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EL 3762

ACROPOLIS SOUTH

PACE INITIATIVE : THEME 2, YEAR 6

DRILLING PARTNERSHIP – EASTERN STUART SHELF – APHRODITE IOCG MINERAL PROSPECT

PROJECT DPY6-3 FINAL REPORT

Submitted by
Minotaur Exploration Ltd
2011

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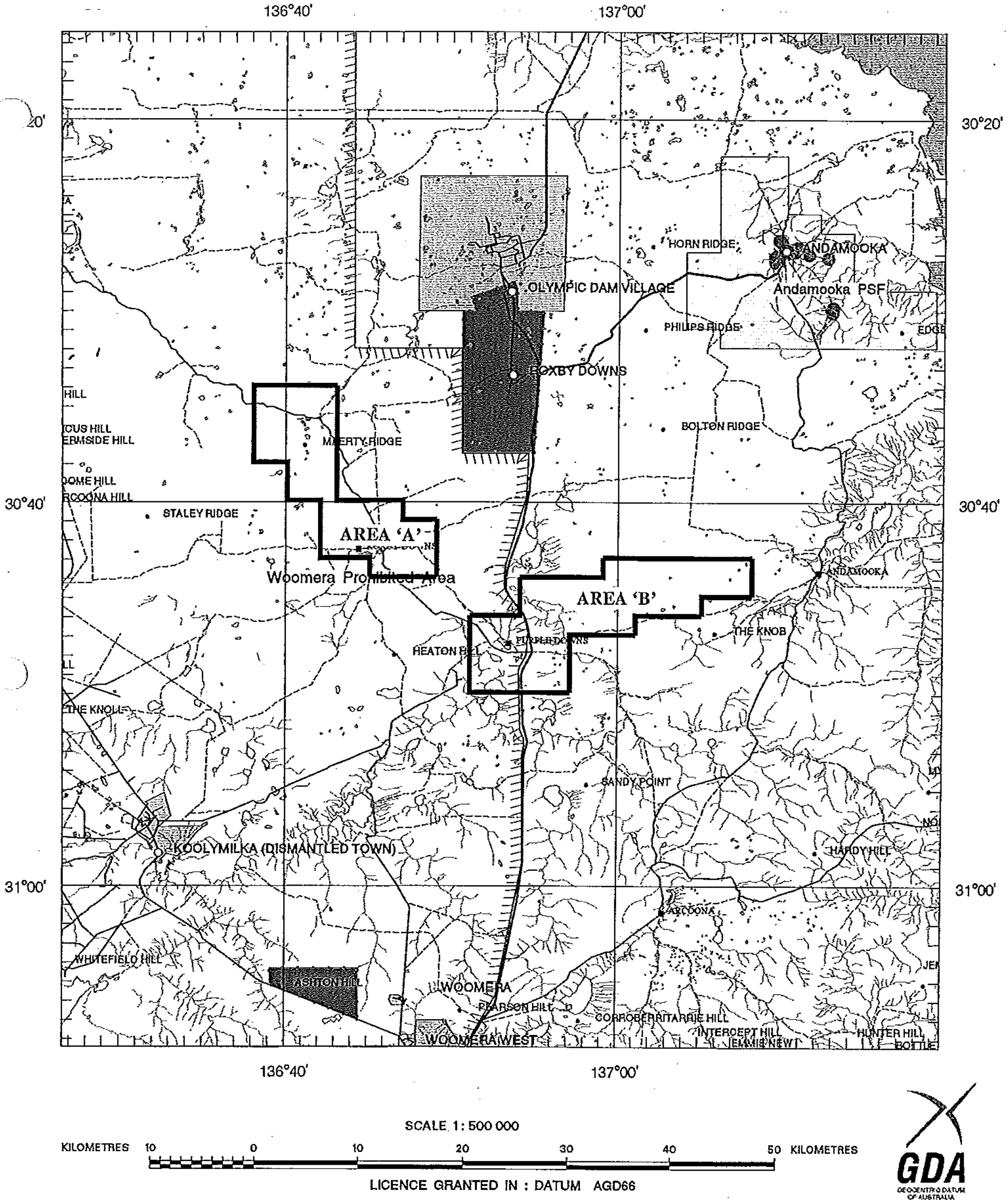
Government of South Australia
Primary Industries and Resources SA

SCHEDULE A



APPLICANT : **MINOTAUR OPERATIONS PTY LTD**

FILE REF : **85/07** TYPE : **MINERAL ONLY** AREA : **327** km² (approx.)

1:250000 MAPSHEETS : **ANDAMOOKA**

LOCALITY : **ACROPOLIS SOUTH AREA - Approximately 50 km southwest of Andamooka**

DATE GRANTED : **04-May-2007** DATE EXPIRED : **03-May-2008** EL NO : **3762**

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PACE PROJECT DPY6-03 (APHRODITE)

FINAL DRILLING TECHNICAL REPORT

R.B. Flint & M. Messeiller

May 2011

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PACE PROJECT DPY6-03 (APHRODITE)

FINAL DRILLING TECHNICAL REPORT

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SUMMARY

- The Aphrodite gravity anomaly on EL 3762 is a gravity-only anomaly with no discernible magnetic anomaly and is located on a SE-trending fault zone, ~15 km SE of known IOCG mineralisation at Wirrda Well.
- Drilling of hole AS09D03 by Minotaur Exploration into the gravity anomaly in 2009 intersected granitic gneisses stratigraphically assigned to the Palaeoproterozoic Donington Granitoid Suite, but lithologies were not sufficiently dense to adequately account for the gravity anomaly. Subsequent, more-detailed gravity surveying indicated that the peak of the gravity anomaly was actually further southwest by ~500 m, suggesting that drillhole AS09D03 was not a true test of the geophysical anomaly.
- Drilling of a second hole (AS10D04), with financial assistance of PIRSA and PACE, to a total depth of 828.8 m also intersected porphyritic granite and granitic gneisses (Donington Granitoid Suite) and occasional mafic dykes, but typical IOCG-style alteration was absent.
- Mafic dykes intersected have a measured density of ~3.0 g/cc and it is assumed that their abundance increases with depth, perhaps coalescing and forming a dolerite-gabbro intrusion which would account for the broad positive Aphrodite gravity anomaly

MAP REFERENCE: 1:250 000:	ANDAMOOKA (SH53-12)
MAP REFERENCE: 1:100 000:	Andamooka (6336)
DISTRIBUTION:	Minotaur Exploration Ltd
	PIRSA

