1980/33. Geological traverse along the Hydro-electric Commission's Pieman Road, from LPD 45.5 km to the Stanley River (LPD 20.2 km)

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Abstract

A traverse along the Pieman Road from the 45.5 km mark to the Stanley River gives access to sedimentary rock successions formed during the period of time from and including the Late Precambrian to the Silurian, and to tectonically emplaced rocks from ultramafic-gabbro complexes.

INTRODUCTION

The following generalised description of geological sequences encountered along the Hydro-electric Commission's Pieman Road between the 45.5 km [CP775786] (SOPHIA 1:100 000 Sheet) and 20.2 km marks [CP576811] (PIEMAN 1:100 000 Sheet) is based upon information gathered during mapping of the Wilson quarter sheet of the Corinna Quadrangle for the 1:50 000 Geological Atlas Series of the Geological Survey of Tasmania.

There is no exposed contact between Mt Read type volcanic rocks, which crop out along the Pieman Road from its junction with the Murchison Highway to the 45.5 km mark, and the sedimentary rock successions to the west along the roadside. Descriptions of three roadside outcrops of variations that can be found within the Mt Read type volcanic rocks of this area are presented in Appendix 1. The area between the volcanic rock outcrop at about 45.7 km and the first outcrop of sedimentary rock at 45.3 km is covered by Quaternary glacial outwash conglomerate. A shallow (40°) easterly dipping fault contact between the above two sequences is exposed in a cutting along a temporary access road to the southern abutment of the Bastyan Dam on the northern bank of the Pieman River at CP774784.

Kilometre measurements given in this report are taken from H.E.C. Pieman Road markers measuring distance from the Lower Pieman Dam (LPD).

All pre-Silurian successions discussed in the following summary are steeply dipping and are overturned over a large part of the area.

SUCCESSION 1. (45.3 - 44.1 km)

The first rock succession is well exposed in three separate cuttings along the road section. The area between outcrops is occupied by glacial outwash conglomerate or road-making fill. In the Pieman River, just to the south of the road, it can be seen that rock sequences exposed along the road belong to the one continuous succession. Minor tight folding produces easterly sedimentary facings locally, but the overall succession faces west.

The succession is unfossiliferous, underlies with apparent conformity rocks correlated with the Crimson Creek Formation, and is derived from a mixture of detritus obtained from metamorphic rocks and acid to basic volcanic rocks. Although this succession may have formed in a similar environment to rocks of the Success Creek Group (Taylor, 1954) it is not necessarily a correlate of this Group, as the lithologies and provenance of the two successions are different. Spatially, this pre-Crimson Creek Formation succession is a north-western extension of rocks that have been mapped to the south as Rosebery Group (Finucane, 1932; and others).

Road cutting c. 45.3 km

Exposed in this cutting is a sequence of thinly interbedded micaceous quartz sandstone and laminated silty mudstone. The sandstone units are fine- to medium-grained and exhibit grading, cross-lamination, ripple and scour marks. In thin section, the sandstone units show pressure solution overgrowth between siliceous clastic grains. Lithic components are dominantly chert and quartzite, but there may also be clastic white mica and volcanogenic quartz. At times coarse sand-grade lithic fragments occur in these units. The sandstone beds are very clean and what matrix fraction there was has been recrystallised into white mica stringers that outline a crude foliation sub-parallel to bedding.

Quarry c. 45.0 km

The sequences in this exposure are dominantly of laminated siltstone with interbedded sandstone and pebble conglomerate lenses. The conglomerate is of mass-flow type and can be either open framework, with a flow orientated silt to fine-grained sand matrix, or closed framework. The pebble clasts are of pink and white quartzite, red and green indurated mudstone, chert, dolomite, lithic sandstone, and tholeiitic-dacitic lavas. Sandstone units are graded and at times have cross-laminated tops. Where undisturbed, the laminated silty mudstone contains a good penetrative foliation. Southern extensions of this sequence, as exposed in the Pieman River, show tight tectonic folds, intraformational soft sediment deformation, and cross-laminated infilled scour channels.

Road cutting c. 44.1 km

This cutting exhibits a sequence of interbedded black silty mudstone, dolomite, lithic wacke, fine conglomerate and tuff. The fine conglomerate consists of similar components to the lithic wacke and also contains rip-up mudstone fragments. In places, the lithic wacke is volcaniclastic, but overall the lithic fragments are derived from a metamorphic terrain. Well compacted horizons of fine-grained acid to basic volcanic lithic crystal tuff occur within this sequence. Similar tuff horizons occur within the Crimson Creek correlate that conformably follows this first succession.

SUCCESSION 2. CRIMSON CREEK FORMATION CORRELATE (43.5 - 41.2 km)

Correlates of the Crimson Creek Formation crop out in road cuttings from the 43.5 km to the 41.2 km marks.

