

“Innovative EM Exploration in Underground Mine settings – Long Victor Mine Kambalda”

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LONG NICKEL MINE GEOLOGICAL SETTING

WMC Production 1979-1999:

5.43M t

3.7% Ni

203,184 Ni t

IGO Production 2002-Dec05:

583,147 t

4.0% Ni

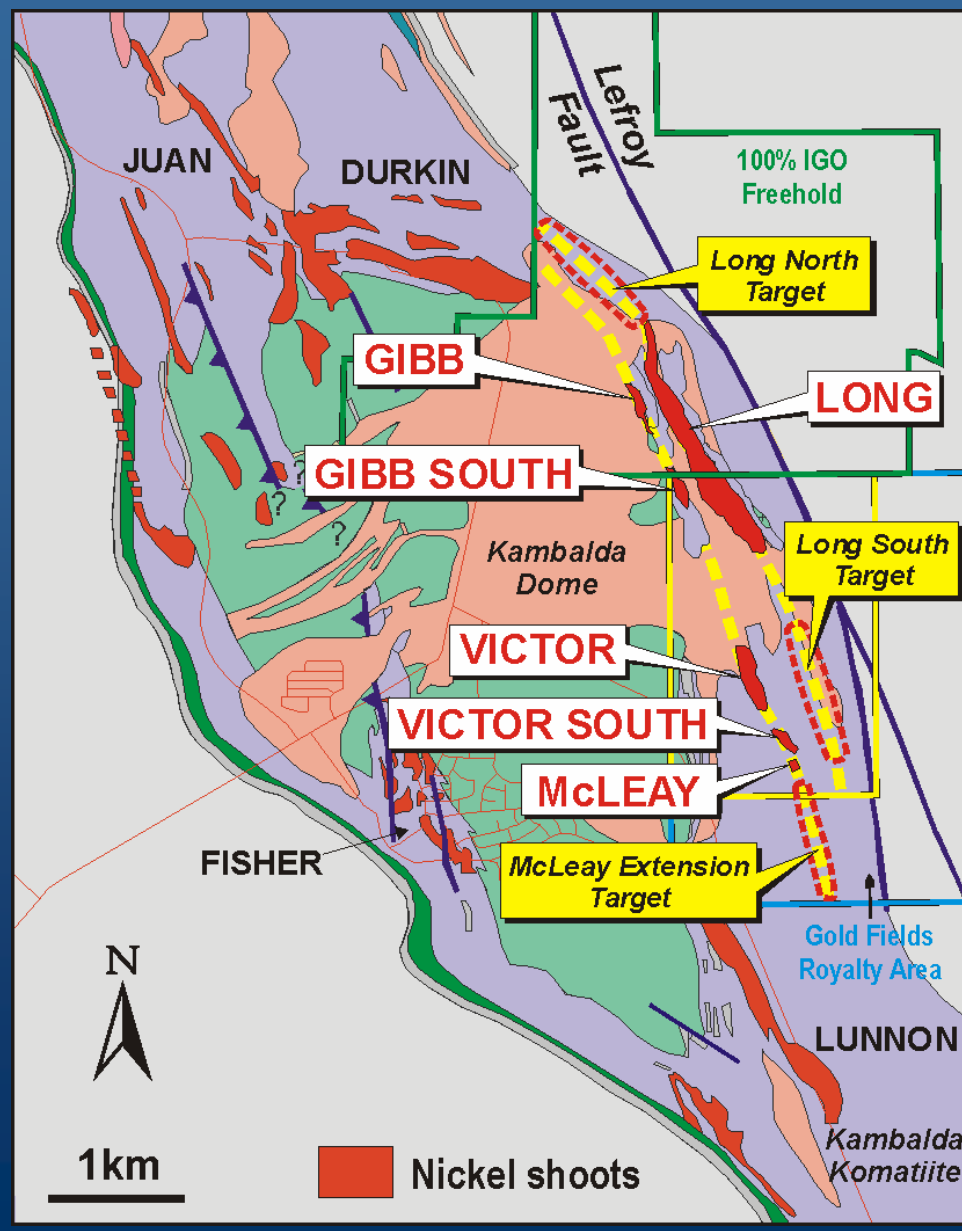
23,313 Ni t

30.06.05 Reserve:

1.43M t

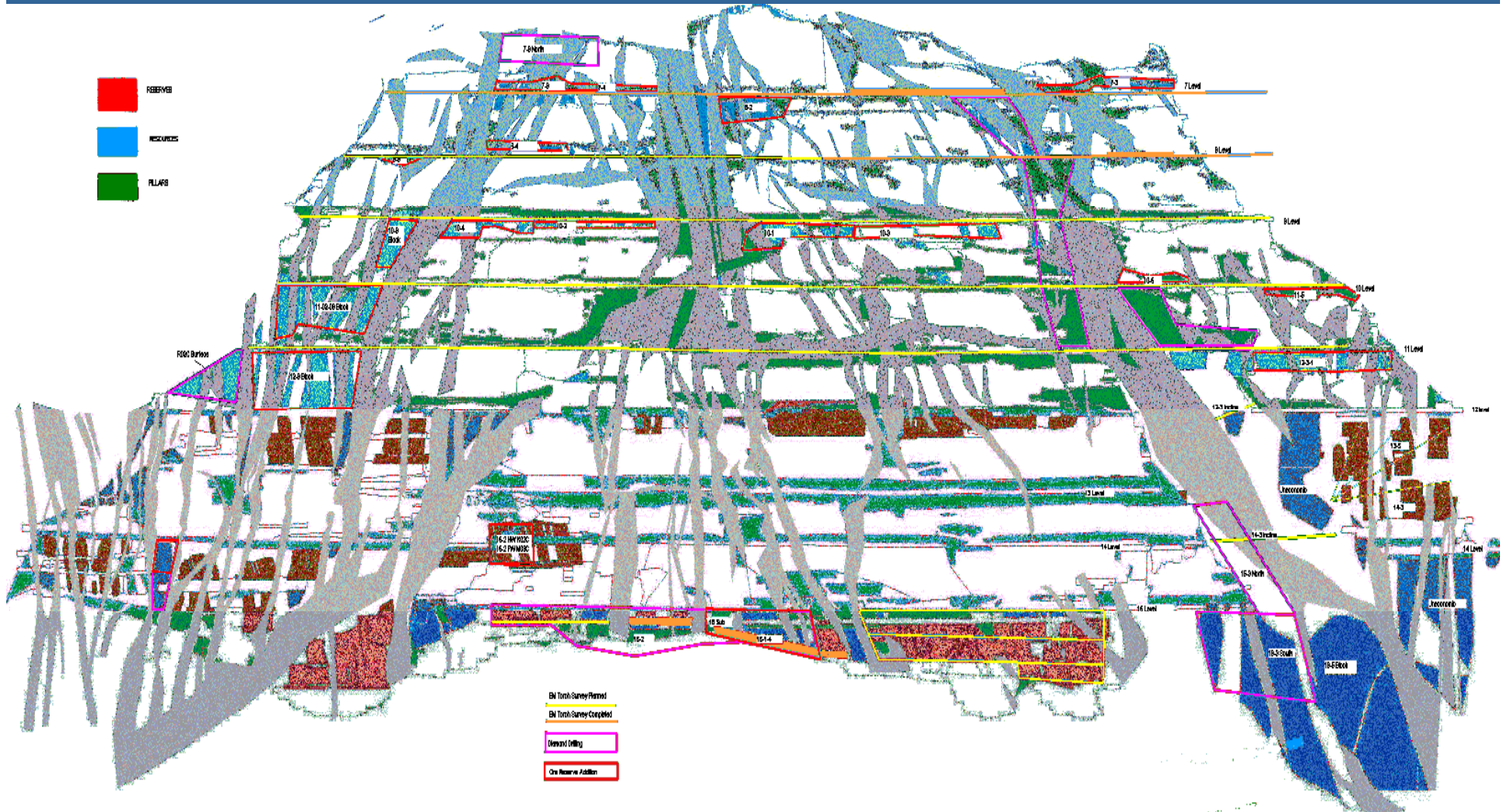
3.9% Ni

55,290 Ni t





LONG NICKEL MINE GEOLOGICAL SETTING





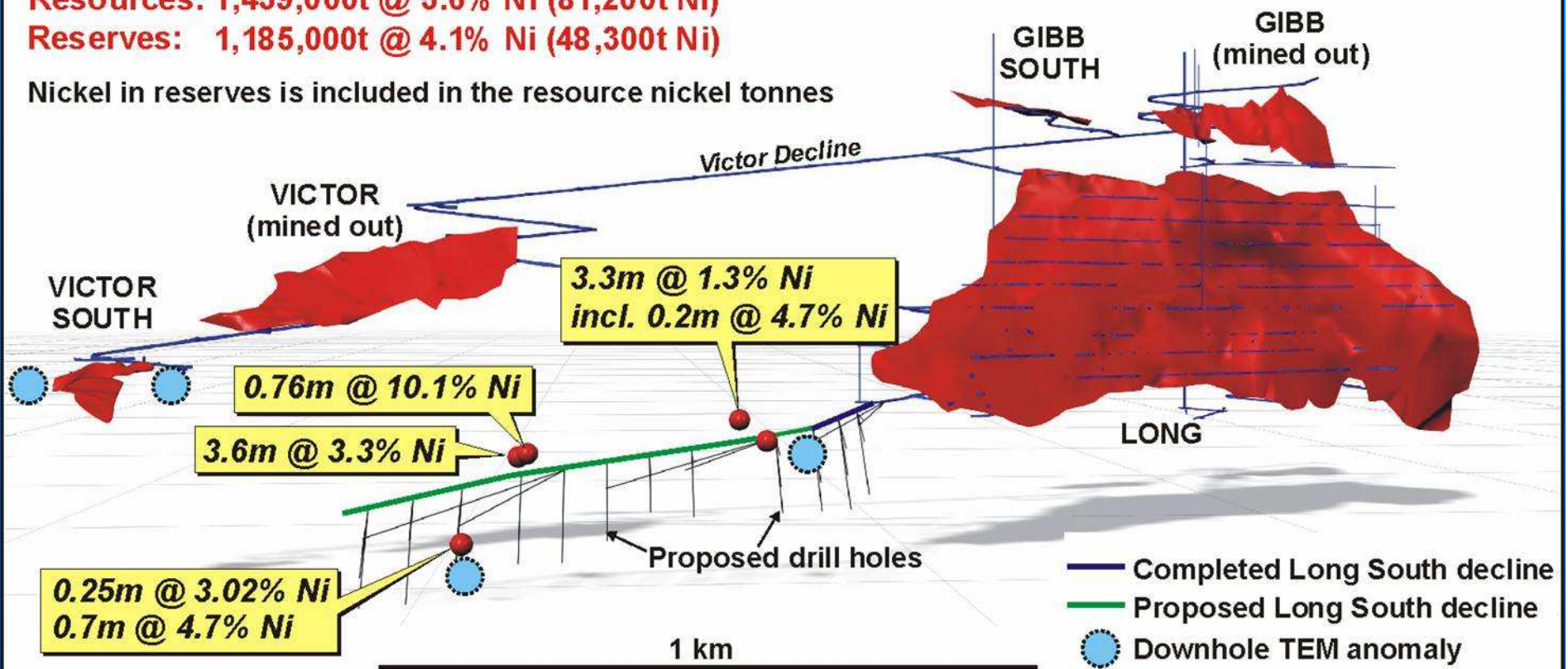
LONG NICKEL MINE GEOLOGICAL SETTING-Long section

Long Complex - June 2004

Resources: 1,459,000t @ 5.6% Ni (81,200t Ni)

Reserves: 1,185,000t @ 4.1% Ni (48,300t Ni)