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INTRODUCTION

Exploration Licence 3762 (Acropolis South) is located ~30–35 km south of Olympic Dam (Figure 1). It is within the Olympic Domain of the eastern Gawler Craton, known for its Mesoproterozoic IOCG-style mineralisation with operating mines at Olympic Dam and Prominent Hill, an advanced project (Carrapateena) along with a number of known prospects (e.g. Acropolis, Wirrda Well, Emmie Bluff). Olympic Dam is a world-class deposit containing an immense resource of 8339 Mt @ 0.88% Cu, 0.28 kg/t U_3O_8 and 0.31 g/t Au, representing the world's largest uranium deposit, fourth largest copper deposit and also fourth largest gold deposit. Notable successes after Olympic Dam are Prominent Hill (2001) and Carrapateena (2005). Despite considerable exploration for IOCG-style deposits along the eastern Gawler Craton since discovery of Olympic Dam in 1975, the discovery rate remains low. This is largely due to the inherent risks and high cost of geophysically driven exploration and deep drilling through a very thick sedimentary cover sequence.

Over the past 2 years, Minotaur has identified and characterised a large new IOCG target (Aphrodite) ~35 km SE of Olympic Dam. The target is coherent and of significant size (~4 x 2 km), amplitude (2 mgal) and initial drilling indicated an associated IOCG-alteration system. The first exploratory hole (AS09D03) drilled by Minotaur in early 2009 is believed to have been drilled on the northern flank of the anomaly rather than at its centre as previously believed. This hole has removed considerable risk normally associated with drilling such isolated geophysical targets and financial assistance from PIRSA through its PACE program was obtained to undertake additional drilling of a single hole to a depth of 1,000 m at the centre of the Aphrodite gravity anomaly.

This present report summarises the technical results of the drilling of exploration hole AS10D04 into the Aphrodite gravity anomaly. Drilling of the RC/diamond hole started on the 19th October and was completed on the 28th of October 2010.

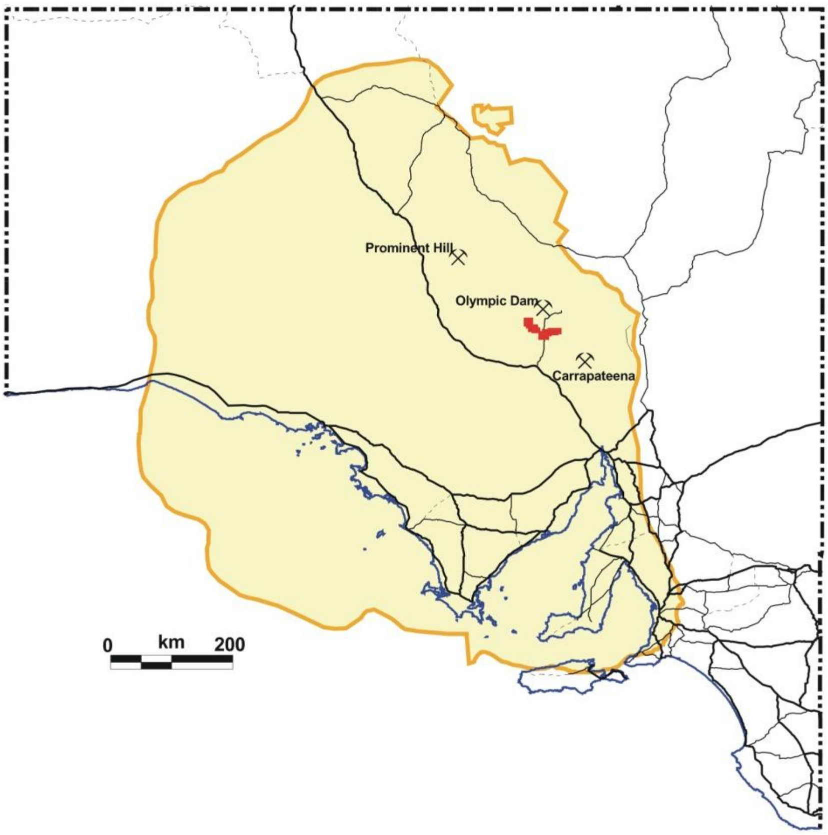

Figure 1: Location of tenement EL 3762 Acropolis South

PREVIOUS EXPLORATION

Significant IOCG-style alteration is known from historical drilling by Western Mining Corporation at Wirrda Well, including 215 m @ 0.8% Cu from 419 m in hole WMC WRD9. Interpretation of airborne magnetic data suggested a fault zone/corridor, possible tectonically active synchronous with mineralisation, extending southeast from Wirrda Well onto EL 3762 (Figure 2). This area was then the focus by Minotaur during 2008 for a MT profile and semi-detailed gravity survey successfully defining a new ~2 mgal positive gravity anomaly (Aphrodite target) with coincident, weakly conductive basement lithologies. Significantly, Aphrodite is a gravity-only anomaly with no associated discernible magnetic anomaly on the southeast end of the structural corridor whilst ~15 km to the northwest is Wirrda Well with its coincident magnetic and gravity anomalies. The Aphrodite gravity anomaly is considered to possibly reflect a haematite-bearing IOCG-style breccia pipe.

The Aphrodite target was initially drill tested in early 2009 and was the only drillhole to basement anywhere near the geophysical feature. Drillhole (AS09D03), near what was then considered to be the peak of the gravity anomaly, intersected granitic augen gneiss (typical of the Donington Granitoid Suite) at a depth of 671 m, displaying red-rock and sericitic alteration along with thin carbonate-rich veins containing minor bornite, chalcocite and haematite. The presence of these veins is consistent with haematite-dominated IOCG-style alteration. In addition, two great risks in targeting gravity anomalies under cover, bed-rock topographic highs and mafic intrusive, have been eliminated by this initial drilling.

Donington Granitoid Suite lithologies in hole AS09D01 have an average density of ~2.65 g/cc and as they were not sufficiently dense to adequately explain the Aphrodite gravity anomaly, a more detailed gravity survey was undertaken in September 2009. Not only was a closer station spacing used (250 m instead of 500 m), but also the survey was extended northwards onto the adjoining tenement held by BHPBilliton (with their written permission) in order that improved regional gravity corrections could be obtained. The end result was greatly improved resolution and delineation of the target anomaly. Most importantly, the peak of the gravity anomaly shifted ~500 m to the south. The previous drillhole AS09D03, rather than being located near the centre of the residual gravity anomaly, now appears to be located on the anomaly's northern flank (Figures 3–4).

