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DEFINITIONS OF NEW STRATIGRAPHIC UNITS
IN THE SLIGAL AND HEDLEYS CREEK 1:100 000 SHEET AREAS,
NORTHERN TERRITORY AND QUEENSLAND

by

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ABSTRACT

This Report contains definitions of eleven new stratigraphic units which were recognised during semi-detailed mapping of the Seigal and Hedleys Creek 1:100 000 Sheet areas in 1972-74. All the new units are of Proterozoic age. The geology of the two Sheet areas is described by Sweet, Mock, & Mitchell (1981).

In the following summary the names of the newly defined units are underlined.

The Nicholson Granite Complex consists of several granite bodies formerly called the Nicholson and Norris Granites. The complex intrudes the Cliffdale Volcanics, the youngest member of which is the Billicumidji Rhyolite Member. The Nicholson Granite Complex and Cliffdale Volcanics form an east-northeast trending belt and are overlain unconformably to both the north and south by sedimentary and volcanic rocks. To the north is the Tawallah Group, containing the Seigal Volcanics. To the south is the Wire Creek Sandstone, which is overlain by the Peters Creek Volcanics containing the Buddawadda Basalt Member. Unconformable on these units is the Fickling Group, comprising the Fish River Formation, the Walford Dolomite, the Mount Les Siltstone, and the Doomadgee Formation. The youngest Proterozoic group south of the basement belt is the South Nicholson Group. The basal formation in the group is the Constance Sandstone, which contains three siltstone members; the youngest one is the Bowthorn Siltstone Member.

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NICHOLSON GRANITE COMPLEX

Derivation of name: From the Nicholson River in the Calvert Hills and Westmoreland 1:250 000 Sheet areas.

Distribution: An east-northeast-trending belt occupying over 600 km² in the southeastern Calvert Hills Sheet area (NT), and the southwestern Westmoreland Sheet area (Qld).

Type area: Between the Fish River and the Queensland/Northern Territory border, in the Calvert Hills Sheet area.

Lithology: The rocks vary from coarse, porphyritic hornblende-biotite adamellite, with xenoliths, through biotite granite, granodiorite, and porphyritic diorite, to leucocratic granite and microgranite. Quartz-muscovite greisen is a marginal phase in some areas.

Relationships and boundary criteria: The granite complex intrudes the Murphy Metamorphics and Cliffdale Volcanics - details are given below.

Age and evidence: See below.

Synonymy: The name replaces Nicholson Granite and Norris Granite.

The problem: The name Nicholson Granite Complex has been coined to avoid the continuing confusion over the names it replaces, namely the Nicholson and Norris Granites.

Carter (1959) assigned the name Nicholson Granite to adamellite and granite which intrude acid volcanics (the Cliffdale Volcanics) in the Westmoreland 1:250 000 Sheet area. Both the granites and acid volcanics crop out more extensively in the Calvert Hills Sheet area, which was examined by Roberts, Rhodes, & Yates (1963). They recognised two granites - the Nicholson Granite, which they considered to be older than the Cliffdale Volcanics, and the Norris Granite, which they considered to be younger than the volcanics. Isotopic age determinations seemed to bear this out (McDougall & others, 1965; Table 1) but contacts were poorly exposed and few conclusions could be drawn from field relations.

During semi-detailed mapping in parts of the Westmoreland and Calvert Hills Sheet areas in 1973 and 1974, Gardner (1978) recognised five major phases and two minor phases of granite, of which only one could not be shown to have intruded the volcanics. This is the oldest phase, Pgn₁, and it

occupies only a small part of the area previously mapped by Roberts & others (1963) as Nicholson Granite. All other phases intrude the volcanics and would, under Roberts & others' nomenclature, have been designated Norris Granite. This seemed unsatisfactory, since (a) Nicholson Granite had been used by Carter (1959) for these granites, and (b) it had not been shown that Pgn₁ was a separate granite, unrelated to the other phases. The name Nicholson Granite Complex was therefore proposed to embrace all the granites in the area.