Nickel in reserves is included in the resource nickel tonnes





LONG NICKEL MINE

Brief geophysics history

Petrophysics stratigraphy completed 1992-1994

- **Re-focus on Conductivity as being the main petrophysical indicator of commercial mineralisation**

Lithological Unit	Conductivity (s/m)
Ultramafics	$1-3 \times 10^{-5}$
Basalt	$0.1-2 \times 10^{-5}$
Dolerites	$0.2-3 \times 10^{-5}$
Meta-sediments	$0.2-10^3$

Ore Type

Disseminated Sulphide	10-20
Net Textured Ni-Sulphide	$1-5 \times 10^3$
Massive Ni-Sulphide	10^5



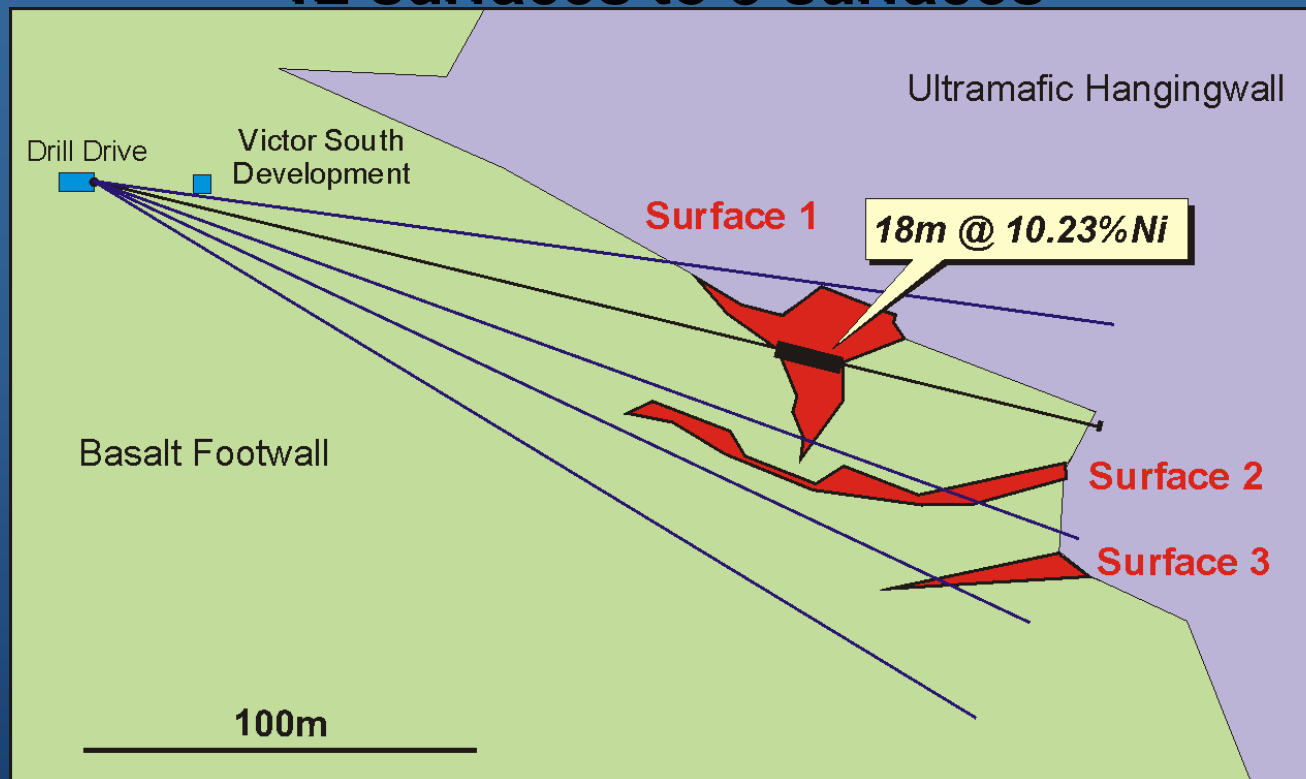
VICTOR SOUTH INTEGRATION

- **WMC Victor South Resource was:
155,000t @ 4.59% Ni (7,107 Ni t)**
- **Geological Remodel:
Structural geology, re-log 11 holes (J Standing)**
- **Test the Geological Model; Reinterpret all DHTEM,
supportive? conflict?**
- **Reiterate;**



VICTOR SOUTH

12 surfaces to 3 surfaces



•Victor South interpreted at Reserve 428,000 t @ 3.6 % Ni (15,600 NiTs...was 7107 NiTs)...the development down plunge continues

•3 Component TEM measurements for a 3d world with each component of equal sensitivity



EXPLORATION STRATEGY

- **Use all holes in the mine as EM platforms**
 - **DHTEM (Fluxgate, EMIT “Atlantis” development)**
 - **Torch (Multiple transmitters, 3 orthogonal coils/preamps (Curtin University) and/or fluxgate sensors (EMIT))**

- **Constantly integrate at all scales (The “3g’s”)**
 - **Geology**
 - **Geophysics**
 - **Geochemistry**

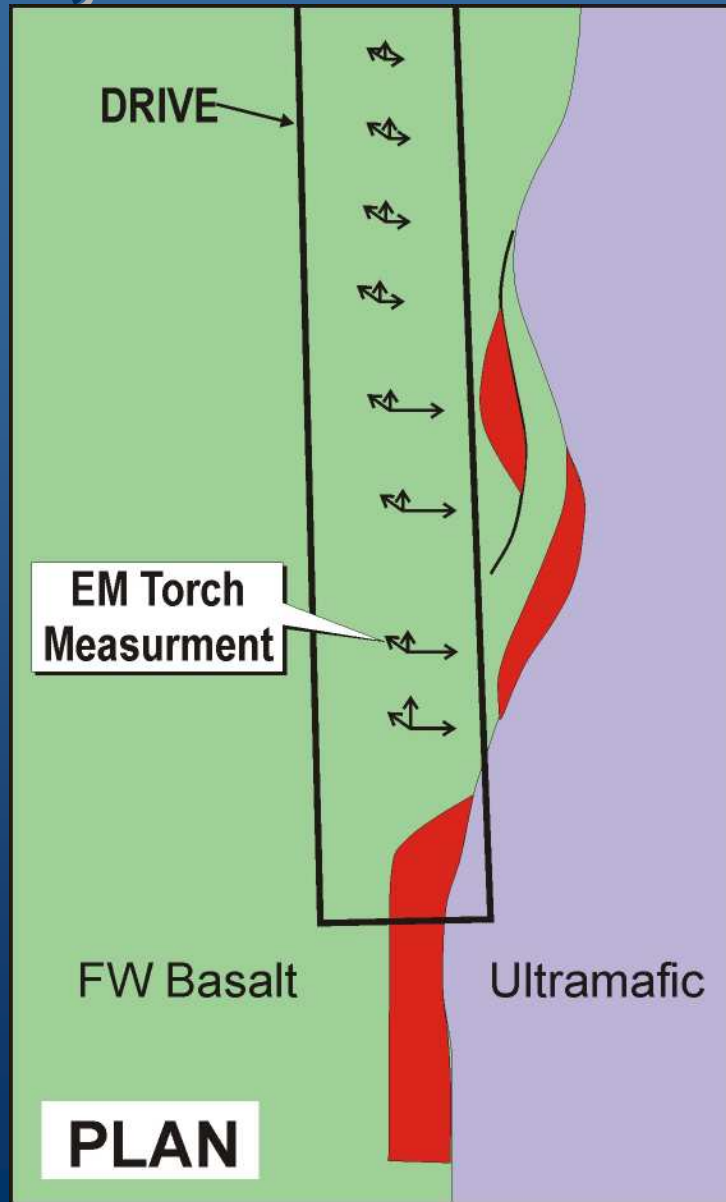


Torch Development rationale

- **LONG MINE FOOTWALL Tunnels can be assets from numerous perspectives.**
- **Approx 45 kms or 45,000 meters of footwall tunnels at Long.**
- **Objective to expand the search radius around the tunnels to 15-70m or more.**
- **Footwall drives are essentially strike parallel or dip parallel drill hole equivalents and can be “excellent geophysical platform holes”.**
- **If Torch Development costs are A\$200k, then this equates to a cost of A\$4.50 per meter to “ream” the hole(/tunnel) out to a diameter of 40-50 meters.**