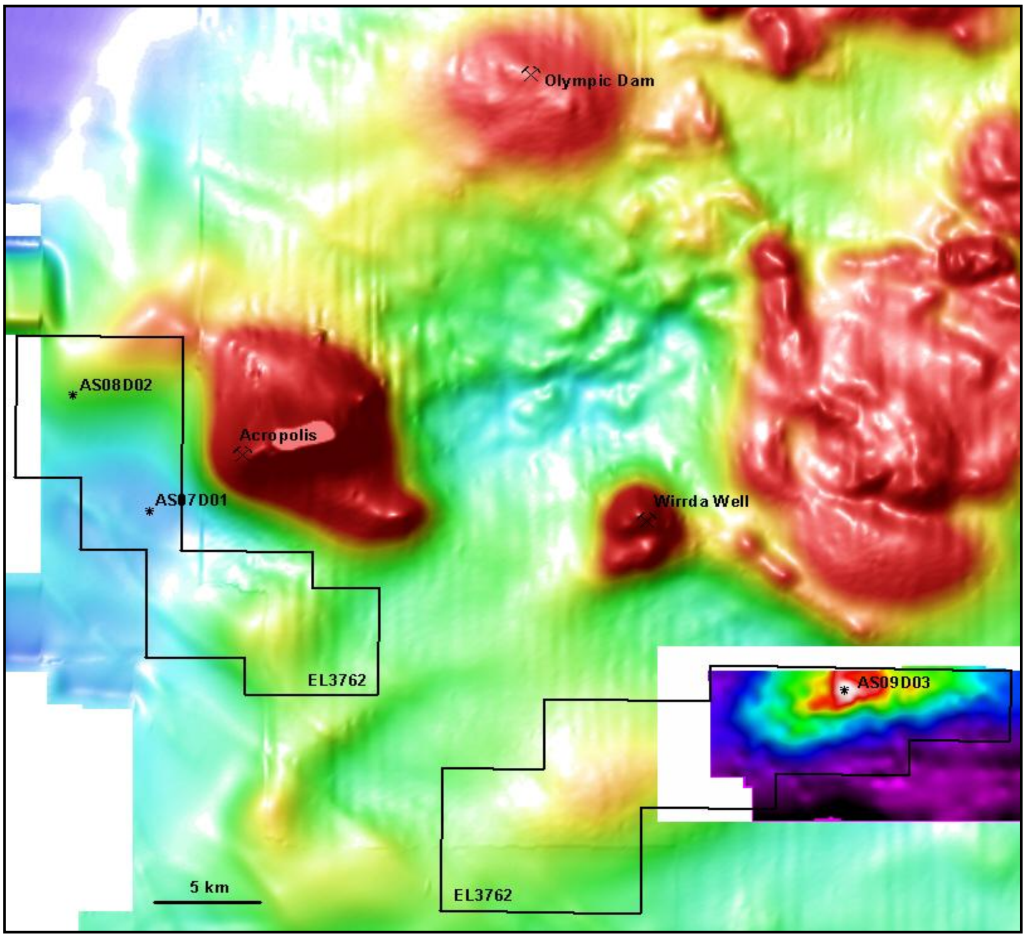

Figure 2: Regional TMI image for EL 3762 (Acropolis South), inset of residual gravity image from 2008 gravity survey and drillhole AS09D03

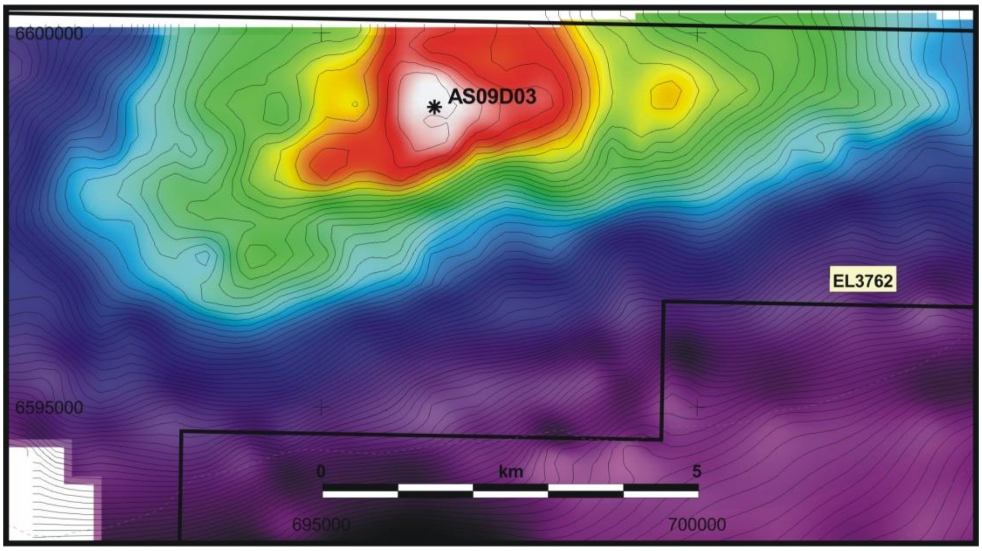

Figure 3: Residual gravity image and Aphrodite anomaly as defined by 500 m station spacing (2008 survey data) and location of hole AS09D03

