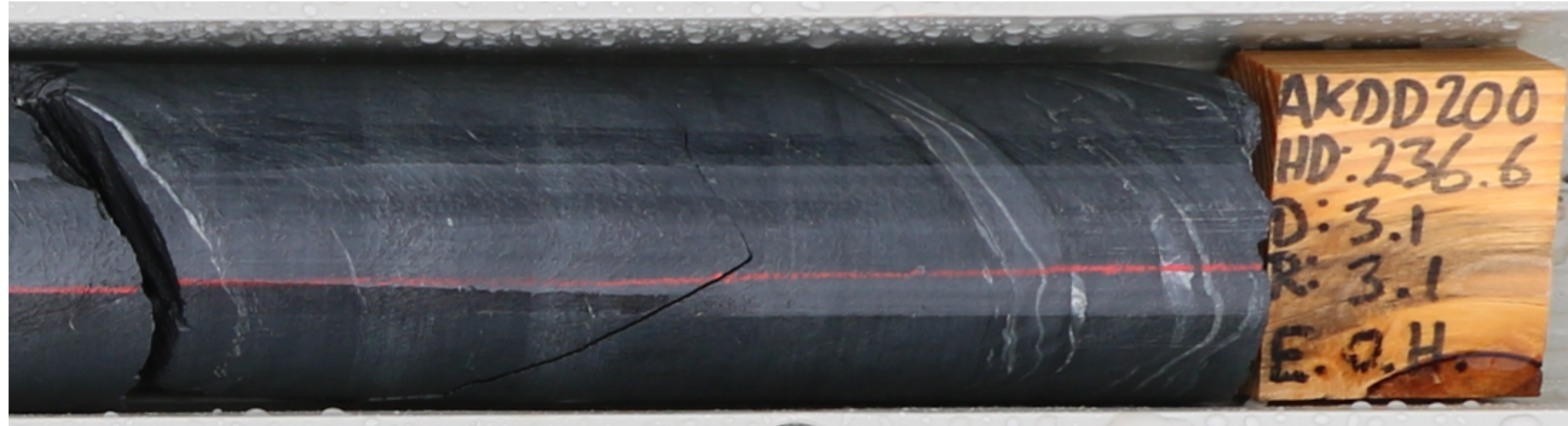


↑ 215

AKDD200 – HQ3 from 214.7m to 215.3m – Volcaniclastic Conglomerate and sandstone – Normally graded, sub-rounded to rounded, monomict conglomerate composed of dominantly crystalline chert clasts with a formerly vitriclastic volcaniclastic sandstone to siltstone matrix now dominated by barite (1.0m @ 0.9% Pb; 4.07% Zn; 86g/t Ag; 0.1g/t Au & 0.06% Ba)



## Smk7 – Volcaniclastic Greywacke / Siltstone



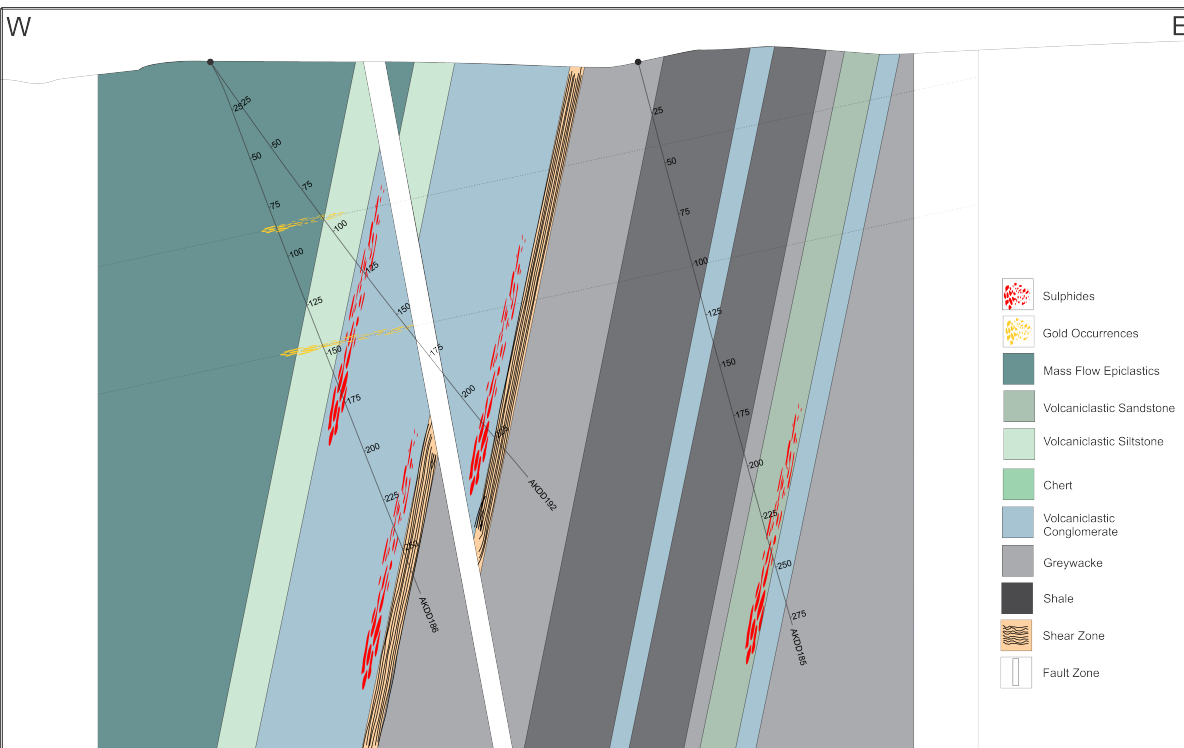
AKDD200 – HQ3 from 236.4m to 236.6m – Volcaniclastic Siltstone – Fine grained, well sorted, planar bedded, quartz-rich volcaniclastic siltstone with minor, and decreasing crystal content up-section.



