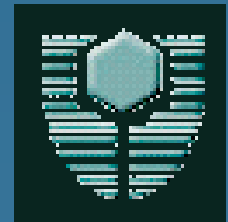


The Contribution of Magnetite to the Chargeability Response of the Centenary Orebody

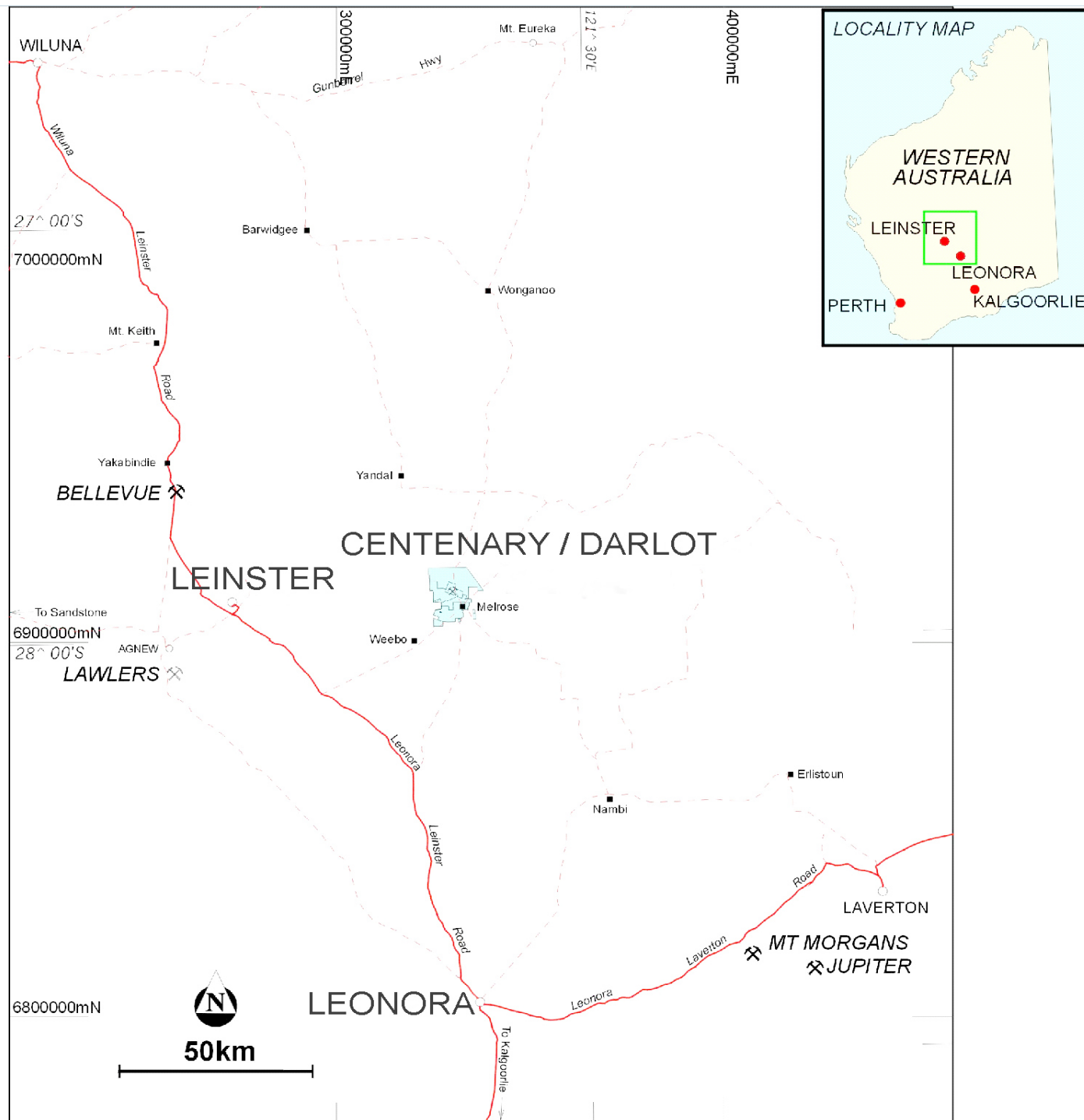
July 2006

Karen Pittard And Barry Bourne

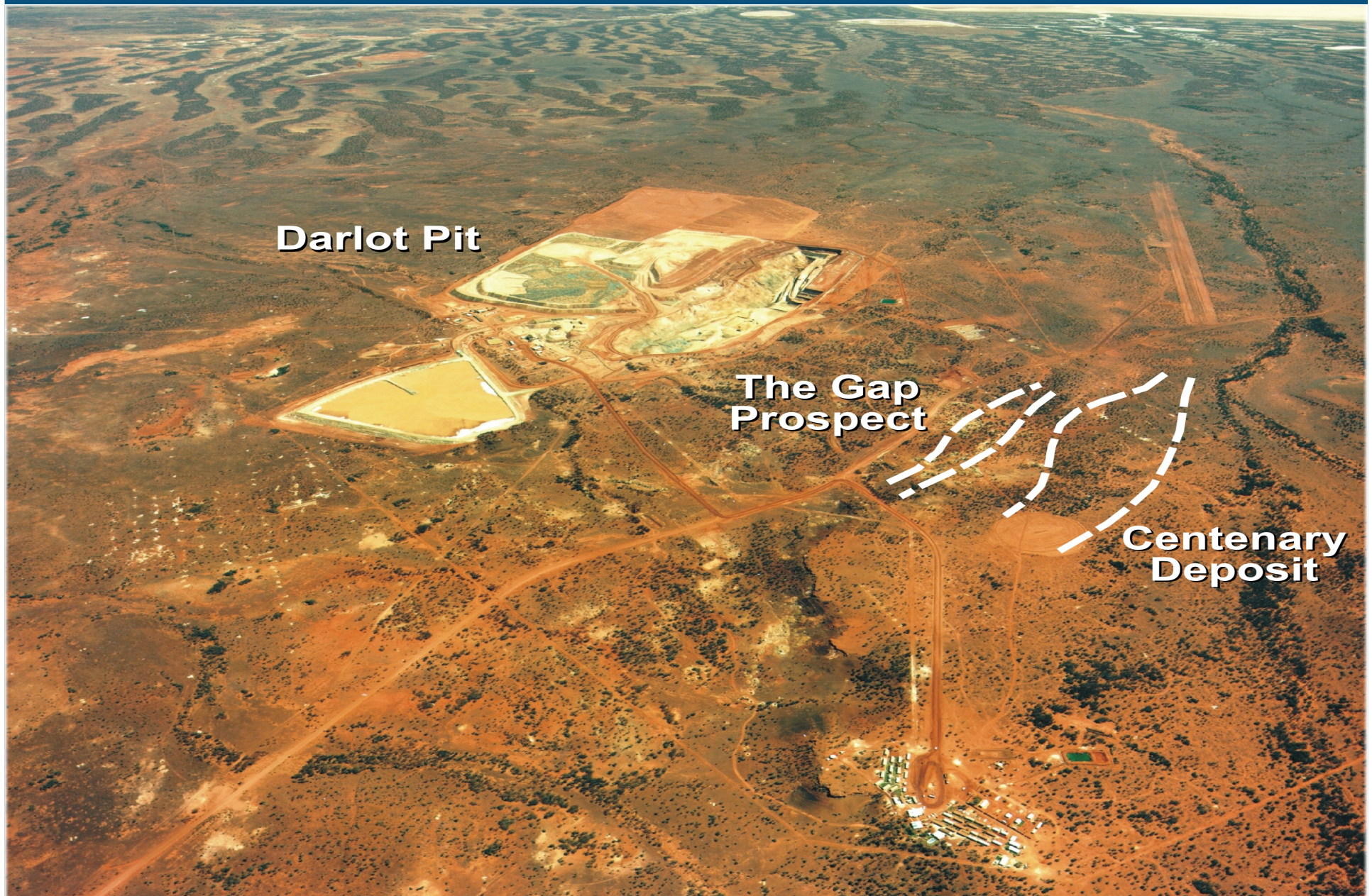


Introduction

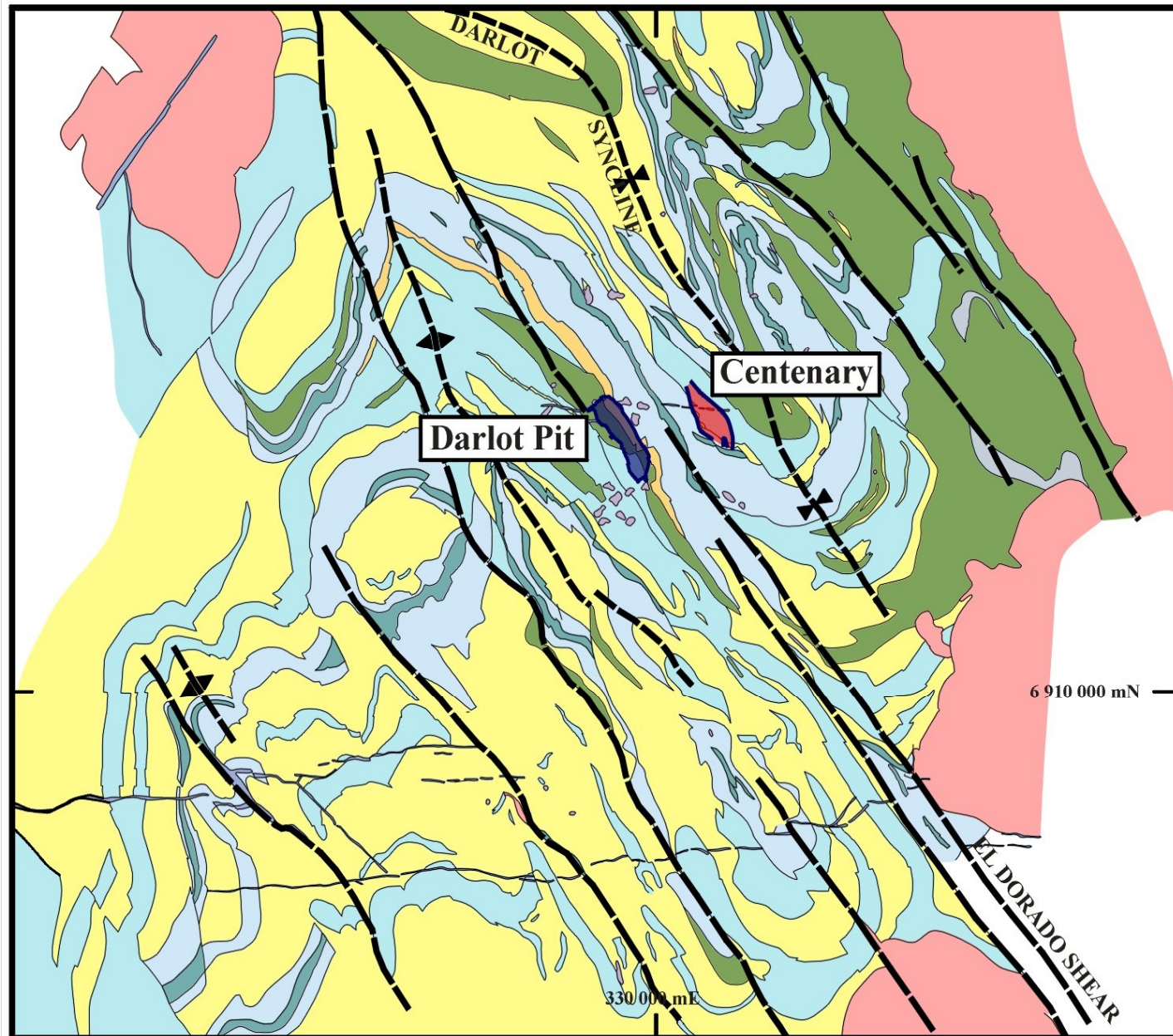
- The magnetic dolerite hosting the Centenary deposit is known to have a chargeability response, while the same magnetic dolerite not hosting mineralisation is not chargeable
- The properties of magnetite which make it chargeable are not known.