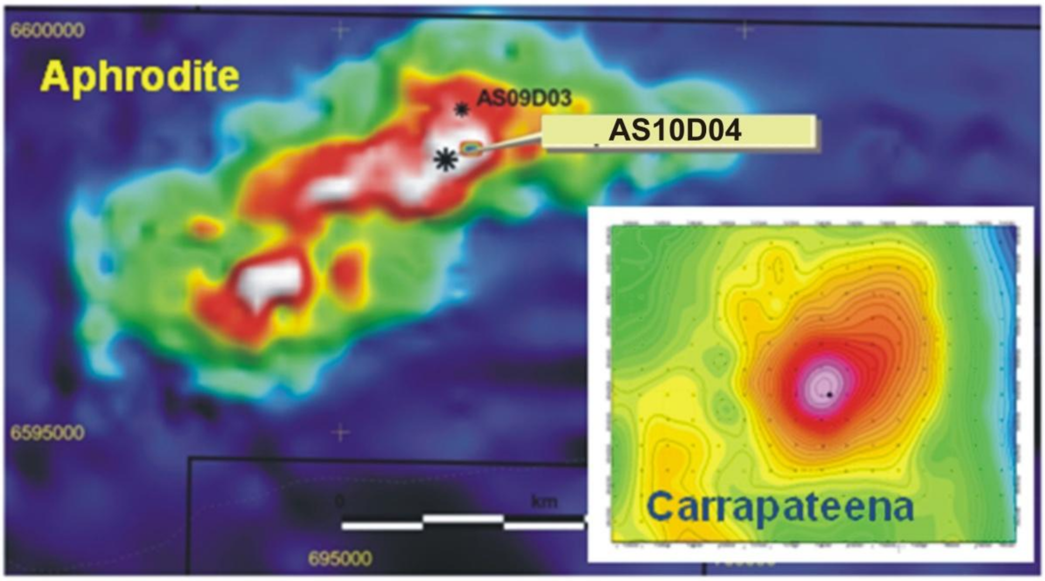

Figure 4: Residual gravity image and Aphrodite anomaly as defined by 250 m station spacing (2009 survey data) and location of hole AS09D03. Note that a different colour stretch has been applied to the data in comparison to Figure 3. Inset shows Carrapateena gravity anomaly at the same scale

DRILLHOLE AS10D04

After protracted negotiations over many months, a cultural heritage survey was conducted on 17–19th July 2010 with representatives of the Kokatha Uwankara Native Title Group and both male and female ACHM archaeologists and approval given for both access and drilling of a single drillhole at the Aphrodite gravity anomaly.

Hole ID	Easting (m)	Northing (m)	Azimuth (°)	Dip (°)	RC		Diamond	
					Depth From	Depth To	Depth From	Depth To
AS10D04	696250	6598360	0	90	0	203.9	203.9	828.8

Table 1 Summary of drilling details for AS10D04

Drilling was efficiently undertaken by United Drilling Services, starting on the 19th October and was completed on the 28th of October 2010 at a total depth of 828.8 m (Table 1).

A detailed graphical lithological log of drillhole AS10D04 along with plots of magnetic susceptibility and SG data and trace element abundances for Cu, Pb and Zn are portrayed in Figure 5.

Quaternary silcrete and unconsolidated sands and clays were drilled in the first 4.5 m. Gypsum and carbonate minerals are common. The underlying Adelaidean Tregolana Shale consists of a thick sequence of finely-laminated, flat-lying shale interbedded with siltstone and minor sandstone (4.5–510.4 m). Weathering is strong to about 15 m, with common limonite. The Tregolana Shale is generally composed of a banded, medium brown–red and green–grey colour (Figure 6). Slump folds and soft-sediment deformational features are common.

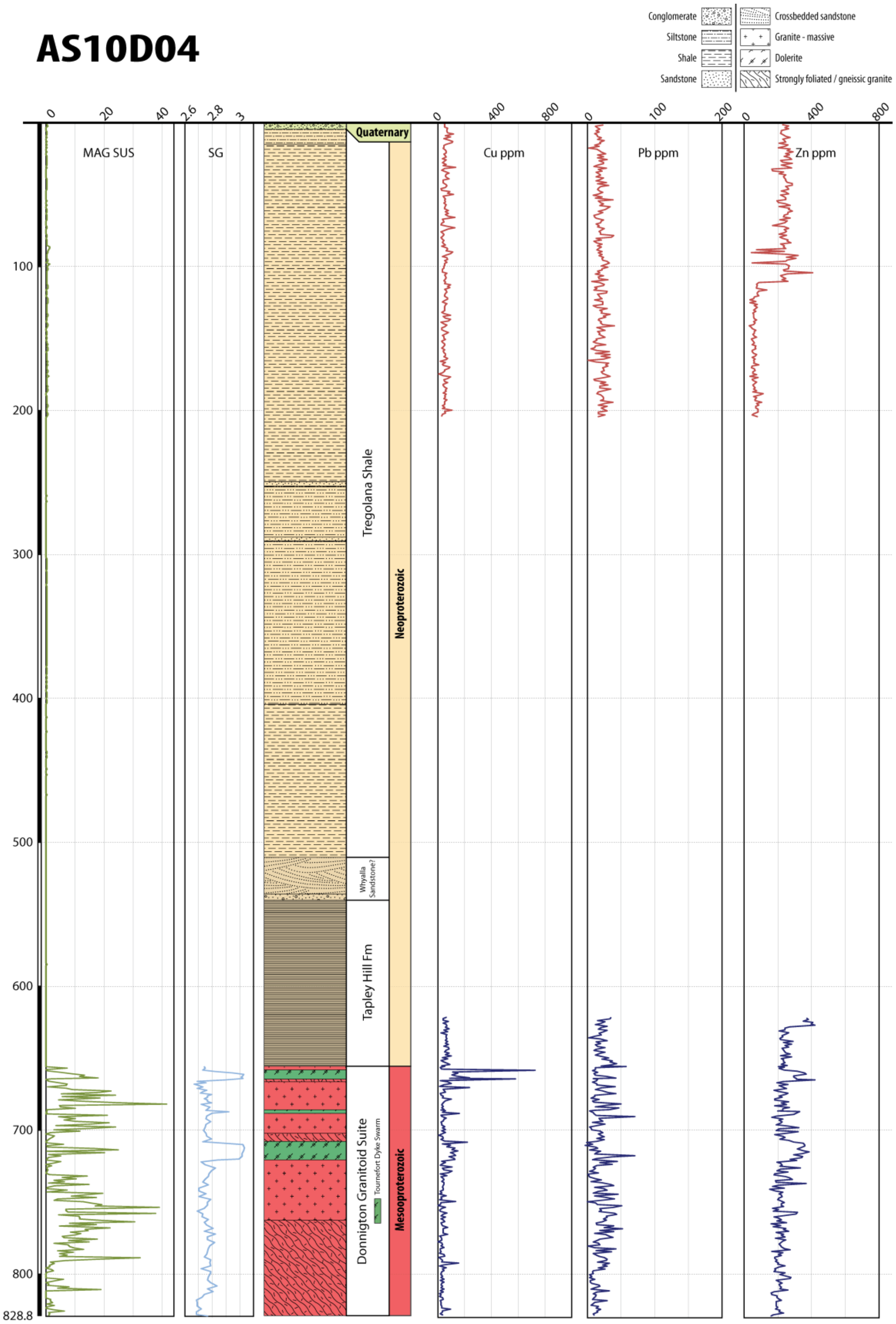

Figure 5: Geological section for drillhole AS10D04 with Cu, Pb, Zn values, Specific Gravity and Magnetic Susceptibility values

Figure 6: Typical Tregolana Shale lithologies at 322.8–327.6 m

Below the Tregolana Shale is a light-coloured sandstone with cross stratification (510.4–535.85m) (Figure 7). Minor interbedded laminated shale is present and the unit is similar to the banded unit above. Also present is a well-rounded, basal conglomerate (535.85–540.15 m), possibly representing a stratigraphic equivalent to the Whyalla Sandstone.