# MINERALISATION

Four main horizons with lithological control in overturned geology, younging east

Horizons are truncated and juxtaposed against other horizons due to sinistral strike slip movement (e.g. Kempfield South B = Kempfield North C)





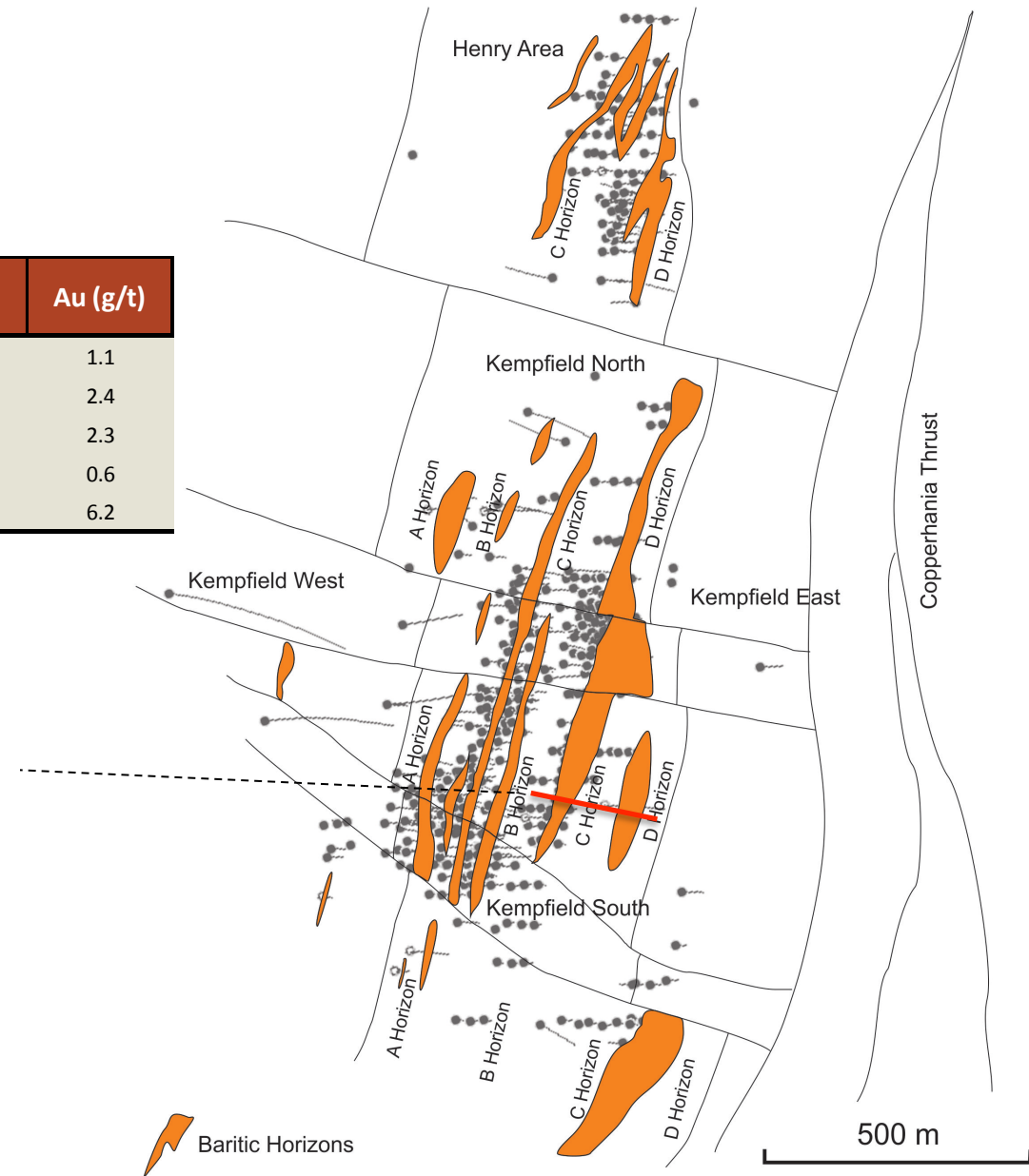
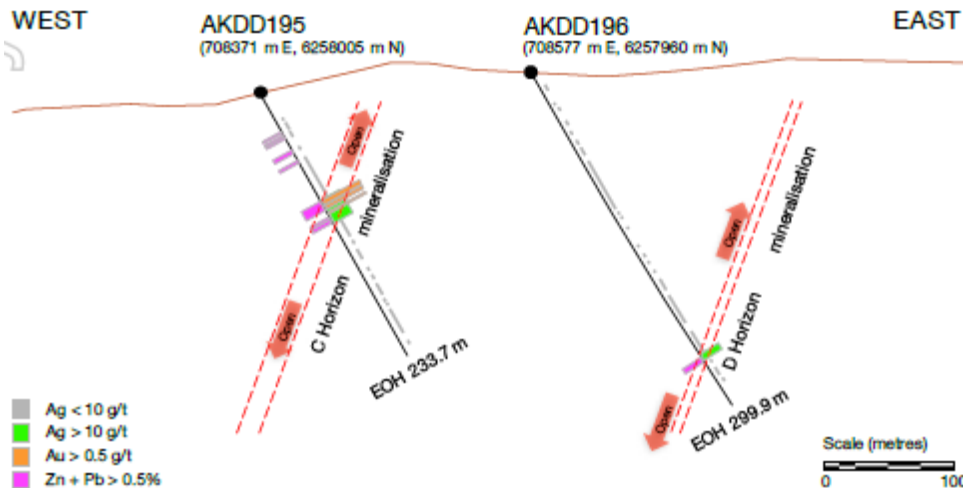
# MINERALISATION

