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Chapter 25: Murraba Basin

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Chapter 25: MURRABA BASIN

INTRODUCTION

Neoproterozoic rocks units exposed along the Northern Territory/Western Australia border in parts of THE GRANITES¹, HIGHLAND ROCKS and LAKE MACKAY are included in the Murraba Basin (**Figure 25.1**). The succession (**Table 25.1**) is predominantly exposed in the Western Australian mapsheets of BILLILUNA, STANSMORE and LUCAS, and probably extends further west beneath the Canning Basin. It unconformably overlies Palaeoproterozoic metasediments and granites, or the Birrindudu Group of the Birrindudu Basin, and is overlain by Devonian sediments of the Lucas Outlier of the Canning Basin and at least in part by the early Cambrian Antrim Plateau Volcanics in THE GRANITES. The Murraba Basin is a remnant of the Neoproterozoic Centralian Superbasin (Walter *et al* 1995) and is filled predominantly with siliciclastic sediments of the Redcliff Pound Group and correlatives (Blake *et al* 1979). However, the apparent absence of thick evaporitic units or unequivocal glacial units in the Murraba Basin, which are found in other Centralian Superbasin remnants, make precise correlations uncertain. Much of the Murraba Basin is concealed beneath Cenozoic sediment.

NEOPROTEROZOIC

Redcliff Pound Group

The Redcliff Pound Group (P10₁ division of Ahmad 2000) is composed almost exclusively of siliciclastic sedimentary rocks and is probably greater than 2000 m thick (Blake *et al* 1979). The basal unit of the group is the Munyu Sandstone, which is inferred to be conformably overlain by the Murraba Formation, which, in turn, is conformably overlain by the Erica Sandstone. This succession probably correlates with a conformable stratigraphic package, comprising the Denison, Jawilga and Boee beds, in BILLILUNA in Western Australia (Blake *et al* 1977, Blake *et al* 1979). Based on correlations

¹ Names of 1:250 000 mapsheets are shown in large capital letters eg THE GRANITES.

