The Darling Basin Code – A Geophysical And Geochemical Data Revelation

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This talk was a progress report on the work on the Darlling Basin which, it is hoped, will be completed as a data package later this year.

With an area of over 100,000 km^2 and sediment infill in excess of 8000 m, the Darling Basin has baffled previous workers and frustrated several attempts to unravel the 'secret' of the basin. It has been subdivided into four 'blocks', which are located predominantly 1:250,000 sheet areas named in brackets: the Pondie Range (Wilcannia), Blantyre Trough (Manana), Poopelloe Lake (Wilcannia) and Neckarboo (Ivanhoe) areas. The most recent seismic survey (2004) and the results of the soil gas geochemical sampling and analysis in the Darling Basin undertaken by NSW DPI offer interesting clues to the 'grail' and perhaps confirm the existence of a petroleum system in the basin.

134 km of multi-fold seismic were acquired last year over known but less explored structures located in three different troughs. The 2004 vintage seismic data clearly demonstrate a regional structural uplift, which predates the widespread deposition of the thick Late-Middle Devonian sequences. This structural event identifies a separate petroleum system related to the maturation of Cambro-Ordovician to Early Devonian marine sediments now located at the deepest and undisturbed portion of the troughs and grabens. Structures related to the generation, migration and emplacement of hydrocarbons from this earlier petroleum system event form valid play targets.

A soil gas geochemical sampling, consisting of 928 samples taken every 500 m along previous seismic lines, show several anomalous concentrations of hydrocarbon gases. The pervasive methane distribution, including anomalous peaks of ethane and propane, indicates the presence of thermogenic hydrocarbons. Ratios of these gases indicate that the source is mostly gas with some distillate fractions. Geochemical profiles superimposed along the seismic lines show anomalous peaks over major deep-seated faults (leaking). AVO analysis of DMR04-03 was shown to demonstrate this trapping and leaking processes occurring at the Pondie Range anticline.

The seismic survey was carried out by the NSW DMR in association with ANSIR (ex BMR-AGSO-GA) using state of the art equipment. The lines were vibrated at 60 or 120 fold, vibration points intervals were – 25-30 m. The processing was carried out by Velseis Ltd, Brisbane. The quality of the result was probably the best records ever recovered in the area. The geochemical survey was conducted by Petrofocus, Bowral NSW. ■

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