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STRATIGRPHIC MEASUREMENTS AMADEUS BASIN.

BY

MAGELLAN PETROLEUM.

FOR

OP46

PR62/18

RETYPED FOR MICROFICHING PURPOSES.

MEGELLAN PETROLEUM CORPORATION.

STRATIGRAPHIC MEASUREMENTS.

AMADEUS BASIN

PERMIT 46

N.T.

by: Roy M Hopkins

AUGUST,1962.

GEOLOGIC STRUCTURE.

The Seymour Range is a large anticlinal feature which has two smaller anticlines and an intervening sycline superimposed upon it. The folds are tight often being of cheveron type. The Areyonga formation is the oldest unit exposed in the stricture.

The Palmer Range is a tightly folded east-trending anticline which also has the Areyonga formation exposed at the core. In the Western part of the structure the beds from the Areyonga formation up through the stairway appear to be involved in faulting and complex folding, but the Mereenie and younger strata are not affected.

The Ippia Hills is a closed anticline with the Bitter Springs formation exposed in the core. It is asymmetrical with dips on the steeper north flank ranging between 50 degrees and vertical whereas those on the south flank average 28 degrees.

No attempt was made to analyse the geologic structure in the Chandler Range, but it was noted that the rocks are complexly faulted and folded.

It has been proposed that the deformation of the rocks in the Amadeus Basin was caused by forces operating in a southerly direction and that the intensity of deformation decreases southward from the MacDonnell Ranges towards then foreland. But the rocks in the southern half of the Henbury sheet are such more deformed than the rocks in the norhtern half, and this is not consistent with the above proposal.

STRATIGRAPHY.

Bitter Springs Formation. - The Bitter Springs fromation is the oldest unit recognized in the area of investigation, and it was noted only in the core of the Ippia Hills anticline where about 250 feet of the formation are exposed. The Bitter Springs consists of reddish-grey or dark-grey algal limestone, some containing much detrital quartz, interbedded with reddish-brown recessive siltstone and minor sandstone. Some of the limestone beds have a petroliferous odour. Five samples were collected for residual hydrocarbon analysis, but they have not yet been submitted to the laboratories.

There is a difference in opinion with Frome- Broken Hill as to the identification of the strata as they include the beds in the Areyonga formation.

Areyonga Formation. - The Areyonga formation crops out in the cores of the Seymour Range and Palmer Range anticlines where 820 feet and 760 feet respectively, of the formation are exposed. All of the Areyonga is exposed on the south flank of the Ippia Hills anticline where it is 1160 feet thick. The formation consists of ridge-forming fractured slickensided medium - to coarse grained sandstone with local conglomerate lenses interbedded with recessive yellowish-grey or reddish-brown marl, siltstone and shale. At all places noted the Areyonga formation is overlain in apparent confirmity by the Pertatataka formation except on the north flank of the Ippia Hills anticline where it is overlain by the Stairway formation. The relationship at this locality is thought to be angular uncomformity (see IPPIA HILLS SECTION), but it could also be a fault contact.

Pretatataka Formation - The Pertatataka formation crops out in the western Seymour Range, the Palmer Range and the south flank of the Ippia Hills where it is 3165 feet, 1640 feet and 1670 feet thick, respectively. Where present, the Pertatataka characteristically forms broad covered valleys, and the few outcrops seen consist of greensih-grey or reddish-brown shale and interbedded siltstone with shaly habit. In the southwest Seymour Range the lower part of the formation consists of reddish-brown platy micaceous "Arumbera looking" sandstone interbedded with shale. The Pertatataka formation is overlain by 850 feet of reddish-brown or yellowish-grey platy micaceous ridge-forming sandstone on the south flank of the Ippia Hills. I have tentatively designated this sandstone as the Aumbera formation- Pertaoorrta group undiferentiated; however. Frome-Broken Hill includes it in the Pertatataka formation. In the Seymour and Palmer Ranges the Pertatataka is overlain by the Arumbera formation. No evidence for an unconformity between the two formations was noted.

Arumbera Formation.- The Arumbera formation crops out in the Seymour Range and Plamer range where it is 205 feet and 380 feet thick, respectively. It consists of reddish-brown micaceous platy ridge-forming sandstone. The lower part of the sandstone sequence that overlies the Pertatataka formation in the Ippia Hills (see above) is also considered to be Arumbera. The Arumbera formation is overlain by the Pertaoorrta group in apparent conformity in the central Seymour Range and in the Palmer Range. However, in the western Seymour Range it is unconformity overlain by the Stairway fromation, and the Pertaoorrta group is missing.

Pertaoorrta Group. -The Pertaoorrta group crops out in the Chandler Range, the eastern and central parts of the Seymour Range and the Palmer Range, and possibly the upper part of the sandstone sequence above the Pertatataka formation in the Ippia Hills is Pertaoorrta.

About 350 feet of the Peraoorrta group is exposed in the core of one of the small anticlines in the eastern Seymour Range where it consists of algal limestone interbedded with yellowish-grey sandstone. The group is 1410 feet thick in the Palmer Range. However, the unit is mostly covered except for a few yellowish-grey sandstone outcrops in the lower part, and it is conceivable that a few feet in the upper part of the unit could be the Horn Valley formation. The group was not measured in the Chandler Range.

The Peraoorrta is overlain in apparent conformity in the Chandler Range by the Pacoota formation, and in the Seymour and Palmer Ranges it is unconformably overlain by the Horn Valley or Stairway formations. If the Pertaoorrta group is present on the south flank of the Ippia Hills it may be unconformity overlain by the Mereenie formation (see below).