INNOVATIONS – Torch Concepts MIL, Down Drive TEM, FLTEM





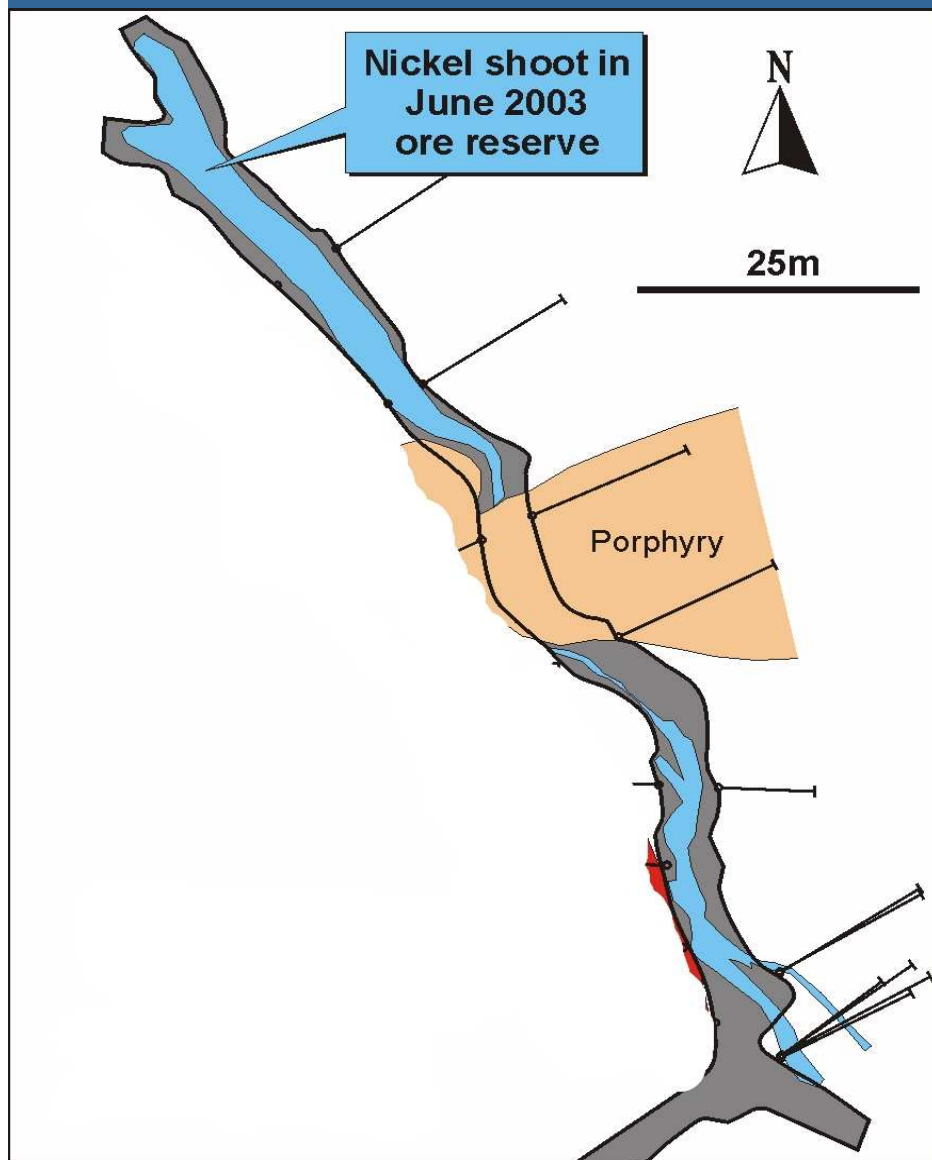
In the beginning – Torch prototype

**3 component
EM torch (V1.0)**

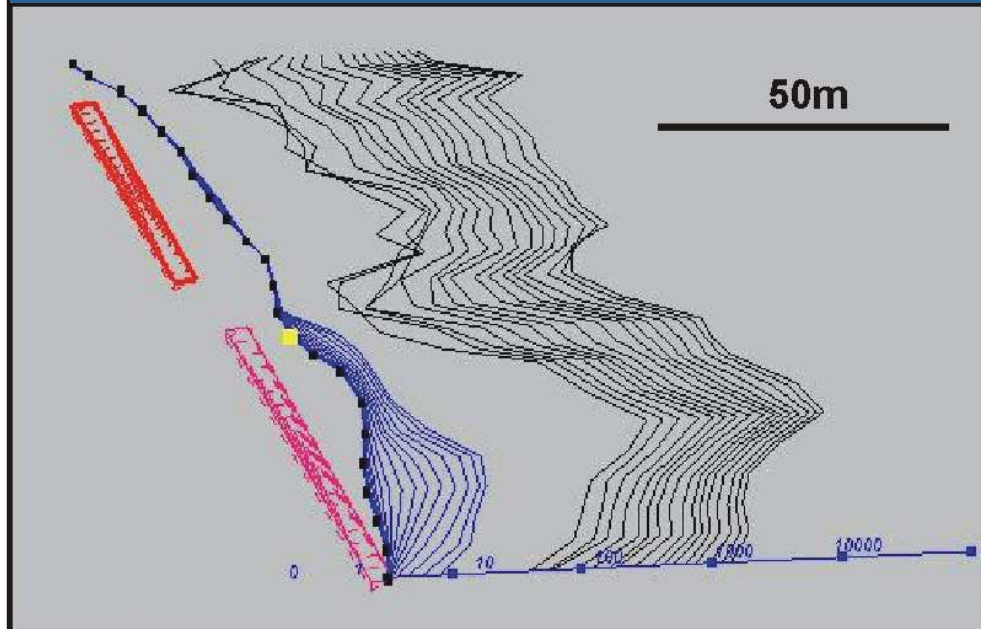




EM TORCH



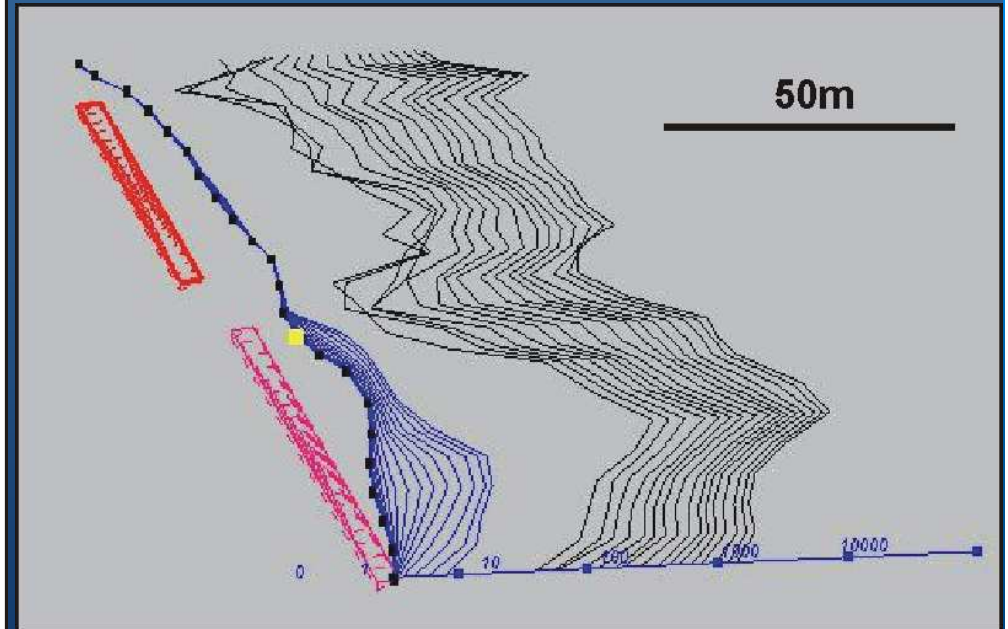
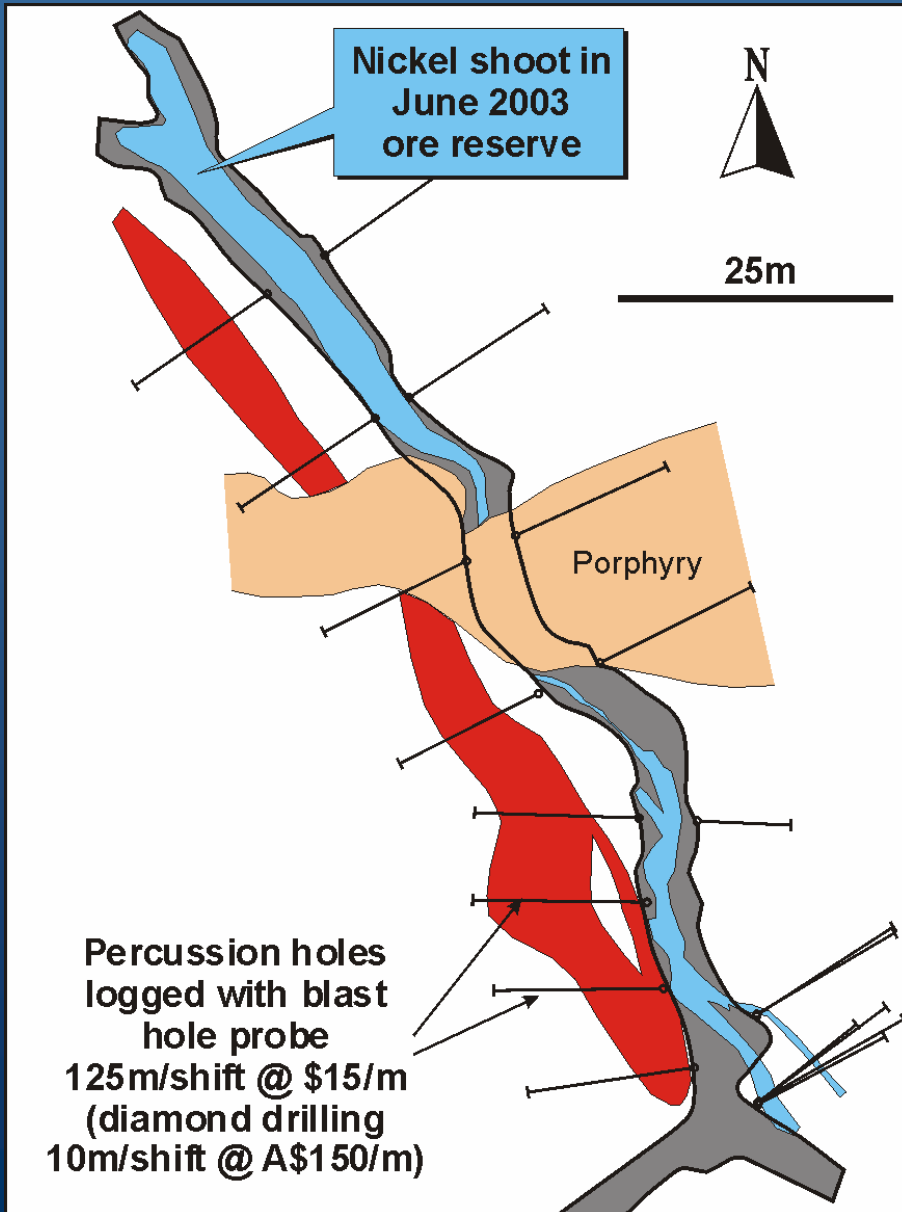
EM Torch Profile