The evidence: Phase Pgn₁, which cannot be shown to intrude the Clifffdale Volcanics, is in contact with a banded recrystallised rock which Mitchell (1976) assigned to the Clifffdale Volcanics. If the intrusion of Pgn₁ caused the rock to recrystallise, then clearly there is no granite older than all of the volcanics. Pgn₁ has yielded a Rb-Sr isotopic age of about 1840 m.y. (McDougall & others, 1965; AMDEL Report AN1814/73, unpublished; Table 1), and phase Pgn₂, which appears to intrude the Clifffdale Volcanics, has yielded an isotopic age of 1860 ± 103 m.y. (AMDEL Report AN2850/75, unpublished). Other phases of granite have yielded ages as young as 1705 m.y. (AMDEL Report AN2850/75). An age of 1773 ± 24 m.y. from an isochron representing samples from Pgn₂ and Pgn₅ is virtually identical with the age of 1770 ± 20 m.y. for the Clifffdale Volcanics.

Conclusions: Isotopic age determinations suggest that some of the granites in the area are older than some of the Clifffdale Volcanics. Although it seems likely that the granites may have been intruded during a period of nearly 100 m.y., it is possible that the volcanics were also extruded over a long period. Many of the volcanics are ignimbritic and have not been dated. Future zircon dating may help resolve the issue, but in the meantime the name NICHOLSON GRANITE COMPLEX is to be applied in place of Nicholson and Norris Granites.

TABLE 1. SUMMARY OF THE GEOCHRONOLOGY OF THE NICHOLSON GRANITE COMPLEX

Reference and sample number	Material dated	Comments	Method	Granite phase (Gardner's mapping)	Age in millions of years
<u>McDougall & others (1965)</u>					
GA125	Biotite	1 ¹	K-Ar	1	1840
GA559	Muscovite	1	K-Ar	8	1790
GA581	Hornblende	1	K-Ar	8	1815
GA559	Total rock and muscovite	1 ²	Rb-Sr	8	1770
GA159	Biotite	0	K-Ar	2	1820
GA483	Biotite	0	K-Ar	5	1760
GA484	Biotite	0	K-Ar	2	1780
GA558	Total rock and feldspar	0	Rb-Sr	2	1725
<u>AMDEL Report AN1814/73*</u>					
7210 0024		Isochron derived		5	
0025		from samples		6	1817 \pm 60
0026	Whole rock	from several	Rb-Sr	6	(1843 \pm 83
0046		localities (1)		1	if 0024 is
0047				1	excluded)
7210 0020				5	
0021		Isochron derived		5	
0022		from samples		5	
0027	Whole rock	from several	Rb-Sr	2	1773 \pm 24
0045		localities (0)		5	
0122				5	
0123				2	
<u>AMDEL Report AN2850/75*</u>					
7476 0222	Whole rock ³ (4 samples)	Anomalously low ⁸⁷ initial Sr ⁸⁶ /Sr ⁸⁶ ratio	Rb-Sr	5	1776 \pm 54
0225	Whole rock ³ (2 samples)	2 ages calculated using assumed initial ratio of 0.700	Rb-Sr	7	1705, 1738
0226	Whole rock ³ (6 samples)		Rb-Sr	8	1751 \pm 67 (1773 \pm 56 if one sample is excluded)
0227	Whole rock ³ (4 samples)		Rb-Sr	2	1860 \pm 103

* AMDEL reports are held in BMR as 'Technical Files', and are filed under the appropriate 1:250 000 Sheet area.

¹ 1 refers to samples from the 'Nicholson Granite'.

² 0 refers to samples from the 'Norris Granite'.

³ Samples were collected from one locality in order to reduce the probability of including in one isochron samples with different initial Sr⁸⁷/Sr⁸⁶ ratios.

N.B. All Rb-Sr isochron ages calculated using the 'old' decay constant, i.e., Rb $\lambda = 1.39 \times 10^{-11} \text{ yr}^{-1}$.

BILLICUMIDJI RHYOLITE MEMBER OF THE CLIFFDALE VOLCANICS

Derivation of name: From Billicumidji Waterhole, at grid reference 931488 in the Hedleys Creek 1:100 000 Sheet area (Sheet 6562), Queensland.

Distribution: The member is exposed over about 70 km² in the western Hedleys Creek Sheet area, and the eastern part of the adjacent Seigal Sheet area, Northern Territory.

