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Bureau of Mineral Resources, Geology & Geophysics

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DEFINITIONS OF NEWLY NAMED AND REVISED PRECAMBRIAN ROCK UNITS IN THE DAVENPORT AND MURCHISON RANGES OF CENTRAL AUSTRALIA (NORTHERN TERRITORY)

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ABSTRACT

Twenty-six stratigraphic and three intrusive rock units are defined. The new nomenclature results from a detailed reconnaissance survey of the Davenport and Murchison Ranges, in the Bonney Well, Frew River, Elkedra, and Barrow Creek 1:250 000 Sheet areas, carried out in 1981 and 1982 by geologists from the Bureau of Mineral Resources and the Northern Territory Geological Survey. All definitions have been approved by the Territories Stratigraphic Nomenclature Subcommittee.

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INTRODUCTION

The 26 stratigraphic and 3 intrusive rock units defined in this report crop out in the Davenport and Murchison Ranges of central Australia - in the northern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek 1:250 000 Sheet areas, Northern Territory. All the units are Proterozoic. The new nomenclature results from a detailed reconnaissance survey of the Davenport province carried out jointly by the Bureau of Mineral Resources and Northern Territory Geological Survey in 1981 and 1982. All definitions were approved by the Territories Stratigraphic Nomenclature Subcommittee on 20 February 1984.

The units defined are shown on 1:100 000 Preliminary Edition maps and are described in detail in reports accompanying the maps: Hatches Creek region (Blake & Wyche, 1983), Kurundi region (Stewart & Blake, 1984), Devils Marbles region (Wyche & Blake, 1984), and Elkedra region (Blake & Horsfall, 1984). They will be used on future published maps and in papers and reports being prepared for publication.

Geological terms used are as defined in Bates & Jackson (1980). Sandstones are classified according to the scheme of Pettijohn & others (1972), and igneous rocks according to Streckeisen & others (1973).

In the following text, 'Sheet area' refers only to a standard 1:250 000 Sheet area; capitalised names are those of standard 1:100 000 Sheet areas. GR refers to Australian Grid Reference, Zone 53K (metric).

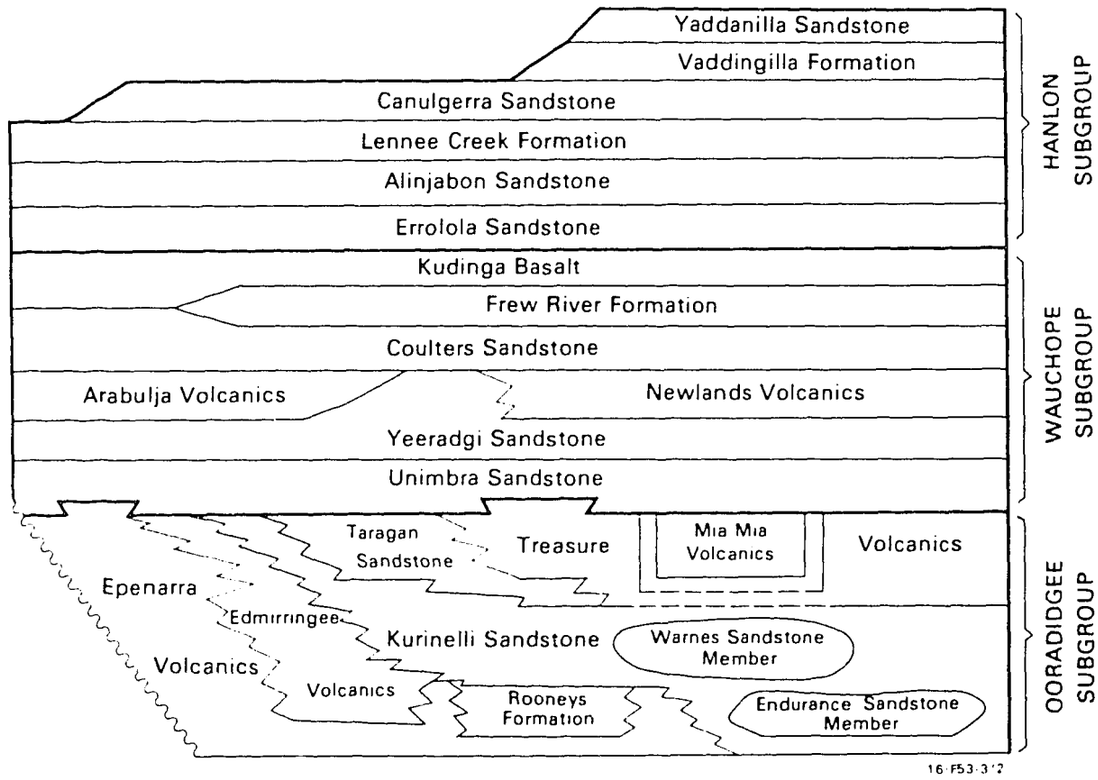

Fig. 1. Diagrammatic relationships of named units within the Hatches Creek Group.

DEFINITIONS OF UNITS

Hatches Creek Group
(redefinition)

Proposer. D.H. Blake.

Derivation of name. From Hatches Creek watercourse, in the south of HATCHES, Frew River Sheet area.

Previous usage. Named by Sullivan (1953) and Hossfeld (1954); name retained, but usage slightly modified, by Smith & others (1961) and Ryan (1961), whose usage is followed in this definition. The Hatches Creek Group has not previously been subdivided into formally named constituent units.

Constituent units. The Hatches Creek Group is subdivided into 3 new subgroups, 20 new formations, and 2 new members (Fig. 1). Seven formations are assigned to the Ooradidgee Subgroup (lowest of the three subgroups) - Epenarra Volcanics, Edmirringee Volcanics, Rooneys Formation, Kurinelli Sandstone, Taragan Sandstone, Treasure Volcanics, and Mia Mia Volcanics; 7 formations are assigned to the Wauchope Subgroup (middle subgroup) - Unimbra Sandstone, Yeeradgi Sandstone, Newlands Volcanics, Arabulja Volcanics, Coulters Sandstone, Frew River Formation, and Kudinga Basalt; and 6 formations are assigned to the Hanlon Subgroup (uppermost subgroup) - Errolola Sandstone, Alinjabon Sandstone, Lennee Creek Formation, Canulgerra Sandstone, Vaddingilla Formation, and Yaddanilla Sandstone. The Kurinelli Sandstone of the Ooradidgee Subgroup includes two members - Endurance Sandstone Member and Warnes Sandstone Member. Contacts between the formations of the Hatches Creek Group are generally conformable, although some local unconformities have been recognised.

Distribution. The group forms most of the Davenport and Murchison Ranges, cropping out in northern and central Bonney Well, southwestern Frew River, northeastern (and also northwestern) Barrow Creek, and northwestern Elkedra Sheet areas (Smith, 1964, 1970; Smith & Milligan, 1964, 1966).

Thickness. Maximum probably at least 10 000 m.

Lithology. Ridge-forming cross-bedded quartz arenite, feldspathic/lithic quartz arenite, and minor pebbly arenite and conglomerate, recessive basaltic and felsic volcanics, friable arenite, siltstone, shale, and minor carbonate rocks.