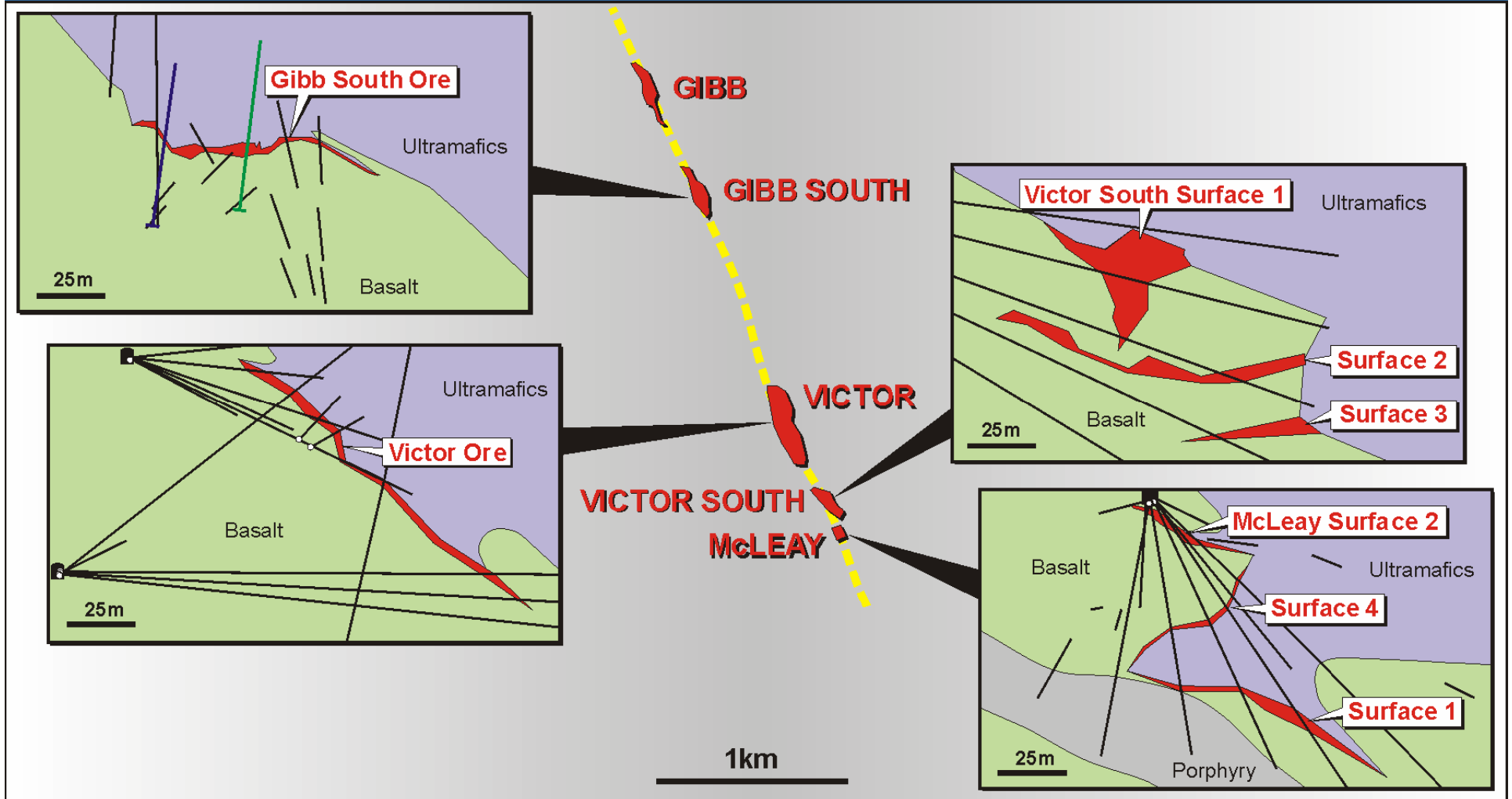
EM TORCH

EM Torch Profile



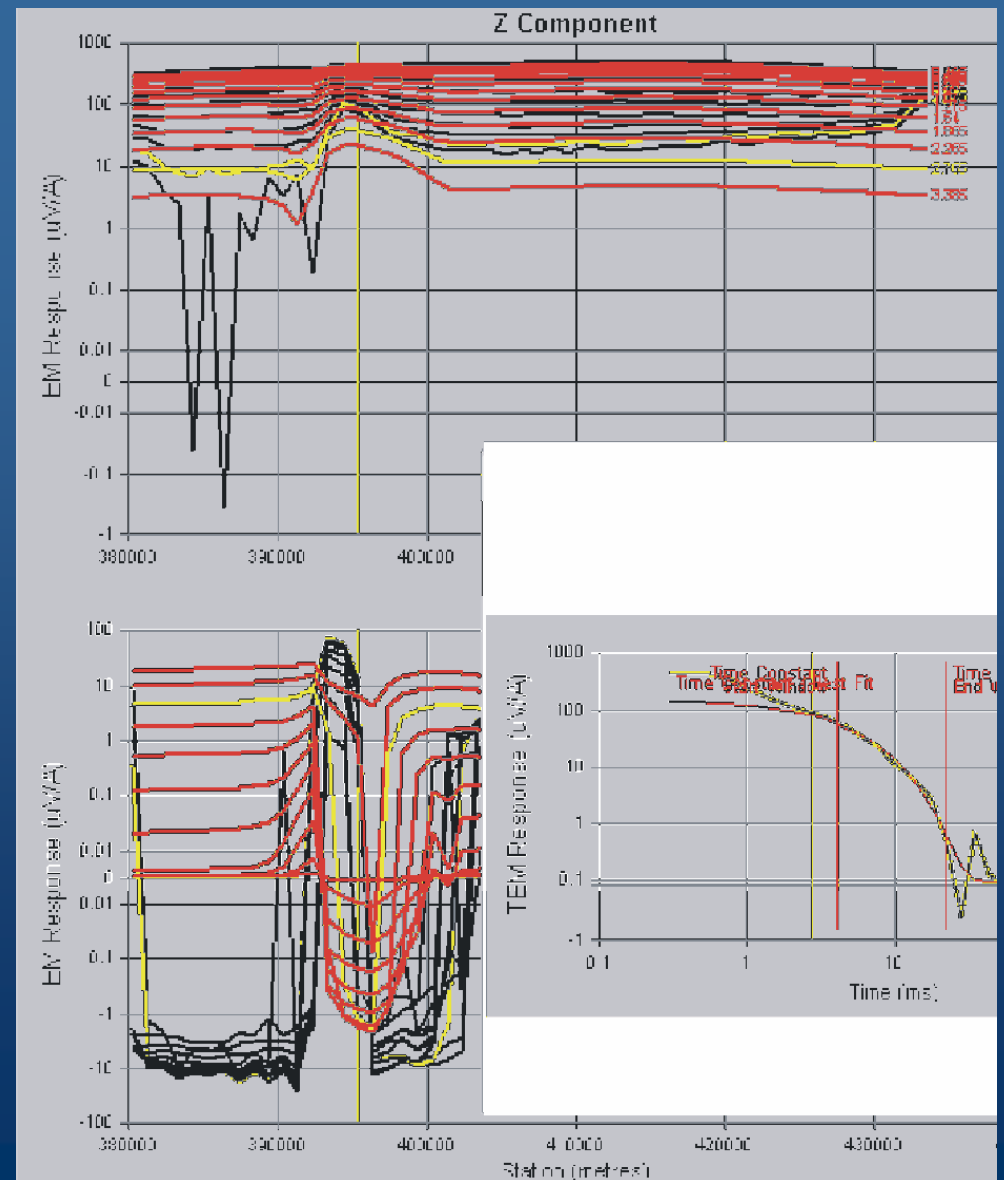
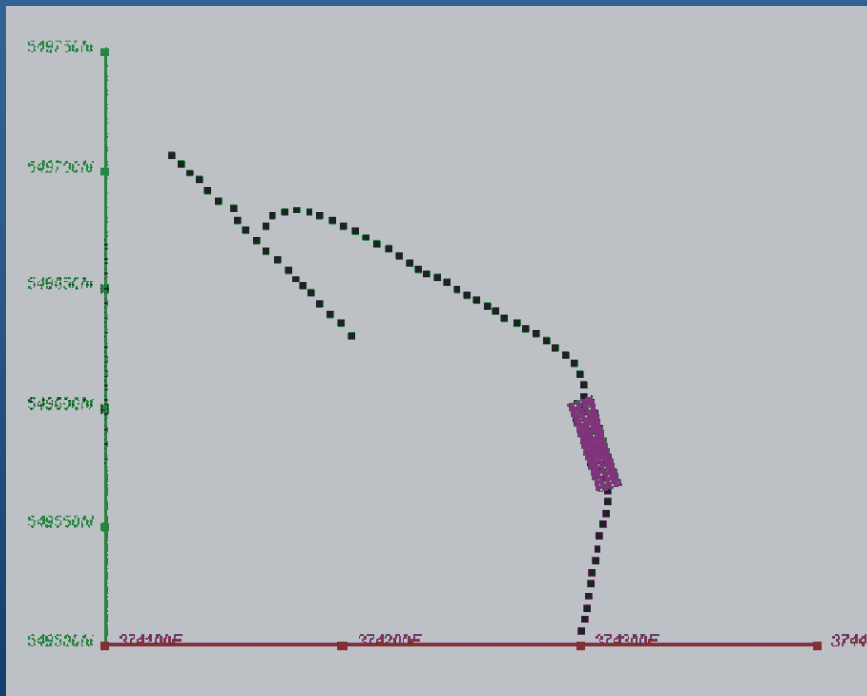


