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1984/33. Brief descriptions for the map 'Regional geology of the Dundas-Mt Lindsay-Mt Ramsay area', western Tasmania.

A.V. Brown

Abstract

This report contains the map (in two parts) 'Regional geology of the Dundas-Mt Lindsay-Mt Ramsay area' and a brief description of the main stratigraphic units included in the map. The locations of good exposures, along the Hydro-Electric Commission's Lower Pieman Dam road (LPD), of certain parts of the stratigraphic column are also given.

INTRODUCTION

This preliminary report has been prepared at the request of Company personnel. It consists of the geological map for the Dundas-Mt Lindsay-Mt Ramsay area and a description of the main stratigraphic units contained on the map.

The rock descriptions are taken from Excursion Guide A1 (Brown, 1982*a*) for the Geological Society of Australia's Symposium 'Geology, Mineralisation, Exploration: Western Tasmania'. This report is an upgrade of, and supersedes, Department of Mines unpublished reports 1980/42 and 1980/33 (Brown, 1980*a*; 1980*b*). It replaces unpublished report 1982/46 which accompanied the preliminary map (Brown, 1982*b*).

STRATIGRAPHY

Oonah Formation

Where transected by the Lower Pieman Dam (LPD) road, sedimentary rock sequences belonging to the Oonah Formation form the western margin of the Dundas Trough, and probably form the basement of the Trough in this area. Isolated inliers of correlates of the Oonah Formation occur within the Dundas Trough in the upper reaches of the Ramsay and Coldstream Rivers and at the eastern boundary of the Trough along the western slopes of Mt Dundas.

The Oonah Formation consists of two parts: A lower succession dominated by indurated, monotonously interbedded, very fine to fine-grained lithic and quartz sandstone with sequences of laminated phyllitic mudstone; and an upper succession, not exposed along the LPD road, of interbedded mudstone and carbonate units alternating with laminated siltstone and mudstone sequences containing graded coarse-grained lithic sandstone, tuff, and lava units. The lower succession is probably a distal turbidite sequence. Some of the sandstone beds are graded, and siltstone horizons often contain cross bedding and convolute folding. The upper sequence is well exposed in the Pieman River and correlates are considered to occur in the Maestries-Comet area east of Dundas, at Queen Hill in Zeehan, and in the upper reaches of the Ramsay and Coldstream Rivers.

Examples of the Oonah Formation are:

(a) Dominantly indurated sandstone of the lower Oonah Formation:- LPD 17.6-17.7 km.
(b) Dominantly laminated phyllitic mudstone of the lower Oonah Formation:- LPD 20 km.

Structurally, rocks of the Oonah Formation contain isoclinal folds with a well developed axial surface cleavage. These folds have been refolded by a later phase of deformation which produced a random distribution of the isoclinal fold axes. Phyllitic mudstone within the Oonah Formation contains a cleavage associated with the isoclinal folding which was subsequently crenulated by the later folding phase. In the fold hinge zones of still later folds, both of these cleavages have been subjected to further crenulation when large scale folding produced anticlinorial-synclinorial structures which dominate the Oonah Formation in the Zeehan-Mt Lindsay-Granville Harbour area. Devonian folding later superimposed up to two additional cleavages on the Oonah Formation.

The structural hiatus between the Oonah Formation and the overlying, structurally similar Success Creek Group, Crimson Creek Formation, and Dundas Group is demonstrated by the fact that the only cleavages so far found in the latter three successions are consistent with Devonian deformation. This deformation produced open folds with shallowly plunging hinge lines and associated steep cleavages. The dominant cleavage recorded in the above three Eocambrian-Cambrian successions is consistent with the north-westerly trending fold phase of Devonian deformation; a second cleavage, observed in some outcrops, is explained as belonging to the earlier northerly-trending fold phase of Devonian deformation.

Success Creek Group

Initial infilling of the Dundas Trough was by shallow water siliceous sandstone and siltstone with interbedded carbonate units. The contact between the Oonah Formation and the Success Creek Group is not exposed along the LPD road and the 50 m section of no outcrop between the two successions has been interpreted, on regional geological evidence, as a fault contact associated with a Devonian deformation event. Proof of an unconformable relationship between the Oonah Formation and the Success Creek Group successions can be observed along the southern bank of the Pieman River at CP616743. Rocks on either side of a scree zone indicate an angular landscape surface between the two formations. This surface represents a structural and low grade metamorphic hiatus as well as a break in sedimentation.

Overall, the Success Creek Group consists of five mappable units. Each has a variable thickness. The basal mixtite has so far only been recognised in the Pieman River where it is approximately 50 m thick. Conformably following the mixtite is a succession of interbedded, clean, shallow-water sandstone beds which crop out along the Pieman River, along the Murchison Highway south of Renison Bell, and to the north-west of the Argent Dam, as well as along the LPD road. This sandstone sequence has been called the 'Dalcoath quartzite' in the Renison Bell area. The sandstone succession grades rapidly into the third sequence, which is dominated by laminated mudstone with interbedded siltstone, minor sandstone, and conglomerate units. This sequence is characterised by pervasive intraformational soft sediment deformation and later reacted incompetently during localised large-scale slump movement.

The mudstone sequence grades upwards into a succession of thinly bedded siliceous siltstone with mudstone partings and minor sandstone, carbonate and calcareous siltstone units. This succession is known as the 'Renison Bell shale' in the Renison Bell area. The fifth sequence has been termed the 'red rock' and consists of haematitic chert and mudstone with minor lithic wacke conglomerate and carbonate units.

