Appendix-1

Bejah Prospect – A drillable Poolowanna Fm Target

Introduction

New exploration axioms distilled from the results of 2008 wells Blamore-1 and Simpson -1 are summarised below:

- As discussed in earlier technical notes the complete lack of gas charge in Permian to Early Cretaceous sequences in the Simpson Desert area negates Gassau's Principle which drives gas displacement of oil pools from the area of source kitchens to the margins of a basin. Integral to this buoyancy driven migration process is the expectation of relatively long migration pathways from suitable source kitchens (eg > 20 km).

  An example comes from the SE Sirte Basin in Libya where Cretaceous source rocks have passed through the oil window and into the gas window in the axis of the Hameimat Trough in the southeast Sirte Basin. There is a migration pathway of 80 km from this source kitchen to the giant trap at Sarir field (23 Bbl OOIIP). The main target is the Jurassic Sarir Sandstone which is the producing reservoir in the field and provides the main carrier bed, with conduits across faults and via relay ramps providing the main pathways (Ambrose, 2000).

  It is now proposed that in the Simpson Desert area, migration pathways from source to trap of 20 km or less provide the lowest risk scenario in the case of oil migration and entrapment. Where the target traps lie on migration pathways of 20 km or more from the kitchen there is a commensurate increase in risk. This is believed to be the main reason Simpson-1 failed to intersect commercial hydrocarbons at either Jurassic or Permian levels.

- The main hydrocarbon charge from both Permian and Mesozoic sequences (Poolowanna Formation, Murta Member) occurred during the Late Cretaceous Winton Formation loading event (Ambrose et al ,2002). Hence in this area of massive Miocene structural rejuvenation a history of structural growth during the Jurassic and Cretaceous is desireable as it high grades individual prospects.

Post – Mortems: Blamore-1, Simpson-1, Colson-1, Erabena-1

Blamore-1:
Failure at the top Algebuckina level is probably due to lack of closure or aquifer flushing, noting that residual oil was recorded at this level. The oil may have a Murta Member source and updip potential could reside up dip on the Hallows Trend at the Camelot lead. In addition, the measured angle of tilt on the Blamore structure (0.17 degrees) is very low and is based on seismic mapping which also gives a vertical closure of only 5 msec. This is very close to the tilt imposed by the Tertiary-Recent aquifer (0.1 degrees) on any oil-water-contact and hence could explain possible aquifer flushing at the level of the Algebuckina Sandstone in this prospect.

Failure at the Poolowanna level was a result of the downdip onlap of the prospective Cycle-1 target. This now presents as an onlap play on the eastern flank of the Hallows Trend.

Failure at the Permian Purni Formation/ Tirrawarra Sandstone level may be a function of lengthy migration pathways from the Madigan source kitchen (18-20 km) or possibly lack of closure. Note that various geochemical and petrological data support the notion that the coal measures are a viable oil source similar to the lower Patchawarra Formation in the Cooper Basin and that the sequence resides in the late oil window in the northern Madigan Trough.

Simpson-1:

Failure at the Algebuckina level can be ascribed to the distance from the Murta Member source kitchen and the fact that the Poolowanna Cycle-1 seal represents the first seal above the Permo -Triassic sequence, thus shielding the Algebuckina Sandstone from oil charge. Dip on the southern limb of the western closure is 0.81 degrees, considerably more than the tilt which could be imposed by the later hydrodynamic regime (0.1 degrees). Thus the possibility of aquifer flushing at the level of the Algebuckina and Poolowanna formations can be downgraded at the Simpson Prospect.

Failure at the Poolowanna Cycle-1 level, noting that very low maturity extracts were recorded in the top sands of Cycle-1, was a function of low maturity Poolowanna shales dominating the drainage area. It is most likely the migration pathway(s) from mature Poolowanna kitchen(s) were too lengthy to be effective (ie 35 km).

Failure at the level of the Purni Formation is probably due to very limited coal development in the drainage area (only 7 m of coal in Simpson-1) combined with long migration pathways to thick oil-mature coal sequences in the northern Madigan Trough (35 km). The lack of migration energy triggered by gas generation is a problem common to most of the area.