GIBB – VICTOR CHANNEL





TORCH AT GIBB SOUTH



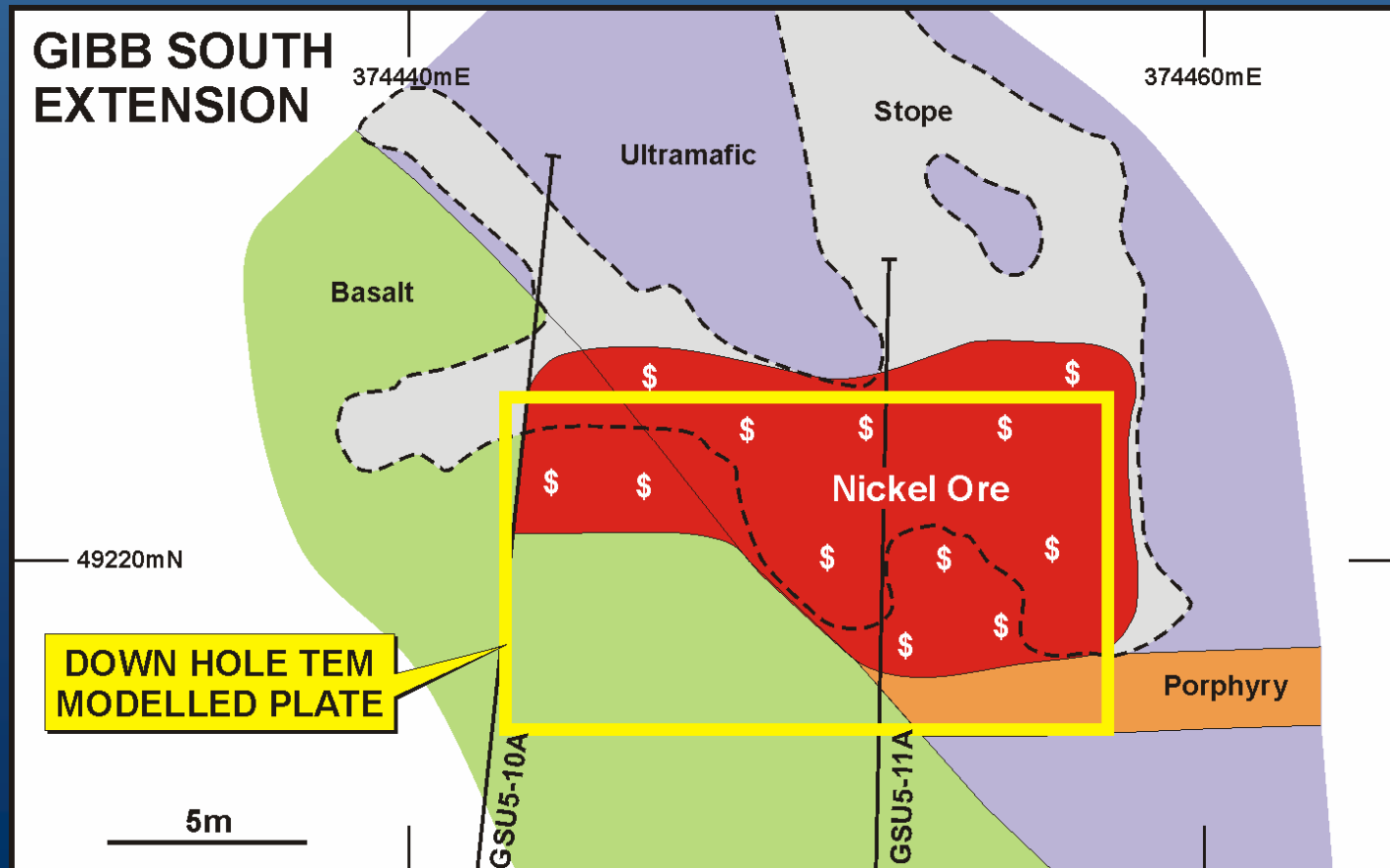


TORCH AT GIBB SOUTH

Gibb South

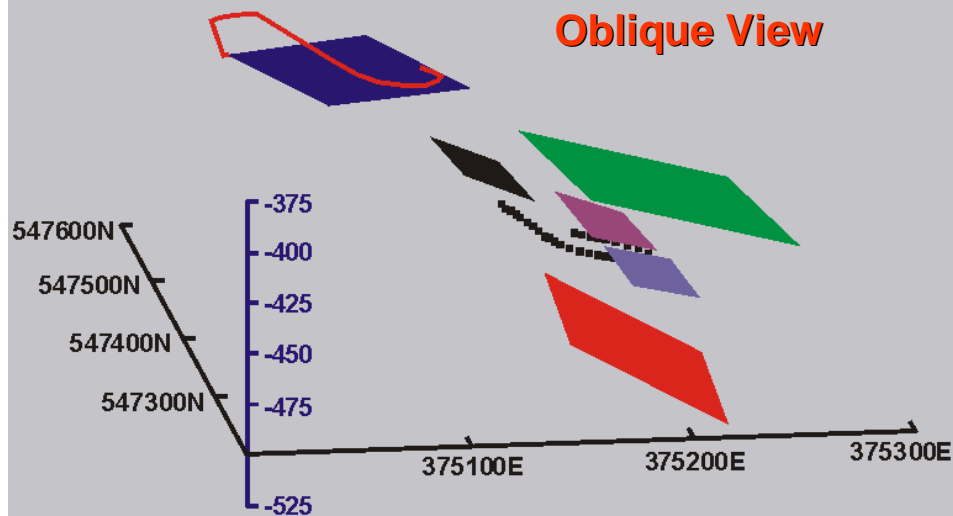
Holes **sub-parallel** to ore surfaces

Confidence through a combination of Geology and Geophysics



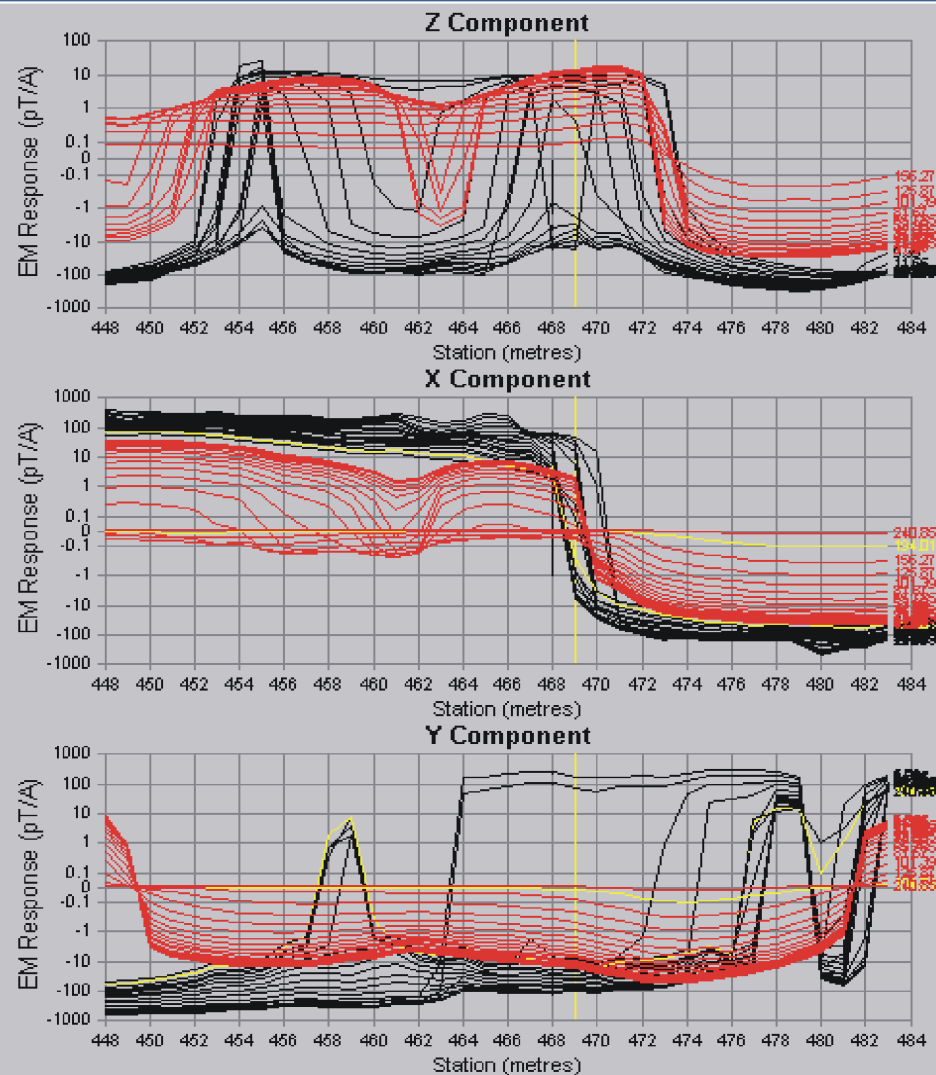


VICTOR SOUTH – TORCH in the development drive and 2 DHTEM logs



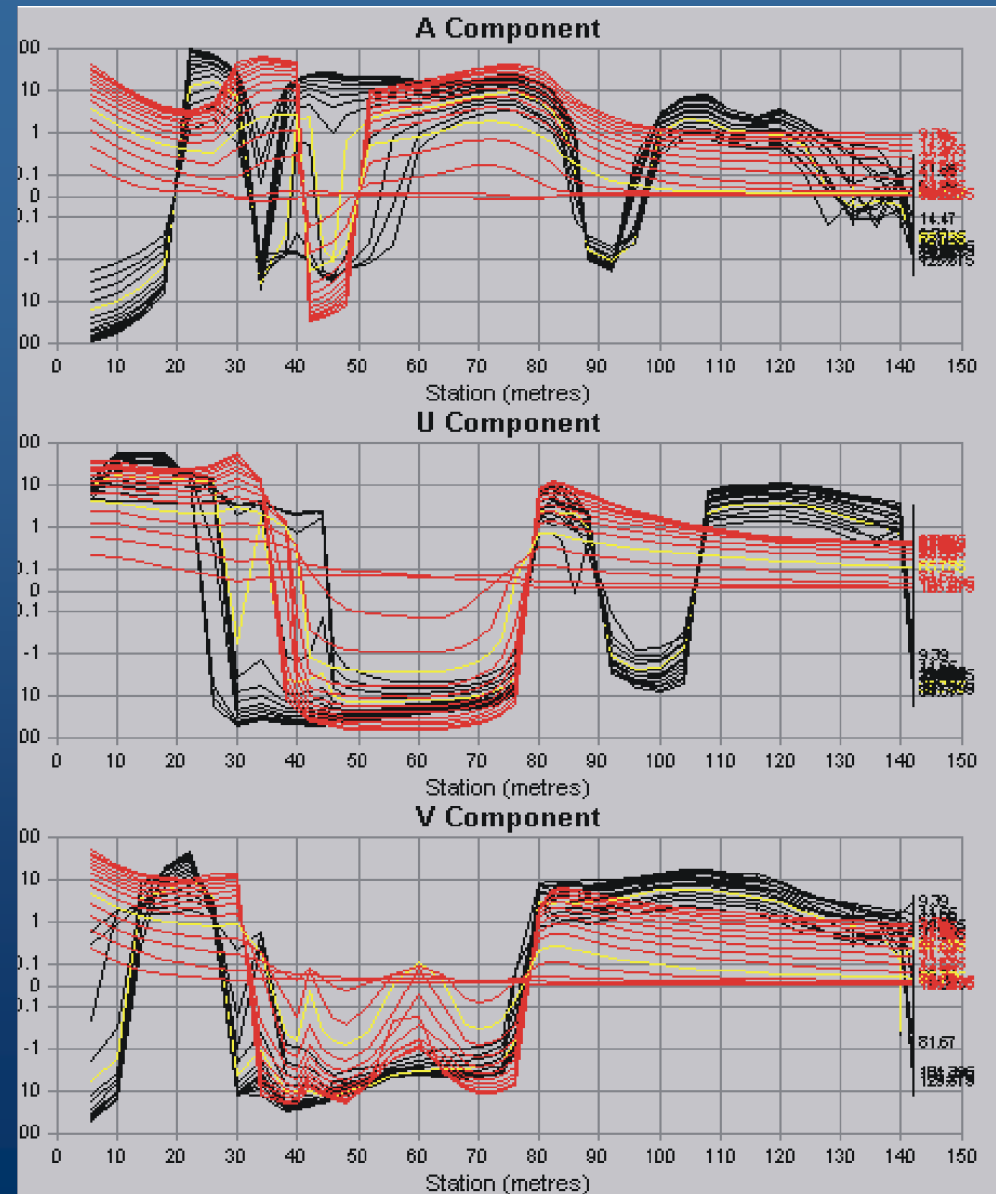
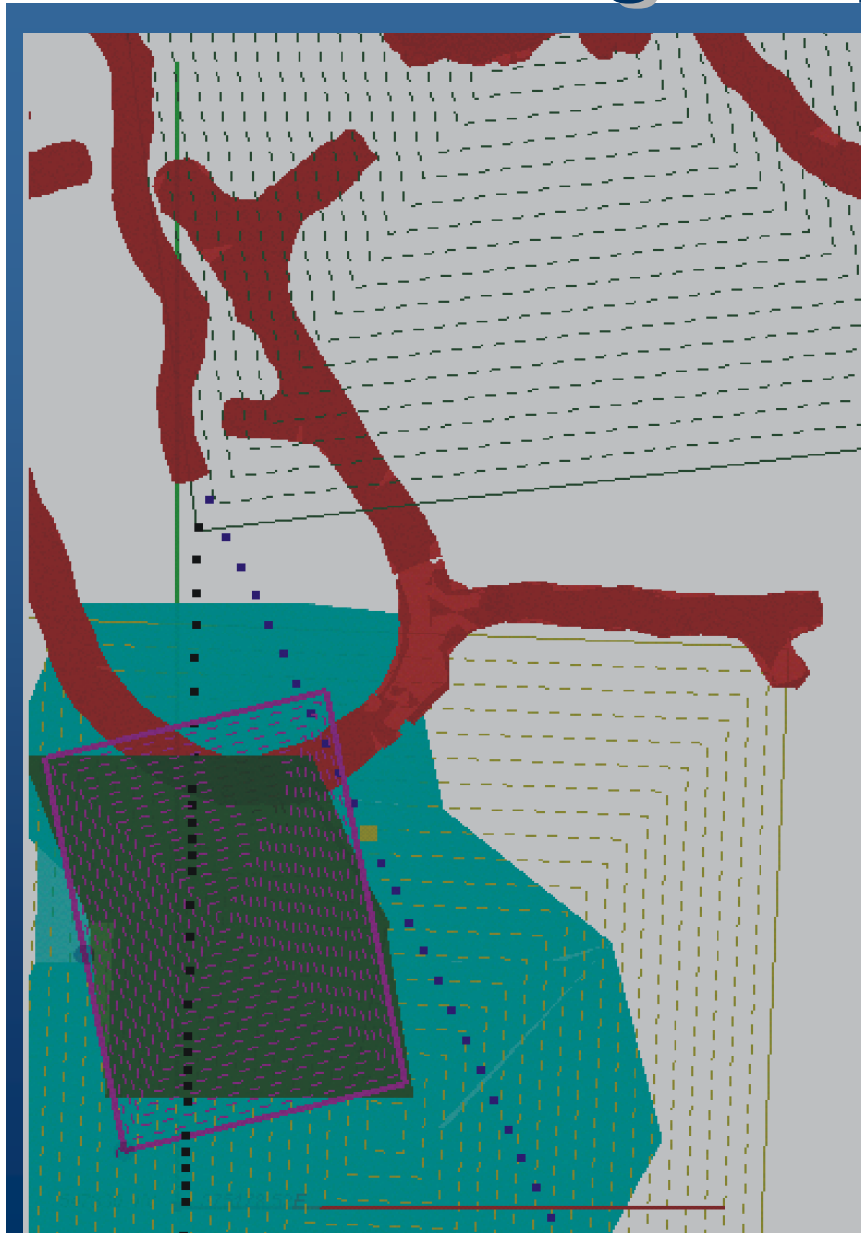
Green Plate – Victor S