Relationships. In the north the Hatches Creek Group is unconformable on the Warramunga Group; elsewhere its base is not exposed. It is intruded by mainly sill-like bodies of dolerite/gabbro and granophyre (which may be comagmatic with the volcanics of the Hatches Creek Group), and by plutons of Devils Marbles Granite, Elkedra Granite, and unnamed granite; the granite plutons postdate the main deformation of the Hatches Creek Group.

Age. Proterozoic; younger than 1870 Ma, the U-Pb zircon age for volcanics in the unconformably underlying Warramunga Group (Black, 1984), and older than 1640 Ma, the Rb-Sr whole-rock approximate date for the Elkedra Granite, which intrudes the Hatches Creek Group (Black, personal communication, 1983).

Remarks. As described by Hossfeld (1954), comprises rocks he had previously assigned to the Hatches Creek Series and the Top Series (in AGGSNA, 1941). Smith & others (1961) extended the group to also include Hossfeld's Bottom Series, which previously was considered to underlie the Hatches Creek Series unconformably (Hossfeld, 1954; AGGSNA, 1941), as they found that the rocks of the Bottom Series were part of the same concordant and generally conformable sequence as Hossfeld's Hatches Creek and Top Series. In the new stratigraphic nomenclature defined here, Hossfeld's Bottom Series and Top Series both belong to the Ooradidgee Subgroup, and his Hatches Creek Series corresponds to parts of the Ooradidgee and Wauchope Subgroups.

Ooradidgee Subgroup

(new name)

Proposer. D.H. Blake.

Derivation of name. From OORADIDGEE (sheet 5357), Bonney Well Sheet area.

Distribution. Crops out extensively in the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra and northeastern part of Barrow Creek Sheet areas.

Constituent formations. Epenarra Volcanics, Elmirringee Volcanics, Rooneys Formation, Kurinelli Sandstone, Taragan Sandstone, Treasure Volcanics, and Mia Mia Volcanics. These formations are partly lateral equivalents of one another, and commonly interfinger.

Thickness. Variable; maximum probably more than 5000 m.

Lithology. Generally recessive felsic and basaltic volcanic rocks, friable arenite, siltstone, and shale, which are commonly cleaved, and ridge-forming quartz arenite, feldspathic/lithic arenite, pebbly arenite, and minor conglomerate.

Relationships. Unconformable on the Warramunga Group in the north; its base is not seen elsewhere. Overlain conformably and possibly disconformably by, and locally interfingers with, the basal formation (Unimbra Sandstone) of the Vauchope Subgroup of the Hatches Creek Group; intruded by the Devils Marbles Granite, Elkedra Granite, unnamed granites, and mainly sill-like bodies of granophyre and dolerite/gabbro. Flat-lying Cambrian strata overlie the subgroup unconformably.

Age. As for the Hatches Creek Group.

Synonymy. Corresponds to the Lower Hatches Creek Group of Blake & others (1982, 1983) and Blake & Wyche (1983).

Remarks. The oldest of the three subgroups of the Hatches Creek Group, it differs from the other two (the Vauchope and Hanlon Subgroups) in that its constituent formations show an interfingering rather than a layer-cake arrangement; it contains a greater proportion of volcanic rocks; and its sedimentary component is thought to be predominantly fluvial, rather than mixed fluvial and marine (Vauchope Subgroup) or entirely marine (Hanlon Subgroup).

Epenarra Volcanics

(new name)

Proposer. D.H. Blake.

Derivation of name. From Epenarra homestead, GR 272394, EPENARRA, Frew River Sheet area.

Distribution. Restricted to the northern part of the Davenport province: BONNEY, OORADIDGEE, and DAVENPORT RANGE, Bonney Well Sheet area; EPENARRA and HATCHES, Frew River Sheet area.

Type section. Northeast of Cannagootchoo Rockholes (20°13'00"S, 134 23'55"E) in the Murchison Range, BONNEY, from GR 393659 (base) west to GR 383659 (top). In this section the formation is about 550 m thick, dips about 35° west, and consists of iron-stained felsic lava flows and interlayered quartzose to volcaniclastic arenite, pebbly arenite, and conglomerate. It is unconformable on the Warramunga Group (its basal contact is concealed here, but is well exposed to the west, e.g., at GR 356657, and also to the east-southeast), and is overlain conformably by the Unimbra Sandstone of the Wauchope Subgroup.

Lithology. Generally recessive volcanics - felsic lava, ignimbrite, agglomerate, lappilli tuff, thin-bedded to laminated tuff, and minor possible mafic lava (very altered) - and interlayered partly ridge-forming quartzose to volcaniclastic arenite, pebbly arenite, and conglomerate. The volcanic rocks are commonly iron-stained to shades of purple or reddish-brown, and in places are cleaved. Small phenocrysts of feldspar (generally pseudomorphed) ± partly resorbed quartz ± pseudomorphed ferromagnesian minerals are generally present in the felsic lavas.

Thickness. 0 to possibly more than 3000 m.

Relationships. Unconformably on the Warramunga Group, intrusive feldspar porphyry, and unnamed leucogranite; overlain conformably by, and locally interfingers with, thinly bedded greywacke and siltstone of the Rooneys Formation, basaltic lavas of the Edmirringee Volcanics, pale buff or grey feldspathic/lithic quartz arenite of the Kurinelli Sandstone, and white or pale pink quartzose arenite of the Unimbra Sandstone. Arenites are distinguished from those of adjacent formations by purplish or reddish-brown colour and volcaniclastic content. The formation is intruded by granophyre, microgranite, and dolerite, and overlain unconformably by Cambrian and younger beds.

Synonymy. Much of the formation was previously mapped partly as Warramunga Group and partly as granite or intrusive porphyry (Smith & others, 1961; Smith, 1964, 1970).

Remarks. Stratigraphically partly equivalent to, but separated geographically from, the Treasure Volcanics and Mia Mia Volcanics, two other formations of mainly felsic volcanic rocks that crop out to the south. The felsic volcanics in each of these three formations are lithologically distinct, and were probably derived from different volcanic centres. The formation is part of the Ooradidgee Subgroup of the Hatches Creek Group.

Edmirringee Volcanics

(new name)

Proposer. A.J. Stewart.

Derivation of name. From Edmirringee Rockhole on Whistleduck Creek, GR 840210, DAVENPORT RANGE, Bonney Well Sheet area.

Distribution. Crops out in DAVENPORT RANGE and southwestern OORADIDGEE, Bonney Well Sheet area, and in northeastern MURRAY DOWNS, Barrow Creek Sheet area.

Type section. In northeastern DAVENPORT RANGE, from GR 864282, where the formation overlies porphyritic felsic lava of the Epenarra Volcanics, to GR 883224, 6 km northeast of Edmirringee Rockhole (20°37'00"S, 134°51'00"E), where it is overlain by, or faulted against, arenite of the Kurinelli Sandstone. In this section the Edmirringee Volcanics are represented by a sequence about 2000 m thick of basaltic lavas and minor interlayered volcaniclastic arenite and siltstone dipping southeast at 30°-60°.