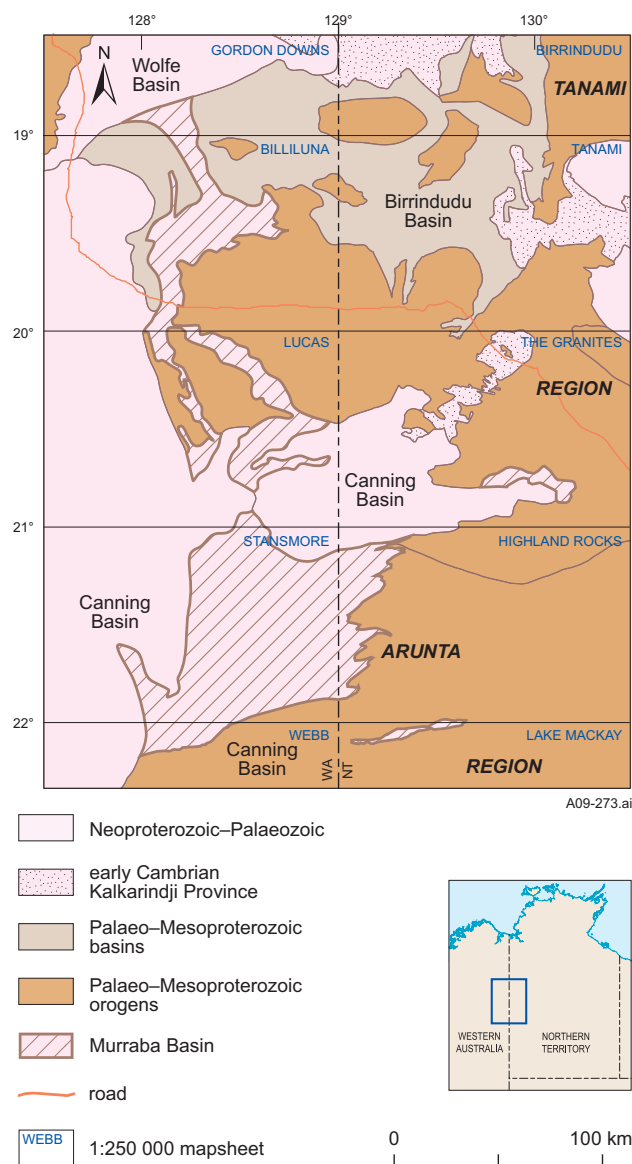


Figure 25.1. Simplified geology of Murraba Basin (Redcliff Pound Group) showing extent in Western Australia and Northern Territory. WA geological regions simplified and slightly modified from Tyler and Hocking (2001).

		Western Australia			Northern Territory	
		NW (GORDON DOWNS, BILLILUNA)	Central (LUCAS)	SW (STANSMORE, WEBB)	NE (THE GRANITES)	SE (HIGHLAND ROCKS, LAKE MACKAY)
Palaeozoic						
Cryogenian				Hidden Basin beds		
		Boee beds / Erica Sandstone	Erica Sandstone	Erica Sandstone		Erica Sandstone*
		Jawilga beds / Murraba Formation	Murraba Formation	Murraba Formation		Murraba Formation*
		Denison beds / Lewis Range Sandstone	Munyu Sandstone / Muriel Range Sandstone / Lewis Range Sandstone	Munyu Sandstone	Muriel Range Sandstone / Lewis Range Sandstone	Munyu Sandstone
Palaeoproterozoic						

* Highland Rocks only.

Table 25.1. Stratigraphic succession of Murraba Basin in Western Australia and Northern Territory (after Blake *et al* 1979, Vandenberg *et al* in press).

Murraba Basin

with Neoproterozoic successions in the Amadeus and Ngalia basins, the Redcliff Pound Group is interpreted to represent the basal part of the early Cryogenian Centralian Superbasin Supersequence 1 (Walter *et al* 1995).

The *Munyu Sandstone* outcrops on the eastern flank of the Murraba Basin and is stratigraphically equivalent to the Muriel Range and Lewis Range sandstones in THE GRANITES, LUCAS and BILLILUNA (**Table 25.1**). It unconformably overlies metasediments of the Lander Rock Formation (**Figure 25.2**) and granite of the Grimwade Suite. The unit has an estimated total thickness of 400 m in STANSMORE (Blake *et al* 1979), but is probably less than 200 m thick in HIGHLAND ROCKS (Vandenberg *et al* in press). It is composed of medium to thickly bedded, fine to coarse quartz sandstone (**Figure 25.3**) with minor pebble conglomerate and rare thin beds of sublithic siltstone. The Munyu Sandstone represents an upward-fining succession, deposited in a large-scale fluvial setting. Interbedded non-fossiliferous limestone lenses near the top of the Munyu Sandstone in STANSMORE indicate, at least in part, a shallow-marine setting (Blake *et al* 1979). The age of the Munyu Sandstone is poorly constrained, but it is inferred to correlate with the Dean and Heavitree quartzites (Amadeus Basin) and Vaughan Springs Quartzite (Ngalia Basin).

The *Muriel Range Sandstone* is correlated with the Munyu Sandstone and outcrops in the southeast of the Tanami Region, mainly in THE GRANITES. It reaches a maximum thickness of about 450 m (Blake *et al* 1979) and unconformably overlies Palaeoproterozoic strata. This unit consists predominantly of sublithic arenite and quartz arenite, but also include minor siltstone, shale, arkose, conglomerate and breccia.

The *Lewis Range Sandstone* is also correlated with the Munyu Sandstone (Blake *et al* 1979) and outcrops in LUCAS and BILLILUNA. It unconformably overlies Palaeoproterozoic strata and consists of well sorted



Figure 25.2. Basement–Munyu Sandstone unconformity. Basement, comprising intensely weathered, strongly foliated quartz-mica-feldspar schist of the Lander Rock Formation, pegmatite and quartz veins is unconformably overlain by Munyu Sandstone, comprising planar, thickly bedded (>10 cm) quartz sandstone and poorly sorted, vein quartz pebble conglomerate. Hammer (centre) positioned on unconformity (52K 520813mE 7641614mN). Photo L Vandenberg (NTGS).

medium- to fine-grained quartz arenite, sublithic arenite, conglomerate and rare siltstone.

