

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

RECORD 1989/15

**REVISED STRATIGRAPHIC NOMENCLATURE
IN WESTERN AUSTRALIAN
PHANEROZOIC BASINS**

by

A.E. Cockbain and R.M. Hocking



**DEPARTMENT OF MINES
WESTERN AUSTRALIA**



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INTRODUCTION

The purpose of this report is to document a number of stratigraphic nomenclatural changes that have been made during the preparation of Memoir 3 "The geology and mineral resources of Western Australia". It was decided that the changes would not be justified in the memoir but documented in a separate publication. Nomenclatural changes made to the stratigraphy of the offshore Bonaparte Basin have been dealt with by Mory (1988) and are not repeated here.

EUCLA BASIN

MADURA FORMATION

The Madura Formation, as defined by Lowry (1970), included all the Cretaceous sediments in the Eucla Basin. Lowry noted that two disconformities might be present in the unit but did not subdivide the formation because they could not be proven. The sequence encountered in Jerboa 1 (Bein and Taylor, 1981) proved one disconformity, while work in South Australia (Fraser and Tilbury, 1979) suggests that the other is present. Therefore, the Madura Formation is here restricted to the lowest part of the unit as originally defined, and the upper parts are assigned to the Toondi and Nurina Formation which are defined below.

The revised type section is the interval between 614 and 640 m in Transcontinental Railway No 1 bore, Madura.

TOONDI FORMATION

Derivation of name: Toondi homestead (now abandoned), about 10 km southwest of Madura.

Type Section: Transcontinental Railway No 1. bore, Madura, between 336 and 614 m.

Lithology: Siltstone and claystone, similar to the Madura Formation. Sandstone occurs as thin intercalated stringers at several levels.

Age: Albian to Cenomanian, based on palynology.

Stratigraphic relationships: Disconformable between Nurina and Madura Formations.

Distribution: Widespread over much of the basin. The unit does not outcrop.

Discussions: The Toondi Formation was previously considered to be part of the Madura Formation. It is removed from that formation because disconformities are believed to separate it from the overlying and underlying units. While these disconformities cannot be demonstrated unequivocally from palaeontology, regional correlations with the eastern Eucla Basin and other Western Australian basins suggest that they are probably present.

NURINA FORMATION

Derivation of name: Nurina Cave, about 15 km south of Madura.

Type Section: Transcontinental Railway No 1 bore, between 283 and 336 m.

Lithology: Greensand, glauconitic sandstone, glauconite and sandy siltstone.

Age: Santonian to early Campanian, from palynomorphs.

Stratigraphic relationships: Unconformable beneath Tertiary sediments; disconformable on Toondi Formation.

Distribution: The Nurina Formation appears to be restricted to the central Eucla Basin around Madura. The unit is about 29 m thick in Eyre 1 and Transcontinental Railway No 1 bore, and about 41 m thick in Gambanga 1. These and the type section are the only known intersections, and the formation does not outcrop.

Discussion: The Nurina Formation was previously included in the Madura Formation. It is here made a separate formation because it is disconformable on the underlying Toondi Formation, and lithologically distinguishable from it. The unit is probably equivalent in age to the Wigunda Formation on the Ceduna Terrace in South Australia (Fraser and Tilbury, 1979).

CARNARVON BASIN

DINGO CLAYSTONE

The Dingo Claystone was one of the first units to be recognised in the subsurface in the northern Carnarvon Basin. It was defined by McWhae and others (1958) who took the type section as the interval between 1130 and 4264 m in Cape Range 2. The formation is now restricted to the fine-grained Jurassic sediments that lie above the breakup unconformity, and corresponds to Kopsen and McGann's (1985) "Upper Dingo Claystone". The lower parts of the original unit are assigned to the Murat Siltstone and Athol Formation (see below). Because of the difficulty in subdividing the original type section a new type section is proposed between 2177 and 3229 m in Barrow Deep 1. A reference section in the Exmouth Sub-basin is proposed in Yardie East 1, 2284-3973 m.

MURAT SILTSTONE

Derivation of name: Point Murat, at the northern end of Cape Range peninsula.

Type Section: Jurabi 1, between 2963 and 3560 m drilled depth.

Lithology: Siltstone, lesser shale, minor sandstone; basal limestone commonly present.

Age: Rhaetian to Toarcian, based on palynomorphs.

Stratigraphic relationships: Mostly conformable on older units. Grades laterally into North Rankin and Learmonth Formations.

Distribution: Basinal troughs of the Exmouth, Barrow, and Dampier Sub-basins.

Discussion: The name was used, but not defined, by Hocking (1988), and the concept was established in unpublished company reports. The Murat Siltstone has previously been referred to as the "Lower Dingo Claystone" (Kopsen and McGann, 1985), or "Muiron Siltstone" (internal company reports), and includes Parry and Smith's (1988) "New Formation" beneath the Dingo Claystone. The name "Muiron Siltstone" is pre-empted by a Quarternary unit in the Cape Range area. The formation is here defined as the fine-grained portion of the Jurassic sequence beneath the rift-onset unconformity.

