Geology of North Tawallah No.1 Prospect
Borroloola Project, NT

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SUMMARY

Sparse outcrops in the North Tawallah Range No.1 area indicate a gently northeast dipping and facing sequence consisting of the upper part of the Rosie Creek Sandstone Member, overlain by siltstones, fine-grained sandstones and stromatolitic dolostones of the Aquarium Formation, semi conformably overlain by pink sandstone of probable Masterton Sandstone, ultimately overlain by red-purple siltstone and sandstone of probable Mallapunyah Formation.

Exploratory drill holes 11BLRC0167 and 11BLRC0168 intersected similar sequences of interbedded red-purple siltstone and sandstone, and appear to have penetrated to within a few tens of metres of the base of the Mallapunyah Formation.

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INTRODUCTION

The name 'North Tawallah Range No.1 refers to the area between the old airstrip at 'Billy's Camp' (locally known as 'the Ruins') and exploratory drill holes 11BLRC0167 and 11BLRC0168. Sandfire drilled these two vertical reverse circulation percussion holes (194 m and 120 m, respectively) in mid October 2011 as part of a program testing the conceptual potential for 'red-bed copper' style mineral deposits at the base of the Mallapunyah Formation.

This note records my observations and interpretations based on a one-day geological reconnaissance on 26th October, 2011.

GEOLOGICAL SETTING

The vicinity of the two drill holes is devoid of outcrop. However, sparse exposures to the southwest afford a reasonably complete and coherent interpretation of the geological setting (Figure 1).

Along the eastern foot of Tawallah Range, near Musterer's Cave about 3 km southwest of the drill holes, the Rosie Creek Sandstone Member of the Tawallah Group dips at 20° to the northeast, and is partly covered by remnants of flat-lying Mesozoic sandstone (Figure 2). The Rosie Creek Member there consists of characteristically bimodally sorted fine- and coarse-grained, locally pebbly, pale grey quartz sandstone (Figure 4) with medium diffuse-planar and locally rippled bed forms.

Northeast of and overlying the Rosie Creek Member is a narrow zone of low rubbly outcrop of purple and grey hematite-stained thinly cross-bedded poorly sorted fine-medium-coarse grained sandstone with common ferruginous solution cavities (Figure 5). It is perfectly conformable with the underlying pebbly quartz sandstone, and could be a hematitic facies of the Rosie Creek Member, or alternatively the basal unit of the Aquarium Formation based on the difference in colour and bed form.

It is followed northeastwards by a 600-m-wide gap in outcrop but just beyond the airstrip there are a couple of unexpectedly well exposed small cliffs and creek bed outcrops of fine grained thinly diffuse-bedded fissile pinkish-buff coloured siltstone and minor fine grained sandstone dipping at about 10-15° to the northeast (Figure 6).

The next 400 metres across strike exposes scattered small outcrops and sub-outcrop float zones of thinly planar-bedded, flaggy to faintly cross bedded pink (tan-weathered), very fine grained sandstones, also dipping gently at 10-15° northeast (Figure 7). This unit is followed, up sequence to the northeast, by a group of interbedded stromatolitic dolomite, and dolomitic siltstone, sandstone and breccia (Figure 8), which are well exposed in several places along the eastern headwater tributary of Kulampirri Creek. The bed forms in the stromatolitic and breccia facies are locally undulose to chaotic, but the layering generally appears to be slightly steeper, dipping at 20-25° to the northeast, indicating a stratigraphic thickness of about 150 metres..

About 700 metres southwest of 11BLRC0168, a NW-trending low 'jump-up' only a couple of metres high, exposes sandstones in a nearly continuous 2-km-long outcrop, beyond which the country is covered by sandy alluvium and scattered remnants of Mesozoic sandstone. This upper sandstone unit consists of a lower ~3-m-thick unit of pink to purplish-grey hematitic, thinly-planar to cross-bedded and rippled, poorly sorted fine-medium-(locally coarse-) grained sandstone with local mud-clast-casts (Figure 9 and 10), overlain by pale grey to white diffuse bedded medium-coarse grained sandstone. Consistent dips of about 10-20° to the northeast suggest a total sandstone package thickness of around 60 metres.

