Geological setting of the Moorowie Formation, lower Cambrian Hawker Group, Mt Chambers Gorge, eastern Flinders Ranges, South Australia.

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SUPPLEMENTARY PAPERS

Australian Journal of Earth Sciences (2020) 67,
https://doi.org/10.1080/08120099.2019.1586771

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Supplementary paper

Appendix 1. Definition of stratigraphic units (after Mount, 1970)

Appendix 2. Field descriptions of measured Stratigraphic Sections A–Z, including paleontological observations (after Mount, 1970).

Large scale versions of:

- Figure 2. Mt Chambers Gorge region, Flinders Ranges, South Australia, geological survey (Mount, 1970). (a) Without field stations (being the main map, as in the text), and (b) with the stations (relates to section descriptions, specimens, and other field observations (for use by future workers).
- Figure 3. Cambrian, Mt Chambers Gorge, stratigraphic sections A–Z (Mount, 1970). (a) Laterally compressed, the (b) at true horizontal scale.
- Figure 4. Stratigraphic fence diagram. Interpretation of vertical and lateral variation in Cambrian sediments as inferred from measured sections (Mount, 1970).
- Figure 5. Mt Chambers Gorge region: structure, diapirs, metabasics, mineralisation (Mount, 1970).
- Figure 8. The paleogeographic sketch. (a) Coloured as in the text, and (b) original B&W drawing.

Appendix 1. Definition of stratigraphic units (after Mount, 1970)

A unit at the top of the Hawker Group, the Moorowie Formation, was introduced without definition by Mount (1970) and was first published by Forbes (1971) before use on the Copley 1:250,000 geological map sheet by Coats (1973). The name has since been widely used. The formation is here defined, together with five named constituent members. As well, the Bendieuta Member of Mount (1970), first published as the 'Bendieuta Formation' (Lafuste *et al.*, 1991; then Reid & Preiss, 1999, and others), is here defined as a member within the Mernmerna Formation.
All seven definitions have been approved and are lodged in the Australian Stratigraphic Units Database. The location of all sections noted below is shown on the geological map (Figure 2).

Formal definitions

Moorowie Formation *(definition of existing unit).*
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Moorowie Spring at eastern entrance to Mt Chambers Gorge.

Synonymy: None.

Distribution: Along the crest of the low range from Mt Chambers Gorge southward towards Mt Frome.

Type section: Composite section comprising 190 to 320 ft (57.9 to 97.5 m) (30°59'58.14"S, 139°15'30.88"E to 30°59'53.86"S, 139°15'28.44"E) in Section Q for the basal beds, as partly repeated and extended by Section H, 0 to 792 ft. (0 to 241.4 m) 30°59'47.36"S, 139°15'43.04"E to 30°59'56.33"S, 139°15'59.89"E, and Section G, 0 to 476 ft (0 to 145.1 m) (incomplete; part faulted at top). 30°59'33.14"S, 139°15'57.49"E to 30°59'37.98"S, 139°16'11.93"E.

Reference sections: Section X, –22 to 120 ft (faulted?) (–6.7 to 36.6 m) 30°59'1.65"S, 139°16'14.12"E to 30°59'5.78"S, 139°16'18.58"E), Section Y, 8 (fault) to 368 ft (2.4 to 112.2 m) (30°58'39.81"S, 139°16'47.11"E to 30°58'44.19"S, 139°16'40.80"E, Section I, 70 to 222 ft. (21.3 to 67.7 m) 30°59'2.12"S, 139°16'10.24"E to 30°59'3.12"S, 139°16'12.72"E.

Thickness: Composite thickness, possibly faulted, from Sections H, Q is 334 m (1096 ft; a probable maximum). Estimated average ~237 m (778 ft) from 17 other variably faulted sections measured across partly lenticular beds.

Lithology: Massive to thick bedded, cliff forming, peloid limestones at base; buff, pink to light grey, part silty to quartz granule-rich, part oolitic, with cross-bedded arkosic sands, ripple marks, buff silty dolostone intraclasts, and abundant archaeocyaths. Interbed above of ferric red to khaki green, finely micaceous siltstones with thin limestone interbeds at base, abundant ripple marks, mud cracks, and rare trilobite tracks. Overlain by a megabreccia of massive, poorly bedded, buff or grey to red, angular to sub-rounded cobbles to boulders of (i) clean, light grey archaeocyath limestone and (ii) dark brown silty to quartz granule-rich (arkosic) limestones, reworked from the breccia matrix. Superseded by massive, buff, light to dark grey or ferric red, richly fossiliferous, peloidal to part oolitic archaeocyath limestones, with siliciclastic silt to grit stringers, silty dolostone intraclasts, and conglomerates of grey limestone boulders to 3 m in a quartz-granule rich, red to buff, silty carbonate matrix. Purple-red micaceous siltstones above with thin grey limestone laminations at base. Local thin polymict

conglomerate lenses with light grey limestone cobbles and quartz granule-rich limestone pebbles in a silty lime matrix. Formation capped by a massive, cliff forming, homogeneous, pale grey, finely laminated to flaggy or medium bedded, microcrystalline microbial limestone with thin clay partings. No obvious macrofossils.

Structure: Moderately dipping, thick beds defining broad fold limbs and cores; partly faulted.

Geomorphic expression: Low hills and ridges, dissected by ephemeral streams and narrow ravines.

Relationships and boundary criteria: Terminal unit of the Hawker Group, as a conformable passage between Mernmerna Formation below and Billy Creek Formation above. Basal contact at transition from dark grey flaggy limestones and slump talus beds of the Mernmerna Formation, into massive light grey peloid limestones. Upper contact at the top of a maker bed of finely laminated to flaggy microcrystalline microbial limestone, below red-brown to green shales of the overlying Billy Creek Formation.

Depositional environment: High-energy intertidal carbonate platform margin or reef barrier set between a shallow restricted marine ramp, and landward to backreef shelf bioherms and ooid-peloid shoals, channelised tidal flats with penesaline lagoons, passing to supratidal sabkhas and alluvial fans. Local extrusive salt domes.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Jago *et al.*, 2020, figure 2).

Correlatives: Related to the upper Wilkawillina Limestone. Possible equivalent deposits in Bunkers Graben and at Reaphook Hill.

Comment: The name Moorowie Formation has been widely used since it was introduced without definition by Mount (1970).

Pinyatta Member (new unit).
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Pinyatta Creek, ~1300 m east of Mt Daily.

Synonymy: None.

Distribution: Exposed in low hills from South Moorowie Mine to Mt Chambers Mine, Mt Daily, and south towards Mt Frome.

Type section: Composite section comprising Section H, 0 to 348 ft. (0 to 106.1 m) 30°59'47.36"S, 139°15'43.04"E to 30°59'51.77"S, 139°15'49.28"E, with faulted-out top beds and upper contact represented by Section G, 0 to 61 ft (0 to 18.6 m) 30°59'34.58"S, 139°16'0.24"E

Reference section: Basal beds of Section H repeated in Section Q, 190 to 320 ft (57.9 to 97.5 m) 30°59'58.14"S, 139°15'30.88"E to 30°59'53.86"S, 139°15'28.44"E, extending down to lower contact with Mernmerna Formation.

Thickness: Composite maximum thickness, possibly faulted, from Sections H, Q is 277 m (489 ft). Estimated average ~46 m (151 ft) measured in other partly faulted sections across highly lenticular beds.

Lithology: Massive to thick bedded, cliff forming, peloid limestones at base; buff, pink to light grey, part silty to quartz granule-rich, part oolitic, with cross bedded arkosic sands, ripple marks, buff silty dolostone intraclasts, and abundant archaeocyaths.

Structure: Massive beds of low dip as ridge caps on broad fold limbs, to moderate dips in anticlinal cores.

Geomorphic expression: Mid level exposures on dissected hills, in ravines, and in anticlinal cores.

Relationships and boundary criteria: Basal unit of the Moorowie Formation. Passage zones into massive light grey peloid limestones from the dark grey flaggy limestones and slump talus of the Mernmerna Formation below, and from the limestones into the overlying green and red micaceous siltstones of the Wookata Shale Member.

Depositional environment: Carbonate platform as backreef shelf shoals at sites of high tidal energy, adjacent to abundant clastic carbonate (archaeocyath meadows) and moderate siliciclastic (emergent salt dome) sources.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Jago *et al.*, 2020, figure 2).

Correlatives: Not confirmed outside Moorowie area; possible equivalents in Bunkers Graben. Broadly related to the upper Wilkawillina Limestone (Jago *et al.*, 2020, figure 2).

Wookata Shale Member (new unit).
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Wookata Creek, ~550 m southeast of South Moorowie Mine.

Synonymy: None.

Distribution: Exposed in low hills from Mt Chambers Gorge, to west of Moorowie Mine, to Mt Daily.

Type section: Section I, 70 ft (basal contact?) to 222 ft (upper contact) (21.3 to 67.7 m) 30°59'2.12"S, 139°16'10.24"E to 30°59'3.12"S, 139°16'12.72"E

Reference section: Section U, 0 to 186ft. (0 to 56.7 m) 30°58'55.57"S, 139°16'7.84"E to 30°58'57.36"S, 139°16'11.18"E

Thickness: 116 m (152 ft) in type section on Section I. Estimated average ~23 m (76 ft) from other sheared or faulted sections, measured across partly lenticular beds.

Lithology: Ferric red-brown to khaki green, finely micaceous siltstones with thin limestone interbeds at base. Abundant ripple marks, mud cracks, and rare trilobite tracks.

Structure: Thin beds of low dip on ridges across broad fold limbs, to layers in tighter folds in anticlinal cores.

Geomorphic expression: Exposed in eroded anticlinal cores south of Moorowie Mine, to ridge caps near Mt Daily.

Relationships and boundary criteria: Second unit from the base of the Moorowie Formation. Conformable, with passage zones from the massive peloid limestones of the Pinyatta Member below and into the megabreccias and archaeocyathan limestones of the Kandramooka Member above.

Depositional environment: A restricted shallow marine ramp and flats seaward of a carbonate platform margin, as a depocentre for fine siliciclastics winnowed from tidal channels.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Jago et al, 2020, figure 2).

Correlatives: A probable eastern extension of the Oraparinna Shale, together with the Pack Creek Member of the Moorowie Formation.

Kandramooka Member (new unit).
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Kandramooka Creek, ~450 m west of Moorowie Mine.

Synonymy: None.

Distribution: Exposed in low hills from Mt Chambers Gorge, south, past Moorowie Mine, to east of Mt Daily.

Type section: Section G, 127 ft (basal contact) to 457 ft. (38.7 to 139.3 m) 30°59'33.82"S, 139°16'1.59"E to 30°59'35.91"S, 139°16'11.60"E (includes minor faults).

Reference section: Section H, 367 ft (basal contact; faulted?) to 467 ft (upper contact) (118.9 to 142.3 m) 30°59'51.77"S, 139°15'49.28"E to 30°59'54.84"S, 139°15'56.89"E), Section X, –22 ft (basal contact) to 120 ft (faulted?) (–6.7 to 36.6 m) 30°59'1.65"S, 139°16'14.12"E to 30°59'5.78"S, 139°16'18.58"E), Section Y, 8 (fault) to 368 ft (2.4 to 112.2 m) (30°58'39.81"S, 139°16'47.11"E to 30°58'44.19"S, 139°16'40.80"E

Thickness: Apparent maximum of 101 m (330 ft) in the type section (base faulted) on Section G. Estimated average 81 m (266 ft: megabreccia, 49 m; upper beds 32 m) from other partly faulted sections measured across lenticular beds.

Lithology: At base: megabreccia: massive, poorly bedded, buff or grey to red, angular to sub-rounded cobbles to boulders of (i) clean light grey archaeocyath limestone and (ii) dark brown silty to quartz granule-rich (arkosic) limestones, reworked from the breccia matrix. *Upper beds:* massive, buff, light to dark grey or ferric red, richly fossiliferous, peloidal to part oolitic archaeocyath limestones, with siliciclastic silt to grit stringers, silty dolostone intraclasts, and conglomerates of grey limestone boulders to 3 m in a quartz-granule rich, red to buff, silty carbonate matrix.

Structure: Massive beds of moderate dip defining limbs and core of a low-plunge anticline.

Geomorphic expression: Exposed as wide prominent ridges tracing major folds.

Relationships and boundary criteria: Third unit from the base of the Moorowie Formation. Conformable, with passage zones from the red-brown to green micaceous siltstones of the Wookata Shale Member below, to the purple micaceous siltstones of the Pack Creek Member above.

Depositional environment: High-energy intertidal carbonate platform margin to backreef shelf bioherms and ooid-peloid shoals, with reef bypass tidal channels. Adjacent siliciclastic sources from emergent salt domes and dune fields.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Lafuste *et al.*, 1991).

Correlatives: Not confirmed outside Moorowie area; possible equivalents in the Bunkers Graben. Broadly related to the upper Wilkawillina Limestone (Jago *et al.*, 2020, figure 2).

Pack Creek Member (new unit).
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Pack Creek, ~1100 m southeast of South Moorowie Mine.

Synonymy: None.

Distribution: Exposed at eastern margin of foothills, south of Moorowie Mine.

Type section: Section H, 467 ft (basal contact) to 687 ft (upper contact) (142.3 to 209.4 m) 30°59'54.84"S, 139°15'56.89"E to 30°59'56.00"S, 139°15'58.90"E

Reference section: None.

Thickness: 67 m (220 ft) in type section on Section H. Average 46 m (151 ft), measured across other possibly faulted sections.

Lithology: Purple-red micaceous siltstones with thin grey limestone laminations at base. Local thin polymict channel conglomerate lenses with light grey limestone cobbles and quartz granule-rich limestone pebbles in a silty lime matrix.

Structure: Soft beds of moderate dip follow the eastern limb of a low-plunge anticline. Partly faulted.

Geomorphic expression: Part scree covered narrow beds, at basal slope concavities.

Relationships and boundary criteria: Fourth unit from the base of the Moorowie Formation. Conformable, with passage zones from the massive archaeocyathan limestones of the Kandramooka Member below, and to the microcrystalline microbial limestones of the Brillig Catch Member above.

Depositional environment: Intertidal flats landward of the backreef, with extensive tidal channels and shallow lagoons. Adjacent to fine siliciclastics winnowed from emergent salt domes, basement uplifts, alluvial fans, or dune field sources.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Figure 2 of Jago *et al.*, 2020, figure 2).

Correlatives: A possible eastern extension of the Oraparinna Shale, together with the Wookata Shale Member of the Moorowie Formation.

Brillig Catch Member (new unit).
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Brillig Catch Creek, ~700 m northwest of Moorowie Mine.

Synonymy: None.

Distribution: Exposed as a prominent ridge at the eastern margin of foothills from Mt Chambers Gorge, to the south of Moorowie Mine.

Type section: Section H, 687 to 792 ft. (209.4 to 241.4 m) 30°59'56.00"S, 139°15'58.90"E to 30°59'56.33"S, 139°15'59.89"E

Reference section: Section J, 136 ft (basal contact) to 268 ft (upper contact) (41.4 to 81.7 m) 30°58'54.06"S, 139°16'25.50"E to 30°58'57.87"S, 139°16'25.60"E

Thickness: 69 m (226 ft) in type section on Section H. Average 41 m (135 ft).

Lithology: Massive cliff forming, homogeneous, pale grey, finely laminated to flaggy or medium bedded, microcrystalline microbial limestone with thin clay partings. Textures after anhydrite. No obvious macrofossils.

Structure: Ridge forming beds of moderate dip trace the eastern limb of a low-plunge anticline. Part faulted.

Geomorphic expression: Narrow, prominent, blocky ridges of up-ended strata.

Relationships and boundary criteria: Uppermost unit of the Moorowie Formation, terminating the Hawker Group. Conformable, with passage zones from the purple micaceous siltstones of the Pack Creek Member below, and from an upper contact at the top of a marker bed of finely laminated to flaggy microcrystalline microbial limestone to the red-brown to green shales of the overlying Billy Creek Formation.

Depositional environment: Intertidal to supratidal sabkhas and shallow penesaline lagoons.

Age and evidence: Lower Cambrian, Stage 4, within the *Pararaia janeae* trilobite Zone (Jago *et al.*, 2020, figure 2).

Correlatives: Probable equivalent of the Edeowie Limestone Member.

Bendieuta Member *(redefinition of existing unit).*
Proposer: T. J. Mount, after Mount (1970).