Colson-1:

Oil staining in the top Poolowanna Cycle-1 sandstone , together with assessment by CSIRO of the charge history of Colson-1, both indicate a residual oil column of about 25 m (Ambrose et al; 2002). A seismic remap of this area may reveal updip potential on this structure at the level of the Poolowanna Formation. The presence of the Poolowanna reservoir/seal couplet in addition to Triassic shales, effectively shielded the top Algebuckina Sandstone from oil charge from stratigraphically lower horizons.

Failure at the Purni and Tirrawarra levels may be due to poor coal development in the drainage area. The main relatively deep kitchen area to the southeast of the Colson structure contains negligible coal and includes the Permian zero edge. The Permian coal sequences developed to the northwest and west are in the oil window based on vitrinite reflectance values of VR0=0.85 in Colson-1; these could be thick enough to provide viable source rocks. However the coal isopach is only 7m in Simpson-1 and 13 m in Colson-1, and hence effective source rock volumes are probably lacking. This is the main constraint on Permian oil charge to Colson-1, but also the lack of migration energy due to the absence of gas charge may have been equally important.

Some oil fluorescence was recorded in a Purni Formation sandstone in contact with a coal seam but vertical migration was probably limited by the Triassic seal over the structure and lateral migration may have been hindered by the absence of gas charge.

Erabena-1:

The lack of hydrocarbons in the Erabena Structure may be in part due to there having been no significant structural closure prior to the main phase of hydrocarbon migration as the main structural siganature developed in the mid-late Tertiary (Carne and Alexander, 1997). These authors also submit that the Erabena Structure is too large an exploration target relative to the volumes of hydrocarbons generated within the drainage area ie smaller targets on the flank of this large structure may become more attractive targets. It is also noted that the Erabena structure is too distant from the Permian zero edge (>25 km) to invoke a Permian source.

The Bejah Prospect

The Bejah Prospect is similar in many respects to the Colson structure, in particular:

- Both prospects display Top Cadnaowie – Top Poolowanna Formation isopach thinning over the structure thus implying palaeoclosure with a significant closure present at the time of oil migration in the Late Cretaceous.
- The Poolowanna Cycle-1 seal and the Triassic seal are present over both structures. This dictates that Permian oil is unlikely to have migrated vertically through the Triassic seal and that Poolowanna sourced hydrocarbons would most likely reside within Cycle-1 sandstones of the Poolowanna Formation as occurs at Colson-1.
- Murta Member siltstones are present in both structures and may present an opportunity to charge the top Algebuckina/Murta reservoir – seal couplet. However, hydrocarbons were absent at this level in Colson-1 thus downgrading this target at Bejah.
- Both structures display relatively little Tertiary (ie Miocene) structural rejuvenation compared to that occurring at Erabena -1 and elsewhere.
- Both structures occur on important migration pathways for Poolowanna Fm and perhaps Triassic sourced oil generated in the Poolowanna Trough.

Important differences between the Bejah and Colson- 1 structures are outlined below and define the Bejah structure as more attractive than the Colson-1 structure, and indeed the Dune Prospect to the north.

- One pivotal factor favouring Bejah is the proximity of the structure to relatively deeply buried Poolowanna Fm source rocks. Assuming that a cut-off of 1.7-1.8 ms TWT can be applied as a cut – off for oil generation from Poolowanna Formation shales then the source kitchen lies 15-20 km SE of the Colson structure. By comparison, the Bejah structure lies only 2 km from Poolowanna Fm source kitchens defined by two narrow structural re-entrants on either side of the Bejah structure.

- The dominant structural grain in the area is clearly NS as defined by several dominant fault trends. The dominant direction of migration in the Late Cretaceous, would have been NS along structural noses associated with these faults. Significantly the Bejah structure lies due north of the Poolowanna Trough (the most important source kitchen) and as such the relevant migration pathways are parallel to the major fault lines. However in the case of Colson, migration pathways are interrupted by several fault lines transverse to migration pathways; these may have severely restricted hydrocarbon charge to the structure.

The seismic grid over the Bejah Prospect is approximately a 2 x1.5 km grid which is probably sufficient to define closure and a crestal location. The most important targets are the Poolowanna Formation (Cycle-1) and possibly the Algebuckina Sandstone, while the Peera Peera Formation is a secondary target.

