

CHAPTER 10 Cambrian basins

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ARROWIE BASIN

Age

Early to Middle Cambrian.

Prospective commodities

Zn–Pb, petroleum.

Major exploration models

Mississippi Valley type.

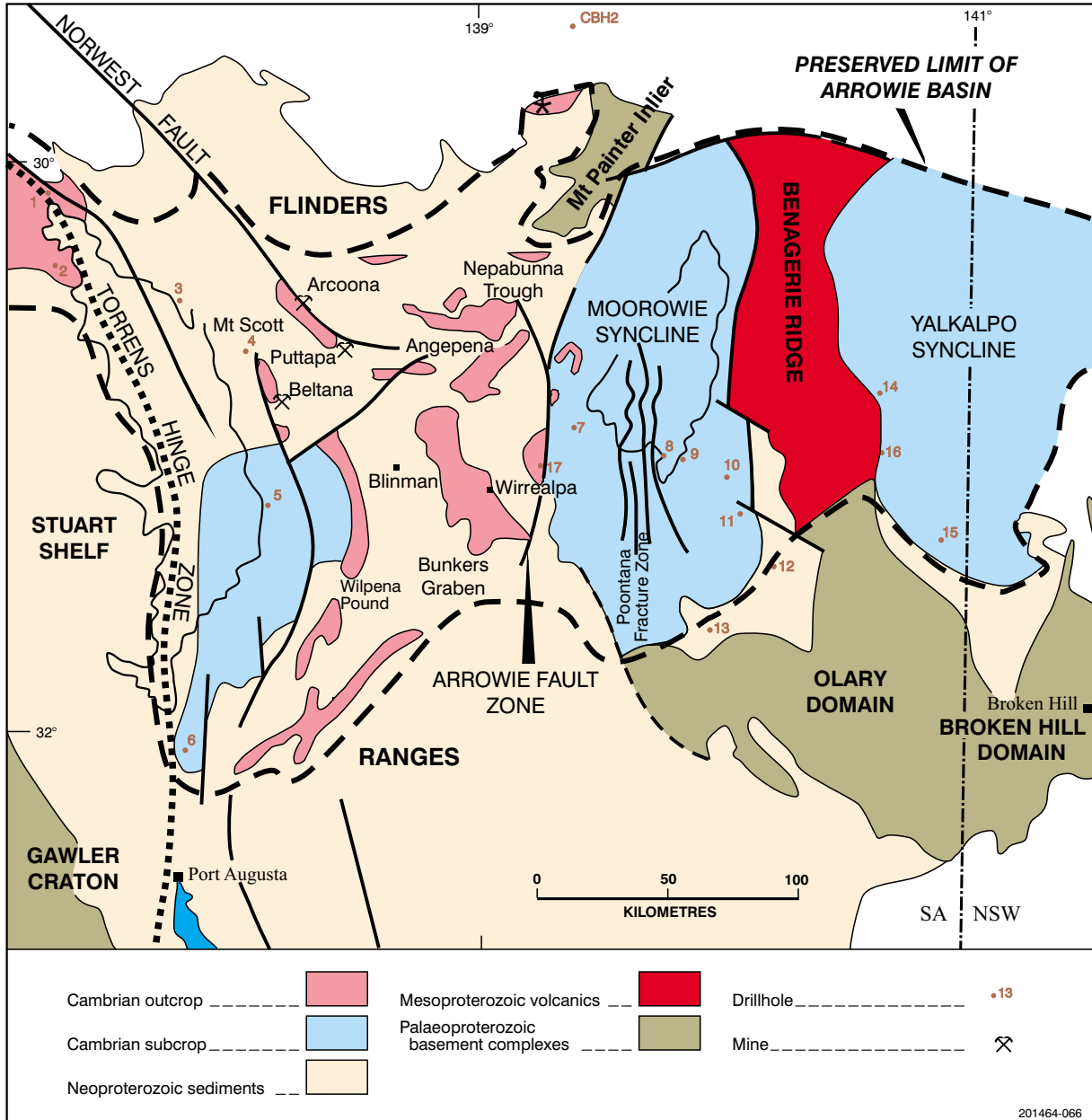
Summary geology and stratigraphy

The Arrowie Basin contains thick carbonates and siliciclastics, up to 4200 m in its northern depocentres and well exposed in the Flinders Ranges (Fig. 10.1). The basin is divided into four depositional regimes — western carbonate platform on the Stuart Shelf, central ramp to trough deposits in the Flinders Ranges, and eastern Moorowie and Yalkalpo Synclines which are separated by the Benagerie Ridge. Provenance analysis in the Arrowie Basin indicated that the terrigenous material was mainly derived from the eastern Olary and Mount Painter Inliers. Carbonate sedimentation was widespread and ranged from calci-microbial mounds and stromatolites to ooid shoals and metazoan–calci-microbe reefs (James and Gravestock, 1990).

Tectonically, the Arrowie Basin has a peri-cratonic nature, and an open shelf and pelagic sea during the Early Cambrian was probably beyond the Mount Freeling region to the north and northeast. To the south, the basin is considered to have been interconnected to the Stansbury Basin during the Early Cambrian, evidenced by the strong similarities in stratigraphic successions and facies development even though the two basins are now ~150 km apart. The Early Cambrian sequence in the Flinders Ranges contains abundant fossils and is regarded as one of the type sections for global correlation (Fig. 10.2).

Tectonic setting

The Arrowie Basin was formed on a rifted continental platform to the eastern Gawler Craton. The Cambrian successions overlie the thick (up to 20 km) Neoproterozoic rift complex (~850–545 Ma) of the Adelaide Geosyncline (Preiss, 1987). During the latest Neoproterozoic, the dextral shear between northern and southern Australian cratons along the Paterson–Petermann Ranges Orogen uplifted the geosyncline and central Australian basins and was followed by renewed rifting, reflecting the latest Neoproterozoic – Early Cambrian continental break-up which formed the western margin of Laurentia (Powell et al., 1994). The Arrowie Basin is considered to have been formed during the event. The aborted rift nucleus of the Curnamona Province is stationed beneath the eastern Arrowie



Cambrian outcrops and subcrops of the Arrowie Basin