Confirmation of revised geology and lithological controls resulting in discoveries

## AKDD195

BHID	From (m)	To (m)	Interval (m)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
AKDD195	96.0	116.3	20.3			32	1.1
incl.	97.0	104.0	7.0			47	2.4
incl.	100.9	104.0	3.1	2.4	2.3	85	2.3
incl.	102.1	103.0	0.9	5.2	0.8	172	0.6
incl.	103.0	104.0	1.0	1.1	2.2	28	6.2

## AKDD196 – 5m @ 51g/t Ag from 256.0m







## A Horizon

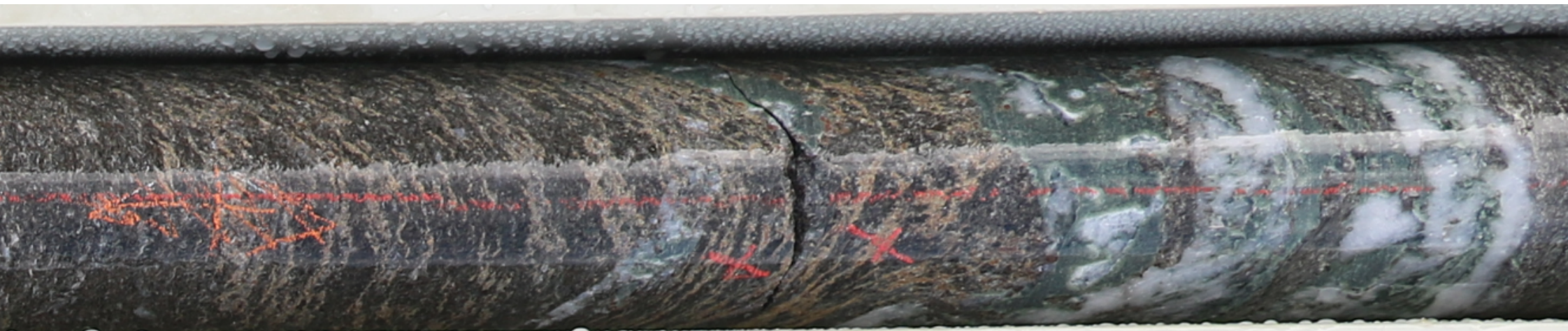


AKDD182 – HQ3 from 106.6m to 106.8m – A Horizon – Upper boundary of Smk1 to Smk2 – Fine banded and disseminated argentite (acanthite) and chalcopyrite in a strongly silicified, fracture constrained, quartz vein stockwork (106.4m to 107.4m – 1.0m @ 0.01% Pb; 0.02% Zn; 0.6% Cu; 62g/t Ag; 0.2g/t Au & 0.1% Ba) Note: 8ppm As & <5ppm Sb.





## B Horizon – Zn Number 60



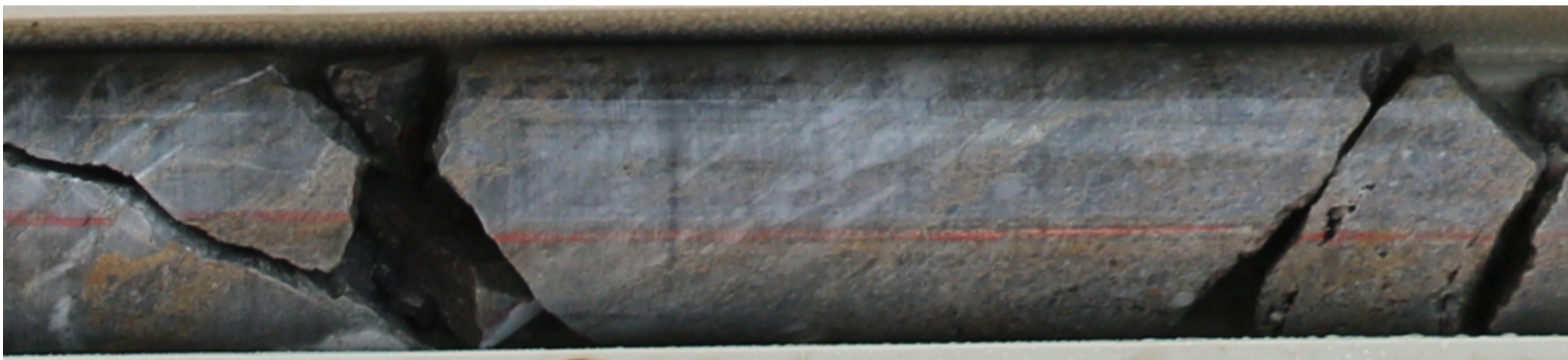
AKDD194 – HQ3 from 144.3m to 144.7m – B Horizon – Upper boundary of Smk2 to Smk3 – Fine red to yellow cleophane sphalerite with associated massive chlorite and opaline quartz and carbonate (144.2m to 144.8m – 0.6m @ 0.5% Pb; 1.9% Zn; 14g/t Ag; 0.1g/t Au & 0.1% Ba. B Horizon Zn Number average of 60

AKDD187 – HQ3 from 177.6m to 177.9m – 1.0m @ 5.07% Pb; 6.48% Zn; 41g/t Ag & 0.3g/t Au.





