

# Riesling Base Metal Project pXRF Soil Geochemistry

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Superior Resources Limited



- Located 280km NW Townsville & 17km SSW of Mount Surprise, North Queensland
- VMS (or Broken Hill) type deposit - (6km of Gahnite 'Quartzite')
- 3000ppm Zn soil anom ± Cu, Ag, Pb, Bi & magnetic anomaly at Central Riesling

AIG pXRF Seminar – November 2015

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# Riesling Base Metal Project Prospect Summary



Cooktown Ironwood (*Erythrophleum chlorostachys*)



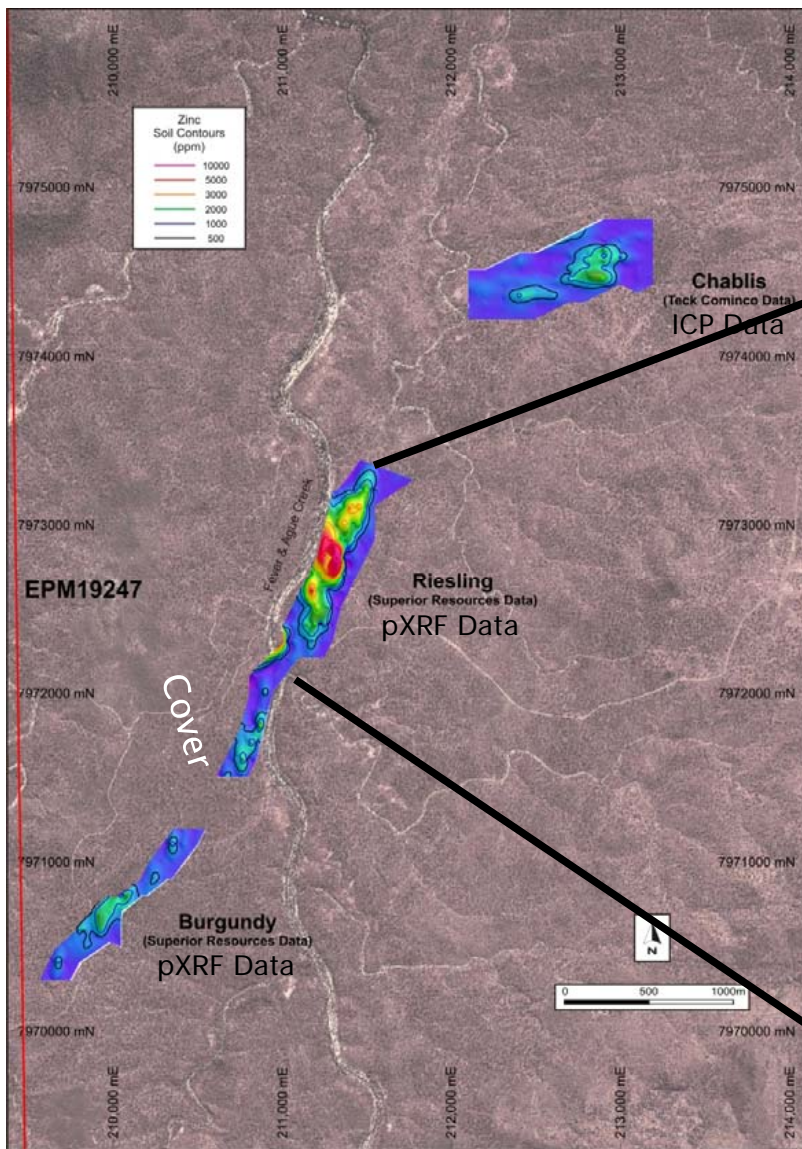
**Gahnite – Zinc Spinel -  $ZnAl_2O_4$**

Occurrence - usually green octahedral crystals

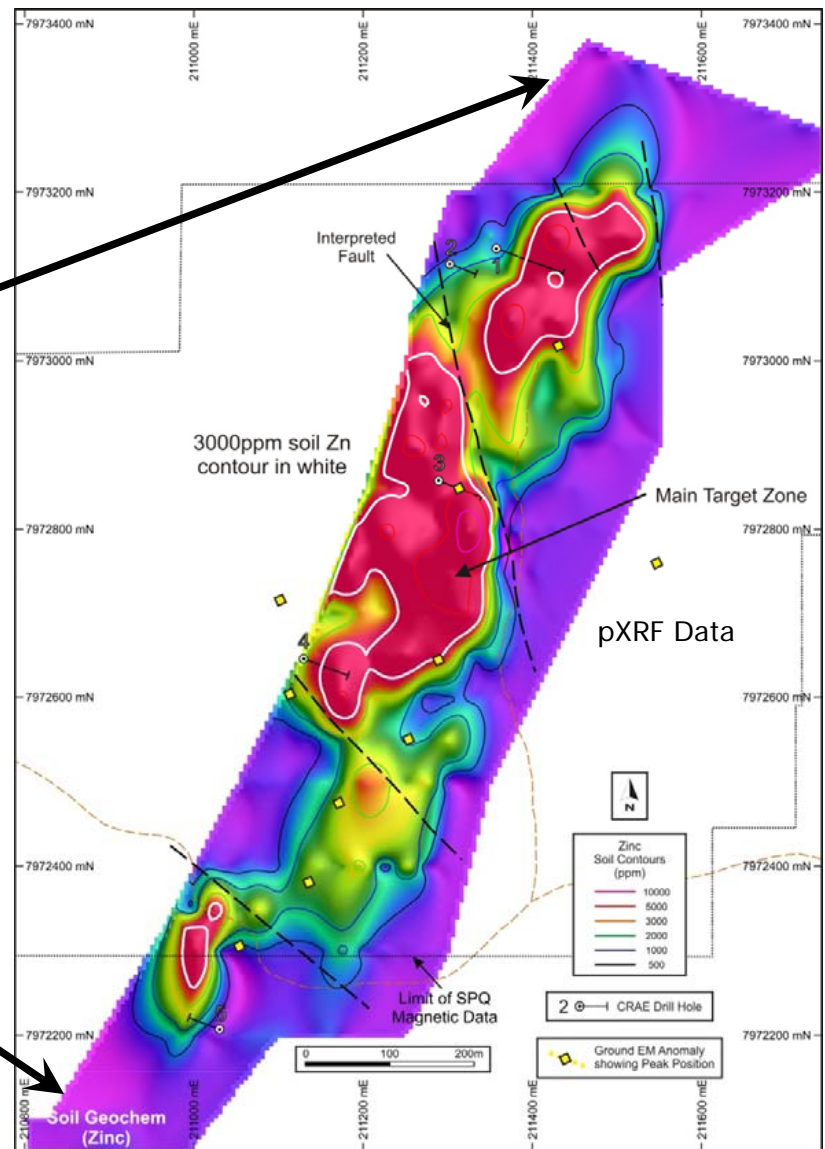


Balcooma Octahedral Gahnites



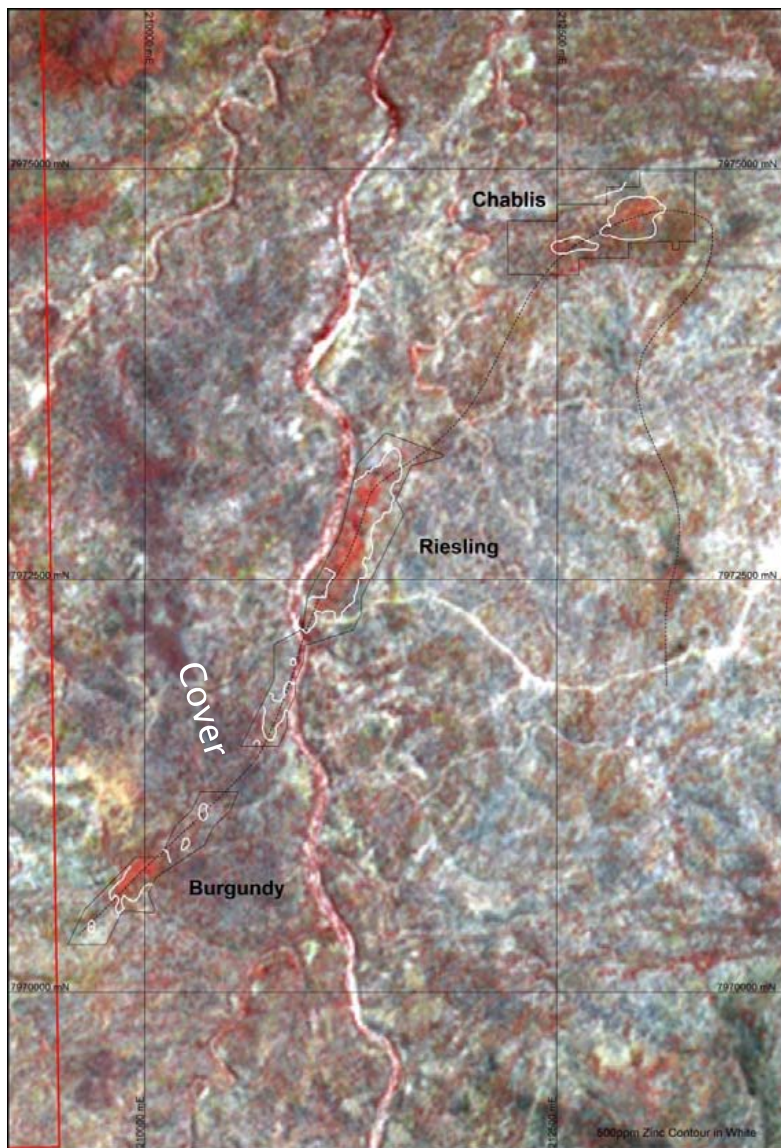


Regional Zinc Soil Geochemistry on Google Earth



Riesling Zinc Soil Geochemistry pXRF Data

# Riesling Base Metal Project



Aster 3,2,1 (RGB) Image and 500ppm Soil Zinc

- Cooktown Ironwood trees show as pale red anomalies on Aster 3,2,1 (RGB) Images
- 500ppm zinc soil anomalies indicated by white lines
- Very good agreement indicates that the Ironwood trees either like zinc in soils or prefer alteration zones or both

