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TURRUM-5

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Esso Australia Ltd.

WELL COMPLETION REPORT

TURRUM 5

VOLUME 2

INTERPRETED DATA

GIPPSLAND BASIN, VICTORIA

ESSO AUSTRALIA LTD

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WELL COMPLETION REPORT

VOLUME 2: INTERPRETATIVE DATA

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1. *SUMMARY OF WELL RESULTS*

Turrum 5 was spudded on 23 August 1995, and was drilled as a vertical well from a location in 60m water depth. The primary objective of Turrum 5 was to delineate previously discovered hydrocarbon systems within the intra-Latrobe Group Turrum 'L' reservoir interval. This Paleocene section (lower *L. balmei* spore-pollen zone) of fluvial to marginal marine sediments underlies the top of Latrobe Group Marlin gas field. On 11 September 1995 Turrum 5 reached total depth of 2755mRT in Late Cretaceous section (Upper *T. Longus* spore-pollen zone). The well was plugged and abandoned and the rig was released on 23 September 1995.

Turrum-5 intersected the top of the Latrobe Group at 1361.5m subsea, 9.5m low to prediction (Table 1). The current Marlin field gas-water contact is interpreted from logs and wireline pressure data to be in shale at 1493.5mSS, 18.5m deeper than predicted for this location, with residual gas in the underlying swept zone from 1493.9 to 1553.0mSS. The original oil leg would be expected between 1556 and 1564mSS, but it is difficult to identify residual oil in the thin, poor quality sands in this interval.

The L-110 reservoir in the upper part of the Turrum 'L' reservoir sequence was intersected at 2172mSS, 13m low to prediction. The L-360 and deeper 'L' reservoirs were penetrated shallower than predicted (Table 1).

Gas and oil shows were recorded through the Turrum reservoir interval. Oil was recovered from the L-360 and L-400 reservoirs. Turrum-5 increased the mapped extent of the L-500 gas and oil reservoir because this reservoir was intersected shallower than predicted, above the L-500 oil-water contact. Turrum 5 provides good control on the depth of gas-oil and oil-water contacts for the L-500 in the western area of Turrum.

Six cores were recovered from the Turrum reservoir interval. Core recoveries are detailed in Volume 1 of the Turrum 5 Well Completion Report and on the Composite Well Log (Volume 2, Attachment 1). The wireline logging suite at Total Depth included resistivity, gamma, density, neutron, sonic, nuclear magnetic resonance imaging, dipmeter/borehole imaging, formation pressure measurements, fluid sampling, vertical incidence VSP, and sidewall core runs.

Log interpretation, pressure tests and core data indicate a total net gas pay of 42.5m in the L-110 to L-350 section, with no zones interpreted as oil bearing. (Reservoir properties are summarised in Appendix 2).

The L-360 reservoir is interpreted to contain 5.4m of net gas, underlain by a gross oil column of 6m in poor quality sandstone, with 3m net oil. The L-400 reservoir contains 1.8 m net gas and 4.7 m net oil, and the L-500 contains 2.1 m net gas and 15.9 m net oil. The L-360, L-400, and L-500 reservoirs are interpreted from contact, pressure, and fluid sample data to be separate systems.

Table 1 : Predicted vs Actual Formation Tops

Formation/Horizon	Predicted Depth (mss TVD)	Actual Depth (mss TVD)	Actual Depth (m MD KB)
Sea Floor	-55	-60.3	85.3
Lakes Entrance Formation	-1264	-1267.0	1292
Top of Latrobe Group	-1352	-1361.5	1386.5
Top of Latrobe Group'coarse clastics'	-1357	-1370.0	1395.0
Top of L-110 Reservoir	-2159	-2171.5	2196.5
Top of L-200 Reservoir	-2326	-2344.0	2369.0
Naples Yellow Sequence Boundary	-2364	-2368.0	2393.0
Top of L-300 Reservoir (shaled out)	-2403	-2423.0	2448.0
Top of L-350 Reservoir (shaled out)	-2462	-2478.0	2503.0
Top of L-360 Reservoir	-2518	-2499.5	2524.5
Top of L-400 Reservoir	-2555	-2541.0	2566.0
Top of L-500 Reservoir/MFSA seismic marker	-2593	-2570.0	2595.0
Base of L-550 Reservoir	-2725	-2654.0	2679.0
Total Depth	-2780	-2730.0	2755.0

RT Height = 25 m

2. *INTRODUCTION*

Turrum 5 is a delineation well in 60m water depth in VIC/L3 in the offshore part of the Gippsland Basin. The well is located 2.5 km to the southwest of Marlin A platform, 0.8 km southwest of Marlin A-24 (at the level of the L-110 reservoir), and 2.8 km northeast of Marlin-2.

The primary objective of Turrum 5 was to increase technically proven gas reserves in the Turrum 'L' reservoirs, by testing the western flank of the main fault block of the faulted Turrum anticline which underlies the top-of-Latrobe Group Marlin field. Eight main reservoirs (the L-100, L-110, L-200, L-300, L-350, L-360, L-400, and L-500), and numerous minor reservoirs, had been identified in the fluvial to marginal marine Paleocene (lower *L. balmei* spore pollen zone) Turrum reservoir interval prior to Turrum 5.

In addition Turrum 5 provided the opportunity to monitor the present position of the gas water contact and the residual gas saturation in the swept zone for the Marlin gas field

The four previous wells to have intersected hydrocarbons in the main Turrum block are: the Marlin platform wells A6 (1969) and A24 (1973); Turrum 2 (1973); and Turrum 3

(1985). Turrum 4 (1992) was a dry hole on the eastern flank, which penetrated all reservoirs deeper than predicted. Only the deviated Marlin A24, with its limited wireline logging suite and questionable deviation survey data, had tested the western part of the structure. The eastern wells Turrum 3 and Turrum 4 provide a reasonably complete suite of modern well data.

Four wells (Marlin 1 and Marlin 2 (1966), Turrum 1 (1969) and Marlin 4 (1973)) have tested the Turrum lower *L. balmei* section in nearby fault blocks. Marlin 1 was production tested at a rate of 10.9 million cubic feet of gas per day from a total perforation interval of 37 metres.

Turrum 5 was drilled after a major study had been undertaken during 1994-95 at Exxon Exploration Company in Houston with the purpose of re-evaluating the field after the disappointing result of Turrum 4. The study used results from the 1993 regional Esso Australia Collaborative Study, and involved some of the same personnel. For the Turrum study, staff from Exxon Exploration Company, Exxon Production Research Company, and Esso Australia Limited integrated seismic interpretation using a 1993 seismic data set, facies analysis and sequence stratigraphy, biostratigraphy (using cuttings, cores and sidewall cores from the seven previous vertical wells), reservoir engineering data (from wireline and production test data), and reservoir modelling (using Exxon's mainframe RESMAP (GEOSET) program).

The Turrum study indicated the need to to increase the technically proven gas reserves, and to improve the structural and stratigraphic control in the western part of the feature. The Turrum 5 location was selected as appropriate to achieve these objectives while maintaining risk (especially associated with depth conversion) at an acceptable level.

3. *REGIONAL SETTING*

The initial formation of the Gippsland Basin was associated with rifting and subsidence that extended along the southern and eastern margins of Australia during the Jurassic to Early Cretaceous, as Australia separated from the Antarctic. The mainly volcanoclastic Strzelecki Group was deposited in a fluvial environment during this time.

In the Late Cretaceous (about 95 Ma), rifting associated with the separation of the Antarctic diverged along the west coast of Tasmania; and the north-south Tasman rift, which led to the separation of Australia from the Lord Howe Rise, developed along the eastern Australian margin.

The Gippsland Basin became a triple junction arm of the Tasman rift. The Golden Beach Group was deposited in this setting, with initial deep rift lacustrine shales and basin margin alluvial fans gradually evolving into a fluvial-dominated system. Marine transgressions are recorded in the upper Golden Beach Group in the southeast of the basin.

The active rift phase in the Gippsland Basin ceased at about 80 Ma. The Gippsland Basin became a failed rift and deposition of the Golden Beach Group ended.

The Latrobe Group was deposited in this post rift setting during extensional structuring associated with the opening of the Tasman Sea. Fault controlled subsidence continued until the late Paleocene.

Most of the Latrobe Group was deposited in a non-marine setting behind a northeast trending beach-barrier complex. As sedimentation rates declined, the strandline moved to the northwest, and during the Eocene thin glauconitic green-sand units of the Gurnard Formation were deposited over a wide area.

Two major phases of canyon cutting occurred during the Tertiary. The Early Eocene Tuna/Flounder Channel was cut, then filled with mainly marine sediments of the Flounder Formation. The Marlin Channel was cut during the Middle Eocene and partially filled with distal marine sediment of the Turrum Formation. Erosion associated with the top of Latrobe Group unconformity resulted in the formation of many of the hydrocarbon traps in the basin.

A late Eocene to mid Miocene compressional event caused selective inversion of faults and established the basin's major east-northeast anticlinal trends.

The Latrobe Group is overlain by marl and calcareous siltstone of the Oligocene Lakes Entrance Formation, which is in turn overlain by the prograding limestone and calcareous siltstone wedges of the Gippsland Limestone that form the present day shelf.

4. STRUCTURE

The Turrum feature is an intra-Latrobe Group fault dependent anticlinal trap situated to the north of the Latrobe Group depositional axis. The structure map on the L360 reservoir top (Enclosure 1) displays the major northeasterly anticlinal axis, formed by the northwest-southeast compression that commenced in the late Eocene.

The Turrum anticline plunges to the southwest and is dissected by a set of west-northwest oriented normal faults which mainly step down-to-the-south. These faults relay and have an average length of 6km. Seismic data indicate that faults become more common with depth and often show growth of the lowside section. Two secondary north-trending folds produce smaller fault dependent closures within the larger scale faulted anticline. Two significant northeast-trending reverse faults have also been identified.

Turrum 5 tested the west flank of the main Turrum fault block. The well was located on a small, north-plunging anticlinal nose on the highside of the normal fault that forms the southern boundary of this main block.

5. STRATIGRAPHY

A thick succession (1232m) of Gippsland Limestone (Mid Miocene to Recent age) was penetrated by Turrum 5 (Figure 2). No samples were collected above 690mRT as this section was drilled without a riser and cuttings were ejected at the sea floor. Below this depth, the Gippsland Limestone comprised light grey to brown grey fossiliferous calcilutite and calcisiltite.

The Oligocene to Middle Miocene Lakes Entrance Formation is 95m thick and includes light and medium grey to olive grey calcareous claystone and argillaceous calcisiltite with some fossil fragments and carbonaceous material.

The Gurnard Formation at the top of the Latrobe Group is 8m thick at Turrum 5, and consists of glauconitic and pyritic sandstone and siltstone, and oxidised iron minerals.

Turrum 5 penetrated 1360 metres of the underlying Eocene to Late Cretaceous Latrobe Group 'coarse clastics'.

The uppermost part of the 'coarse clastics' is of Eocene age (*N.asperus* to *M.diversus* spore-pollen zones), and consists mainly of coarse grained marginal marine to lower coastal plain sandstone, with minor siltstone and coal. This forms the Marlin Field 'N' reservoir sequence.

The underlying section is dominated by shale and siltstone with thin sandstone and coal beds, deposited in a mainly lower delta plain environment. Sandstones in this interval are generally less than 5m thick and were deposited in channels, point bars and crevasse splays during the Eocene to Paleocene (lower *M.diversus* to upper *L. balmei* spore-pollen zones).

The objective of Turrum 5 was to test the 500m thick 'L' reservoir section, which is of Paleocene age (lower *L. balmei* spore-pollen zone). Parts of this interval are shale-prone, but sandstone packages up to 25m thick are present. Reservoir quality and extent varies considerably. Coals are more common and thicker than in the overlying section, and help to constrain the stratigraphic framework within Turrum.

Interpretation of the facies and stratigraphy of the Turrum L reservoirs was an important part of the 1994-95 Exxon Exploration Company Turrum study. The initial stratigraphic framework established during the Esso Australia Collaborative Study (1993-94) was revised substantially when all the Turrum wells were included. The Turrum study incorporated cores, facies, biostratigraphic analysis, and correlation to the seismic surfaces interpreted from the 1993 3D Turrum seismic data set.