Figure 7: Tregolana Shale /Whyalla Sandstone? (518.7–523.3 m)

The top of the Adelaidean Tapley Hill Formation was intercepted at 540.15 m and the unit comprises dark, laminated carbonaceous shale and siltstone interbedded with fine- to medium-grained light-coloured arkosic sandstone (Figure 8).

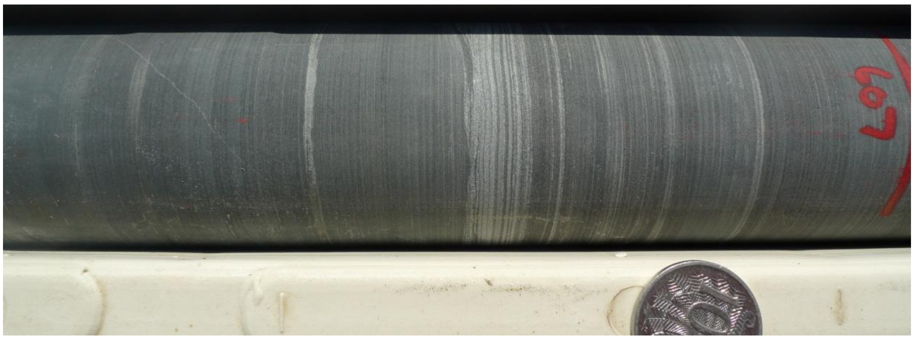

Figure 8: Typical Tapley Hill Formation lithologies at 606.8–607 m

Slumping and intraformational clasts are common. Granitoid pebbles are present within the shale near the base of the unit. Disseminated pyrite is common within particular bands.

The contact between the cover sequence and the basement at AS10D04 was intercepted at 655.55 m, slightly shallower than the basement depth of 671.2 m previously recorded in hole AS09D03. As for AS09D03, the basement is identified as part of the Mesoproterozoic Donington Granitoid Suite. The principal lithology is a granite (quartz + feldspar + biotite + magnetite). The degree of deformation varies considerably from essentially undeformed (massive texture, medium- to coarse-grained granite often containing frequent feldspar megacrysts) to a strong biotite foliation to extremely strong mylonitic foliation (muscovite foliation and mylonite development) (Figures 9–10).

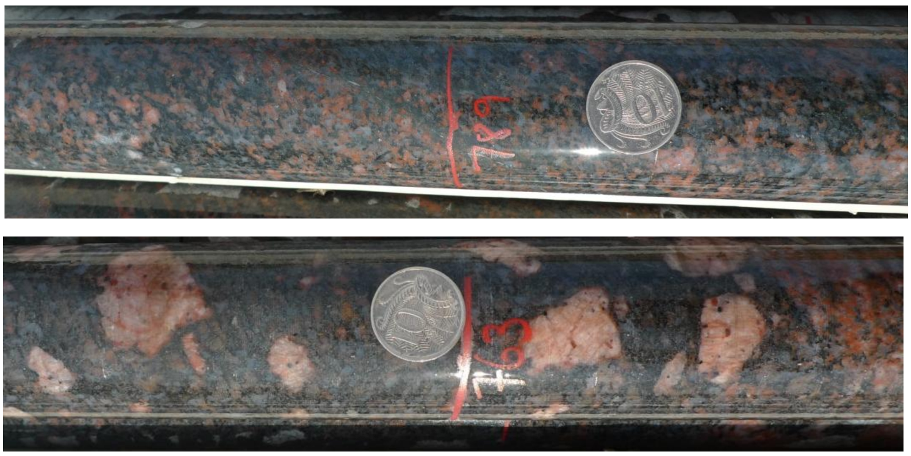

Figure 9: Massive, medium- to coarse-grained granite (788.9–789.15 m) and coarse-grained megacrystic granite (762.9–763.1 m)

Several zones of intense shearing are present with highly attenuated feldspar phenocrysts, strong gneissic layering development and grading through to mylonite (Figure 10). The foliation angle to the core is variable and generally in the range 20–60°.

Three mafic units were intercepted and are interpreted as being part of the Palaeoproterozoic Tournefort Dyke Swarm. They consist of medium-grained dolerite, incorporate xenoliths of the Donington Granitoid Suite, and display chilled margins (Figure 11).

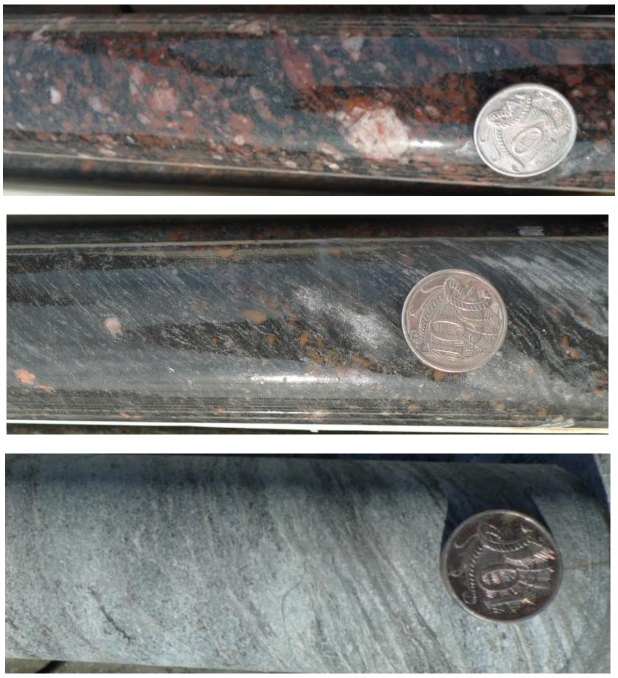

Figure 10: From top to bottom: moderately foliated granite (824.2–824.3 m), strongly foliated gneissic granite (805.5–805.65 m) and mylonite (686.1–686.4 m)

Figure 11: Minor haematite and calcite vein within dolerite dyke (712.4 m)

Minor chloritic and haematite red-rock alteration are common throughout the basement. Epidote is common as a pervasive alteration, especially in the vicinity of carbonate and chlorite veins (Figure 12). Sericite present at the bottom of the drillhole (~762.6 m–828.8 m) is associated with retrogressive ductile deformation. No significant IOCG style alteration is evident.