Note:  
 Erythrophleum chlorostachys  
 (Cooktown Ironwood)  
 is poisonous to stock and probably humans





Cooktown Ironwood Trees on Alteration Zone



Complex Folding of Siliceous Band in Alteration



Gahnite Quartzite Horizon



Gahnite ( $ZnAl_2O_4$ ) Quartzite

# Riesling Base Metal Project





Geobotanical Anomaly on Mineralisation



Geobotanical Anomaly on Mineralisation



High Grade Lead Gossan



High Grade Lead (29% Pb, 44g/t Ag, 0.4% Zn, 0.3% Cu)





Riesling Central Gossan



Riesling Central Gossan (0.4% Zn, 0.4% Cu)

## Riesling Base Metal Project



## Riesling Base Metal Project

# Soil Geochemistry

pXRF (Total) vs ICP (ME-ICP41 - Acid Soluble)

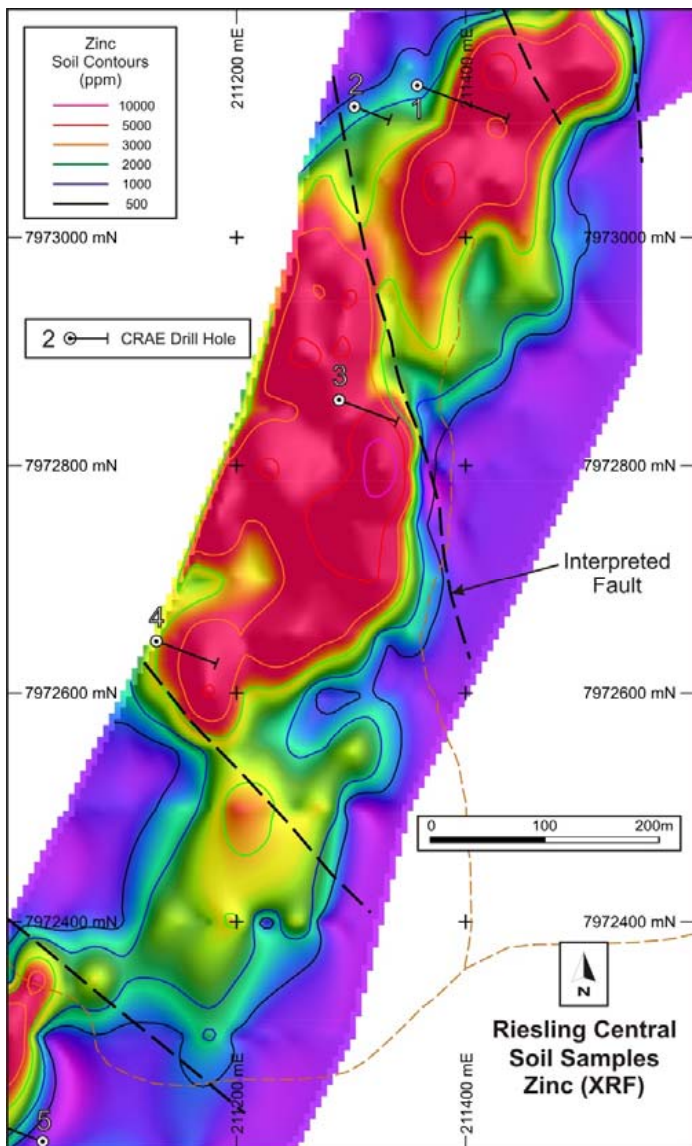


- Adjacent Gossan

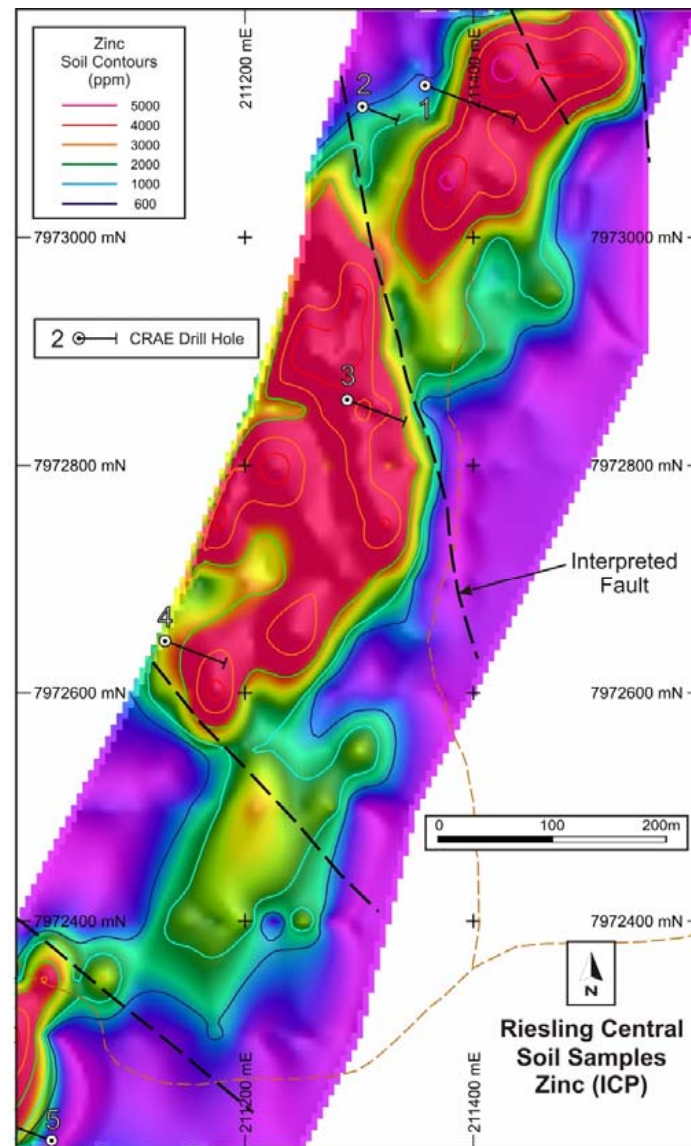


Soil Samples 10-20cm Depth  
-80# Sieved Samples  
This Sample:  
17061 Zn, 837 Cu, 3021 Pb (pXRF)  
1990 Zn, 705 Cu, 1890 Pb (ICP)





Zinc (pXRF)



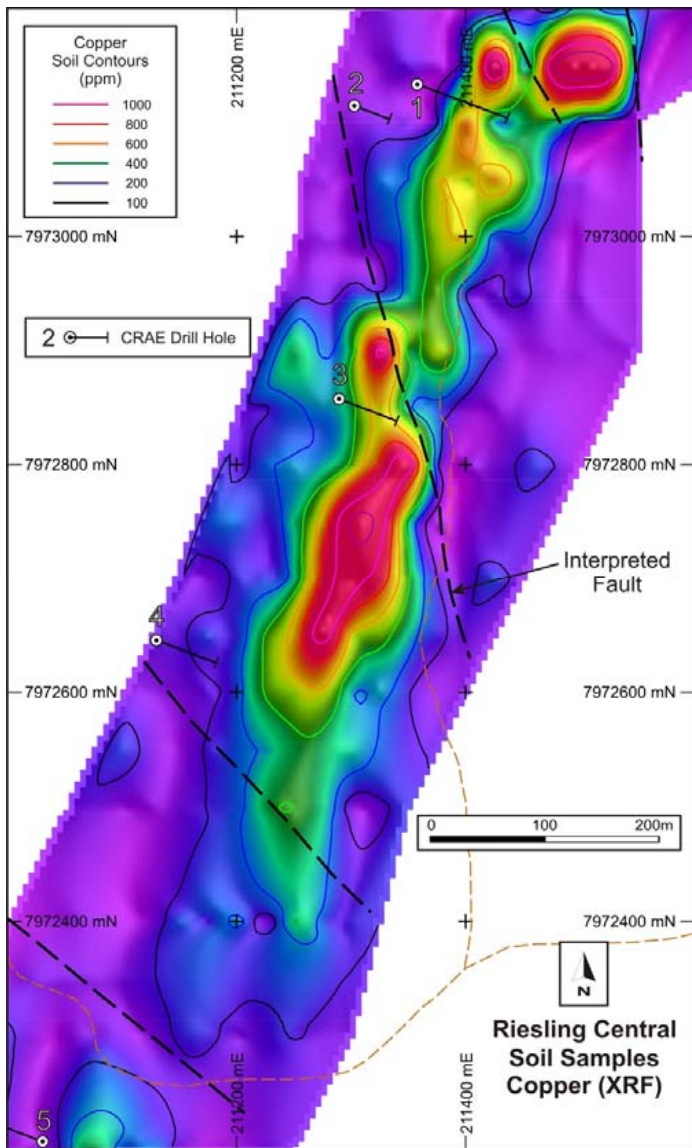
Zinc (ICP)