## C Horizon – Zn Number 68



AKDD183 – HQ3 from 97.3m to 97.6m – C Horizon – Smk4 host – Fine red to yellow and white cleophane sphalerite stringers and bands precipitating along permeability pathways, sulphide rims on clasts and matrix replacement. (97.0m to 98.0m – 1.0m @ 2.34% Pb; 5.79% Zn; 41g/t Ag; 0.4g/t Au & 0.6% Ba)

C Horizon Zn Number average of 68





## D Horizon – Zn Number 74



AKDD200 – HQ3 from 213.5m to 213.8m – D Horizon – Smk6 host – Fine red to yellow and white cleophane sphalerite stratiform bands, preferential replacement of more reactive lithologies.  
(213.4m to 214.4m – 1.0m @ 2.15% Pb; 8.33% Zn; 0.02% Cu; 250g/t Ag; 0.2g/t Au & 0.2% Ba)

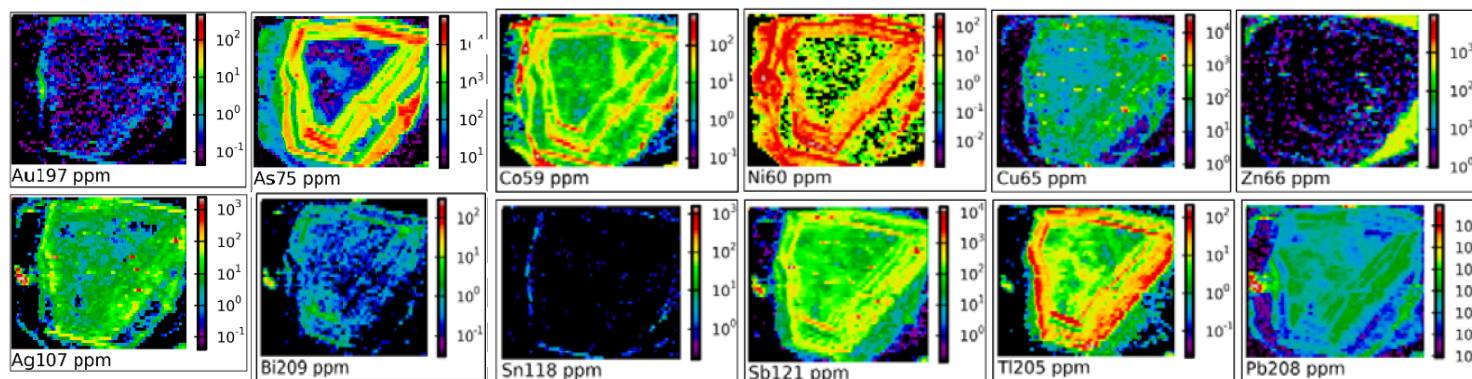
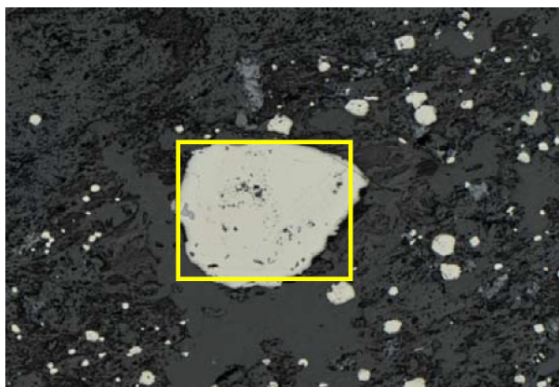
D Horizon Zn Number average of 74



Laser Ablation ICP-MS pyrite study to determine key mineralising events and evolution of pyrite

- Stage 1 – Diagenetic Pyrite – Elevated Au, Ag, Te, As related to background trace element enrichment in the marine basin
- Stage 2 – VHMS High T hydrothermal fluid – Enriched Ni-Co-As in recrystallised pyrite cores
- Stage 3 – VHMS Lower T hydrothermal fluid – Enriched Sb-Tl-Pb-Cu-Bi-Au zonation in Inner Rims
- Stage 4 – Orogenic Au overprint – Enriched As-Co-Ni-Au-Sn zonation in outer rims