Purple Grey Red Plates – McLeay Emerging



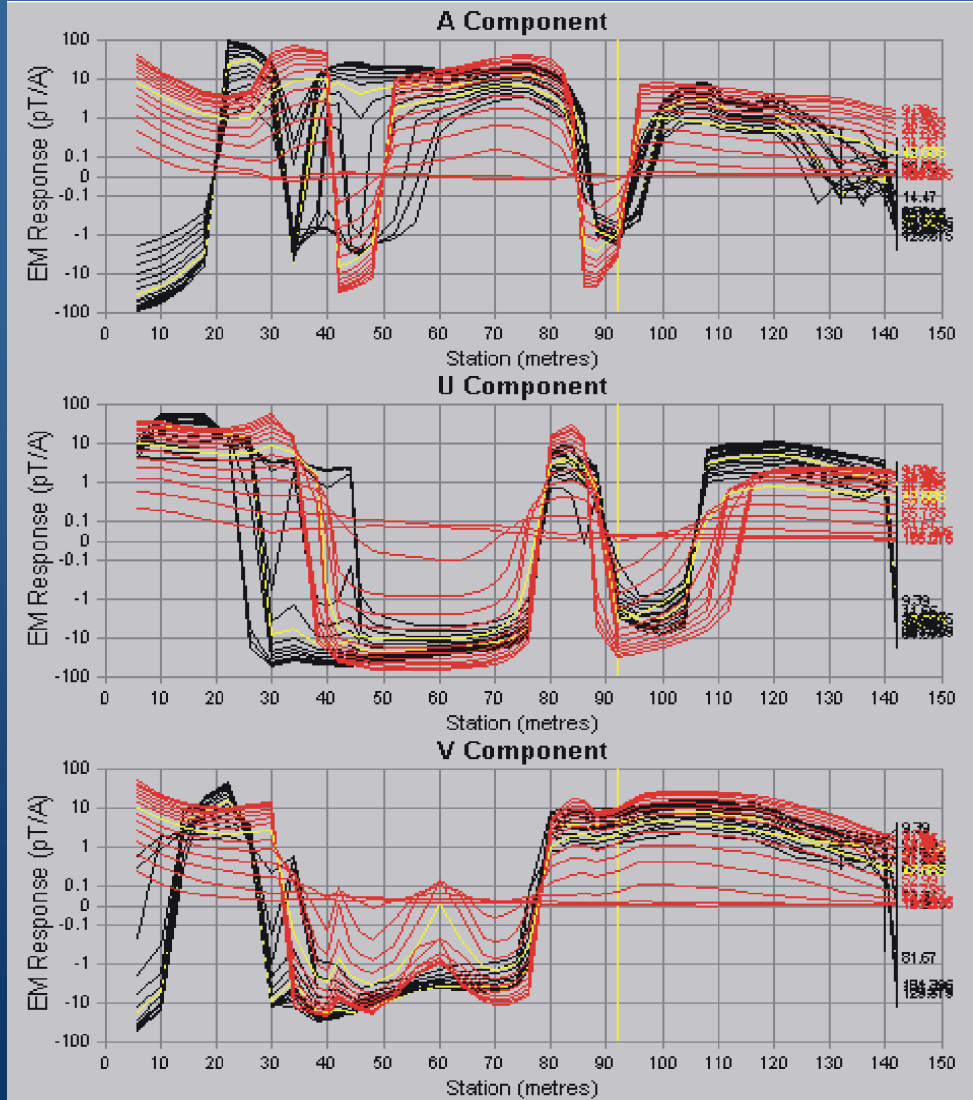
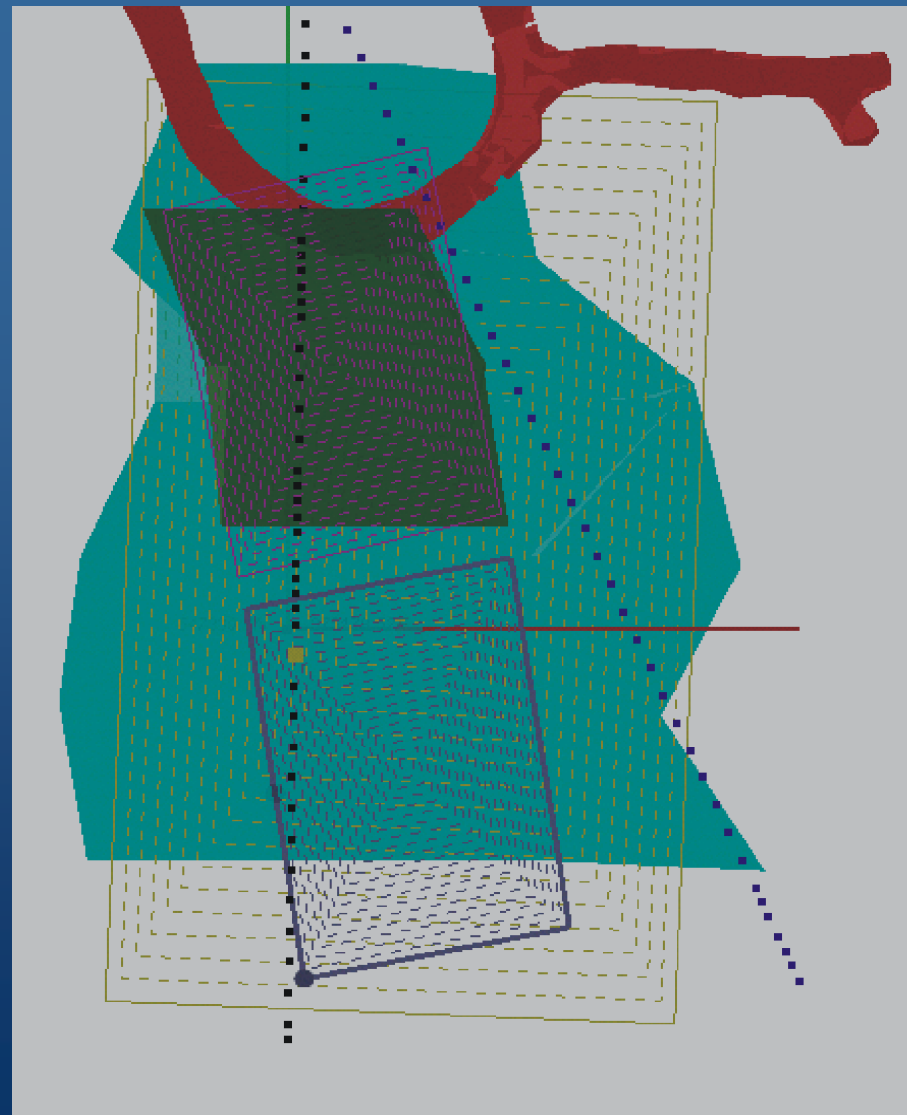