Lithology. Generally epidotised amygdaloidal porphyritic and non-porphyritic basalt (50-54% SiO_2) and scoriaceous basalt lava, basaltic flow-margin breccia, local minor dacite and rhyolite, and interlayered volcaniclastic (largely basaltic) arenite and siltstone.

Thickness. 0 to about 2500 m.

Relationships. Conformably overlies and in places interfingers with the Epenarra Volcanics, and interfingers with and is conformably overlain by the Kurinelli Sandstone; where the Kurinelli Sandstone is absent, it is overlain conformably or disconformably by the Unimbra Sandstone. Upper and lower contacts are taken at abrupt changes in lithology from felsic volcanics or arenites to basaltic volcanics.

Synonymy. None.

Remarks. Readily distinguished lithologically from adjacent units; part of the Ooradidgee Subgroup, Hatches Creek Group.

Rooneys Formation
(new name)

Proposer: D.H. Blake.

Derivation of name. From Rooneys Yard, GR 308430, HATCHES, Frew River Sheet area.

Distribution. Crops out in the northeast of the Davenport province - in northern HATCHES and northwestern HANLON, Frew River 1:250 000 Sheet area - and in the southwest - in southeastern ELKEDRA and southwestern GEORGE CREEK, Elkedra Sheet area.

Type section. In the vicinity of Kurinelli outstation (20°37'00"S, 135°02'15"E), HATCHES, from GR 068180 (base, contact with intrusive gabbro) northeast to GR 030206 (top, conformable contact with overlying Kurinelli Sandstone, 1 km west of the outstation). The typical rock types of the formation are exposed here, together with dolerite/gabbro sills (a typical association), dipping 20-35°NE.

Lithology. Recessive thin-bedded to laminated, grey or greenish grey, variably micaceous siltstone and fine-grained, commonly quartz-poor arenite and greywacke; locally cleaved, especially in the east.

Thickness. Uncertain because of lack of continuity of outcrop and variable dips; about 1200 m is exposed in the type section.

Relationships. Conformable on and locally interfingers with the Epenarra Volcanics; overlain conformably by thicker-bedded and more quartz-rich arenite of the Kurinelli Sandstone, the contact generally being gradational over several metres; intruded by dolerite/gabbro sills and also by Elkedra Granite (in the southeast), granophyre, and unnamed granite.

Synonymy. None.

Remarks. The formation is a recessive non-volcanic unit within the Ooradidgee Subgroup of the Hatches Creek Group.

Kurinelli Sandstone
(new name)

Proposer. I.P. Sweet.

Derivation of name. From Kurinelli gold mine at GR 036180, HATCHES, Frew River Sheet area.

Distribution. Crops out in the eastern and central parts of Bonney Well, the southwestern part of Frew River, the northwestern part of Elkedra, and the northeastern part of Barrow Creek Sheet areas.

Type section. From GR 030206 (base), 2.5 km NNW of Kurinelli gold mine (20°38'00"S, 135°02'00"E), HATCHES, where the formation is conformable on Rooneys Formation, west to GR 992204 in DAVENPORT RANGE, and southwest through GR 960185 to GR 939147 (top), where it is overlain conformably by the Taragan Sandstone. The type section, 11.5 km long, crosses low ridges of gently to moderately dipping Kurinelli Sandstone, which is about 3000 m thick and consists of fine to medium-grained, thin to thick-bedded arenite with some medium to coarse-grained and gritty interbeds in the upper part and some laminated siltstone and claystone near the base.

Lithology. Mainly brown or pale grey to greenish-grey weathering, thin to medium-bedded, fine to medium-grained, clay-grain rich (? kaolinised feldspar) arenite, which is strongly cross-bedded in places. Some interbedded medium to coarse-grained and gritty lithic arenite, especially in the upper part of the formation, and minor quartzose arenite, siltstone, claystone, slate and intermediate to felsic volcanics. Interlaminated claystone, siltstone and fine-grained arenite form a mappable member (Endurance Sandstone Member) near the base of the formation in southern HATCHES, and non-bedded quartzose arenite forms a mappable member (Warnes Sandstone Member) in the upper part of the formation in southern HATCHES, southeastern DAVENPORT RANGE (Bonney Well sheet area) and northeastern MURRAY DOWNS (Barrow Creek Sheet area).

Thickness. 0 to at least 3000 m.

Relationships. Conformable on, and interfingers with, the Rooneys Formation, Epenarra Volcanics, and Edmirringee Volcanics; overlain conformably by and probably also interfingers with pebbly arenite and conglomerate of the Taragan Sandstone; and overlain conformably by more quartzose arenite of the Unimbra Sandstone and unconformably by Cambrian beds. Sill-like bodies of granophyre and dolerite/gabbro and plutons of Devils Marbles Granite and unnamed granite intrude the formation.

Synonymy. None.

Remarks. The most extensive formation within the Ooradidgee Subgroup of the Hatches Creek Group, it contains two lenticular units of distinctive, readily mappable lithology: the Endurance Sandstone and Warnes Sandstone Members.

Endurance Sandstone Member of the Kurinelli Sandstone
(new name)

Proposer. D.H. Blake.

Derivation of name. From the Endurance tungsten mine, GR 190914, HATCHES, Frew River Sheet area.

Distribution. Crops out in southern central HATCHES, near Hatches Creek.

Type section. About 1.5 km east of the Pioneer tungsten mine (20°52'10"S, 135°11'00"E), from GR 200924 (base) to GR 202915 (top), where the typical rock types of the member - thinly interbedded greywacke and siltstone - dip 45° southeast, a e intruded by dolerite/gabbro, and are overlain and underlain by clay-grain-rich arenite of the undivided Kurinelli Sandstone.

Lithology. Thinly interbedded fine-grained micaceous greywacke and siltstone and minor variably feldspathic? arenite of Kurinelli Sandstone type.

Thickness. 0 to about 500 m.

Relationships. The member forms a conformable lens within the Kurinelli Sandstone, and is intruded by gabbro/dolerite sills. Contacts with the undivided Kurinelli Sandstone, which are generally poorly exposed, are taken at abrupt changes in lithology from recessive greywacke and siltstone to ridge-forming arenite.

Synonymy. None.

Remarks. Generally finer grained, more micaceous, and less quartzose than other parts of the Kurinelli Sandstone.

Warnes Sandstone Member of the Kurinelli Sandstone
(new name)

Proposer. D.H. Blake.

Derivation of name. From Warnes Gully, which trends east-west between the northerly draining Mia Mia and Hatches Creeks, near GR 180870, HATCHES, Frew River Sheet area.

Distribution. Crops out in southern central HATCHES, southeastern DAVENPORT RANGE (Bonney Well Sheet area), and northeastern MURRAY DOWNS (Barrow Creek Sheet area).

Type section. About 3.5 km south-southeast of the Pioneer tungsten mine (20°52'10"S, 135°11'00"E) at Hatches Creek, from GR 192886 to GR 192878, HATCHES, where the member forms two prominent strike ridges. Neither the stratigraphic base nor top are seen here. (Contacts with underlying and overlying undivided Kurinelli Sandstone are exposed at GR 202910 and GR 178877, respectively, HATCHES).

Lithology. Mostly poorly sorted and apparently non-bedded quartzose arenite, which commonly contains scattered grit grains and small pebbles of vein quartz. Also minor lenses of bedded quartz arenite.