Volumetrics assuming the Bejah structure is filled to spill, and assuming oil columns in both the Algebuckina and Poolowanna Formations, stands at 125 mmbl UOIIP (From

Rawson's volumetrics). Bejah Prospect can now be included in the company's listing of drillable prospects

Conclusions

Failure analysis of the following wells,- Blamore-1, Simpson-1, Colson-1, Erabena-1- has yielded the following explanations for the lack of commercial hydrocarbons in these wells. One over-riding factor is the absence of gas generation in the Permian which has in a regional sense, reduced the distance of migration pathways as gas displacement is missing from the migration scenario.

Blamore-1: The possible absence of structural closure, the downdip onlap of Poolowanna Formation Cycle-1, the relatively long distance from the source kitchen and possible aquifer flushing, have all militated against discovery of commercial hydrocarbons.

Simpson-1: Drainage from local areas containing immature or early mature source rocks was the main reason behind the absence of commercial hydrocarbons. Basically the structure was too distant from the oil mature source kitchen in the northern Madigan Trough.

Colson-1: Obstruction of migration pathways by transverse fault lines was the main reason behind the absence of commercial hydrocarbons, although the structure may retain some updip potential. The relatively long migration pathway from the Poolowanna Trough also militates against entrapment of commercial hydrocarbons.

Erabena-1: The late timing of the structure (Miocene) which post – dated oil migration was the main reason behind the absence of commercial hydrocarbons.

This review of exploration hazards means future prospects mooted for drilling in the area must satisfy geological criteria outlined above. The Bejah Prospect is favoured in this respect and can now be added to the corporate inventory of drillable prospects.

