

# May Drilling Pty Ltd Giants Reef Conductor Drilling Collaboration Report

---

**Author:** H.Mees, Consultant geologist,  
Parus Exploration Services ([parusex@westnet.com.au](mailto:parusex@westnet.com.au))

**Date:** May 2014

**Tenement:** EL28462

**Map Sheet:** Pine Creek SD52-08

**Holder & Operator:** May Drilling Pty Ltd

**Copyright statement:**

Copyright of this document is owned by May Drilling Pty Ltd. May Drilling Pty Ltd hereby authorizes the Department of Minerals and Energy to copy and distribute the report and associated data under(Regulation 126(3)(a)).



Geophysics and Drilling Collaborations

Proposal Cover Sheet

Project title	Giants Reef conductor
Applicant (Company Name)	May Drilling Pty Ltd
Applicant ABN	95123393135
Applicant postal address	P.O. Box 2068 Humpty Doo 0836
Contact officer	Seamus May
Contact phone number	0428530306
Contact fax number	08 8988 1087
Contact email address	maydrillingptyltd@bigpond.com
Granted exploration licence number(s) where this proposal is to be undertaken	EL28462
Proposed type of exploration program for funding (diamond drilling, gravity survey etc)	Diamond drilling
Brief summary of program (total number of metres to be drilled, number of gravity stations, total length of flight lines etc)	400 m angled diamond hole targeted at Airborne ElectroMagnetic anomaly defined during 2009 survey by Geoscience Australia. Subsequent ground EM has confirmed the extent and position of anomaly. An initial diamond hole was drilled to 105.9 metre but failed to identify the conductor.
Total direct costs for the program including GST	\$86213.68
Amount of funding requested including GST	\$43106.00
Proposed timeframes for commencement and completion of program	Heritage Clearances and Mine Management and Risk Management Plans have been approved. The site must be prepared for drilling. Drilling can commence immediately after the wet season.
Names and positions of signatories to the funding contract	Frederick Seamus May managing director
Signature of applicant	
Date	

## Summary

A diamond drilling program was carried out by May Drilling Pty Ltd on EL28642 with funding assistance from the NT Government under its Geophysics and Drilling Collaboration Program. The drilling program consisted of a single 401.7m deep diamond drill-hole to test a large conductive anomaly defined from Geoscience Australia Tempest airborne EM and fixed loop ground ground EM data for VHMS style base-metal mineralisation. The drilling phase of the program was carried out from 10/1/2014 to 8/2/2014. The drill-core intersected a sequence of bedded arenites and muscovite schists in the upper part of the hole separated by a fault-zone at 296m down-hole from bedded arenites, carbonaceous siltstones and carbonaceous shale in the lower part of the hole. No significant base-metal mineralisation was intersected. The EM conductors are interpreted to be caused by graphitic units. A total of 16 half core samples were taken for assay for precious and base-metals. An additional 5 half core samples were taken for graphitic carbon analysis.