Ratio XRF/ICP: 0.98 to 8.57

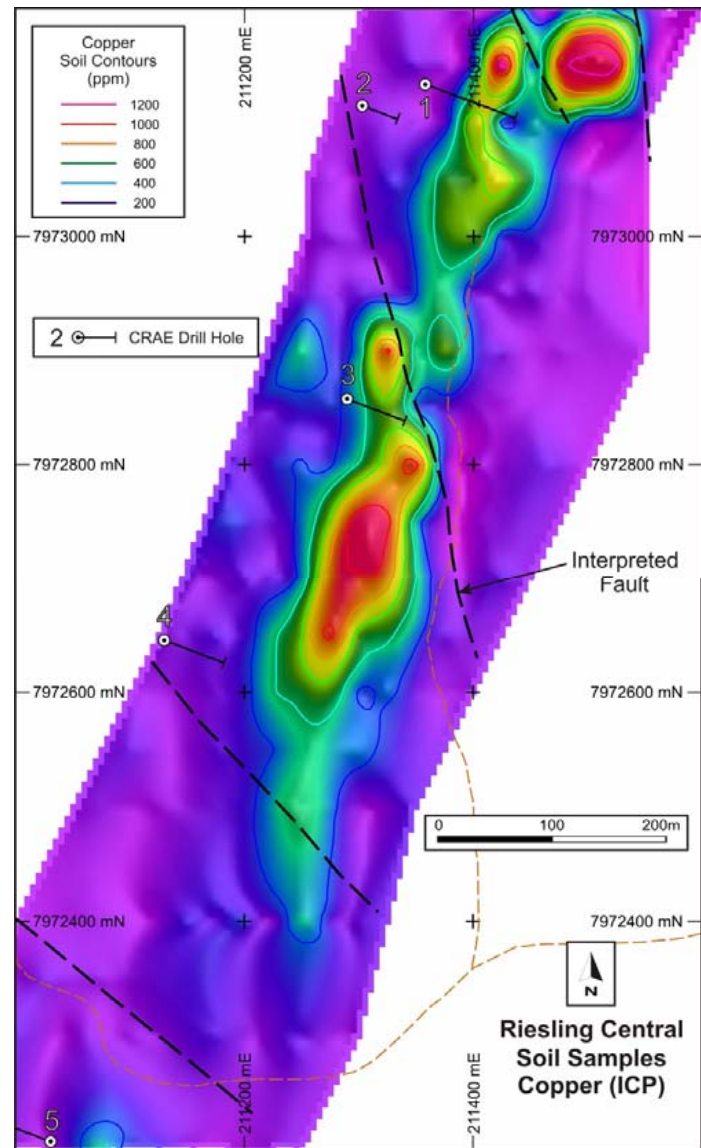
Similar Anomaly Pattern

Riesling Base Metal Project





Copper (pXRF)



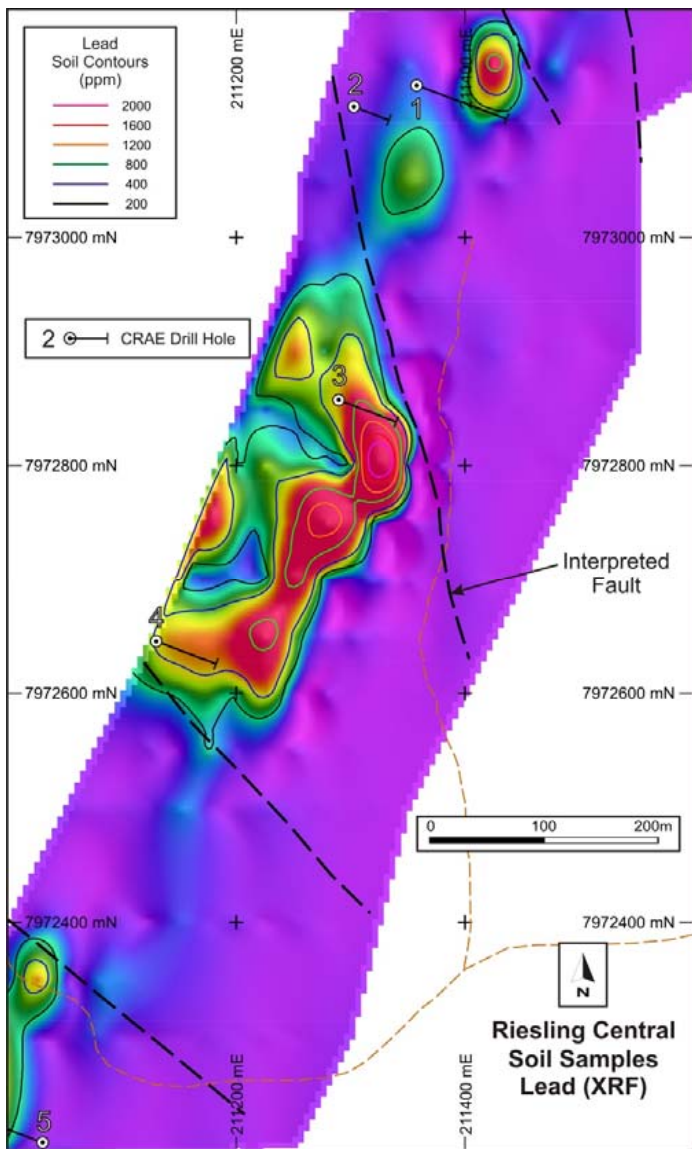
Copper (ICP)

Similar Anomaly Pattern

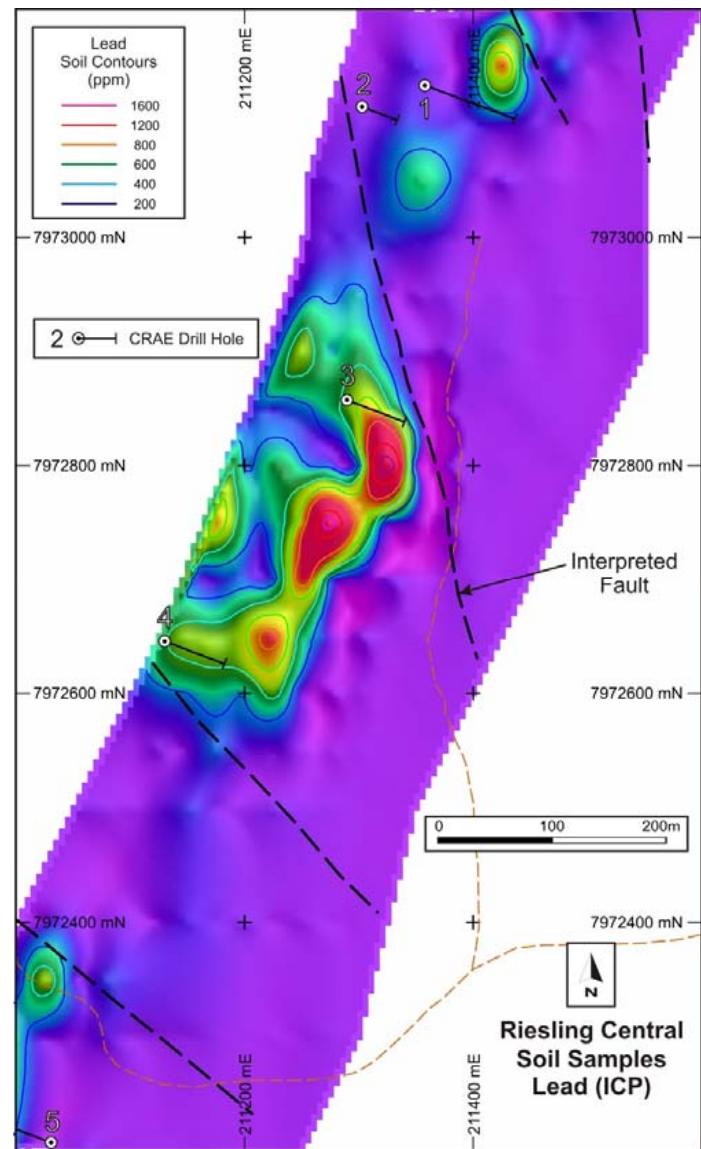
Ratio XRF/ICP: 0.33 to 3.50

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Lead (pXRF)