Figure 12: Epidote and chlorite alteration associated with calcite vein (745.4 m)

Generally, sulphides are rare. Pyrite is present as rare traces disseminated within veins or as blebs. Very rare chalcopyrite has been observed within calcite veinlets. No breccias have been intersected and no significant mineralised veins crosscut the basement. A single occurrence of a hematite + calcite vein with minor pyrite was observed in the dolerite at 712.4 m (Figure 11).

Specific gravity readings were taken on representative samples, at approximately 2 m intervals, from basement lithologies (Figure 13). The average SG value for all basement samples is 2.78 g/cc with maximum value of 3.03 g/cc at 661 & 712 m. The three mafic dykes of the Tournefort Dyke Swarm record the highest SG values and have an average of 2.97 g/cc. Granite, gneissic granite and mylonitised granite have an average SG of 2.75 g/cc.

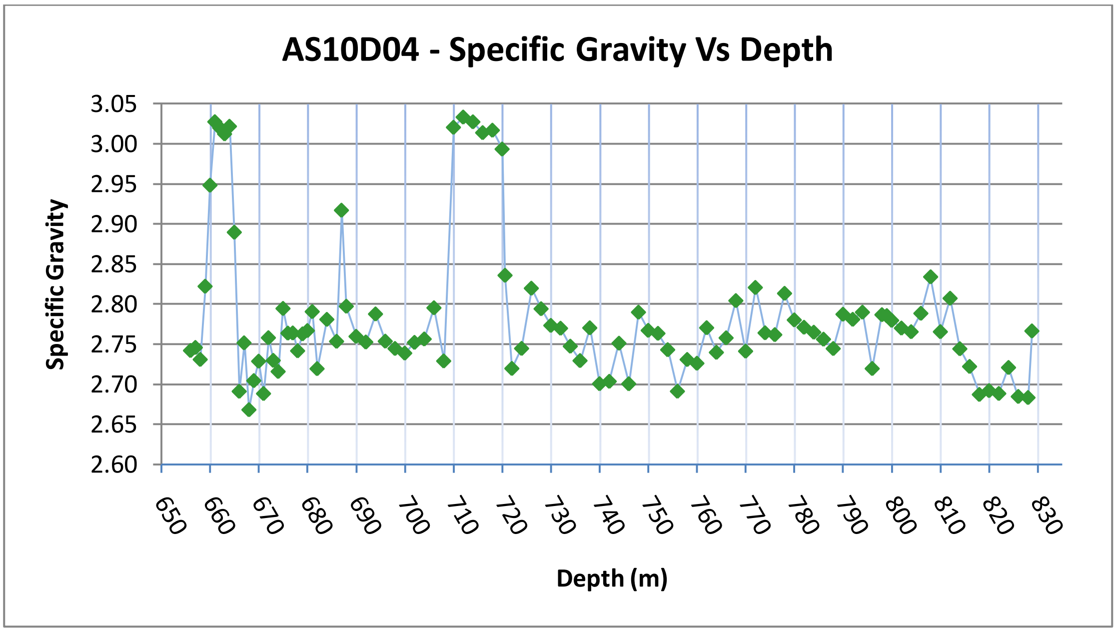

Figure 13: Specific Gravity vs Depth for AS10D04 (655.55–828.8 m)

Magnetic susceptibility values are generally low in the cover (average 0.3 SI x 10^{-3} and maximum 1.46 SI x 10^{-3}) and high to very high in the basement (average 7.25 SI x 10^{-3} and maximum 40.7 SI x 10^{-3}) (Figures14–15). Strong variations throughout the basement are related to the quantity of magnetite within the various lithological units, especially phases richer in ferromagnesian minerals (biotite).