## Contents

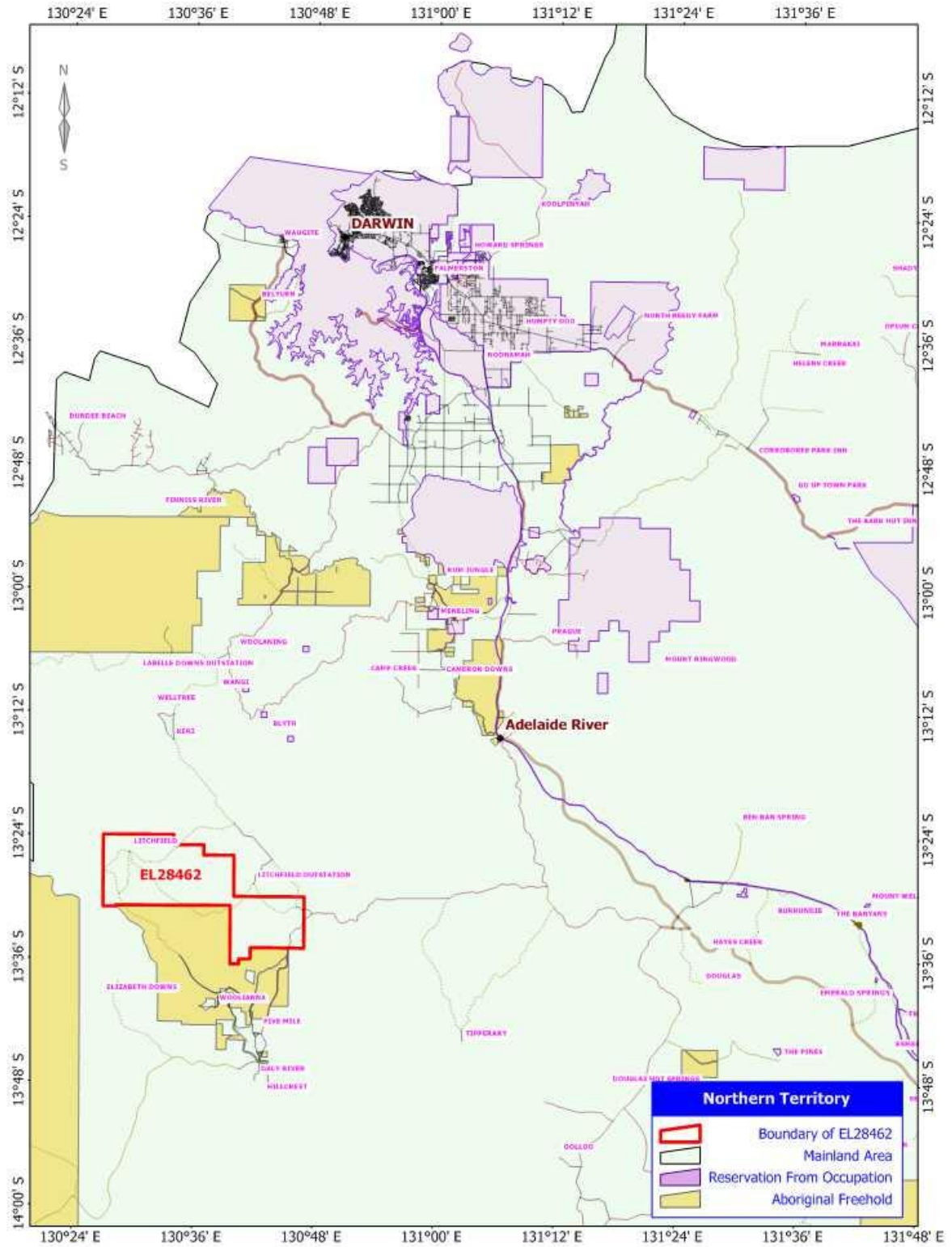
Summary .....	3
1 Introduction .....	5
2 Regional context .....	7
3 Previous exploration .....	7
4 Exploration Concept.....	8
5 Details of Collaborative program .....	9
6 Results and interpretation .....	10
6.1 General geology as observed from core logging of MDD003: .....	10
6.2 Structure in MDD003. ....	13
6.3 Mineralisation. ....	14
7 Conclusion.....	15
Figure 1 Location Plan.....	6
Figure 2 Surface Geology map .....	7
Figure 3 Cross section of MDD003 in relation to modeled EM anomalies .....	11
Figure 4 Cross section through MDD003 .....	12
Figure 5 Stereoplot of structural measurements MD003.....	14
Figure 6 Stereoplot of quartz vein orientations MD003.....	14

## **1 Introduction**

EL 28462 is in the Daly River region of the NT. The exploration license straddles the Giants Reef Fault, which separates the Central and Litchfield Sub-domains of the Palaeoproterozoic Pine Creek Orogen. The Pine Creek Orogen contains numerous world-class unconformity-related uranium deposits, plus significant gold, tin-tantalum, tungsten, copper and lead-zinc deposits. EL 28462 also covers parts of the Palaeozoic Daly Basin, which overlies the Pine Creek Orogen.

EL 28462 is within the Tipperary Perpetual Pastoral Lease. May Drilling has built a strong, friendly relationship with Tipperary Station, both having worked on their stations as drilling contractors for other parties and when undertaking their own exploration works.

Access to the area is excellent with the sealed Daly River Road passing within 1,500 metres of the proposed drill site. The proposed drill site is approximately 26 km north of the Daly River community and 78 km west of the Stuart Highway.



**May Drilling Pty Ltd  
LOCATION PLAN - EL28462**

DRAWN BY: AMETS ([www.amets.com.au](http://www.amets.com.au))  
DATE: 22-Feb-11  
DATUM: GDA94

Figure 1 Location Plan

## 2 Regional context

The proposed drill site is approximately 2 km east of the Giants Reef Fault, which separates the Litchfield and Central Sub-domains of the Palaeo-proterozoic Pine Creek Orogen. Although the Giants Reef Fault divides this significant geological difference, the immediate geology across the fault is remarkably similar. For example, near EL 28462 the Burrell Creek Formation and the interlayered Warrs Volcanic Member have been mapped on either side. However, the Daly River Mineral Field, which includes numerous Kuroko-type VHMS and silver + base metal vein deposits, is found in these units to the west of the Giants Reef Fault, but similar deposits have not been identified to the east. In the magnetic imagery, the Warrs Volcanic Member is interpreted as the sub-linear, highly magnetic features. At the proposed drill site the stratigraphy appears to trend north-northwest.