The lithofacies and thicknesses observed in the approximately kilometre-metre wide zone northeast of the old airstrip are consistent with NTGS' description of the Aquarium Formation, including a lower section of interbedded mudstone and fine-grained sandstone, and an upper section of dolostones (Haines et al., 1993). Except for its rather poor sorting, the overlying ~60-m-thick sandstone unit is comparable to the NTGS description of Masterton Sandstone, as mapped (Madigan and Rawlings, 1992). However, as is the case on the western side of the Tawallah Range (Herrmann, 2011) there is no obvious unconformity at its base.

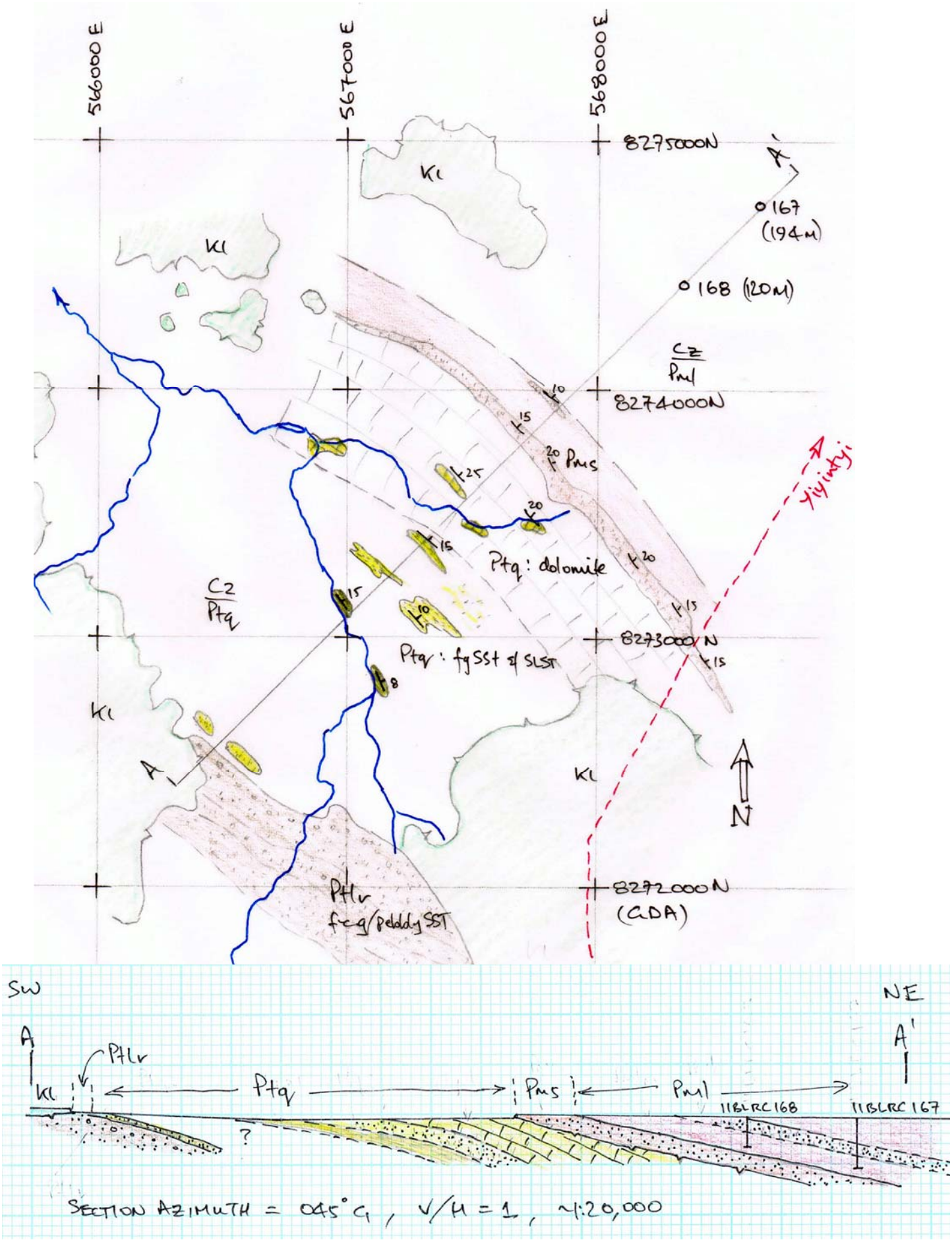

Figure 1. Geological sketch map and interpretative cross section of NTR1 area.

Figure 2. Flat lying orangey-tan coloured Mesozoic sandstone overlying northwesterly dipping and facing pebbly sandstone of the Rosie Creek Sandstone Member; waypoint NTR1-04.

Figure 3. Bioturbated medium-grained poorly sorted Mesozoic sandstone; the stratified sand-filled worm burrow (?) at middle-left of the frame is about 2-cm-wide. Waypoint NTR1-46.

Figure 4. Fine & coarse-grained bimodally sorted and coarse-grained pebbly facies of the Rosie Creek Sandstone Member, waypoint NTR1-02.

Figure 5. Hematite-stained thinly cross-bedded poorly sorted fine-medium-coarse grained sandstone with ferruginous solution cavities, waypoint NTR1-03.

Figure 6. Outcrop and macro-scale photos of gently northeast dipping fissile siltstone, waypoints NTR1-66, and NTR1-65, respectively.

Figure 7. Macro and outcrop-scale photos of thinly bedded flaggy fine-grained sandstone; waypoints NTR1-53 and NTR1-54, respectively.