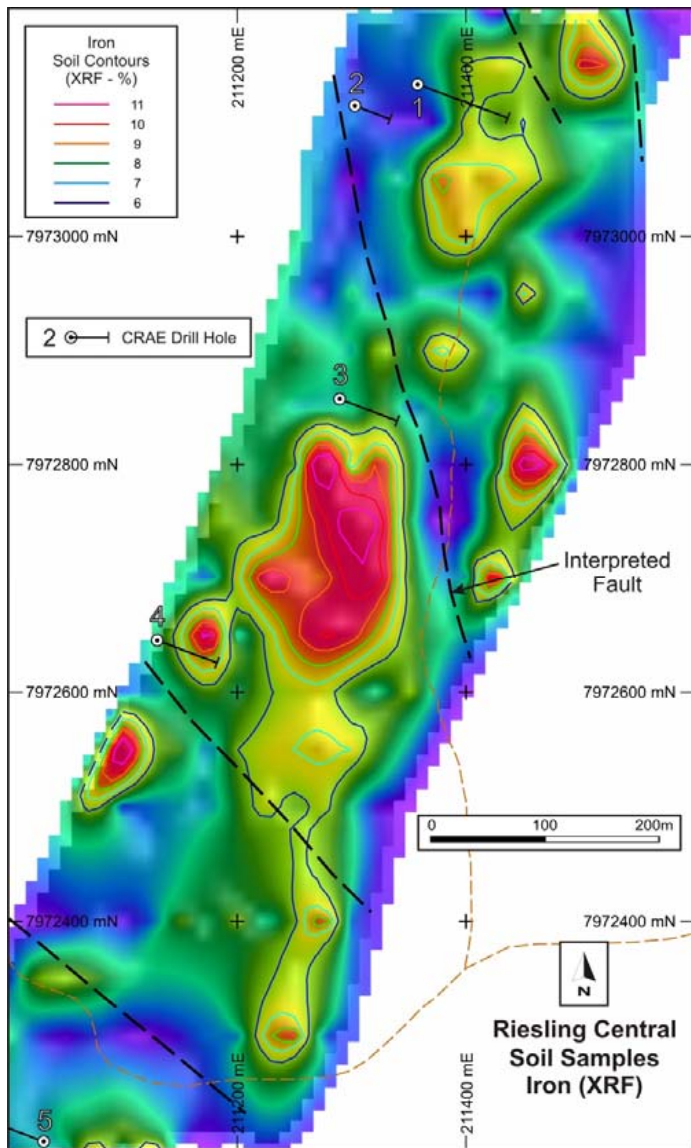
Lead (ICP)

Ratio XRF/ICP: 0.33 to 3.50

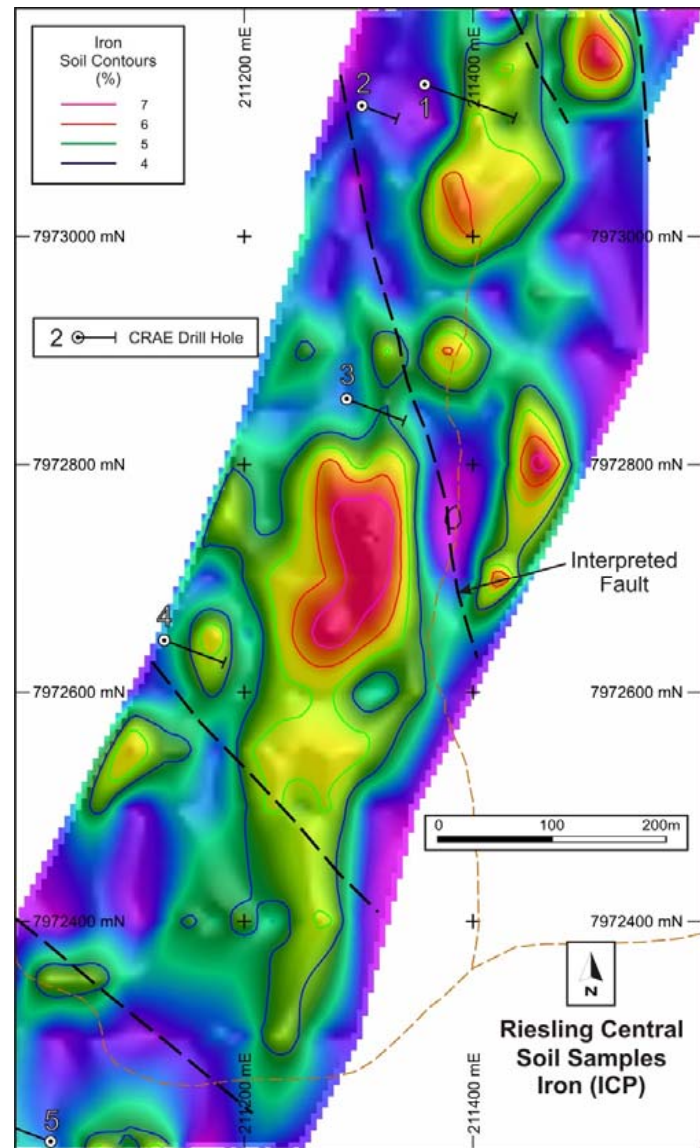
Similar Anomaly Pattern

Riesling Base Metal Project





Iron (pXRF)



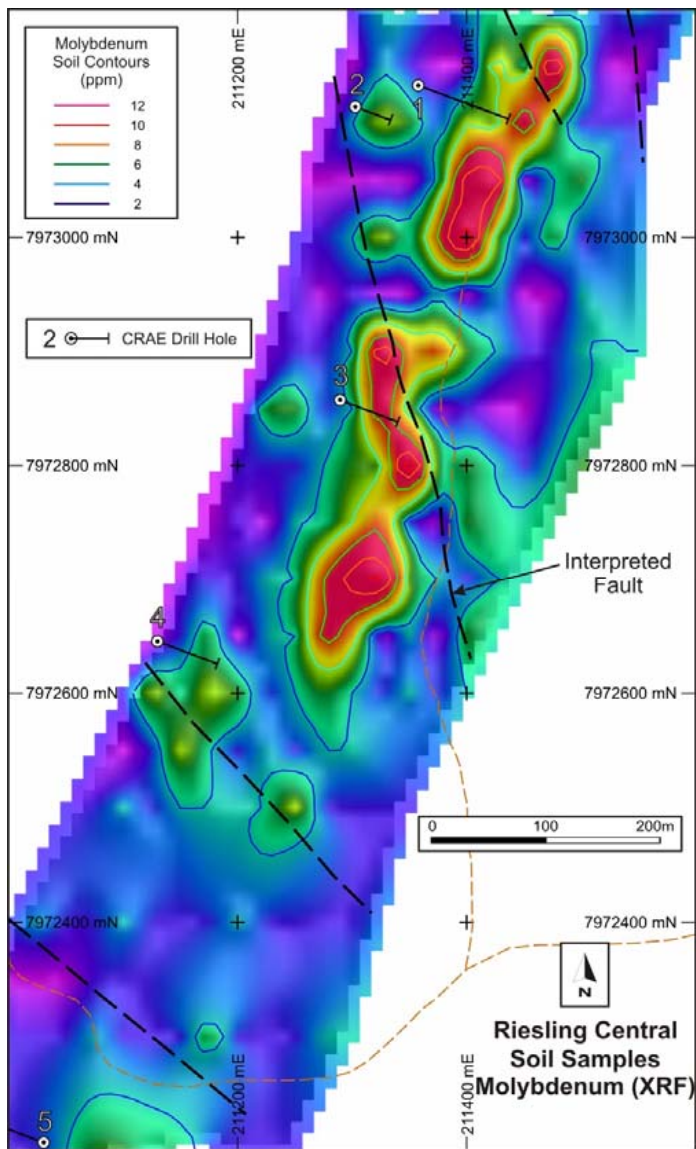
Iron (ICP)