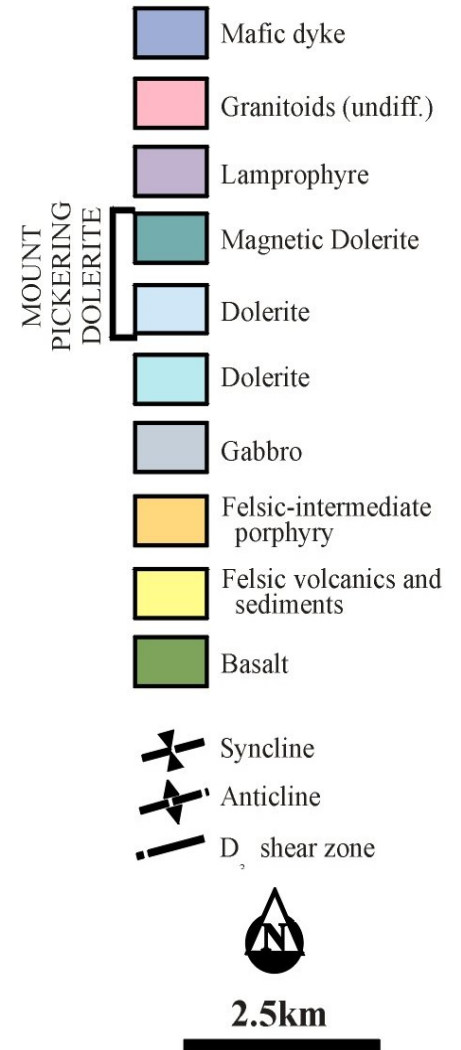
Centenary Deposit



Local Geology



LEGEND



SW

NE

1500RL

5000mE

5500mE

6000mE

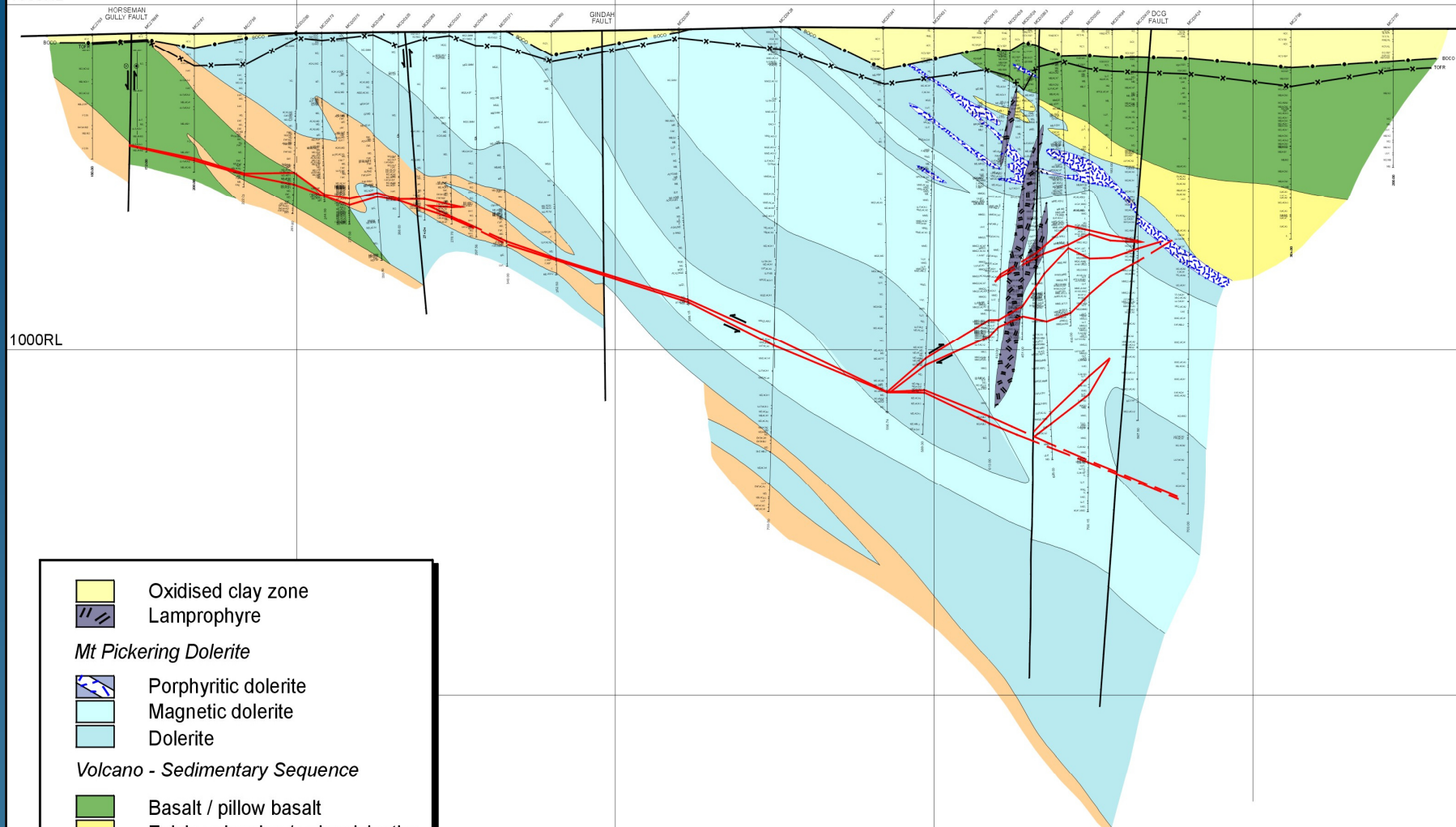
6500mE

Cricket Pitch Area

1000RL

-  Oxidised clay zone
-  Lamprophyre
- Mt Pickering Dolerite*
-  Porphyritic dolerite
-  Magnetic dolerite
-  Dolerite
- Volcano - Sedimentary Sequence*
-  Basalt / pillow basalt
-  Felsic volcanics / volcaniclastics
-  Felsic aphanitic porphyry
-  Mineralised envelope
-  Geological contact definite
-  Geological contact inferred
-  Fault
-  Movement sense

