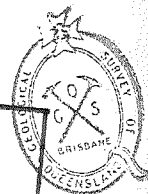


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DEPARTMENTAL DRILLING, SPRINGSURE SHELF  
PROGRAMME, WESTERN BOWEN BASIN

by

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## SUMMARY

During 1973 the Department of Mines drilled a series of six continuously cored holes to test the coal-bearing potential of the Bandanna Formation along the western side of the Springsure Shelf.

Intersected coal seams were very thin and of very low rank.

The results of the programme indicated the absence of significant coal in the Bandanna Formation on the western part of the Springsure Shelf.

## INTRODUCTION

Regional geological mapping, most recently by Mollan et al. (1969) and Exon et al. (1972), has shown that the Bandanna Formation crops out along the Springsure Shelf. This formation is continuous with the coal-bearing uppermost Permian coal measures elsewhere in the Bowen Basin, and it was thought that it would be prospective in this area. The strata are relatively flat lying, are well exposed on the western side of the shelf, and have very little structural complication, thus facilitating exploration and any subsequent mining development in the area.

Six holes were programmed, at about 18 km centres, to test the Bandanna Formation on the western part of the Springsure Shelf. Five were drilled by the Department's Drilling Branch, using a Mindrill E1000 cutting NQ sized core, between April and August 1973. The holes were designated Buckland NS 1, 2 and 3, and Claude NS 1 and 2. Drilling totalled 868.56 m of which 836.41 m were cored. The sixth site was moved a short distance and drilled as GSQ Tambo 3 by the Petroleum Section, as part of its stratigraphic programme. Three of the holes were geophysically logged

using single-point electric and gamma-ray equipment. Full core of all of the holes is stored in the Department's Core Library.

The following plans and diagrams accompany this report:

- Fig. 1        -    Plan showing the regional geology and borehole locations.
- Fig. 2        -    Cross section showing stratigraphic correlations.
- Fig. 3-8      -    Lithological and geophysical logs of boreholes.

## STRATIGRAPHY

### Regional Setting

The Springsure Shelf is an east-west trending area of condensed section providing a link between the Bowen Basin to the east and the Galilee Basin to the west, and is considered by some authors (for example, Exon et al., 1972) to be a tectonic element of the Bowen Basin. It is overlapped to the south by the Surat and Eromanga Basins.

Strata on the shelf range in age from Early Permian to Late Triassic, and unconformably or disconformably overlie either Devonian - Carboniferous rocks of the Drummond Basin sequence or the Carboniferous - Lower Permian Joe Joe Formation.

### Reids Dome Beds

The Reids Dome Beds form the base of the Springsure Shelf sequence, and were mapped by Mollan et al. (1969) and Exon et al. (1972) on its western edge, disconformably to unconformably overlying the Joe Joe Formation. A nearby core hole, GSQ Tambo

3, did not intersect the unit (Gray, in prep.) so its distribution appears to be patchy.

### Colinlea Sandstone

The Colinlea Sandstone consists mainly of sandstone, coarse grained to conglomeratic, quartzose to sublabile, and is of fluvial to marine origin. It thins from about 350 m on the eastern side of the shelf to 125 m on the western (Gray, in prep.). The total thickness was cored in GSQ Tambo 3, and only the very top in Buckland NS 2, and Claude NS 1 and NS 2 - it was not reached in the remainder of the holes.

The Colinlea Sandstone disconformably or unconformably overlies Reids Dome Beds or older units. It is the Springsure Shelf correlative of the interval containing the Aldebaran Sandstone, Freitag Formation, Ingelara Formation, and Catherine Sandstone of the Denison Trough. This correlation was proposed by Mollan et al. (1969) from field mapping and corroborated by Gray (in prep.) from corehole data.

Although there have been only thin coal seams reported in holes drilled through the Colinlea Sandstone on the Springsure Shelf, its correlatives contain good quality coal both in the Denison Trough and the Galilee Basin. In the Galilee Basin the seams occur near the top, whereas units correlative with both the top and bottom are coal-bearing in the northern Denison Trough.

### Peawaddy Formation

The Peawaddy Formation overlies the Colinlea Sandstone with apparent conformity.

Lithology consists of an upper arenaceous section of non-porous sandstone and a lower argillaceous section. The sandstone was found to be mainly labile and non-porous; however a thin, porous, more quartzose bed was located near the top in Claude NS 2. The argillaceous section was found to wedge out

westwards. Total drilled thickness ranges from 66 m in Buckland NS 2 to 44 m in Claude NS 1, the thinning probably being due mainly to the wedgeout of the lower section.

Marine fossils, including brachiopods, pelecypods, bryozoa and crinoids, were found throughout most of the unit, and concentrated in a lenticular zone close to the top. This richly fossiliferous bed is a continuation of the Mantuan Productus Bed, a coquinite located at or near the top of the Peawaddy Formation in the western Denison Trough and Springsure Shelf.

#### Black Alley Shale

The Black Alley Shale was found to be approximately 45 m thick, and consist essentially of dark mudstone with a relatively high proportion of light coloured tuffaceous mudstone beds. Some marine fossils were found in the core.

The boundary with the underlying Peawaddy Formation is sharp, but appears to be conformable.