The facies interpretation of Marlin and Turrum cores indicate that the main reservoir sandstones were deposited within sandy-braided channel complexes as ***stacked channel and channel-levee deposits*** with associated splay and splay levee deposits; ***point bars encased in floodplain mudstones***; and ***tidal-estuarine deposits***. In general, the channel complexes are interpreted to be oriented parallel to the faults, and trends of meandering stream deposits are considered to be more variable. Reservoir distribution is primarily determined by movement of the rift-margin faults and pivoting of individual tilt-blocks. The Turrum reservoir units are interpreted to thicken on the lowside of major tilted fault blocks, and to be flanked by ponded, brackish-water floodplains.

In the ***stacked channel and channel levee association***, splay levee fine clastics typically grade up into channel levee sandstones and stacked channel sandstones. The vertical stacking pattern reflects the lateral migration of a multi-channel system across floodplain splays and a poorly defined channel levee system. Medium to coarse sands were deposited in a series of downstream-prograding bars within the multichannel system. Laterally equivalent, finer grained sands formed shallow-mounded levees separating floodplain mudstones from riverine sandstones during low water stage.

Point bar deposits typically form upward fining packages up to 10-15 metres thick, separated by a basal scour from the underlying floodplain mudstones and coals. Gravels and coarse sands deposited above the basal scour grade upwards into trough cross bedded sands of the middle point bar, where mud drapes between beds indicate fluctuating water levels. The upper point bar sands are current rippled and interfinger with flood plain deposits. The vertical stacking of these deposits reflects the lateral migration of a single channel and point bar.

Tidal-estuarine sediments were deposited as stacked subtidal bar complexes within an estuarine setting. The narrow, elongate subtidal bar deposits form upward coarsening tidal bar complexes overlain sharply by lagoonal mudstones. This vertical stacking reflects the lateral facies transition from subtidal bar toe to bar core and bar top. Individual bars are typically a few metres thick and may be separated by thin muddy drapes. The bars may toe out into subtidal muds and muddy sands. Tidal bar complexes at Turrum merged to form a sheet-like geometry that filled most of the estuary.

The predominantly non-reservoir or seal-prone facies at Turrum include ***floodplain deposits with small channel fills, splay deposits, and coals;*** and ***bay head delta and lagoonal deposits***. Sandstones deposited within these environments potentially represent minor reservoir units.

Floodplain deposits are variable and thin bedded, with often abrupt lateral and vertical facies changes. Channels were probably fairly stable and leveed, and are interpreted to have connected with the floodplain via small splays. Coals and individual channel and splay deposits are laterally discontinuous, but overall the floodplain intervals are relatively continuous. The abundance and variable thickness of coal, and the presence of clay zones within the mudstones, indicate significant ponding in the floodplain.

Within the ***bay-head delta and lagoonal association,*** fine grained lagoonal deposits typically coarsen upward through the lower and middle parts of the bayhead delta, into the the coarser clastics deposited in outer and inner stream mouth bars and distributary channels. This succession may be capped by thin, laterally extensive coals and floodplain deposits. Along depositional strike, the bidirectional downlap and clinoforms of the outer stream mouthbar may be truncated by minor channelling. The areal extent of stacked bay-head delta intervals may by 10s of square kilometres.

The L-100 unit is the shallowest significant Turrum reservoir. As predicted by trends from Marlin A24 and other wells, the typical L-100 association of stacked fluvial channel and channel levee deposits was absent at Turrum 5.

The top of the L-110 reservoir was penetrated at 2171.5 m subsea, 12.5m deeper than predicted. This reservoir is a stratigraphic trap, previously penetrated in Marlin A24 where 25 metres of fair to good quality gas-bearing sandstone is interpreted from cores to represent splay levee, channel levee, and stacked fluvial channel deposits. In Turrum 5, two cores were cut and the L-110 is substantially thinner and of poorer quality than in Marlin A24. The unit is interpreted at Turrum 5 to represent mainly poorer quality splay levee and channel levee deposits.

The L-195 reservoir is indicated by wireline pressure data to be separate from the underlying, more volumetrically important, L-200 and L-220. Log character and correlation suggest that the L-195 includes thin coastal plain splay and channel deposits.

The upward fining L-200 and L-220 sandstones above the Naples Yellow Sequence Boundary probably represent point bar deposits. A small pressure discontinuity between the reservoirs suggests they form separate fluid systems, although if there are measurement inaccuracies, for example due to slight supercharging, these reservoirs could form a common system.

The L-260 reservoir beneath the Naples Yellow sequence Boundary is interpreted as a bayhead delta or coastal plain splay complex overlain by a fining-upward point bar deposit.

The L-300 reservoir overlying the MFS 'B' sequence boundary was expected to be significant at Turrum 5. In Turrum 3 this unit is about 20 metres thick, with about 15% average effective porosity, and is interpreted to represent the deposits of the stacked channel and channel levee association. The lateral equivalents in Turrum 4 and Turrum 2 are interpreted as point bar sandstones. Correlation into Marlin A6 and A24 is difficult and the unit may be faulted out in those wells. In Turrum 5 the L-300 was penetrated 20 metres deep to prediction and is 5 metres thick and upward-fining, with porosity less than 10%; it possibly represents a point bar or a floodplain channel. It now appears that the stacked fluvial channel sandstones of the L-300 in Turrum 3 are of limited areal extent.

The L-350 reservoir which overlies the 'Pink' Sequence Boundary is interpreted to be absent in Turrum 5. This unit is a well-developed 7 metre thick point bar sandstone in Turrum 3, where wireline pressure data suggest that L-350 may form a common reservoir system with the underlying L-360 unit. In Marlin A24 a sandstone at this level is more than 10 metres thick.

The L-360 sandstone overlies the 'Sub Pink' Sequence boundary. It is correlated as the most extensive reservoir unit above the L-500. It is interpreted to represent mainly stacked channel and channel-levee deposits. At Turrum-3 the reservoir is of good quality, about 20 metres thick and with effective porosity of up to 24%. At Marlin A24 the L-360 is almost 20 metres thick but of slightly poorer quality. At Turrum 5, the L-360 was penetrated 19 m shallower than predicted, and is 25 metres thick, with about 8 metres total net sandstone at an average porosity of 15%. Only the top 4 metres of the L-360 is good quality sandstone, with average porosity of 17%.

The underlying L-400 reservoir is interpreted to be a point bar deposit in Turrum-5. The unit is interpreted to be part of a fairly extensive system, as similar sandstones are present at this level in Turrum 3 and Marlin A24. At Turrum 5, the L-400 contains 6.5 metres net sandstone with an average effective porosity of 17%. The Nuclear Magnetic Resonance Log indicates that the upper part of the unit is gas-bearing (Appendix 2). Oil was recovered from good quality sandstone in the lower part of the L-400.

The L-360 and L-400 reservoirs exhibit lateral variability, and it is possible that stratigraphic barriers could isolate the west-flank oil accumulations penetrated by Turrum-5 from fluid systems in equivalent reservoirs on the eastern flank.

Sandstones in the L-500 to L-550 interval were deposited as tidal bars within an estuarine environment. Intensive bioturbation is evident in some intervals on the FMI image log. The gas and oil-bearing L-500 is of moderate quality in Turrum 5, with average porosity of about 14%.

About 75m of Late Cretaceous (*T. longus* spore-pollen zone) coastal plain to marginal marine sediment with minor sandstone, common siltstone and shale, and minor coal was drilled below the base of the lower *L. balmei* before the well reached its total depth of 2730mSS.

6. HYDROCARBONS AND RESERVOIR

No significant hydrocarbon shows were encountered within the Gippsland Limestone or Lakes Entrance Formation in Turrum 5. Typically, background gas levels within this section were less than 0.5% (25units).

The top of the Latrobe Group was penetrated at 1387 mRT, with gas increasing to nearly 1% in the 8 m thick Gurnard Formation.

Reservoir properties and net pay in the Latrobe Group 'coarse clastics' are summarised in Appendix 2, using a 10% cutoff to define net sandstone. A lower cut off may be appropriate for the Turrum gas reservoirs; this will be considered when final core analysis results are available.

Within the Latrobe Group 'coarse clastics', up to 7% gas was recorded on the mudlog above the current Marlin field gas-water contact, interpreted from logs and wireline pressure data to be in shale at 1518.5 mRT (1493.5 m SS), 18.5 m deeper than the pre-drill prediction for this location and 62.5m above the original gas-oil contact. Wireline logs indicate gas-bearing sandstone from 1393.7 to 1513.7 mRT, with a total of 79.6 m TVT net gas pay and a weighted mean porosity of 24.1%.

Residual gas is clearly indicated to be present in sandstones from 1518.9 to 1578.0m RT. The original oil leg would be expected in the interval 1581 to 1589m RT, but the quality of the very thin sands in this interval makes it difficult to identify residual oil.

In the interval between the Marlin N-1 reservoir and the Turrum L reservoirs, gas peaks of up to 10% were recorded. The major peaks are associated with coal; and water bearing sands are interpreted from 1592.6 to 2054.9mRT. Minor gas shows were encountered through a 150 metre interval above the L-110 reservoir, where log analysis indicates thin interbedded gas and water sands from 2060.5 m to 2172.6 mRT.

Core 1 was cut in the L-110 reservoir from 2197.0-2205.5mRT, with 8.3m recovered. Core 2 was cut from 2205.5-2223.5mRT, recovering 17.3m. Gas was not circulated to surface after coring. These cores are interpreted to have recovered the entire gas-bearing L-110 reservoir and drilled into the underlying siltstone and shale. Log analysis and preliminary core description indicates that at the Turrum 5 location the L-110 reservoir contains 6.6 m net gas pay in fine and medium grained sandstone, with average porosity of 17% and average water saturation of 19%. Core analysis indicates air permeabilities ranging from several millidarcies to around 1 darcy. Wireline pressure data indicate that a gas-water contact (ie, assuming no oil leg) would occur at

2218mSS (Appendix 3). The L-110 in Turrum 5 is substantially thinner and poorer quality than in the nearby Marlin A24 well where it contains almost 30 m net sandstone with variable effective porosities ranging up to 24%.

Only minor gas sandstones occur between the L-110 and the L-195 reservoirs.

The L-195 reservoir is interpreted to contain 4.4 m net sandstone from 2356.4 to 2363.9mRT, with average effective porosity of 16% and average water saturation 30%. Wireline pressure data indicate a gas-water contact (asuming no oil leg) of 2361mSS (Appendix 3).

The L-200 reservoir is interpreted to contain 3.7 m net sandstone from 2370.8 to 2381.2mRT, with average porosity of 12% and average water saturation 24%. Wireline pressure data indicate a gas-water contact (assuming no oil leg) of 2392mSS (Appendix 3).

Log analysis indicates that the L-220 reservoir contains 7.0 m net sandstone from 2585.7 to 2393.1 mRT, with average porosity of 17.0% and average water saturation 20%. Wireline pressure data indicate a gas-water contact, if there is no oil leg, of 2390mSS.

It is possible that the L-200 and L-220 reservoirs are in communication. Only a thin shale separates them, and they have similar interpreted gas-water contacts,

The L-260 reservoir is interpreted to contain 10 m net sandstone from 2405.0 to 2419.3mRT, with average porosity of 14% and average water saturation of 36%. Wireline pressure data indicate that the L-260 is separate from the overlying L-200 and L-220 reservoirs, with an interpreted gas-water contact (assuming no oil leg) of 2409mSS.

The L-300 unit is interpreted to be represented by a thin siltstone at 2450mRT, with no net sandstone.

Cores 3, 4, and 5 drilled the entire L-350 and L-360 interval. Core 3 was cut from 2508.5 to 2526.8 m MD RT, recovering 18.3 m. The upper part of this core recovered the non-net equivalent of the L-350 reservoir. Core 4 from 2526.8 to 2544.8 m MDRT recovered 16.7 m; and Core 5 from 2544.8 to 2549.8 m MDRT recovered 5.0 metres.

The uppermost part of the L-360 is good quality gas-bearing sandstone. In total there is an estimated 5 metres of net gas sandstone in the L-360, with an average effective porosity of 16% and water saturation of 21%. The lower part of the L-360 is oil bearing, but is of very poor quality, containing about 3m net sandstone with average effective porosity of 14% and water saturation of 32%. The low permeability and producibility of the L-360 oil zone are demonstrated by the wireline sampling. More than 11 hours was required to recover 3.75 litres of 41 degree API oil. The gas-oil contact cannot be determined from log or wireline pressure data, but is indicated by a marked change in fluorescence in Core 4 at about 2518mSS, which is 13m below the previous L-360 Low Proved gas (LPG) of 2505 mSS. Previously, only gas had been intersected in the L-360 (except for the water-wet Turrum 4), and a gas-oil contact so close to the LPG, with the implied substantial oil leg, has been considered unlikely.