500m



Centenary Mineralisation



Petrophysics

- Measurements were taken of the mineralised dolerite and surrounding lithologies
- The mineralised (magnetic) dolerite is anomalously chargeable
- The non-mineralised magnetic dolerite is also significantly more chargeable than the non-magnetic dolerite
- No other physical property distinguishes mineralisation from background

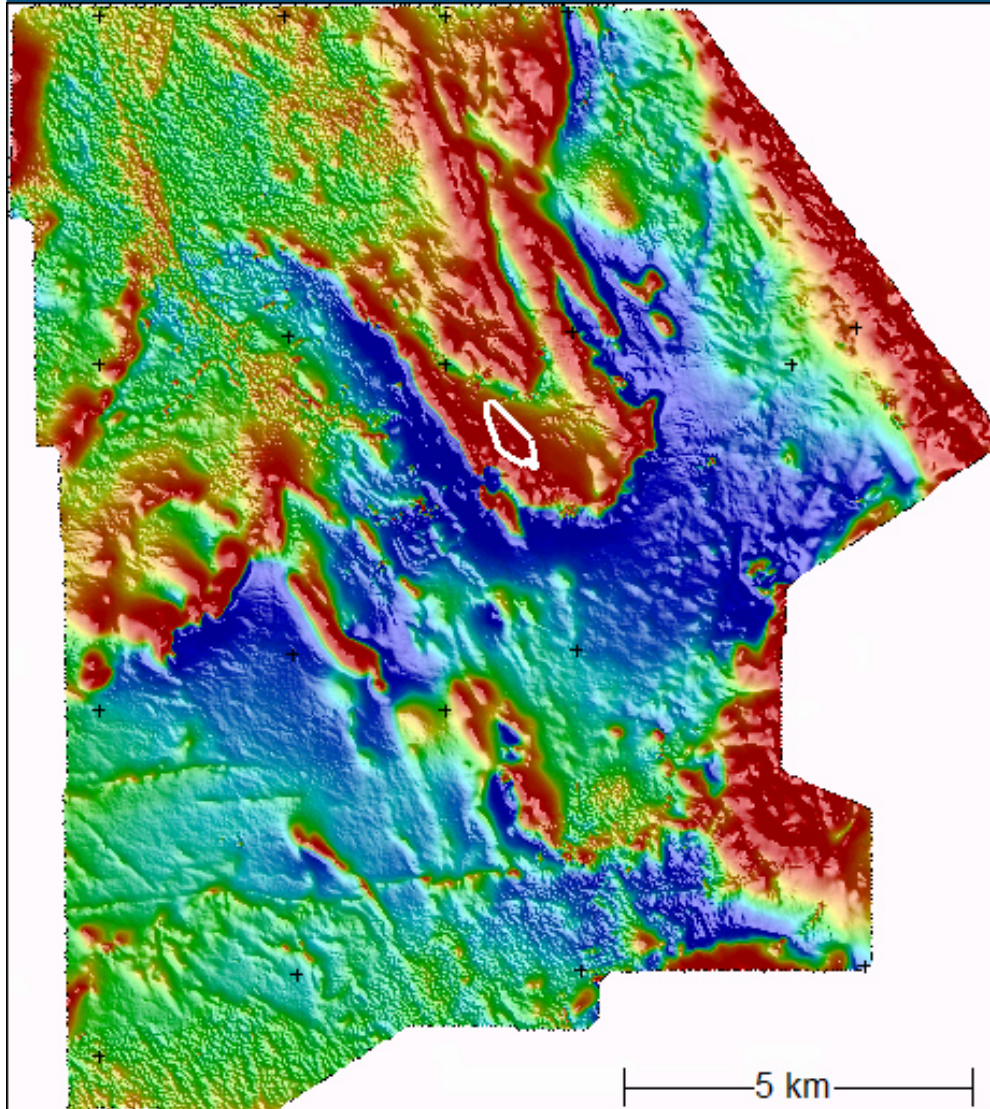
Rock Type	Chargeability (mV/V)	Resistivity (Ωm)	Density (g/cc)	Mag Susceptibility (SI $\times 10^{-3}$)	Number of Samples
Tertiary Hardpan	5.1	34.0	1.94		1
Pisolitic Laterite	14.5	22.0	2.73	13.80	1
Residual Clay/Saprolite	6.9	110.0	1.75		2
Felsic Volcanic	2.3	5513.3	2.74		3
Basalt	1.7	5006.7	2.91		3
Dolerite	3.3	3988.0	2.91	1.36	5
Pyritic Dolerite	4.6	3660.0	3.08	0.60	1
Magnetic Dolerite	17.0	3886.8	2.94	68.62	13
Mineralised Dolerite	34.7	3129.5	2.99	64.71	27
Lamprophyre	3.6	3600.0	2.81	3.05	3

Petrophysics

Location	Count	Density (g/cc)	IP (mV/V)	Mag Susc (SIx10-3)	Resistivity	Percentage Magnetite	Percentage Pyrite
LOCAL	24	2.98	71	69	3431	9.8	6.8
REGIONAL	11	2.93	36	72	3448	9.7	0.3

- The magnetic dolerite hosting mineralisation is chargeable
- The magnetic dolerite away from mineralisation is not chargeable.
- This could be solely due to disseminated sulphides

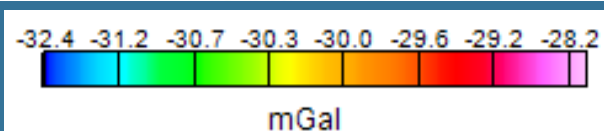
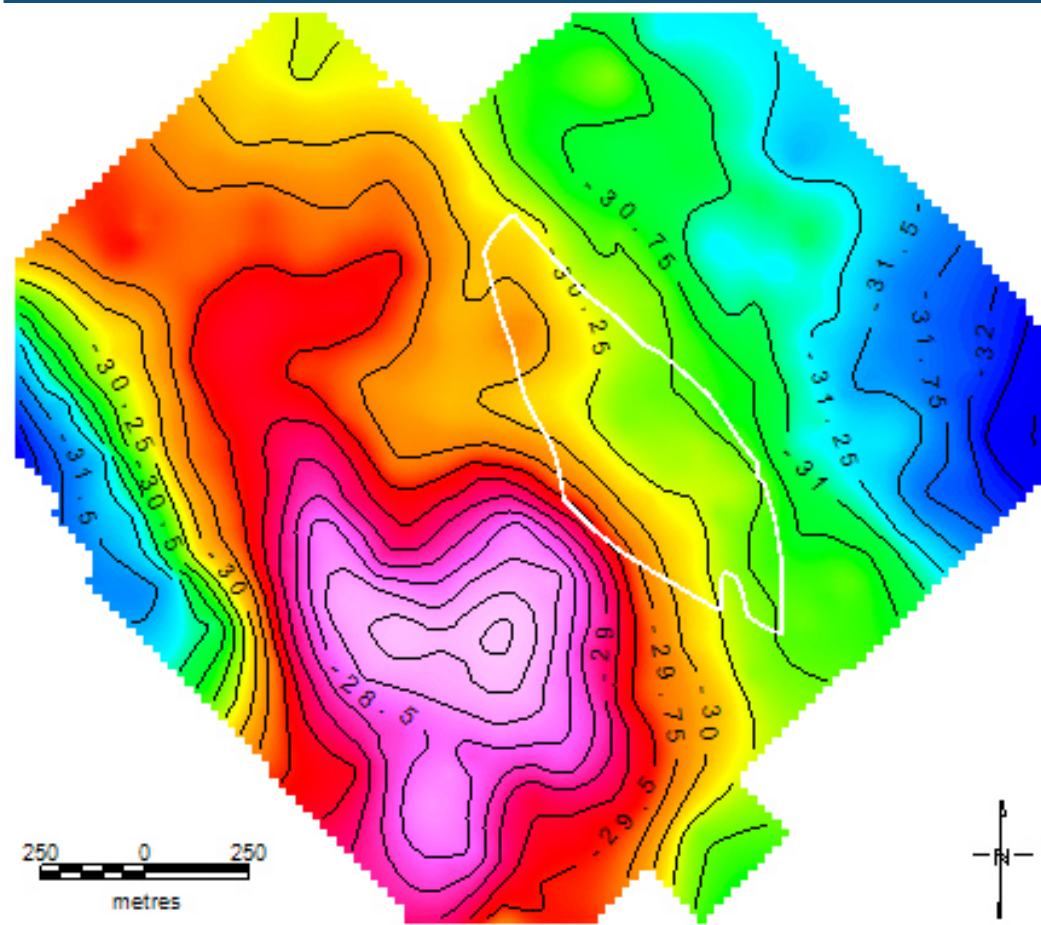
Aeromagnetics



Total Magnetic Intensity
Reduced to Pole

- 20m terrain clearance and 25m line spacing
- Magnetic highs trace the magnetic portion of the Mt Pickering dolerite
- Surface projection of Centenary shown in white