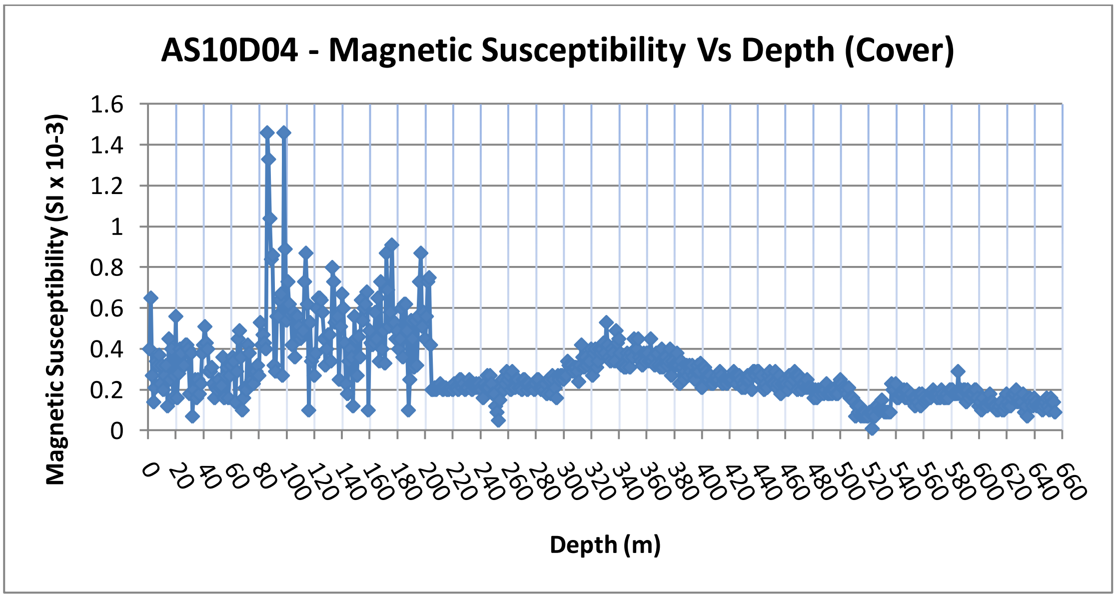

Figure 14: Magnetic Susceptibility vs Depth for cover sediments in AS10D04

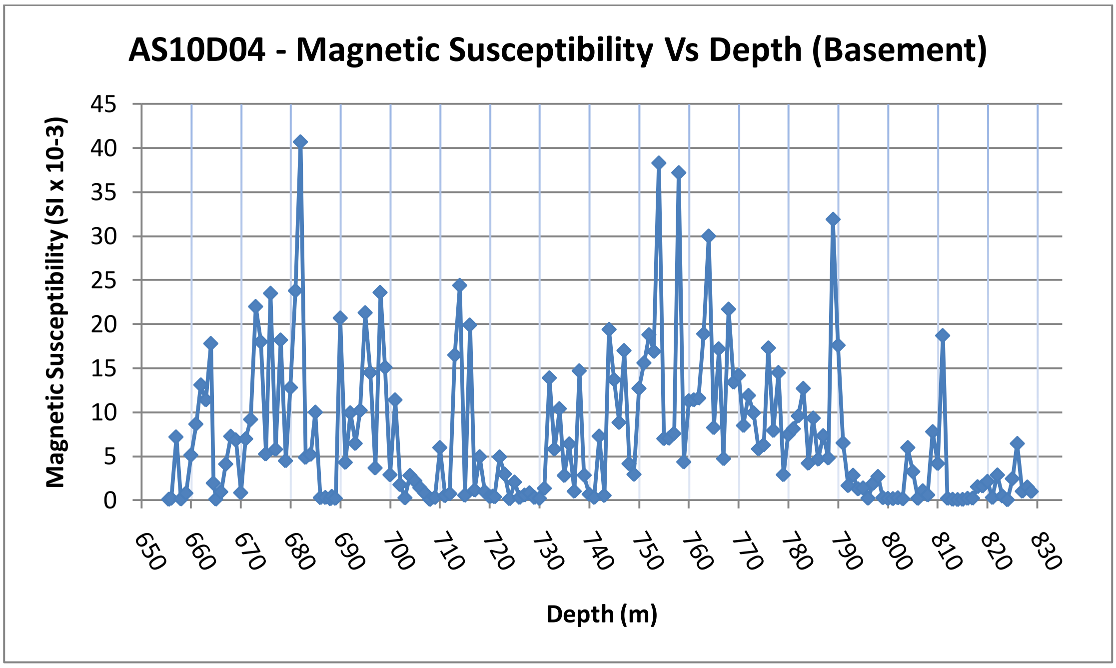

Figure 15: Magnetic Susceptibility vs Depth for basement lithologies in AS10D04

Geochemical analysis was undertaken using a portable XRF (NITON) machine on basement lithologies and by selecting a representative sample every 1 m (Figure 16). The portable XRF analyses an area of ~1 cm^2. Consistently low values were recorded for Cu, Pb and Zn with highest Cu value being 700 ppm within one of the mafic dykes. Due to the low base metal values recorded by the portable XRF machine and apparent lack of typical IOCG alteration in the drill core, no standard geochemical laboratory analyses were undertaken.

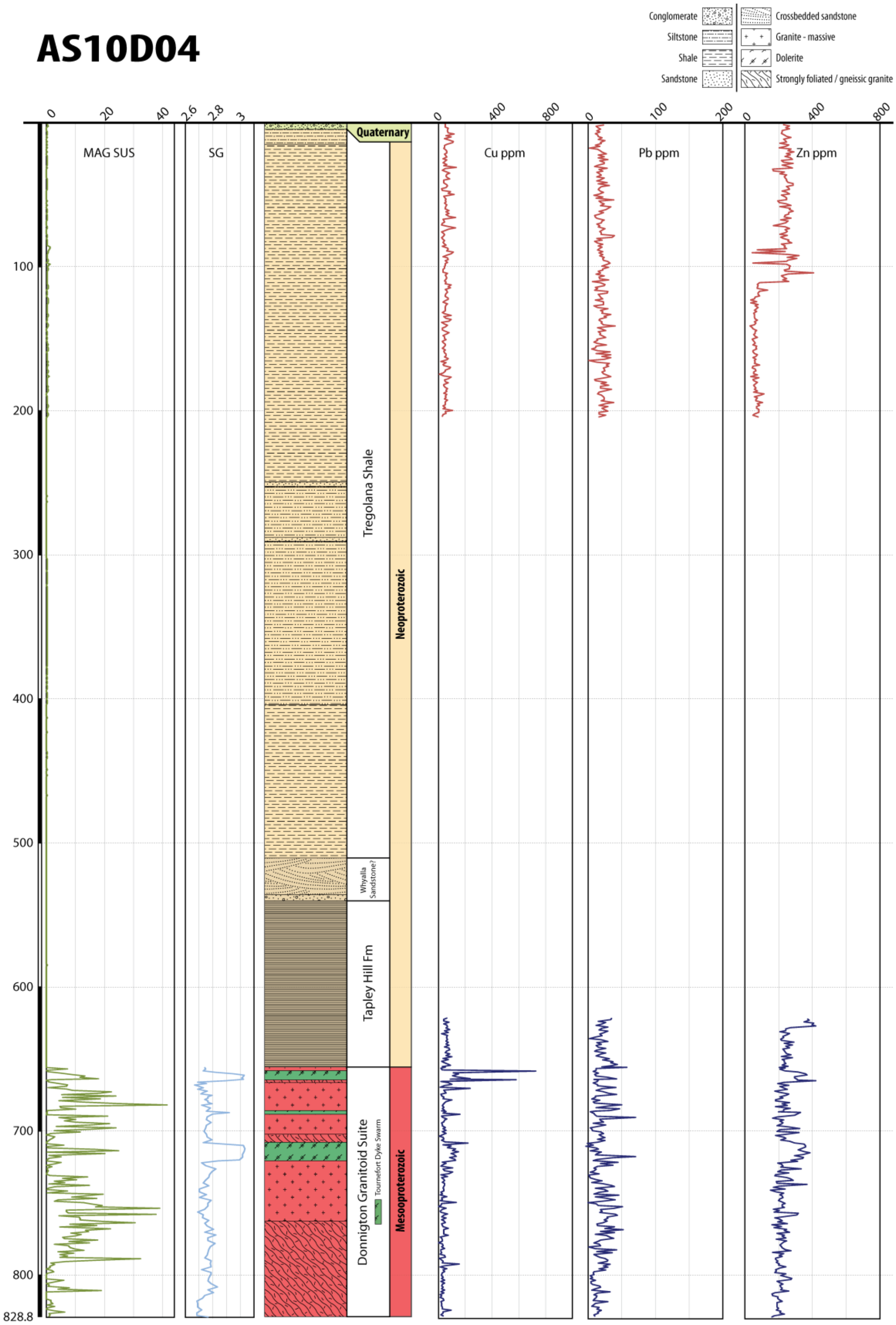

Figure 16: Base metal values (Cu, Pb & Zn) for basement lithologies in AS10D04

CONCLUSIONS

The Aphrodite gravity anomaly, located ~13 km to the southeast of Wirrda Well, is a positive gravity-only anomaly with an amplitude of ~2 mgal and significant areal extent of ~4 x 2 km. Previous drilling (hole AS09D03) had established a depth to crystalline basement of ~670 m, but the nature of source rocks causing the gravity anomaly was a conundrum.