Ratio XRF/ICP: 1.12 to 3.10

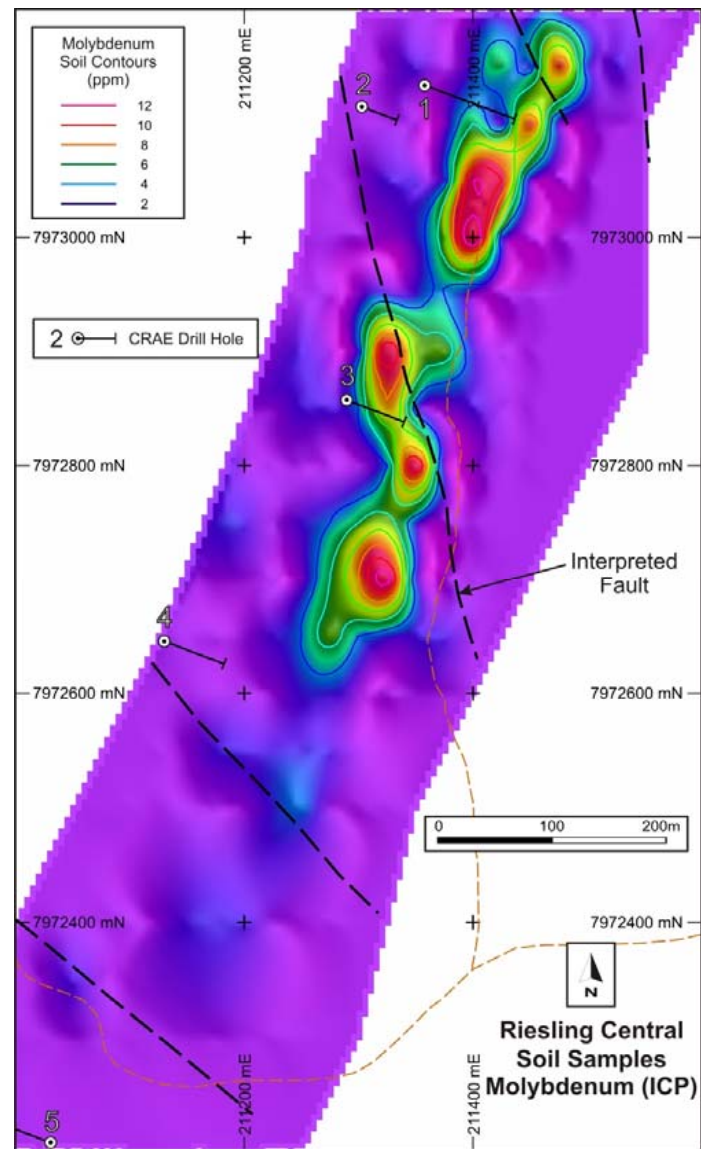
Similar Anomaly Pattern

# Riesling Base Metal Project





Molybdenum (pXRF)



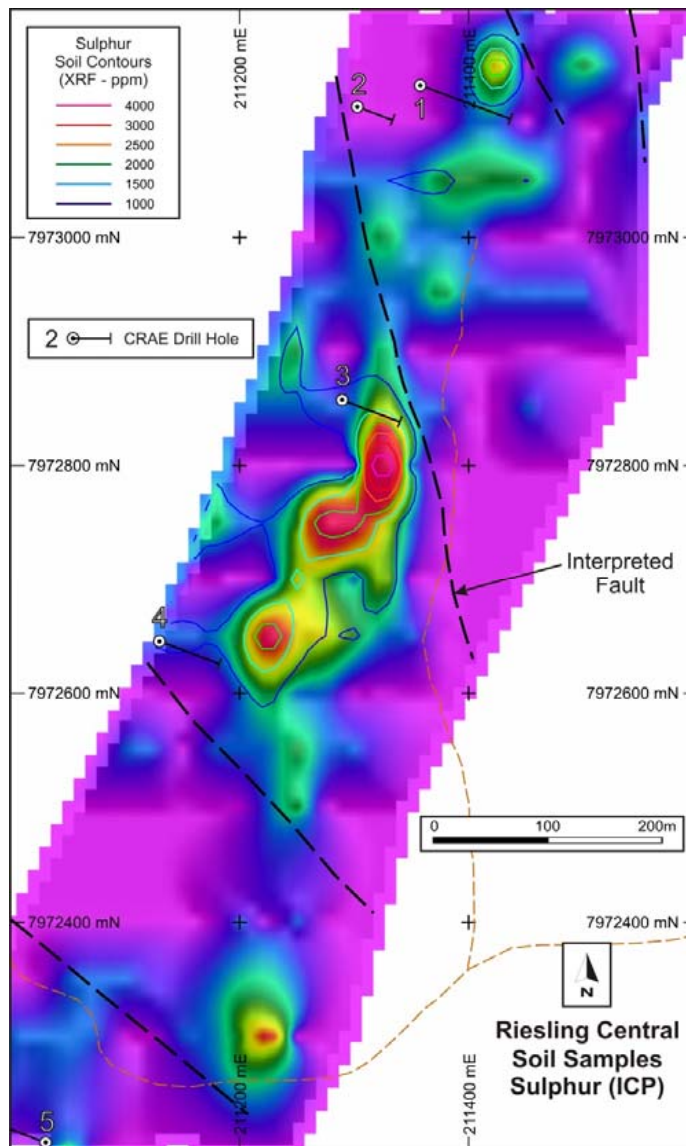
Molybdenum (ICP)