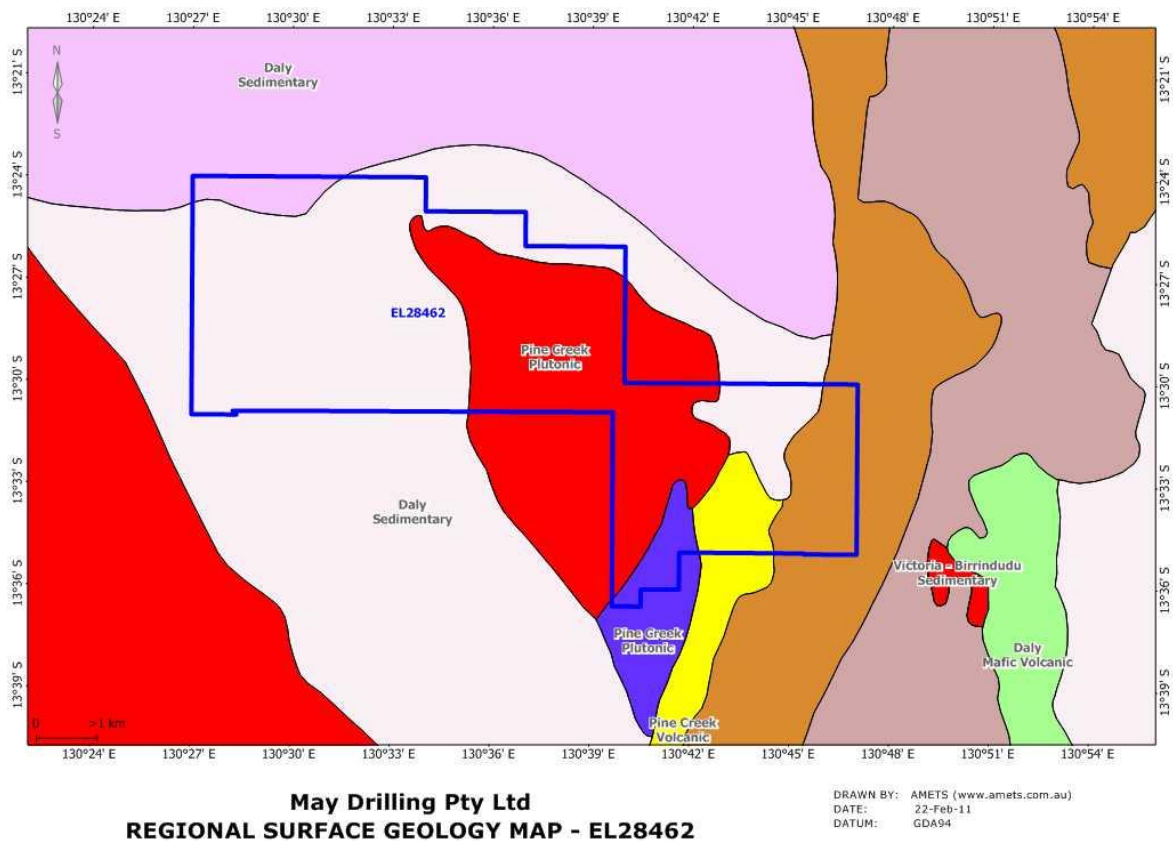


Figure 2 Surface Geology map

## 3 Previous exploration

Although the area covered by EL 28462 has been under tenure numerous times, there are no surface sample sites recorded in the STRIKE database, except for whole-rock samples collected by the Northern Territory Geological Survey during regional mapping. These whole-rock samples were collected from the western side of the Giants Reef Fault. There are three (3) diamond drill holes

recorded in the Coredat database along the southern boundary of EL 28462. These drill holes were completed by Mobil Energy in 1982 when exploring for uranium. This drill core is preserved in the Darwin Core Store. Although these drill holes are only four kilometres southwest of the proposed drill site, these are all west of the Giants Reef Fault. Mobil Energy also drilled two (2) diamond holes east of the Giants Reef Fault, but these are approximately seven (7) kilometres south of the proposed drill site, also targeted radiometric anomalies and are relatively shallow (maximum 200 metres). In addition, the historic drill holes to the east of the Giants Reef Fault were not drilled in the package containing the Warrs Volcanic Member, and so did not test for VHMS-style mineralisation. There is little evidence of any historic on-ground exploration around the anomaly.

