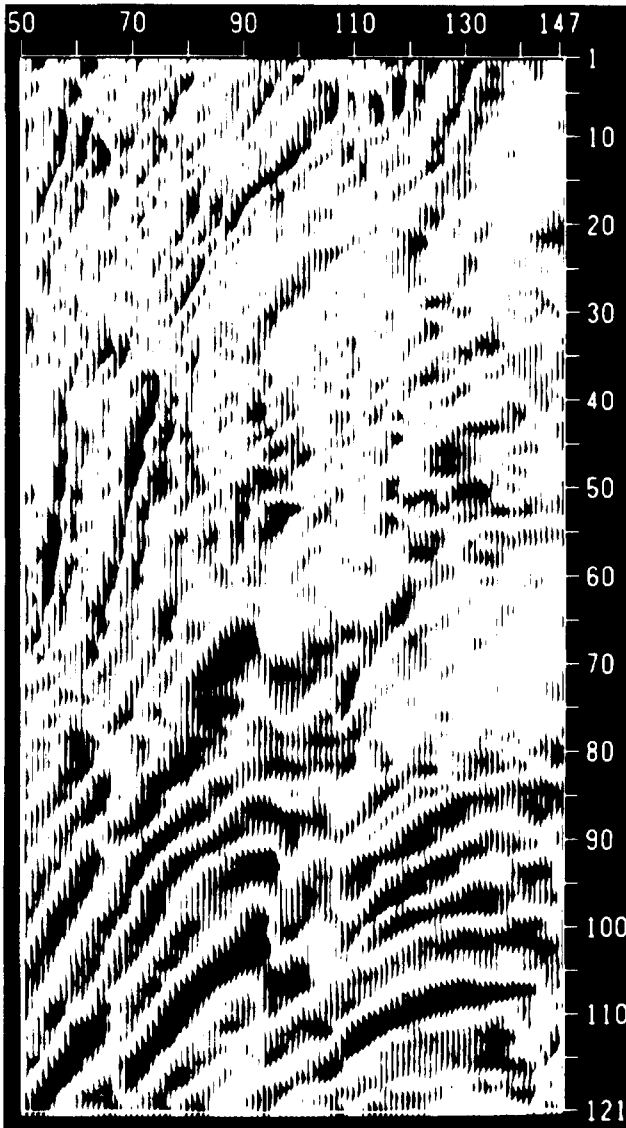


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Interactive Seismic Interpretation

Interactive interpretation is urgently needed to increase the productivity of the world's hard-pressed seismic interpreters. This paper describes the use of a system which displays seismic data in color on a television screen. The system is easy to use and, by managing the data base for the interpreter, permits him to spend a larger proportion of his time on the thoughtful process of interpretation itself. A 3D data volume can be studied in vertical



or horizontal section form. The system can equally well handle the irregular grid of data from a 2D survey.

In the course of interpreting a section on the screen, the interpreter may manipulate portions of that section in a variety of ways, making composite displays of multiple pieces, track horizons in automatic or manual modes and zoom portions of the data to any desired extent. Any interpretation made on one section can later be viewed on other sections marked at the points of intersection. Data can also be flattened to aid in structural and stratigraphic interpretations.

Various different data sets will be used to illustrate the capabili-

ties of the system. Interpretive problems addressed will include: structural mapping, fault correlation, bright spot and flat spot delineation, and the study of depositional features.

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Geology and Petroleum Prospectivity of Officer Basin, Western Australia

The Officer basin is a large, 390,00 km² (150,579 mi²) intracratonic basin underlying the Gibson and Great Victoria Deserts in Western Australia and adjoining parts of South Australia. It contains a sedimentary sequence, up to 6 km (19,685 ft) thick, composed predominantly of upper Proterozoic beds.

These are overlain by latest Proterozoic to earliest Cambrian Babbagoola Beds, 200 to 700 m (656 to 2,296 ft) thick; Lower Cambrian Table Hill Volcanics, 120 m (394 ft) thick; Lower Cambrian to Lower Permian Lennis Sandstone, 400 to 450 m (1,312 to 1,476 ft) thick and Wanna Beds, 140 m (459 ft) thick; Lower Permian Paterson Formation, 450 m (1,476 ft) thick; Lower Cretaceous Samuel Formation, 80 m (262 ft) thick and Bejah Claystone, 35 m (115 ft) thick.

The stratigraphy of the Proterozoic sequence is poorly known, but it appears to be characterized by basal sandstone overlain by carbonates and evaporites in shallow water marine settings and by shales and siltstones in deeper water environments. These beds are in turn overlain by tillites and fluvioglacial beds. The upper part of the Proterozoic sequence is poorly known, but includes arenites, arkoses, conglomerate, siltstone, and dolomite. The upper Proterozoic beds experienced gentle folding prior to the deposition of the Babbagoola Beds. Seismic evidence shows that the Babbagoola Beds overlie the upper Proterozoic with angular unconformity in places, grading into disconformity elsewhere. The Babbagoola Beds are composed of shale, siltstone, sandstone, anhydrite, and gypsum. The sequences which are prospective for hydrocarbons include the upper Proterozoic beds and the Babbagoola Beds. Known hydrocarbon occurrences in the Officer basin include oil and gas shows encountered in Hunt Oil Browne No. 1 and No. 2 which were drilled into salt diapirs whose source was upper Proterozoic beds. Oil bleeding from vugs in argillaceous dolomites has been encountered in Lower Cambrian Observatory Hill beds which are the South Australian equivalent of the Babbagoola Beds in South Australian Department of Minerals and Energy Byilkaoora No. 1.

Eagle et al Dragoon No. 1 has encountered source rocks in an upper Proterozoic sequence of evaporites, dolomite, and claystone in the northwestern part of the basin. Preliminary data from Dragoon No. 1 suggest that peak generation of liquids occurs in these upper Proterozoic beds. Palynological investigation shows that the color of the contained primitive algal material is dark brown, indicative of good maturation, whereas microplankton from Babbagoola Beds intersected in Hunt Oil Yowalga No. 2 is light yellow to orange indicating immaturity for oil maturation.

Porosity and permeability trends within the prospective beds are poorly known at this stage. Hydrocarbon maturation probably occurred at an early stage and the generated hydrocarbons may have inhibited destruction of porosity by diagenesis. Reservoir possibilities include preserved primary porosities in clastic and carbonate sequences, as well as paleokarsts and weathered zones in evaporites at the upper Proterozoic - Babbagoola Beds unconformity.

Possible trap structures include numerous large anticlines as well as abundant salt diapirs. The geographical location of the Officer basin as well as the antiquity of its target beds render it a real frontier region for hydrocarbon exploration.