Good quality pressure data were obtained from the gas zone in the upper part of the L-360. These pressure points are on a gradient 3 to 4 psi below that in the equivalent unit in Turrum 3 in 1985. This is consistent with a slight aquifer drawdown due to production from other fields. However, the wireline pressure data from the underlying poorer quality interval are difficult to interpret (Appendix 3). If the oil leg in the L-360 in Turrum 5 is in communication with the gas at the top of the unit, and the pressure data are constrained by the gas-oil contact indicated by core fluorescence, an oil-water contact is estimated between 2623 and 2665mSS, depending on the oil gradient. (A gradient of 1.0 psi/m gradient is based on a small recovered oil sample; a 0.833 psi/m gradient is based on the wireline pressure gradient in the underlying L-400 oil system). A contact at 2665 mSS would be 12m deeper than high proved water in Turrum 4.

There are a number of possible explanations, including:

1. The pressures obtained from the L-360 oil leg in Turrum 5 may be supercharged due to the low formation permeability. This is supported by the inability to tie Turrum 5 oil pressure data to the oil-water contact indicated by core fluorescence.

2. The oil sample used to calculate the oil pressure gradient may be unreliable, as only a small oil volume was available for analysis; the lighter oil gradient based on the L-400 pressure data may be more accurate.

3. The gas-bearing upper part of the L-360 sandstone may be isolated from the lower interval, although no obvious seal is present.

4. The western part of the Turrum feature may be isolated at the L-360 level from the eastern area. However correlation, and gas cap pressure data, in Turrum 3 and Turrum 5 are consistent with reservoir continuity.

Core 6 from 2568 to 2586.5 mRT recovered 18.5m from the lower part of the L-400 and the underlying shale prone interval, and wireline sampling recovered 1.5 litres of 43 degree API oil from the L-400 reservoir, the first oil recovery from this unit. This oil has a similar API gravity and visual appearance to the L-360 oil sample. The Nuclear Magnetic Resonance Log log indicates that the upper part of the unit is gas-bearing (Appendix 2), although this was not confirmed by wireline pressure tests or samples. Wireline log analysis indicates 1.8 metres net gas sandstone in the L-400, with average effective porosity of 15% and water saturation of 25%; and 4.7 metres net oil sandstone with average effective porosity of 18% and water saturation of 17%.

The L-500 reservoir was expected to be outside the field L-500 oil-water contact at the Turrum 5 location, but was penetrated higher than predicted. Turrum 5 contains 2.1m net gas with average effective porosity of 15% and water saturation of 21%, and a gas-oil contact at 2577mSS; and 15.9m net oil with average effective porosity of 14% and water saturation of 30%. Oil is present at the base of L-500 porosity at 2598mSS, and wireline log character and pressure data suggest that this is very close to the oil-water contact. Turrum 5 provides good control on the thickness of the L-500 oil leg in the western part of the field. Gas and oil were previously known within the L-500 from Turrum 3, Marlin A6, and Marlin A24. It is possible that the accumulation at Turrum 3 is in a separate culmination and has different gas-oil and oil-water contacts than Turrum 5.

Minor thin, low porosity gas sandstones, were penetrated in the Late Cretaceous interval below 2700mRT. These were not sampled and are considered to contain very small volumes.

7. *GEOPHYSICAL DISCUSSION*

Turrum-5 was drilled on the western flank of the Turrum field, 0.8km southwest of Marlin-A24. The location was identified after integrating the analysis of the Turrum G93C seismic grid with data from the surrounding Marlin and Turrum wells. The actual well depths for the Top of Latrobe and Turrum horizons were within 1% of prognosis.

Depth conversion was recognised as a major uncertainty after the poor depth prediction results of Turrum-4, which at the lower Turrum levels (L-250 to L-500) was from 50 to 60m deep to prediction. During the Turrum 3D seismic interpretation, depth conversion methods were examined in detail. The preferred depth conversion technique used velocities calculated from GEODEPTH down to the Top of Latrobe Group, and compaction-based time-velocity relationships intra-Latrobe. The final Top of Latrobe depth map was also verified using attribute analysis that targetted the Marlin gas-oil contact. The top of Latrobe was intersected at 1361.5mSS, 9.5m deep to prediction; an error of 0.7%. This is within the expected depth conversion uncertainty of 1% at this level.

The Intra-Latrobe depth conversion from Top of Latrobe to the Blue-Grey Sequence Boundary (intra L-100 marker) was made using a relationship between seismic time and interval velocity, which relates the mid-point seismic time for the interval to the interval velocity seen in the Marlin and Turrum wells. Compaction due to depth of burial beneath Top of Latrobe is the main element in this relationship. Turrum-5 intersected the top of the L-110 at 2171mSS, 12m deep to prognosis: an error of 0.6%. This is within the pre-drill depth conversion uncertainty of 1.5% for Intra-Latrobe horizons.

The top of the L-110 was built from the Blue-Grey Sequence Boundary, which came in in 16m shallow than expected. The different results at these two horizons is due to uncertainties in the isopach between them. The depth error at the Blue-Grey Sequence Boundary has been attributed to the interval velocity being lower than expected.

The horizons from L-200 to L-500 were also depth converted using compaction based relationships, but it was recognised pre-drill that these relationships would be less certain due to variations in the stratigraphy. These horizons were built from seismic boundaries carried during the interpretation. The three key control surfaces were Blue-Grey (intra L-100), Naples Yellow (Base L-250) and MFSA (Top L-500).

The Naples Yellow Sequence Boundary was intersected at 2368mSS, 4m deep to prediction; a depth error of 0.2%. The MFSA Sequence Boundary was intersected at 2570mSS, 23m shallow to prediction; a depth error of 0.9%. These depth errors although small contain variations in prognosed isopach thicknesses that need to be examined. The isopach between Blue-Grey and Naples Yellow sequence boundaries is 20m thicker than predicted while the Naples Yellow to MFSA isopach is 27m thinner than predicted. In addition, the complete isopach is only 7m thinner than expected. The reason is that the Naples Yellow time-pick is being carried slightly high when matched against the Turrum-5 synthetic.

The top of the L-360 was intersected 19m shallow to prognosis. Most of this error can be attributed to the 16m error at the Blue-Grey level.

The top of the L-200 is 18m deep to prognosis, but this variation is due to a change in the correlation surface used to pick the reservoir top. The original stratigraphic top on which the L-200 was based (the Naples Yellow Flooding Surface 4) is 1m deep to prognosis.

The base of the L-550 is markedly shallower than the pre-drill prognosis but no seismic event was identified at this level. Instead nearby well control was used to estimate the thickness of the L500 to L550 package.

8. *GEOLOGICAL DISCUSSION*

Reservoir properties and volumes were predicted pre-drill using correlations from the Exxon Exploration Company Turrum Field Study and 3-dimensional GEOSET models. Turrum is a complex field, in which reservoir heterogeneity occurs at a finer scale than well spacing, hence pseudo and random wells were incorporated into the GEOSET models to capture the heterogeneity implied by the stratigraphic and facies models.

Prior to Turrum 5, only gas-on-rock had been observed in the L-110 to L-400 interval. The downdip oil potential for these reservoirs was expected to be small.

The important results of Turrum 5 were:

1. Oil was proven in the L-360 and L-400 reservoirs. The lateral extent of these separate oil pools remains to be delineated, and the downdip column was not well established due to the poor quality of the pressure data (particularly in the L-360).

2. The reservoir quality of the lower part of the L-360 was poorer at Turrum 5 than expected.

3. The interval previously assigned to the L-200 reservoir contains at least two separate gas systems. Good quality pressure data in the L-195, L-200, L-220, and L-260 improves confidence in estimating the downdip potential of these units. This interval contains more net sandstone at the Turrum-5 location than expected.

4. The known extent of the L-110 reservoir was increased; previously this stratigraphic trap was known only from Marlin A24. Although thinner and poorer quality than predicted from A24, the intersection at Turrum-5 supports the depositional model, and adds proved reserves to the unit. Valuable pressure data were acquired.

5. The L-350 reservoir appears not to be present in Turrum 5.

6. The L-300 reservoir is interpreted to be present but essentially non-net.

7. The current gas-water contact for the Marlin N-1 gas reservoir was intersected at 1493.5m SS, 62.5m above the original gas-oil contact, and 18.5m deeper than expected for the Turrum-5 location at the time of drilling. This information is important for Marlin volumetric assessments.

PE906494

This is an enclosure indicator page.
The enclosure PE906494 is enclosed within the container PE900858 at this location in this document.

The enclosure PE906494 has the following characteristics:

ITEM_BARCODE =	PE906494
CONTAINER_BARCODE =	PE900858
NAME =	Locality Map
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	GENERAL
SUBTYPE =	PROSPECT_MAP
DESCRIPTION =	Locality Map for Turrum-5
REMARKS =	
DATE_CREATED =	17/07/95
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	TURRUM-5
CONTRACTOR =	
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