Exposed in these cuttings along this section of the Pieman Road are monotonously interbedded, turbiditic sequences of laminated siltstone-mudstone and volcaniclastic lithic wacke with minor well compacted lithic crystal tuff horizons and tholeiitic lava flows. In places this succession has been intruded by gabbroic dykes. As the succession is unfossiliferous, the correlation with the Crimson Creek Formation is based on lithological criteria. All facings obtained from outcrops within this succession are to the west. The volcaniclastic lithic wacke units vary in thickness from approximately 200 mm up to one metre, are usually graded, and often contain elongate mudstone fragments up to 50 mm in length. The laminated siltstone-mudstone units contain multiple truncated cross-laminations and are up to 100 mm in thickness. The lithic crystal tuff horizons are well compacted and contain material derived from tholeiitic-dacitic lava flows as well as volcanogenic quartz and feldspar. Tuff horizons of similar composition to those found in the last road cutting of the first succession are found in this succession near the western boundary with ultramafic rocks.

ULTRAMAFIC-GABBRO SEQUENCE (41.2 - 40.75 km)

The western margin of the Crimson Creek Formation correlate has a sheared faulted boundary with serpentinised peridotite and gabbroic rocks at the 41.2 km mark. The contact is not exposed along the road but is exposed in a quarry just to the south, accessible by a track off the Pieman Road at the 41.0 km mark. The dominant primary ultramafic rocks found in this area are serpentinite, orthopyroxenite, olivine orthopyroxenite and fine- to coarse-grained gabbro.

A glacial outwash sequence occurs between 41.2 and 40.5 km.

SUCCESSION 3. ELDON GROUP CORRELATE (40.5 - 35.9 km)

Between the 40.5 km mark and the Huskisson River (37.05 km), a highly fossiliferous succession of interbedded laminated siltstone-mudstone, calcareous mudstone and friable and siliceous sandstone crops out. This succession yields a rich shelly fauna of probable Middle Silurian (Wenlock) age (M.J. Clarke, pers. comm.) and thereby suggests an approximate correlation with the Amber Slate. In this area, the above sequences stratigraphically overlie a fossiliferous correlate of the Crotty Quartzite. The first part of the succession consists dominantly of laminated and thinly interbedded mudstone, siltstone and sandstone with some calcareous mudstone horizons (38.7 km). Thin sequences of cross-laminated and bioturbated siliceous and friable sandstone sequences occur at two different levels in the succession (40.2 km and 37.1 km).

Between 39.7 and 39.1 km, exposures of glacially-derived laminated clay, silt, sand and conglomerate occur. Similar glacially-derived conglomerate covers basement rock on the northern side of the Huskisson River to the 35.9 km mark. At this point the road cuts through a spur of Crotty Quartzite correlate. The correlation is made on the basis of bio- and lithostratigraphic evidence. Exposures showing the variation in lithology within this latter sequence are found around the spur in numerous quarry cuts.

SUCCESSION 4. HUSKISSON GROUP (34.8 - 34.3 km)

Between 34.8 km and the fault contact with ultramafic rocks at the 34.3 km mark, a succession of laminated and thinly bedded siltstone, sandstone and fine conglomerate is exposed. The sandstone and conglomerate units are usually graded with the conglomerate horizons being lensoidal (34.6 km). Some sandstone units show ripple marks. This succession is a north-westerly extension of the fossiliferous Huskisson Group (Taylor, 1954), which is a correlate of the upper part of the Dundas Group (Elliston, 1954). Numerous thin quartz-feldspar porphyry and fine-grained granitic dykes cut the succession (34.4 km).

ULTRAMAFIC-GABBRO COMPLEX (34.3 - 29.5 km)

For approximately five kilometres west of the faulted contact with Huskisson Group sequences, the Pieman Road traverses a strike ridge of massive and thickly interlayered serpentinised dunite and pyroxene-bearing dunite. This area of ultramafic rock is part of the Wilson River Complex.

SUCCESSION 5. CRIMSON CREEK FORMATION (29.5 - 24.9 km)

Along the faulted western margin of the ultramafic complex occur rock sequences belonging to the Crimson Creek Formation. From the contact at 29.5 km the Pieman Road trends westerly "down through" approximately 3000 m

of this east facing succession. This area is a northern extension of the type area of the Crimson Creek Formation (Taylor, 1954), and consists of monotonously interbedded laminated siltstone-mudstone, volcaniclastic lithic wacke and minor tuff, tholeiitic basalt flows and carbonate horizons. The clastic units show most of the characteristics of typical turbidite flows, but the presence of tuff horizons, thin interbedded non-pillowed lava flows and carbonate units leave the question of water depth undetermined.

