

3.1 GEOLOGY AND SHOWS

BALEEN – 4

Due to the ERD nature of the well all depths in this section will be presented in measured depth from rotary table (MDRT) and true vertical depth from rotary table (TVDRT) unless stated otherwise.

Samples for Baleen - 4 were taken at the following intervals:

Depth (mMDRT)	Sampling Interval
260 – 465m	5m
470 - 2290m	10m

Missed samples for Baleen – 4:

Depth (mMDRT)	Reason
1840 - 1850	Sample board cleaned
1380 – 1390	No returns

The lithological sequence intersected at Baleen - 4 is described below. For more detailed descriptions of the cuttings, refer to Appendix I: The Formation Evaluation Log.

DRILLED HOLE SECTIONS

12 ¼” (311mm) HOLE SECTION

340 to 1890 mMDRT

8 ½” (216 mm) HOLE SECTION

1890 to 2290 mMDRT

GIPPSLAND LIMESTONE

MDRT: 340m – 1190m/ TVDRT: 340– 625.0m

The Gippsland Limestone was predominantly composed of Calcilutite and Calcareous Claystone with Calcareous decreasing in percent with depth. The basal section of this formation was purely Calcareous Claystone.

CALCILUTITE: The designation Calcilutite was assigned to this lithology due to it's high clay and calcareous nature. The colour of the Calcilutite ranged from very light grey, light grey to medium grey, rarely off white or light olive grey. Hardness and break ranged from being soft and plastic to firm and sub-blocky and often locally moderately hard. The Calcilutite at random depths became silty in part. Accessories included common fossils and Foraminifera as well as rare carbonaceous material.

CALCAREOUS CLAYSTONE: The designation Calcareous Claystone was assigned to this lithology as the clay content was greater than the Calcilutite but the calcareous percent was considerably lower. Colour ranged from medium dark grey, medium dark grey to commonly dark grey. Hardness and break ranged from firm and sub-blocky to moderately hard and sub-blocky to blocky. Accessories included common fossils, Foraminifera, trace pyrite and rare carbonaceous matter.

CALCARENITE: The designation Calcarenite was assigned to this lithology as the grain size was within the sand size range and was calcareous in nature. Hardness ranged from moderately hard to hard, with a minor unconsolidated component. Grain size ranged from very fine to medium, predominantly ranging from very fine to fine. The grains angularity ranged from angular to sub-rounded, predominantly ranging from sub-angular to sub-rounded. Sphericity was generally sub-elongated. Sorting was fair to well with a calcareous cement and commonly a argillaceous matrix. Accessories included fossil fragments, Foraminifera, tr crystalline calcite. Porosity was considered poor and there were no shows.

The section from 340 to 1190mMDRT was drilled with an average ROP of 50.9mMDRT/hr, ranging from 0.0mMDRT/hr to 185.29mMDRT/hr.

For the Gippsland Limestone the minimum gas is 0.00%, average 0.58% and 2.53%. Significant gas peaks observed in the interval:

Depth mMDRT	Total Gas %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm
790	1.49	1490 0	0	0	0	0	0	0
861	2.53	2530 0	0	0	0	0	0	0
952	1.49	1490 0	0	0	0	0	0	0
1108	1.38	1380 0	0	0	0	0	0	0
1143	2.13	2130 0	0	0	0	0	0	0

LAKE ENTRANCE FORMATION

MDRT: 1190.0 – 1730.0m/ TVDRT: 625.0 – 700.5m

This formation was predominantly Calcareous Claystone and Claystone, both Calcilutite and Calcarenite were excluded from the geological log within the first one hundred meters of the formation.

CALCILUTITE: The colour of the Calcilutite ranged from very light grey, light grey to medium grey, rarely off whit, light olive grey. Hardness and break ranged from being soft and amorphous to moderately hard and sub-blocky. Accessories included common fossils and Foraminifera as well as rare carbonaceous material.

CALCAREOUS CLAYSTONE: The designation Calcareous Claystone was assigned to this lithology as the clay content was greater then the Calcilutite but the calcareous percent was considerably lower. Colour ranged from light grey, medium dark grey, medium dark grey and olive grey. Hardness and break ranged from being firm and sub-blocky to moderately hard to hard and blocky. With depth this lithology decreased in its calcareous content and became silty in part. Accessories included common fossils, Foraminifera, trace to rare glauconite.