LOCALITY MAP

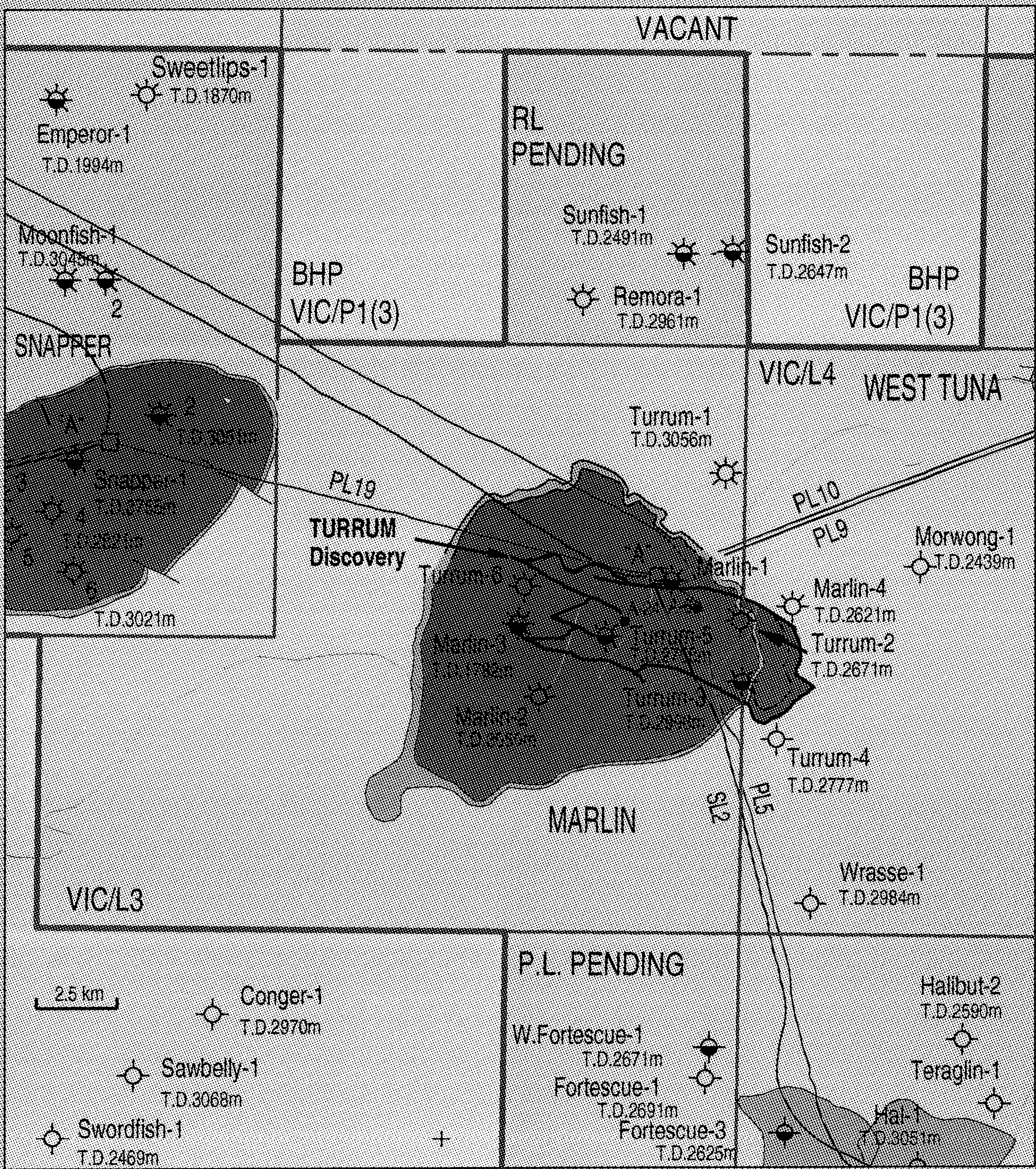


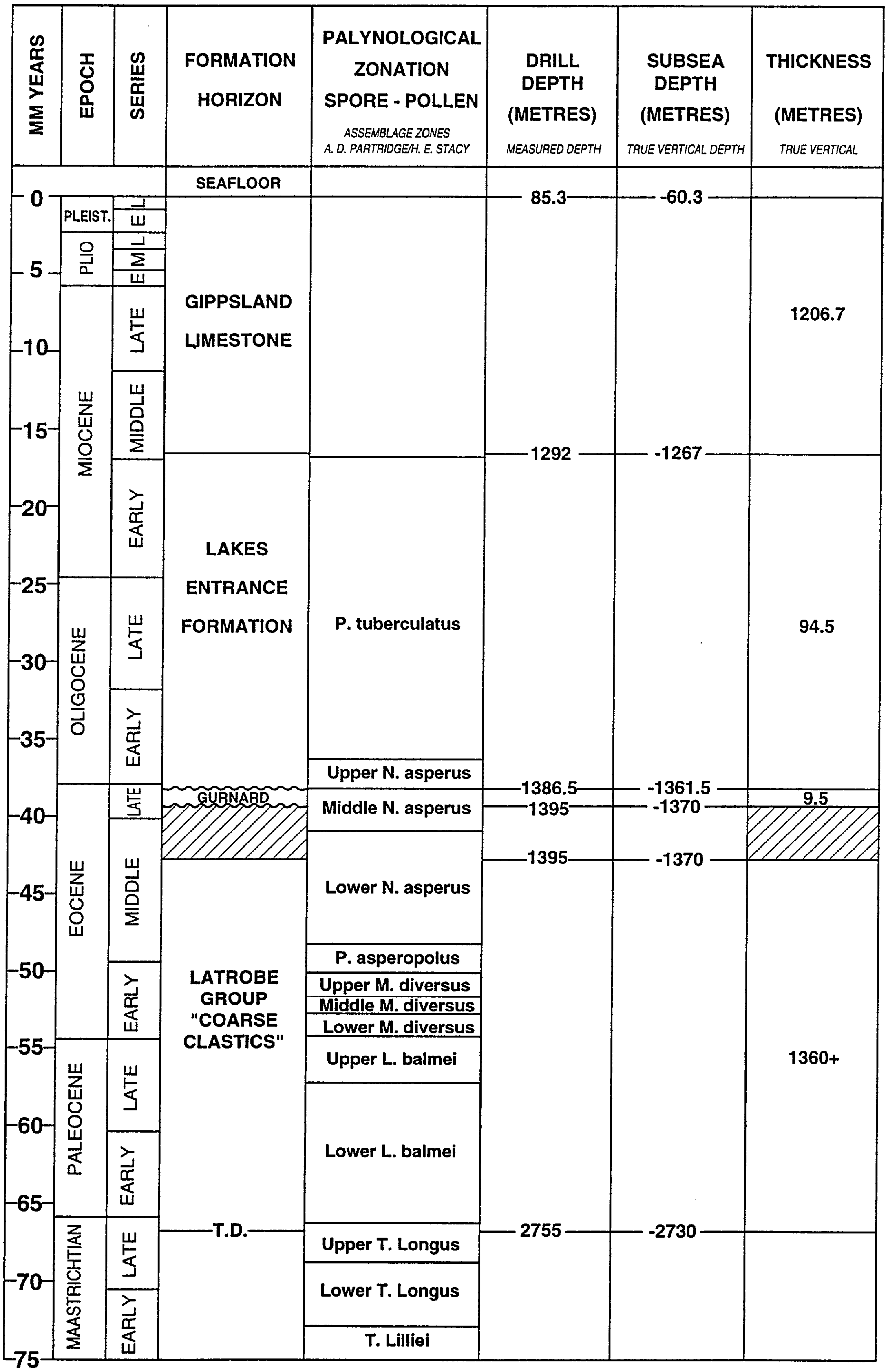
FIGURE 1

26/03/96 GPV01419:dwg3

GIPPSLAND BASIN

TURRUM-5 STRATIGRAPHIC SECTION

FIGURE 2



K.B. = 25.0m

NB: Ages are based on correlation to other Marlin/Turrum wells

96210

APPENDIX 1

APPENDIX 1

TURRUM 5

Palynological Analysis

PE906495

This is an enclosure indicator page.
The enclosure PE906495 is enclosed within the container PE900858 at this location in this document.

The enclosure PE906495 has the following characteristics:

ITEM_BARCODE = PE906495
CONTAINER_BARCODE = PE900858
NAME = Palynological Report
BASIN = GIPPSLAND
PERMIT = VIC/L3
TYPE = WELL
SUBTYPE = PALY_RPT
DESCRIPTION = Biostratigraphic Zonation and Palaeoenvironments of the Turrum-5 Well, Gippsland Basin, Australia (enclosure from WCR vol.2) for Turrum-5
REMARKS =
DATE_CREATED = 31/03/96
DATE_RECEIVED = 29/11/96
W_NO = W1145
WELL_NAME = TURRUM-5
CONTRACTOR = EXXON EXPLORATION COMPANY
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 2

APPENDIX 2

APPENDIX 2

TURRUM 5

Quantitative Formation Evaluation

Esso Australia Ltd
Exploration Department

TURRUM-5
Formation Evaluation
Log Analysis Report

Petrophysicist: L.J. Finlayson
January 1996

TURRUM-5 LOG ANALYSIS

Turrum-5 wireline logs have been analysed for effective porosity and water saturation over the interval 1385m to 2740m. Analysis was carried out using LASER derived total porosity and a combination of Dual Water and Archie water saturation models.

Note that all depths quoted below are MDRT unless specified otherwise. Subtract 25m to convert measured-depth to sub sea-depth.

DATA

Logs Acquired

Suite 1

LDT-AS-GR	118m to 658m

Suite 2

DLL-MSFL-AS-GR	2757m to 655m (MSFL to 1305m)
FMI-LDT-CNL-NGT	2750m to 2135m (only FMI recorded)
LDT-CNL-NGT	2757m to 1305m (LDT to 655m)
MDT	2711m to 1406.5m (pretests and samples)
CSAT	2753m to 1340m (75 levels)
SAT	1340m to 645m (11 levels)
MRIL-GR	2695m to 2460m (Numar)
CST	2756.5m to 2133.5m, 58/60 recovered

Note: All logs acquired conventionally on wireline.

Log Quality

- The Array Sonic curves showed some minor anomalies so an edited DT curve was produced from the four transit time curves available (DT, DTL, DTLN, DTLF).

- The PEF curve was reading too high due to barite in the mud and was not used in the log analysis.

- The initial run of the LDT in suite two had unstable long and short spacing detector high voltage readings (LSHV and SSHV). These curves should normally increase slowly with temperature. Due to concerns about log validity the nuclear string was rerun with the backup LDT. The backup tool initially exhibited similar voltage instability but then stabilised. The repeat section was good (and also repeated well with the first LDT log) and the log is considered valid except for the interval 2692m to 2701m where severe voltage problems result in bad data.

Log Processing

- The NGT curves were environmentally corrected for barite and potassium in the mud by Schlumberger using the ALPHA filtering option.
- Schlumberger ALPHA processed hi-res bulk density curve HNRH was used with TNPH in LASER porosity calculations.
- A gain of 1.2 was applied to TNPH to estimate the environmental corrections.
- An invasion corrected Rt was derived from the dual laterolog curves in fresh water and hydrocarbon zones. In saline water zones the LLD curve is reading too high due to resistive shoulder beds so the LLS curve was used as Rt.

INTERPRETATION

Logs Used

LLD, LLS, MSFL, HNRH, TNPH, POTA, THOR, DT (Schlumberger).

Analysis Parameters

a	1
m	1.85
n	2
Apparent Shale Porosity (PHISH)	0.15
Shale Resistivity (RSH)	20 ohmm
Bottom Hole Temperature	119 DEGC

Total Porosity

Total porosity was derived from LASER using a 4 mineral model based on quartz, feldspar, illite and kaolinite with gas included as necessary.

Neutron porosity response was modelled in SNUPAR (Schlumberger Nuclear Parameter programme) for each mineral including gas based on Marlin and Turrum composition data.

Both Marlin and Turrum sands are quartz rich with up to 10% feldspar content. When clay is present it is typically illite/smectite with minor amounts of kaolinite. Below 2595m the feldspar content of sands increases to about 20%.

Mineralog

The Mineralog analytical technique is based on the infrared absorption of a finely ground sample dispersed in a potassium bromide matrix.

In this well the samples were from wellsite plugs and the volume percentages of common rock forming minerals are displayed in a table and compared on a depth plot with the LASER outputs. Mineralog accuracy is plus or minus five percent. In general, a good match is seen with the LASER output which validates the mineral model and total porosity calculated.

Coring and Core Analysis

Five conventional cores were cut as follows:

Core No.	Depth (m)	Recovery (m)	Recovery (%)	Shift to Log (m)
1	2197.0-2205.5	8.3	98	+2.3
2	2205.5-2223.5	17.3	96	+2.3
3	2508.5-2526.5	18.0	100	+3.5
4	2526.5-2544.5	16.7	96	+3.4
5	2544.8-2549.8	5.0	100	+2.0
6	2568.0-2586.5	18.5	100	+3.0

Routine core porosity and permeability measurements were performed by ACS at overburden conditions on wellsite plugs cut every metre. Final core analysis will be performed by ACS every 20cm . Attached is a plot showing a comparison of core and LASER derived total porosity and grain density. In general, a good match is seen which validates the four mineral model used in LASER.

Shale Volume

The Volume of Wet Clay derived from LASER was used as VSH in effective porosity and water saturation calculations.

Free Formation Water Resistivity

Below the current Marlin GWC free formation water resistivity was derived from RWA calculations in clean water sands. Above the current Marlin contact an Rw equivalent to the deeper saline reservoirs was used instead of the underlying fresh water which is believed to have replaced the original water in this interval.

Listed below are the selected Rw values and equivalent salinity.

Depth	Rw (ohmm)	Salinity (ppm NaCleq)	Comments
1385-1515	0.09	35,000	saline water
1515-1725	0.40	6,500	fresh water
1725-2740	0.80-0.60	35,000	saline water

The fresh water salinity is consistent with water produced from the Marlin gas reservoirs and the saline water is consistent with regional salinity data below fresh water flushing.

Water Saturations

Below the Marlin current GWC total water saturation was calculated using LASER total porosity in the Dual Water programme DWGP. Effective porosity and effective water saturation were calculated using the LASER VWCL as VSH. Above the Marlin current GWC the sands have high porosities, low clay content and high resistivities. In these zones, where the Dual Water equation over-corrected the effective water saturation, it was considered appropriate to use an Archie equation to derive water saturation. Invaded zone saturation, SXO, was calculated from effective porosity and an Rxo derived from the MSFL using an apparent mud filtrate resistivity of 0.05 to 0.035 ohmm.

The SXO calculation should be treated with some caution due to uncertainty in the depth of filtrate invasion and resistivity of the filtrate/formation water in the invaded zone.

Water saturation was set to 1 and porosity set to 0 in coals and carbonaceous shales.

Nuclear Magnetic Resonance Logging

Numar's MRIL was run in several modes over the interval 2460m to 2695m. Attached is a memorandum discussing the results and interpretation of this log. As a tool to identify sand fluid content it confirmed the gas, oil and water systems as interpreted by conventional log analysis over the Turrum interval. In addition, it also suggested the presence of a GOC at 2568m which was not clear from the other logs.

The L-360 Gas-Oil Contact at 2540m in the memorandum is based on core fluorescence before the core was shifted. After a core gamma shift of +3.4m is applied the L-360 GOC is at 2543.4m.