Type section: At least 2000 m, from the base at grid reference 855466 in the Hedleys Creek Sheet area to the uppermost exposed beds at grid reference 175482 in the Seigal Sheet area. The section runs 4.5 km in a west-northwesterly direction. At least five thick rhyolite flows, separated by four thin ignimbrite sheets (1 to 10 m thick), are present.

Lithology: Red to pink, massive and convolutely banded rhyolite. Microphenocrysts of potash and plagioclase feldspars are set in a groundmass of devitrified glass.

Thickness: At least 2000 m in the type section; unknown elsewhere.

Relationships and boundary criteria: Conformably overlies ignimbrites of the Clifffdale Volcanics unit 4. As it forms the youngest known outcrops of the Clifffdale Volcanics it is overlain unconformably by the Westmoreland Conglomerate. It is the only thick rhyolite sequence in the volcanics, the remainder of which are thinly interlayered ignimbrite and rhyolite.

Age and evidence: Proterozoic - Carpentarian. Part of the type section of the Carpentarian System in Australia (Dunn, Plumb, & Roberts, 1966). Lower units in the Clifffdale Volcanics have yielded isotopic ages of 1770 m.y. (A. Webb, AMDEL Report An 1814/73, unpublished, quoted in Plumb & Sweet, 1974).

Synonymy: None.

SEIGAL VOLCANICS

Synonymy and modification of previous nomenclature: The unit here defined had been mapped as Peters Creek Volcanics by Carter, Brooks, & Walker (1961), Roberts & others (1963), Smith (1963), Plumb & Paine (1964), and others by correlating it with the type section of Carter & others (1961) on the southern side of the Murphy Tectonic Ridge. The Peters Creek Volcanics were therefore included in the Tawallah Group. Recent semi-detailed mapping of the

type section of the Peters Creek Volcanics (Plumb & Sweet, 1974), however, has shown that the type Peters Creek Volcanics are probably equivalent to most of the Tawallah Group north of the Murphy Tectonic Ridge; the Seigal Volcanics correlate with only the lowest of the seven informal subdivisions of the Peters Creek Volcanics. The name Peters Creek Volcanics is now restricted to volcanics that are confined to an area south of the Murphy Tectonic Ridge, and the unit is tentatively removed from the Tawallah Group pending a later review of stratigraphic nomenclature of northwest Queensland when 1:100 000 mapping has progressed further.

Relationships and boundary criteria: Part of the Tawallah Group, which is the oldest group occurring in the McArthur Basin. The oldest units in the group consist of thick basal conglomerate (Westmoreland Conglomerate) in the Calvert Hills Sheet area, and sandstone (Yiyintyi Sandstone) in the Bauhinia Downs and Mount Young Sheet areas. The Seigal Volcanics are conformable on these basal units, and overlain conformably by the McDermott Formation (in part of the Calvert Hills Sheet area) and with apparent conformity but probable disconformity by the Sly Creek Sandstone (in all other areas). The McDermott Formation, Sly Creek Sandstone, and several younger formations are also included in the Tawallah Group. The base and top of the Seigal Volcanics are placed at the base and top of the first and last lava flows respectively.

Derivation of name: From Seigal Creek, a tributary of the Calvert River in southeastern Calvert Hills 1:250 000 Sheet area.

Distribution: An area of about 600 km² in a northeast-trending belt in the Calvert Hills and Westmoreland 1:250 000 Sheet areas on the Northern Territory/Queensland border. The volcanics extend 300 km to the northwest as a series of narrow outcrops through the Bauhinia Downs and Mount Young 1:250 000 Sheet areas.

Type section: In a valley 6 km northwest of the confluence of the Fish River and Breakneck Creek in the Calvert Hills Sheet area. The base is on the northern side of the China Wall, a prominent strike ridge of Westmoreland Conglomerate, at metric grid ref. 797319. The section extends northward for 2 km to the base of a steep scarp at 795333.

Lithology: Amygdaloidal basalt in flows 5-30 m thick; thin siltstone and tuffaceous interbeds in the upper part. The unit includes the Carolina Sandstone Member, a prominent sandstone bed which was previously defined as a member of the Peters Creek Volcanics (Roberts & others, 1963).

Thickness: From 225 m (northwest) to 1100 m (type section)

Age: Proterozoic - Carpentarian. The Seigal Volcanics are part of the stratotype of the Carpentarian System.