CLAYSTONE: Colour ranged from light grey to medium grey and light olive grey to olive grey. Hardness and break ranged from being soft and sub-blocky to moderately hard and blocky. Accessories included rare fossils, foraminifera, trace to common glauconite. With depth this Claystone increased in silt an glauconite.

CALCARENITE: The designation Calcarenite was assigned to this lithology as the grain size was within the sand size range and was calcareous in nature. Hardness ranged from moderately hard to hard, with a minor unconsolidated component. Grain size ranged from very fine to medium, predominately ranging from very fine to fine. The grains angularity ranged from angular to sub-rounded, predominantly ranging from sub-angular to sub-round. Sphericity was generally sub-elongated. Sorting was fair to well with calcareous cement and commonly an argillaceous matrix. Accessories included fossil fragments, Foraminifera, trace crystalline calcite. Porosity was considered poor and there were no shows.

The section from 1190 - 1730mMDRT was drilled with an average ROP of 57.87mMDRT/hr, ranging from 12.46mMDRT/hr to 122.91mMDRT/hr.

For the Lake Entrance Formation the minimum gas is 0.00%, average 1.48% and 3.22%. Significant gas peaks observed in the interval:

Depth mMDRT	Total Gas %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm
1212	2.01	2010 0	0	0	0	0	0	0
1239	2.36	2360 0	0	0	0	0	0	0
1285	2.51	2510 0	0	0	0	0	0	0
1345	2.02	2020 0	0	0	0	0	0	0
1409	2.19	2190 0	0	0	0	0	0	0
1498	3.22	3220 0	0	0	0	0	0	0
1662	2.18	2180 0	0	0	0	0	0	0

GURNARD FORMATION

MDRT: 1730.0 – 1790.0m/ TVDRT: 700.5 – 708.0m

This formation consists of Siltstone and Silty Sandstone.

SILTSTONE: Colour ranged from medium light grey to medium grey and greyish brown. Hardness and break ranged from being soft and sub-blocky to moderately hard and blocky. Sandy in part. Common to abundant glauconite.

SILTY SANDSTONE: Colour was medium grayish brown, soft. Grain size was very fine quartz, sub-rounded – rounded, spherical, well sorted, silty matrix. Abundant glauconite.No to poor visual porosity and no shows.

The section from 1730 - 1790mMDRT was drilled with an average ROP of 48.9mMDRT/hr, ranging from 9.6mMDRT/hr to 91.8mMDRT/hr.

For the Gurnard Formation the minimum gas is 1.03%, average 3.25% and 9.21%. Significant gas peaks observed in the interval:

Depth mMDRT	Total Gas %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm
1747	5.97	5970 0	0	0	0	0	0	0
1781	9.19	9180 0	100	0	0	0	0	0

TOP POROSITY – GURNARD FORMATION

SANDSTONE: Colour ranged from medium to dark brownish grey and olive black. Occasionally there was a mottled greyish yellow or greyish orange. Hardness was firm to moderately hard. The grain size was very fine quartz grains. Roundness ranged from sub-angular to sub-round with equant sphericity. Sorting was good to excellent. There was a common silt matrix, occasionally minor to abundant argillaceous matrix, with minor to common glauconite and trace pyrite. Porosity was visually rated as poor to none. However, the high gas levels indicate a good or greater inferred porosity. There were no fluorescence shows.

The section from 1790 – 2290mMDRT was drilled with an average ROP of 48.65mMDRT/hr, ranging from 4.94mMDRT/hr to 48.65MDRT/hr.

For the Top Porosity – Gurnard Formation the minimum gas is 0.00%, average 6.67% and 33.05% maximum. Significant gas peaks observed in the interval:

Depth mMDRT	Total Gas %	C1 ppm	C2 ppm	C3 ppm	iC4 ppm	nC4 ppm	iC5 ppm	nC5 ppm
1805	35.6	47740 0	800	0	0	0	0	0
1855	17.86	17660 0	200	0	0	0	0	0
1878	18.82	18420 0	400	0	0	0	0	0
1919	39.26	39260 0	500	0	0	0	0	0
1941	27.60	27600 0	400	0	0	0	0	0
1967	27.82	27820 0	400	0	0	0	0	0
1985	26.61	26000 0	400	0	0	0	0	0
2006	31.00	31000 0	600	0	0	0	0	0
2047	4.27	4270	0	0	0	0	0	0
2077	25.38	5380	100	0	0	0	0	0
2132	6.50	6500	100	0	0	0	0	0
2332	11.74	11740 0	0	0	0	0	0	0
2263	7.12	71200	0	0	0	0	0	0