RESULTS

1. Gas bearing sands are interpreted in the Marlin reservoirs from 1393.7m to 1513.7m.

2. Residual gas sands are interpreted from 1518.9m to 1578m.

3. Residual oil sands are interpreted from 1582.6m to 1586.1m.

4. Water bearing sands are interpreted from 1592.6m to 2054.9m.

5. Thin interbedded gas and water sands are interpreted from 2060.5m to 2172.6m.

6. Turrum gas and oil sands are interpreted from 2198.7m to 2623m with a water sand at 2438m.

7. Water sands are interpreted from 2627.8m to 2679m.

8. Thin gas bearing sands are interpreted from 2710m to 2735.3m.

Attached are the following presentations of results:

Summary Table
Log Analysis Listing
Core Analysis Plots
Mineralog Tables
Mineralog Plots
Log Analysis Depth Plot
LASER Modelling Results
SNUPAR Modelling Results
MRIL Magnetic Resonance Image Log Results

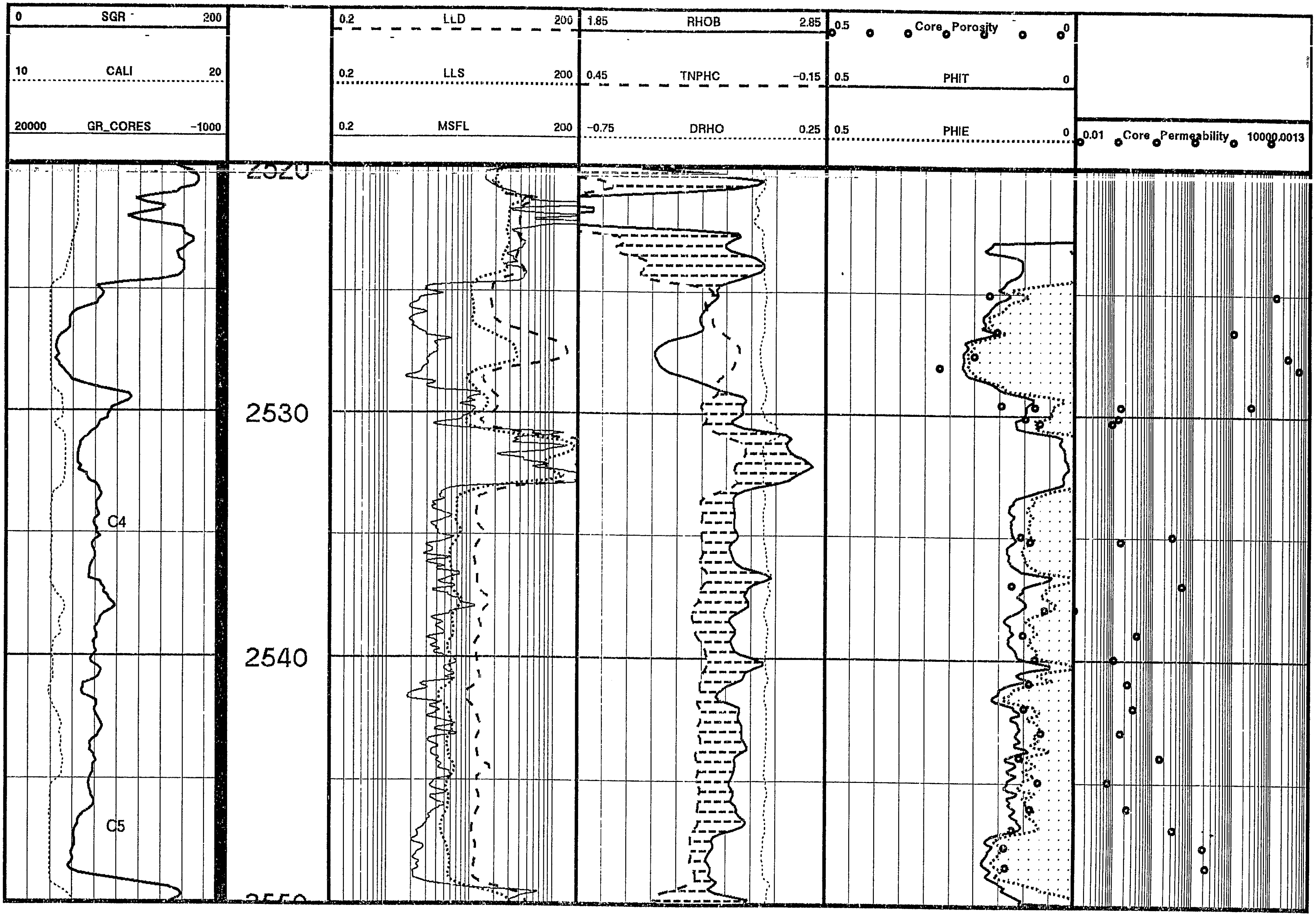
TURRUM 5 SUMMARY OF RESULTS

Net porosity Cut-off: 10%

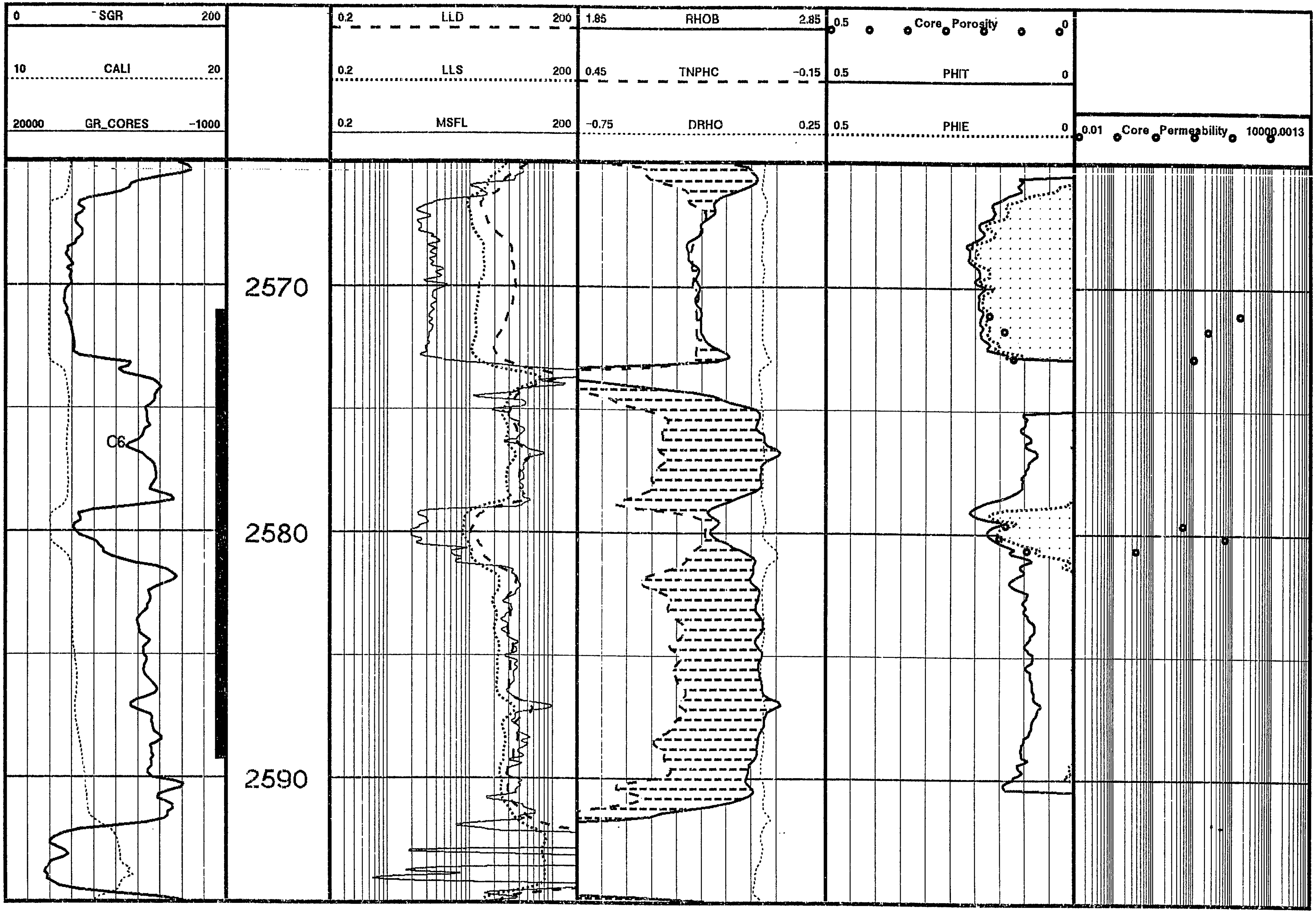
Depth (mMDRT) (top)	(base)	Gross (m)	Net (m)	N/G (%)	Mean Vwclay	Mean Porosity	(Std.) (Dev.)	Mean Sw	Comments
1393.7	1401.2	7.5	5.6	75	0.180	0.220	0.030	0.410	Gas
1405.4	1452.0	46.6	45.8	98	0.150	0.250	0.038	0.060	Gas
1456.4	1463.9	7.5	0.6	8	0.040	0.130	0.016	0.040	Gas
1473.3	1474.8	1.5	1.0	66	0.400	0.160	0.022	0.370	Gas
1479.3	1480.1	0.8	0.6	78	0.210	0.230	0.034	0.310	Gas
1483.6	1492.3	8.7	8.6	99	0.080	0.290	0.029	0.060	Gas
1493.2	1513.7	20.5	17.4	85	0.310	0.210	0.045	0.160	Gas
Current Marlin Gas-Water Contact at 1518.5m MDRT									
1518.9	1534.0	15.1	15.0	99	0.100	0.280	0.026	0.760	Resid. Gas
1534.1	1537.6	3.5	3.4	97	0.070	0.290	0.019	1.000	Resid. Gas
1545.7	1547.2	1.5	1.1	77	0.470	0.150	0.026	1.000	Resid. Gas
1550.0	1551.8	1.7	1.6	92	0.260	0.240	0.040	0.560	Resid. Gas
1554.6	1555.6	1.0	0.8	80	0.390	0.200	0.040	0.780	Resid. Gas
1560.0	1563.2	3.2	2.9	90	0.080	0.260	0.044	0.710	Resid. Gas
1576.7	1578.0	1.4	1.0	74	0.350	0.170	0.025	1.000	Resid. Gas
Original Marlin Gas - Oil Contact at 1581m MDRT (-1556m SS)									
1582.6	1583.3	0.7	0.5	67	0.460	0.160	0.026	0.980	Resid. Oil
1585.3	1586.1	0.8	0.6	74	0.520	0.140	0.027	0.890	Resid. Oil
Original Marlin Oil - Water Contact at 1589m MDRT (-1564m SS)									
1592.6	1593.3	0.7	0.5	76	0.400	0.150	0.021	1.000	Water
1595.6	1597.4	1.8	1.6	89	0.240	0.230	0.040	1.000	Water
1602.0	1604.5	2.5	1.8	73	0.400	0.140	0.023	1.000	Water
1605.8	1608.7	2.9	1.5	52	0.470	0.120	0.015	1.000	Water
1612.9	1614.9	2.0	1.3	68	0.450	0.140	0.012	1.000	Water
1617.7	1619.3	1.6	1.4	90	0.430	0.160	0.028	1.000	Water
1620.7	1621.8	1.1	1.0	92	0.330	0.170	0.029	1.000	Water
1630.1	1644.8	14.8	14.8	100	0.180	0.230	0.052	1.000	Water
1657.5	1658.5	1.0	0.9	87	0.400	0.150	0.017	1.000	Water
1672.5	1674.6	2.0	1.9	91	0.370	0.160	0.021	1.000	Water
1678.6	1679.8	1.2	1.0	89	0.360	0.160	0.028	1.000	Water
1688.2	1689.0	0.9	0.8	92	0.460	0.130	0.010	1.000	Water
1693.1	1703.4	10.3	9.5	92	0.190	0.210	0.058	1.000	Water
1716.8	1717.5	0.7	0.6	90	0.360	0.180	0.025	1.000	Water
1719.9	1722.4	2.6	2.3	92	0.400	0.150	0.027	1.000	Water
1732.2	1734.3	2.0	1.7	82	0.340	0.130	0.020	1.000	Water
1747.5	1751.6	4.0	2.6	65	0.420	0.130	0.014	1.000	Water
1753.8	1760.4	6.6	6.2	93	0.300	0.170	0.043	1.000	Water
1779.1	1782.6	3.6	3.4	96	0.190	0.210	0.029	1.000	Water
1786.5	1789.1	2.6	2.2	84	0.380	0.150	0.023	1.000	Water
1791.8	1793.0	1.3	1.0	82	0.380	0.140	0.025	1.000	Water
1796.5	1800.9	4.4	3.6	83	0.370	0.140	0.025	1.000	Water
1813.1	1817.2	4.1	3.7	89	0.300	0.160	0.024	1.000	Water
1821.1	1823.2	2.1	1.6	76	0.350	0.150	0.031	0.900	Water
1824.7	1827.0	2.4	2.2	93	0.350	0.140	0.019	1.000	Water
1835.1	1839.4	4.3	4.1	95	0.290	0.180	0.017	1.000	Water
1848.0	1849.4	1.5	0.9	62	0.440	0.120	0.011	0.890	Water
1851.1	1853.2	2.2	1.9	85	0.350	0.150	0.025	1.000	Water
1860.3	1861.3	1.0	0.8	83	0.330	0.120	0.013	1.000	Water
1870.6	1871.7	1.1	0.8	73	0.410	0.120	0.008	1.000	Water
1881.4	1883.0	1.6	1.4	87	0.290	0.160	0.028	1.000	Water
1888.1	1890.1	2.1	0.7	35	0.410	0.120	0.009	1.000	Water
1930.7	1932.2	1.4	1.0	74	0.290	0.160	0.023	1.000	Water
1960.0	1961.0	1.0	0.8	81	0.310	0.140	0.021	0.940	Water
1968.8	1971.8	2.9	1.6	56	0.380	0.120	0.017	1.000	Water
1977.1	1978.0	0.9	0.6	69	0.350	0.120	0.010	1.000	Water
1979.8	1984.2	4.4	3.1	71	0.300	0.150	0.022	1.000	Water
1994.0	2000.3	6.3	6.2	97	0.230	0.180	0.024	1.000	Water
2003.8	2006.3	2.5	1.7	67	0.320	0.130	0.019	1.000	Water
2013.3	2014.9	1.7	1.4	83	0.290	0.140	0.017	1.000	Water
2040.3	2044.5	4.2	2.0	49	0.340	0.130	0.024	1.000	Water