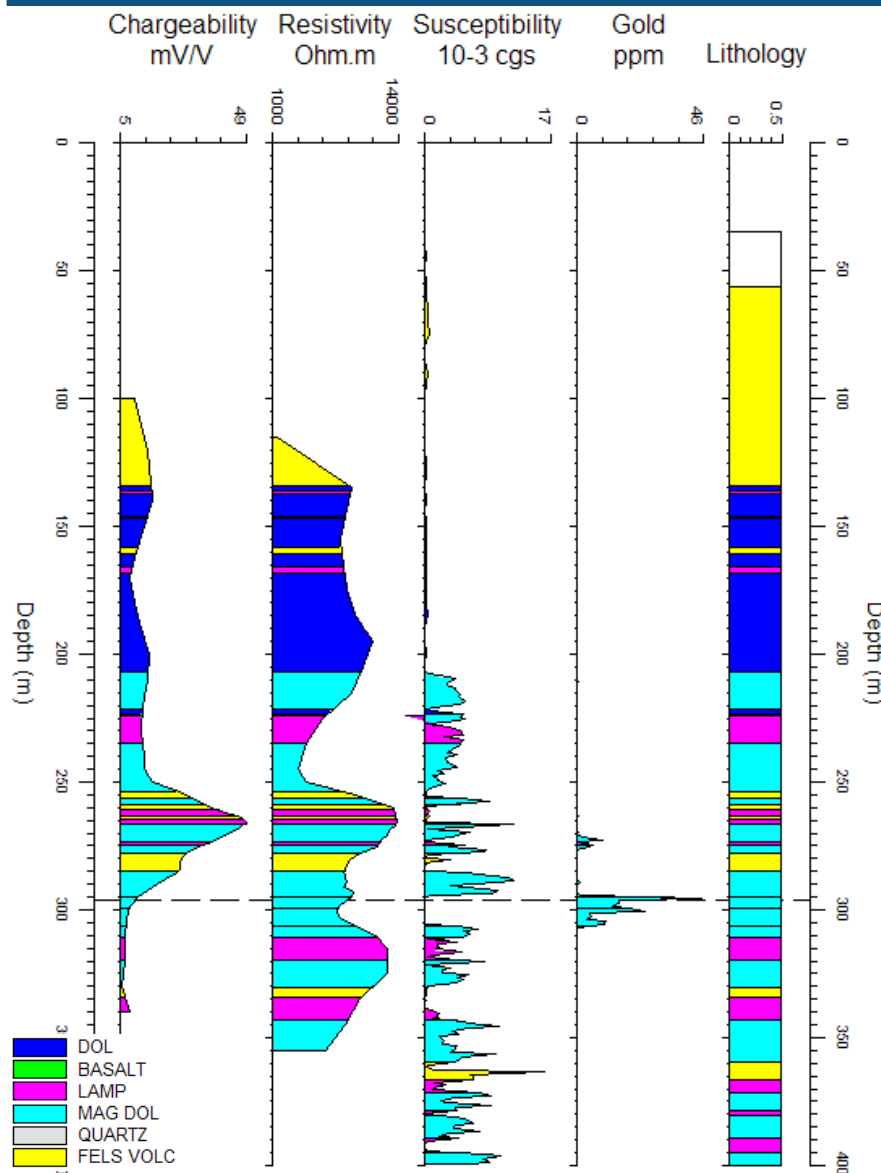
Gravity



Bouguer Anomaly
(density 2.67 g/cc)

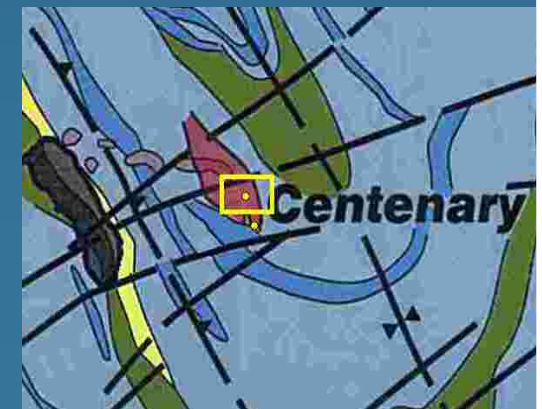
- Stations 160m x 40m
- Orebody not visible in the data
- Gravity high coincides with outcropping magnetic dolerite
- Surface projection of Centenary shown in white

Down Hole IP and Resistivity

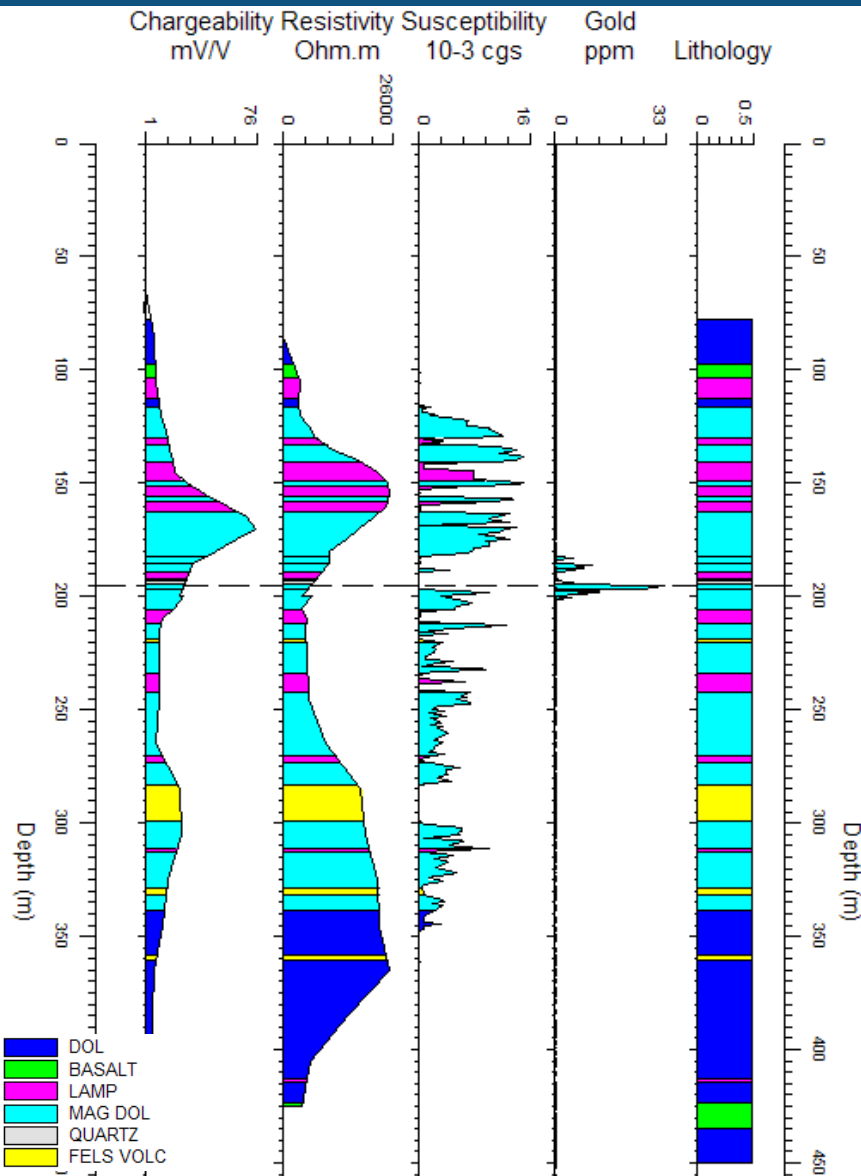


MCD430

- Dipole spacing 20m
- Destruction of magnetite coincident with mineralisation
- Chargeability response offset from mineralisation (shallower)