ATHOL FORMATION

Derivation of name: Mount Athol, near Exmouth at the northern end of Cape Range.

Type Section: Hermite 1, between 1466 and 2133 m drilled

depth. A reference section is in Yardie East 1, between 3973 and 4658 m drilled depth.

Lithology: Siltstone and shale, lesser claystone, minor sandstone; basal limestone locally present.

Age: Toarcian to Bathonian.

Stratigraphic relationships: Generally unconformable between the Murat Siltstone and the Dingo Claystone; locally conformable in the central parts of the basin.

Distribution: Basinal troughs of the Exmouth, Barrow, and Dampier Sub-basins.

Discussion: The name Athol Formation was used, but not defined, by Hocking (1988). The unit comprises the fine-grained Jurassic rocks that were deposited between the rift-onset and breakup unconformities in the northern Carnarvon Basin. The formation was referred to as the "Middle Dingo Claystone" by Kopsen and McGann (1985).

FLAG SANDSTONE

Derivation of name: Flag 1 petroleum exploration well.

Type section: Harriet 1, between 1934 and 2194 m.

Lithology: Massive sandstone with minor siltstone (Osborne and Howell, 1987; de Boer and Collins, 1988).

Age: Berriasian to Valanginian.

Stratigraphic relationships: Conformable on Malouet Formation ("lower Barrow Group" of Howell (1988) and Osborne and Howell (1987)), but also interfingers with upper part of that formation. Interfingers with and overlies Flacourt Formation, due to its depositional

setting as a basin-floor fan downslope from the upper delta foresets and topsets of the Flacourt Formation.

Distribution: Northern Barrow Sub-basin, on the northern flank of the Barrow delta. The maximum thickness of about 250 m is in the vicinity of Harriet Oilfield.

Discussion: The name has been used informally in internal company reports for several years, but has not been formally defined previously. It was published but not defined by Kopsen and McGann (1985) and used subsequently by several authors.

PERTH BASIN

CATAMARRA MEMBER

The Catamarra Coal Measures Member (Playford and Low, 1972) of the Cockleshell Gully Formation is here renamed the Catamarra Member on the grounds of economy of words.

PORPOISE BAY FORMATION

Derivation of name: Named after Porpose Bay on Rottnest Island.

Type Section: Rottnest Island bore, between 285 and 667 m.

Lithology: Brown calcareous shale and siltstone.

Age: Middle Eocene, on the basis of foraminifers and coccoliths.

Stratigraphic relationships: The formation rests unconformably on the Leederville Formation.

Distribution: Central Vlaming Sub-basin, offshore from Perth.

Discussion: The formation was referred to as "Kings Park Formation" by Quilty (1978), although he recognised that it was younger than the true Kings Park Formation which is Late Paleocene to Early Eocene in age.

CHALLENGER FORMATION

Derivation of name: Challenger 1 petroleum exploration well in the Vlaming Sub-basin.

Type Section: Challenger 1, between 530 and 597 m.

Lithology: Chalk, calcarenite, and chert.

Age: Late Eocene on the basis of foraminifer fauna.

Stratigraphic relationships: The unit rests disconformably on the Kings Park Formation.

Distribution: Central Vlaming Sub-basin, offshore from Perth.

Discussion: The unit is Quilty's (1978) "Late Eocene - Unnamed Formation".

WADJEMUP FORMATION

Derivation of name: Wadjemup hill on Rottnest Island.

Type Section: Gage Roads 1, between 100 and 389 m.

Lithology: Yellow to red, well-sorted, medium to coarse-grained calcarenite; some limestone and dolomite.

Age: Late Miocene and Pliocene, although it may extend into the Holocene.

Stratigraphic relationships: The formation is unconformable on the Stark Bay Formation or older units.

Distribution: Central Vlaming Sub-basin, offshore from Perth.

Discussion: Quilty (1978) named this unit the "Rottnest Formation"; however, that name is preoccupied by the Rottnest Limestone (Fairbridge, 1953).

"BEDS" IN VARIOUS BASINS

A number of units that were originally described as "Beds" under the Australian Code are here named as formations. The Australian "Field Geologist's Guide" (Staines, 1985) recommends that such units should be referred to as "beds". However, it is potentially confusing to use "beds" with a lower case "b". The principle adopted here is that if the unit was sufficiently distinctive to warrant naming, then it should be considered to be of formation status. The following "beds" are given formation status:

OFFICER BASIN

Steptoe Formation, Kanpa Formation, Hussar Formation, Woolnough Formation, Madley Formation, Browne Formation, Neale Formation, Ilma Formation, Wright Hill Formation, Lefroy Formation, Robert Formation, Turkey Hill Formation, Lupton Formation, Punkerri Formation, Wirrildar Formation, Clutterbuck Formation, Babbagoola Formation, Wanna Formation, and Lampe Formation.

PERTH BASIN

Ascot Formation.

CANNING BASIN

Carranya Formation, Babrongan Formation, Lake George Formation, Oakover Formation, and Lawford Formation.

EUCLA BASIN

Plumridge Formation

YILGARN BLOCK

Rollos Bore Formation.

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