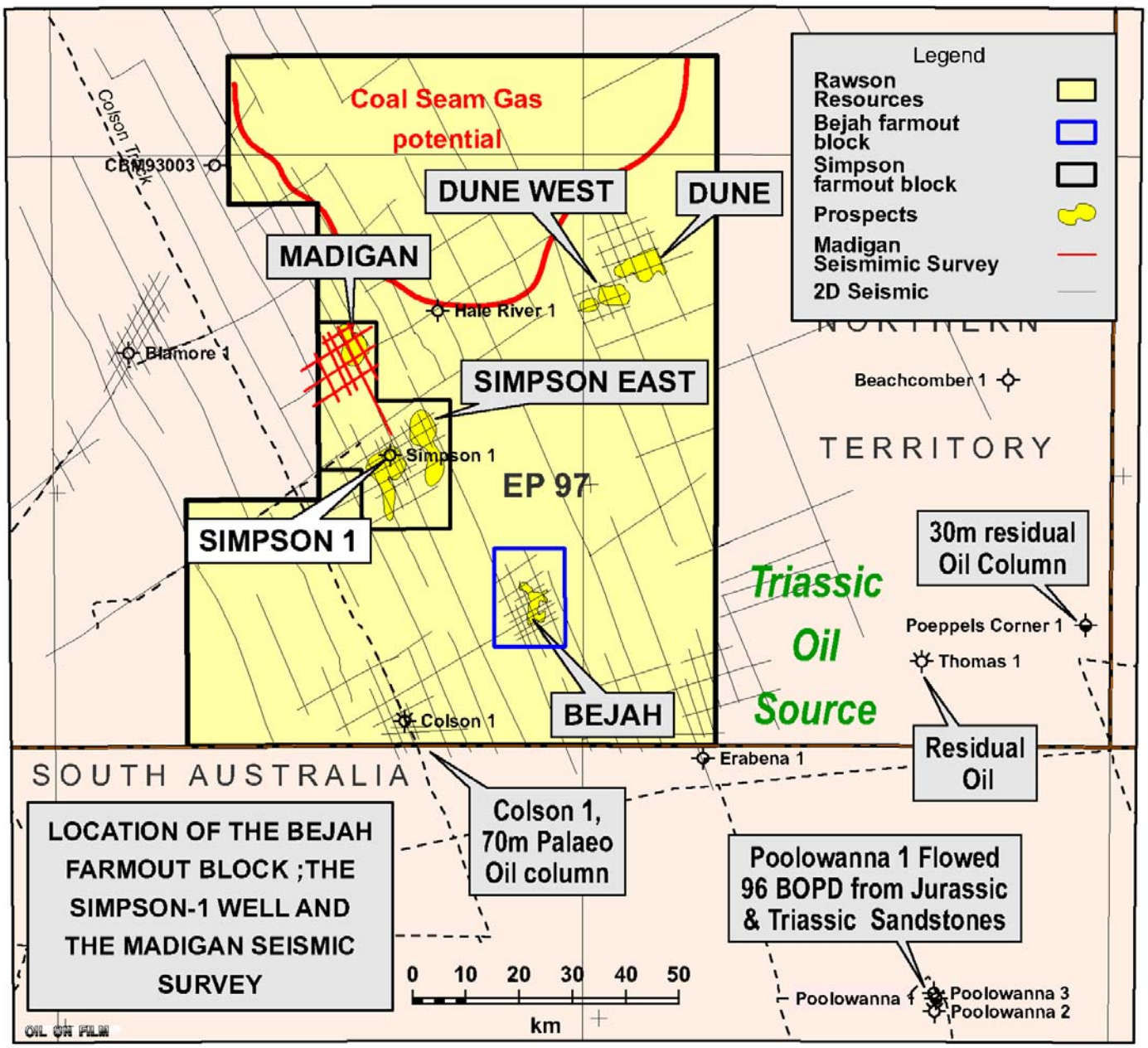

Figure 1: Location Diagram EP 97 Bejah Block in the Simpson Desert area.