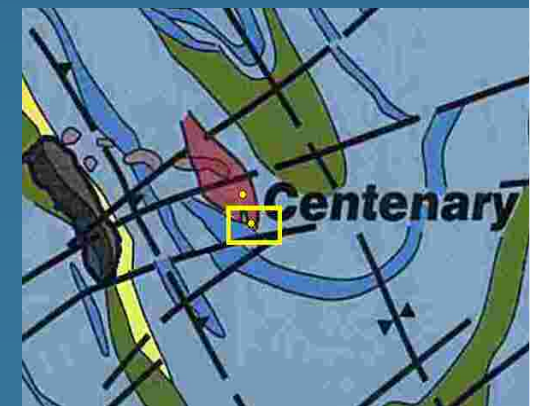


Down Hole IP and Resistivity



MCD447

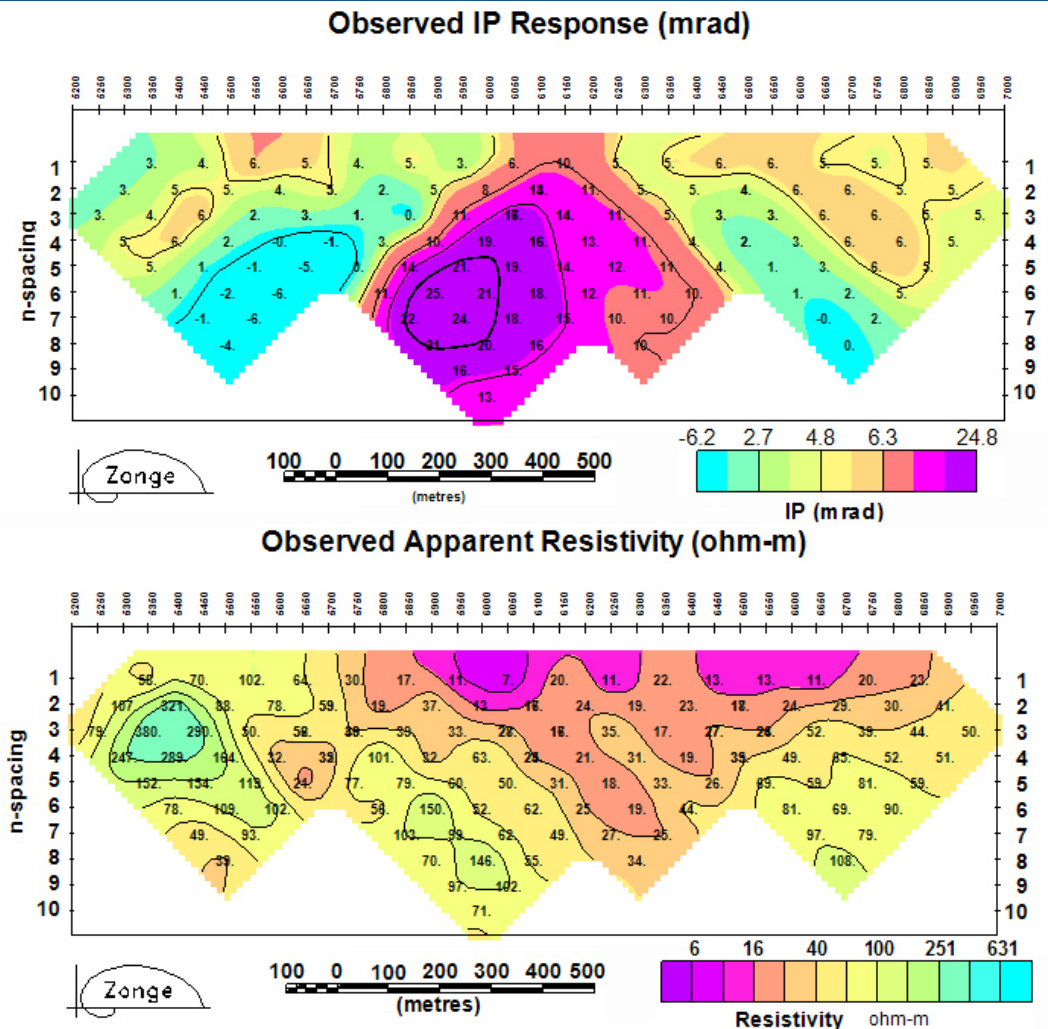
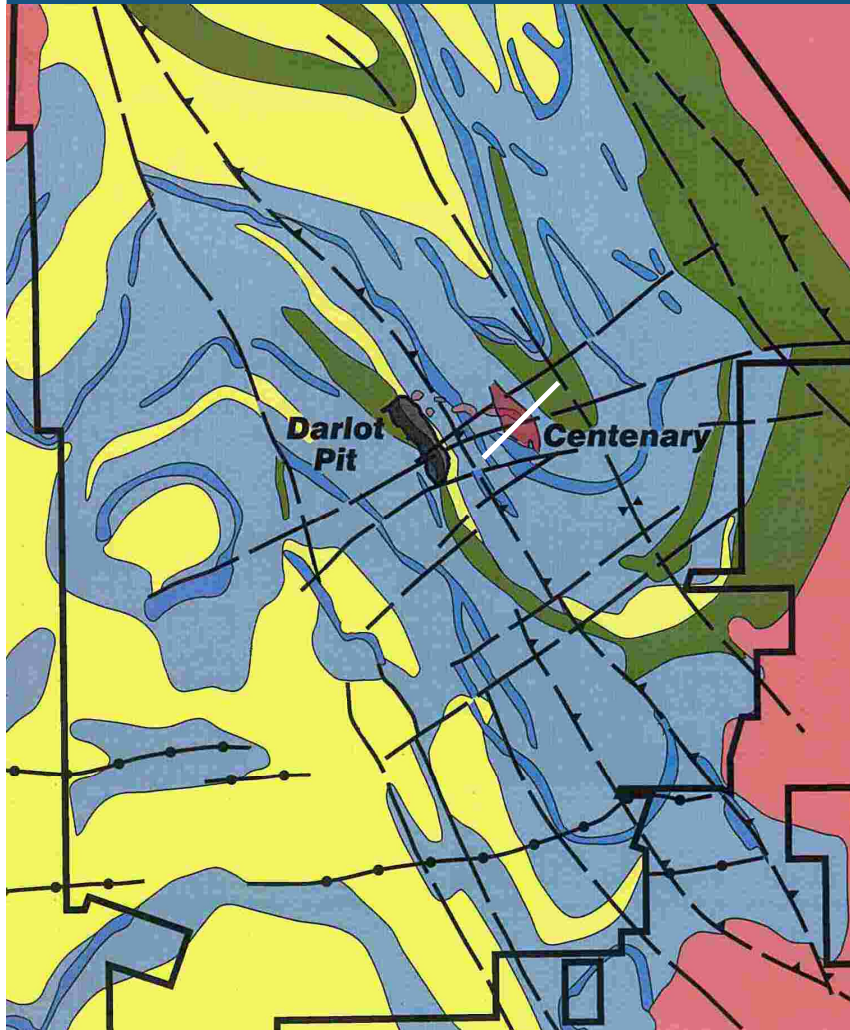
- Dipole spacing 20m
- Destruction of magnetite coincident with mineralisation
- Chargeability response offset from mineralisation (shallower)