Thickness. 0 to about 500 m.

Relationships. Forms conformable discontinuous band or lenses within the Kurinelli Sandstone. Intruded by sill-like bodies of granophyre and dolerite/gabbro.

Synonymy. None.

Remarks. Typically forms distinctive knobbly, rather than smooth, strike ridges.

Taragan Sandstone

(new name)

Proposer. I.P. Sweet.

Derivation of name. From Taragan Waterhole on Lennee Creek, GR 057102, HATCHES, Frew River Sheet area.

Distribution. Crops out in the central part of the Davenport province: in southern Bonney Well, southwestern Frew River, and northeastern Barrow Creek Sheet areas.

Type section. In the east of DAVENPORT RANGE, from GR 956064 (base), 2 km west of the Great Davenport gold prospect (20°45'50"S, 134°58'25"E), to GR 944073 (top). The section is 600 m thick and consists of 3 informal members: a lower member, 220 m thick, of strongly cross-bedded medium-grained to pebbly arenite with siltstone interbeds near its base; a middle member, 50 m thick, of fine-grained lithic arenite and, at the top, minor coarser quartz arenite; and an upper member, 330 m thick, of pebbly arenite and pebble conglomerate. The formation here overlies the Kurinelli Sandstone with local unconformity and is overlain conformably by the Treasure Volcanics.

Lithology. The formation consists of ridge-forming pebbly quartz arenite and feldspathic/lithic quartz arenite, and minor pebble to boulder conglomerate, non-pebbly arenite, and recessive siltstone, mudstone, friable arenite and altered felsic lava.

Thickness. 0 to 1200 m.

Relationships. Mainly conformable between non-pebbly arenite of the Kurinelli Sandstone below and the Treasure Volcanics above; also interfingers with parts of these two formations, locally unconformable on the Kurinelli Sandstone, and overlain conformably (in the west) by less pebbly arenite of the Unimbra Sandstone.

Synonymy. None.

Remarks. A ridge-forming formation, characterised by pebbly arenite, within the Ooradidgee Subgroup of the Hatches Creek Group.

Treasure Volcanics

(new name)

Proposer. D.H. Blake.

Derivation of name. From the Treasure tungsten mine, GR 199869, HATCHES, Frew River Sheet area.

Distribution. Crops out in the central and eastern part of the Davenport province, mainly in the southern part of HATCHES and western part of HANLON, Frew River Sheet area.

Type section. In the southwest of HATCHES, from GR 128983, 8 km northwest of the Pioneer mine (20°52'10"S, 135°11'00"E), where the formation conformably overlies the Taragan Sandstone, to GR 098941, where it is overlain conformably (or disconformably) by the Unimbra Sandstone. In this 5-km long section the formation is about 1700 m thick and consists of felsic lavas, subordinate basaltic lavas, and interlayered arenite bands. The sequence, together with some granophyre sills, dips 15-40°SW.

Lithology. Moderately recessive felsic lava, which contains small phenocrysts of albite ± quartz ± pseudomorphed ferromagnesian minerals, together with subordinate interlayered and generally ridge-forming quartzose to feldspathic and volcaniclastic arenite, which is locally pebbly, recessive basaltic lava and minor bedded tuff.

Thickness. 0 to possibly about 3500 m.

Relationships. Conformable on, and in places interfingers with, the Taragan Sandstone; overlain conformably and possibly disconformably by, and also interfingers with, the Unimbra Sandstone; intruded by granophyre and dolerite/gabbro sills. In the far southeast of the Davenport province felsic volcanics mapped as Treasure Volcanics are conformable on Kurinelli Sandstone and overlain conformably by Unimbra Sandstone (Blake & Horsfall, 1984).

Synonymy. None.

Remarks. Stratigraphically equivalent to parts of the Mia Mia Volcanics and Epenarra Volcanics, two other formations consisting mainly of felsic volcanics. But the three units differ from one another in overall lithology, are geographically separated, and were probably derived from different volcanic centres. The Treasure Volcanics belong to the Ooradidgee Subgroup of the Hatches Creek Group.

Mia Mia Volcanics

(new name)

Proposer. D.H. Blake.

Derivation of name. From Mia Mia Creek, in the southwest of HATCHES, Frew River Sheet area. The headwaters of this northerly flowing creek drain much of the outcrop area of the formation.

Distribution. Confined to the central part of a large dome in the southwest of HATCHES and north of ELKEDRA (Elkedra Sheet area); crops out over about 60 km^2.

Type section. In HATCHES, from GR 163810, in the central part of the dome, north to GR 164835 (8.7 km SSW of the Pioneer mine, 20°52'10"S, 135°11'00"E), where the formation is overlain by Unimbra Sandstone. The main rock types of the formation are exposed in this section.

Lithology. Moderately recessive massive ignimbritic felsic tuff, bedded tuff, and rhyolitic lava, and minor interlayered, partly ridge-forming, variably feldspathic/volcaniclastic quartz arenite, and rare volcaniclastic conglomerate; volcanic rocks commonly cleaved.

Thickness. Probably at least 2000 m.

Relationships. Overlain conformably, or possibly disconformably, by the Unimbra Sandstone; arenite beds in the upper part of the unit are concordant with those of the overlying Unimbra Sandstone. Its base is not exposed, nor are any underlying rocks. It is intruded by unnamed granite and pegmatite.

Synonymy. Correspond to the Bottom Series of Hossfeld (1954, and in AGGSNA 1941).

Remarks. Differs from geographically separated, but stratigraphically partly equivalent, Treasure Volcanics exposed to the north, in consisting mainly of felsic tuffs rather than lava flows. Part of the Ooradidgee Subgroup of the Hatches Creek Group.

Wauchope Subgroup
(new name)

Proposer. A.J. Stewart.

Derivation of name. From WAUCHOPE (sheet 5756), Bonney Well Sheet area.

Distribution. Forms much of the Davenport and Murchison Ranges, cropping out in Bonney Well, Frew River, Barrow Creek, and Elkedra Sheet areas.

Constituent formations. From base to top: Unimbra Sandstone, Yeeradgi Sandstone, Newlands Volcanics, Arabulja Volanics, Coulters Sandstone, Frew River Formation, and Kudinga Basalt. Contacts between these formations are generally conformable, but locally an unconformity exists at the base of the Coulters Sandstone.

Thickness. About 3500-4000 m.

Lithology. Lithic and/or feldspathic arenite, quartz arenite, and pebbly arenite; commonly cross-bedded; felsic volcanics and basalt; minor slate, siltstone, limestone, and dolomite.

Relationships. Overlies the Warramunga Group unconformably (in the north). Conformable to locally disconformable on the Ooradidgee Subgroup of the Hatches Creek Group; in places the basal formation (Unimbra Sandstone) interfingers with the upper parts of the Ooradidgee Subgroup. Overlain conformably by the Hanlon Subgroup of the Hatches Creek Group; intruded by sill-like bodies of granophyre and rare dolerite, and by Devils Marbles Granite; unconformably overlain by Cambrian strata.

Synonymy. None. Corresponds to the Middle Hatches Creek Group of Blake & others (1982, 1983) and Blake & Wyche (1983), except that it does not include the Errolola Sandstone.