WIRE CREEK SANDSTONE

Derivation of name: Wire Creek - a tributary of the Nicholson River, into which it flows at grid reference 025193, Hedleys Creek 1:100 000 Sheet area (Sheet 6562, Qld).

Distribution: Exposed as a strike ridge over a distance of 70 km from the headwaters of Peters Creek, in the central part of the Hedleys Creek 1:100 000 Sheet area, Queensland, to the Fish River, in the southern central part of the adjacent Seigal 1:100 000 Sheet area, in the Northern Territory.

Type section: A small gorge where Wire Creek intersects the unit. The base is at grid reference 907368, Hedleys Creek 1:100 000 Sheet area, and the section extends east-southeastwards along Wire Creek for a distance of 1 km.

Lithology: Conglomeratic quartz sandstone - white to purple, medium to coarse-grained, clayey; scattered pebbles of quartz and quartzite; conglomerate lenses - clasts up to 30 cm of quartz, quartzite, and acid volcanics.

Thickness: 1-70 m

Relationships and boundary criteria: Non-conformably overlies an uneven erosion surface of the Clifffdale Volcanics and Nicholson Granite Complex; cobbles and boulders of the underlying acid volcanics are present in the basal conglomerate. The upper boundary is sharp but apparently conformable with the overlying amygdaloidal basalts of the Peters Creek Volcanics.

Age and evidence: Proterozoic - Carpentarian. 1770 m.y., the age of the non-conformably underlying Cliffdale Volcanics.

Synonymy: Previously mapped as Westmoreland Conglomerate by Carter (1959) in the Westmoreland 1:250 000 Sheet area, Queensland, and by Roberts & others (1963) in the Calvert Hills 1:250 000 Sheet area, Northern Territory. The Westmoreland Conglomerate is the basal sedimentary unit in the McArthur Basin, and is separated from the Wire Creek Sandstone, the basal unit of the Lawn Hill Platform, by a belt of basement rocks. This belt probably formed a topographic high during deposition in both basins, and it is unlikely that units in the two basins were ever connected.

BUDDAWADDA BASALT MEMBER OF THE PETERS CREEK VOLCANICS

Name of host formation: Peters Creek Volcanics, described and defined by Carter & others (1961).

Derivation of name: From Buddawadda Swamp, a circular lagoon about 1 km across, 1.5 km north of the Nicholson River, at grid reference 103224 in the Hedleys Creek 1:100 000 Sheet area.

Distribution: In an east-northeast-trending arcuate belt up to 3 km wide, across the central part of the Hedleys Creek 1:100 000 Sheet area, Queensland. Several isolated outcrops occur adjacent to a fault zone in the southern Seigal Sheet area.

Type section: Along the banks and bed of Wire Creek, from the base at grid reference 916366 to the top at 935342, in the Hedleys Creek Sheet area.

Lithology: Numerous thin basalt flows, many of them vesicular and amygdaloidal, and some with brecciated tops. Many flows are capped by thin siltstone interbeds. At least two thicker flows occur - they are porphyritic, non-vesicular, and less weathered than the thin flows. A fine-grained sandstone bed occurs near the top.

Thickness: Up to 600 m.

Relationships and boundary criteria: Forms the basal part of the Peters Creek Volcanics. It has a sharp contact with the underlying Wire Creek Sandstone, but no evidence of unconformity. A similarly sharp contact with the overlying lavas, which are mainly rhyodacite, is recognised by the abrupt change from basic to acid volcanics, but there is no evidence of erosion or unconformity.

Age and evidence: Proterozoic - Carpentarian. Correlated with the Seigal Volcanics, which form part of the stratotype of the Carpentarian System.

FISH RIVER FORMATION

Introduction: The name was first published by Roberts & others (1963), but the unit was not defined. During mapping in 1972 the unit was completely remapped and a suitable type section nominated. Although the unit is mainly sandstone, the term 'Formation' has been retained because (a) the name, which has been in use for 18 years, is established in the literature, and (b) conglomerate and sandstone are both prominent rock types in the type area.

Derivation of name: From Fish River, a south-flowing tributary of the Nicholson River in the southern Seigal Sheet area.