Since grant of EL 28462 (15 July 2012) May Drilling has completed:

- Reprocessing of the TEMPEST (system used by OESP) data by Lindeman Geophysics. This identified an area with very strong conductance. Inverse modelling of the data defined two (2) very strong conductors either side of the anomaly and dipping into the anomaly.
- Completion of a fixed-loop ground EM survey by GEM Geophysics. This was also processed and interpreted by Lindeman Geophysics. Inverse modelling of the FLEM data required only one (1) east dipping conductor to explain the anomaly. The model plate had a calculated length of 546 m, a depth extent of 387 m and a dip of 61.4° with a nominal thickness of 20 m. The surface projection of the centre of the plate comes to surface at (692515, 8500500). The top of the body is 10-20 m deep.
- 45 stream sediment samples were collected in the general EM anomaly area from the uppermost 5 cm of the channel and tested by BLEG for Au, Ag, As, Bi, Cd, Cu, Mo, Ni, Pd, Pt and Zn. Samples were analysed by Northern Territory Environmental Laboratories (NTEL) in Darwin. All the anomalous gold samples (maximum of 37.48 ppm; median 0.79 ppb) were found along strike of the EM anomaly. Moreover, the gold correlated positively with silver, copper and zinc, which are metals associated with VHMS deposits.
- One (1) diamond drill hole (MDD001) was targeted at the EM conductor. This drill hole was collared at (692548, 8500492) and drilled at -60° to 270° to a depth of 105.9 m. The hole intersected interbedded quartz arenite and phyllite, with minor zones of chlorite alteration. There was some minor graphite (up to 1 %) in the phyllite, but Lindeman Geophysics concluded that this did not explain the very large amplitude of the conductor. The drill hole crossed the projected model plate at ~30 metres. Except for some minor arsenic peaks, the down-hole geochemistry is bland and does not reveal any mineralisation. This drill hole was scanned by the NTGS HyLogger.

## 4 Exploration Concept

EL 28462 was pegged to explore for vein-related, orogenic gold, similar to that found elsewhere in the Pine Creek Orogen, and base metals, such as the VHMS deposits found in the Daly River Mineral Field. Definition of a highly conductive body about 2 km east of the Giants Reef Fault and in the same geological units that host the VHMS deposits in the Daly River Mineral Field provided strong encouragement that the conductor might have been a VHMS deposit. Surface geochemical sampling returned anomalous results that are consistent with VHMS mineralisation. Hence, there was a very strong likelihood that the Burrell Creek Formation to the east of the Giants Reef Fault is prospective for VHMS deposits.



## 5 Details of Collaborative program

The collaborative program consisted of the drilling of MD003, a single 401.7m deep diamond drill hole. Drilling commenced on 10/1/2014 and was completed on 8/2/2014.

Drill hole details:

MDD003	From	To	Total
Total depth	0	401.7	401.7
HQ Core	0	236.8	236.8
NQ2 Core	236.8	401.7	164.9

HoleID	Easting	Northing	Elevation*1	Inclination	Azimuth*2
MDD003	672771	8500507	100	-60	270

Coordinates in MGA GDA94 Z52. \*<sup>1</sup> Nominal RL. \*<sup>2</sup> Magnetic Azimuth

Drilling was carried out "in house" by May Drilling Pty Ltd, the holders of EL28462 using a HD900 Diamond drill rig. From 0 to 236.8m was drilled in HQ core, from 236.8m to end of hole at 401.7m the hole-size was reduced to NQ2 core. The core was oriented using the Reflex System and bottom – of-hole orientation line and metre marks were applied by May Drilling personnel where core conditions allowed. Apart from some loss in the first few strongly oxidised core runs, and minor loss in zones of clayey fault gouge recovery for most of MDD003 approached 100%.

Down hole surveys were carried out approximately every 30m. These show that while the azimuth remained relatively consistent from 265.8° at 30m to 262.7° at 401m, the inclination of the hole decreased significantly, finishing at 45° at 401m, indicating 15 degrees of lift. In the case of this particular hole the lifting of the hole has had positive results in that it means that the lower part of the hole is not drilled as oblique to the stratigraphy as otherwise might be the case.

Collar coordinates were fixed using a handheld GPS with approximately 10m accuracy. Collar elevation has been set at a nominal 100m without reference to AHD.

MDD003 was geologically logged by a consultant geologist from NT based Parus Exploration Services using the facilities provided at the NTGS Berrimah Core Library. Lithology, alteration and veining were logged. A small amount of structural data was recorded as an aid to interpretation.