Derivation of name: Bendieuta Creek, east of Mt Frome.

Synonymy: ‘Bendieuta Formation’ (Lafuste *et al.*, 1991).

Distribution: Exposed low on hill slopes in the area from Mt Chambers Gorge to Mt Chambers Mine, Mt Daily, and south towards Mt Frome.

Type section: Section M, 130 to 510 ft.(39.6 to 155.4 m) 31° 0'50.17"S, 139°14'44.83"E to 31° 0'46.91"S, 139°14'38.70"E

Reference section: None.

Thickness: 116 m (381 ft) in type section on Section M. Lenticular across region.

Lithology: Massive to thick bedded, part mottled, buff to light grey or pink, part oolitic to fenestral, peloid limestones with interbeds of broadly cross-bedded, rippled, silty to sandy quartz granule-rich limestones, and small, buff, silty dolostone intraclasts. Sparse fauna, with rare transported archaeocyaths, and small brachiopods.

Structure: Massive beds of moderate dip on broad fold limbs and cores.

Geomorphic expression: Forms basal exposures of broad folds, or anticlinal cores.

Relationships and boundary criteria: Member of the Mernmerna Formation, as a lenticular interbed. Passage zone from dark grey flaggy limestones of the basal Mernmerna Formation below. Abrupt contact (disconformity?) at top with the dark grey flaggy limestones of a younger unit of the Mernmerna Formation.

Depositional environment: Carbonate platform as backreef shelf or channel margin shoals at sites of high tidal energy, adjacent to abundant clastic carbonate (archaeocyath meadows) and siliciclastic (emergent salt dome) sources.

Age and evidence: Lower Cambrian, Stage 3 to 4, within the *Dailyatia odyssei* SSF zone and the *Paraia tatei* and *P. bunyerooensis* Zones (Betts *et al.*, 2017b; Jago *et al.*, 2020, figure 2).

Correlatives: See Jago *et al.* (2020, figure 2).

Comments: Member status confirmed by local mapping.

Appendix 2. Field descriptions of measured Stratigraphic Sections A–Z, including paleontological observations (after Mount, 1970).

After preliminary geological mapping was completed, the Mt. Chambers Gorge area was re-examined in the field, including the detailed measuring of over 3000 m of strata in 26 stratigraphic sections (A–Z, Figure 3) across suitable outcrop: usually steep cliff faces normal to bedding in the many ravines.

Traverses were chosen to examine the lateral and vertical variation of rock units in the map area, with emphasis on the newly-recognised Moorowie Formation of the upper Hawker Group.

Field-based geological descriptions along the section lines focused on the stratigraphy and sedimentology of the major rock units, with comment on fossils, structure, tectonics, diapirism, igneous events, alteration, mineralisation, and weathering.

The measuring method involved a five-foot (1.5 m) graduated Jacob's staff, held perpendicular to the bedding at a given station and sighted to the next station upslope. This method was fast and generally precise to about 1 in 20 ft, or 5%; less in gently-dipping bedding in flat terrain.

Not all faults were indicated in the section descriptions due to a lack of clear evidence on some traverse lines, compared to trends on the broader geological map (Figure 2).

Observations were supported in the laboratory by binocular examination of hand specimens, and thin-section petrography that included carbonate staining methods.

Drafted stratigraphic sections (Figure 3) were coloured to represent average fresh rock surfaces of the strata.

Typical rock types in sections A–Z were sampled in the field, with a single tray of representative hand specimens, and selected thin sections, being stored in the Department of Earth Sciences, University of Adelaide. These samples, which *include those from the type area of the Moorowie Formation*, were confirmed in 2015 as retained under the archival Accession Number A343/ followed by the Stratigraphic Section designation A–Z and the position, in feet, above the start of the traverse.

No.	Access Code	Field description
1	A343/B267	Common form of white archaeocyath in ferric red silty limestone
2	A343/C40	Dolomitic siltstone intraclast; typical
3	A343/C265	Dolomitised grey limestone (Unit 5)
4	A343/D175	Typical dark grey flaggy limestone (Mernmerna Formation)
5	A343/E175	Fragmental limestone
6	A343/E390	Calcirudite with ferric red silty carbonate matrix
7	A343/F70	Microbial structures (?) in dolomitic limestone
8	A343/G220	Contact, limestone clast and matrix
9	A343/H305	Quartz granule-rich limestone clasts in a silty limestone matrix
10	A343/J140	Karren ridges on microbial limestone; typical Unit 11
11	A343/J210	Stylolites in typical Unit 11
12	A343/J525	Halite pseudomorph, Unit 12

13	A343/J760	Billy Creek Formation, Unit 12
14	A343/J900	Trilobite markings, Unit 12
15	A343/K5a	Carbonate megabreccia with quartz granules, malachite stain
16	A343/K5b	Calcirudite, Unit 9
17	A343/K25a	Grey limestone and quartz granule-rich limestone pebbles in a buff silty limestone matrix; typical small-scale megabreccia of Unit 9
18	A343/K25b	
19	A343/K220a	Silicified archaeocyath
20	A343/K220b	Silicified limestone with chalcopyrite
21	A343/L367	Hyolith
22	A343/M0	*Micrina* sp. (1970)
23	A343/M107	Mottled limestone, Unit 4
24	A343/M160	Peloidal limestone
25	A343/M165	Typical peloid limestone, Unit 3
26	A343/N127	Phosphatic or pyrolusite deposit on contact surface
27	A343/N245	Brachiopod
28	A343/N317	Redlichiid(?) trilobite
29	A343/P4	Wilkawillina Limestone
30	A343/P140a	Travertine vein fill
31	A343/P140b	
32	A343/Q317	Dark grey peloid limestone
33	A343/R60	Grey limestone pebbles in red silty limestone matrix; part dolomitic
34	A343/R134	Green calcareous siltstone
35	A343/R138	Feldspar and quartz granules in limestone
36	A343/R139	Quartz granules in silty limestone with graded bedding
37	A343/R140	Archaeocyath–microbial–coral limestone as boulders in megabreccia
38	A343/R150	Graded interbed of quartz sand/granules in green calc-siltstone
39	A343/S10	Travertine
40	A343/S130	Limonitic infill (after siderite?) in archaeocyathan limestone
41	A343/U187	Stromatolites in ferric red silty limestone
42	A343/U200a	Sediment-filled archaeocyath
43	A343/U200b	Quartz granule-rich limestone
44	A343/Z85a	Large archaeocyath in ferric red silty carbonate matrix
45	A343/Z85b	Archaeocyath in ferric red silty limestone

The composite total of 885 m of exposed Cambrian succession (Figure 3) was divided into twelve mappable units which were assembled into an interpretive Stratigraphic Fence Diagram (Figure 4) to illustrate the vertical and lateral changes in character (thickness, lithofacies, and relationships) of undeformed Cambrian strata in the Moorowie area.

Sources of uncertainty in construction of the fence diagram (Figure 4) included: (i) sections were in general measured over variably inclined surfaces, not normal to the bedding, leading to sighting errors

that increased with distance, (ii) sections inclined in the field had to be rotated to the vertical for the fences, using a common datum being the top of Unit 8 (assumed once to have been planar), but this surface was not always available due to erosion or faulting. On rotation, units progressively above or below the datum move further away from their true location, (iii) sections that cross eroded folds may have components repeated, or reversed. Two sections may have a common starting point in the centre of a fold but higher units, if measured in opposite directions, will be increasingly distant from each other on the unfolded horizontal plane and from the common point, and (iv) the original section may be deleted, reduced, or repeated by faulting.

A full record of the Mt. Chambers Gorge investigations, including original photographic plates, is held by the State Library of South Australia at PRG-1492/5.

Descriptions

Bold type indicates an interpreted Unit boundary. Grain sizes are adopted from Wentworth (1933). The terms silt, sand, and granules refer to siliciclastic sediment. Imperial units and some terms relate to field measurements, specimens, and figures from Mount (1970).

SECTION A

feet

–3 to **0**	**Unit 3**, Mernmerna Formation, Bendieuta Member? Peloid limestone; massive, part mottled.
0 to 20	**Unit 4**, Upper Mernmerna Formation, basal unit: slate grey, thinly laminated flaggy limestone, mottled in places.
20 to 21	Grey flaggy limestone, as below, with abundant clasts to 20 mm long of laminated dolostone, grey limestone pebbles, and quartz granules.
21 to 26	Slate grey, thinly-laminated flaggy limestone, part mottled (as 0–20 ft).
At 26	Silicified trilobite debris (redlichiid?), including occipital spine.
26 to 190	No reliable outcrop; inferred grey flaggy limestones, as below.
190 to **200**	Laminated to rubbly, slate grey flaggy (5–8 mm) limestones; clean, fine grained, homogeneous, with thin (10 mm) greenish shale partings. Thin chert nodule bed at 192 ft.
200 to 313	**Unit 5**, Upper Mernmerna Formation, middle lens: massive buff-brown to purplish dolomitic limestone to light grey limestone with light dolomitic mottling. Quartz granules increase near 313 ft. Some silt.
At 313	End Section A.

SECTION B (Continues above Section C, but 50 ft west).

<**0**	**Unit 5**, Upper Mernmerna Formation, middle lens: dark, mottled, massive limestone with well-preserved archaeocyaths.
0 to 5	**Unit 6**, Upper Mernmerna Formation, upper unit: fine grained, homogeneous, part silty, light to medium grey laminated to flaggy limestone.
At 5	Abundant silicified trilobite debris in a 50 mm bed, sparse above. Includes small intact specimens in blocks collected by B. Daily (B.D. 20).
5 to 30	Part-silty, light to medium grey, laminated to flaggy limestone, with sparse trilobites.
30 to 31	Interbed of dark limestone, massive with abundant dolomitic siltstone clasts to 50 mm.
31 to 42	Medium grey, laminated to flaggy limestone, with silt increasing to 42 ft and a prominent, dark weathered, 80 mm marker bed at 40 ft.
42 to 55	25 mm silty bands persist, some with graded bedding.
At 55	Slate grey flaggy limestone with some transported (?) archaeocyaths, trilobite debris in float.

55 to 60	Less silt; some trilobite remains at 60 ft.
60 to 89	Medium grey, laminated to flaggy limestone. Fewer trilobites in float, with fragments at 80 ft.
89 to 90	Silty interbed in lighter mauve-grey limestones with trilobites.
90 to 120	Medium grey, laminated to flaggy limestone, massive from 100–101 ft with archaeocyaths (transported?) and rare trilobites. Abundant silicified trilobites 102–105–110 ft, with small complete silicified archaeocyaths.
120 to 128	Dark weathered, silty grey flaggy limestones with some buff dolomitic siltstone intraclasts and graded bedding.
128 to 130	No outcrop.
130 to 140	Mottled to flaggy grey limestones with trilobites.
140 to 150	Medium grey laminated to flaggy limestone, part rubbly, slightly silty.
150 to 155	Silty grey, laminated to flaggy limestone.
155 to 160	No reliable outcrop; silty grey, laminated to flaggy limestone inferred.
160 to 162	Calcareous siltstone interbed; massive, yellow to buff with quartz silts and clay influx as overprint to flaggy limestones.
162 to **165**	No outcrop. Irregular contact with Unit 7 above.
165 to 238	**Unit 7**, Moorowie Formation, basal Pinyatta Member: archaeocyath limestone; very massive, medium grey to pink-grey, with fossils well preserved in white carbonate. Indistinct medium bedding, partly defined by rare dolomitic siltstone intraclasts. Silt to 2–3% contributes to brown weathering surfaces on prominent rillenkarren surfaces. Possible small brachiopods. Archaeocyaths especially common at 180 ft in a pink, white, to grey mottled limestone with some silt and reddish (orthoclase?) grains. Carbonates partly recrystallised. Fossils less evident at 220 ft. Buff yellow silty dolostone clasts very common at 230 ft.
238 to 248	Poor outcrop. Interbed of silty grey laminated to flaggy limestone (*sensu* Unit 6) at 238–241 ft?
248 to 267	Purple to ferric red archaeocyathan limestone; very fossiliferous with archaeocyaths (commonly intact up to 30 mm long by 10 mm in diameter) lying parallel to bedding, and well preserved in white carbonate in a red silty limestone matrix. Abundant dolomitic siltstone intraclasts in some beds indicate periodic currents associated with felling, upset, and gentle alignment of archaeocyath cups.
At 267	Goethite pseudomorphs after pyrite, to 25 mm in diameter, in a limestone fissure.
At 267	End Section B.

SECTION C

0 to 20	**Unit 3**, Mernmerna Formation, Bendieuta Member: peloid limestone; solid 60–90 mm beds, pink-orange to buff with buff rounded carbonate grains (~0.5 to 1 mm) in a lighter carbonate matrix with some silt and minor coarse quartz sand (to 1.2 mm, well rounded, highly spherical). No prominent fossils. Some stylolites. Grading to mottled from 10 ft, increasing to 20 ft, with buff-pink silty mottles around grey limestone cores. Distinctive red (to 2.4 mm; orthoclase?) granules at 10 ft. Rare, angular, buff dolomitic siltstone clasts to 100 mm.
20 to 23	Interbed, 800 mm thick, of medium to light grey semi-homogeneous limestone with scattered coarse sand to granules of milky quartz (av. 2 mm diameter, sphericity 0.5, rounding 0.7), topped by a 150 mm bed of light grey to pale orange peloid (av. clast diameter 1.0 mm) limestone with stylolites and rare clasts of dolomitic siltstone.
23 to **63**	Mottled, alternating to homogeneous, peloid limestones: generally as for 0–20 ft, very massive 2 to 3 m beds of medium grey limestone with scattered quartz granules (av. 2 mm, well rounded, high sphericity) to 1%. Large-scale, low-amplitude, cross bedding. Carbonate clasts

	are well rounded to elliptical, about 1 mm in diameter, and are poorly sorted. Form suggests possible origin of peloids as segments of archaeocyath frameworks. Rare dolomitic siltstone clasts, but more abundant as angular clasts to 50 mm long, with quartz granules, in a fine grained peloid limestone at 40–45 ft. Mottled fabric less evident from 44–63 ft.
At **63**	Dark grey peloid limestones with a 150 mm bed rich in quartz granules (to 10%), sand, silt, and dolomitic siltstone clasts to 30 mm which are partly aligned SSE–NNW.
	Very sharp contact between Unit 3 and Unit 4 above. Unconformity, hiatus, slump, or tectonic?
63 to 70	**Unit 4**, Upper Mernmerna Formation, basal unit: weathered zone, shaley, khaki to slate grey, laminated to thinly flaggy limestone.
70 to 110	Slate grey, laminated to flaggy (to 80 mm) limestone with thin khaki green silt partings and silty limestone interbeds. Silty grey limestones weather to light brown. Minor quartz sand at 49 ft with trilobite fragments. Siliceous trilobite debris and quartz granules as an 80 mm bed at 97 ft, less above, to cleaner at 100–110 ft. Silt decreasing up from 100 ft.
110 to 136	Loss of outcrop. Measurements unreliable; 5 ft error in 30 ft?
136 to 179	Slate grey, laminated to flaggy limestone with thin khaki green silt partings, as below, with minor cross-bedding in silty beds. Conchoidal fractures in limestones.
179 to 180	Mottled grey flaggy limestones, more massive than below, with up to 10% dolomitic siltstone intraclasts and pebbles in a poorly sorted, very sandy (quartz), limestone matrix. Some quartz granules and silicified trilobite remains; mainly spines. Sediment influx possibly responsible for demise of trilobites, while transporting and sorting their remains. Silt as source of silica for fossil preservation?
180 to 216	Mottled grey flaggy limestones, as below. Some quartz grit beds. At 195 ft, a 30 mm bed of siliceous trilobite debris with abundant remains at 200–217 ft. Hyoliths at 213 and 215 ft. A large redlichiid (?) doublure at 200 ft and a free cheek at 214 ft.
216 to 220	Sudden loss of fauna, or not preserved? More massive 60 mm beds of dark grey mottled khaki limestone with some quartz granules and sand (10%). Dolomitic siltstone clasts at 219 ft. Burrows (?) at 200 ft. Higher energy conditions inferred.
220 to **229**	Slate grey, laminated to flaggy limestone with thin khaki green silt partings, as below, with minor trilobite debris. Small brachiopods common at 225 ft.
229 to 237	**Unit 5**, Upper Mernmerna Formation, middle lens: very massive, cliff-forming, buff weathered, dark grey mottled (part dolomitised?) flaggy limestone.
237 to 243	Very thin bedded (25 mm), dark grey to flaggy limestone with thin khaki green silt partings, as below. Possibly lenticular.
243 to 255	Very massive, cliff-forming, dolomitic limestone, thick bedded and commonly peloidal (recalling Unit 3). Buff dolomitic siltstone clast (150 mm) at 225 ft. Numerous stylolites. Cliff top at 250 ft.
255 to 338	Massive, thick bedded, dolomitised limestone, as below with prominent mottling. At 285 ft, a 600 mm band of deeper grey limestone with less mottling. Coarse quartz sand (av. 0.8 mm) and silt above ~300 ft. Grades to massive grey mottled to flaggy limestone above ~310 ft with an archaeocyath fragment at 320 ft. Quartz grit peaks at ~330 ft, then less sandy and less dolomitic.
338 to 360	Massive, medium to dark grey, thick bedded limestone with dolomitic mottling in 50 mm interbeds. A 100 mm buff silty limestone bed at 338 ft with dolomitised peloid limestone above. Some 20 mm dolomitic pebbles and archaeocyath fragments to 360 ft, as evidence for currents. Quartz sand (av. 0.5–1.0 mm, poorly sorted), increases to 360 ft.