Distribution: The unit forms a series of disconnected ridges trending east-northeast across the southern part of the Seigal Sheet area, Northern Territory, and crops out in a belt up to 4 km wide with similar trend in the central part of the Hedleys Creek Sheet area, Queensland.

Type section: Roberts & others (1963) nominated a reference section in the Seigal Sheet area but, since this has not been published as a type section, a complete well-exposed section in and adjacent to Wire Creek in the Hedleys Creek Sheet area is nominated as the type section. The base of the section is in the east bank of Wire Creek at grid reference 957314. The section runs southeast along the creek bank for 1.3 km to a cliff, then for a distance of 0.7 km due east to the top of the formation at grid reference 974305.

Lithology: Fine to medium-grained quartz sandstone, with minor lithic sandstone, conglomeratic sandstone, siltstone, and shale. A lens of siltstone and shale (Pff₂) has been mapped in the Hedleys Creek Sheet area, and divides the lower (Pff₁) and upper (Pff₃) sandstones in the unit.

Relationships and boundary criteria: The contact with the underlying Peters Creek Volcanics is sharp, and is marked by a thin (1 m) conglomerate at the base of the Fish River Formation. It appears to be a disconformity in outcrop, but on a regional scale is an angular unconformity: successively older units of the Peters Creek Volcanics are truncated westwards. The upper contact is also sharp and is recognised by an abrupt change from sandstone (with gritty lenses) to poorly outcropping shale, and silicified stromatolitic dolomite.

Age and evidence: Proterozoic - Carpentarian. It is correlated on lithological grounds with the sandstone in the Masterton Formation in the nearby McArthur Basin (which is part of the stratotype of the Carpentarian System).

Thickness: 250 m in type section; 10-200 m in the Seigal Sheet area.

WALFORD DOLOMITE

Derivation of name: Walford Creek, which drains the eastern portion of the Hedleys Creek 1:100 000 Sheet area, Queensland (Sheet 6562).

Distribution: About 100 km² in the southwestern Hedleys Creek Sheet area (Qld) and the adjacent eastern Seigal Sheet area.

Type section: Over 400 m of dolomite, shale, and minor sandstone. The base is at grid reference 859250, 2 km north-northwest of Galena Pits prospect, in the southwestern Hedleys Creek Sheet area; the section runs 2.3 km on a bearing of 170°, and the top is about 200 m southwest of Galena Pits prospect at grid reference 864228.

Lithology: In Hedleys Creek a basal member of limonite concretions and leached shale (originally pyritic?) is overlain by stromatolitic, intraclastic, and oolitic dolomite with minor black shale and glauconitic and dolomitic sandstone. Many of the dolomite exposures are silicified, and a variety of cherts, in which the original textures are preserved, is present.

Thickness: From 250 m to over 400 m.

Relationships and boundary criteria: Although sharp, the basal contact with the Fish River Formation appears to be conformable. The upper contact with the Mount Les Siltstone is conformable, and the two units probably intertongue.

Age and evidence: Proterozoic - Carpentarian. Correlation of part of the underlying Peters Creek Volcanics with the Hobblechain Rhyolite Member of the Masterton Formation in the McArthur Basin suggests an age of less than 1575 m.y. (age of the Hobblechain Rhyolite Member). A younger age limit is provided by 1280-m.y.-old dolerites; these intrude equivalents of the South Nicholson Group, which unconformably overlies the Walford Dolomite.

Synonymy: Included by Carter (1959) in the 'Wollogorang Formation', a name now restricted to an older formation in the Tawallah Group in the McArthur Basin (Roberts & others, 1963). The Walford Dolomite was included in the Fickling beds of Roberts & others (1963); these now become the Fickling Group, of which the Walford Dolomite forms the basal unit.

MOUNT LES SILTSTONE

Derivation of name: From Mount Les, a small hill at grid reference 857230, in the southwestern Hedleys Creek 1:100 000 Sheet area. The name is best known as applied to the Mount Les prospect, near Gorge Creek 0.5 km south of Mount Les.

Distribution: Exposed over 30 km in the southwestern Hedleys Creek 1:100 000 Sheet area, Queensland, and the eastern part of the adjacent Seigal Sheet area, Northern Territory.