The laminated siltstone-mudstone units may be calcareous, vary in grain size from clay to silt grade, and commonly contain multiple truncated cross-laminations. These finer units usually display a good anastomosing foliation. The carbonate beds rarely crop out, but weathered units can be seen in some road cuttings (27.0 km). Lithic wacke horizons vary in thickness from 200 mm up to 1.5 m, are fine- to coarse-grained, usually graded, contain rip-up mudstone fragments up to 100 mm in length, basal scour and flame structures, as well as the occasional soft sediment deformed zone in the upper parts of a unit (28.5 km). The tuff horizons can be lithic crystal or crystal lithic, are well compacted and are derived from acid to basic volcanic sources.

In the upper parts of this succession, as exposed between the 26 to 27 km marks, the tuff horizons are dominantly medium-grained, contain volcanogenic fragments of tholeiitic and dacitic lavas and crystal fragments of fresh pyroxene as well as volcanogenic quartz and feldspar (29.1 km). In the lower parts of the succession, as exposed around the 26 to 25 km marks, the volcaniclastic lithic wacke units are fine- to medium-grained and tuff horizons are infrequent, although thin tholeiitic basalt flows occur in this part of the succession. Gabbroic dykes have also intruded this succession in many places, for example at the 26.0 km mark.

A zone with local faulting and brecciation occurs at the 24.9 km mark. The westernmost outcrop of Crimson Creek Formation sequences occur in this zone.

SUCCESSION 6. SUCCESS CREEK GROUP CORRELATES (24.9 - 20.5 km)

Regionally, this east facing succession of interbedded, laminated siltstone-mudstone, dolomite, red and black chert, quartz sandstone and fine conglomerate appears to underlie the Crimson Creek Formation conformably, but in detail the contact zone contains many tectonic features. The succession exposed along this section of the road is lithologically different and structurally younger than Oonah Formation sequences that form open ridges 300 m to the south-west of the road section. These relationships place the succession in the stratigraphic position of the Success Creek Group. A direct correlation with the Success Creek Group, as it occurs in the type section in the Pieman River, or around Renison Bell, is possible only in general lithological and stratigraphic terms. The Success Creek Group correlate contains a 'Red Rock' type unit (Condor, 1918), at the 24.9 km mark. This 'Red Rock Formation' occurs between the Success Creek Group and the Crimson Creek Formation in the Renison Bell mine sequence, but is faulted out in the type area of the successions along the Pieman River.

The Red Rock Formation is underlain by thinly interbedded and laminated mudstone, siltstone, carbonate, chert, fine conglomerate and minor quartz sandstone horizons between 24.9 and 23.1 lm. A far more siliceous sequence of laminated siltstone-mudstone with interbedded siliceous sandstone and minor fine conglomerate crops out from 23.1 km to the 20.5 km mark. From the 20.4 km mark sequences belonging to the Oonah Formation are encountered.

The surface expression of the contact runs north-westerly from south of the road to the Meredith Granite. The contact relationship of the succession with the Oonah Formation sequences to the south-west of the road is a landscape unconformity.

GENERAL STRUCTURE

The dominant structure affecting the region traversed is the north-westerly plunging Huskisson Syncline, the southern nose of which is crossed between the 39 and 38 km marks. All successions described above may show up to two foliations, both of which are considered to be consistent with Devonian folding.

Following the folding a major phase of faulting occurred and parts of underlying ultramafic-gabbro complexes were reintruded through their sedimentary cover to give the present geometric relationships shown by the above successions. After the faulting, there was an episode of granitic rock emplacement that metamorphosed parts of most of the successions discussed. From regional geological and geophysical evidence granitic masses underlie all this region at shallow depths.

REFERENCES

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APPENDIX 1

Descriptions of roadside outcrops of Mt Read type volcanic rocks

The following descriptions are taken from Corbett and Brown (1980). The 'Stop Numbers' quoted are from that reference.

(a) *Road Cutting - LPD 51.3 km.* ("Stop 12. Flow-Banded Lava".)

"A typical central belt rock type of the Mt Read Volcanics - flow-banded felsophyric rhyolite-dacite lava."

*(b) *Road Cutting - LPD 50.3 km.* ("Stop 13. Volcanic Breccia".)

"An unusual coarse breccia in the central belt contains abundant felsophyric lava blocks, with reaction rims, in a clastic matrix which also contains chloritic wisps resembling pumice fragments. The rock is possibly of ash-flow origin. The outcrop also shows a large basic-intermediate dyke, and a smaller chloritised fine-grained dyke."

*(c) *Road Cutting - LPD 50 km.* ("Stop 14. Ash-flow with large fiamme".)

"Glassy felsophyric ash-flows containing collapsed pumice fragments (fiamme) are abundant in the central belt. This example contains fiamme up to more than a metre long, forming a strong eutaxitic foliation. Smaller disoriented pumice fragments also occur."

* Parking at the exact spot could be dangerous due to the outcrop being on a tight corner.

REFERENCE

CORBETT, K.D.; BROWN, A.V. 1980. Lower Palaeozoic geology of Western Tasmania. *Fourth Australian Geological Convention. Excursion guide No. A1.*