Additional gravity surveys and the drilling of hole AS10D04 into the peak of the gravity anomaly intersected predominantly granitic lithologies (porphyritic granite, augen gneiss, mylonitic granite) of the Donington Granitoid Suite with an average density of 2.75 g/cc. Also present were rare thin dolerite dykes of the Tournefort Dyke Swarm which have an average density of 3.0 g/cc. The recorded average densities for these rock units at a depth of ~700 m are insufficient to adequately account the 2 mgal positive gravity anomaly.

Remodelling of the gravity data revolved around the assumption of no significant variations in basement topography. Instead, it was geologically assumed that there might exist an upper more felsic unit /sill /lopolith of the Donington Granitoid Suite which is underlain by a massive doleritic to gabbroic body coeval with the Tournefort Dyke Swarm. If the latter mafic body has an assumed density of ~3.0 g/cc, slightly greater than observed measurements for thin dykes and reasonable for a large less-deformed body, then 2D gravity modelling indicates that measured and computed gravity profiles are matched for a such a mafic body with a top at ~1.25 km and depth extent of >1 km (Figure 17). This model is considered geological plausible and is preferred due to the lack of IOCG-style haematite-rich alteration and mineralisation encountered in hole AS10D04.

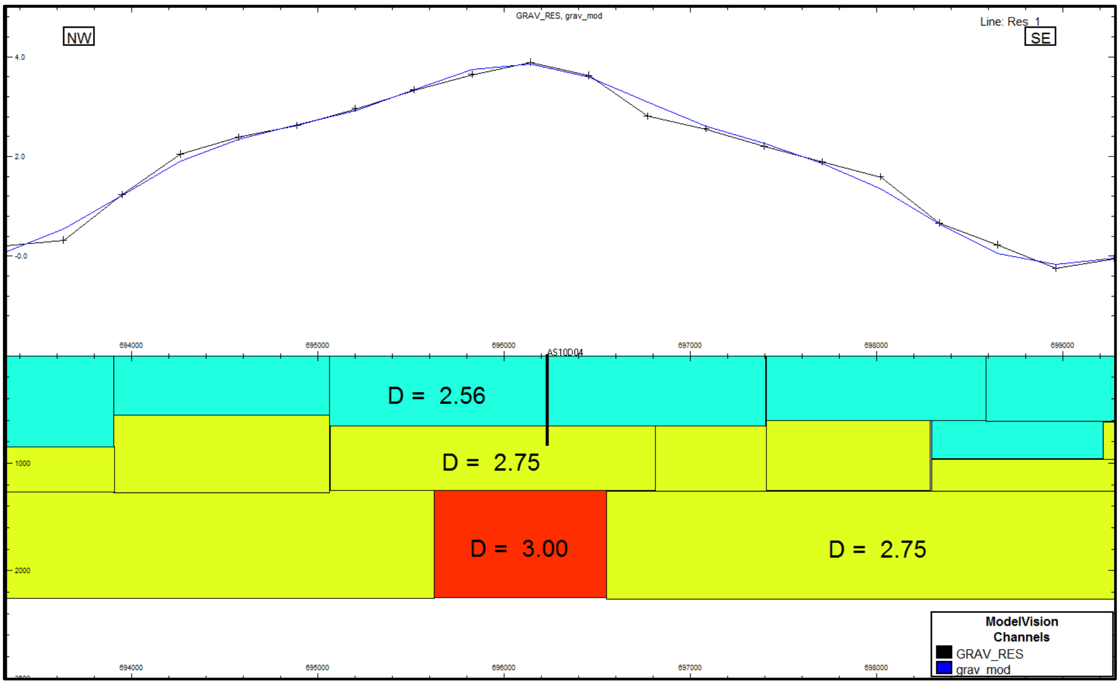

Figure 17: Revised 2D gravity modelling post drilling of hole AS10D04

REHABILITATION

To minimise the environmental impact of exploration activities associated with drilling of hole AS10D04, guidelines developed by PIRSA (Environmental Guidelines for Mineral Exploration Activities in South Australia M33) were followed.

Prior to the commencement of drilling and in order to provide access for the drill rig, water truck and rod truck, it was necessary for a rubbly soil and clay capping to be added to one sand dune just north of the drill site. This work and preparation of sumps at the drill site were undertaken by Northern Earthmoving from Roxby Downs.

Final rehabilitation of the drill site and access tracks was completed in April 2010 by local contractor Ron Collins (Northern Earthmoving). All surface rubbish was removed and plastic sump liners were removed from each sump before backfilling. The drill collar was left in place to permit access to further down-hole geophysical logging should it be deemed appropriate. The soil capping on the sand dune also remains to assist further access for the geophysical investigations. All other access tracks and the drill site were scarified and all vehicle tyre marks were smoothed out (Figures 18–22).

Figure 18: AS10D04 drill site during drilling operations, view southeast

Figure 19: AS10D04 drill site prior to rehabilitation, view southeast

Figure 20: AS10D04 drill site immediately after rehabilitation, view southeast

Figure 21: Access track after drilling and prior to rehabilitation

Figure 22: Access track immediately after scarification

APPENDICES

APPENDIX A:
AS10D04: Drill collar particulars
(Digital file: DPY6-03_2011_F_02_drillcollars.txt)

APPENDIX B:
AS10D04: Geological log
(Digital file: DPY6-03_2011_F_03_lithology.txt)

APPENDIX C:
AS10D04: Magnetic susceptibility data
(Digital file: DPY6-03_2011_F_04_magsus.txt)

APPENDIX D:
AS10D04: Specific gravity data
(Digital file: DPY6-03_2011_F_05_SG.txt)

APPENDIX E:
AS10D04: Geochemistry
(Digital file: DPY6-03_2011_F_06_geochemistry.txt)