Pacoota Formation. - The Pacoota formation was seen only in the Chandler Range where it is 885 feet thick, and apparently the southern limit of deposition of the formation is only a short distance south of the Chandler Range. This may be the reason for the unusual coarseness of the grains making up the formation. The Pacoota consists of very coarse-grained sandstone with grit and pebble stringers in the upper part and massive coarse - grained gritty and conglomeratic sandstone interbedded with pink, yellow or red siltstone in the lower part. It is overlain by the Horn Valley formation.

Horn Valley Formation.-The Horn Valley formation crops out in the Chandler Range where it si 105 feet thick, and a small outcrop of Horn Valley, consisting of gypsiferous greenish-grey shale and interbedded fossiliferous limestone, is present beneath the Stairway formation about five miles north of the Seymour Range (see Henbury aerial photograph Run 10B , number 5059). Frome-Broken Hill reports 85 feet of grey fossiliferous Horn Valley limestone in the eastern Seymour Range, and it is likely that it does not extend very far south from this locality. The Horn Valley is absent in the western Seynour Range. In the Chandler Range the formation is generally recessive consisting of greenish-grey shale and siltstone and contianing a weak cliff-forming very fossiliferous limestone interbed in the upper part. The limestone bed is considered to be the same as the limestone marker present in the Horn Valley throughout the James Ranges. The Horn Valley formation is overlain by the StairwaY FORMATION.

Stairway Formation. -The Stairway formation is one of the most widespread units in the Amadeus Basin. It occurs as a strong ridge-former in the Chandler Range, east Seymour, west Seymour and Palmer Ranges and on the north flank of the Ippia Hills where it is 520 feet, 355 feet (less 85 feet for the Horn Valley formation from Frome-Broken Hill data), 660 feet, 160 feet and 350 feet thick, respectively. The Stairway is comprised of fine-to coarse-grained grey ridge-forming sandstone interbedded with greenish-grey recessive shale and siltstone. Pebble and grit beds occur in the lower part of the formation, and Frome-Broken Hill reports coarse conglomerates in the Stairway in the Ippia Hills. It is conformably overlain by the stokes formation.

STOKES FORMATION - The Stokes formation is a widespread unit in the south half of the Henbury sheet where it forms covered recessive valleys and it is present everywhere that the Stairway was observed . It is 610 feet, 700 feet and 620 feet thick, respectively, in the east Seymour, west Seymour and Palmer Ranges. The formation was not measured in the Chandler Range and Ippia Hills.

Younger Paleozoic Rocks.- The Mereenie formation appears to conformably overlie the Stokes formation in most places. Its measured thickness range between 160 feet in the Palmer Range to 655 feet in the western Seymour Range. The Mereenie formation truncates the Stokes, Stairway, Arumbera, Pertatataka and Areyonga formations in the extreme south-western part of the Seymour Range. The relationship is believed to eb stratigraphic although it could be a fault. A thin sequence of clean white highly cross-bedded sandstone overlies the Arumbera formation - Pertaoorrta group undifferentiated on the south flank of the Ippia Hills. The beds are tentatively considered to be Mereenie and if this is so, there is an unconformity at the base of the unit and the Stairway and Stokes formations are absent. Frome-Broken Hill apparently includes thebeds in the Pertatataka formation.

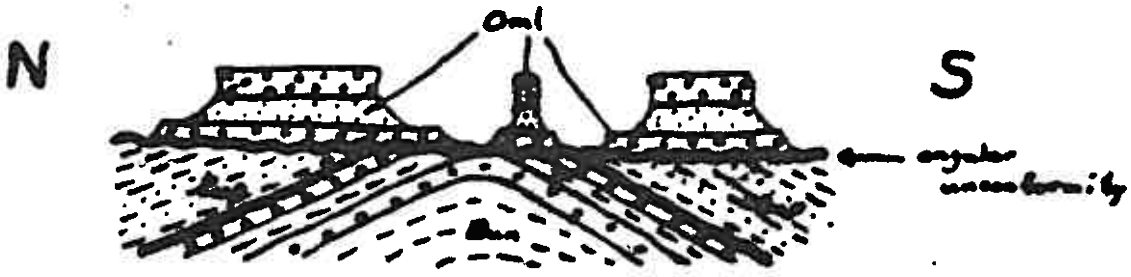
The valley-forming Pernjara siltstone overlies the Mereenie formation and, in turn, is overlain by the ridge-forming Pernjara sandstone in the Seymour Range and Palmer Range. Although no definite evidence was obtained, there could be an unconformity between the Pertnjara and Mereenie formation.

RECONAISSANCE TRIP, ANGUS DOWNS AREA.

A reconnaissance trip was made to the Angus Downs Area, but no stratigraphic sections were measured.

At the north east end of the Angus Downs airstrip the Areyonga formation consisting of shale overlain by conglomeratic sandstone and shale is exposed in the core of an east-trending anticline. The Pertatataka formation, comprised of reddish-brown or grey shale interbedded with reddish-brown micaceous siltstone and sandstone, crops out above the Areyonga on the flanks of the anticline.

A nearly flat-lying sequence of conglomerate and sandstone overlies the Areyonga and Pertatataka formations in marked angular unconformity (see sketch below). Although it resembles the coarse conglomeratic phases of the Arumbera formation, Frome-Broken Hill has apparently are of the Stairway formation.



SKETCH GEOLOGIC CROSS-SECTION, ANGUS DOWNS, AREA.

LIST OF PLATES.