VICTOR SOUTH – VS 15-125 drilling sub parallel to the ore surface



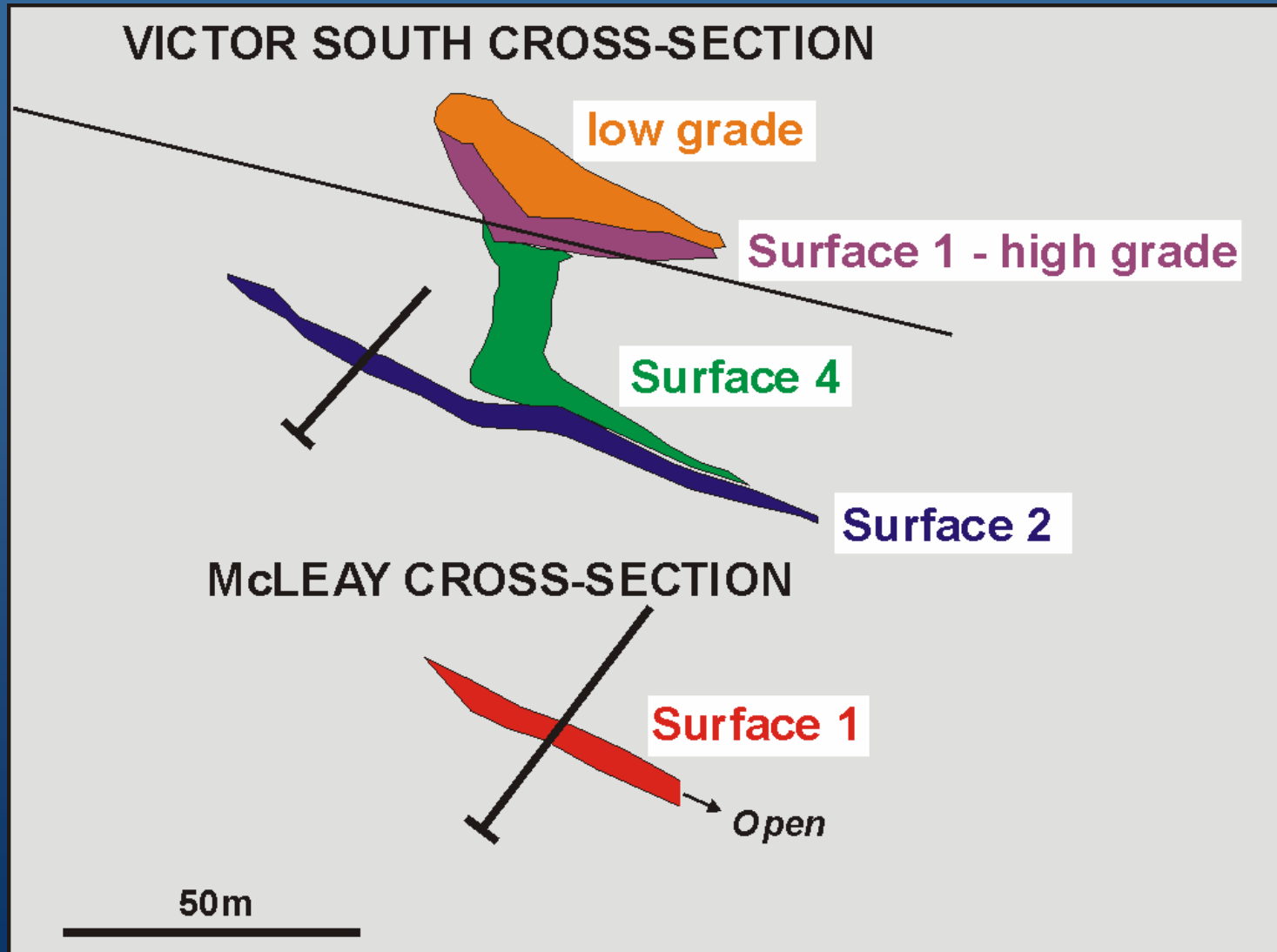


VICTOR SOUTH – VS 15 – 125 a porphyry bar and extension south





McLeay Ore surface 1 Gaining confidence from a few holes

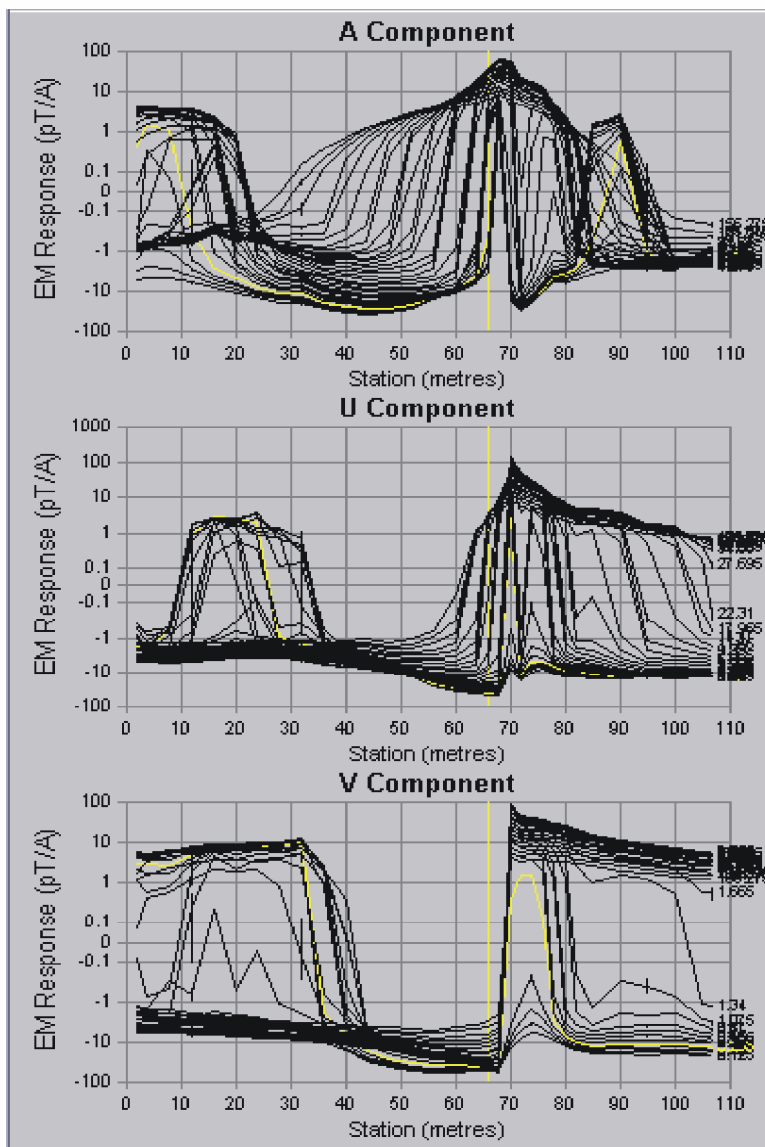




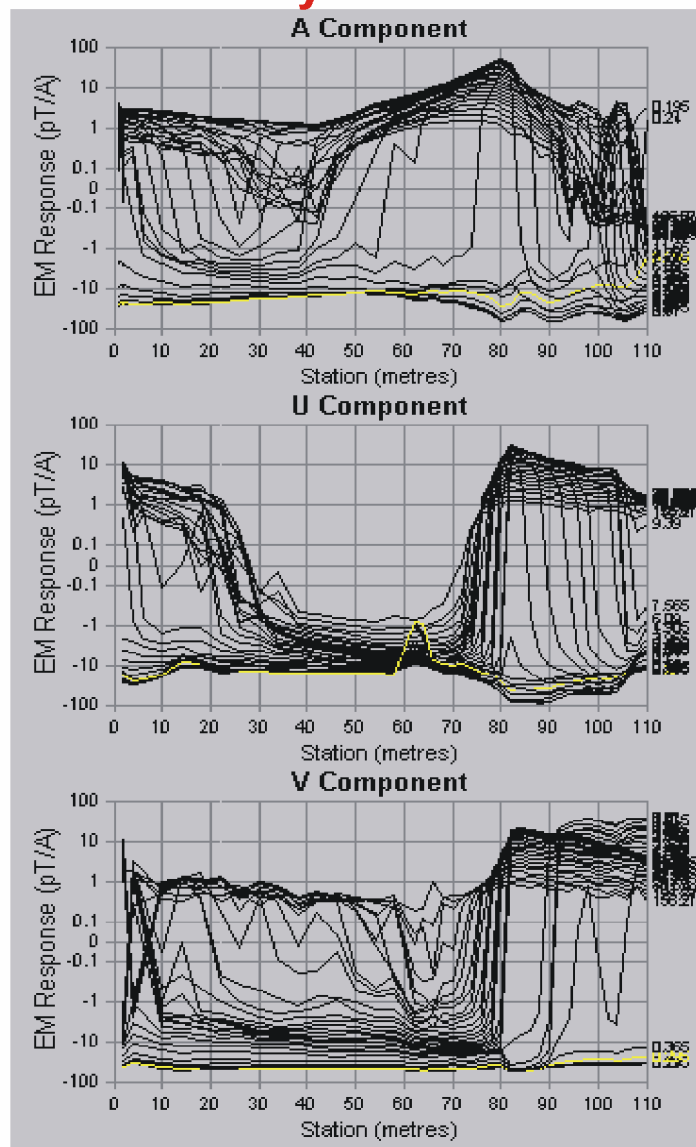
McLeay Ore surface 1

Gaining confidence from a few holes

Victor South - Surface 2



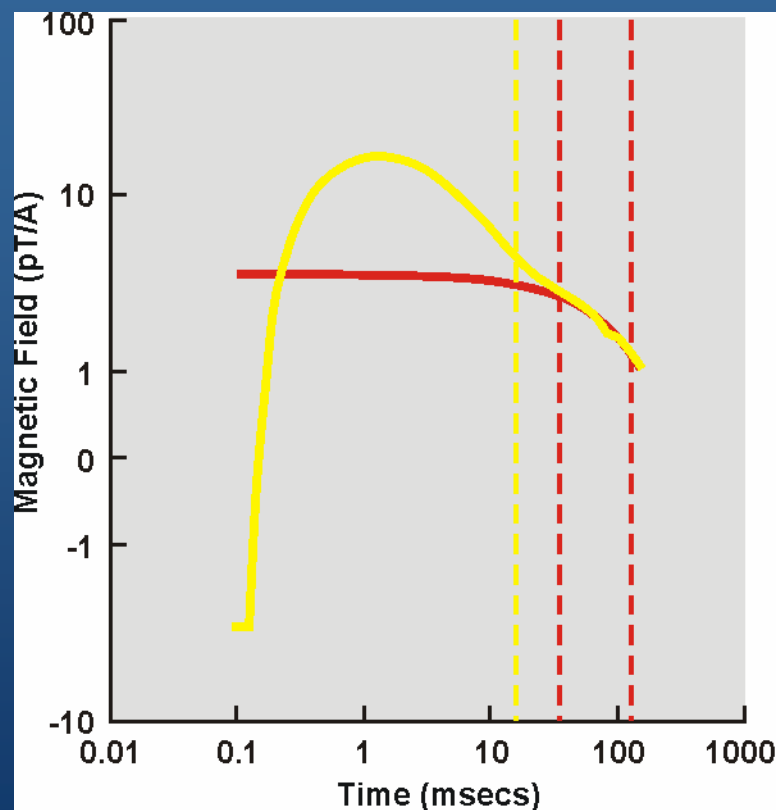
McLeay - Surface 1





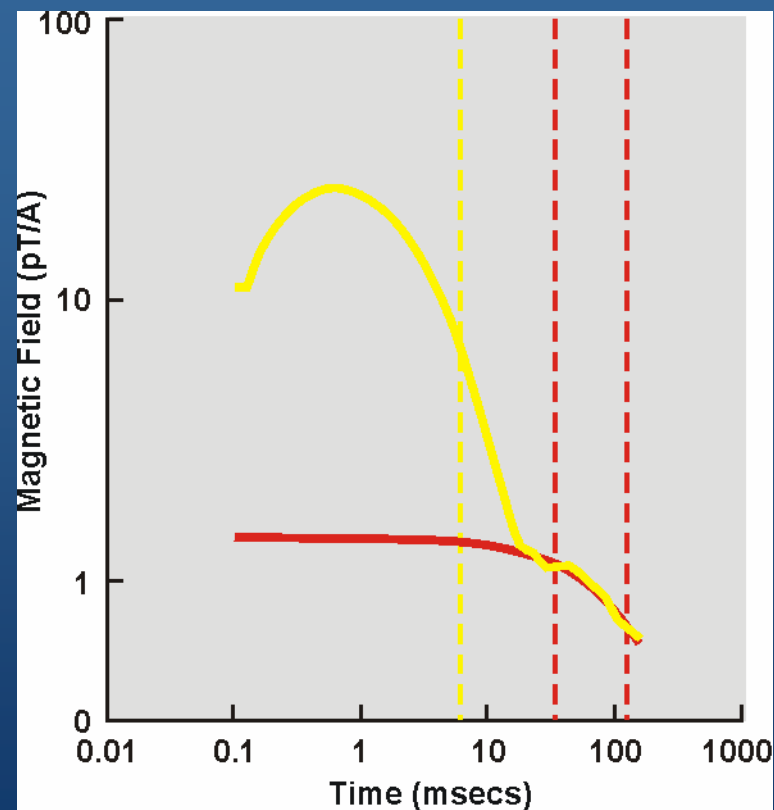
McLeay – DHTeM decays of the magnetic field (Atlantis probe)