Remarks. The middle of the three subgroups making up the Hatches Creek Group. More widespread than the underlying Oordidgee Subgroup, and rests on basement where the Ooradidgee Subgroup is absent. In contrast to the interfingering volcanic and fluvial formations constituting the Ooradidgee Subgroup, it has a general layer-cake stratigraphy, with only a minor degree of interfingering, and volcanics are less abundant. Sedimentary environments were mixed fluvial and near-shore marine. The base is marked by the base of a major ridge-forming sandstone unit (Unimbra Sandstone); the top corresponds to an abrupt change in lithology, from basalt lava (Kudinga Basalt) to ridge-forming sandstone of the overlying Hanlon Subgroup.

Unimbra Sandstone
(new name)

Proposer. I.P. Sweet.

Derivation of name. From Unimbra Rockhole on the Frew River at GR 112894, HATCHES, Frew River Sheet area.

Distribution. Extends throughout the Davenport province, cropping out in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. In southeastern BONNEY, Bonney Well Sheet area; from GR 447367, where the formation overlies the Kurinelli Sandstone, southwest to GR 443355 (8 km west of Kurundi homestead, 20°30'00"S, 134°41'00"E), where it is overlain by Yeeradgi Sandstone. The section consists of 750 m of mainly medium-grained quartz arenite with coarse to gritty and pebbly beds in the lower half.

Lithology. Ridge-forming, mainly medium-grained, quartz-rich to sublithic and subarkosic arenite. Gritty and pebbly to conglomeratic beds are common, particularly in the west; fine-grained clayey and micaceous arenite partings are common; trough cross-bedding is very widespread.

Thickness. From 120 m at Unimbra Rockhole to over 1500 m in eastern HATCHES and western HANLON, Frew River Sheet area.

Relationships. Unconformable on the Warramunga Group (in the north), and conformable and possibly disconformable on the Mia Mia Volcanics, Treasure Volcanics, Epenarra Volcanics, Kurinelli Sandstone, and Taragan Sandstone of the Ooradidgee Subgroup of the Hatches Creek Group; also interfingers locally with the upper parts of the Treasure Volcanics and Epenarra Volcanics. Overlain conformably by the Yeeradgi Sandstone and Newlands Volcanics; intruded by some sill-like bodies of granophyre and rare dolerite, and also by Devils Marbles Granite. Underlying Kurinelli Sandstone and overlying Yeeradgi Sandstone are less quartzose than the Unimbra Sandstone, and the underlying Taragan Sandstone, where in contact with the Unimbra Sandstone, is more pebbly.

Synonymy. None.

Remarks. One of three region-wide major ridge-forming units in the Davenport province, and the basal formation of the Wauchope Subgroup of the Hatches Creek Group.

Yeeradgi Sandstone
(new name)

Proposer. A.J. Stewart.

Derivation of name. From Yeeradgi Rockhole at GR 223468, BONNEY, Bonney Well Sheet area.

Distribution. Crops out in the central and northern parts of the Davenport province, mainly in the Bonney Well Sheet area.

Type section. In the southeast of BONNEY, from GR 443355, 8 km west of Kurundi homestead (20°30'00"S, 134°41'00"E), where the formation overlies Unimbra Sandstone conformably, to GR 442352, where it is conformably overlain by Coulters Sandstone. In this type section, which follows on directly from that of the Unimbra Sandstone, the Yeeradgi Sandstone comprises about 200 m of mostly friable, purplish, fine to medium-grained, cross-bedded, variably lithic arenite.

Lithology. Mainly ridge-forming to recessive cross-bedded arenite, having a sparse to abundant lithic/kaolinitic/feldspathic/micaceous component, grading to arkose and greywacke. It also includes shale, mudstone, slate, phyllite, and siltstone, especially in the upper part, and minor lenses of porphyritic felsic volcanics and beds of ashstone and tuff.

Thickness. Generally 200-800 m.

Relationships. Conformable on the Unimbra Sandstone and, generally, overlain conformably by the Arabulja Volcanics, Newlands Volcanics, or Coulters Sandstone; also locally interfingers with the Newlands Volcanics and, in the northwest of DAVENPORT RANGE, is overlain unconformably by the Coulters Sandstone. Intruded by sills of granophyre. Base is taken at the change from ridge-forming quartzose arenite of the Unimbra Sandstone to less resistant and less quartz-rich arenite; top is taken at the top of recessive sedimentary beds.

Synonymy. None.

Remarks. An extensive, relatively recessive formation within the Wauchope Subgroup of the Hatches Creek Group.

Newlands Volcanics

(new name)

Proposer. D.H. Blake.

Derivation of name. From Newlands Creek in the southwest of GEORGE CREEK, Elkedra Sheet area. The headwaters of Newlands Creek drain an outcrop area of the formation. Newlands Bore is on Newlands Creek at GR 696329.

Distribution. Forms extensive outcrops in the southeastern part of the Davenport province, mainly in northwestern Elkedra and southwestern Frew River Sheet areas.

Type section. In the eastern part of Elkedra Pound, 36 km west of Elkedra homestead (21°11'00"S, 135°28'00"E), from GR 110645 to GR 115592 (top), ELKEDRA, Elkedra Sheet area. Here the main rock types of the formation are well exposed:

partly recessive pink and grey felsic lava, ignimbrite, and minor interlayered feldspathic and volcaniclastic arenite, and a band of ridge-forming quartz arenite. A sill of porphyritic mafic granophyre, probably comagmatic with adjacent volcanics, is also present. At GR 115592 the formation is overlain by ridge-forming Coulters Sandstone. The base of the formation is not exposed in this section, which is probably at least 1000 m thick.

Lithology. Mainly recessive dacitic to rhyolitic ignimbrite and subordinate lava, which contain abundant phenocrysts of tabular sodic plagioclase up to 5 mm long ± partly resorbed quartz, together with small ferromagnesian clots (mainly biotite aggregates), in a fine-grained, commonly dark grey, groundmass. Also includes minor bedded tuff, ashstone, agglomerate, siltstone, shale, and partly ridge-forming quartzose to feldspathic or lithic (volcaniclastic) arenite and quartzite; volcanic rocks commonly cleaved and much altered.

Thickness. 0 to probably more than 2000 m.

Relationships. Conformable on the Unimbra Sandstone in the southeast; conformable on and locally interfingers with the Yeeradgi Sandstone in the north; however, basal contacts are generally poorly exposed. Overlain conformably and possibly disconformably by the Coulters Sandstone; overlain unconformably by Cambrian and younger beds; intruded by sill-like bodies of porphyritic mafic granophyre probably related genetically to the volcanics.

Synonymy. Corresponds to part of the Arabulja Volcanics of Blake & others (1982, 1983) and Blake & Wyche (1983).

Remarks. Mapped separately from the Arabulja Volcanics, a stratigraphic correlative, because of geographical separation and lithologic differences - the Newlands Volcanics consist mainly of ignimbrite containing abundant small tabular plagioclase phenocrysts, whereas the Arabulja Volcanics consist mainly of lava flows containing relatively sparse equant altered alkali feldspar phenocrysts. Part of the Wauchope Subgroup of the Hatches Creek Group.