At 360	A bedding plane covered with silicified and largely complete archaeocyaths, about 80 mm long, of cup as well as cylindrical forms including *Pycnoidocyathus*- and *Syringocnema*-like forms. *This marker bed is extensive over the map area.*
360 to 370	Mottled to laminated, dark grey limestone with khaki silt partings.
370 to 380	Finely mottled limestone with clean grey masses set in a buff silty matrix. Minor silt. Sharp rillenkarren. Crumbly at 377–380 ft with a 150 mm buff dolomitic siltstone clasts at 375 ft; some at 378 ft.
380 to 401	Massive, fine grained slightly silty limestone. Well mottled, grey, at 387–395 ft; thin mottling from 395 ft.
401 to 404	Massive mottled medium grey to khaki silty limestone with fine quartz sand and rare quartz granules. Some intraclastic pebbles.
At **404**	Top of Unit 5, base of Unit 6.
At 404	End section C.

SECTION D (From base of massive bed just above the slump horizon)

0 to 18	**Unit 6**, Upper Mernmerna Formation, upper unit: massive, cliff-forming band of very silty mottled, medium grey, very thin bedded to flaggy (20–50 mm) limestone with 15 mm, yellow to dark brown weathered, silty limestone interbeds. A few transported archaeocyaths at 10 ft. Graded bedding common in siliciclastics, suggesting turbid grain flows. A 50 mm band of nodular chert at 18 ft.
18 to 25	Slightly silty, medium grey, very thin bedded to flaggy limestone, as below.
25 to **49**	Exotic block of massive, clean, light to medium grey limestone with some archaeocyaths, small brachiopods, and buff dolomitic siltstone clasts (to 10%). Resembles Sec. B/170 ft.
49 to 59	**Unit 7**, Moorowie Formation, basal Pinyatta Member: peloid limestone.
At 59	Major fault. Returned to 0 ft and *measured down succession*.
0 to –2	**Unit 6**, Upper Mernmerna Formation, upper unit: dark slate grey, slightly silty, laminated to flaggy (to 80 mm) limestone with thin khaki green silt partings.
–2 to –20	Intra-formational syn-sedimentary bedding slumps in silty to sandy limestones with one 30 mm-thick bed thrown into a sinuous recumbent 5 x 1.5 m fold with its axial plane sub-parallel to bedding. Prominent graded bedding and intraclasts indicating turbidity currents and debris flows. Allochthonous components include: (i) medium grey, biohermal archaeocyathan limestone as sub-rounded boulders to 5.8 m; similar to B/248 ft but grey, not red; (ii) a 1m boulder of grey silty limestone with abundant silty limestone intraclasts at –8 to –13 ft. Resembles B/230 ft; and (iii) other carbonate variants. Matrix infill to disrupted sediments is a silty to part sandy grey limestone, *itself reworked* as clasts in places.
At –20	Moved traverse ~10 m east.
0 to –7	Intra-formational syn-sedimentary bedding slumps, as above. Many imbricated silty limestone intraclasts of angular, bladed-to-platy form.
–7 to –28	Slate grey, slightly silty, laminated to flaggy (to 80 mm) limestone with thin khaki green silt partings.
–28 to –31	Massive, silty grey flaggy limestone forming a 1 m ledge. At –29 ft, a dark 50 mm-thick grey limestone interbed with archaeocyath debris, similar to the debris in slumped boulders.
–31 to –32	Laminated green-brown weathered silty grey limestone.
–32 to –50	Dark grey, mottled to flaggy limestone with thin khaki green silt partings. Silty from –40 ft forming a 300 mm ledge. Dark weathered silty limestone marker bed at –48 ft. Below –48 ft, a 130 mm greenish bed, possibly a tuff.

–50 to –54	More-massive limestones with thin laminations in top 300 mm. Laterally variable.
–54 to –55	Slightly silty, dark grey, laminated to flaggy (to 80 mm) limestone with thin khaki green silt partings. Abundant carbonised trilobites in black in a fine dark grey limestone, with well preserved glabellae, spines, and a complete head.
–55 to –56	Dark grey, mottled to flaggy limestone with thin khaki green silt partings.
–56 to –63	Dark grey, laminated to flaggy limestone with silt partings. Trilobites.
–63 to –66	More-massive interbed of grey, silty, mottled to flaggy limestone.
–66 to –86	Dark grey, laminated to flaggy (to 80 mm) limestone with silt partings. Abundant well preserved trilobite remains (glabellae, spines) and small brachiopods.
–86 to –89	Silty grey, mottled limestone with minor syn-depositional slumping. Probable annelid burrows in float.
–89 to –104	Part silty, grey, flaggy (to 130 mm) limestone, some with pyrite in float.
At –104	Prominent, dark silty limestone marker bed.
–104 to –140	Dark grey, laminated to flaggy (to 80 mm) limestone with silt partings and some siltier interbeds. Minor slump at –135 ft.
–140 to –143	More-massive interbed of grey, silty, mottled to flaggy limestone.
–143 to –168	Dark grey, laminated to flaggy (to 100 mm-thick at top, grading up from 25 mm at base) limestone with silt partings.
–168 to –171	More-massive interbed of grey, silty, mottled to flaggy limestone with minor slumping.
–171 to –241	Very well laminated to flaggy (to 80 mm), dark slate grey, clean limestone with thin khaki green silt partings and abundant trilobite remains, notably at –174ft, –188ft, –195 ft.
–241 to –260	Massive, dark brown weathered, abundantly silty, mottled to flaggy limestone.
–260 to **–275**	Dark grey, thinly laminated to flaggy limestone with silt partings. Part siliceous. Rich trilobite remains at –269 to –270 ft.
At **–275**	Base of Section D; equates to top of Section C and base of Section B.
Below **–275**	**Unit 5**, Upper Mernmerna Formation, middle lens: limestones.

SECTION E

Below **0**	**Unit 3**, Mernmerna Formation, Bendieuta Member: peloid limestones; light grey, spherical to elliptical, well-rounded carbonate grains to 0.5 mm in a light grey lime matrix. Includes larger grains to 20 mm and scattered quartz granules.
0 to 106	**Unit 4**, Upper Mernmerna Formation, basal unit: medium to dark grey laminated to flaggy (to 80 mm) limestone with thin (25 mm) khaki green silt partings. Minor silt influx at 20 ft, 30 ft, with thinner laminae and small-scale cross beds. At 93 ft, red (siliceous or orthoclase?) granules on weathered surfaces. Laminations less defined at 100ft.
At 106	Shifted traverse south by ~30 m.
106 to 134	Dark grey, silty and mottled limestones with abundant red-brown siliceous debris including trilobite trash (130 ft), very rare transported archaeocyaths (118 ft), and rare quartz granules (2 mm) commonly in graded beds. Silt fraction encloses grey limestone cores. Scattered dolomitic siltstone clasts. Bedding surface at 134 ft with nodular chert and trilobite remains (75 mm spines, axial segments 15 mm wide).
134 to **140**	Obscured.
140 to 170	**Unit 5**, Upper Mernmerna Formation, middle lens: Massive scarp-forming, buff to pale grey limestone, part dolomitised (white) and finely peloidal (rounded carbonate grains to ~0.2 mm) with minor silt. No prominent fossils. Siliceous nodules to 25 mm. At 170 ft, grading to pink or mottled light grey with pyrolusite dendrites.

170 to 172	Negative relief; likely dark grey laminated to flaggy limestone.
172 to **186**	Buff to light grey limestone, as for 140–170 ft below.
At **186**	Fault.
186 to **204**	**Unit 6**, Upper Mernmerna Formation, upper unit: light grey, slightly silty, partly flaggy limestone. Prominent, orange weathered, siliceous nodules. Some trilobite occipital spines. Rare transported archaeocyaths and small dolomitic silt intraclasts.
At **204**	Fault.
204 to 280	**Unit 7**, Moorowie Formation, basal Pinyatta Member: massive buff to patchy pink-orange peloid (grains to 0.2 mm) limestone. Rare (1–2%) fine-to-coarse quartz sand (poorly sorted, av. 0.6 to ~1 mm, medium sphericity, well rounded), and buff to yellow silt. Cleaner, with less sand and 150 mm patches of light grey limestone above 220 ft. At 240 ft, a 150 mm bed or pod (channel fill?) of clean light grey archaeocyathan (complete cups to 80 mm long) limestone with 25 mm dolomitic siltstone clasts and darker grey limestone cobbles. Quartz granules not evident, only fine yellow silt, at 250 ft. A 150 mm bed of buff dolomitic siltstone at 270 ft. Pyrolusite dendrites. Smooth-weathering and rillenkarren surfaces.
280 to 348	Thick bedded, clean white to buff and pale yellow archaeocyathan limestones, with small brachiopods (at 280 ft) and tabular (30 mm) silty limestone intraclasts. At 310 ft, pink to yellow limestones. At 314 ft, silt influx with quartz granules to <1% in buff to light grey limestones. More-massive and homogeneous at 320 ft, with bedding defined in fine silt and sand. A few buff-to-brown dolomitic siltstone intraclasts at 330 ft. Rillenkarren surfaces on outcrop.
348 to 383	Minor change from below; massive, buff, recrystallised part-peloidal lightly silty limestone with some lighter grey patches. Rare archaeocyath fragments and minor silt with quartz sand (av. 0.3 mm) to minor granules. Authigenic quartz crystals (~0.4 mm) and small brachiopods accentuate the bedding. Upward trend to increasingly light grey, part mottled (silty) pale orange, clean archaeocyathan limestones. Dolomitic intraclasts persist. At 380 ft, a lens of buff to yellow, very fine grained dolostone.
383 to 392	Lighter grey limestones, smooth-weathering, in part mottled limonitic yellow, with thin conglomerate lenses (channel fills?) of grey limestone pebbles and dolomitic siltstone clasts in a silty to sandy pale yellow to part-red limestone matrix. At 391 ft, limestone is brecciated (minor fault?) with rare malachite staining.
392 to **404**	Pale buff weathered, fine grained, homogeneous dolostone with rare silt, and no prominent fossils. Dendritic pyrolusite on joints. Sabkha facies?
At **404**	Fault.
404 to 410	**Unit 8**, Moorowie Formation, Wookata Shale Member (?): poorly exposed, weathered and deformed purple shales?
At 410	Top of Section E.

SECTION F (Begins ~100 m north of top of Section E)

0 to 34	**Unit 8**, Moorowie Formation, Wookata Shale Member: red-brown micaceous shale; highly deformed, in a fault zone.
34 to **70**	No outcrop, red shale inferred.
70 to 100	**Unit 9**, Moorowie Formation, Kandramooka Member: massive, light grey to buff limestones with silt and rare quartz granules. Commonly highly recrystallised, possibly dolomitic in patches. Stromatolites at 70 ft with dolomite rhombs at 80 ft and archaeocyaths at 80, 90, 106 ft. Some small dolomitic clasts.
100 to 106	Undolomitised, light grey archaeocyathan limestone.

106 to 120	Dolomitised, light grey archaeocyathan limestone. Less silt at 120 ft.
At 120ft	Minor fault suspected.
120 to 175	Pale buff, rather massive, well bedded to almost flaggy (150 mm) finely granular (~0.2 mm) dolostone; or dolomitised limestone? Includes sub-angular (4 mm) dolomitic siltstone clasts, as in 80 mm beds at 135 ft and 140 ft. Largely clean with very little silt, and no quartz granules. Some archaeocyath fragments, including irregular forms, becoming abundant (recumbent on bedding) at 170 ft. Possible trilobite. Pass up to alternating beds (Specimen F/170 ft), 8–150 mm-thick, of (i) light grey limestone with transported archaeocyath fragments, and (ii) buff, homogeneous, silty dolomitic (dolomitised?) archaeocyathan limestones. Both units with rare dolomitic intraclasts. Stylolites.
175 to 185	Limestones as below, including a massive reef-like or biostromal mass with stromatolites and large intact archaeocyaths (to 200 mm long, by 100 mm in diameter) set in a clean light grey limestone.
185 to 196	Limestones as below, but more a thick bed (marginal to biostromal meadows?) than a mound with archaeocyaths lying on the bedding, largely intact and partially aligned by currents. Rare dolomitic clasts to 80 mm. Buff silty interbeds selectively dolomitised. Stylolites, and rillenkarren surfaces.
At 196	Possible loss of about 5 ft of section due to minor faulting.
196 to 197	Upper beds of Unit 9, Kandramooka Member: abrupt influx of quartz granules (yellow, pink, or grey; to1%) in the limestones; loss of obvious archaeocyaths, then a passage into granule-rich peloid limestones. Peloids (av. 0.6 mm to max.1.3 mm) are well rounded.
197 to 236	Massive (2 m beds) richly-granular limestones. Quartz granules (to 1–2%, av. 2 mm to max. 5 mm in diameter) of intermediate rounding and sphericity, poorly sorted. Granules decline in abundance and tend to coarse sand in a fining-up cycle (channel or debris flow?) from 200 ft, then absent from 210 ft, grading to silty limestone with finer (<0.4 mm) peloidal carbonate, and possible ooids. Rare dolomitic clast. Carbonate peloids to 2 mm; well rounded, moderately spherical, in pink, grey, pale yellow, orange, white, or rare green. Marked recrystallisation at 220 ft with silt to <1% and no apparent fossils. Pale buff at 230 ft with fine carbonate to 0.2 mm. Very clean at 236 ft with small pods of light grey limestone.
236 to 250	Yellow dolomitic limestone; massive, uniformly bedded, with rare irregular archaeocyaths. Sabkha affinities? May relate to northern sections, just below Unit 10.
250 to 300	Peloid limestone: patchy light grey to buff with some archaeocyaths (e.g. 270 ft) and rare quartz granules and minor silt. Yellows at 260, 290 ft. Pinks at 270 ft. Possible trilobites at 280, 300 ft, but recrystallised. Carbonate grains to 0.3 mm at 300 ft.
At 300	Top of Section F; terminates.

SECTION G

This section is in a geological complex area that reduces the reliability of the observations. There are diapiric dykes nearby, many complex faults, 60 mm wide calcite veins, small scale cross folds (related to thrusts along the northern map boundary), and blocks of anomalous dip. Proven faults are noted in the descriptions, while regional dip has been adopted in anomalous zones through to the next reliable outcrop.