Depth (mMDRT) (top)	(base)	Gross (m)	Net (m)	N/G (%)	Mean Vwclay	Mean Porosity	(Std.) (Dev.)	Mean Sw	Comments
2048.4	2054.9	6.5	2.2	33	0.390	0.110	0.007	1.000	Water
2060.5	2063.0	2.4	1.9	79	0.280	0.150	0.025	0.880	Water w/gas ?
2079.1	2082.3	3.2	2.3	73	0.340	0.140	0.031	0.840	Water w/gas ?
2088.6	2090.2	1.6	1.3	79	0.290	0.140	0.026	0.780	Water w/gas ?
2096.1	2100.1	4.0	3.5	86	0.290	0.130	0.015	1.000	Water
2102.3	2104.2	1.9	1.4	70	0.160	0.170	0.030	0.630	Water w/gas
2105.1	2107.0	1.9	1.2	64	0.340	0.140	0.030	0.760	Water w/gas
2110.2	2112.6	2.4	1.8	78	0.270	0.140	0.039	0.700	Water w/gas
2113.7	2115.6	1.9	1.7	91	0.220	0.160	0.021	0.780	Water w/gas
2116.2	2116.9	0.7	0.3	46	0.350	0.120	0.007	0.900	Water w/gas ?
2125.7	2128.7	3.0	2.5	84	0.300	0.140	0.028	1.000	Water
2134.4	2137.1	2.6	2.2	84	0.300	0.130	0.015	0.800	Water
2145.8	2147.0	1.1	0.9	77	0.400	0.110	0.006	0.950	Water
2152.4	2153.5	1.1	0.6	58	0.320	0.130	0.015	0.770	Water w/gas
2157.2	2157.8	0.6	0.3	52	0.460	0.120	0.012	0.670	Water w/gas
2162.4	2163.7	1.3	1.0	73	0.340	0.120	0.006	0.670	Water w/gas
2166.6	2168.0	1.4	0.4	27	0.350	0.110	0.003	1.000	Water
2171.5	2172.6	1.1	0.8	75	0.220	0.150	0.030	0.940	Water
L110									
2198.7	2209.4	10.8	6.6	61	0.170	0.170	0.038	0.190	Gas
2221.4	2224.0	2.6	0.3	12	0.240	0.100	0.002	0.680	Gas
2230.8	2232.2	1.4	0.9	65	0.180	0.180	0.044	0.370	Gas
2246.3	2249.2	2.9	1.5	53	0.300	0.140	0.026	0.380	Gas
2256.3	2259.6	3.3	1.8	55	0.270	0.150	0.031	0.400	Gas
2261.2	2262.4	1.2	0.2	20	0.340	0.100	0.002	0.680	Gas
2290.5	2294.8	4.3	3.4	80	0.270	0.120	0.017	0.320	Gas
2331.2	2335.9	4.6	0.8	17	0.200	0.130	0.016	0.390	Gas
2339.9	2345.3	5.4	0.0	0					Gas, < 10% porosity
2356.4	2363.9	7.5	4.4	59	0.160	0.160	0.030	0.300	Gas
L200									
2370.8	2381.2	10.4	3.7	35	0.310	0.120	0.017	0.240	Gas
2385.7	2393.1	7.5	7.0	94	0.130	0.170	0.035	0.200	Gas
2405.0	2407.5	2.4	2.2	89	0.120	0.160	0.035	0.300	Gas
2409.6	2419.3	9.6	7.8	81	0.180	0.130	0.021	0.380	Gas
2435.8	2437.4	1.6	0.3	17	0.310	0.100	0.002	0.610	Gas ?
2437.6	2439.5	1.9	1.3	71	0.210	0.120	0.007	0.890	Water
2473.9	2475.4	1.5	0.3	17	0.280	0.100	0.001	0.640	Gas ?
L360									
2524.6	2529.2	4.6	4.2	92	0.110	0.170	0.034	0.180	Gas
2533.1	2543.4	10.3	1.2	12	0.190	0.120	0.014	0.380	Gas
			Gas - Oil Contact at 2543.4m**						
2543.4	2549.5	6.0	3.0	50	0.170	0.140	0.021	0.320	Oil*
L400									
2566.0	2568.0	2.0	1.8	88	0.160	0.150	0.021	0.250	Oil**
			Gas - Oil Contact at 2568m						
2568.1	2572.8	4.7	4.7	100	0.090	0.180	0.020	0.170	Oil*
2579.0	2581.0	2.0	1.5	72	0.210	0.140	0.018	0.310	Gas ?
L500									
2598.9	2602.0	3.1	2.1	67	0.050	0.150	0.029	0.300	Gas*
			Gas - Oil Contact at 2602m						
2602.1	2609.6	7.5	7.2	97	0.040	0.150	0.014	0.210	Oil
2610.6	2623.0	12.4	8.7	71	0.060	0.130	0.016	0.390	Oil
2627.8	2641.6	13.7	6.6	48	0.080	0.120	0.008	1.000	Water
2649.6	2675.1	25.5	14.7	58	0.110	0.130	0.014	1.000	Water
2676.5	2679.0	2.5	1.4	55	0.100	0.120	0.012	0.870	Water
2710.0	2711.7	1.7	0.8	47	0.210	0.120	0.013	0.670	Gas ?
2721.9	2723.8	2.0	0.0	0					Gas, < 10% porosity
2726.4	2727.9	1.4	0.4	27	0.260	0.110	0.003	0.350	Gas
2729.2	2730.4	1.2	0.5	43	0.210	0.120	0.007	0.310	Gas
2734.2	2735.3	1.1	0.4	39	0.230	0.110	0.007	0.370	Gas