Figure 8. Stromatolitic dolomite and thinly bedded dolomitic breccia and siltstone; waypoints NTR1-56 and NTR1-51, respectively.

Figure 9. Outcrop and macro scale photos typifying the thinly planar to cross-bedded and rippled, poorly sorted fine-medium-grained pink sandstone exposed in a low 'jump-up' at the north-eastern limit of outcrop; waypoint NTR1-64.

Figure 10. Pebble sized casts of probable mud pellets exist locally in the lower thinly bedded fine-medium grained facies of pink-purple sandstone.

RC DRILLING RESULTS

Drill holes 11BLRC0167 and 11BLRC0168 (~440 m apart, and respectively 194 m and 120 m deep) both intersected a similar sequence of interbedded dominantly red-purple micaceous siltstone and fine-medium grained sandstone, (Figure 11). This sequence includes an approximately 50-m-thick unit of pink-purple fine to medium-grained poorly sorted sandstone that correlates between the holes at a dip of about 12° to the northeast, which is consistent with the dips observed in outcrops to the southwest (Figure 1).

The drill cuttings are not noticeably dolomitic (they fail the warm-up and acid test) but otherwise the prominence of fine siltstone, and mainly red-purple colouration with minor pale green siltstone, are comparable to clastic parts of the Mallapunyah Formation. The sandstones in the drill cuttings are not particularly distinctive but the evidence of interbedded siltstones, and down dip projection of the nearest outcrops of Masterton Sandstone, suggest that both drill holes ended a few tens of metres above the base of the Mallapunyah Formation (Figure 1).