–**11** to 0	**Unit 7**, Moorowie Formation, upper Pinyatta Member: massive, slightly peloidal, silty, pale orange to pink thick bedded (to 60 mm) limestone with scattered quartz granules.
0 to 8	Massive, 90 mm beds of silty limestone with minor quartz granules and medium grey limestone cobbles (elongate, to 20 x 100 mm) and rare dolomitic siltstone clasts in a pink to pale yellow

	silty carbonate matrix, imparting a subtle mottled appearance to the beds. Small brachiopods and archaeocyath fragments in the matrix. All reworked, as in a persistent tidal channel; strong reworking in a rubbly zone at 5 to 8 ft.
8 to 10	Poorly exposed. Highly weathered whitish shale debris.
10 to 15	Thin (50 mm) beds of sparsely peloidal, medium grey limestone with very rare and small archaeocyath fragments. Peloids are <0.6 mm, light to medium grey, and rarely reddish (feldspar, not jasperoidal). Only a few quartz granules. Silty limestone bed (300 mm) at ~14 ft.
15 to 20	Typical, clean, light grey mottled pale orange to yellow (silt or dolomite?) archaeocyath-rich limestone; no quartz granules.
20 to 61	Very dark brown to black weathered, coarse sand to granule-rich buff to pink or pale yellow limestone (relates to Section H/>200 ft). Siliciclastics are quartz, of medium sphericity and roundness; av. ~1 mm diameter, to 2 mm. Slope concavities at 34–36 ft and 46–50 ft followed sandy (av. quartz grains 0.9 mm, max, 1.2 mm) limestone ridges at 36–46 ft, and above 50 ft.
At **61**	Major break in slope; small valley. Lateral shift of line south by ~15 m.
61 to **127**	**Unit 8**, Moorowie Formation, Wookata Shale Member: red-brown to purple, friable, micaceous and laminated siltstones or shale. Thins laterally to the south towards Section C; possibly faulted-out?
127 to 149	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: light grey, clean, archaeocyath-rich limestone cobbles to small boulders in a buff-yellow silty limestone matrix.
149 to 154	Dark brown weathered, 'typical' quartz granule-rich, silty limestone (correlates, north, with Sections I, K, U, V, and X).
154 to 165	Light grey, clean, archaeocyathan limestone, as comprise the cobbles above 127 ft. No megabreccia in this unit; possibly a southern source bed for the conglomerates to the north.
165 to 170	As for 149 ft; dark brown weathered, quartz granule-rich, silty limestone.
170 to 260	Clean, pale orange mottled, light grey silty archaeocyathan limestones, as below, but including quartz granule-rich limestone interbeds. Granules decline above 200 ft, leaving buff silty limestones to buff calc-siltstones. Occasional cobbles (to 150 mm) of the quartz granule limestone indicate reworking by currents. Clasts of the grey archaeocyathan limestone are highly irregular in form, up to 300 mm in diameter, with indistinct margins and closely bound to the silty limestone matrix. Bedding is largely obscure within the clasts, and in the breccia pile. Significantly, all coarse siliciclastic are present only in the matrix to the conglomerate, in contrast to the 'clean grey carbonates' of the limestone boulders. The episodic currents that delivered the grey limestone clasts also carried in the quartz granules and buff silt, then later currents reworked the newly deposited (semi-lithified) 'quartz granule-rich silty limestones' and mixed the autochthonous intraclasts with the next influx of grit and limestone rubble. *Persistent currents are indicated, rather than breccia formation by a single event.*
260 to 262	Quartz granule-rich silty limestone lens.
262 to 330	Calcirudites, as below. Granule-rich buff limestones at 275 to 284 ft. Poor exposure above 268 ft. Subtle reddening at 320–325 ft.
330 to 334	Dark brown weathered, quartz granule-rich, buff silty limestone.
334 to **360**	Poor outcrop; probable megabreccia.
360 to 385	**Unit 9**, Moorowie Formation, Kandramooka Member, upper unit: massive, clean, pale pink to grey mottled limestone with sparse archaeocyaths. Grey limestone as possible reworked cobbles in part? Prominent grass-green brick-red granule marker bed, relating to upper Unit 9 in Section H. At 370 ft, a 30mm bed of silty quartz granule-rich limestone with silty mottling at 371 ft; no archaeocyaths evident. Poor exposure; fault (?) zone; 380–384–385 ft.

385 to 450	Massive, ridge-forming silty dolostone with odd patches of quartz granule (2–3% grit) limestone as an apparent matrix infill to a grey limestone conglomerate (current reworked?) with cobbles to ~150 mm. Pink colour internally, some mottled buff (silty) and with white recrystallised carbonate. Relates to Section H/400 ft?
450 to **457**	Massive, clean, light grey to part buff (silty) limestone with scattered black and red granular chert nodules. Karren weathering ridges and some smooth pavements.
457 to **471**	**Unit 10**, Moorowie Formation, Pack Creek Member: deeply weathered, friable, purple-red shales. White tones at base. At 459 ft, a 30 mm bed of pale yellow silty dolostone with purplish to light grey limestone pebbles.
At 471	Fault.
471 to 476	**Unit 11**, Moorowie Formation, Brillig Catch Member: distinctive, bright limonitic yellow (weathered sideritic?) calcareous siltstone with ferric red patches. Fine wavy banding to laminations; possibly microbial? Small black chert nodules. No evident fossils.
At 476	Significant fault zone. End, top, of Section G. Moved ~30 m south, across creek, and began Section G2 at a fault at top of the first purple shale, the level apparently equal to the fault in Section G at 471 ft.

SECTION G2

471 to **487**	**Unit 9**, Moorowie Formation, Kandramooka Member, upper unit?: massive, brown to light grey weathered, purplish to grey, medium bedded (to 300 mm) to thickly-laminated, slightly silty limestone. Small, pale yellow calc-siltstone clasts in a light grey limestone. Thinner beds, to 80 mm, towards 487 ft. No prominent fossils.
487 to **501**	**Unit 10**, Moorowie Formation, Pack Creek Member: weathered, friable, purple-red shale?
At 501	Fault? Base of Unit 11 faulted out?
501 to 520	**Unit 11**, Moorowie Formation, Brillig Catch Member (top?): ridge of bright limonitic yellow (sideritic?) limestone, moderately well bedded, with ferric red patches and some limonite.
520 to 523	Massive, medium to light grey limestone with black chert granules and limonitic patches; no prominent fossils.
523 to 540	A distinctive marker bed at base, resembling stacked sheets of card or thick paper. Ultra-thin (0.1 to 1 mm) laminations of microcrystalline (microbial?) limestone or dolostone, with excellent fine partings of yellowish silt and clay.
540 to **546**	Fine grained, well bedded to laminated, light to medium grey limestone.
546 to >558	**Unit 12**, Billy Creek Formation: red-brown to green, part sandy, micaceous siltstones.

SECTION H

–10 to 0	**Unit 7**, Moorowie Formation, Pinyatta Member?: massive, buff to pale yellow, part purplish, variably silty limestone. No obvious fossils.
0 to 5	Poor exposure; limonitic yellow to greenish, highly weathered, shaley limestone; possible affinities with Unit 6?
5 to 10	Grades up to buff weathered, light grey to pink, laminated to flaggy (80 to 150 mm) limestone; interbed of Unit 6?, recalls Section T/57 ft?
10 to 20	Very poor exposures; grey limestone?
20 to 21	Massive grey limestone.
21 to 25	Medium to dark slate grey, finely-laminated to flaggy limestone with thin khaki green silt partings; probable interbed of upper Unit 6 in a Unit 6 to 7 passage zone?
At 25	Definite **Unit 7**, Moorowie Formation, Pinyatta Member, above a poorly exposed passage zone with Unit 6?

25 to 52	Massive, medium bedded (150 to 300 mm) peloid limestone (part dolomitic?) with accessory quartz granules (av. 2 mm). Carbonate peloids (av. 0.6 mm) are light to medium grey, some pale orange or red to pinkish, with persistent quartz granules at 30–40 ft. Silty interbeds to 30mm. Rare dolomitic siltstone clast to 50mm at 25 ft, 40 ft. Occasional dark granular chert nodules.
52 to 57	Poor exposures at slope concavity; inferred peloid limestone or light grey flaggy limestone with 30 mm peloidal interbeds.
57 to 73	Peloid limestone, part ooid. Grains of uniform size (av. 0.7 mm), light to medium grey, highly spherical, some with radial (spherulitic) textures. Some poorly-rounded, elongate (3 x 30 mm, av. 10 mm) pale yellow carbonate clasts. At 60–65 ft, poorly exposed but strongly oolitic saccharoidal limestone with more yellowish clasts. Peloidal from 57 ft. At 67 ft, thinly-laminated, medium grey, ooid to peloid limestone. Some quartz granules.
73 to 76	More-massive, bedded, dark brown weathered, yellow-brown silty peloid limestone with quartz granules.
76 to 85	As for 25–52 ft, below: green-grey weathered, massive, medium bedded (150 to 300 mm) peloid limestone with accessory quartz granules (av. 2 mm).
At 85	Shifted traverse ~30 m south, across creek. Lithofacies change; 73–76 ft equivalent has abundant quartz sand and granules in the peloid limestone.
Repeat section, from 76 ft:	
76 to 100	Cliff-forming, medium to dark grey, slightly sandy (quartz), medium bedded (150 mm) peloid limestone; as for 25–52 ft. Part mottled where silty. Current reworking indicated. Progressively cleaner from 89 ft with some transported archaeocyaths associated with silt influxes. At 90 ft, only minor silt in a massive, medium to light grey to pale orange and white-mottled (part dolomitised?) limestone with abundant, well preserved, archaeocyaths.
100 to 110	Massive, 900 mm-thick, quartz granule-rich conglomeratic bed, of overall mottled appearance, with medium grey peloid limestone and clean light grey fine grained limestone cobbles (av. 25–50 mm, to 100 mm) reworked by currents into a pinkish to buff silty to granular limestone matrix. Shaley interbeds at 103 to 105 ft. Rare small dolomitic siltstone clasts.
110 to 113	Pink, silty to quartz granule-rich limestone, or calc-sandstone. Some granules to 5 mm, well rounded, spherical, and poorly sorted.
113 to 118	Fewer quartz granules in a pink, silty, peloid limestone.
At 118	Poor outcrop at slope concavity to 135 ft.
118 to 145	Massive pink to buff limestone, of irregular laminations with alternating bands of buff silt and grey peloids; few quartz granules.
145 to 150	More massive, 30 mm bed of clean, pale yellow, peloids (round yellow grains in a clear matrix) dolostone.
At 150	Base of cliff.
150 to 160	Grading from buff up to pink, massive quartz granule-rich (laterally variable) and silty limestone.
160 to 200	A mass (lens or block?) of buff, grading to orange-mottled, clean, light grey, archaeocyathan limestone with medium quartz sand (av. 0.4 mm) that decreases to 190 ft. A few limestone pebbles to 50 mm. Bedding defined by a yellow weathered, 1.2 m-thick, granule-rich limestone bed. At 190 ft, a 1 m boulder of light grey, clean, archaeocyath-rich limestone. Pale orange mottling. Interval relates to Sections E, F, G? Quartz sand and granules (av. 1.2 mm) from 190 ft; well rounded, highly spherical, with no red feldspar, in a pink silty limestone matrix with

	scattered archaeocyathan limestone cobbles and boulders. Grading to buff, with siliciclastics reduced, to ~200 ft.
200 to 233	Dark brown to black weathered, pink to buff, quartz granule-rich limestone, as below; a marker bed. Section H/230 = G/30 ft; and Z.
233 to 285	Dark weathering tones and abundant quartz granules, fewer than below, to ~285 ft. Limestones buff to some pink.
285 to 289	Recrystallised, pink and white mottled limestone with abundant cobbles to boulders of light grey, clean, archaeocyath-rich limestone. Locally reworked by currents.
289 to 320	Massive, dark weathered, buff limestone with some quartz granules and silt, as below from 285 ft, but with more intraclasts (coincident with granule influxes). Pinkish at 294 ft. Dark surface tones at 330 ft. Sub-rounded blocks of light grey archaeocyath-rich limestone at 305 ft (2.4 m) and 325 ft (2.4 x 1.5 m).
320 to 335	Massive, dark weathered, quartz granule-rich limestones as below. Change in granule type to 60% brick-red (not jasper; orthoclase?), 20% clear to smokey blue quartz, and 15% grass-green grains (to 335 ft) in a sienna brown silty limestone matrix. Relates to Sections G and R.
335 to **348**	Buff, quartz granule-rich limestones, as below; to a calcarenite at 350 ft.
348 to 351	**Unit 8**, Moorowie Formation, Wookata Shale Member: deep pink to ferric red calc-siltstone, with a passage zone from Unit 7 to Unit 8 indicated by a thin interbed above of grey archaeocyathan limestone with quartz granules and small pale yellow clasts. Includes cobbles to 150 mm of (i) granule-rich limestone facies, and (ii) clean, grey archaeocyathan limestone, both in a granule-rich silty limestone matrix. Reworking by currents in a shallow tidal (?) channel is indicated.
351 to **367**	Ferric red, quartz granule-rich silty limestones with a few cobbles of archaeocyathan limestone. Passage indicated from Unit 8 to Unit 9.
367 to 440	**Unit 9**, Moorowie Formation, Kandramooka Member: massive, ridge-forming, poorly bedded, clean, light grey, part mottled, buff to pale yellow (silt) and white archaeocyathan limestone with possible algal structures (stromatolites?) and rare cobbles of reworked granule-rich silty limestone. Includes intact interbeds of granule-rich silty limestone at 380, 400, 410 ft. Some patches of archaeocyathan limestone rubble with arenaceous nodules and yellow silty mottling. Less granules at 410 ft, grading to clean and grey limestones to 430 ft. Small siliceous black weathered nodules at 430–440 ft.
440 to 455	Poorly bedded, medium grey limestone with buff, pink, or yellow silty patches. Rare archaeocyaths.
455 to **467**	Medium grey, flaggy (to 150 mm) limestone with irregular purplish red silty interbeds; passage zone from Unit 9 to Unit 10.
467 to 505	**Unit 10**, Moorowie Formation, Pack Creek Member: deeply weathered, partly friable, purple to minor green shales or siltstones.
505 to 512	Oligomict conglomerate: rubbly, loosely consolidated in weathered outcrop. Well-rounded, poorly sorted cobbles of clean, light grey, slightly silty, archaeocyathan limestone in a buff silty limestone matrix (with no red silt). Lenticular form thins 86% to ~300 mm-thick at 20 m north. Probable shallow intertidal channel fill.
512 to 592	Friable, thinly-laminated purple shales.
592 to 604	Polymict conglomerate: irregular boulders to 600 mm in maximum dimension, sub-angular to sub-rounded, very poorly sorted, comprising (i) clean, light grey limestone with sparse archaeocyaths (resembles Section G/367 ft), and (ii) purple-red mottled, white limestone. Matrix comprises progressively finer clasts of the two rock types, with a silty carbonate cement.

604 to **687**	Purple shales or siltstones. Conglomerate lens (150 mm-thick), as below, at 610 ft; a probable intertidal channel fill.
At 687	Major unit contact, poorly exposed.
687 to 755	**Unit 11**, Moorowie Formation, Brillig Catch Member: ridge forming, khaki weathered, thick bedded (to 300 mm) to laminated, medium grey, very clean, splintery and homogenous, microcrystalline (microbial?) limestone. No macrofossils evident. At 744 ft, an distinct interbed of pale yellow weathered khaki limestone, possibly dolomitic. Current activity waning up section.
755 to 760	Massive, medium to light grey, clean, fine grained limestone with dark gritty black chert nodules on the surface at 760 ft. Reworked by currents, producing elongate intraclasts to 50 mm long, set in a pale yellow silty carbonate matrix. No macrofossils.
760 to 775	A distinctive marker bed resembling stacked sheets of thick paper. Ultra-thin (0.1 to 1 mm) laminations of microcrystalline (microbial?) limestone or dolostone, with excellent partings of yellowish silt and clay. At 770 ft, a single 300 mm bed of light grey limestone.
775 to 785	Massive, rubbly (leached or faulted?) limestone with 80 mm siliceous veins in fractures. At 784 ft, a 150 mm yellow (weathered, sideritic?) limestone bed on a thin dolostone bed.
785 to **792**	Very poor outcrop; infer an orange-mottled to medium grey, clean, limestone.
792 to 797	**Unit 12**, Billy Creek Formation: weathered shales inferred under thin surficial deposits. Unit 12 contact taken as top of last prominent limestone of Unit 11, at slope break.
797 to 965	Green, part sandy, micaceous siltstones, grading to red-brown and purple towards 965 ft.
965 to 966	Thin, pale yellow (limonitic after siderite?) dolostone.
966 to **1075**	Red-brown and purple shales. Largely obscured by Cainozoic deposits from 1075 ft.
>**1075**	**Cainozoic:** lacustrine deposits: palaeoshorelines with beach pebble bars; very well rounded to ellipsoidal cobbles of mixed character, commonly highly polished. Gypsiferous clays and Fe–Mn silcretes in patches.
At ~ 1080	End, top, of Section H.