Sections of core of potential economic interest were sawn in half using a Almonte coresaw located at the NTGS Berrimah core storage facility. They were submitted for assay in 1m intervals corresponding to the metre marks on the core. A total of 16 samples were submitted to Australian Assay Laboratories for analysis for Au by Fire assay and Cu, Pb, Zn, Ni, Co, Ag, Bi, Sb, Mo, Sn, W, Ta, U, Th, Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Yb, Lu by inductively coupled plasma mass spectrometry. A total of 5 samples were submitted to Bureau Veritas for carbon analysis. In these samples Fe<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, CaO, MnO, MgO, P<sub>2</sub>O<sub>5</sub>, SO<sub>3</sub>, TiO<sub>2</sub>, K<sub>2</sub>O, Na<sub>2</sub>O, BaO were analysed by X-ray fluorescence spectrometry, Au was determined by Atomic Absorption Spectrometry and Carbon, Total Elemental carbon and Total Graphitic carbon were determined by Total Combustion Analysis.

Prior to cutting and sampling, the entire hole was scanned using the NTGS Hylogger at Berrimah Core Library. The core was also scanned using an analogue handheld scintillometer. As no significant, that is above background, radiation was recorded no attempt was made to formally record the scintillometer readings.

Output of the Hylogger scans were not made available to May Drilling at the time of reporting.

One sample was taken by NTGS geologists from 1151.6-152m depth for whole rock analysis. Results of this haven't been made available yet.

All core from MDD003 is stored in the NTGS Berrimah Core Library.

## **6 Results and interpretation**

### **6.1 General geology as observed from core logging of MDD003:**

MDD003 has intersected a bedded sequence of arenites, siltstones and carbonaceous shales which are assigned to the Proterozoic Burrell Creek Formation. The sequence appears turbiditic, although no classical Bouma cycle deposition is evident, except perhaps in the lower section of the hole, where upwards younging of the sedimentary package is indicated by graded bedding. Some of the arenites are gritty to conglomeratic, dominated by quartz but also containing angular black shale and feldspar clasts suggesting deposition relatively close to the source. The upper part of the hole, from 0 to 296.85m is dominated by mainly fine to coarse grained quartz arenites interbedded with muscovite-quartz schist (after siltstones). The arenites sometimes have muscovite in the matrix but are largely grain supported. Below 296.8m (the boundary being marked by a major zone of shearing and faulting apparently sub-parallel to bedding) the nature of the sediments changes; all rock types become more carbonaceous, the pelitic sediments are less schistose, muscovite becomes far less prominent and some of the arenites are much coarser in grain size. It appears that the structure at 296.8m marks a major change in strain domain.