The *Murraba Formation* has a maximum thickness of 800 m in STANSMORE and is composed of conglomerate and sublithic and quartz sandstone, with rare mudstone and dolostone (Hodgson 1977, Blake *et al* 1979). The most extensive exposures are in Western Australia, but some outcrops occur in the Sydney Margaret Range in HIGHLAND ROCKS. The Murraba Formation is interpreted to have been deposited in fluvial to less common shallow-marine environments and at times was emergent (Vandenberg *et al* in press). The formation is inferred to be conformable above the Munyu and Lewis Range sandstones and is conformable beneath the Erica Sandstone.

The *Erica Sandstone* is the uppermost unit of the Redcliff Pound Group and has a maximum thickness of 700 m in Western Australia, where it is most extensively exposed (Blake *et al* 1979). In the Northern Territory, the Erica Sandstone occurs in western HIGHLAND ROCKS, but is only about 50 m thick (Vandenberg *et al* in press). The unit is predominantly composed of well sorted, medium to fine sublithic sandstone, with up to 10% clay matrix, and some glauconitic sandstone (Hodgson 1977, Blake *et al* 1979). The Erica Sandstone is interpreted as having been deposited under fluvial to partly shallow-marine conditions. It conformably overlies the Murraba Formation and may be conformable beneath the Hidden Basin beds, although the contact is faulted or concealed. The Erica Sandstone is unconformably overlain by the Devonian Lucas Formation and Pedestal beds of the Canning Basin.

The *Denison beds* are confined to the Denison Range in the southwest of the Birrindudu Basin, in BILLILUNA. This unit consists of predominantly of quartz arenite and appear to be unconformable on the underlying Pindar beds. The Denison beds are inferred to be overlain conformably by the Jawilga beds and probably correlate with the lithologically similar Lewis Range Sandstone (Blake *et al* 1979).

The *Jawilga beds* outcrop on both sides of a major anticline between the Baines Hills and Denison Range in BILLILUNA. This unit consists of conglomerate, fine- to medium-grained sublithic arenite and thinly bedded, chert granule conglomerate similar to the Murraba



Figure 25.3. Munyu Sandstone. Peaked ripples in gently dipping, coarse quartz sandstone, flow direction (left to right) is towards the northwest (52K 534682mE 7665221mN). Photo L Vandenberg (NTGS).

Formation, with which it probably correlates (Blake *et al* 1979). The Jawilga beds are conformably overlain by the Boee beds.

The *Boee beds* outcrop as narrow strike ridges east of the Baines Hills in BILLILUNA. The main rock type is sublithic arenite similar to that of the probably correlative Erica Sandstone (Blake *et al* 1979). Conglomerate beds are also known from the reference area in the southwest part of their outcrop area.

The *Hidden Basin beds* in STANSMORE and WEBB (WA) are up to 3000 m thick and form parallel strike ridges, developed on resistant quartz arenite and sublithic arenite, and separated by sand plains. Some thinly bedded to laminated shale is also present. The Hidden Basin beds possibly conformably overlie the Erica Sandstone and form the top of the Murraba Basin succession.

MINERAL RESOURCES

The Murraba Basin area was first prospected by Davidson's 1900 expedition to the Granites and Tanami regions. Remoteness and surficial cover have generally precluded mineral exploration and there is no record of any work in the NT portion of the Murraba Basin prior to 1991. Since then, several companies have held tenure over the Murraba Basin, often in conjunction with work on the surrounding older rocks. Geophysical targets within, or beneath, the Murraba Basin were drill-tested (Rovira 1993). Limited empirical exploration for gold, uranium and base metals which relied on surface sampling failed to identify any economic mineralisation. Although the area is currently under application for mineral exploration, most of this interest relates to the uranium potential of the overlying Cenozoic sediments.

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