SECTION I

0 to 9 **Unit 7**, Moorowie Formation, Pinyatta Member: dark brown to tan weathered (black in bands), laminated to thin bedded (~1 to 40 mm) slabstone as a light purplish to buff, part grey, coarsely silty limestone with shaley partings. Silt is ferric red (not jasperoidal), grading to quartz sand and granules in the thicker beds.

9 to 42	Minor ridge. Darker, quartz granule-rich limestone beds, with pink feldspar (orthoclase?), and rare black grains. Concave slope at 15–24 ft with laminated variants.
42 to 43	Dark ridge of slabstone (to 100 mm); tan calc-siltstones to silty limestones. Linguoid sole or trilobite marks on some slabs. Weathering penetrates ~25 mm into medium grey carbonates. Silt (size term) includes carbonate clasts, quartz, pink (orthoclase?), clays, and black opaques.
43 to **70**	Concave slope. Cyclical deposition recorded by limestone beds at 54, 55, 60, 65, and 70 ft, alternating with thinly-laminated shaley interbeds. Shales grading to purple and becoming dominant from 65 ft, indicating a passage from Unit 7 into Unit 8 above.
70 to 79	**Unit 8**, Moorowie Formation, Wookata Shale Member: ferric red micaceous siltstone, gradational in a passage zone from Unit 7 below. Laminated near 79 ft.
79 to 150	Interbedded zone; alternations of dark brown weathered, thin bedded (70 to 100 mm), silty to quartz granule-rich limestone (79–80, 91–92, 93–94, 140–150 ft), with shale (to purple-red towards 140 ft) interbeds. Also scattered red (orthoclase?) granules in the carbonates.

150 to **222**	Largely a purple micaceous shale or siltstone, with very thin (to 25 mm) grey limestone interbeds.
222 to 256	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: (i) light grey, clean, archaeocyathan limestone cobbles to small boulders (to 80%), and (ii) buff, quartz granule-rich silty limestone cobbles (to 5%; current reworked) in a buff-yellow silty limestone matrix. Transition from Unit 8 indicated by red matrix silts and reddish limestone clasts in the basal 300 mm of Unit 9. Limonitic (after siderite?) geopetals in many archaeocyaths; as at base of Section K.
At 256	End, top, of Section I.

SECTION J

–13 to **1**	**Unit 9**, Moorowie Formation, Kandramooka Member, upper unit: massive, thick bedded (to 1.5 m), dark slate grey, mottled light grey and orange (weathered?), part silty, limestone. Small 10mm clasts of lighter carbonate. Prominent rillenkarren surfaces. Unexposed from –13 to –8 ft. Variable archaeocyath content to absent (?) above –8 ft. Lighter grey above 0 ft with orange-weathered silcrete masses.
1 to 22	**Unit 10**, Moorowie Formation, Pack Creek Member: poor outcrop. Purplish soils, from shales above? Infer a rubbly light grey limestone; clean, unfossiliferous (?) with band of abundant siliceous nodules to 5 mm.
22 to 31	A small ridge of thinly-laminated but rubbly (weathered?), clean, light grey limestone, with some dark chert nodules. Distinctive rock type; an oligomict conglomerate with poorly sorted light grey limestone pebbles to cobbles (av. ~25, some 50–80, rare 130 mm) in a pale red-pink silty limestone matrix. Relates to Section H/505 ft. Intertidal channel fill?
31 to **136**	Very poor exposure; deeply weathered, partly friable, purple micaceous siltstone or shale inferred; confirmed along strike for 20–30 m.
136 to 227	**Unit 11**, Moorowie Formation, Brillig Catch Member: ridge-forming, buff to khaki weathered, laminated to medium bedded (to 300 mm), medium grey, very clean, splintery and homogenous, microcrystalline (microbial?) limestone. Minor very fine clay. At ~145 ft, chicken-wire textures after vanished anhydrite. No macrofossils evident. Stylolites. Distinctive rillenkarren weathering on outcrop. Relates to same unit in Sections G and H. At 217 to 220 ft, a lighter grey bed, with more clay, weathering to a light buff.
227 to 249	At base, a distinctive marker bed resembling stacked sheets of thick paper or card. Ultra-thin (0.1 to 1 mm) laminations of microcrystalline (microbial?) limestone or dolostone, with excellent thin partings of yellowish silt and clay. Cleaves into thin limestone sheets. At 230 ft and 236 ft, 300 mm beds of light grey limestone with siliceous debris and black chert nodules on beds; as for Section H/770 ft.
249 to 265	Siliciclastic granules in a peloid limestone; poorly exposed, but pinkish-brown weathered with coarse pink to red (not jasper; orthoclase?) and coarse quartz sand (0.7 –1 mm); poorly rounded, medium sphericity, to 25% of rock. Buff weathered, dolomitic limestone peloids to ~1 mm. Some ooids. Buff dolostone interbeds, free of granules, are probable parents of dolomitic intraclasts, by current reworking.
265 to **268**	Massive to bedded, clean, medium to light grey limestones with thin (to 80 mm) interbeds of limonitic-yellow dolostone. *A reducing quartz granule content into Unit 11, compared to units below, suggests a waning or more-distant source for these distinctive siliciclastics.*

268 to 343	**Unit 12**, Billy Creek Formation: tan weathered, banded (~1 mm), thin bedded (to 80 mm), buff to pink or part-red, very fine grained dolostone. No quartz granules. All buff carbonate towards 331 ft, grading to a massive, clean, light grey limestone. Chert nodules at 315 ft.
At 268	Note: Section J has a carbonate unit, not 'Billy Creek Formation red shales', from 268 to 365 ft. The contact between Units 11 and 12 is here based on correlation of J/268 ft with H/792 ft. Although Unit 11 is very similar between J and H, more typical Billy Creek Formation red-brown and green shales are present in H, above 792 ft. The carbonate above J/268 ft is considered to be part of Unit 12; possibly related to the Coads Hill Member of Moore (1979, 1980). Faulting may apply.
343 to 365	Semi-massive, buff, microcrystalline limestones or dolostones. Yellow weathered with haematitic patches and pyrolusite.
365 to 755	Red-brown and purple to green, part sandy, micaceous siltstones. Green at 520–530 ft; poorly exposed purple shale 530–730 ft, and purple with thin green shale beds at 730–755 ft.
755 to 825	Unexposed. Fault inferred.
825 to 868	Interbeds of (i) massive grey limestone; clean, slightly mottled (silt?) with a few dark cherty nodules; at 828–830, 835–839, 857–860 ft, with (ii) massive, dense, ridge-forming khaki or pale yellow to buff (sideritic?) fine grained dolostones with irregular thin laminations (not banded), ferric red patches, and black cherty debris; at 825–828, 830–835, 839–857, 860–868 ft.
At 868	Fault?
868 to >1210	Purple to red-brown micaceous shales.
At 1210	End, top, of Section J.

SECTION K

–30 to **2**	**Unit 8**, Moorowie Formation, Wookata Shale Member: red-brown to purple, lesser green, micaceous and well-laminated siltstones or shale. Contact zone –6 to 2 ft; passage from buff shales to overlying limestones.
2 to 30	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: very massive to rubbly outcrop, with obscure to very thick bedding. Poorly sorted, sub-rounded cobbles to boulders (to 600 mm) of light grey, clean, archaeocyath-rich limestone (some cups to 150 mm diameter). Matrix is a yellow to buff, silty dolomitic limestone with limonite and haematite patches. Cross-bedding at 0 to 10 ft in 50 mm lenses of sand-rich calc-siltstone (i.e. sand influx into purple shale facies giving a purple, silty calcarenite). Sand (to 0.5 mm) is mainly red (orthoclase?) and pale green, with some quartz grains.
At 30	Lateral shift of ~30 m to avoid fault or isoclinal fold. Reset numbering.
0 to 25	Megabreccia, as for 2–30 ft with clasts of mottled white to pale orange, light grey, clean, archaeocyathan limestone, as in Section I. Limonitic to ferric-red geopetals common in archaeocyath cups, possibly after sideritic silt. At ~20 ft, small exposures of weathered purplish shale with rare siliciclastic granules. Limestone clasts and granules apparently shed or carried together into the red-silt environment, then reworked by currents? Dark limestone breccias at ~19 ft in Section K closely resemble those at ~13 ft in Section J.
At ~25ft	Calcite veins; multiple minor faults? Regional dip assumed for traverse across to reliable outcrop at ~70 ft.
25 to 100	Megabreccias, as below; purple silt interbeds and silt overprint terminated above ~25 ft. Breccias composed of (i) to 80% light grey to yellow mottled (limonite), clean, archaeocyathan limestone pebbles and cobbles to small boulders (to150 x 460 mm); and (ii) to 5–10% buff, quartz granule-

	rich, silty limestone cobbles (current reworked), all in a buff to yellow silty to quartz granule-rich limestone (part dolomitic) matrix with ferric red patches. Breccia bedding variable and commonly indistinct, with some broad cross-beds in the granule-rich beds of the matrix. Fallen, almost-complete archaeocyaths may rest on bedding planes. At 60–66 ft, a 3 m xenoclast of sandy dolostone, with its bedding vertical and striking ~N–S, compared to the regional dip of 30° west. The block does not persist along strike and faulting is an unlikely cause. At 75–100 ft, some lenses and bands of dark weathered, internally buff, silty to sandy and quartz granule-rich limestone.
100 to 109	Quartz sand to granule facies limestone beds, as below, with light grey archaeocyath limestone rubble at 103–107 ft.
109 to 111	Archaeocyathan limestone rubble bed with pebbles of buff granule-rich silty limestone. Variable granule content of silty limestone matrix, to absent in patches. Minor authigenic quartz crystals at 111 to 116 ft. Granules dominate over silt in the upper beds. Depositional model suggests that: (i) a buff, calcareous and/or dolomitic siltstone was being deposited on a shallow shelf, with (ii) periodic and energetic influxes of quartz sand and granules that were transported and worked by strong currents, probably in intertidal channels, (iii) periodic inputs of archaeocyathan limestone rubble from a raised part of the platform, and (iv) persistent reworking of the combined deposit by repetitive high-energy tidal currents. The input of granules and the input of limestone clasts into the zone of reworking need not have been simultaneous or otherwise linked.
116 to 134	Light grey, clean, archaeocyathan limestone boulders being replaced by a darker grey limestone as boulders to 600 mm, and with cobbles to 150 mm of dark quartz-granule limestone, both in a buff silty limestone matrix. Clasts poorly rounded, and unsorted.
134 to 156	Massive, thick bedded, scarp-forming, very dark brown weathered, quartz sand and granule-rich silty limestone. Hydrothermal alteration of the carbonates, including silicification and minor mineralisation (chalcopyrite and other sulfides; weathered to secondary copper minerals).
At 156	Fault zone, with crush, silicification, vein calcite, and copper mineralisation; numerous slickensides. Traverse terminated and continued from the eastern edge of the fault zone.
156 to 172	Megabreccia, with (i) to 80% light grey, clean, archaeocyathan limestone pebbles to small boulders; and (ii) to 10% buff, quartz granule-rich silty limestone cobbles (current reworked), all in a buff to yellow silty to part quartz granule-rich limestone (part dolomitic) matrix. Silicified patches.
172 to 180	Buff, thick bedded, sandy to quartz granule-rich limestone; part silicified. Same bed as K/100 ft, indicating a 72 ft throw on the fault.
180 to 188	Rubbly zone with megabreccia facies and silty limestone blocks.
188 to 200	Bedded (to 1 m at 192 ft) granule-rich buff limestones and breccia; with large limestone boulders at 195 to 200 ft.
200 to 275	Megabreccia, with clean darker-grey limestone boulders to 0.3 x 1 m and cobbles of quartz granule-rich silty limestone, both in a yellowish silty limestone matrix. Rare quartz granules in the silt matrix. Archaeocyaths rare and silicified. Copper sulfides and secondary carbonates as minor disseminations. Dark limestone at 210 ft is same bed as K/130 ft, indicating a throw of 80 ft on the intervening fault. Numerous slickensides in silicified zones, with selective replacement of 'clean grey limestone' blocks by mineralising fluids, leaving the 'silty matrix limestones' unaltered. Much silica at 245 ft. Pale purplish limestone at K/240 ft is K/156 ft, for 84 ft of throw on the fault. Average throw is 79 ft, west block down. Silicification common to 275 ft with minor crush zones; some with angular limestone fragments (to ~150 mm) in a malachite matrix.

	Limestone is light grey, with few archaeocyaths and no coarse siliciclastics. Minor silty yellow mottling.
At 275	End, top, of Section K.

SECTION L

This section traverses an area of structural complexity; a major fault zone that includes steep reverse faults, stranded fault blocks, repeated section, and associated minor cross folds (*See* Geological Map Figure 2). Supplementary sections required.

0 to 49	**Unit 6**, Upper Mernmerna Formation, upper unit: part silty, light to medium slate grey, splintery, fine grained, laminated to very thin bedded (to 25 mm) to flaggy limestone with silt partings. Abundant, carbonised or silicified trilobite remains (mainly glabellae, and a pygidium); fewer from 34 ft. Less slatey and more medium grey from 15–46 ft. Silty above 46 ft.
49 to 59	Very massive, blocky, 1.5 m beds of reworked Mernmerna Formation-type grey flaggy limestone; light to medium grey with 20 mm sub-rounded limestone pebbles. Some clasts to 30 x 130 mm, with rare transported archaeocyaths and trilobite debris in a yellowish silty carbonate matrix. This horizon considered to be equivalent to the major syn-depositional slump zone in sections to the south, and may here represent the tail end of the slump debris, distal to its source. Pebbles rounded on the carbonate platform and carried as debris flows into the adjacent trough?
59 to **78**	Medium grey, laminated to flaggy limestone, dark weathering, silty laminated beds at 77 ft and 79 ft as minor ridges.
78 to **90**	**Unit 7**, Moorowie Formation, Pinyatta Member?: dark weathering, silty laminated limestone with graded peloidal (buff to grey grains, irregular, to 1.2 mm) interbeds to 150 mm-thick with round quartz granules to 10% at the base, to dark weathered silty carbonates at the top.
90 to 93	**Unit 8**, Moorowie Formation, Wookata Shale Member?: thin beds (30–50 mm) of dark brown weathered, silty limestone alternating with interbeds (300–900 mm) of khaki-green shale (relates to top Section R). *Considered equivalent to the Oraparinna Shale of the Central Flinders Ranges to the west.* Here assigned to the Wookata Shale Member.
At 93	Significant reverse fault.
93 to **165**	**Unit 4**, Upper Mernmerna Formation, basal unit: poorly exposed (concave slope at foot of a large cliff). Rubbly, off-white (weathered?) to light grey, thin bedded, fine grained limestone with silt partings. No fossils evident. Grades to darker slate grey away from the fault at 150–165 ft. Peloidal, with minor quartz granules at 160 ft.
165 to 206	**Unit 5**, Upper Mernmerna Formation, middle lens: alternating beds of (i) massive to thick bedded (600–900 mm), medium to dark grey limestone, with mottling (buff to yellow weathered) from minor reworking and silt; at 165–172, 176–181, 192–206 ft, and (ii) medium grey, laminated to flaggy limestone with thin (25 mm) khaki green silt partings; at 172–176, 181–192 ft.
206 to 223	Rubbly, grey, thin bedded, part silty limestone with silt partings.
223 to **272**	Base of prominent cliff, with 2–3 m beds of massive, medium grey limestone with 600 mm mottled (silty) interbeds. At 250 ft, peloids (0.2–0.3 mm) in the limestone which grade to lighter grey. Rare quartz granules (3 to 4 mm).
272 to 308	**Unit 6**, Upper Mernmerna Formation, upper unit: rubbly, medium grey, slightly silty flaggy limestones.
308 to 318	Thick bedded (0.3–1 m), clean, peloid (light grey grains, 0.4–1 mm) limestone, with quartz granules and silt almost absent.
318 to 370	Rubbly, medium grey, thin bedded, part silty limestones; dark grey from 328 ft with abundant silicified fossils from 366–370 ft, including: (i) numerous (>100s) trilobites; probable redlichiid, up

	to 80 mm wide, with long occipital spines, extended genal spines, and large bulbous patterned eyes, (ii) hyoliths (~20), 12 mm long, with two parallel longitudinal and dorsal ridges on the cones, (iii) porifera, as 3 siliceous triaxial (hexactinellides) spicules, (iv) gastropod; a 12 x 20 mm semi-flattened cone with 5 or 6 circular ribs or plications along the length, of a form 'represented in the Cambrian limestones of Ardrossan, South Australia' (B. Daily, pers. comm. 1970), and (v) one conchostrid.
370 to 441	Medium to dark slate grey, laminated to flaggy limestone with thin khaki green silt partings, becoming lighter and alternating with thicker (to 150 mm) siltier limestone beds from 374 ft. Trilobites persist to 370, 410, 416, 424 ft. One massive (1 m) silty, mottled, slate grey limestone bed at 421 ft.
441 to 476	Massive, medium bedded (to 300 mm) to laminated, mottled, medium to dark grey silty limestone, peloidal in part. Rare trilobite remains. At 475 ft, a 50 mm silty to sandy limestone interbed with silicified archaeocyath and trilobite debris (siliciclastic influx; carrying the archaeocyaths, smothered the trilobites?). At 476 ft, a very rich trilobite horizon; bedding plane with large numbers of almost-complete silicified glabellae of *Yorkella* (*australis*?), and a few small transported archaeocyaths.
476 to 486	Part-siliceous, dark slate grey, laminated to flaggy limestone with thin khaki green silt partings and some trilobites. Silty at 480 ft with few trilobites.
486 to 502	Massive, medium bedded (to 300 mm) to laminated, mottled, medium to dark grey silty limestone.
At 502	Short lateral move, east.
502 to 551	Thin bedded (to 100 mm) to laminated, mottled and silty (graded), medium to dark grey limestone. Sparse sponge spicules; related to a thin, dark red-brown weathered siliceous layer at 537–538 ft? Small 300 mm ridge at 544 ft with buff-yellow silt influx and laminations, not mottling as at 546–551 ft.
551 to **583**	Thin bedded (80–100 mm), slate grey, flaggy limestone with thin khaki silt partings and 15 mm silty limestone interbeds.
At 583	Fault
583 to **590**	**Unit 7**, Moorowie Formation, Pinyatta Member? Fault zone: altered, medium grey limestone. Calcite veins.
At 590	Fault
>**590**	Umberatana Group, Tapley Hill Formation: green-grey siltstones. End, top, of Section L.