Type section: About 90 m of finely laminated shale and siltstone, and some dolomite interbeds. The base is at grid reference 906243, about 5 km east-northeast of the Mount Les prospect; the section runs 450 m in a southeasterly direction along a mining company track.

Lithology: Black dolomitic siltstone and black and white shale; interbeds of pink and brown dolomite in western outcrops.

Thickness: 55-90 m

Relationships and boundary criteria: Conformably overlies the Walford Dolomite; the boundary is sharp in most areas because the upper layers of the Walford Dolomite have been altered to chert. The boundary is gradational in places, as interbeds of dolomite occur in the Mount Les Siltstone. The upper contact is a disconformity in most places, and around grid reference 135227 in the eastern Seigal Sheet area the Mount Les Siltstone has been completely eroded and the Doomadgee Formation lies unconformably on the Walford Dolomite.

Age and evidence: Proterozoic - Carpentarian. Correlation of part of the underlying Peters Creek Volcanics with the Hobblechain Rhyolite Member of the Masterton Formation in the McArthur Basin suggests an age of less than 1575 m.y. (age of the Hobblechain Rhyolite Member). A younger age limit is provided by 1280-m.y.-old dolerites; these intrude equivalents of the South Nicholson Group, which unconformably overlies the Mount Les Siltstone.

Synonymy: Included by Carter (1959) in the 'Wollogorang Formation', a name now restricted to an older formation in the Tawallah Group in the McArthur Basin. Roberts & others (1963) included the Mount Les Siltstone in the Fickling beds, which now become the Fickling Group.

DOOMADGEE FORMATION

Derivation of name: From Doomadgee Mission Station, at metric grid reference 269015 in the Westmoreland 1:250 000 Sheet area (SE/54-5), Queensland.

Distribution: The unit is exposed over about 150 km² in the southwestern part of the Hedleys Creek 1:100 000 Sheet area (Sheet 6562), Queensland, and the adjacent southeastern part of the Seigal 1:100 000 Sheet area (Sheet 6462), Northern Territory. The unit extends southward into the northeast corner of the Cleanskin 1:100 000 Sheet area, Northern Territory.

Type section: 180 m of sandstone, siltstone, and dolomite exposed in a section 1 km northeast of Gorge Creek, in a southwestern Hedleys Creek Sheet area. The base of the section is at grid reference 877225, and the top is 1.6 km to the southeast, at grid reference 890214.

Lithology: The formation includes conglomerate, sandstone, siltstone, shale, and dolomitic rocks. The conglomerate occurs as lenses at the base of the unit, and contains pebbles and cobbles of underlying units, particularly chert and dolomite from the Walford Dolomite. A prominent finely laminated siltstone and black shale member is present in the middle of the formation. Above the member, thin-bedded manganese-stained fine sandstone is interbedded with dolomite. A prominent lens of conglomerate, containing dolomite intra-clasts and green clasts or flakes of clay or siltstone, overlies the siltstone and black shale member.

Thickness: From 180 m at the type section to over 400 m in the southern Seigal Sheet area.

Relationships and boundary criteria: Disconformable on the Mount Les Siltstone and Walford Dolomite. The contact is marked by pebbly sandstone and conglomerate lenses. The formation is overlain disconformably in the east, and with angular unconformity in the west, by the Constance Sandstone.

Age and evidence: Proterozoic - Carpentarian. Correlation of part of the underlying Peters Creek Volcanics with the Hobblechain Rhyolite Member of the Masterton Formation in the McArthur Basin suggests an age of less than 1575 m.y. (age of the Hobblechain Rhyolite Member). A younger age limit is provided by 1280-m.y.-old dolerites; these intrude equivalents of the South Nicholson Group, which unconformably overlies the Doomadgee Formation.

Synonymy: Included by Carter (1959) in the 'Wollogorang Formation', a name now restricted to an older formation in the Tawallah Group in the McArthur Basin. Roberts & others (1963) included the Doomadgee Formation in the Fickling beds, which now become the Fickling Group.

FICKLING GROUP

Names of constituent formations: Walford Dolomite, Mount Les Siltstone, and Doomadgee Formation (and the Fish River Formation - see redefinition, below).

Lithologic affinities of constituent formations: All units are mainly shallow-water sediments and contain dolomitic beds.