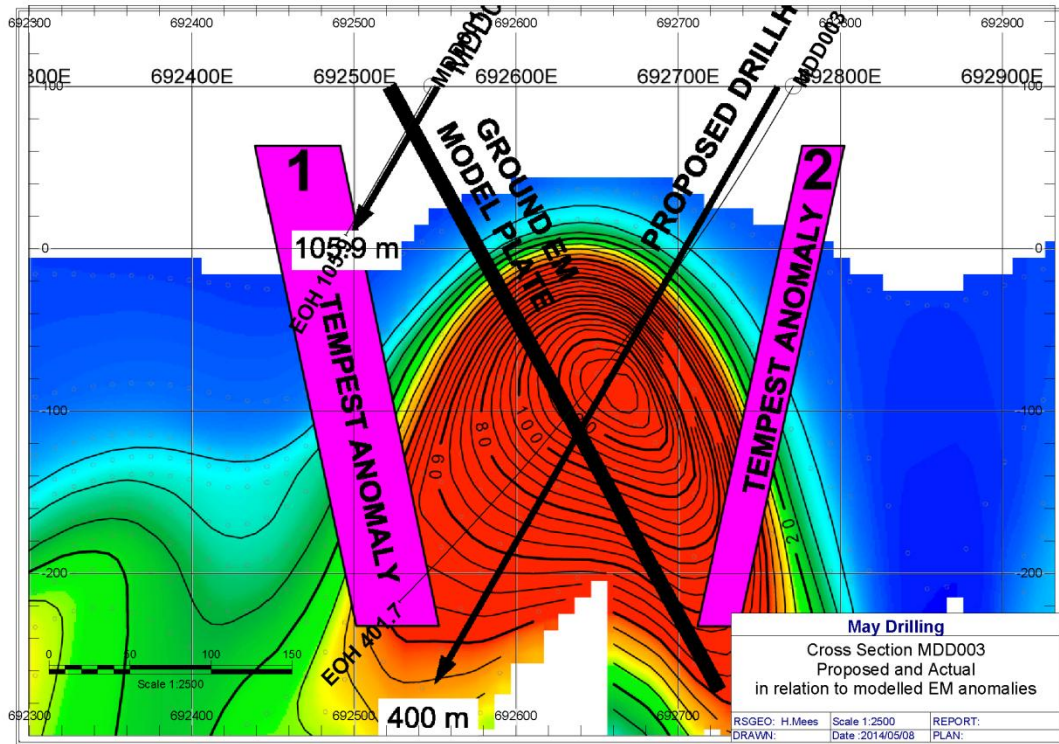


Figure 3 Cross section of MDD003 in relation to modeled EM anomalies

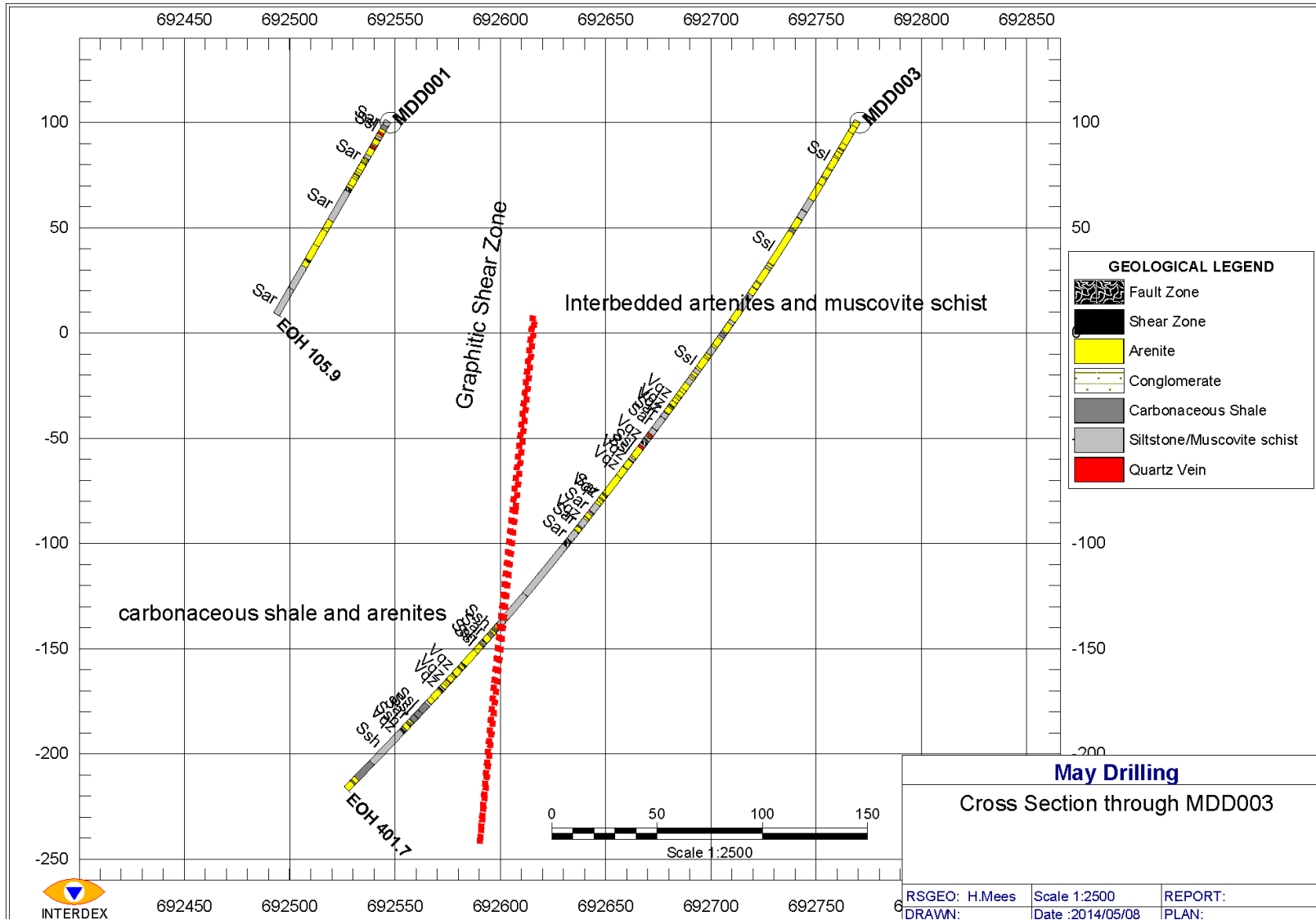


Figure 4 Cross section through MDD003 (85% of original size)

**6.2 Structure in MDD003.**

Structure in the hole is relatively simple. Bedding throughout the hole is near vertical striking NNW and dipping in a range from 70 WSW to 80 ENE (see figure 1 below). Increasing alpha angles in the core down-hole are largely a function of the hole lifting rather than due to a significant change in orientation of the bedding. The occasional change from a steep WSW to very steep ENE dip in many cases is attributable to only a 10 degree change in the beta core angle of measured structures, and hence may be caused by slight errors in the location of the orientation line, although it is possible that it is real and indicates minor flexures.