SECTION M

0 to 25	**Unit 1,** Wilkawillina Limestone: massive, clean, pale yellow weathered, light grey to white limestone, part peloidal (<0.2 mm) with abundant archaeocyaths and well preserved, small, phosphatic brachiopods (*Micrina sp*., 1970); very abundant above 5 ft. Stylolites common. Jasper vein (~150–600 mm wide) in fault with ~300 mm throw; east block down. Possible hyoliths to 16mm diameter. Grades to dark grey mottled limestone at 22 ft.
25 to 35	Massive, pale orange weathered, less mottled, light grey to white peloid limestone with archaeocyaths and tabular (to 20 x 60 mm) pale yellow, dolomitic siltstone clasts. Stylolites.

35 to 65	**Unit 2**, Mernmerna Formation, lower unit: slope concavity; rubbly, clean, light grey laminated limestone with archaeocyath fragments. Orange mottling on joints. Ridge forming bed at 47 ft with 3 mm brachiopods at 50 ft; less laminated and lighter grey. Concave surface at 54 ft with finely laminated light grey limestone. Pink and purple-grey patches at 56 ft.
65 to 117ft	More massive, light grey, laminated to flaggy limestone with a few archaeocyath fragments and small brachiopods. Darker medium grey, very thin bedded (~25 mm) limestone at 66 ft. At 75 ft, 15 mm purplish silty limestone interbeds. Dark grey from 75 ft with a trilobite spine at 80 ft and a 150 mm bed of 25 mm silty interbeds. Scarp at 85 ft of medium grey, laminated to flaggy limestone with 150 mm siltier interbeds. Light grey from 95 ft and finely laminated. Single 1 m bed of silty, sandy, peloid limestone at 104–107 ft, followed by light grey, very thin bedded limestone to 117 ft. Abundant silicified trilobites at 114 ft, 115 ft but difficult to extract in the field; successful acid etch (hydrochloric) in the laboratory (Specimens A343/M-Stn.4).
117 to **130**	Very massive, dark grey to pale grey in part, mottled (silty) to part sandy limestone. Bed at 104 to 107 ft thins from 1 m to 300 mm at 60 m due north, with the 10 ft interval 107 to 117 ft reduced to ~80 mm.
130 to 146	**Unit 3**, Mernmerna Formation, Bendieuta Member: very massive, dark brown weathered, pale pink to pale orange or grey, thick bedded, fine calcareous sandstone to finely sandy (quartz, <0.2 mm, well sorted, well rounded, spherical, and part graded) limestone. Sandy intervals, as at 145 ft, grade to lighter grey peloid limestone.
146 to 232	Pale grey weathered, pale pink, orange, yellow to light grey peloid limestone. Peloids very well rounded, spherical to ellipsoidal (long axes to 1.6 mm). Archaeocyath fragments and abundant brachiopods at 147 ft. Some sandy mottling in patches. At 154 ft, buff-yellow, laminated silty dolostone as a few pebbles (~20 mm) and a cobble (60 x 150 mm). Very thick beds (~2 m) of massive, sandy, peloid (~10%) limestone at 146–160 ft (Specimen A343/M160). Some lighter pale purple-orange to pale pink or buff, medium to thick, less sandy peloid limestone beds, followed by 10–25 mm very sandy interbeds. Sand is medium to coarse (av. 0.5 mm), well rounded, highly spherical, moderately well sorted, frosted quartz: possibly aeolian. Carbonate clasts (av. 0.7, rare max. 2 mm) are pale orange to light grey, part dolomitic, spherical to ellipsoidal. Rare darker grains. Less sand at 170–210 ft, contributing to mottled textures and buff-grey weathered outcrop. One bed to 4.6 m thick. At 131 ft, peloid diameters average 0.3 mm, maximum 0.7 mm. Colour is purplish-grey. Some quartz granules.
232 to 510	Alternating interbeds of : (i) pale pink to purple-buff, light grey, oolitic to highly peloidal limestone, with variable coarse quartz sand or granules (av.1 mm; well rounded, spherical; weather-out to a sandpaper texture) at 281–290, 297–316, 320–406, 425–510 ft, and (ii) mottled (silty) buff to part-pink, light grey peloid limestone with some quartz sand, at 277–281, 290–297, 316–320, 406–425 ft. Dark weathered and granule-rich limestones towards 510 ft with small, angular, pale yellow silty dolostone pebbles

	(to 50 mm) and red (orthoclase?) granules to 3 mm (relates to Unit 3 in Section C). Uncertain possible passage zone from Unit 3 into Unit 4, above, compared to a sharp contact in other sections.
510 to 537	Poor exposure; as for Section N, 0 to 35 ft. Top of Section at 510 ft.

SECTION N (Start at 510 ft, Section M)

0 to **35**	**Unit 4**, Upper Mernmerna Formation, basal unit: weathered zone to 2 ft; medium to dark slate grey, laminated to flaggy limestone with khaki green silt partings. Part peloidal at base, above Unit 3. Trilobite and siliceous debris at 5 ft. Small brachiopod (*Lingula sp.*?) at 27 ft.
35 to 65	**Unit 5**, Upper Mernmerna Formation, middle lens: massive, cliff-forming, medium bedded (major partings at ~1m), pale yellow to medium grey, part silty, finely peloidal limestone, with a few silty dolostone pebbles. Brown weathered, pale orange to pink (silty) to medium grey, mottled, laminated at 36–38, 42 ft. Grey, non-silty limestones weather grey. Sand on weathered surfaces at 50–60 ft with rare quartz granules and small pebbles to 5.5 mm.
65 to 75	As below, grading to a mottled (silty), dolomitised (in patches; pale yellow to pink) medium grey limestone to pale yellow dolostone. Rare quartz granules.
75 to 89	Dark slate grey, laminated to flaggy limestone with khaki green silt partings. Archaeocyath fragments and abundant trilobites at 81 ft.
89 to 100	Purple to pale pink, fine grained, peloid limestone (as for Unit 3, below). Peloids well rounded (av. 0.6 to max. 1.1 mm) in a clean, light grey carbonate matrix with 1 x 3 mm authigenic quartz crystals. Massive, light pink to buff, finely peloidal, calc-siltstone (with quartz granules) from 96 ft.
100 to 123	Dolomitised (patches to 5%) mottled grey limestone (resembles Unit 5, Section C/265 ft). Rare archaeocyath fragments with small brachiopods at 110 ft. Pale buff, silty limestone at 117–118 ft. Contact at 123 ft includes stylolites, pyrolusite band.
123 to 140	Mottled grey limestone as 50–80 mm beds, alternating with pale yellow dolomitised limestone interbeds 20–50 mm thick. Relic ooids?
140 to 170	Pale pink to off-white, coarsely silty to finely-sandy peloid limestone; part-dolomitised (patches transect and obliterate bedding). Medium grey, mottled, at 167–170 ft. Silt and fine sand is mostly quartz, some to 0.2 mm. Archaeocyath fragments at 138, 142, 148, 150, and 159 ft. Pink horizon at 160–167 ft may indicate exposure. Rare, small pebbles of pale yellow dolomitic siltstone.
170 to 182	Distinctive interbed; very dark, almost black (mauve-lilac patches in darkest beds; vanadium salts?), laminated to flaggy (av. 80–100 mm, to 250 mm) limestone with khaki green silt partings (10 to 15 mm). Minor silt, no quartz granules. Trilobites at 74ft (Specimen A343/N-7D). Passage into bed above.
182 to 241	Part mottled, medium grey, part-dolomitised (pale yellow, patchy, to banded 223–241 ft) peloid limestone, and dolostone. Massive, part pink, at 202–205, 212–223 ft. Darker grey at 235–241 ft. A few small pebbles of pale yellow dolomitic siltstone. Silicified archaeocyath cups at 241 ft. Passage into Unit 6, above. Break in slope; base of Unit 6 may be lower?
241 to 255	**Unit 6**, Upper Mernmerna Formation, upper unit: medium grey, slightly silty, laminated to flaggy (to 100–130 mm) limestone. Slightly mottled (silt) in some beds. Mauve (vanadium salts?) to purplish in 50 mm patches. Brachiopods, hyoliths (to 12 x 60 mm, with dual dorsal ridges), and abundant silicified trilobite fragments (redlichiids with long, 80 mm, occipital spines); few at 250 ft. Unusually complete, but transported archaeocyaths at 245–250 ft. Dark, black chert nodules (some to 25 x 150 mm) in a 70 mm gritty limestone bed at 255 ft.

255 to 280	Medium grey, slightly silty, laminated to flaggy (to 100–130 mm) limestone, as below, but fewer fossils; trilobites (occipital spine) at 265 ft. Some transported archaeocyaths with chert nodules and bands. Mauve silty mottling at 250–265, 270–275 ft; siltier at 275–280ft. Grades to darker more-massive and mottled flaggy limestone at 260–265 ft; variable along strike.
280 to 286	Calcareous sandstone bed (150–200 mm; sand influx) grading up to silty limestone above. Silty dolostone intraclasts in a 150 mm bed at 280 ft. Rubbly, concave slope at 286–290 ft.
286 to 297	Massive, mottled (silty) medium grey limestone with abundant cup-like archaeocyaths at 295–296 ft, with silty patches at 297 ft. Resembles 'archaeocyath marker bed' of Section C/360 ft and elsewhere.
297 to 298	Mottled (khaki silt), medium grey rubbly to flaggy limestone.
298 to 300	Massive, mottled (silty) grey limestone with transported archaeocyath debris at 299 ft.
300 to 336	Slate grey, splintery, slightly silty, laminated to flaggy (to 800 mm) limestone with khaki green silt partings to ~20 mm. Abundant trilobites, especially at 302–305 ft (then in places to 336 ft) with large occipital, genal spines to 75 mm (redlichiid?). A foetid sulfurous-to-petroleum odour to some beds, recalling trilobite horizons at Balcoracana Creek and elsewhere in the Flinders Ranges. Small brachiopods at 204 ft.
336 to 337	Distinctive dark rust-brown weathered silty limestone marker bed.
377 to 340	Tuff? Unusual, weathered, part-rubbly, bright-greenish siltstone with thin laminations of grey limestone; no apparent fossils. Recalls 'blue-green' sandstone-shale marker beds of other sections, considered to be reworked tuffs of volcanic origin.
340 to 357	Slate grey, splintery, slightly silty, finely laminated (345–357 ft) to flaggy (to 800 mm) limestone with khaki green silt partings to ~20 mm. Very abundant trilobites (black carbonised; mainly heads, glabellae) at 350–357 ft (Specimens A343/N-CG8 D). Relates to Section D/60 ft?
357 to 360	Mottled (silty) grey limestone, laterally variable.
360 to 365	Slate grey, slightly silty, finely-laminated to flaggy limestone with khaki silt partings. Abundant trilobites (black, carbonised) at 362 ft; as for Section D/60 ft.
365 to 374	Mottled (silty), medium grey, irregularly finely-laminated to flaggy (to 130 mm) limestone.
374 to 380	Finely-laminated to flaggy (to 800 mm) limestone with khaki green silt partings.
380 to 430	Cliff-forming, fine to thickly-laminated, part silty (as at 420–430 ft), light grey limestone. Rare transported archaeocyaths at 385 ft.
430 to 445	Light to medium grey, laminated to flaggy limestone with khaki green silt partings.
445 to 452	Mottled (silty), medium grey, laminated to flaggy limestone.
452 to 473	Part mottled, light grey, finely-laminated to part-flaggy limestone. Rare, transported archaeocyath fragments at 445 ft.
473 to 486	Mottled (silty), medium grey, laminated to flaggy limestone.
486 to 506	Poor exposure; medium grey, laminated to flaggy limestone with mottled (silty) to thin shale interbeds. Rare siliceous debris with trilobite spines.
506 to 525	Massive silty, buff to grey limestone; not mottled, but a laminite due to thin layers of silt. Irregular bedding at 515 ft grading to partly mottled above, with rare silicified trilobite debris.
525 to 526	Abundant, dark brown weathered, nodular chert in a massive silty limestone. Trilobite fragments at 526 ft.
526 to 554	Light to medium grey, laminated to flaggy limestone, with silt partings.
554 to 558	Very thick bed of dark brown weathered, silty limestone. Marker bed, related to Section C.
558 to **564**	Poor exposure; inferred medium grey, laminated to flaggy limestone, with silt partings.
564 to 644	**Unit 7**, Moorowie Formation, Pinyatta Member: massive, very thick bedded, buff to grey, silty to sandy peloid limestone. Dolomitic siltstone intraclasts to 50 mm near base; more abundant in

	siltier beds above with fine to coarse quartz sand and granules (to 2 mm, angular to sub-rounded), above; fewer clasts at 590 ft, abundant at 601–605 ft; rare from 605 ft. in a light to medium grey peloid limestone with silty to sandy ~1 m wide cross-bedding to 120 mm thick. No obvious fauna. Quartz sand is coarse, grading to granules (to 2 mm). Light grey peloid limestones towards 644 ft, with less silt.
644 to 647	Light to medium grey, clean, archaeocyathan (regular, large, well preserved) limestone, with pale yellow dolomitic siltstone pebbles.
At 647	Lateral shift of section, 60 m north.
647 to 654	Light to medium grey, clean, archaeocyathan limestone.
654 to 660	Massive, pale pink to red-purple, sandy, peloid (0.1 mm) limestone. Archaeocyaths absent? Some red (orthoclase or jasper?) grit.
660 to 714	Massive, ferric red (silty) thick bedded, limestones with quartz sand and granules. Grey above 709 ft.
At 714	End, top, of Section N. Red silts in strata above 654 ft relate to top of Sections B and R, and to red shales of Unit 8 to the north.