Examples of the Success Creek Group are:

(a) Sandstone and siltstone units - correlate of the Dalcoath Formation:- LPD 20.2 km.
(b) Siliceous siltstone, carbonate, haematitic chert and mudstone, and conglomerate-correlate of the Renison Bell Formation, transition zone and 'red rock' successions:- LPD 23.3 km.

The Success Creek Group is conformably overlain by the Crimson Creek Formation. The transitional nature of the boundary is well exposed in the Renison Bell area and along the LPD road, whereas the boundary between the two successions in their type area, along the Pieman River, is now known to be a fault. This fault is a north-westerly continuation of the Federal Bassett structure of the Renison Bell area. Along the LPD road sections, the succession dominated by haematite is approximately 15 m thick and contains minor fine conglomerate and pebbly lithic wacke as well as chert and mudstone. Between the 'red rock' and the Renison Bell Formation correlate is a 60 m thick sequence of interbedded laminated siltstone, black and haematitic mudstone, dolomitic limestone, black oolitic and recrystallised brecciated chert units. In places the laminated siltstone shows soft sediment deformation.

An example of the transition zone from the Renison Bell Formation correlate into the Crimson Creek Formation, including the 'red rock' sequence, occurs at LPD 24.8 km.

Crimson Creek Formation

Along the Crimson Creek-Pieman River-Huskisson River type section, the Crimson Creek Formation consists mainly of laminated siltstone and mudstone with volcaniclastic lithic wacke. The proportion of volcaniclastic material in the succession increases northwards from south of the Pieman River into the Mt Lindsay area, where the first interbedded basaltic units have been found.

In the Mt Lindsay area, the Crimson Creek Formation is composed of volcaniclastic lithic wacke and minor tuffaceous horizons, monotonously interbedded laminated siltstone and mudstone, tholeiitic basalt flows, and carbonate units. The clastic units show most of the characteristics of typical turbidite flows. The laminated siltstone and mudstone units may be calcareous, vary in grain size from clay to silt grade, and commonly contain multiple truncated cross-laminations. These finer units display a good anastomosing cleavage. The carbonate horizons rarely crop out, but weathered units occur in one road cutting. Lithic wacke beds 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, and the occasional soft sediment deformation zone in the upper part of a turbiditic unit.

The LPD road gives access to a section of 3000 m of the Crimson Creek Formation. In the upper part of this formation, as exposed between the LPD 27 km and LPD 29 km marks, tuffaceous units are dominantly medium-grained and are derived from tholeiitic lavas. In the lower parts of the succession, as exposed between the LPD 25 and LPD 27 km marks, the volcaniclastic lithic wacke units are fine to medium-grained and tuffaceous horizons are infrequent. Thin tholeiitic basalt flows occur in the lowest part of the sequence. Gabbroic dykes intrude the sequence at many localities, for example at the LPD 26 km mark.

Examples occur of:

(a) Weathered carbonate units within the Crimson Creek Formation:- LPD 26.9 km
(b) Typical variation within rock sequences of the Crimson Creek Formation:- LPD 28.5 km
(c) Fresh volcaniclastic lithic wacke - Crimson Creek Formation:- LPD 29.1 km

Over 300 bedding readings have been obtained from rock units of the Crimson Creek Formation from a strip of country running from Renison Bell to Mt Lindsay. At over half of these stations sedimentary facings were obtained, which, without exception, faced east. Apart from minor drag folds near fault zones, only minor tectonic folds have been observed within rock sequences of the Crimson Creek Formation. The dominant cleavage within this formation is consistent with an axial surface cleavage formed during the north-westerly trending Devonian deformation fold phase.

Dundas Group

All contacts so far observed by the writer between rocks of the Crimson Creek Formation and Dundas Group are faults. Re-mapping the type area of the Dundas Group shows that it consists of two distinct successions and that no formation of the original Dundas Group can be successfully walked very far outside the Dundas area. Any correlation with the Dundas Group can only reliably be made on biostratigraphic evidence, because very similar lithological units to those found in the upper part of the Dundas Group have been found elsewhere in much older successions.

One biostratigraphic correlate of the Dundas Group, the Huskisson Group, is exposed along the Lower Pieman Dam road between the 34.8 and 34.3 km marks. This succession can be followed along an arcuate belt south-easterly across the type area of the Huskisson River to the Pieman River, and then south through the Ringville area as far as the Curtain Davis mine. Along the LPD road the sequence consists of laminated and thinly bedded siltstone, sandstone, fine conglomerate, and acid volcanic derived tuffaceous units. The sandstone and conglomerate units are usually graded, and the conglomerates are lensoidal.

Some of the sandstone units show ripple marks. Several of the siltstone and tuffaceous horizons are fossiliferous, containing late Middle Cambrian agnostid faunas.

Examples occur of: Variations in Huskisson Group succession:- LPD 34.4-34.6 km.

Rocks of the Dundas Group contain up to two cleavages. The dominant cleavage is parallel to the axial surface of the north-westerly trending Devonian fold phase, while the second cleavage occurs randomly throughout the Dundas area and is consistent with the earlier northerly trending fold phase of Devonian deformation.

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APPENDIX 1

Corrections to the map 'Regional geology of the Dundas-Mt Lindsay-Mt Ramsay area'.

(1) Csv changed to Esv at 580818, 601801, 616795

(2) Esc symbol added at 621743

(3) Boundary added at 634743

(4) Overprints added to Crg at 735650, 744645

N.B. Map not included.