*Confirmed by MDT sample
**Based on core fluorescence



CORE ANALYSIS VS LOG ANALYSIS



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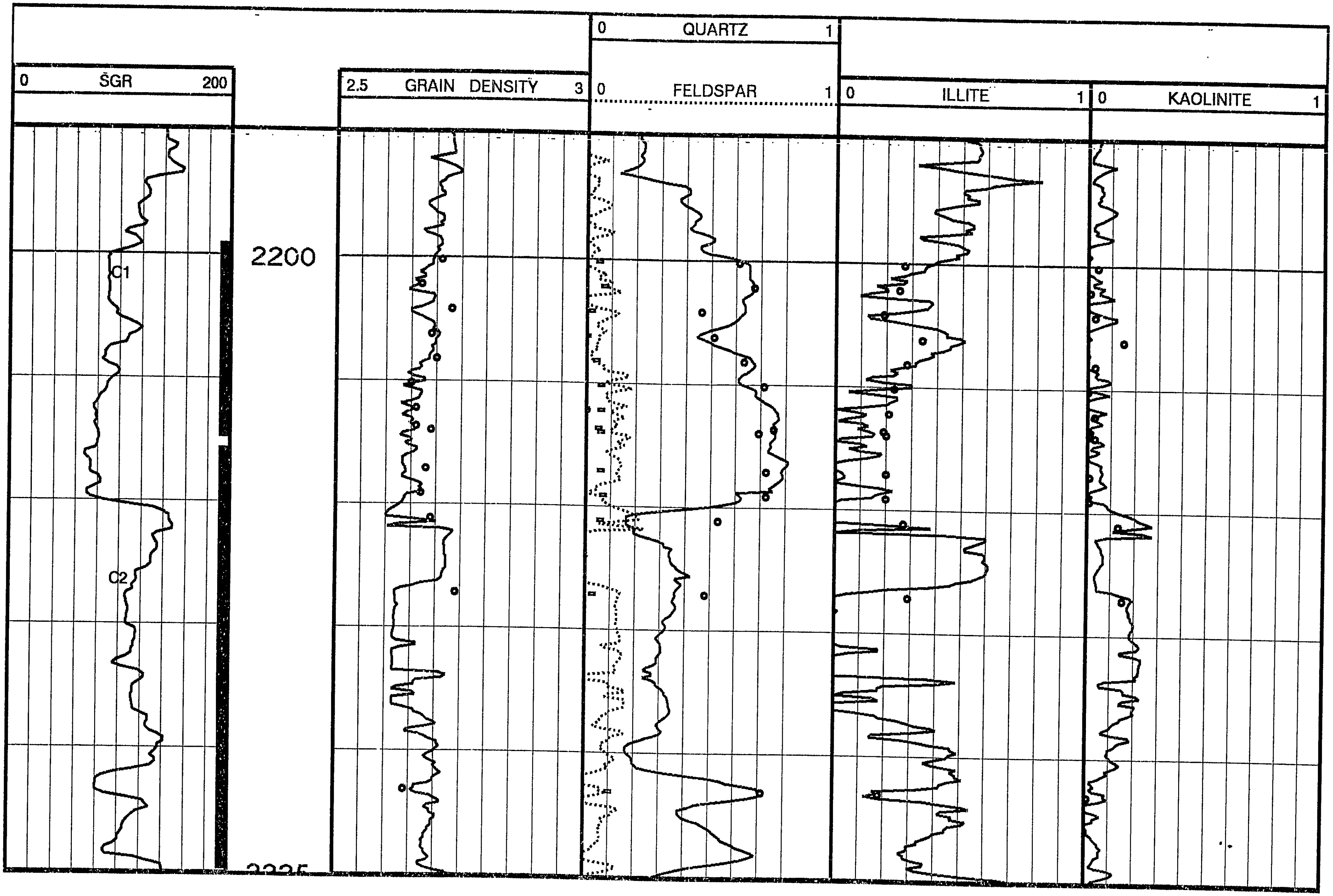
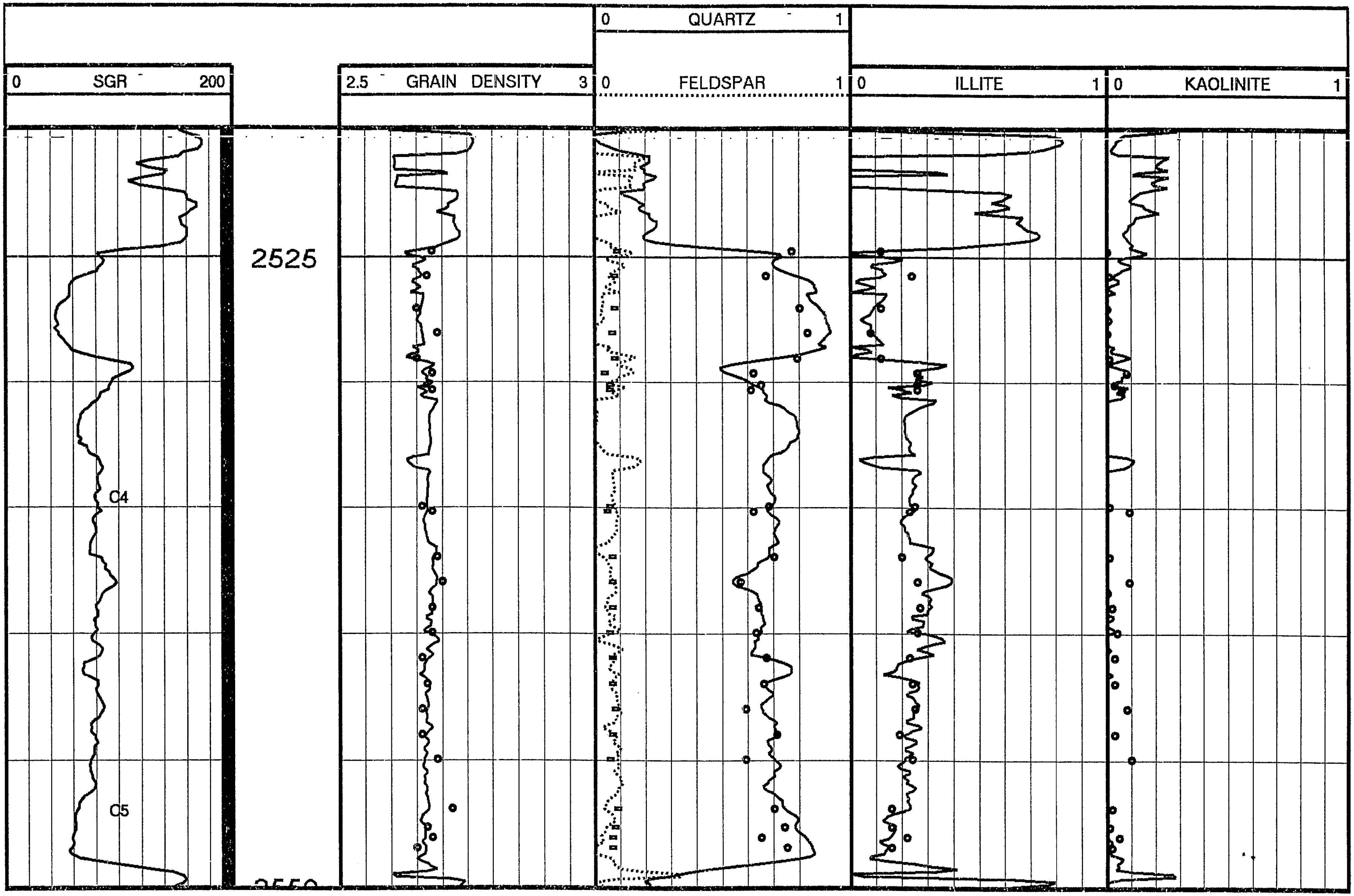
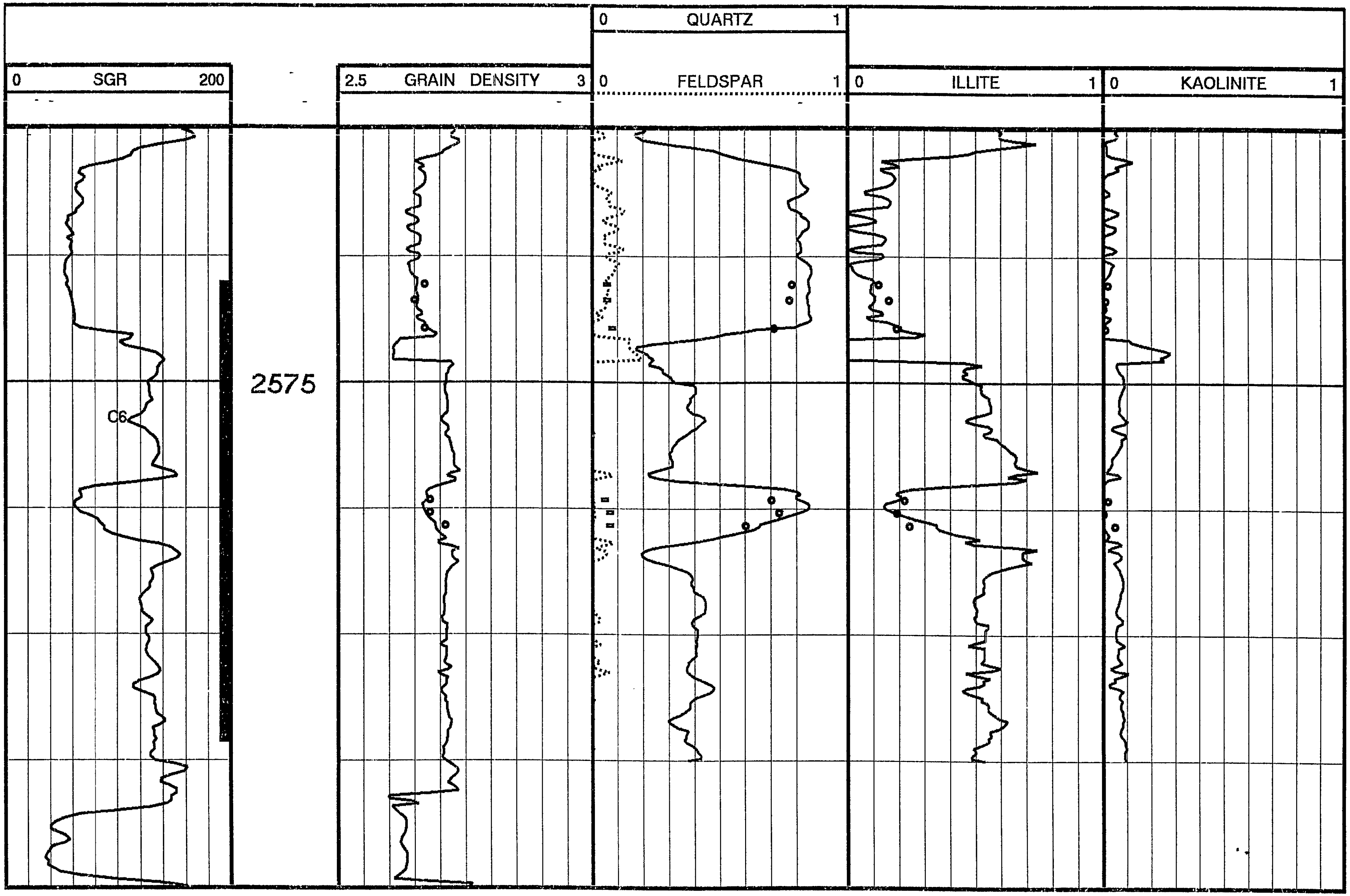


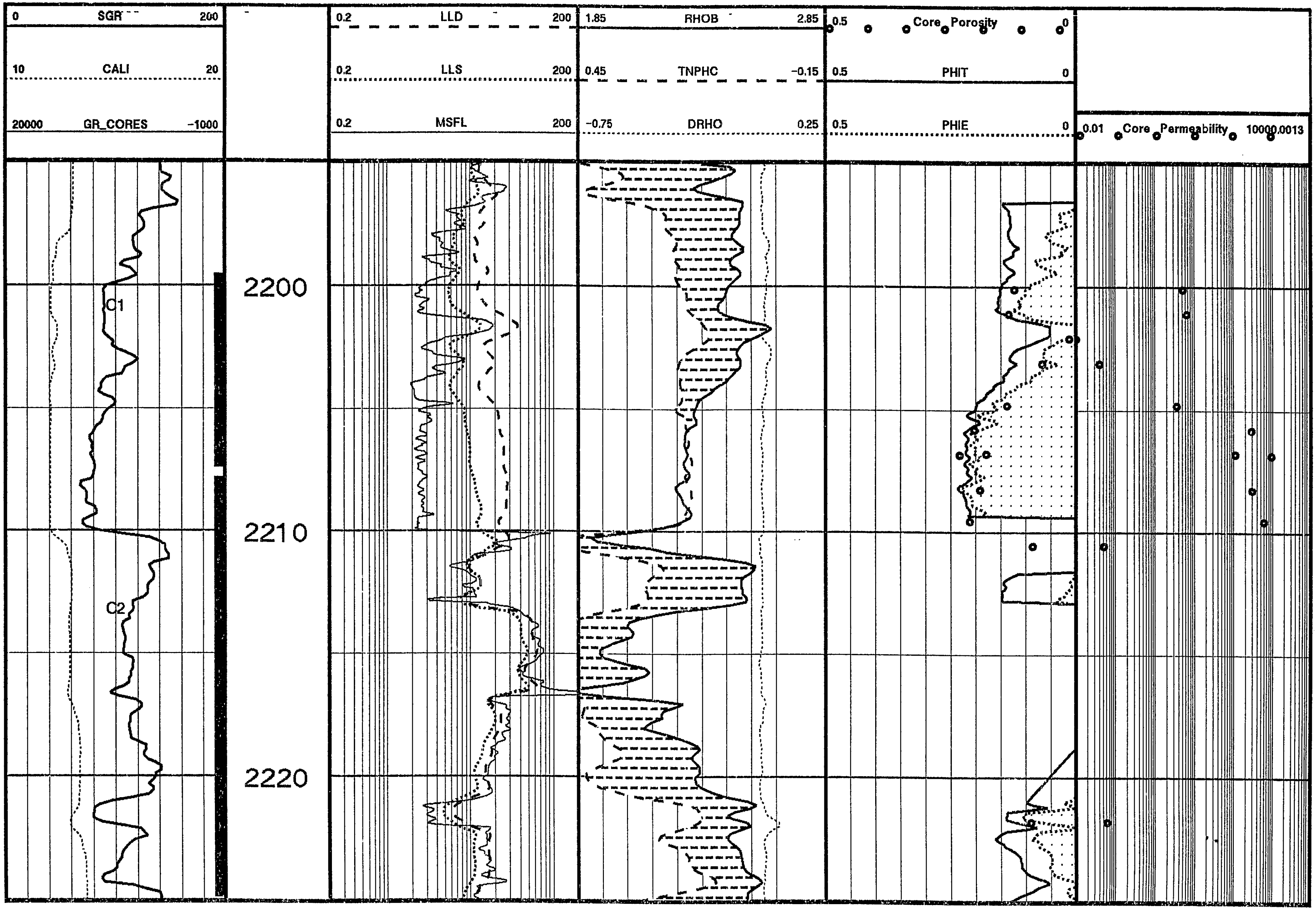
MINERALOG VS LASER RESULTS



MINERALOG VS LASER RESULTS



MINERALOG VS LASER RESULTS



CORE ANALYSIS VS LOG ANALYSIS

CORE LABORATORIES
MINERALOG ANALYSIS
VOLUME %*

COMPANY: ESSO AUSTRALIA LTD.
WELL NAME: TURRUM #5
WELL LOCATION: AUSTRALIA
SAMPLE TYPE: PLUG TRIM ENDS

FILE NO.: PRP-95048
DATE: 1-Nov-95
ANALYSTS: M.KAROLIA
J.LOWRY

DEPTH (M)	GRAIN DENSITY INDEX	QUARTZ	PLAGIOCLASE	K-FELDSPAR	SIDERITE	DOLOMITE	PYRITE	TOTAL CLAY	KAOLINITE	CHLORITE	ILL+SMEC
CORE 1											
2197.78	2.71	61	0	5	2	1	0	31	4	0	27
2198.78	2.67	67	0	7	0	0	0	26	0	0	26
2199.78	2.73	46	0	2	0	30	0	22	3	0	19
2200.78	2.69	51	0	0	0	0	0	49	15	0	34
2201.78	2.70	63	0	4	2	0	0	31	3	0	28
2202.78	2.65	71	0	6	0	0	0	23	0	0	23
2203.78	2.66	70	0	6	0	0	0	24	3	0	21
2204.52	2.66	75	0	5	0	0	0	20	0	0	20
2204.68	2.68	67	0	5	1	0	0	27	3	0	24
2206.25	2.68	72	0	6	1	0	0	21	0	0	21
CORE 2								0			
2207.25	2.67	72	0	7	0	0	0	21	0	0	21
2208.25	2.69	53	0	6	1	0	0	40	13	0	27
2211.25	2.74	48	0	3	4	1	0	44	15	0	29
2219.25	2.64	71	0	10	0	0	0	19	0	0	19
CORE 3								0			
2521.25	2.68	77	0	9	0	0	2	12	0	0	12
2522.25	2.67	67	0	8	0	0	0	25	0	0	25
2523.55	2.65	80	0	8	0	0	0	12	0	0	12
2524.55	2.69	83	0	7	0	0	2	8	0	0	8
2525.55	2.65	79	0	8	0	0	0	13	0	0	13
2526.15	2.68	62	0	4	0	0	0	34	8	0	26
2526.70	2.67	65	0	6	0	0	0	29	3	0	26

* Values calculated using mineral densities supplied by ESSO Australia Ltd.