AKDD159-102.5m

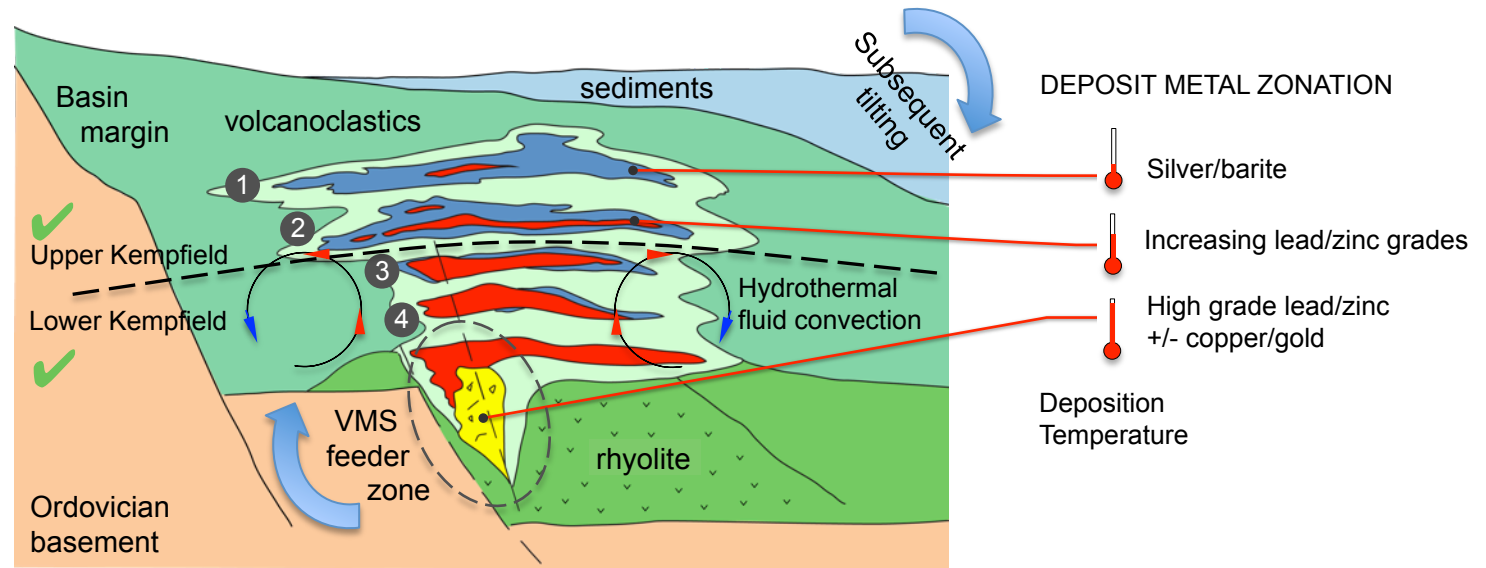




# GENETIC MODEL

## Confirmation of VHMS Genetic Model

↓  
Zonation  
 Ag-Ba  
 Zn-Rich  
 Pb-Rich  
 Cu±Au

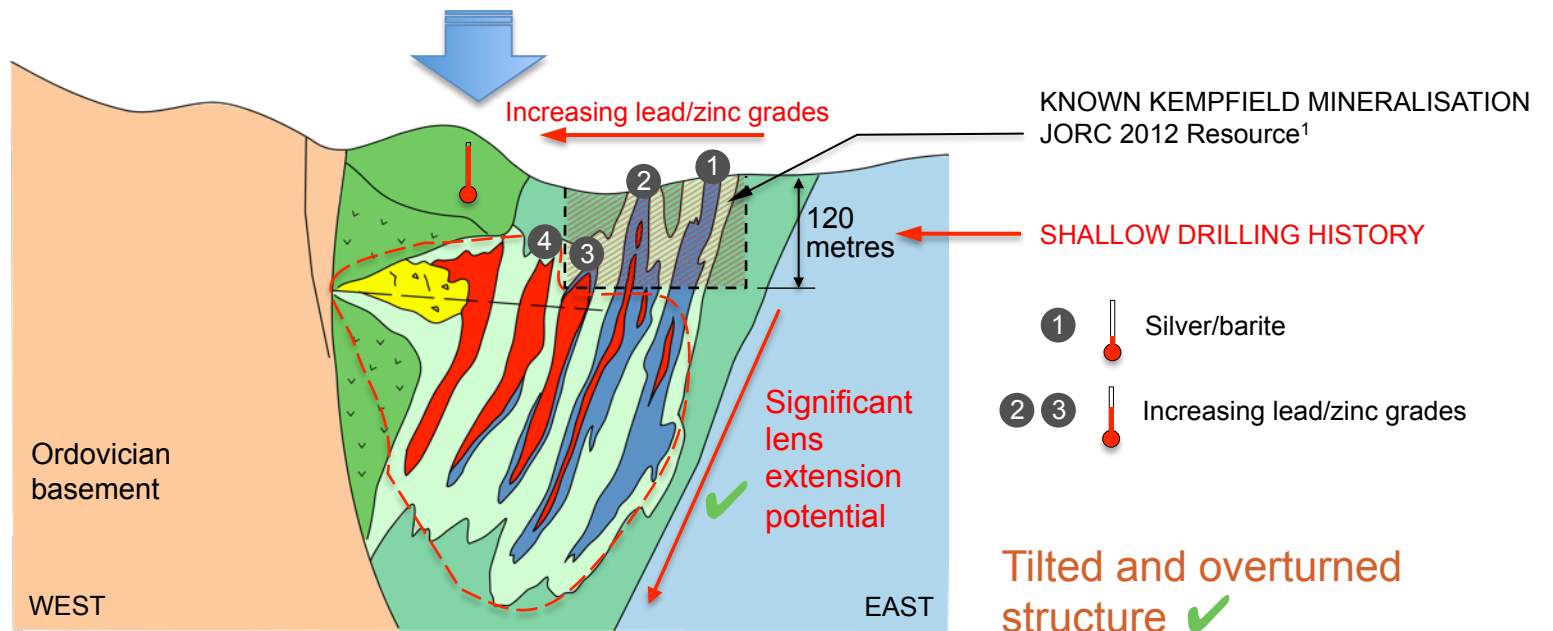


## VHMS Facts

✓ Zoned metal distribution

✓ Multi Centre Poddy Lenses or sheets

✚ Camp Scale Deposits



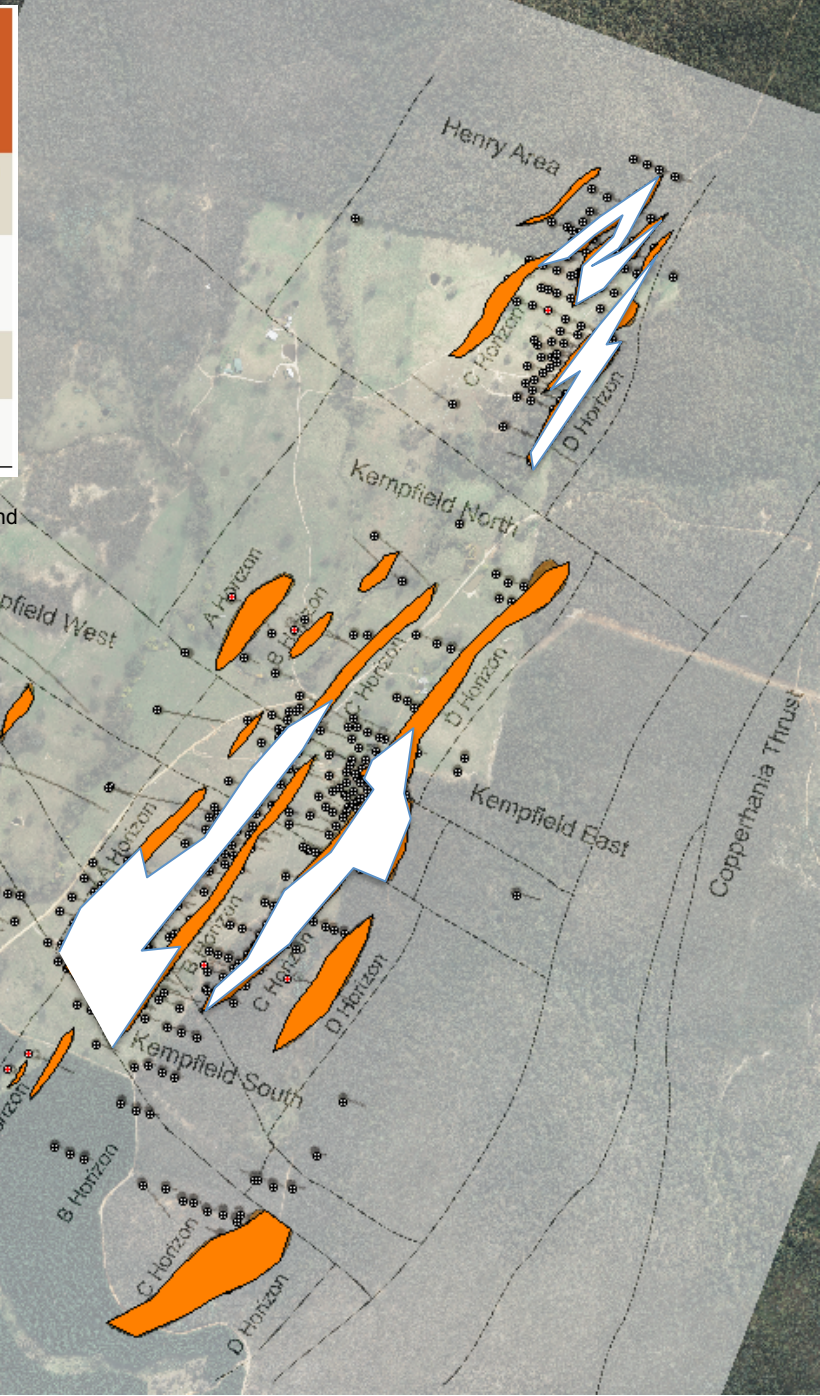
1. See Mineral Resources and Ore Reserves Statement in 30 June 2017 Annual Report. 24



# MINERAL RESOURCE UPDATE



	Silver (Ag)		Gold (Au)		Lead (Pb)		Zinc (Zn)		In-situ Contained Ag Equivalent <sup>2</sup>		
	Resource Tonnes (Mt)	Grade (g/t)	Contained Metal (Moz)	Grade (g/t)	Contained Metal (000 oz)	Grade (%)	Contained Metal (000 t)	Grade (%)	Contained Metal (000 t)	Grade (Ag Eq g/t)	Contained Ag Eq (Moz)
Oxide/ Transitional*	6.0	55	10.7	0.11	21	N/A	N/A	N/A	N/A	-	11.7
Primary**	15.8	44	22.3	0.13	66	0.62	97	1.3	200	-	40.5
<b>Total***</b>	<b>21.8</b>	<b>47</b>	<b>33.0 M</b>	<b>0.12</b>	<b>86</b>	<b>N/A</b>	<b>97</b>	<b>N/A</b>	<b>200</b>	<b>75</b>	<b>52 M</b>



\*90% \*\*79% \*\*\*82%: % of resource tonnes in Measured or Indicated category. 1. Cutoff grades 25g/t Ag for Oxide/Transitional and 50g/t AgEq for Primary. 2. AgEq based on US\$30/oz Ag, US\$1,500/oz Au, US\$2,200/t Pb and Zn, recoverable and payable @ 80% of head grade for Ag and Au and 55% for Pb and Zn. For full details refer to the Mineral Resources and Ore Reserves Statement in the Company's 30 June 2016 Annual Report.