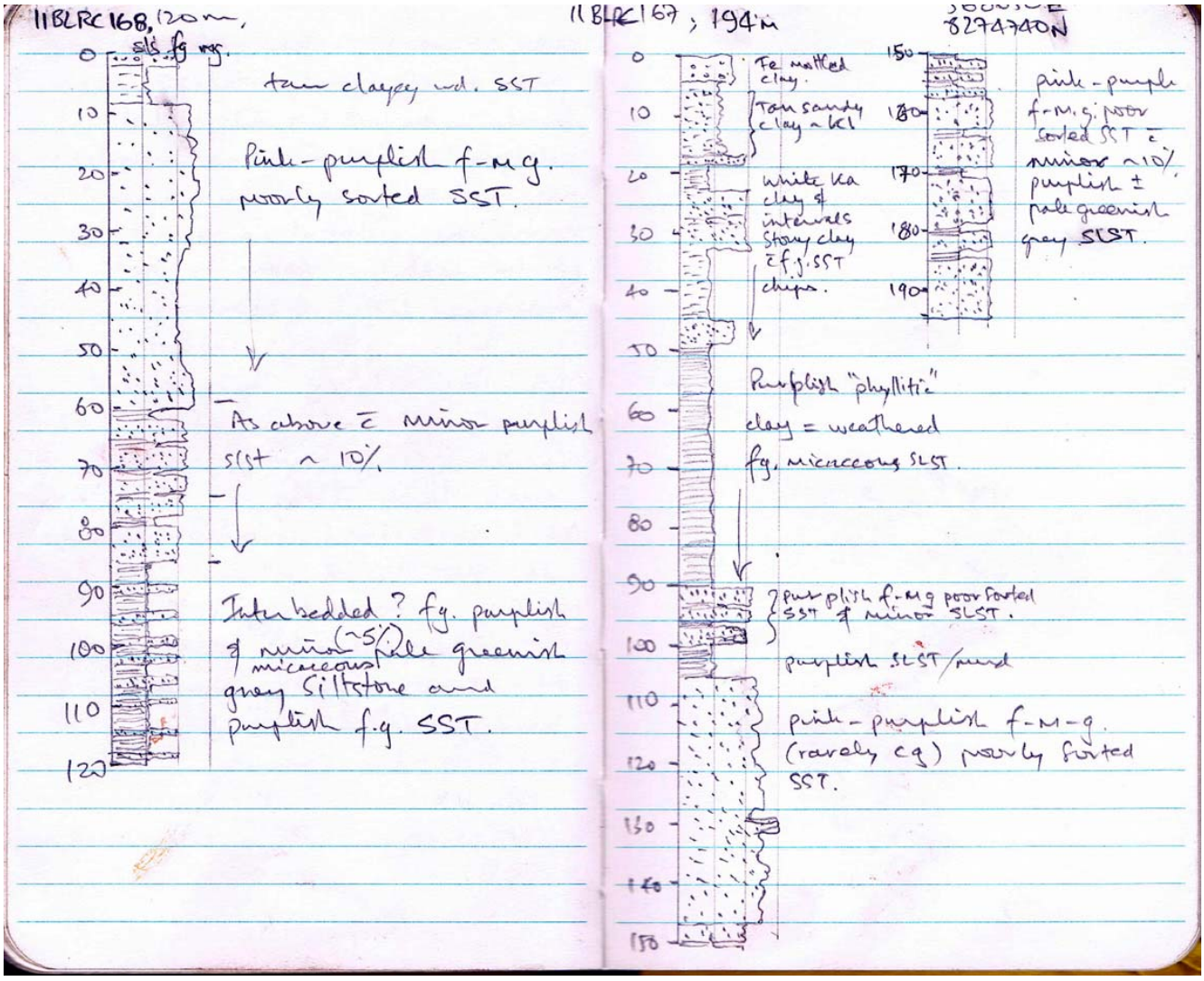

Figure 11. 'Field book' graphic logs of cuttings from drill NTR1 drill holes 11BLRC0167 and 11BLRC0168.

REFERENCES

Haines, P. W., Pietsch, B. A., Rawlings, D. J., and Madigan, T. L. A., 1993, 1:25,000 Geological Map Series, Explanatory Notes, Mt Young SD53-15, p. 81.

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Madigan, T. L. A., and Rawlings, D. J., 1992, Tawallah Range Sheet 6066, 1:100,00 scale Geological Map, NT Department of Mines & Energy.