THE CENTRAL EROMANGA BASIN PROJECT - A CONTRIBUTION TO THE REGIONAL STUDY OF THE EROMANGA AND UNDERLYING BASINS

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BIOGRAPHY

John Moss obtained his B.Sc. from Aberdeen University in 1953. He was employed for two years in the electronics industry in England before joining the Geophysical Branch of the Australian Bureau of Mineral Resources. Since 1955 he has been engaged mainly on geophysical engineering surveys and seismic surveys in sedimentary basins throughout Australia. Since his appointment as Supervising Geophysicist in charge of the Bureau's Seismic and Detailed Gravity Groups in 1969, he has been responsible for major seismic and gravity projects studying the structure and history of sedimentary basins and seismic reflection studies of the deeper part of the crust and upper mantle.

SUMMARY

The Bureau of Mineral Resources in cooperation with the Geological Survey of Queensland is providing new regional information on the structure and depositional history of the Eromanga and underlying Cooper, Galilee and Adavale Basins in southwestern Queensland. The information being obtained is particularly relevant to a better understanding of the petroleum prospectivity of the area covered by the central part of the Eromanga Basin where recent discoveries of oil and gas in the Eromanga and Cooper Basin sequences has stimulated a renewal of petroleum exploration activity in the area. The Central Eromanga Basin Project (Harrison et al., 1980) was initiated after preliminary studies of the structure, hydrodynamics and hydrocarbon potential of the area by Senior & Habermehl (1980).

By the end of 1982 approximately 1500 km of regional 6-fold C.D.P. seismic reflection traverses recorded to 20s, up to 300 km long will have been recorded over major structures in the Eromanga Basin, the eastern margin of the Cooper Basin, the south-western Galilee Basin and the underlying Adavale Basin with its associated troughs. The seismic traverses are being tied to existing petroleum exploration wells for which synthetic seismograms have been produced to assist in identifying reflectors and integrated with older seismic data to provide good quality structural and stratigraphic information. Some of the older analogue seismic data which has been transcribed to digital form has also been reprocessed. The seismic cross sections are released through the Government Printing Office, Canberra.

Seismic refraction, gravity, magnetic and magnetotelluric surveys are providing additional information on both sedimentary features and basement. LANDSAT imagery studies have provided new perspective on many regional features particularly when used in conjunction with seismic and gravity information. Geochemical and source rock maturation studies are also providing information on the generation and migration of hydrocarbons.

The Warrabin Trough, containing sediments ranging in age from the lateral equivalents of the Devonian Buckabie Formation and of the Middle Devonian Cooladdi Dolomite to possible early Devonian, is up to 3,000 m thick. The sequence is folded and faulted by high angle reverse faults which were active during the Late Carboniferous. The Canaway Ridge was uplifted at that time and separated the Trough from the main part of the Adavale Basin (Pinchin & Senior, in press). The Barcoo Trough, another Devonian trough, lies north of the Warrabin Trough to which it is connected by a flat-lying to gently folded sequence of Devonian sediments. The trough which underlies the Thomson Syncline contains up to 1450 m of Devonian sediments previously considered to be part of the Cooper Basin sequence. The Quilpie Trough which lies to the south of the main Adavale Basin contains a similar package of sediments to the Warrabin Trough. Direct correlation between the Adavale Basin and its associated troughs is not possible because of faulting at the margins of the troughs, basement uplifts and the lack of deep wells in the troughs. Thus their petroleum potential is generally unknown.

The eastern extents of the Permian and Triassic Cooper Basin sediments have been defined. Cooper Basin sediments are not present over the southern part of the Warrabin Trough as previously interpreted. Petroleum source rock geochemistry indicates that potential gas-prone kerogens are widespread within the northeast coal measure facies of the Cooper Basin sequence.

The Jurassic-Cretaceous Eromanga Basin sequence shows a number of reflections which provide information on the stratigraphy and structure. Shoaling and channelling of the Toolebuc Formation and coal and carbonaceous shale within the basal Winton Formation are clearly evident from reflection character. Post-Cretaceous movement due to differential compaction and minor tectonic rejuvenation may have given surface expression to some of the deep seated faults. LANDSAT imagery indicates low relief in the Eromanga Basin sediments which are deeply weathered and mainly covered by surficial sediments. The LANDSAT data enables faults to be traced over long distances between seismic traverses.

The concluding phase of the Central Eromanga Basin Project will be undertaken in 1983 with interpretation of the seismic and related data and publication of results.

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