Induced Polarisation and Resistivity

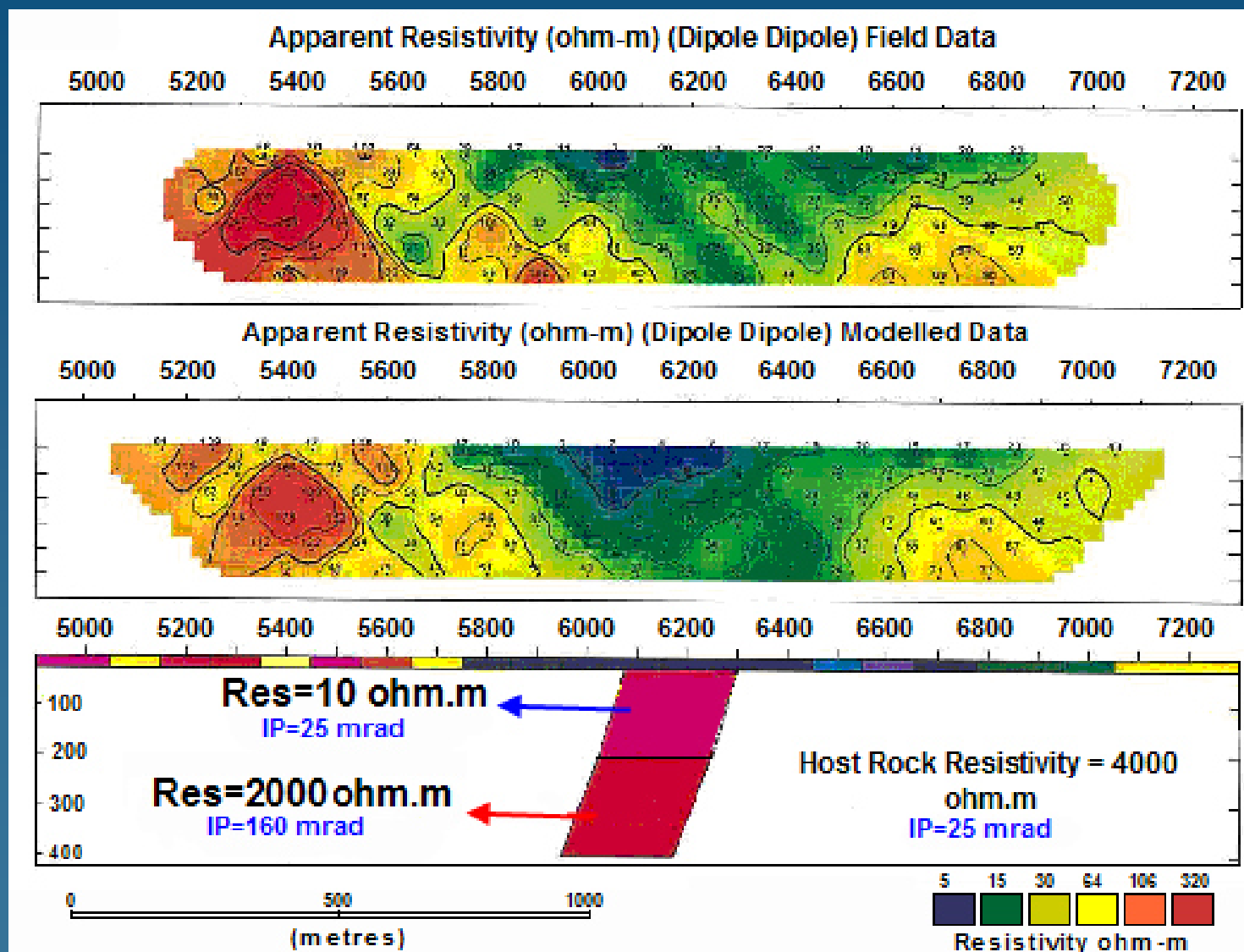
SW

NE

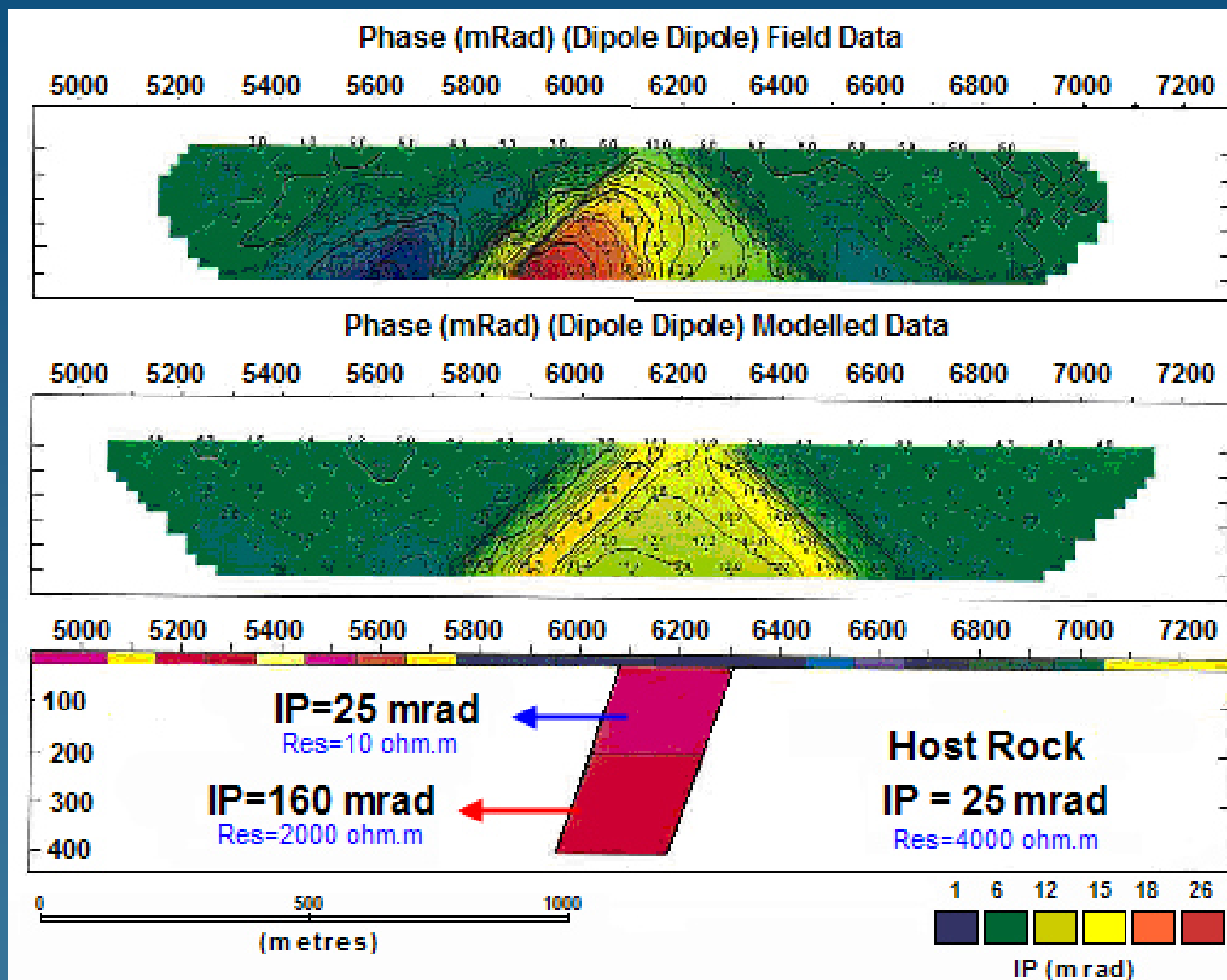


Observed field data

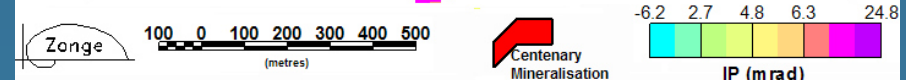
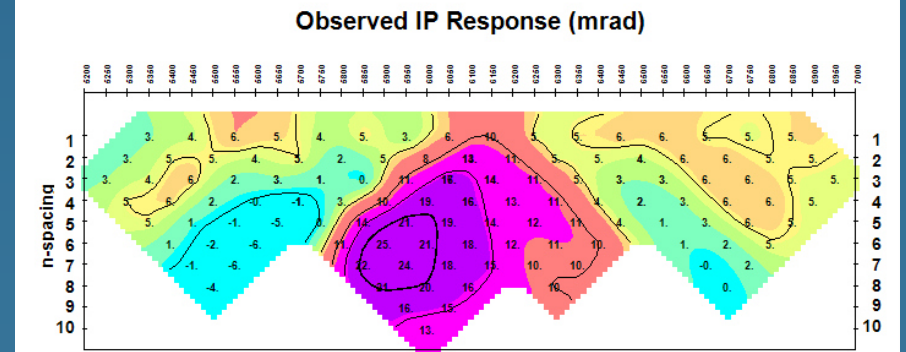
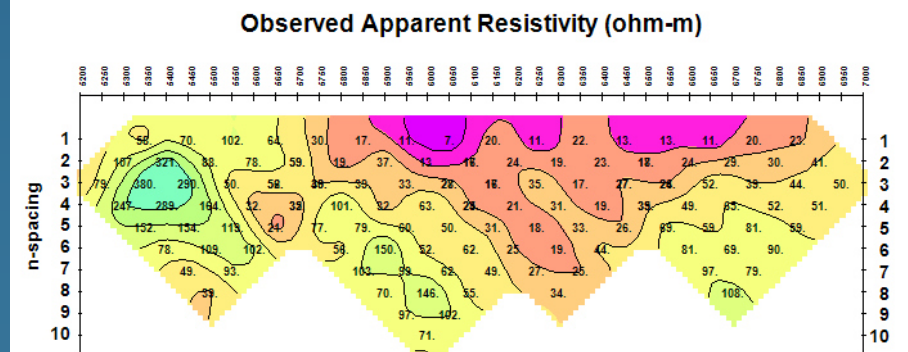
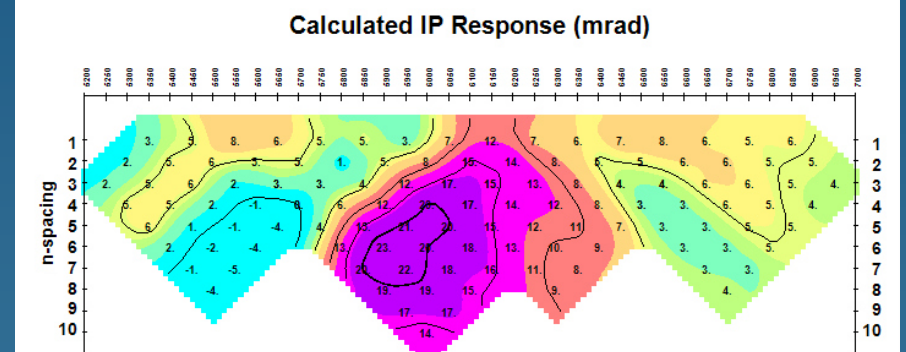
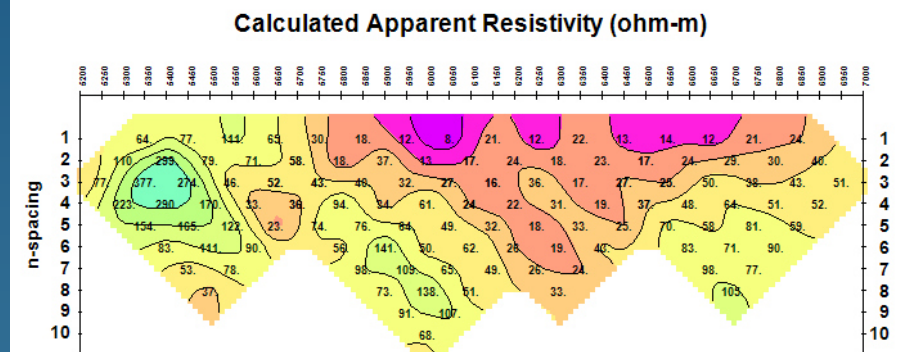
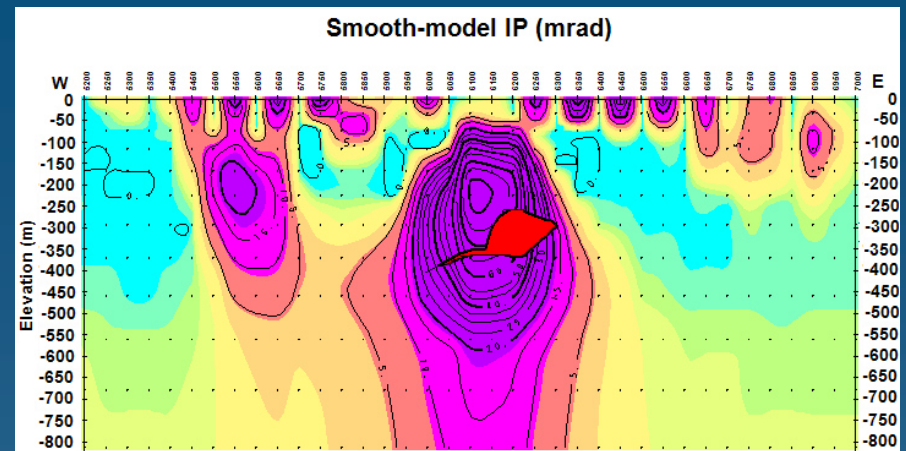
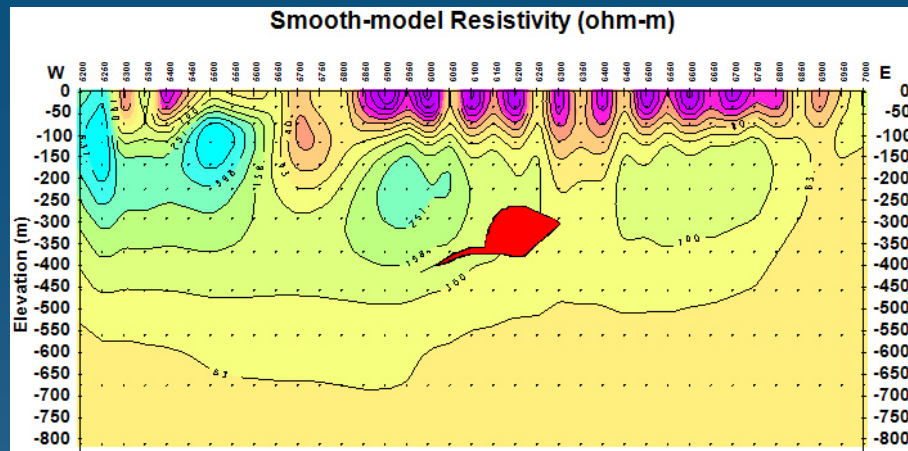
Forward Model Resistivity