Current extent of the Mineral Resource

Known extent of barite ± mineralisation

- Kempfield South resource to 200m depth (McCarron)
- Kempfield North resource to 150m depth (BJ)
- Henry Area resource to 100m depth (Quarry)

Known mineralisation to 200m+ in all areas now  
 Existing Mineral Resource estimate is a bulk shell  
 Refine the lenses > reduce dilution > increase grade



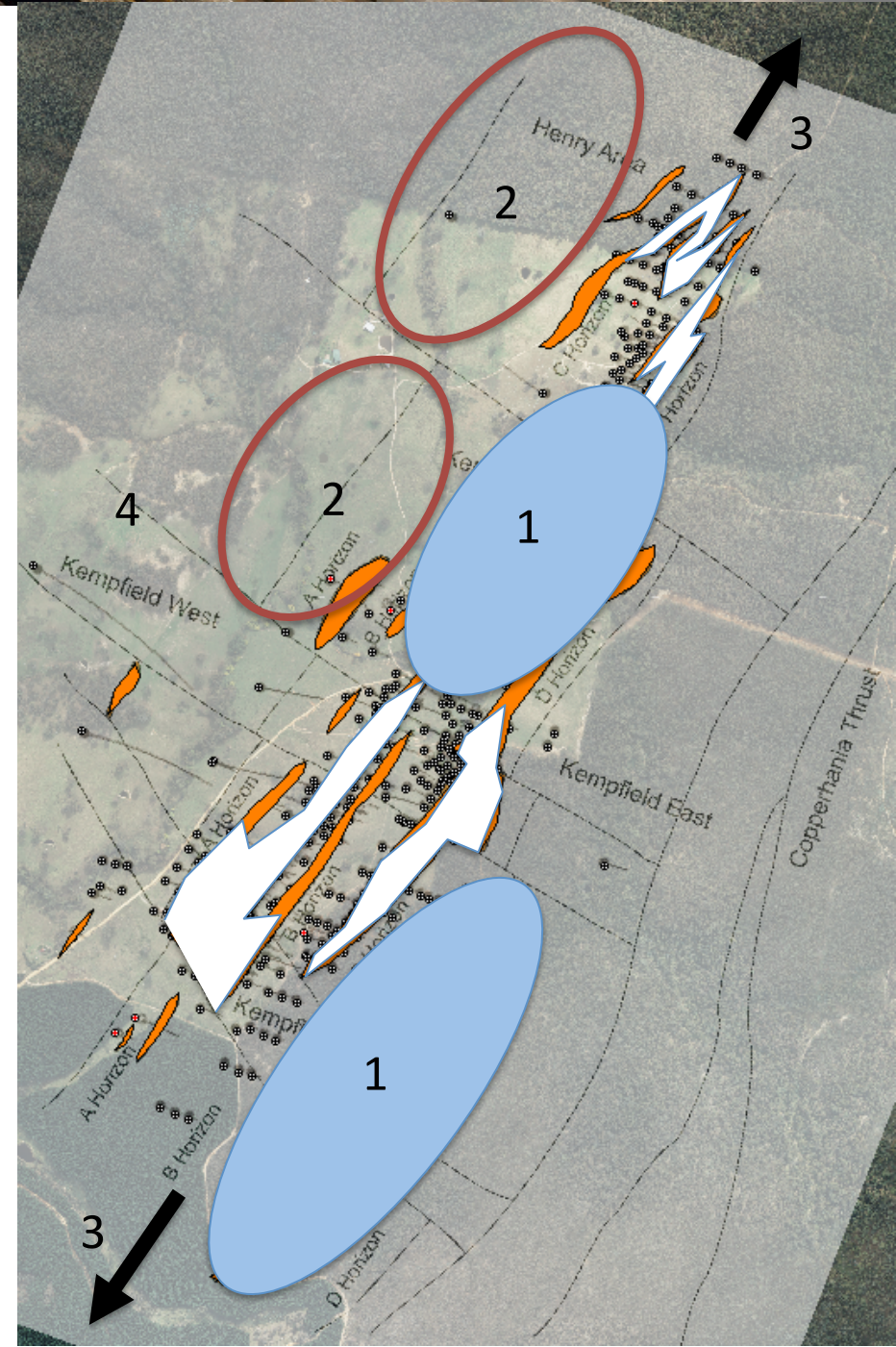
# EXPLORATION PRIORITIES

1. Resource Infill of latest exploration drilling to >200m depth
2. Lens position confirmation drilling into existing areas (Kempfield East and West)
3. Strike extension on peripheries of existing mineralisation (Kempfield North to discovered gossans 3km north; Kempfield South to Gully Swamp Cu Mine and Sugarloaf Barite Mine 800m to the south) – 4.5kms strike length of prospective horizons
4. Kempfield West stockwork Cu-Au Zone drilling – analogous to Wetar VHMS Deposit (Indonesia)