Similar Anomaly Pattern

Ratio XRF/ICP: 0.00 to 3.00

Riesling Base Metal Project

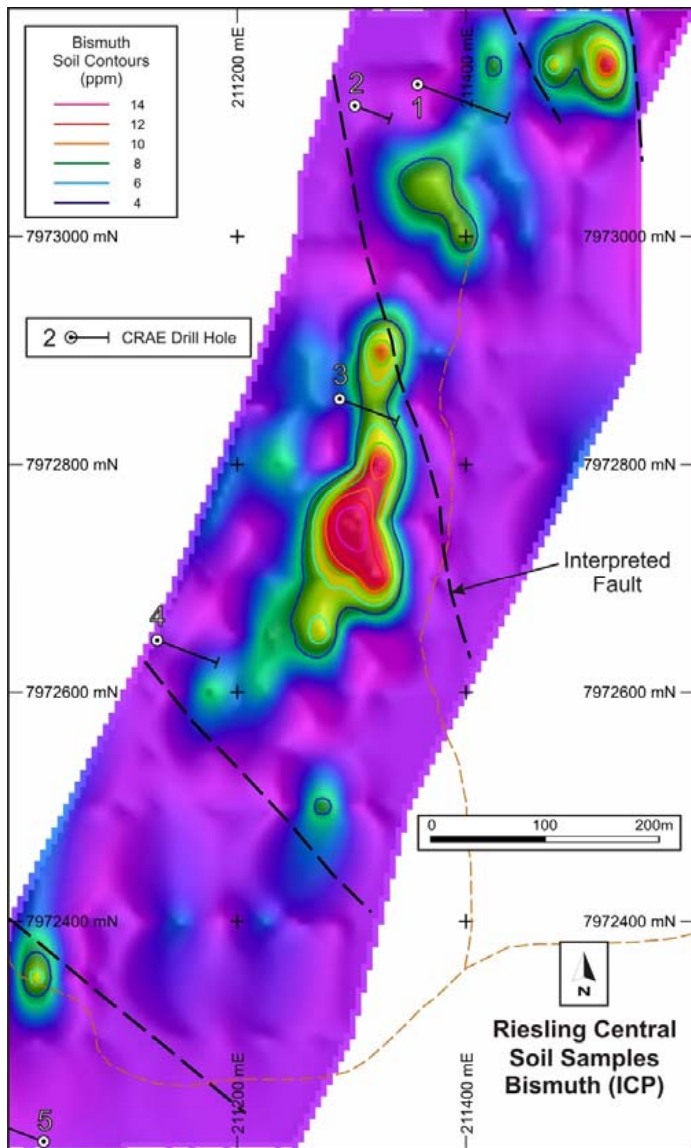




Sulphur (ICP Image & pXRF Contours)  
Similar Anomaly Pattern

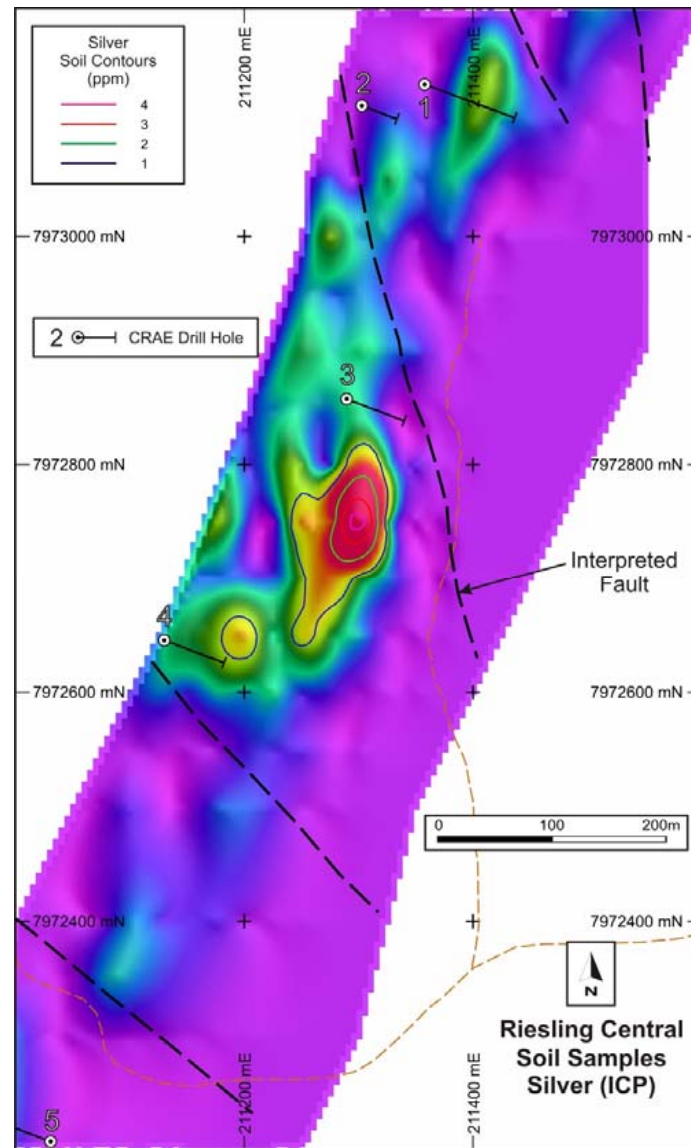
Riesling Base Metal Project





**Bismuth (ICP)**

Good ICP Anomalies

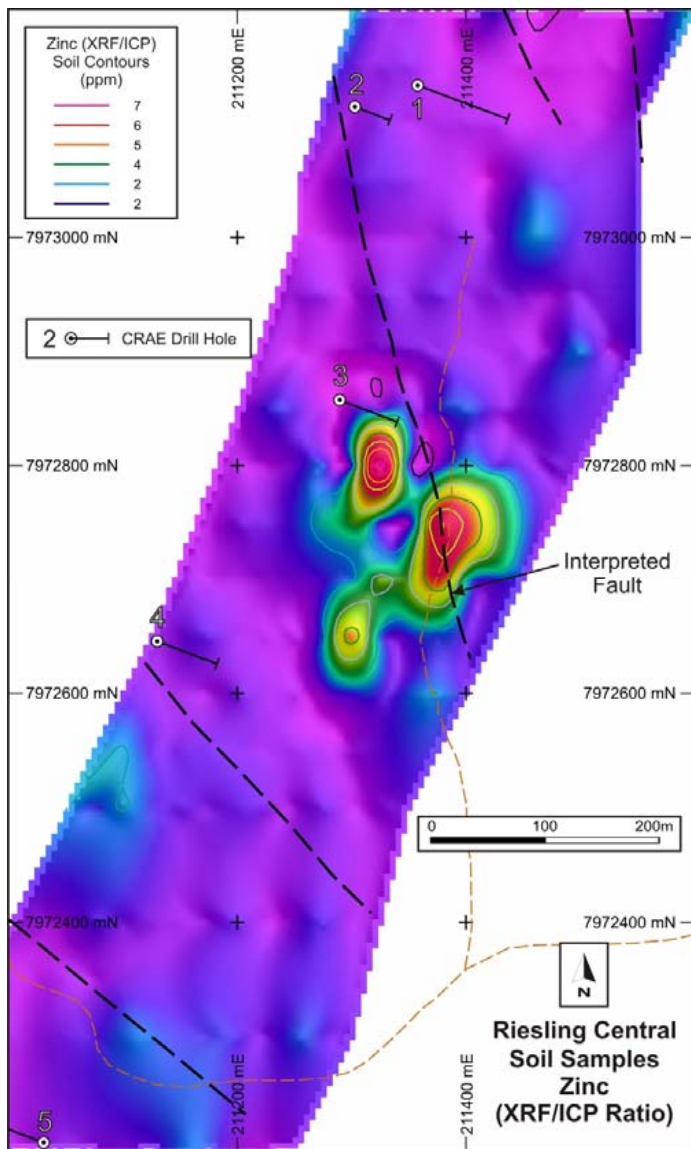


**Silver (ICP)**

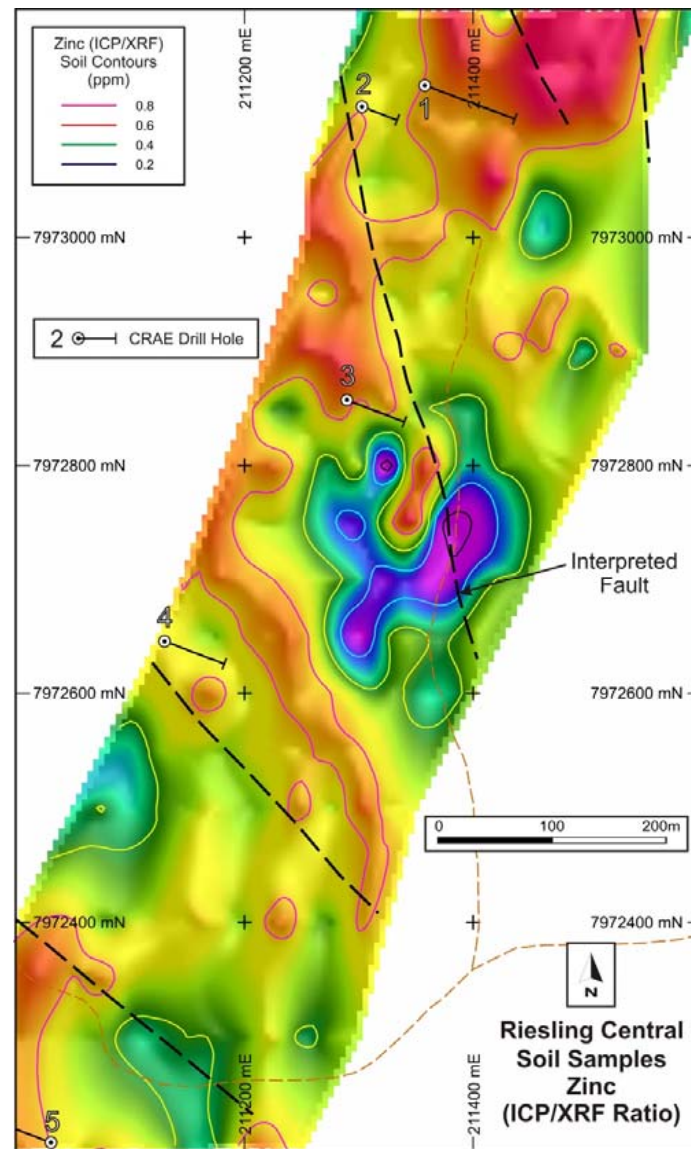
Don't use pXRF at these levels

**Riesling Base Metal Project**



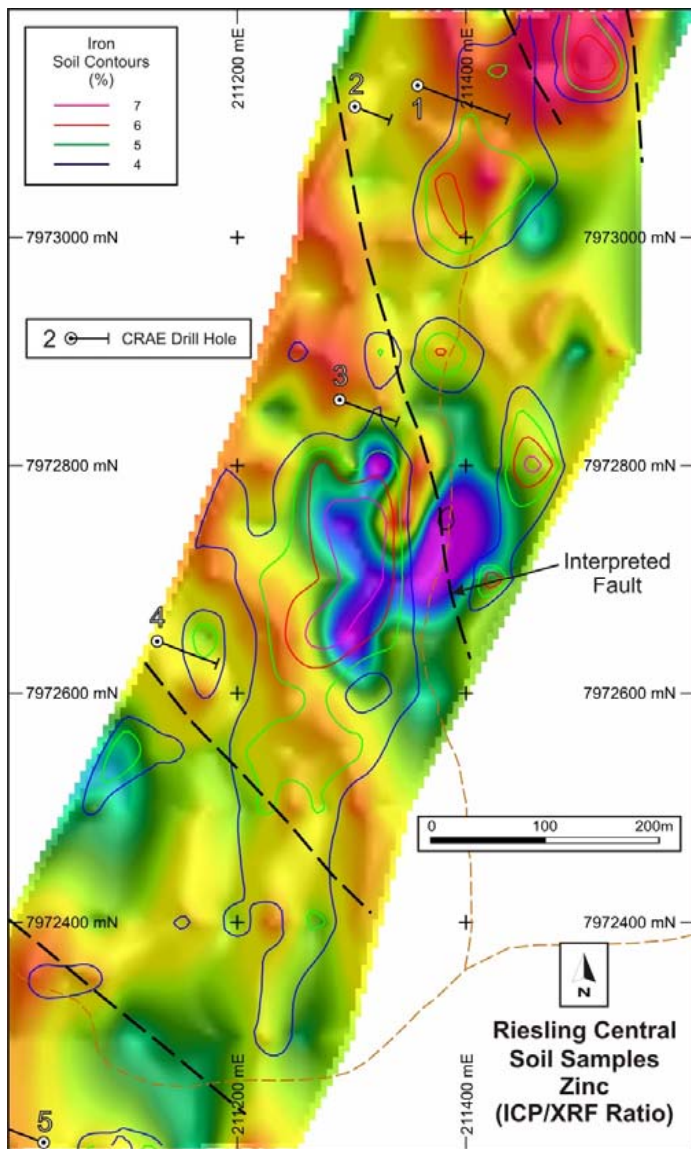


Zinc (pXRF/ICP)