**Victor South
Surface 2 DHTeM Decay**



Time constant: ~150 msecs

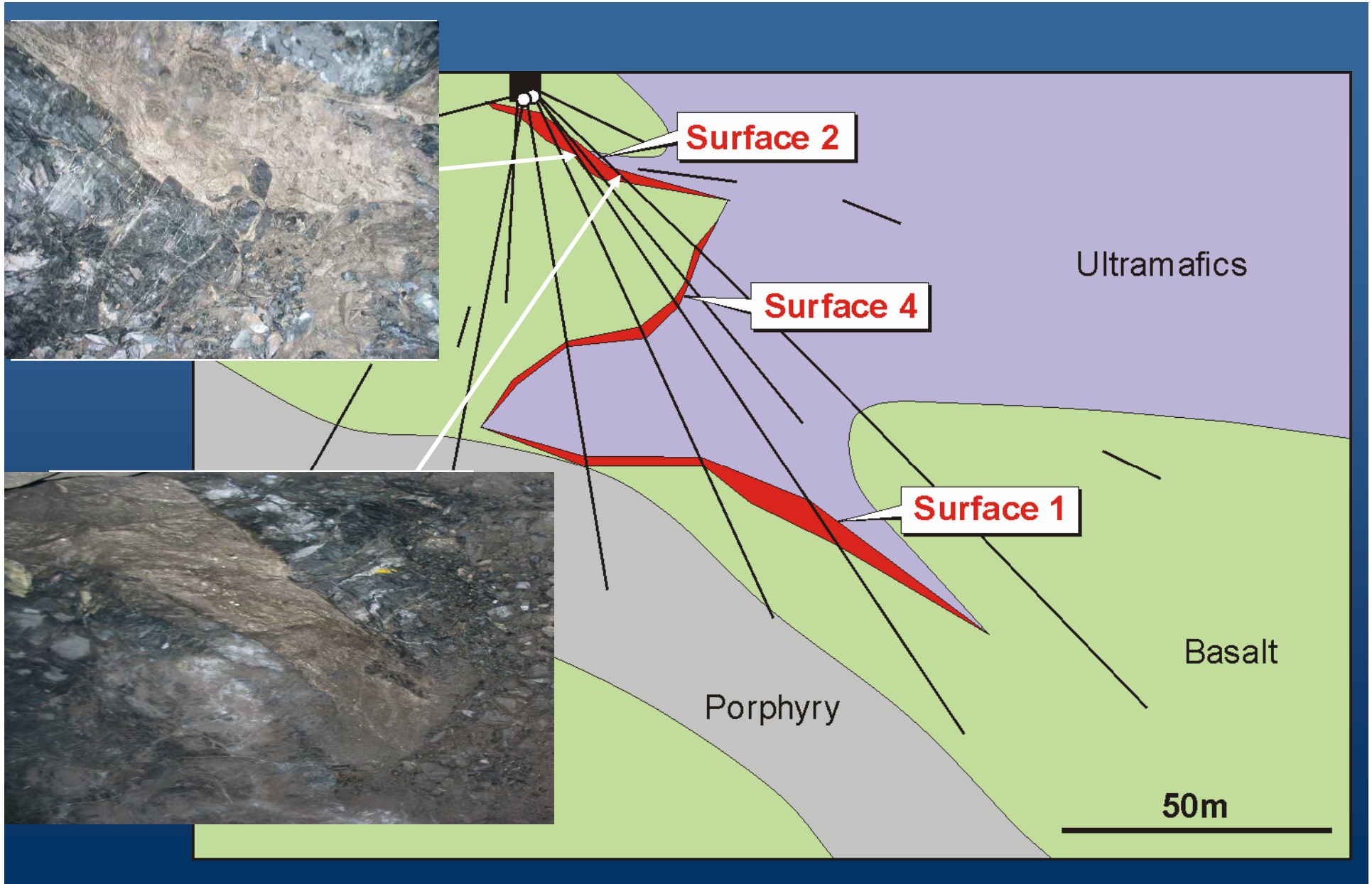
**McLeay Surface 1
DHTeM Decay**



Time constant: ~200 msecs

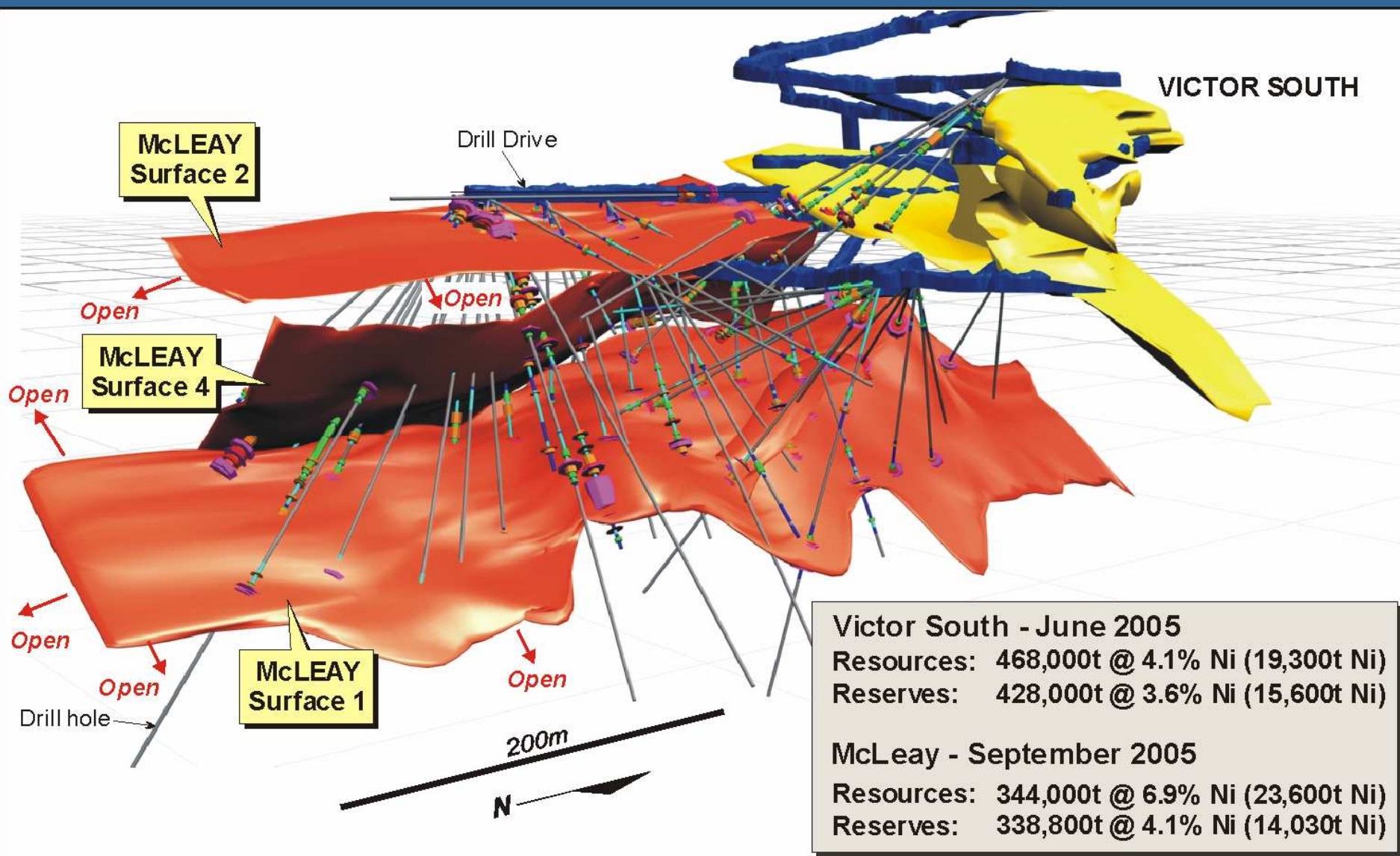


McLeay Ore - Cross section



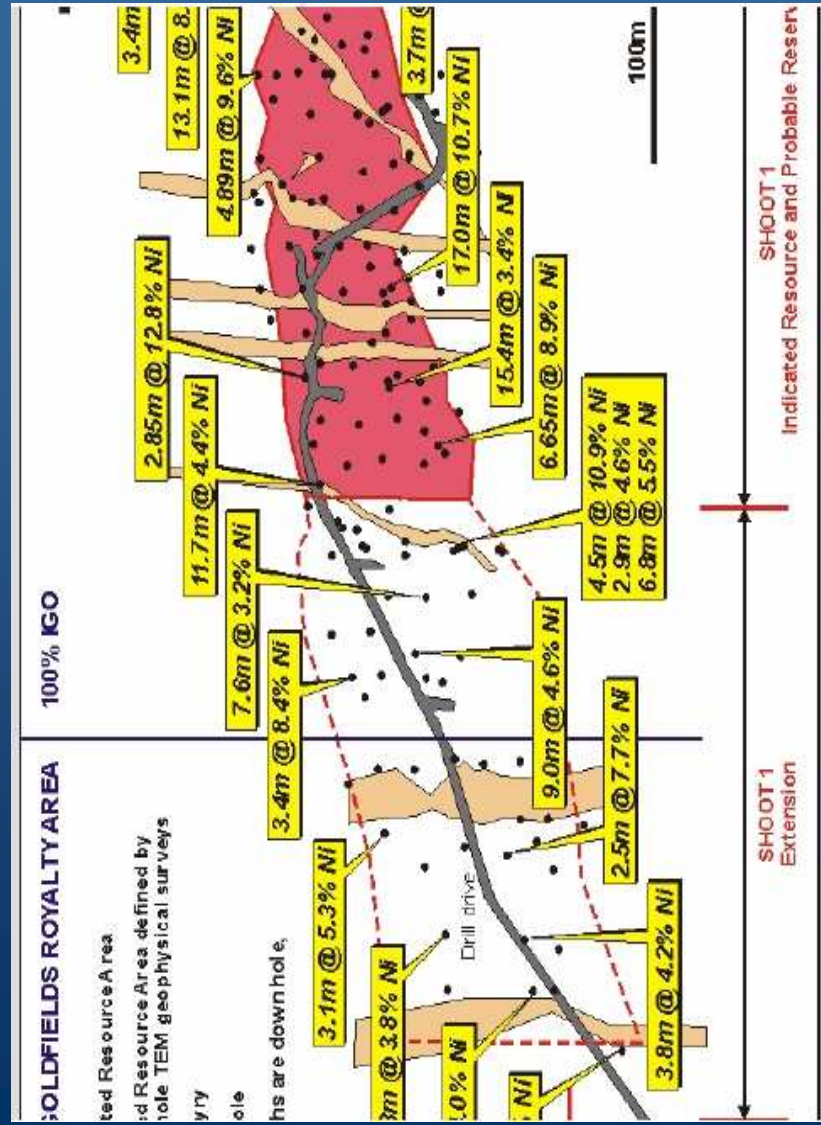


LONG NICKEL MINE NEW McLEAY DISCOVERY



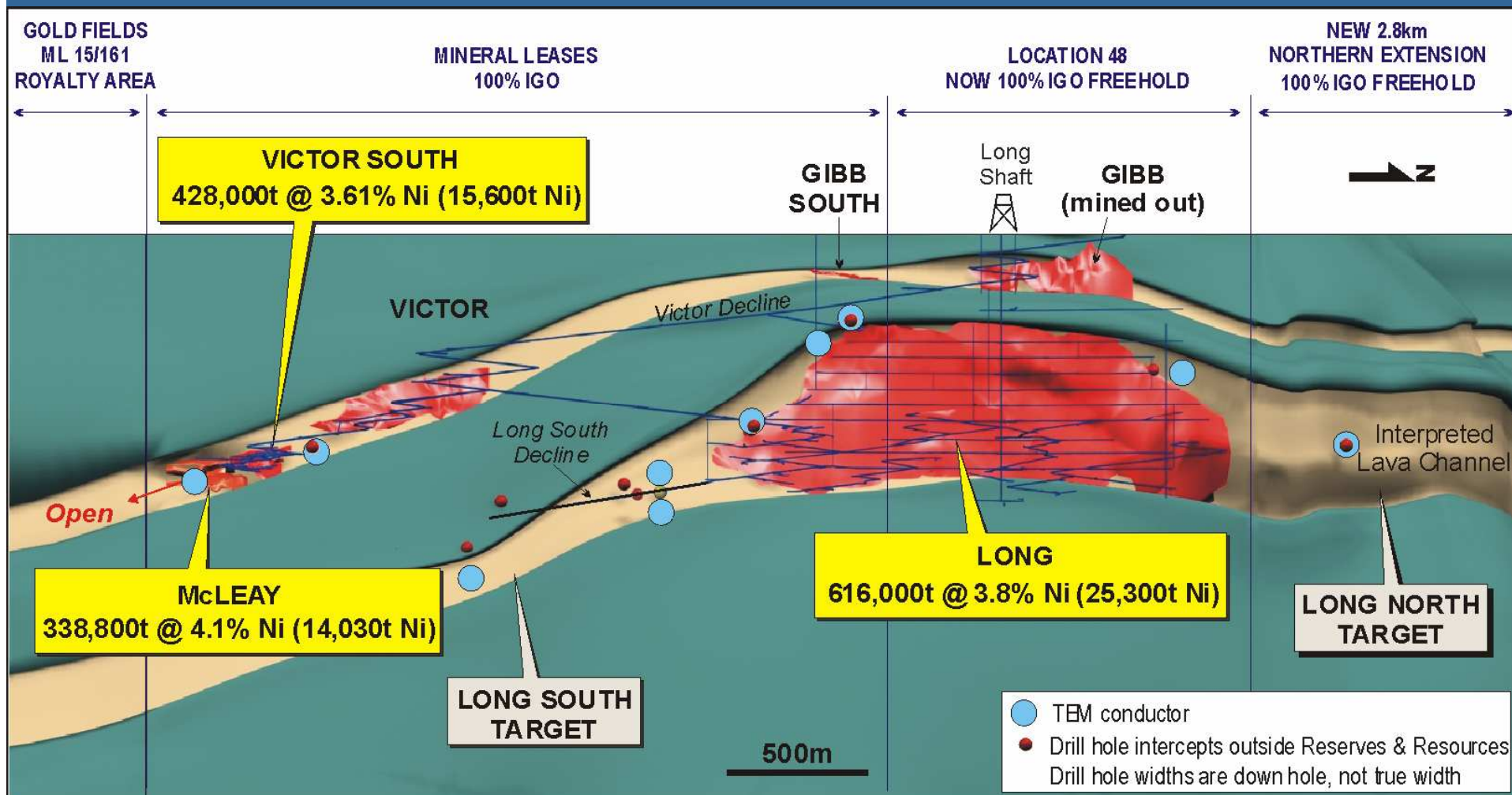


LONG NICKEL MINE - McLEAY – plan of surface 1....the porphyry bars





LONG PROJECT AREA LONGITUDINAL PROJECTION



McLeay 2006:

Reserve 13,200 Nits Resource 20800 Nits



SUMMARY

- **Victor South Resource**
 - **7107 NiTs >>>>> Reserve 15,600 NiTs**
- **McLeay 2006**
 - **Reserve 13,200 Nits @ 4.1 % Ni**
 - **Resource 20800 Nits @ 6.9 % Ni**

- **Closely integrating the 3g's**
 - **Tight**
 - **Integrated**
 - **Multidisciplinary**
 - **Exploration**
 - **In other words its TIME !**



ACKNOWLEDGEMENTS

- **Board** at Independence Group
- **Board and Management** at Lightning Nickel NL
- **Mining team** at Lightning Nickel NL
- The **wider team**, including but not limited to Andrew Duncan, Jon Standing and...
- **Colleagues in ex-WMC** that laid down the foundations for this work.