Current extent of the Mineral Resource

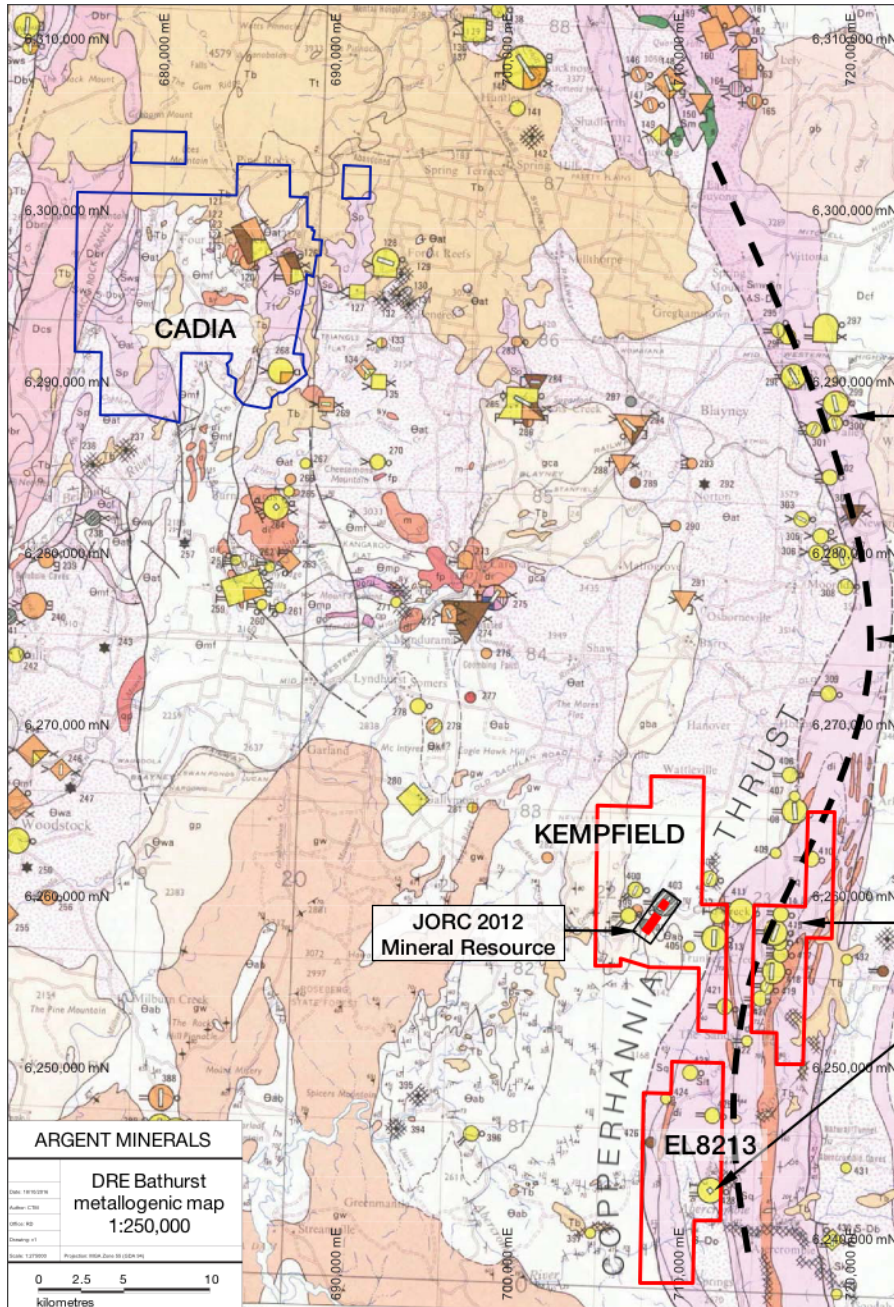


Known extent of barite ± mineralisation





# SATELLITE DEPOSIT POTENTIAL - TRUNKY-KINGS PLAINS GOLD



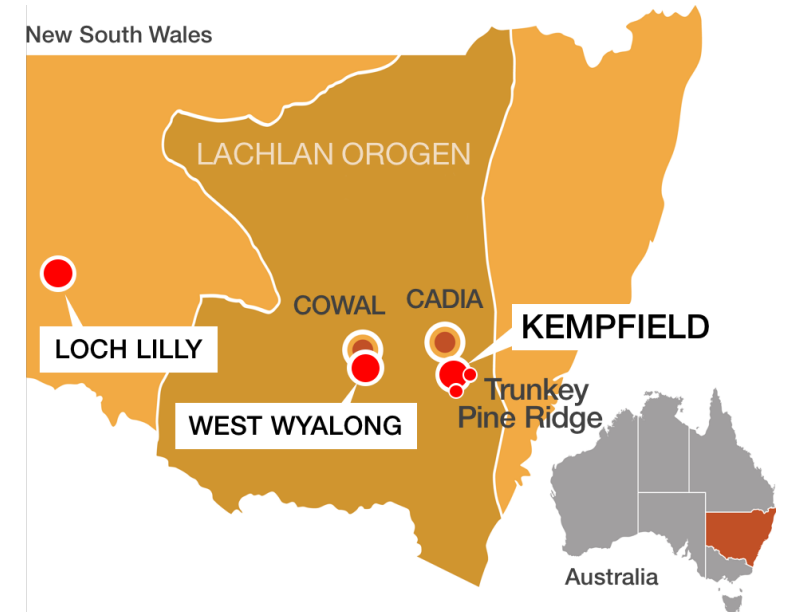
KINGS PLAIN GOLD CLUSTER

TRUNKY-KINGS PLAIN GOLD BELT

TRUNKY GOLD CLUSTER

PINE RIDGE GOLD MINE

- Gold occurrences
- Argent tenements
- Newcrest Mining Cadia tenements



## Intersection highlights:

- 21 m @ 5.6 g/t Au from 50 m (PR010) incl. **1.0 m @ 62.9 g/t Au from 59 m**
- 10 m @ 3.7 g/t Au from 71 m (PR012) incl. 1.0 m @ 11.2 g/t Au from 76 m
- 18 m @ 2.4 g/t Au from 68 m (PR023) incl. 1.0 m @ 5.3 g/t Au from 77 m





Crawford, A. J., 2015a. Petrographic Report – 46 Rocks from Drillholes AKDD178 and AKDD179 on the Kempfield Ag-Barite Deposit, NSW, for Argent Minerals Ltd (Sydney) 24/06/2015. *Internal Unpublished Report*.

Crawford, A. J., 2015b. Petrographic Report – 17 Rocks from Drillholes AKDD177, AKDD178 and AKDD159, Kempfield Ag-Barite Deposit, NSW, for Argent Minerals Ltd (Sydney) 26/09/2015. *Internal Unpublished Report*.

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Timms, D., and David, V., 2011. Kempfield Silver, Barite and Base Metal (Pb-Zn) Deposit, Lachlan Orogen, Eastern Australia. Eighth International Mining Geology Conference – Queenstown, New Zealand, 22-24 August 2011.