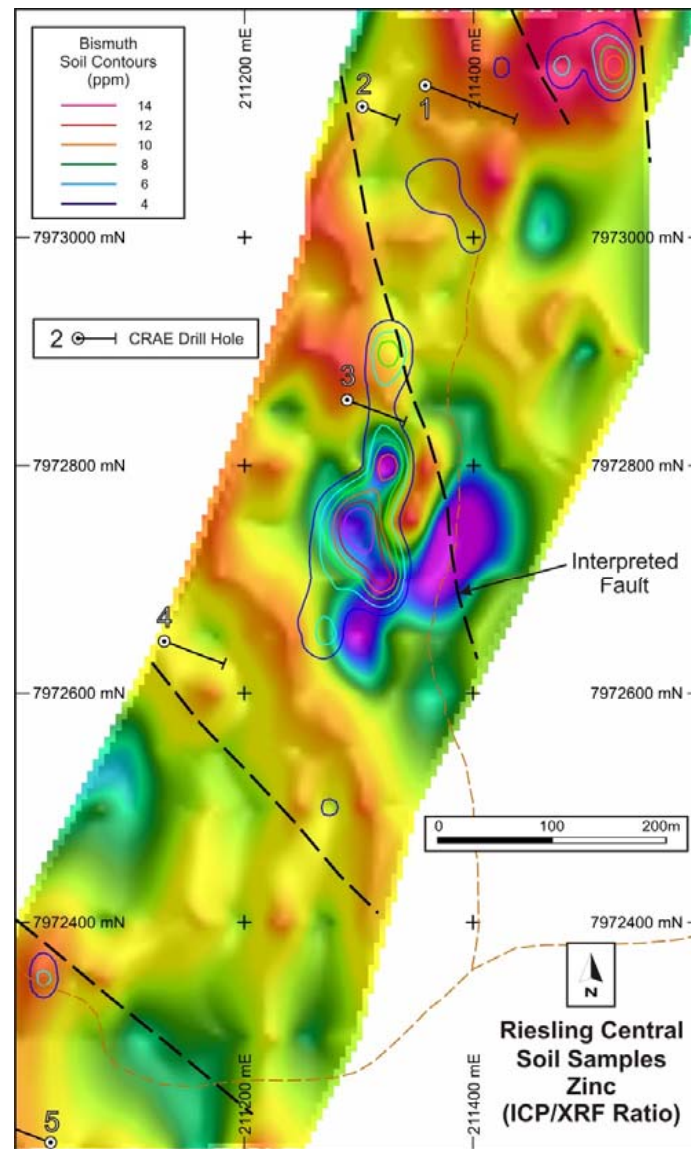


Zinc (ICP/pXRF)

# Riesling Base Metal Project



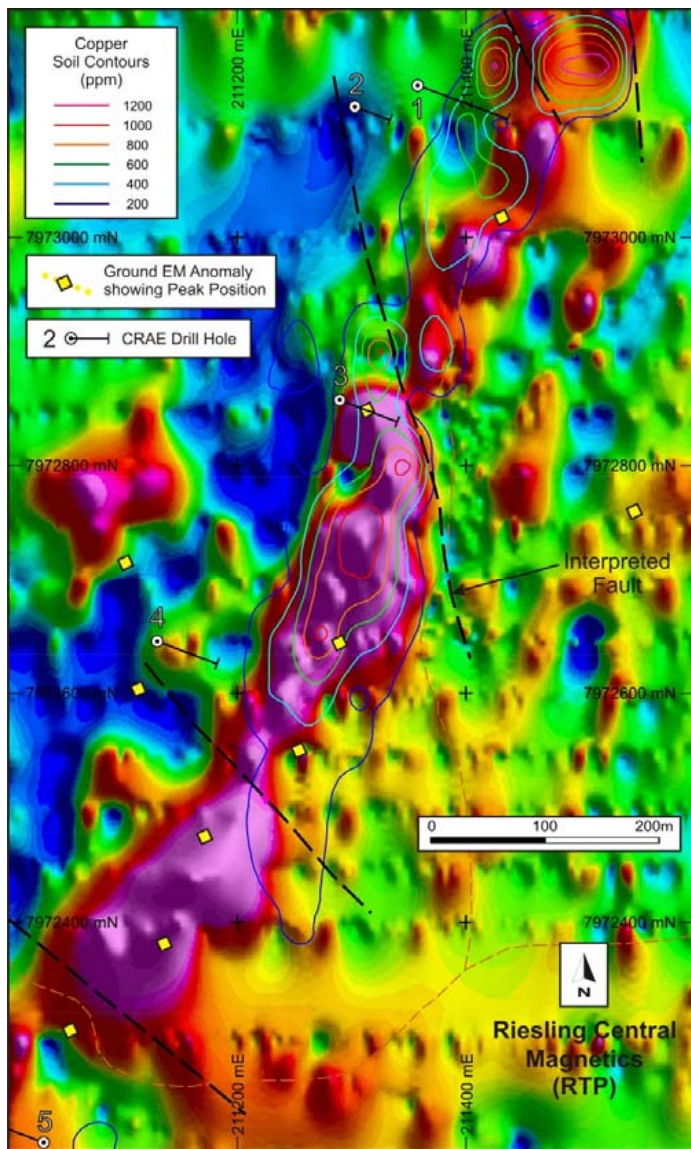
Zinc (ICP/pXRF) + Fe Contours (ICP)



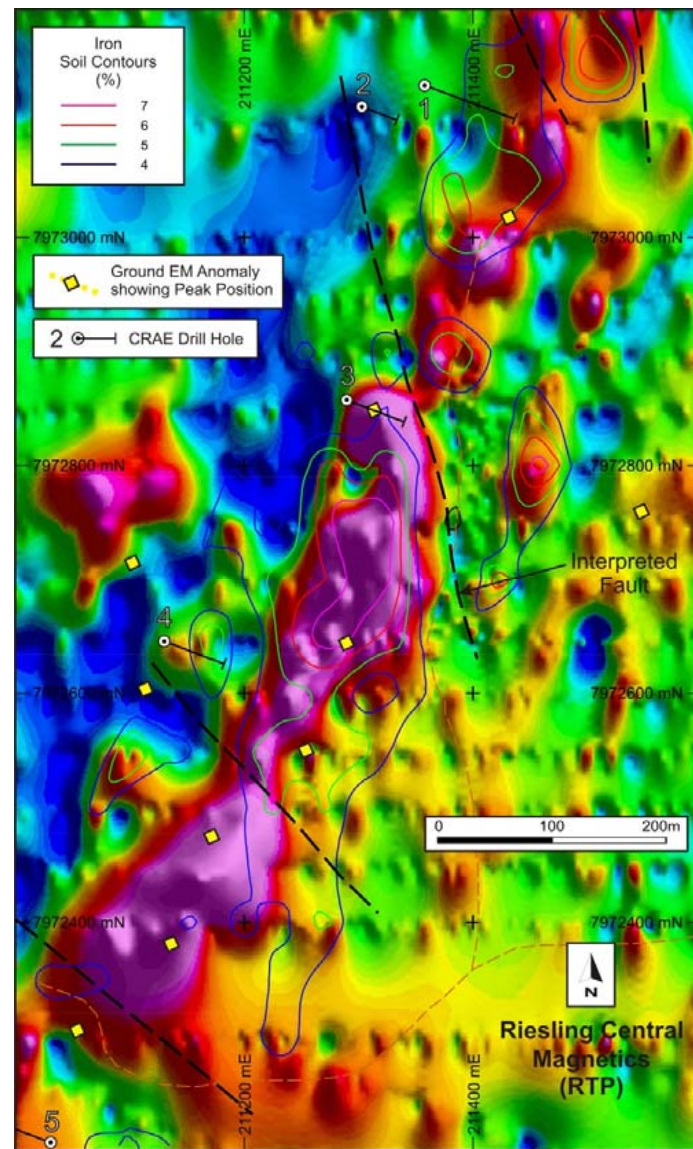
Zinc (ICP/pXRF) + Bi Contours (ICP)