Derivation of name: From Fickling Creek, a tributary of the Nicholson River in the southeastern part of the Nicholson River 1:100 000 Sheet area (Sheet 6362), Northern Territory.

Distribution: Exposed over an area of about 500 km² in the southeastern Nicholson River, southeastern Seigal, southwestern Hedleys Creek, and northeastern Cleanskin 1:100 000 Sheet areas.

Thickness: 600-800 m

Relationships: Unconformable on Peters Creek Volcanics; overlain disconformably, and with angular unconformity, by the Constance Siltstone of the South Nicholson Group.

Age: Proterozoic - Carpentarian.

Synonymy: Mapped by Carter (1959) as 'Wollogorang Formation', a name now applied only to an older unit in the Tawallah Group in the McArthur Basin. Mapped by Roberts & others (1963) as Fickling beds. The name has been modified to Fickling Group, as individual formations have now been recognised and named.

Proposed redefinition: That the Fickling Group now be extended to include the Fish River Formation.

Former definition: The Fickling Group previously included only the Walford Dolomite, Mount Les Siltstone, and Doomadgee Formation.

Reasons for inclusion of Fish River Formation: The Fish River Formation, which unconformably overlies the Peters Creek Volcanics, marks the beginning of a major new cycle of sedimentation in the Westmoreland region of Queensland and adjacent parts of the Northern Territory. It is overlain conformably by the Walford Dolomite, which represents the beginning of widespread carbonate sedimentation after the initial clastic episode during transgression.

The Fish River Formation had previously been excluded from the Fickling Group because it is not dolomitic. However, mapping of equivalent sequences in the Lawn Hill and Mount Isa areas shows the same pattern of clastic, followed by dolomitic, sedimentation: i.e., it is obviously a widespread sedimentation pattern, and the Fish River Formation is a part of it.

BOWTHORN SILTSTONE MEMBER OF THE CONSTANCE SANDSTONE

Derivation of name: From Bowthorn homestead, at grid reference 143966, in the Bowthorn 1:100 000 Sheet area (Sheet 6561), Queensland.

Distribution: The unit forms an arcuate band up to 1 km wide, and crops out over about 50 km² in the northwestern quarter of the Bowthorn 1:100 000 Sheet area; minor outcrops occur to the north in the southwestern corner of the Hedleys Creek 1:100 000 Sheet area (Sheet 6562), and to the west, in the northeastern corner of the Cleanskin 1:100 000 Sheet area (Sheet 6461), Northern Territory.

Type section: Along a low ridge 1.5 km south of the access road to Bowthorn homestead, in the Bowthorn Sheet area. The base is at grid reference 208945, and the section runs west-southwest for 350 m to the top of a low ridge at grid reference 205943.

Lithology: Laminated purple and brown micaceous siltstone; a few thin interbeds of quartz sandstone. The type section is all siltstone; the sandstone interbeds occur farther north and west.

Thickness: 50 m at the type section; about 100 m in the Cleanskin and Hedleys Creek Sheet areas.

Relationships and boundary criteria: A conformable member within the Constance Sandstone. The member conformably overlies cross-bedded medium-grained quartz sandstone, and is in turn overlain by similar sandstone. It is probably a lenticular siltstone body extending for no more than 50 km across the Bowthorn and adjacent 1:100 000 Sheet areas. Although its contacts with the enclosing sandstone are sharp, there is no evidence of unconformity. The member, and two previously named members, form prominent markers in an otherwise uniform sandstone sequence.

Age and evidence: The Bowthorn Siltstone Member and the remainder of the South Nicholson Group are designated Carpentarian or Adelaidean. They unconformably overlie rocks which in turn overlie the Cliffdale Volcanics, which have been dated at 1770 ± 20 m.y. (A.W. Webb, AMDEL Report AN1814/73, unpublished). The South Nicholson Group is correlated with the Roper Group in the McArthur Basin, from which glauconites have yielded ages from 1270-1390 m.y. (Plumb & Derrick, 1975). 1390 m.y. is regarded as a minimum age of deposition of the group. Because Dunn, Plumb, & Roberts (1966) placed the Carpentarian/Adelaidean boundary at about 1400 m.y., the Roper Group and its correlatives are regarded as Carpentarian or Adelaidean in age.

Synonymy: None.

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