

# Hydrocarbon potential of the northern extension of the Oaklands Basin, Griffith, NSW

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In 2006, the NSW Department of Primary Industries (DPI) acquired two 25 km long seismic lines (DPI 06-01 and DPI 06-02) to the west and southwest of Griffith, NSW, to investigate the northern extension of the Oaklands Graben as interpreted by Gunn (2003) on regional gravity and magnetic data. In the absence of well data within the study area, a potential petroleum system has been hypothesised using the interpretation of the seismic survey and other datasets, including geochemical, gravity, magnetic, geological mapping, seepage data, burial history modelling, borehole and the nearest well data.

The results of this work are briefly summarised as follows:

## NSW DPI gravity survey data

The gravity maps illustrate a NNE-SSW trending gravity trough associated with the major granite complex to the south-east of the southern seismic line, a northward extension of the gravity low occurs to the east of the northern seismic line. The axis of a gravity feature coincides with deeper features in the seismic profiles.

## NSW DPI magnetic survey data

Magnetic survey data more clearly illustrates structural features, including the major granite complex to the south-east and the up-thrown block to the east of the seismic survey.

## Geochemical survey

The GORE Petroleum Microseep Survey (W.L. Gore & Associates, 2006) indicates that petroleum generation and migration has occurred and anomalies appear to coincide with structural features.

## Seismic Survey

Six stratigraphic divisions have been interpreted on the seismic dataset:

**Division I:** Depths and inferred composition are consistent with the Murray Basin strata of Tertiary age reported in the Walooona-1 borehole.

**Division II:** conformably below Division I and bounded below by an unconformity, consistent with Murray Basin coal/peat bearing strata reported in the Walooona-1 borehole.

**Division III:** The upper boundary may represent the top of the Triassic Jerilderie Fm. This division may also contain Upper Permian coal seams.

**Division IV:** relatively thin and interpreted to be Early Permian in age. Basin collapse structures associated with faulting are evident in this section.

**Division V:** is characterised by a strong basal reflector, with multiple strong, stratigraphically concordant reflectors in the lower half of the zone. This division is interpreted to consist of sedimentary rocks of Devonian age.

**Division VI:** is characterised by poorly defined, irregular reflectors which are not conformable with Division V. This zone is presumed to consist of basement metasediments and igneous intrusive rocks.

The newly acquired seismic data illustrate a variety of trapping structures, including faulted traps and anticlines. Possible Permian age source rocks are indicated by drilling data in the south, and from the interpretation of the seismic data with positive indications for generation of hydrocarbons according to burial history models. Devonian source rocks may also be present. Clay and mudstone seal units are reported in nearby wells and boreholes, and may be present as thick strata to provide the upper seal and lateral barrier in a fault juxtaposition setting.

## References

- GUNN, P., 2003. Interpretation of Gravity and Magnetic Data over the Oaklands Basin, New South Wales. NSW Department of Primary Industries, Report GS2003/308.
- W. L. GORE & ASSOCIATES, 2006. Geochemical survey of the Griffith area, New South Wales, Australia. Client report prepared for NSW Department of Primary Industries (unpublished).

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