

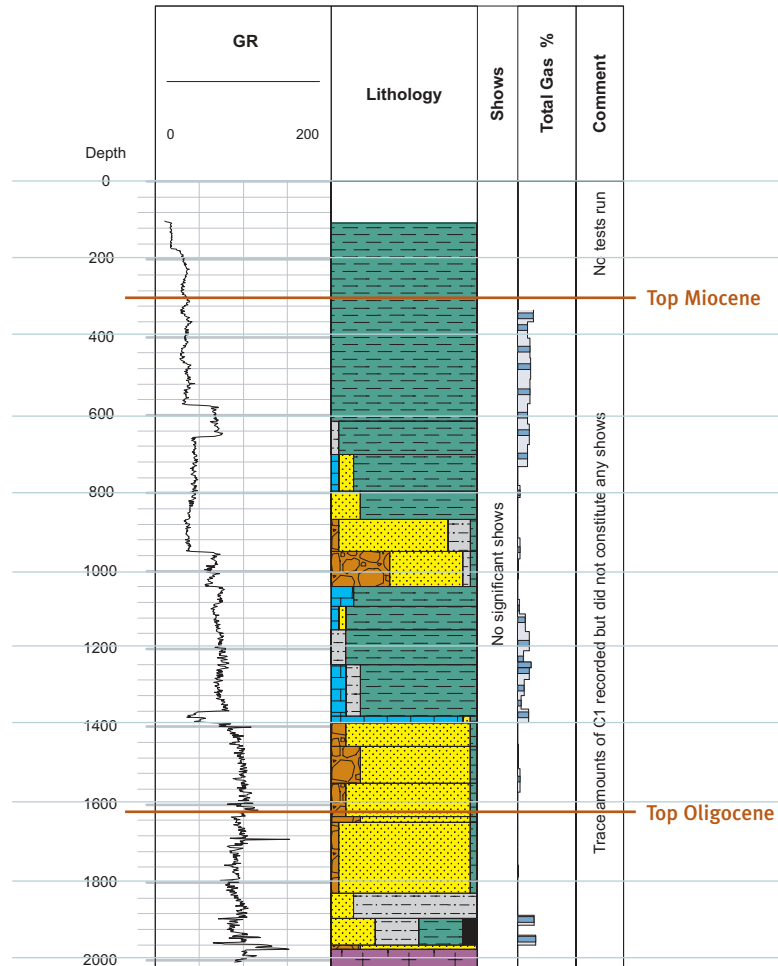
Western Southland Basins Prospectivity

The Western Southland region is made up of a number of small basins that run from Te Anau in the north to Waiiau and then offshore to the Solander and Baleny basins off the southern Fiordland coast. Four wells were drilled during an active exploration phase from the 1960s to the mid 1980s: two offshore and two onshore. None of these wells fully tested the potential of their respective basins or the region as a whole, but their failure to produce hydrocarbons saw further exploration largely abandoned.

A thermogenic gas seep, oil residues in Parara-1 in the offshore Solander Basin, an oil shale that saw limited production early in the 20th century and a recently discovered degraded oil outcrop are all indicators of an active hydrocarbon system. Maturation modelling of the Waiiau Basin indicates that extensive areas of the basin have been or still are in the hydrocarbon generation window, and this is likely to be the case in other basins.

Thick, regionally extensive fluvial, lacustrine and backswamp deposits of Cretaceous and Eocene ages are recognised as the most promising potential source and reservoir units in Western Southland. Although similar to parts of the Kapuni Group in Taranaki, with interbedded coals and clean fluvial sandstones, the Southland Eocene equivalent is more oil prone (HI up to 466 kgHC/tC_{org}), due to the increased Type 1 (algal) kerogen within the lacustrine mudstones. Overlying late Oligocene to early Miocene limestones and sandstones offer secondary reservoir targets. The similarity of the key stratigraphic units to those in the Taranaki Basin is a consequence of their being directly aligned prior to separation by strike-slip motion on the Alpine Fault.

Numerous structural and stratigraphic leads, some very large, are evident in 1980s regional seismic data. Seismic data obtained in 2000 over only a small part of the Waiiau Basin identified three good structural targets on two separate structural trends, highlighting the prospectivity of the region as a whole.



Solander-1



Solander-1 was drilled as a wildcat well to test the hydrocarbon potential of Eocene coal measures in a fault-bounded anticline in the offshore Solander Basin. The prognosed target was not encountered as a result of an unforeseen foot-wall collapse and basement was tagged after drilling through lithologies dated as Late Oligocene. The well penetrated 437 m of gross Oligocene sands with an average porosity of 9.5%. The only hydrocarbons encountered were methane peaks with associated with minor coals. Adequate vertical seals were identified and geochemical analysis of base Oligocene coals showed them to be gas and condensate prone, although the cumulative thickness in the well section was negligible (2.75 m).

Drilling data: Water depth 79 m. Spud date 26 November 1985, TD 2017 m (BRT) 20 December 1985. 30", 20", 13 3/8" and 9 5/8" casing strings. Rotating time for drilling & hole opening was 251 hours, which gave an average ROP of 8.05m/hour for the well.

Happy Valley-1



Happy Valley-1 was drilled as a wildcat well to evaluate the hydrocarbon bearing potential of Eocene and Late Cretaceous coal measures in a four-way, dip-closed structure on the western side of the Waiiau Basin. Unstable well conditions and numerous hole problems led to three side tracks being drilled from the original well. No hydrocarbons were encountered while drilling, but the Late Cretaceous coal measure target was never reached. Sections of very porous sandstones were encountered below 1850 m with average porosities of 11%, but reaching 16%.

Drilling data: TD Happy Valley-1 1623 m (MD), -1A 1600 m, -1B 611 m, -1C 3270 m. 20" & 13 3/8" casing strings run, all side tracks kicked off below the 13 3/8" shoe; only in #1C was a string of 9 5/8" casing able to be run. Happy Valley-1 spudded on 24 December 1987 and -1C reached TD on 24 March 1988.