Most zones of shearing are controlled by lithology contrasts and are thus mainly parallel to bedding, with massive arenite acting as relatively rigid units with strain mostly taken up by ductile deformation of carbonaceous or micaceous pelites, which turn into graphitic sericitic schists or muscovite schists. Sericitic+kspar alteration is common within the shear zones.

Quartz veining is present as mainly two distinct but structurally related populations; laminated quartz+chlorite-muscovite-pyrite emplaced in shear/fault zones, usually parallel to bedding/foliation, and as massive quartz k-spar tension veins in the more rigid brittle units, dipping moderately to the SE. The latter are likely to be of short strike extent, being controlled by the width of the rigid arenite beds which rarely exceed 2m. Veins frequently have silicified and /or kspar-sericite altered margins. In the more conglomeratic units vein boundaries can merge into silicified matrix material. Veining is by no means common in the core, even in zones of more intense veining it rarely makes up more than 4% of the rock. The largest veins are up to 0.5m wide but generally much less.

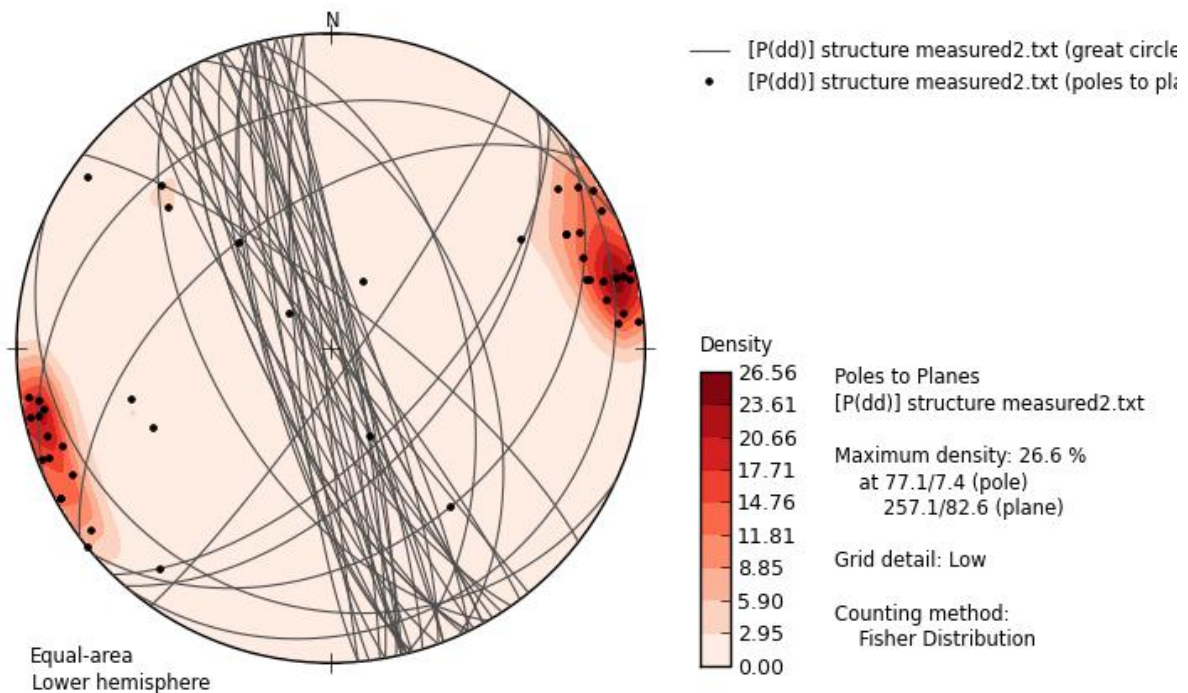


Figure 5 Stereoplot of structural measurements MD003. Plotted using OpenStereo Open source software.