Arabulja Volcanics

(new name)

Proposer. D.H. Blake.

Derivation of name. From Arabulja Waterhole on Murray Creek at GR 825700, MURRAY DOWNS, Barrow Creek Sheet area.

Distribution. Crops out in the northeastern part of MURRAY DOWNS and in adjoining parts of DAVENPORT RANGE (Bonney Well Sheet area), HATCHES (Frew River Sheet area) and ELKEDRA (Elkedra Sheet area).

Type section. In southwestern HATCHES, 1.5 km north of Coulters Waterhole (20°59'55"S, 135°01'50"E): from GR 024797 (base) to GR 028797 (top). Here the formation consists of two felsic lava flows dipping about 50° east, conformably overlying feldspathic arenite of the Yeeradgi Sandstone and overlain conformably by quartz arenite of the Coulters Sandstone.

Lithology. Moderately recessive, pinkish, and reddish-brown felsic lava flows and minor tuff. The lavas generally contain phenocrysts up to 5 mm across of alkali feldspar (largely altered) and ferromagnesian minerals (pseudomorphed) in a very fine-grained quartzofeldspathic groundmass; they commonly show platy jointing in their lower parts and contorted flow-banding in their upper parts, and typically have rubbly or autobrecciated margins.

Thickness. 0 to about 700 m; about 300 m in the type section.

Relationships. Conformable on the Yeeradgi Sandstone and overlain conformably or possibly disconformably by the Coulters Sandstone. Boundaries are taken at abrupt contacts between felsic volcanics and underlying and overlying sedimentary rocks.

Synonymy. None.

Remarks. The felsic lavas of the Arabulja Volcanics differ petrographically (e.g., in phenocryst content) from those of other volcanic formations within the Hatches Creek Group. Part of the Wauchope Subgroup of the Hatches Creek Group.

Coulters Sandstone

(new name)

Proposer. I.P. Sweet.

Derivation of name. From Coulters Waterhole on the Frew River at GR 028781, HATCHES, Frew River Sheet area.

Distribution. Exposed throughout the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. In the southwest of HATCHES, 2 km north of Coulters Waterhole (20°59'55"S, 135°01'50"E). The base is at GR 027800, and the section runs eastwards to the top at GR 034801. The formation here is 500 m thick, and consists predominantly of fine to medium-grained, cross-bedded quartz arenite; however, it is pebbly near the base, includes a central band, 25 m thick, of very fine-grained lithic arenite, and is medium to coarse-grained at its top.

Lithology. Ridge-forming quartz arenite and slightly feldspathic or lithic quartz arenite; also minor pebbly arenite and recessive friable kaolinitic or sericitic arenite, siltstone, and altered basaltic? lava. Two recessive bands, up to 100 m thick, present in the southeast, one near the centre of the formation, the other near the top. Arenites mostly white, pale pink, or pale grey, well sorted, medium to coarse-grained, medium to thick-bedded, and cross-bedded; ripple marks common, especially towards the top of the formation.

Thickness. From about 300 m to at least 1000 m, and possibly up to 3000 m (e.g., in the southeast of HATCHES).

Relationships. Conformable on the Arabulja Volcanics; conformable and probably disconformable on the Newlands Volcanics, conformable to locally unconformable on the Yeeradgi Sandstone; overlain conformably by the Frew River Formation and, in the northwest, by the Kudinga Basalt; overlain unconformably by Cambrian strata. Lower and upper contacts taken at abrupt topographic breaks between the ridge-forming arenite of the Coulters Sandstone and recessive underlying and overlying rocks.

Synonymy. None.

Remarks. A region-wide ridge-forming formation assigned to the Wauchope Subgroup of the Hatches Creek Group.

Frew River Formation
(new name)

Proposers. D.H. Blake, A.J. Stewart, and I.P. Sweet.

Derivation of name. From the Frew River, the main watercourse in the western part of HATCHES, Frew River Sheet area.

Distribution. Crops out in the central and southern parts of the Davenport province: in the central part of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. Along a small creek 5 km northwest of Errolola Rockhole (20°58'35"S, 135°02'25"E), in the southwest of HATCHES: from GR 008834, where the formation overlies the Coulters Sandstone with a gradational (over a few metres) conformable contact, north to GR 011838, where the formation is overlain abruptly by basaltic lava of the Kudinga Basalt. In this section the formation is about 500 m thick, dips 50-60° north, and consists of about 50 m of generally recessive thinly bedded quartzose, feldspathic, and kaolinitic arenite and micaceous siltstone, which show ripple marks, mud-cracks, and rare halite casts, and an overlying sequence about 450 m thick of mainly carbonates - yellow, brown, and pink stromatolitic dolomite and ripple-marked dolomitic arenite, and grey limy beds. The stromatolites present include bulbous forms about 50 cm across, algal mats, and Conophyton.

Lithology. Recessive, thinly bedded, fine-grained kaolinitic arenite, micaceous siltstone, and mudstone, which in the upper part of the formation are commonly dolomitic and/or calcareous, together with laminated and stromatolitic dolomite and silty dolomite, and, mainly near the base, subordinate quartz arenite and feldspathic quartz arenite.

Thickness. 0 to about 500 m.

Relationships. Conformable on the Coulters Sandstone and overlain conformably by the Kudinga Basalt.

Synonymy. None.

Remarks. A distinctive recessive, partly calcareous formation within the Wauchope Subgroup of the Hatchess Creek Group.

Kudinga Basalt
(new name)

Proposer. A.J. Stewart.

Derivation of name. From Kudinga Creek in the northeast of DAVENPORT RANGE, Bonney Well Sheet area.

Distribution. Throughout the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. In the far northwest of ELKEDRA, Elkedra Sheet area, about 3 km south-southeast of Coulters Waterhole (20°59'55"S, 135°01'50"E, in HATCHES). The base is at GR 038754 and the top is at GR 042755. Here the formation is about 400 m thick, dips about 55° east, and consists, from base to top, of basalt lava a few centimetres thick (overlying the Frew River Formation), two bands of ridge-forming arenite, and an intervening recessive band, total thickness about 100 m, and about 300 m of basalt flows. It is overlain by ridge-forming Errolola Sandstone.

Lithology. Recessive massive to amygdaloidal and scoriaceous basalt, rare pillow basalt, trachyte, and tuffaceous siltstone, and, commonly, at or near its base, two thin bands of ridge-forming quartzose to feldspathic or lithic arenite.

Thickness. Generally between 100 m and 800 m.

Relationships. Conformably overlies the Frew River Formation and, where this unit is absent, the Coulters Sandstone; overlain conformably by the Errolola Sandstone. Base of formation taken as the base of the lowest basalt lava or thin band of ridge-forming arenite overlying the recessive Frew River Formation; top taken as the top of the uppermost basalt lava.

Synonymy. None.

Remarks. A distinctive recessive region-wide marker unit at the top of the Wauchope Subgroup of the Hatches Creek Group.

Hanlon Subgroup
(new name)

Proposer. I.P. Sweet.

Derivation of name. From HANLON (Sheet 6056), Frew River Sheet area.