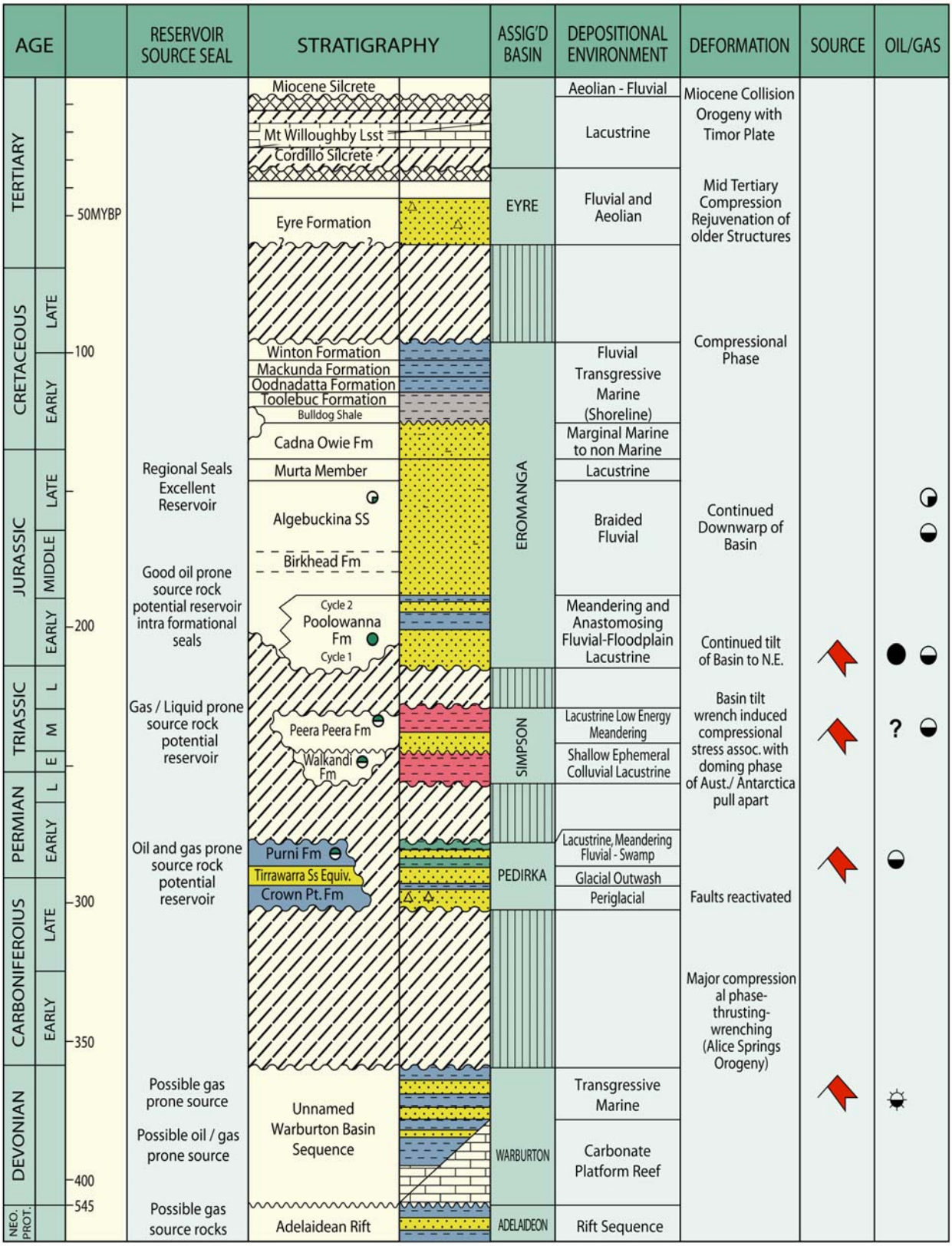

Figure 2 : Startigraphic Table Simpson Desert area

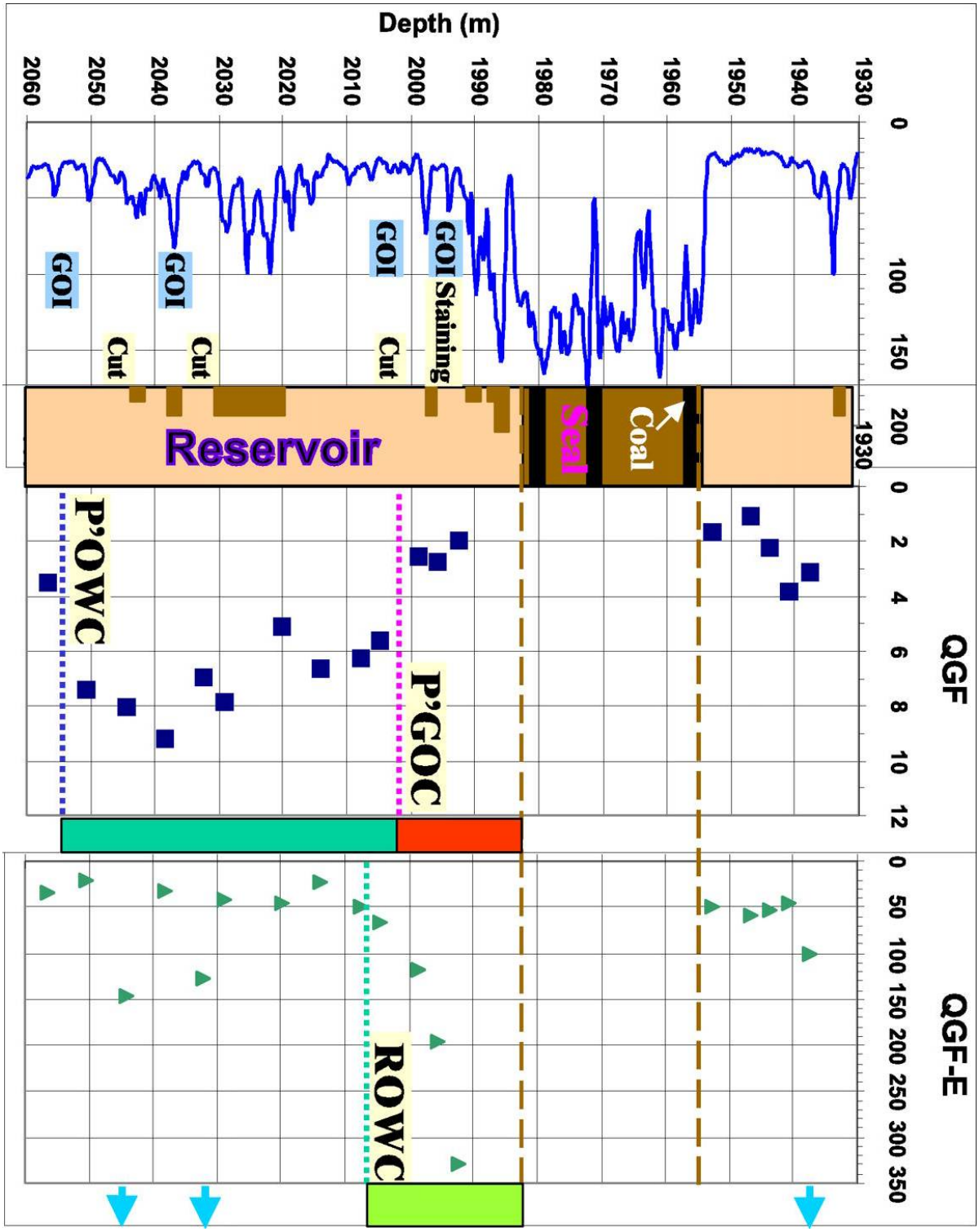