SECTION O

0 to 40	**Unit 6**, Upper Mernmerna Formation, upper unit: medium grey, slightly silty, thinly laminated to flaggy limestone with some well-rounded grey limestone pebbles to cobbles (to 80 mm) at 30–40 ft. Current reworking?
40 to 43	Syn-depositional slump horizon, with current-reworked and slump-folded to brecciated, grey, laminated to flaggy limestone in a buff to olive green, silty, carbonate matrix. One massive sub-rounded boulder (2.1 x 4.6 m) of dark grey limestone (an unfamiliar rock type) with differential compaction and drape of the overlying laminated to flaggy limestone beds; some deformation of a semi-lithified substrate. *Note: consider correlation potential of slump horizons, and any potential as isochrons; seismic triggering etc?*
43 to 95	Medium to dark grey, part slightly silty, thinly laminated to flaggy limestone (43–45, 46–58, 63–69, 75–95 ft) with greenish silt partings. Thick laminations from 78ft; massive (silty) with 20–80 mm beds from 79ft. Dark weathered silty limestone marker bed at 52–53 ft. Syn-depositional slump horizons, as below, at 45 ft (0.2 x 2m lens), 58–63 ft, 69–75 ft (rubbly at 72–75 ft). Periodic debris flows indicated, into anoxic deeps below storm wave base.
95 to 107	Very massive, 1–4 m beds, of silty to sandy, buff to grey limestone. Silt weathers out buff and in bands with sandy interbeds inserted by currents and debris inflows, into grey flaggy limestones. Sands grade to quartz granules in part, to define large scale (1–2 m wide) low-amplitude cross-beds.
107 to 114	Small scale syn-depositional slump, within *in situ* mottled (silty) limestone; with quartz granules at 95–107 ft. Current-reworked, with siliciclastic debris inflows.
114 to 116	Reworked tuff? Distinctive bed of friable, pale epidote green to turquoise blue or whitish, finely arenaceous siltstone with small rounded pebbles of medium grey limestone (derived from grey flaggy limestones, as below).
116 to 120	Massive, very thick bedded, silty to finely sandy, buff to medium grey limestone; as for 95–107 ft.
120 to 122	Intra-formational slump, or oligomict breccia, with angular, elongate slabs (intraclasts, to 150 mm) of 'buff to medium grey limestone' and dolomitic siltstone (to 50 mm) in a silty limestone matrix, with accessory quartz granules. Syn-sedimentary slumping of semi-lithified carbonates indicated, associated with debris flows and bottom currents.

122 to **146**	Alternations of: (i) medium grey laminated to flaggy limestone at 122–124, 126–145 ft (with dark brown weathered, silty laminae as resistant layers), with (ii) syn-depositional slump facies at 124–126 ft; and at 145–146 ft, including peloid limestone, with pebbles of medium grey limestone, and a few quartz granules. Passage to Unit 7, above, is indicated.
146 to 171	**Unit 7**, Moorowie Formation, Pinyatta Member: dark brown weathered, massive, cliff-forming peloid limestone with bedding (part-graded) accentuated by very coarse quartz sand (as at 168–171 ft; beds to 150 mm) at the base, to buff-yellow silt at the top. Peloids (av. <1 mm) buff to light grey.
171 to 185	Beds to 600 mm of current-reworked 'grey flaggy limestones' in a quartz granule-rich, silty to sandy part-peloidal limestone matrix, as for syn-depositional slumps below.
185 to 192	Dark brown weathered, massive, pink to grey, quartz granule-rich (to 20%, well-rounded spherical grains), silty to sandy peloid limestone. Includes poorly sorted, buff to light grey carbonate sand to fine pebbles (to 9 mm). Other granules include feldspar (?) and opaques.
192 to 196	Coarse peloid limestone; bimodal clastics with fines (av. <1 mm) and medium grey limestone pebbles (av. 10 mm, max. 30–40 mm).
196 to 200	Poor exposure.
200 to 206	Current-reworked 'grey flaggy limestones' in a very silty to sandy limestone matrix, as below.
206 to 214	Medium bedded, mid grey limestone with silty interbeds and some quartz granules to ~8%.
At 214	End, top, of Section O.

SECTION P

The succession exposed in this area is heavily faulted, largely sub-parallel to the bedding, with the potential for excised or repeated intervals. Further, bedding may be obscured in the more massive limestones by dolomitisation, recrystallisation, or deformation. Large calcite veins occupy vugs and fractures. The observations should be considered together as 'indicative of the whole'.

0 to 25	**Unit 1**, Wilkawillina Limestone: massive, pale yellow, part pale pink, buff-brown, to light grey, part silty, archaeocyathan (abundant, with 'irregular' forms; do not weather-out) limestones. Some pyrolusite dendrites. Internal structures obscured by dolomitisation and recrystallisation; infer very fine grained primary carbonate with minor silt and rare quartz sand. Rare chert nodules, abundant small phosphatic brachiopods weathered-out as small white crescents (*Micrina sp.*). Unaltered, non-silty, limestone as light to medium grey patches (to 40% of exposures) to 300mm. Minor calcite veins and vugs to 80 mm wide.
25 to 45	Generally as below, buff to pale yellow, with silt and some well-rounded to moderately spherical coarse quartz sand to 1 mm. Peloidal (ellipsoidal carbonate grains, reminiscent of archaeocyath framework components, to 0.3 mm, av. 0.5; to 0.9 mm at 30 ft), to oolitic (grains to 0.8 mm) patches. Small red jasper vein. Fewer archaeocyaths.
45 to 250	Massive, pale limonitic yellow, dolomitised archaeocyathan (to 50 mm diameter) limestone with fine sand and silty patches. Bedding (2 m thick?) obscured by recrystallisation. Part sideritic? Tectonic breccias parallel to dominant joints and across bedding. Quartz sand and granules (av. 2 mm) to 1% at 65–70 ft. Minor calcite veins. A few peloids to 0.6 mm at 70 ft. No obvious fauna. Change to brown-buff (silty and/or sideritic?) to khaki at 90 ft, with manganese oxide stains to above 110 ft. Massive, with rare (relic?) peloids and vugs of sparry calcite. Fault breccias persist with cross-cutting travertine veins at 140 ft. Solution cavities as small caves. Highly irregular, blocky, vertical faces. Yellowish from 150 ft. Succession part duplicated by faulting? Massive, part-brecciated, pale yellow, part-silty, dolomitised limestone facies with relic peloids, as below; no quartz granules or overt fossils. Minor calcite veins.

250 to **280**	Unreliable outcrop; 1.2 m wide calcite vein and fault breccias.
At 280	Fault; part Unit1 and Unit 2 (part Unit 3?) deleted.
280 to 310	**Unit 3**, Bendieuta Member: massive, buff, silty peloid limestone with quartz sand and granules.

SECTION Q

0 to 3	**Unit 5**, Upper Mernmerna Formation, middle lens: massive, clean, light to medium grey, rarely silty, limestone with rare, transported, silicified archaeocyaths. Limonitic vugs and archaeocyath geopetal infills, after siderite (?). Small (pebble size), angular, dolomitic siltstone clasts at 3 ft (as for Unit 5, Section B).
3 to 8	Poor outcrop; infer medium to dark grey, part slightly silty, thinly laminated to flaggy limestone.
8 to 9	Massive, mottled (silty; sideritic?) medium grey limestone.
9 to 12	Reworked tuff? Distinctive bed of shaley to rubbly, pale epidote green-grey to turquoise blue, finely arenaceous siltstone. As for Sections N, S.
12 to **22**	Thick bedded, mottled (silty; sideritic?) medium grey limestone. Rubbly at 14–16, 18–21 ft. Archaeocyath fragments at 21 ft.
22 to130	**Unit 6**, Upper Mernmerna Formation, upper unit (Unit 5–6 contact possibly lower): medium grey, homogeneous, fine grained moderately-laminated to part flaggy limestone with very minor silt (as above 63 ft) weathering-out pale buff-yellow. At 40–43, 50, 63–85 ft, abundant carbonised, black, siliceous trilobite (redlichiid, and other) remains; weathered-out glabellae on slabs; very numerous along strike. Thin interbeds with archaeocyaths (to 150 mm long; syringocnemines) and small dolomitic siltstone clasts. Hyoliths at 40 ft. Minor faults to 1.5 m throw. Dark weathered silty grey limestone marker beds at 92–92, 97 ft. Poor exposure towards 130 ft.
130 to 165	Megaclast to ~10 m of massive, clean, light grey archaeocyathan limestone, as for 18 m exotic block in syn-depositional slump zone with collapse talus near top of Unit 6, Section D; and others. Clast bedding discordant with regional dip. Host with abundant, tabular, dolomitic siltstone intraclasts.
165 to **190**	Poorly exposed, light grey, white mottled, laminated to part flaggy limestone with minor siliceous nodules (to 2 mm) and debris. Darker at top with marker bed at ~171 ft; mottled (silty), dark to medium grey above.
190 to 245	**Unit 7**, Moorowie Formation, Pinyatta Member (Unit 6–7 contact possibly lower): very massive, very thick bedded (2–2.5 m), light grey (part red), part mottled (silty), archaeocyathan limestone. Distinctive fossil preservation as white calcite in a clear to grey carbonate matrix; as for Unit 5 in Section B. Silt influx at 230 ft, leaving patches of clean grey non-silty archaeocyathan limestone. Less massive, white-mottled (part dolomitised?) with less silt and darker grey at 240–245 ft.
At 245	Probable fault (east down), with repeated succession.
245 to 270	Exposure poor; massive archaeocyathan limestones, with white fossils in a light grey matrix, as for 240–245 ft.
270 to 275	Poor exposure; grey silty laminated limestone inferred. At 275 ft, an unusual crumbly, khaki green, sandy siltstone (resembles Oraparinna Shale) in a recent burrow.
275 to 305	Unexposed; pale yellow to part red (?) silty limestones inferred.
305 to 317	Massive, thick bedded, dark greenish to dark grey homogeneous, part peloidal (pale orange, buff, to dark grey, grains av. 0.4–0.5 to max. 0.8 mm) limestone with a few quartz granules and rare archaeocyaths. Weathers to broad flat smooth surfaces. *Peloid limestones confirm Unit 7; no Unit 8 found, and no megabreccia found, as occur elsewhere for basal Unit 9.*
At 317	End, top, of Section Q.

SECTION R

0 to 30	**Unit 7**, Moorowie Formation, Pinyatta Member: massive, medium to dark grey limestone with silty interbeds. R/22 ft relates to N/645 ft.
30 to 59	Resembles N/654 ft. Dark brown weathered, pink to pale purple, peloid limestone with bands rich in silt, sand, or quartz granules (as define bedding), and some small dolomitic siltstone clasts, as at 55 to 57 ft. Increases to 15–20% granules at 40 ft. Gritty limestones as a matrix to lenticular conglomerates of clean (no quartz granules), purple-red, limestone pebbles (to 25 mm). Consistent with siliciclastic and limestone rubble influxes into shallow intertidal channels, for reworking by moderate currents. Lighter purple with few granules at 57–59 ft.
59 to 64	Purplish peloid limestone, as below, with large sub-rounded (poorly spherical) boulders of (i) pale yellow weathered, light purple, clean, fine grained limestone, (ii) light grey limestone with small dolomitic siltstone clasts *within* the boulder, (iii) other purple limestone fragments (at 60 ft), and (iv) rare, mottled, light grey archaeocyathan limestone.
64 to 80	Massive, cliff-forming, purplish limestone with a gradual loss of larger boulders, and a decrease of average clast size paralleled by a reduction in the quartz granule fraction, to a silty limestone above 80 ft.
80 to **115**	Purplish, silty, peloid (av. 0.3 mm) limestones, with quartz granules and rare dolomitic clasts and a change to light to medium grey peloid (av. 0.8 mm) limestone above 85 ft. Granules and coarse quartz sand more abundant, beds grading to pink-grey peloid (1.0 mm) limestone above 90 ft. More grey than pink from 90–96 ft, then pink. Limestone boulders together with carbonate peloids and abundant quartz granules (clear to smokey blue quartz, jasper-red feldspar grains, to 3 mm). Peloids (fewer) average 0.3 mm from 96 ft; granules persist, but pink-red shades lost at ~85 ft to the contact with Unit 8 at 115 ft.
At 115	Unit 7–Unit 8 contact based on the first appearance of green-grey silts.
115 to 125	**Unit 8**, Moorowie Formation, Wookata Shale Member: medium bedded, khaki green (weathered buff-yellow to black), argillaceous to silty (quartz), fine grained limestone. No quartz granules. Dark 20 mm elongate markings as possible (annelid?) trace fossils.
125 to **134**	Dark brown to black weathered, khaki green micaceous siltstone in resistant ~75 mm beds. Poor outcrop 125–134 ft. Resembles Oraparinna Shale of Central Flinders Ranges.
134 to 148	**Unit 9**, Moorowie Formation, Kandramooka Member: dark brown weathered; abundant, green-grey, angular pebbles to cobbles of siltstone as current rip-up intraclasts in a green-grey silty limestone matrix with abundant quartz granules. Shaley (interbed of Unit 8?) from 145 ft.

Passage zone from Units 8 to 9, with a sudden granule influx and moderate currents (Unit 9) superimposed on the 'khaki green siltstone' environment of Unit 8.

148 to 154	Quartz granule influx, as below. Dark brown to black weathered, silty limestones with resistant siliciclastic bands, as graded beds, standing proud of the rock face as a sandpaper texture (Specimen A343/R150); less so for ~50 mm silty interbeds.
154 to 156	Red-brown micaceous siltstone, as a possible intertongue of (green) shales of Unit 8, as below.
156 to 159	Quartz granule influx, as below; dark brown to black weathered, silty limestones with resistant siliciclastic bands.
159 to 165	Massive, dark brown to black weathered, medium bedded (150–280 mm), buff to off-white, silty, fine grained limestones, devoid of granules and obvious fossils. Boulder conglomerate

from 157–160 ft, with sub-rounded blocks to 1.8 x 2.4 m, largely of light grey, clean, archaeocyathan (abundant; two orders) limestone (Specimen A343/R140; as *in situ* in Unit 9, Sections F, G, H, and others). Accessory, small, pale yellow dolomitic siltstone intraclasts *within* the limestones boulders. Conglomerate matrix is a greenish silty quartz granule-rich limestone, as below, but with large (1–2 m wide) low-amplitude (variable, to ~300 mm) cross-beds defined by the grit, and swirled (part differentially-compacted?) around the megaclasts. Limestone boulders include purple-pink to white-mottled rock types, similar to (but younger than) top of Unit B.

Limestone masses may in part be in situ bioherms or reef pinnacles, replete with framework-building organisms; notably the abundant archaeocyaths but including white branching biogenic frameworks, up to ~200 mm high (considered in the field to resemble bryozoans or corals in appearance), probable sponges, and the encrusting calcimicrobes Epiphyton and Renalcis. Architecture is largely intact within the masses, and some structures appear to be in growth position, perpendicular to the bedding; unless orientation is by chance, in tumbled clasts. Archaeocyath cups are part-filled with 'green silt quartz-granule limestone' components, demonstrating a siliciclastic overprint, such as by tidal or storm-surge currents, to a low-turbidity reef environment. Alternatively, if blocks of clean limestone were shed from distant sources, they must have been well-lithified to survive, leaving few cups available to receive the grit infills. A local or in situ origin for the reef facies is favoured.

At 165 — End, top of Section R.

SECTION S

Section S begins at a prominent fault zone.

–22 to **4** — **Unit 5**, Upper Mernmerna Formation, middle lens: poorly exposed, dark weathered (some mauve patches), buff to pale yellow or white (dolomitised), part mottled, medium bedded, slightly silty limestone.

At 4 — Significant fault; truncated beds, with east block down with loss of all but top of Unit 6.

4 to **82** — **Unit 6**, Upper Mernmerna Formation, upper unit: medium grey, slightly silty, laminated to flaggy (100–130 mm) limestone; siltier, part mauve, at 30–31 ft. Abundant siliceous trilobite (occipital spines) and archaeocyath (syringocnemines, as for Section Q/40 ft) debris over 800mm at 27 ft, and 45–46 ft. Laminated, pure white (calcitic) travertine at 10 ft. Some minor (drag?) folding at 20 ft. Siliceous bed (750 mm) at 55 ft; limestones grading to dark grey. Light grey limestones at 55–65 ft with minor siliceous rubble. Laterally, syn-depositional debris flows with scattered boulders of light grey archaeocyathan limestone from ~40 ft, and one large boulder above 65 ft. Relates to Section Q/165–178 ft, 240–244 ft, and Section D.

At 82 — Complex area; faults sub-parallel to bedding. Moved ~45 m north.

82 to 125 — **Unit 7**, Moorowie Formation, Pinyatta Member: massive, purple-ferric red, white-mottled, clean, archaeocyathan limestone (as for top Section B?), with orange-mottled light grey limestone above.

At 125 — End, top of Section S.

SECTION T

0 to 5 — **Unit 7**, Moorowie Formation, Pinyatta Member: poorly exposed, massive, buff to light grey limestone with sideritic (?) patches and some transported archaeocyaths. Rare, small, dolomitic siltstone clasts.