Distribution. Most complete section of the subgroup is in the western part of HANLON. The older parts are preserved in the keels of several synclines in HATCHES, ELKEDRA, DAVENPORT RANGE, BONNEY, and MURRAY DOWNS (Frew River, Elkedra, Bonney Well, and Barrow Creek Sheet areas).

Constituent formations. From base to top: Errolola Sandstone, Alinjabon Sandstone, Lounee Creek Formation, Canulgerra Sandstone, Vaddingilla Formation, and Yaddanilla Sandstone.

Lithology. Fine to medium-grained quartzose and feldspathic/lithic/kaolinitic arenite, siltstone, and shale; minor coarse-grained arenite, pebbly conglomerate, calcareous beds, and mafic lava. Cross-bedding, wave and current ripple marks, and mudflakes common.

Thickness. Maximum exposed is about 5200 m, in the western part of HANLON.

Relationships. Conformably overlies the Wauchope Subgroup of the Hatches Creek Group; unconformably overlain by Cambrian rocks.

Synonymy. Corresponds to the Upper Hatches Creek Group of Blake & Wyche (1983) and Blake & others (1982, 1983), except that it also includes, at its base, the Errolola Sandstone.

Discussion. Youngest of the three subgroups making up the Hatches Creek Group. The six formations of the subgroup are probably all marine: the arenites appear to have been laid down in nearshore, partly intertidal environments, and the finer-grained rocks in deeper, quieter water. The subgroup differs from the two older subgroups of the Hatches Creek Group in that it contains few volcanics and virtually no fluvial sediments.

Errolola Sandstone

(new name)

Proposer. A.J. Stewart.

Derivation of name. From Errolola Rockhole on the Frew River at GR 043807, in the southwest of HATCHES, Frew River Sheet area.

Distribution. Crops out throughout the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. In southwest HATCHES, from GR 041780, 1 km east of Coulters Waterhole (20°59'55"S, 135°01'50"E), where the formation overlies the Kudinga Basalt, east to GR 047780, where it is overlain by Alinjabon Sandstone. In this section the Errolola Sandstone is about 500 m thick, dips east at about 70°, and consists of ridge-forming quartz arenite which is mainly white, medium-bedded, and medium-grained; cross-bedded and ripple marks are common.

Lithology. Ridge-forming cross-bedded quartz arenite and subordinate feldspathic (lithic) kaolinitic arenite. Some beds, mainly near the bottom and top, contain sparse to abundant pebbles.

Thickness. Ranges between about 100 and 1200 m.

Relationships. Conformably overlies the Kudinga Basalt; overlain conformably by the Alinjabon Sandstone. Base marked by abrupt change from recessive basalt to ridge-forming arenite; top marked by abrupt change from ridge-forming arenite to recessive basal beds of the Alinjabon Sandstone.

Synonymy. None.

Remarks. A region-wide ridge-forming marker unit of resistant clean arenite, which is readily distinguished from the overlying alternating recessive and ridge-forming bands that make up the Alinjabon Sandstone, and from the underlying Kudinga Basalt. The basal formation of the Hanlon Subgroup of the Hatches Creek Group.

Alinjabon Sandstone
(new name)

Proposer. A.J. Stewart.

Derivation of name. From Alinjabon Rockhole on Bonney Creek, at GR 590183, DAVENPORT RANGE, Bonney Well Sheet area.

Distribution. Crops out extensively in the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. In the southwest of HATCHES, Frew River Sheet area, continuing on from the type section of the Errolola Sandstone: from GR 047780, 2 km east of Coulters Waterhole (20°59'55"S, 135°01'50"E), where the Alinjabon Sandstone overlies the Errolola Sandstone, to GR 052780, where it is overlain by the Lennee Creek Formation. Here, basal recessive beds (friable arenite exposed) about 50 m thick are overlain by about 100 m of ridge-forming, thin to medium-bedded, fine to medium-grained white quartz arenite, overlain by recessive beds (again, mainly friable arenite exposed) about 200 m thick, overlain by ridge-forming thin-bedded, fine-grained and medium-grained feldspathic (or lithic) arenite about 100 m thick (top). This sequence dips about 80°E.

Lithology. Ridge-forming quartz arenite and feldspathic or lithic arenite interbanded with recessive siltstone, friable arenite, shale, and in places, mainly at or near the base, altered mafic lava.

Thickness. Generally about 500 m, but ranges between 350 m and 750 m.

Relationships. Conformable between the Errolola Sandstone below and the recessive Lennee Creek Formation above; unconformably overlain by Cambrian and younger beds. Base taken as the base of the lowest recessive band overlying the ridge-forming Errolola Sandstone; top taken as the top of the uppermost band of ridge-forming arenite.

Synonymy. None.

Remarks. A region-wide unit characterised by two or three thin ridge-forming arenite bands and intervening, generally subordinate, recessive bands; readily distinguished from the underlying thick ridge-forming Errolola Sandstone and the overlying thick recessive Lennee Creek Formation. Part of the Hanlon Subgroup of the Hatches Creek Group.

Lennee Creek Formation

(new name)

Proposer. A.J. Stewart.

Derivation of name. From Lennee Creek, which drains eastwards to join the Frew River at GR 180180, HATCHES, Frew River Sheet area.

Distribution. Crops out in most parts of the Davenport province: in the eastern and central parts of Bonney Well, southwestern part of Frew River, northwestern part of Elkedra, and northeastern part of Barrow Creek Sheet areas.

Type section. Across part of the southern limb of a syncline in western ELKEDRA, Elkedra Sheet area, 40 km west of Elkedra homestead (21°11'00"S, 135°28'00"E): from GR 070532 (base) to GR 070548 (top). Here the Lennee Creek Formation is about 1500 m thick; dips steeply north; consists of recessive, thinly bedded, partly cleaved siltstone, shale, and friable arenite; conformably overlies Alinjabon Sandstone; and is partly overlain by flat lying Cambrian conglomerate. Top not exposed in this section.

Lithology. Recessive siltstone, shale, and friable feldspathic/lithic/kaolinitic/sericitic arenite, together with minor thin bands of ridge-forming quartz arenite and recessive calcareous beds.

Thickness. Generally about 1000 m, but ranges up to about 1500 m, as in the type section.

Relationships. Conformable between ridge-forming arenite of the Alinjabon Sandstone below and Canulgerra Sandstone above (upper contact generally concealed); overlain unconformably by Cambrian strata.

Synonymy. None.

Remarks. Distinctive in that it is a thick recessive unit separating underlying and overlying units of ridge-forming arenite. Part of the Hanlon Subgroup of the Hatches Creek Group.

Canulgerra Sandstone
(new name)

Proposer. S. Wyche.

Derivation of name. From Canulgerra Rockhole on Yaddanilla Creek, at GR 650968, HANLON, Frew River Sheet area.

Distribution. Crops out in three areas within the Davenport province: one in the west of HANLON, one in eastern central BONNEY, and the other in eastern central DAVENPORT RANGE (Bonney Well Sheet area).

Type section. In HANLON, 4 km northwest of Canulgerra Rockhole (20°49'30"S, 135°37'30"E): from GR 615006, where the formation conformably overlies the Lennee Creek Formation, to GR 632020, where it is overlain conformably by the Vaddingilla Formation. Here, it is about 500 m thick, dips 15°-30° east, and is well exposed in strike ridges.