Forward Model Induced Polarisation



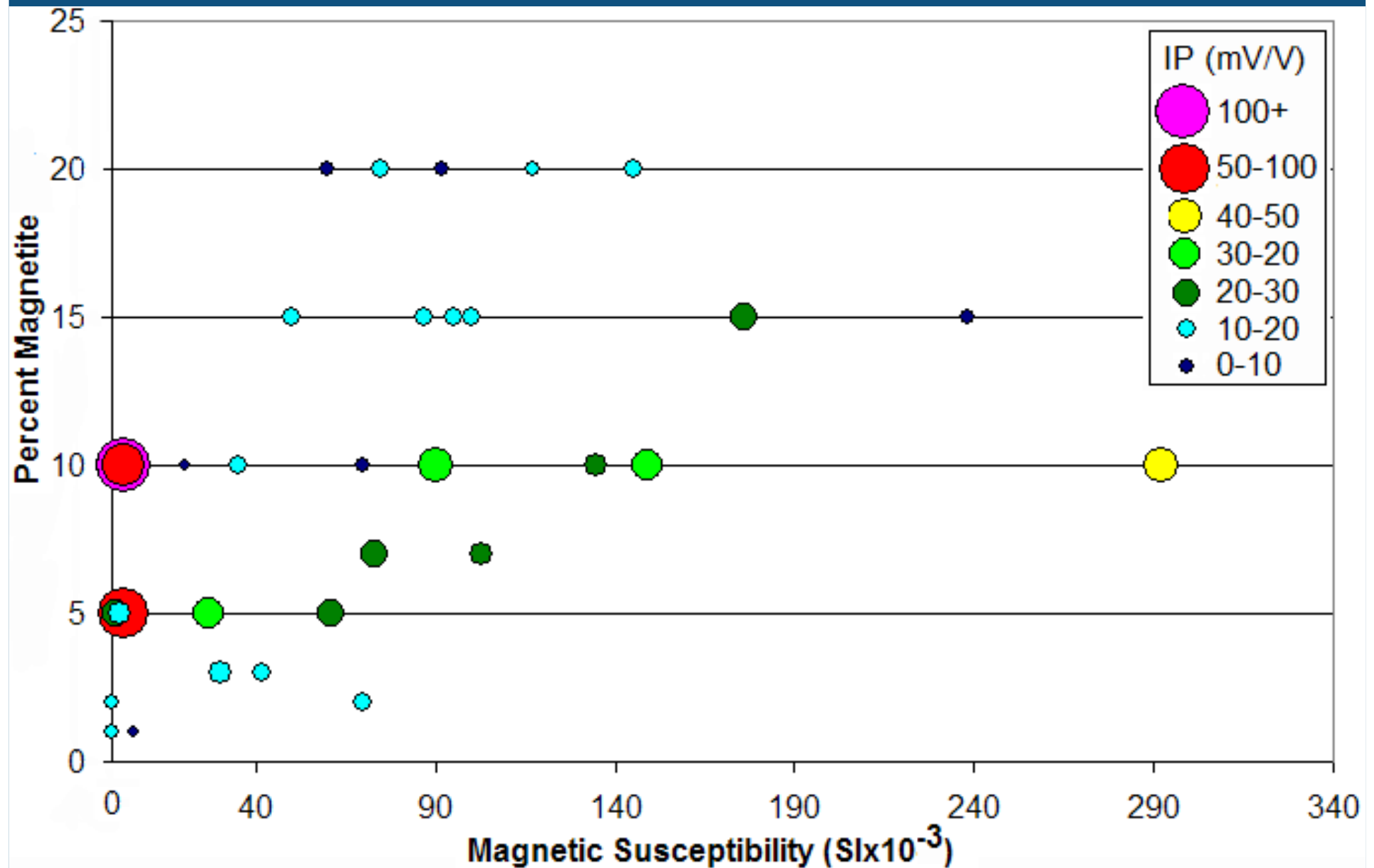
Inverse Model IP And Resistivity



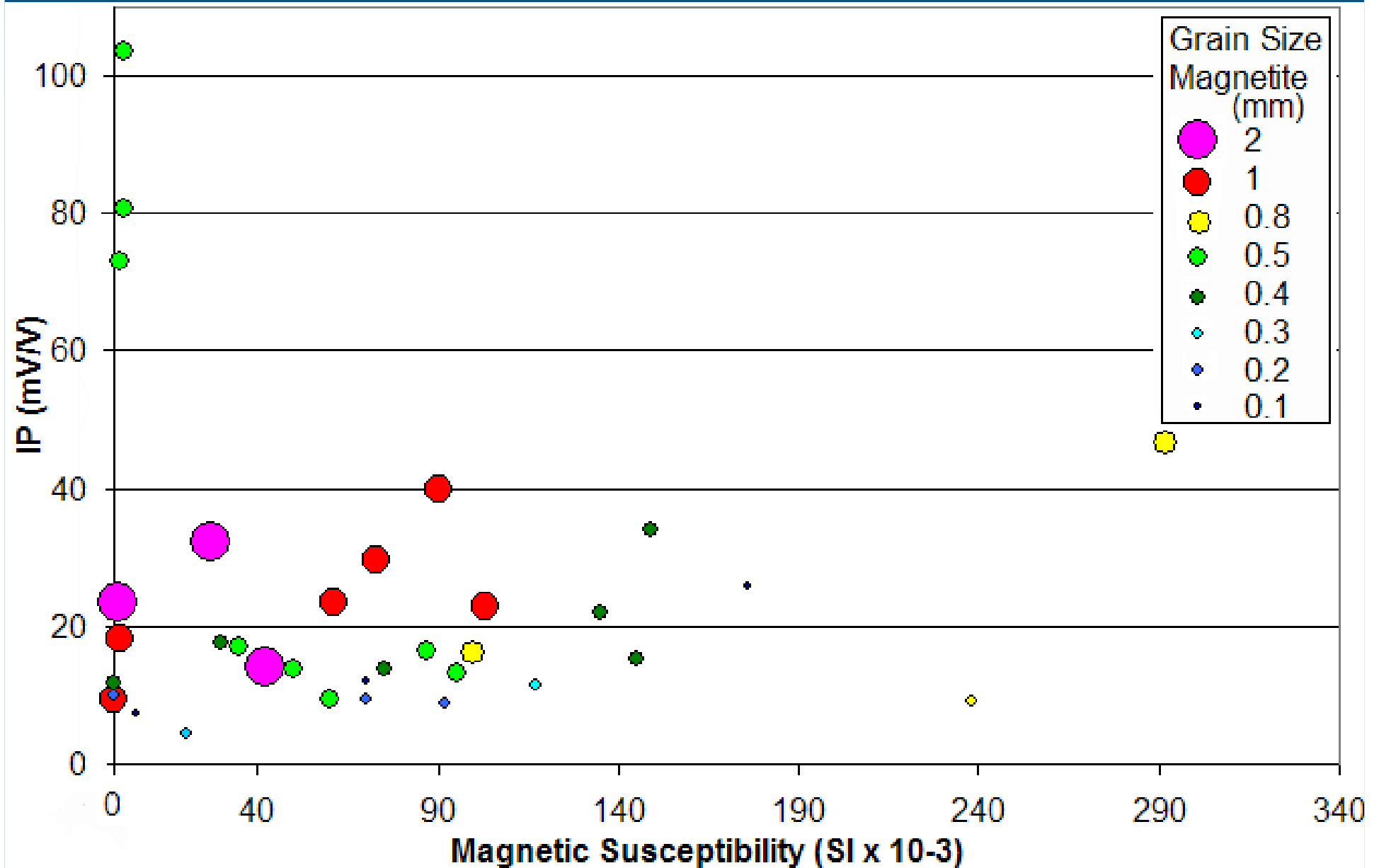
Laboratory Measurements

- Thin sections were made of mineralised and unmineralised magnetic dolerite samples
- Grain size and percentage of both magnetite and pyrite was estimated
- These measurements were correlated with physical properties