5 to 25	Ferric red to purplish, mottled white, clean, archaeocyathan limestone (as for top Sections B, S, and others). Distinctive white fossils (including irregular forms) well preserved in the red silty limestone matrix. Dolomitic siltstone clasts at 8–10 ft. Some grey limestone at 10–25 ft.
25 to 57	Semi-massive, light grey (not purple) to pale yellow (part-silty), mottled white (dolomitised?), archaeocyathan limestone with patches of clean, very light grey limestone. Resembles Unit 7 at top of Section E.
At 57	Small fault sub-parallel to bedding inferred, from evidence to the south. Repeated or deleted section?
57 to 80	**Unit 8**, Moorowie Formation, Wookata Shale Member? Weathered shales with grey to pink, laminated, shaley limestone interbeds; some peloidal in part (cf. Section V/0-16 ft). Buff to darker grey from 70 ft. Interpreted as remnants of Unit 8, partly faulted-out along the bedding, between massive limestones of Unit 7 and Unit 9.
80 to 93	**Unit 9**, Moorowie Formation, Kandramooka Member: medium bedded, light to medium grey, peloid (0.5 mm, pale orange to grey) limestone with minor quartz granules (resembles Section Q/305 ft).
93 to 130	Pale pink, buff, mottled white, slightly silty, archaeocyathan limestone (as for Unit 9, Section F). Mottled with fewer archaeocyaths above 120 ft, with buff silty intervals in a light grey to white (recrystallised, dolomitised patches?) limestone.
At 130	End, top, of Section T.

SECTION U (resembles Section V)

0 to **186**	**Unit 8,** Moorowie Formation, Wookata Shale Member: purple to ferric red (some lighter laminations) finely micaceous shales. Green and purple from 35–45 ft; purple with resistant beds at 115–123 ft.
186 to 203	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: light grey, clean, archaeocyath-rich limestone cobbles to small boulders in a purplish silty limestone matrix, with quartz granules, at base. Clast rock types or breccia characteristics include: (i) boulders of: a. dark weathered, buff, quartz granule-rich silty limestone pebbles, together with b. light grey archaeocyathan limestone cobbles; (ii) boulders of type (i) with a purple silty limestone matrix; (iii) cobbles of purple silty limestone; (iv) quartz and red feldspar as coarse sand to granules in a silty limestones comprising most of the breccia matrix; (v) free archaeocyaths in the main matrix limestones, but with a purple granule-rich silty limestone fill to the cups, set in a purple silty limestone matrix; (vi) archaeocyaths with a limonitic yellow silty limestone fill to the cups; (vii) purple silty limestone with small columnar stromatolites (Specimen A343/U187); and (viii) cobbles of medium grey, clean, archaeocyathan limestone. Persistent reworking of breccias, over an extended period (allowing lithification of earlier deposits), by moderate tidal currents is indicated.
203 to 213	Purple (to 205 ft) to buff above 205 ft, quartz granule-rich silty limestone lenses, and a 300 mm bed.
At 213	End, top, of Section U.

SECTION V (unexposed below 0ft.)

0 to 16	**Unit 8,** Moorowie Formation, Wookata Shale Member: purple to ferric red, micaceous shales with green shale interbeds. At 10 ft, very thin beds (to 25 mm) of pale grey peloid

	limestone (compare with Unit 8, Section T) with rare red (orthoclase?) and green grit, as in Section G.
16 to 40	Unexposed; shales inferred.
40 to **132**	Dark weathered, mid-buff, massive but laminated to thin bedded, part peloidal limestone with red (orthoclase?) and green (reworked green siltstone?) grit. Small, angular, dolomitic siltstone pebbles to 20 mm. Thin (to 80 mm) silty limestone interbeds alternate with thin shaley partings. Granule-rich laminations to very thin beds at 41 to 50 ft alternate with green shale interbeds. 150 mm bed of silty yellow to grey peloid limestone, with angular green shale rip-up clasts at 45 ft.

Reworking of shales by moderate currents, associated with influxes of coarse siliciclastics, is indicated. Purplish shales from 45 ft with ripple marks at 61 ft and thin buff to grey limestone laminations at 61–62 ft; all purple shale above. Poor outcrop at 98–132 ft.

132 to 153	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: very massive, to very thick bedded (vague; to 2 m) breccia with indistinct sub-rounded, light to medium grey, clean, archaeocyathan limestone boulders in a mottled, buff to pale yellow, silty limestone matrix (<10% of breccia). Archaeocyaths commonly (~90%) almost complete, with long axes parallel to bedding and vaguely orientated towards N190°E; bases towards N100°E in one bed. Includes specimen 100 mm in diameter with walls 10 mm apart. Cups may be empty (recently weathered?), or filled with sparry calcite and/or limonitic yellow (after siderite?) silty limestone. Branching white biogenic frameworks, up to ~200 mm high, in some light grey limestone blocks. Some darker limestone clasts may have a different geographic or stratigraphic source.
153 to 188	Dark weathered, reddish to buff, quartz granule-rich silty limestone beds, similar to the mineralised horizons in Section K. Light grey limestone cobbles to ~150 mm, with pebbles to cobbles (to 50 x 100 mm) of quartz-granule limestone, both in a buff silty limestone matrix. Darker grey with few archaeocyaths and few light grey limestone blocks from 170 ft.
At 188	End, top, of Section V.

SECTION W

–3 to **0**	**Unit 9**, Moorowie Formation, Kandramooka Member, upper beds: massive, vaguely mottled (no silt), light to medium grey archaeocyathan limestone with a few small (<2 mm) pale orange cherty nodules. Rillenkarren surfaces developed. No obvious macrofossils.
0 to **97**	**Unit 10**, Moorowie Formation, Pack Creek Member: partly friable, purple micaceous shales or siltstones.
97 to 161	**Unit 11**, Moorowie Formation, Brillig Catch Member: laminated to thin bedded (to ~30 mm), clean to trace-argillaceous, homogeneous, splintery, microcrystalline (microbial?) limestone. No evident fossils. Certain equivalents in Sections G, H, J. Less uniform, part mottled, pale orange-buff to medium grey at 139–160 ft. Light to medium grey, silty limestone with darker interbeds at 158–161 ft. Yellow-grey (part silty?) dolostone at 145–160 ft. Prominent rillenkarren surfaces.
161 to **176**	Distinctive marker bed resembling stacked sheets of thick paper or card. Ultra-thin (0.1 to 1 mm) laminations of microcrystalline (microbial?) limestone or dolostone, with excellent thin partings of yellowish silt and clay. Cleaves into thin carbonate sheets; as for Sections G, H, J. At 163 ft, a 150 mm medium grey limestone bed with thin light grey laminations in a part-rubbly limestone, and abundant cherty debris as small clumps above to 165 ft. Light grey laminated limestone at 165–176 ft.

176 to 200	**Unit 12**, Billy Creek Formation: poor exposure with purple-red soils/scree; infer red-brown to green, part sandy, micaceous siltstones.
At 200	Fault, as eastern margin to a diapiric breccia dyke.
At ~203	End, top, of Section W.

SECTION X

<–30 to –22	**Unit 8**, Moorowie Formation, Wookata Shale Member: purple to ferric red, micaceous shales with green shale interbeds.
–22 to 0	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: (i) light grey, clean, archaeocyathan limestone cobbles to small boulders, and (ii) buff, quartz granule-rich silty limestone cobbles (current-reworked) in a buff-yellow silty limestone matrix.
At 0, 15	Suspected fault in valley, extending to Section X from a metabasic ~250 m SW. Slickensides, minor calcite veins at 15 ft. Section resumed across valley.
0 to 16	Massive block of light grey limestone with obscure bedding; no purple silt, no obvious archaeocyaths. Abundant, orange, siliceous nodules to 0.9 mm, as a 150 x 600 mm mass in one limestone block. Irregular rillenkarren surfaces.
16 to 105	Outcrop unreliable. Calcite veins, alteration, and minor faulting? At 20 ft, massive to rubbly, part mottled, pale orange to white (recrystallised), light grey archaeocyathan limestone; probable block, but bedding obscure. Certain megabreccia at 30 ft; massive to rubbly outcrop of sub-rounded boulders of light grey archaeocyathan limestone to 90% of interval, in a pale yellow silty limestone matrix with patches of rare quartz granules (to 3 mm), especially in peloidal interbeds. Gritty matrix limestone also as small pebbles to ~30 mm. At 70 ft, dark slate grey, white-mottled, massive limestone blocks, free of quartz granules.
At 105	Fault?
105 to 143	Outcrop poor. Sudden loss of dark grey limestone, as at 70–105 ft below. Pale yellow, silty, altered breccia at 110–114 ft, comprising: (i) ~80%; cobbles of a. clean light grey archaeocyathan limestone (to 150 mm) and b. cobbles (10%) of dark slate grey limestone in a silty limestone matrix, with (ii) ~10%; dark weathered, quartz granule-rich, silty limestone as cobbles to ~300 mm boulders. Both (i) and (ii) in a silty limestone matrix with quartz granules, small pale yellow dolomitic siltstone clasts, and light grey carbonate peloids.

Persistent reworking by moderate currents indicated, allowing for lithification then rip-up (and repeated rip-up) of earlier rock types.

	Silicified, mineralised, above 120 ft, weathering dark brown with malachite stains.
At 143	Top, end, of Section X.

SECTION Y

Complex area, adjacent to the major Arrowie Fault Zone. Measured from the eastern plains, west, up onto a ridge.

<–26 to **8**	**Unit 12**, Billy Creek Formation: poor exposure, with red-brown to green, part sandy, micaceous siltstones.
–20 to 8	Major fault; crush zone in red-brown micaceous siltstones. Throw exceeds 150 m.
8 to 125	**Unit 9**, Moorowie Formation, Kandramooka Member, upper beds: massive, light grey weathered, very thin bedded to flaggy, ooid limestone. Ooids highly spherical to 0.7 mm, with light grey (some orange) shells enclosing pale orange (weathered?) to purplish nuclei. Grains separate on weathering from the carbonate matrix. Some fine grey, to silty purple-grey, peloid (av. 1 mm) limestone interbeds devoid of ooids. No outcrop at 12–13 ft, then a

	light grey to pale pink, very fine (to 0.7 mm, highly spherical) ooid grainstone with 80–150 mm beds of light grey carbonate granules (to 2 mm). Coarser, less oolitic to more peloidal (av. 1.6 mm; brown weathered, light buff), with quartz (smokey blue grains; with some orange to red feldspar?) sand to 10% above 25 ft. Hyolith section at 12 ft. One irregular archaeocyath fragment at 59 ft. Coarse quartz sand, with minor red feldspar grains, to 20% of semi-massive, light buff, part silty, peloid limestones in lenses above 60 ft. Rare, 20 mm silty intraclasts. Base of cliff at ~115 ft.
125 to 230	Very massive, very thick bedded (to 1.8 m), light pink to pale buff (silty), peloid limestone with part-silty beds rich in coarse (av.1 mm) quartz sand related to moderate currents. Some red (orthoclase?) grains. Peloids persist, with some silt in part yellow to pale pink interbeds above 180 ft. Small brachiopod (?) at 170 ft; one archaeocyath fragment at 180 ft.
230 to 255	Grading to pale pink, richly peloidal (<1 mm; pale orange-red carbonate matrix) limestones with coarse (av. 1 mm) quartz sand from 240 ft.
255 to 280	General reduction to loss of siliciclastics, as for upper Unit 9 in other sections. Archaeocyaths return at ~260 ft; abundant at 280 ft, suggesting thriving meadows as the waters cleared. Light grey archaeocyathan limestone, non peloidal, some with a pale yellow silty mottling. *Lithofacies closely resembles the 'light grey archaeocyathan limestone boulders' of the* Kandramooka Member *megabreccia.* Transitional zone to 280 ft.
280 to 368	At 280 ft, a massive, poorly bedded, blocky, light grey archaeocyathan limestone with some pale red-orange, irregular, silty mottling. Some archaeocyaths filled with silt; others with sparry calcite in former voids. No peloidal beds observed. Chert nodules to 1 mm. Loss of fauna above 290 ft, with purplish patches in a massive to part-rubbly, light grey limestone. Silty, buff to pale yellow with fine mottling at 320, 351–368 ft. Possible microbial (stromatolite?) structures at 320 ft.
At 368	End, top, of Section Y.

SECTION Z

0 to **39**	**Unit 8**, Moorowie Formation, Wookata Shale Member: dark weathered (after siderite or chlorite?), part limonitic yellow (in joints), 50 mm interbeds of silty grey limestone in a passage zone above Unit 7, as at base of Section I. Accessory red and green grit at 7–8 ft. Linguoid sole and ripple marks common. Shaley from 8 ft with ferric red to purplish micaceous siltstones from 15 ft. Dark 25 mm interbeds at 15, 36–39 ft.
39 to **81**	Alternating dark, light to medium grey, sandy to part peloidal limestone and thin pale yellow (sideritic?) to grey limestone interbeds, grading to ferric-red to purplish micaceous shale at 55–57 ft. Dark at 77–81 ft, as 10 to 150 mm beds of sandy to part peloidal limestone, with red (feldspar?) and green grit.
81 to 101	**Unit 9**, Moorowie Formation, Kandramooka Member, megabreccia: passage zone from Unit 8 to Unit 9. Limestone megabreccia with matrix of red-to-purple (not buff) silty limestone.
101 to 132	Megabreccia: (i) ~90%, light grey, clean, archaeocyathan limestone cobbles to small boulders, and (ii) rare pebbles of buff, quartz granule-rich silty limestone, both in a buff-yellow silty limestone matrix. Absence of lenses and reworked clasts of quartz granule-rich limestones may indicate a northern source for the siliciclastics. Individual quartz granules are found in purplish silty limestone fill to archaeocyath cups, suggesting the fossil remains are not local and were transported from a sandy setting.
At 132	End, top, of Section Z. End of sections.

Ends

References

Betts, M. J., Paterson, J. R., Jago, J. B., Jacquet, S. M., Skovsted, C. B., Topper, T. P., & Brock, G. A. (2017b). Global correlation of the early Cambrian of South Australia: Shelly fauna of the *Dailyatia odyssei* Zone. *Gondwana Research, 46,* 240–279. Doi: 10.1016/j.gr.2017.02.007

Coats, R. P. (1973). *Copley map sheet*. Adelaide SA: Geological Survey of South Australia, Geological Atlas 1:250 000 Series. Sheet SH54-9.

Forbes, B. G. (1971). A table of Adelaidean and Cambrian stratigraphic names. *Geological Survey of South Australia, Quarterly Geological Notes, 38* (1–2), 5–6.

Jago, J. B., Gehling, J. G., Betts, M. J., Brock, G. A., Dalgarno, C. R., García-Bellido, D. C., Haslett, P. W., Jacquet, S. M., Kruse, P. D., Langsford, N., Mount, T. J., & Paterson, J. R. (2020). The Cambrian System in the Arrowie Basin, Flinders Ranges, South Australia*. Australian Journal of Earth Sciences.* doi:10.1080/08120099.2018.1525431

Lafuste, J., Debrenne, F., Gandin, A., & Gravestock, D. I. (1991). The oldest tabulate corals and the associated Archaeocyatha, Lower Cambrian, Flinders Ranges, South Australia. *Geobios, 24*, 697–718. Doi: 10.1016/S0016-6995(06)80298-6

Moore, P. S. (1979). Stratigraphy of the Early Cambrian Edeowie Limestone Member, Flinders Ranges, South Australia. *Transactions of the Royal Society of South Australia, 103,* 101–111.

Moore, P. S. (1980). Stratigraphy and depositional environments of the Billy Creek Formation (Cambrian), east of the Flinders Ranges, South Australia*. Transactions of the Royal Society of South Australia, 104,* 117–132.

Mount, T. J. (1970). *Geology of the Mt. Chambers Gorge region* (BSc. (Honours) thesis, unpublished). Adelaide SA: University of Adelaide. http:hdl.handle.net/2440/67162.

Reid, P., & Preiss W. V. (1999). *Parachilna, South Australia, sheet SH54-13* (second edition). *Geological Atlas 1: 250 000 Series*. Adelaide SA: Geological Survey of South Australia.

Wentworth, K. C. (1933). Fundamental limits to the sizes of clastic grains. *Science, 77*, 633–634.