Lithology. Ridge-forming quartzose to feldspathic arenite interbanded with recessive friable arenite, micaceous siltstone, and mudstone; also includes minor conglomerate.

Thickness. Generally about 500 m.

Relationships. Conformable on the Lennee Creek Formation and overlain conformably by the Vaddingilla Formation. Upper and lower contacts generally concealed; taken at abrupt topographic breaks between ridge-forming arenite of the formation and recessive beds of the underlying and overlying units.

Synonymy. None.

Remarks. A relatively resistant (ridge-forming) formation in between two recessive formations. Part of the Hanlon Subgroup of the Hatches Creek Group.

Vaddingilla Formation
(new name)

Proposer. S. Wyche.

Derivation of name. From Vaddingilla Rockhole on Yaddanilla Creek at GR 677983, HANLON, Frew River Sheet area.

Distribution. Crops out only in the western part of HANLON.

Type section. 5 km northwest of Vaddingilla Rockhole (20°49'00"S, 135°39'10"E): from GR 632020, where the formation conformably overlies the Canulgerra Sandstone, northeast to GR 648034, where it is overlain conformably by the Yaddanilla Sandstone. The sequence dips 20°-25° east-northeast, and is about 800 m thick. Here, as elsewhere, much of the formation is concealed beneath surficial Cainozoic sediments.

Lithology. Recessive siltstone, shale, and friable arenite.

Thickness. About 800 m.

Relationships. Conformable on the Canulgerra Sandstone and overlain conformably by the Yaddanilla Sandstone. Contacts are taken at abrupt topographic changes from recessive beds to underlying and overlying ridge-forming units.

Synonymy. None.

Remarks. A poorly exposed recessive unit lying between two ridge-forming formations. Part of the Hanlon Subgroup of the Hatches Creek Group.

Yaddanilla Sandstone
(new name)

Proposer. S. Wyche.

Derivation of name. From Yaddanilla Creek in the west of HANLON, Frew River Sheet area.

Distribution. Confined to the western part of HANLON.

Type section. About 4 km northwest of Vaddingilla Rockhole (20°49'00"S, 135°39'10"E), from GR 653024, where the formation conformably overlies the Vaddingilla Formation, northeast to GR 661020, the limit of outcrop - bedrock to the east is concealed beneath Quaternary surficial cover. In this section the Yaddanilla Sandstone dips 20°-45° northeast and forms a series of strike ridges, of which the highest is the westernmost.

Lithology. Ridge-forming quartz arenite and feldspathic quartz arenite, and some interbanded recessive rocks (concealed).

Thickness. About 300 m in type section; may be thicker to southeast.

Relationships. Conformable on the Vaddingilla Formation; no overlying Proterozoic unit exposed.

Synonymy. None.

Remarks. Uppermost unit of the Hanlon Subgroup, and youngest formation of the Hatches Creek Group exposed in the Davenport province.

Devils Marbles Granite
(Previously named, but not defined)

Proposer. S. Wyche.

Derivation of name. From the Devils Marbles on the Stuart Highway 9 km northeast of Wauchope, at GR 230260, WAUCHOPE, Bonney Well Sheet area. The name Devils Marbles was used informally for this granite by Sullivan (1952).

Distribution. Confined to about 15 km^2 in the vicinity of the Devils Marbles.

Type area. The Devils Marbles on the Stuart Highway (20°34'S, 134°15'E), where the unit forms piles of large spheroidal boulders.

Lithology. Medium to coarse-grained muscovite-biotite granite containing microcline phenocrysts.

Relationships. Intrudes the Kurinelli Sandstone and Taragan Sandstone of the Ooradidgee Subgroup and the Unimbra Sandstone of the Wauchope Subgroup, Hatches Creek Group.

Age. Older than 1540 Ma, a K-Ar biotite age reported by Hurley & others (1960); possibly similar to the Elkedra Granite, the Rb-Sr whole-rock age of which is approximately 1640 Ma.

Synonymy. None.

Remarks. Forms a well-defined pluton which postdates the main folding of the Hatches Creek Group.

Elkedra Granite

(Previously named, but not defined)

Proposer. D.H. Blake.

Derivation of name. From the Elkedra pastoral property, in the Elkedra Sheet area.

Distribution. Confined to about 12 km^2 in the southeast corner of ELKEDRA and southwest corner of GEORGE CREEK, Elkedra Sheet area.

Type area. In the vicinity of the Juggler mine (21°29'00"S, 135°28'30"E), around GR 480250, ELKEDRA, where the main varieties form tors, spheroidal boulders, and rock pavements.

Lithology. Pale pink, medium to coarse-grained, even-grained to slightly megacrystic, homogeneous leucogranite, and minor medium-grained tourmaline granite, greisen, aplite, quartz + feldspar ± tourmaline pegmatite, and quartz-tourmaline veins. Leucogranite consists of about equal amounts of quartz (variably strained), subhedral oligoclase, and perthitic microcline, and up to 10% muscovite and subordinate biotite (partly altered to chlorite).

Relationships. Intrudes the Rooneys Formation of the Ooradidgee Subgroup of the Hatches Creek Group and a granophyre sill, and has a metamorphic aureole about 100 m wide. Cut by quartz veins and overlain by flat-lying Cambrian Sandover beds. Intrusive roof and side contacts well exposed near the Juggler mine.

Age. Probably emplaced around 1640 Ma ago (L.P. Black, personal communication 1983). Dated by Riley at 1695 Ma (Rb-Sr whole-rock age using $1.39 \times 10^{-11} y^{-1}$. as the decay constant for ^{87}Rb, as reported by Compston & Arriens, 1968). 1430 Ma was obtained on biotite from the granite by Hurley & others (1961).

Synonymy. None.

Remarks. Mapped as unnamed granite by Smith & Milligan (1966) and named Elkedra Granite, but not defined, by Compston & Arriens (1968). Was intruded after the main deformation of the Hatches Creek Group.

Hill of Leaders Granite
(new name)

Proposer. D.H. Blake.

Derivation of name. From the Hill of Leaders tungsten mine at GR 630535, OORADIDGEE, Bonney Well Sheet area.

Distribution. Crops out in the northeastern part of the Bonney Well Sheet area, in BONNEY and OORADIDGEE.

Type area. The vicinity of the Hill of Leaders mine (20°18'00"S, 134°38'00"E), around GR 630535, where the granite is well exposed as tors and spheroidal boulders.

Lithology. Mainly grey, medium to coarse-grained muscovite-biotite granite containing abundant large feldspar phenocrysts (up to 5 cm across) and numerous angular to rounded fine-grained micaceous xenoliths. Also includes minor medium to coarse-grained even-grained granite, aplite, and greisen.

Relationships. Intrudes the Warramunga Group; cut by dolerite and lamprophyre dykes and quartz veins. Not seen in contact with Hatches Creek Group rocks.

Age. Younger than 1870 Ma, the U-Pb zircon age for volcanics in the Warramunga Group (Black, in press), and older than 1400 Ma, the K-Ar biotite age for the granite obtained by Hurley & others (1961).

Syncnymy. None.

Remarks. Mapped as unnamed granite by Smith & others (1961) and Smith (1970).

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