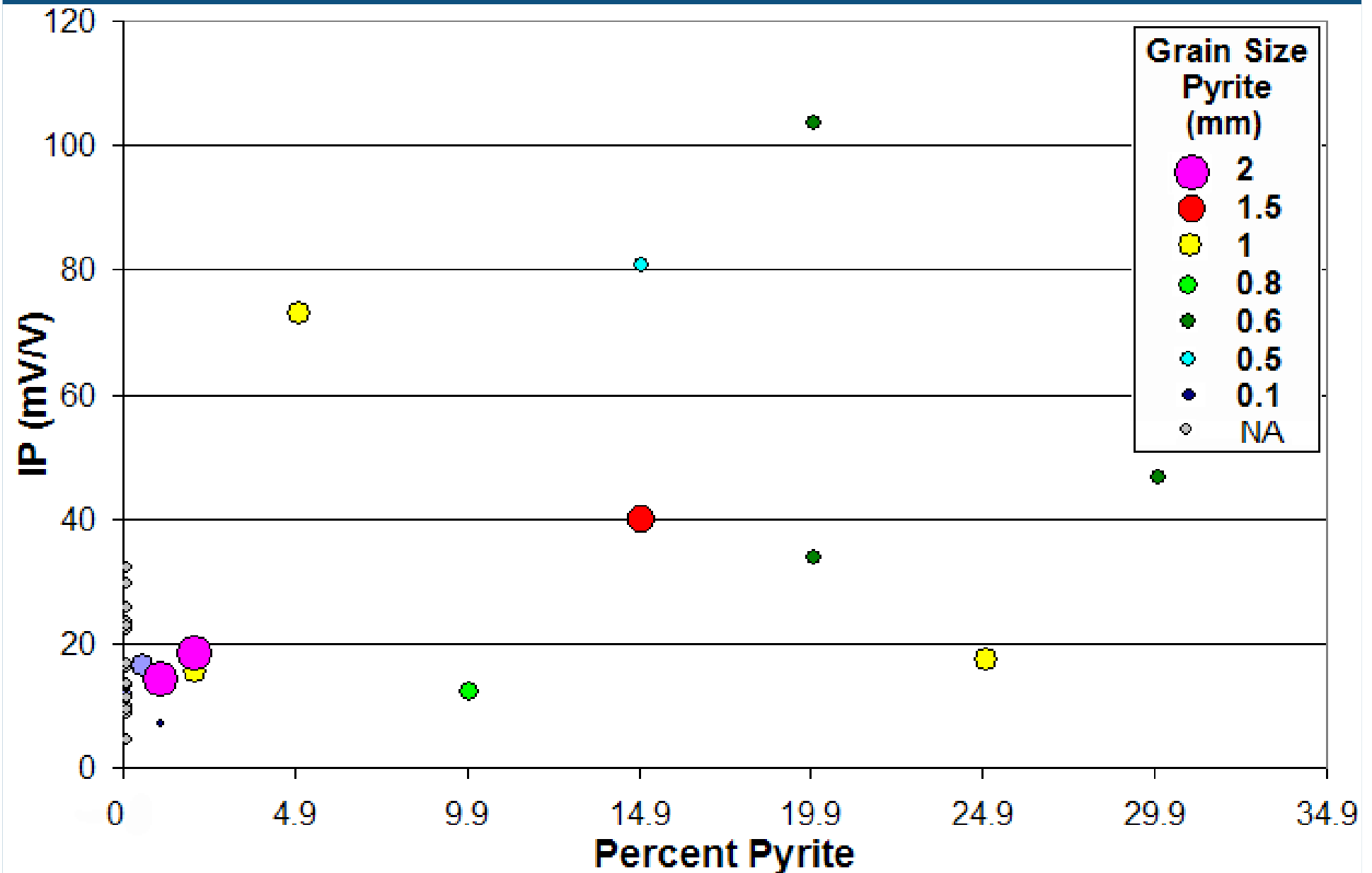
Petrophysics



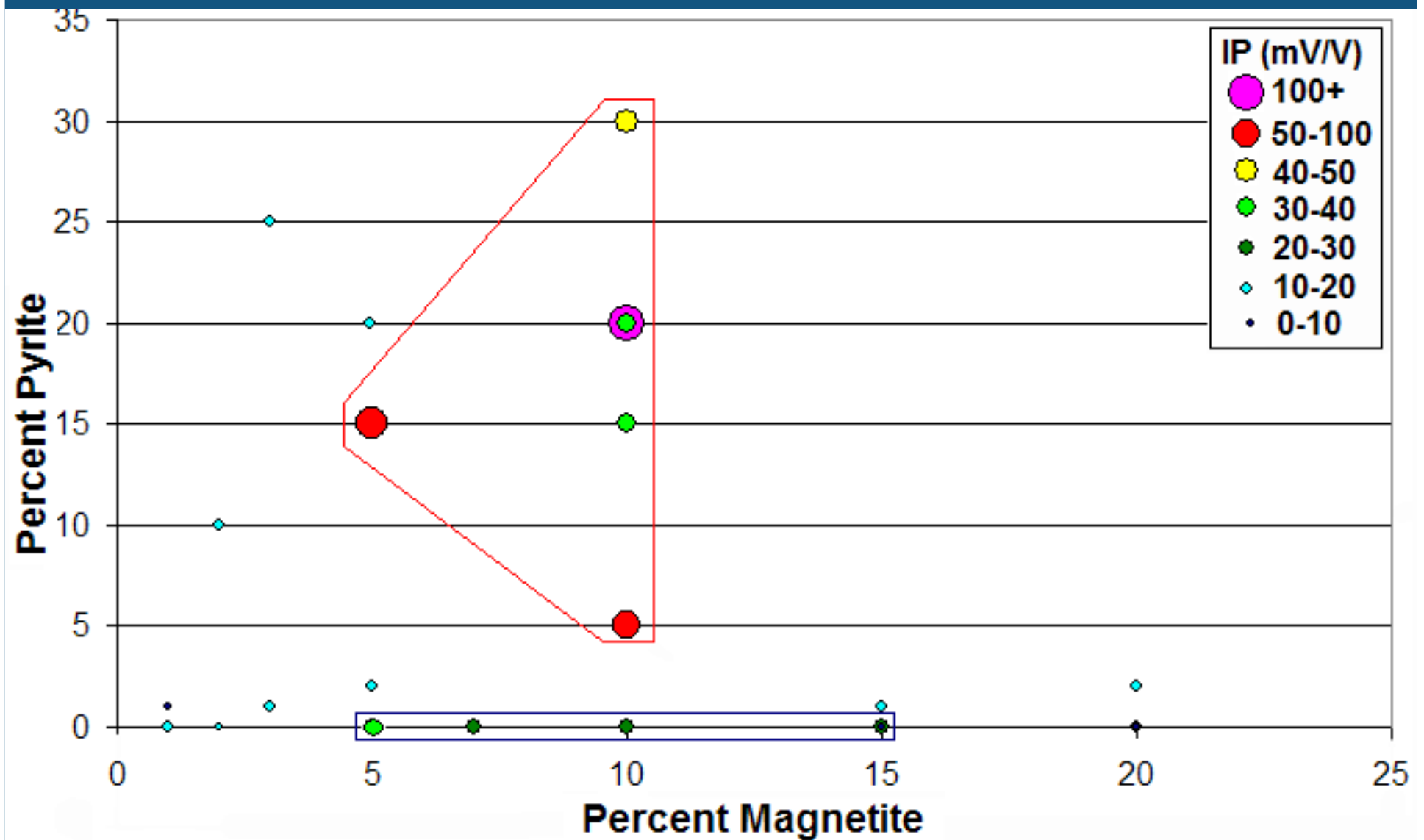
Petrophysics



Petrophysics



Petrophysics



Conclusions

- A straight forward correlation was not seen between quantity sulphides and chargeability in rock samples.
- It was only when quantity of magnetite was also considered that a relationship emerged
- Downhole logging data show a chargeability response which was shallower than, and broader than, mineralisation.

Conclusions

- Forward and inverse modelling of surface data also suggested a contributory source to the anomaly which was shallower than mineralisation.
- Induced Polarisation should be employed as an exploration tool when looking for sulphide-associated mineralisation in host rocks containing magnetite.

Acknowledgements

- Barrick Gold of Australia Limited.
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