Riesling Base Metal Project





**Mag (RTP) + Cu Contours (ICP)**



**Mag (RTP) + Fe Contours (ICP)**

# Riesling Base Metal Project

# Riesling Base Metal Project

# Conclusions



**Terra Search Bench-Top XRF**



# Riesling Base Metal Project

## Niton Portable XRF Analyser vs ME-ICP41 (ALS)

- pXRF cheaper and more immediate but needs to be setup properly and with standards (eg. Terra Search)
- Similar anomaly patterns from pXRF and ICP analyses for Cu, Pb, Zn, Fe, Mo & S
- Apparently better results from ICP for low-level elements Ag & Bi
- pXRF/ICP Zn (Total/Soluble Zn) ratio may be useful for determining the centre of mineralising system for metamorphosed stratiform/VMS deposits

Either:

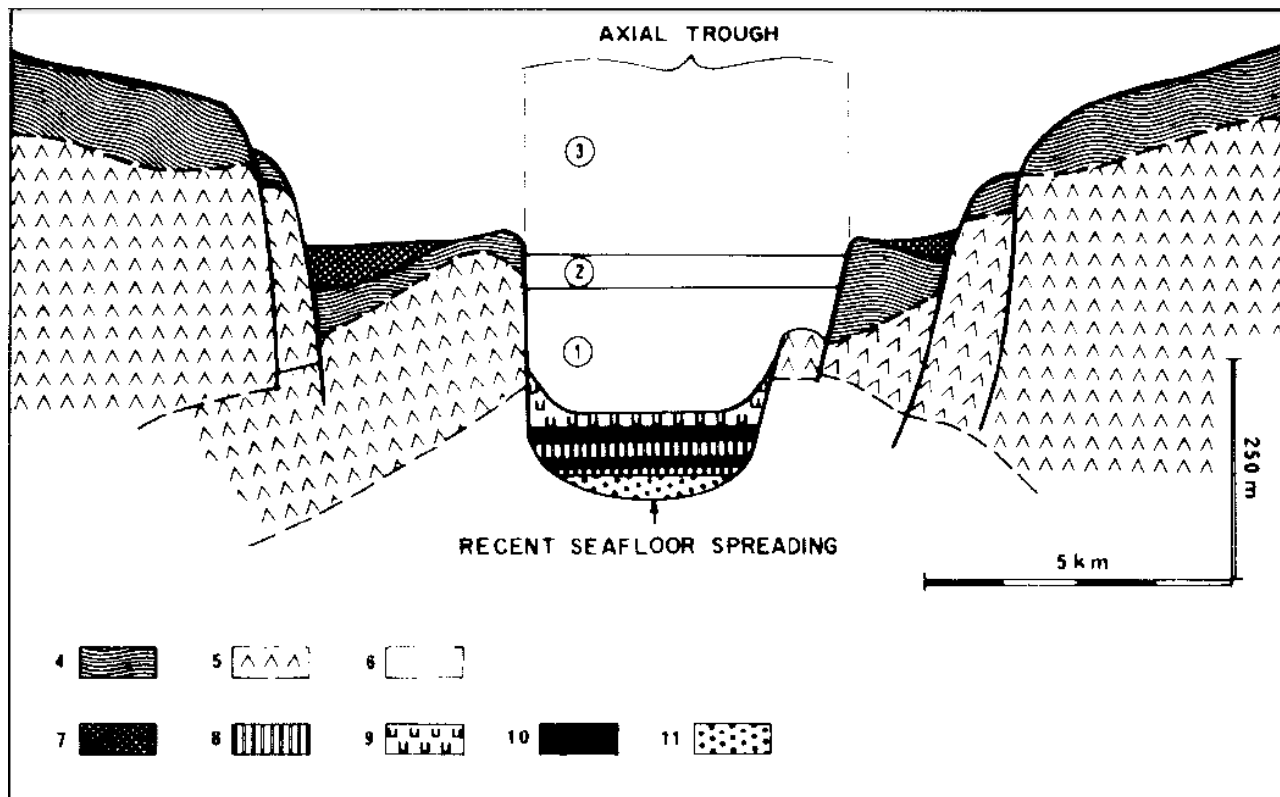
1. Zinc doesn't compete well for sulphur during metamorphism and forms gahnite (also goes into staurolite) or
2. Acid from oxidation of massive sulphides leaches soluble zinc from the weathered zone (cf. Balcooma)

## Riesling Base Metal Project

# Deposit Model

- Syngenetic/Stratiform/VMS
- Massive Sulphide
- Metamorphosed
- Deformed and Remobilised
- Extensional Trough Setting?

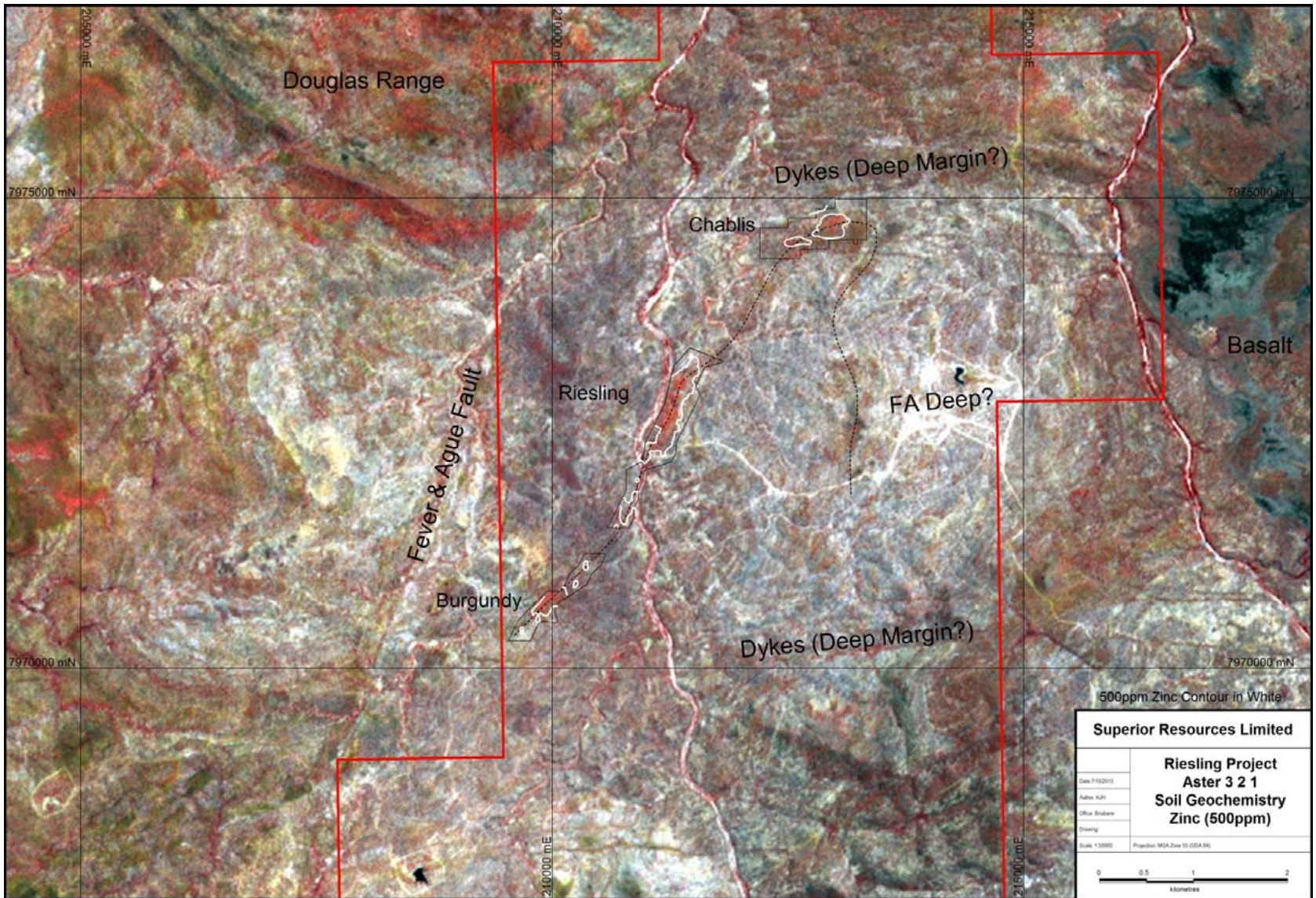




**Figure 3:** Schematic E-W section through the southern Atlantis II Deep (modified from Bäcker, 1973 and Bignell, 1978). **1** - lower brine; **2** - upper brine; **3** - Red Sea water; **4** - Pliocene to Quaternary marls; **5** - Miocene evaporites; **6** - oceanic basement; **7** - Fe-Mn oxides; **8** - oxide zone; **9** - amorphous silicate zone; **10** - sulphide zones; **11** - biogenic-detrital marls.

### Atlantis II Deep in the Red Sea

after Thisse, Guennoc, Pouit and Nawab – Episodes, 1983, No.3



Was the Riesling mineralisation deposited within a "Deep" structurally similar to the Atlantis II Deep in the Red Sea?