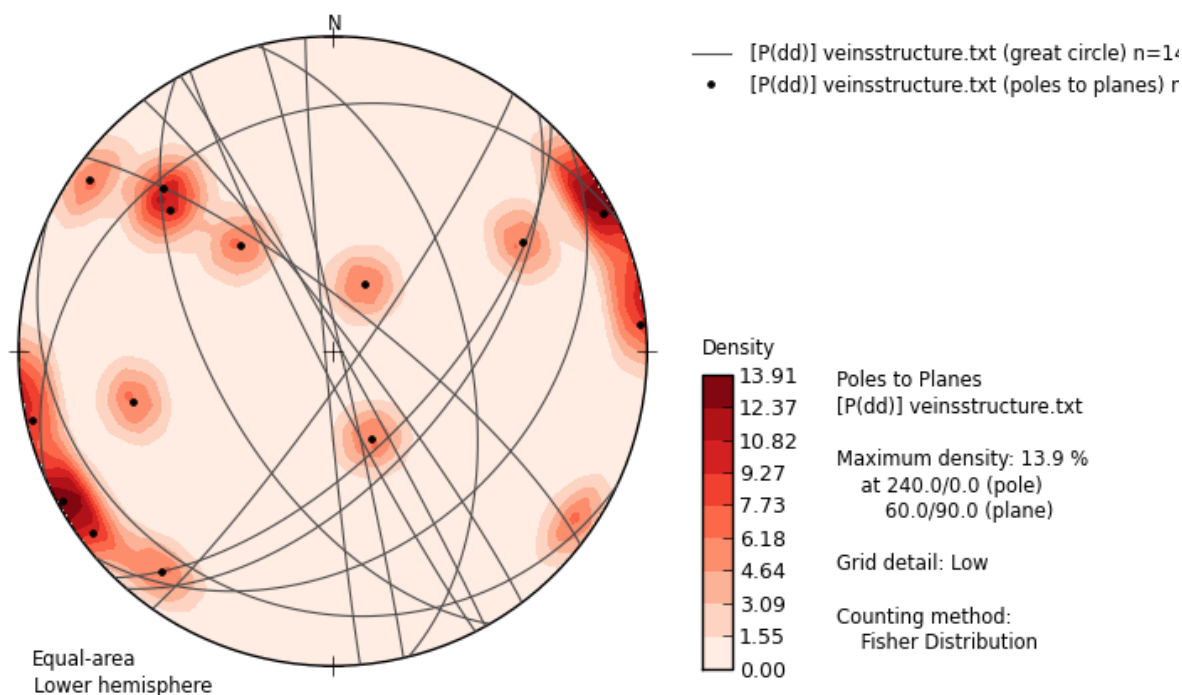


Figure 6 Stereoplot of quartz vein orientations MD003

### 6.3 Mineralisation.

No economic gold or base-metal mineralisation was observed in MDD003.

A minor quartz vein at 129m contains trace chalcopyrite and galena. Several other minor quartz veins contain traces of pyrite and sometimes pyrrhotite.

A wider deformation zone with shearing, faulting, quartz flooding and veining between 180m and 187m contains some (<0.5%) coarser, euhedral, arsenopyrite and pyrite. Gold assays to 0.02ppm and silver assays to 4.6ppm are associated with this zone, indicating only minor precious metals enrichment.

The change to more carbonaceous lithologies from 296m is accompanied by minor shearing of the more shaly units, which has resulted in sections of strongly graphitic schist. Total graphitic carbon analysis of selected intervals returned assays ranging from 2.15 to 11% TGC, which suggests the possibility of economic graphite mineralization occurring in the area.

## 7 Conclusion

MD003 was completed as per the collaboration proposal. No evidence of VHMS style mineralisation, alteration or felsic volcanic lithologies were observed in the core. The graphitic intervals present at 180m and especially from 296m onwards adequately explain the EM conductors observed, even if the modelled conductor plates are not a good fit; ground EM suggests a moderately steep east dipping plate while geological logging suggests a steep west dip to the main graphitic shears.

In the light of the overall apparent steep dip to the west, it may have been better to angle the hole to the east, although the lifting of the hole has to a certain extent mitigated against this and ensured that targeting of the EM anomaly was adequate.

Minor arsenopyrite associated with quartz veining and sericite-kspar alteration in a major shear-zone indicated some potential for gold mineralisation that was tested by assaying the relevant intervals. The assays indicated only barely anomalous gold and silver values, which while possibly of interest in a regional context, are unlikely to indicate proximity to significant mineralization.

Total carbon analysis of selected samples show potentially economic grades of graphite mineralization. More work to ascertain the style of graphite (flake v amorphous) may be warranted, although the depth of the graphite intercepts are well below potentially economic open-pittable limits. The zone of graphitic shearing is a potential target where it comes close to the present land surface.

Down-hole conductivity logging or down-hole EM could be carried out to further confirm the graphitic intervals as being the source of the EM anomaly; however in the absence of other geological criteria indicating the potential presence of VHMS mineralisation this seems unwarranted for base-metal exploration. It may however assist in defining the significance and confirm the orientation of the graphite mineralisation.

Hole MDD001 was previously drilled on the same section line as MDD003. While it intersected similar lithologies as in MDD003, the steep dip of the stratigraphy measured in MDD003 means that the stratigraphy in the two holes cannot be directly correlated.

## 8 References

NTGS 1:250,000 Geological Map Series Explanatory Notes Pine Creek SD52-8

May Drilling NTGS Collaborative Drilling Application