Figure 3: Colson-1, Elogs and Residual Oil Column

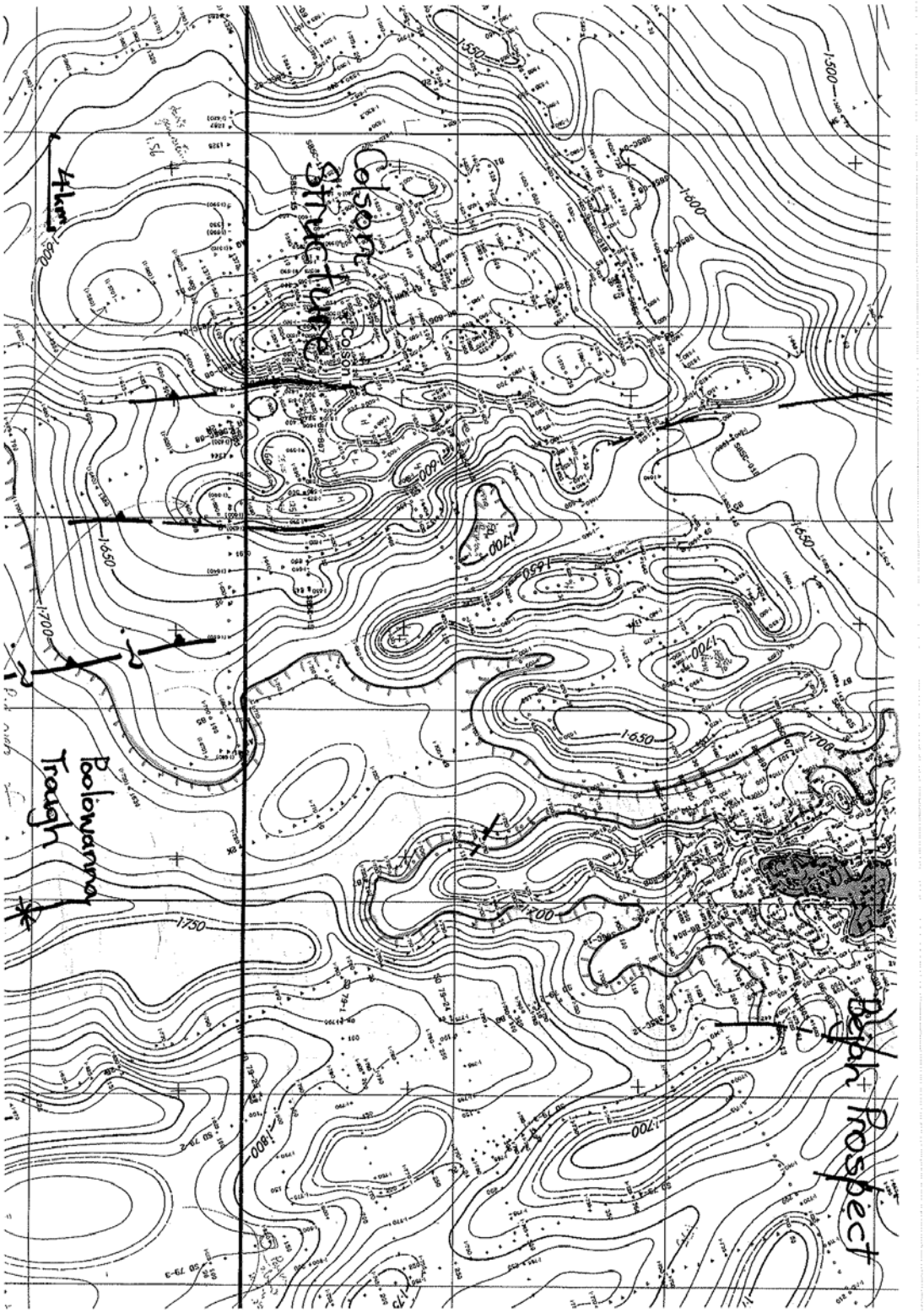

Fig.4 Bejah Prospect : Bejah-Colson area; Top Poolowanna Structure Map