#### Bandanna Formation

The Bandanna Formation conformably overlies the Black Alley Shale, the boundary being gradational from mudstone and siltstone below to sandstone and siltstone above. On the Springsure Shelf it can be divided into three parts - bottom and top arenaceous sections and a middle argillaceous section. Small amounts of coal were found near the top of the top sandy section, and tuffaceous material within the middle and bottom parts. Thickness drilled was approximately 50 m.

#### Rewan Formation

The Rewan Formation overlies the Bandanna Formation with apparent conformity. Drilling elsewhere in the Bowen Basin has not produced evidence of any regional hiatus between these two units, however the possibility of local disconformities in areas marginal to the basin, such as the Springsure Shelf, cannot be dis-

counted. The lower boundary of the Rewan Formation is generally taken to mark the base of the Triassic sequence.

Most of the Rewan Formation drilled in the programme was weathered, as the holes were sited close to the outcrop of the Bandanna Formation. Lithologies included sandstone and mudstone, the sandstones being labile with an abundance of mica. Surface exposures show that the unit is thin and, like the underlying Upper Permian section, is condensed. Red beds, which occur above the basal 150 m in the Denison Trough, were seen in outcrop a few tens of metres above the base on the Springsure Shelf.

#### Post-Rewan Formation Units

The Rewan Formation is overlain by the Clematis Sandstone and the Moolayember Formation. A major unconformity separates the Moolayember Formation from the overlying Jurassic strata of the Surat Basin. No units younger than the Rewan Formation were investigated in the programme.

### STRUCTURE

The structure of the area is dominated by an east-west strike with a gentle southerly dip. Mapping by Mollan et al. (1969) shows that there has been slight north-south folding, sympathetic with that of the underlying strata of the Drummond Basin.

### COAL RESOURCES

The Bandanna Formation was found to be devoid of significant coal seams in the holes drilled - the thickest seam being 0.89 m at 20 m in Buckland NS 1.

Rank was found to be very low - reflectance in oil being

0.38 in Buckland NS 1 and 0.32 in Buckland NS 3 (J. W. Beeston pers. comm.). The chemical analysis of the seam from Buckland NS 1 is included in the Appendix. ASTM classification of this coal is sub-bituminous C.

### CONCLUSIONS

The results of the Springsure Shelf drilling programme showed that the coal-bearing potential of the Bandanna Formation on the western side of the Springsure Shelf is negligible. Formations correlative with the Colinlea Sandstone elsewhere in the Bowen Basin and in the nearby Galilee Basin are, however, significantly coal-bearing, and this unit warrants further investigation.

The very low rank of the coal indicates that it was never buried very deeply, and that the Springsure Shelf has remained a stable area since the Permian.

### REFERENCES

- EXON, N. F., GALLOWAY, M. C., CASEY, D. J., and KIRKEGAARD, A. G., 1972: Geology of the Tambo/Augathella area, Queensland. Rep. Bur. Miner. Resour. Geol. Geophys. Aust., 143
- GRAY, A. R. G., in prep: Stratigraphic relationships of Upper Palaeozoic strata between Springsure and Jericho.
- MOLLAN, R. G., DICKINS, J. M., EXON, N. F., and KIRKEGAARD, A. G., 1969: Geology of the Springsure 1:250 000 sheet area, Queensland. Rep. Bur. Miner. Resour. Geol. Geophys. Aust., 123.

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## APPENDIX

Analysis of coal seam Buckland NS 1 (20.01 - 20.90 m),  
sample no. R. C. 7486 by the Government Chemical Laboratory.

Air dried basis	Moisture %	14.6
	Ash %	6.0
	Volatile Matter %	31.6
	Fixed Carbon %	47.8
	Specific Energy (MJ per kg)	24.66
	Crucible Swelling No.	0
	Specific Gravity	1.34
	Sulphur %	3.5
	Moisture Holding Capacity %	28.0

### Ash Fusion Properties

(semi reducing atmosphere)

Deformation °C	1020
Hemisphere °C	1090
Flow °C	1190

### Ash Analysis (ignited at 800 °C basis)

SiO <sub>2</sub> %	46.4
Al <sub>2</sub> O <sub>3</sub> %	17.1
Fe <sub>2</sub> O <sub>3</sub> %	9.4
TiO <sub>2</sub> %	0.72
MnO %	0.20
P <sub>2</sub> O <sub>5</sub> %	0.13
CaO %	14.1
MgO %	1.6
Na <sub>2</sub> O %	1.7
K <sub>2</sub> O %	0.37
SO <sub>3</sub> %	0.87
Loss on ignition %	7.4

The above analysis was performed on ash ignited at 800 °C for three hours. Further ignition at 1150 °C produced a loss on ignition of 7.4%. Calcium carbonate is present in the ash, and this explains the loss on ignition at 1150 °C. Calculation of the above figures to a "loss free" basis gives the following.

SiO <sub>2</sub> %	50.1
Al <sub>2</sub> O <sub>3</sub> %	18.5
Fe <sub>2</sub> O <sub>3</sub> %	10.2
TiO <sub>2</sub> %	0.78
MnO%	0.22
P <sub>2</sub> O <sub>5</sub> %	0.14
CaO%	15.2
MgO%	1.7
Na <sub>2</sub> O%	1.8
K <sub>2</sub> O%	0.40
SO <sub>3</sub> %	0.94