MINERALOG RESULTS

CORE LABORATORIES
MINERALOG ANALYSIS
VOLUME %*

COMPANY: ESSO AUSTRALIA LTD.
WELL NAME: TURRUM #5
WELL LOCATION: AUSTRALIA
SAMPLE TYPE: PLUG TRIM-ENDS

FILE NO.: PRP-95048
DATE: 1-Nov-95
ANALYSTS: M.KAROLIA
J.LOWRY

DEPTH (M)	GRAIN DENSITY INDEX	QUARTZ	PLAGIOCLASE	K-FELDSPAR	SIDERITE	DOLOMITE	PYRITE	TOTAL CLAY	KAOLINITE	CHLORITE	ILL+SMEC
CORE 4											
2526.90	2.68	61	0	6	0	0	1	32	6	0	26
2531.55	2.66	68	0	6	0	0	0	26	1	0	25
2531.75	2.68	62	0	5	0	0	1	32	9	0	23
2533.55	2.68	69	0	9	2	0	0	20	0	0	20
2534.55	2.70	57	0	7	0	0	1	35	9	0	26
2535.55	2.68	64	0	7	0	0	0	29	0	0	29
2536.55	2.68	63	0	6	0	0	1	30	4	0	26
2537.55	2.66	67	0	7	0	0	0	26	3	0	23
2538.55	2.66	67	0	7	0	0	0	26	3	0	23
2539.55	2.66	59	0	8	0	0	0	33	8	0	25
2540.55	2.66	71	0	7	0	0	0	22	0	0	22
2541.55	2.69	59	0	6	0	0	1	34	10	0	24
2544.65	2.68	65	0	7	0	0	1	27	5	0	22
CORE 5								0			
2544.90	2.72	70	0	9	0	0	3	18	0	0	18
2545.65	2.67	74	0	8	0	0	1	17	0	0	17
2546.45	2.65	75	0	7	0	0	0	18	0	0	18
CORE 6								0			
2568.10	2.67	78	0	6	2	0	0	14	0	0	14
2568.75	2.65	77	0	6	0	0	0	17	0	0	17
2569.85	2.67	71	0	8	0	0	1	20	0	0	20
2576.65	2.68	70	0	5	1	0	0	24	2	0	22
2577.15	2.68	73	0	7	1	0	0	19	0	0	19
2577.65	2.71	60	0	7	4	0	0	29	5	0	24

* Values calculated using mineral densities supplied by ESSO Australia Ltd.

MINERALOG RESULTS

Petrophysical Response of Common Minerals
LASER Modelling Parameters
Marlin and Turrum Reservoirs

by

Wm Scott Dodge Snr

Mineral Classification	Mineral Name	Chemical Elements	RHOB Litho Density (gm/cm3)	PEF Photoelectric Factor (barns/electron)	U Volumetric Photoelectric Factor (barns/cm3)	TNPH Thermal Neutron Porosity (p.u.)	DT Compressional Transit Time (us/metre)	POTA Potassium (wt %)	THOR Thorium (ppm)
Silica	Quartz	SiO2	2.64	1.81	4.79	-2.1	165.3	0.00	0.5 -> 6.0
Feldspars	Orthoclase	KAlSi3O8	2.54	2.86	7.29	-0.1	175.5	10.50	0.0
Clays	Kaolinite	Al4(Si4O10)(OH)8	2.62	1.70	4.46	32.8	694.6	0.49	7 -> 47
	Illite	K.8(Al1.6Fe.2Mg.2)(Si3.4Al.6)O10(OH)2	2.77	3.03	8.37	13.3		4.91	8 -> 25
Fluids	Water (35 kppm)	H2O(0.965) NaCl(0.035)	1.02	0.61	0.54	100.0	620.0	0.00	0.0
	Gas-Marlin	CH3.383 O0.031 N0.008	0.13	0.61	0.18	7.3	620.0	0.00	0.0
	Gas-Turrum	CH3.043 O0.169 N0.003	0.25	0.61	0.25	17.7	620.0	0.00	0.0

Notes:

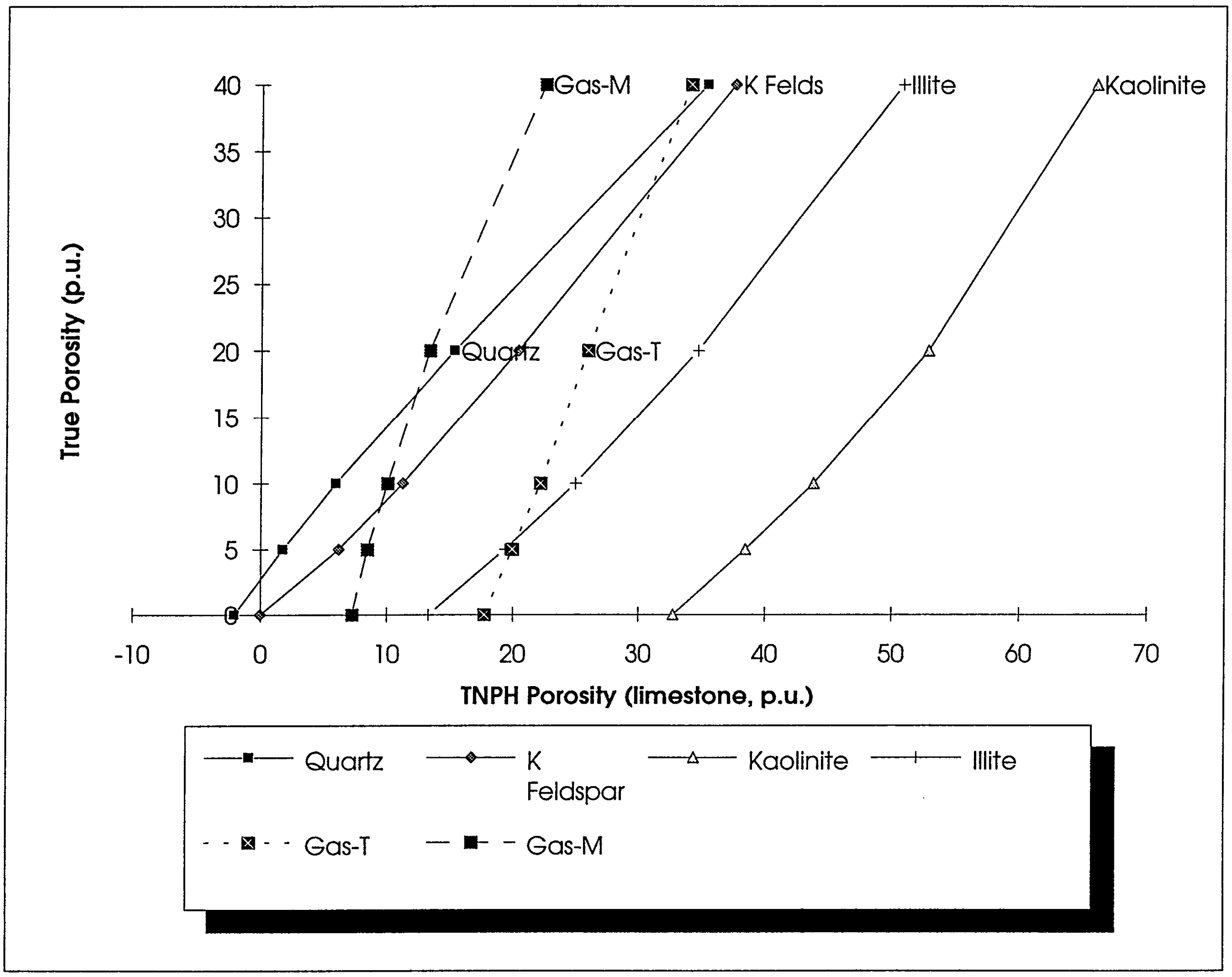
Reference: Schlumberger 1990 Element Mineral Rock Catalog
Reservoir sands primary constituent is quartz with secondary potassium feldspar grains.
Muscovite and Biotite are present and commonly decompose to form authigenic clays (i.e. chlorite).
Micro porous clays assosciated with micas are Chlorite, Illite, Illite-Smectite, Glauconite-Smectite mixtures.
Biotite is usually associated with Pyrite from the decomposition of this mica mineral with kaolinite and illite.
Detrital heavy minerals of Zircon and Tourmaline are visible in clean reservoir sands.
Feldspar dissolution develops micro/secondary porosity. Kaolin is formed during dissolution.
Granitic trace minerals causing saturated GR responses: Zircon, Sphene
Radioactive Isotopes: Potassium 40, Thorium 232, Uranium 238

LASER 4 mineral model + gas	
Structural Grains	
	Quartz
	Potassium Feldspar
Structural & Authigenic Clays	
	Kaolinite
	Mixed layer Illite-Smectite
Others	Gas

Version 1: 16/11/92
Version 2: 18/04/94
Version 3: 22/12/94
Version 4: 14/07/95 (EXCEL)

Turrum 5 Thermal Neutron "TNPH" Mineral Response

SNUPAR MODELING RESULTS of TNPH



Molecular Composition Modeled by SNUPAR

Quartz: Si O2
K Feldspar: K Al Si3 O8
Kaolinite: Al4 (Si4 O10) (OH)8
Illite: K0.8 (Al1.6 Fe0.2 Mg0.2) (Si3.4 Al0.6) O10 (OH)2
Marlin Gas: C1.0 H3.383 O0.031 N0.008
Turrum Gas: C1.0 H3.043 O0.169 N0.003

True Porosity	Quartz	K Feldspar	Kaolinite	Illite	Gas-M	Gas-T
0	-2.074	-0.046	32.75	13.34	7.253	17.74
5	1.75	6.18	38.49	19.4	8.474	19.95
10	5.93	11.26	43.88	24.97	10.048	22.16
20	15.32	20.39	52.89	34.65	13.374	25.95
40	35.39	37.62	66.07	50.85	22.545	34.06

1/11/95 h:\swindows\log\tech_inf\snupar\T5_LJF.XLS

SNUPAR MODELLNG RESULTS

MEMORANDUM

TO: Brodie Thomson
Bob Griffith

DATE: 27 November, 1995

FROM: Andy Mills

CC: Wayne Mudge
Adem Djakic
Kumar Kuttan (EEC)
Marianne Weaver (EPR)
Dale Fitz (EPMI)
Hans Thomann (ER&E)

SUBJECT: Turrum 5 MRIL Magnetic Resonance Image Log Results

Logging of the NUMAR MRIL Magnetic Resonance Image Log on Turrum 5 in the L-360, L-400 and L-500 reservoirs has been summarised in the attached report. This report focuses on using the MRIL for detection of hydrocarbon fluid type in these reservoirs which contain multiple gas-oil contacts.

In brief the tool successfully measured the presence of oil in the L-360, L-400 and L-500 reservoir sands. Of particular mention is the tools ability to identify oil in the basal portion of the L-360 reservoir which was not definitive from conventional wireline logs. The only conventional means to validate oil in this sand was by recovering a 1 gallon MDT oil sample at the cost of 2 days rig time. Table 1 shows the gas-oil contacts and what technology was used to determine these contacts in Turrum 5.

Table 1 Turrum 5 Gas-Oil Contacts

Reservoir	Depth (metres MDKB)	Technology
L-360	2540.0	MDT pressures & Core
L-400	2568.0	MRIL T2
L-500	2602.5	MRIL T2, TNPH porosity

Upon completion of NMR core measurements in the L-360 and L-400 reservoirs a subsequent report will detail additional data on reservoir permeability, porosity and irreducible pore fluids. The attached report will be sent to EPRCo for publication in the Exxon Formation Evaluation Newsletter as a means of technology transfer to Exxon affiliates. If you have any further questions, please feel free to contact Scott Dodge or myself.

Title: **Identification of Hydrocarbon Pore Fluids with the MRIL at Turrum**

Authors: **Scott Dodge, Lachlan Finlayson, John Phillips, Peter Glenton**

Affiliate: **Esso Australia Ltd**

Location: **Melbourne, Victoria, Australia**

PROBLEM

The Turrum 5 well was drilled as an appraisal in the undeveloped Turrum gas field. The well was designed to increase proven gas reserves in the western flank of the field. On a going in basis, the NUMAR Magnetic Resonance Image Log, MRIL, was planned to be run in Turrum 5 gas reservoirs to assess the petrophysical properties; permeability, effective porosity and irreducible fluid filled porosity. However, the well encountered both gas and oil reservoirs in a complex hydrodynamic system with multiple gas-oil contacts. Therefore a high priority was placed on obtaining fluid identification with the MRIL in both good and poor quality sandstone reservoirs.

DISCUSSION

Turrum reservoirs are set in a fluvial depositional system characterised by good quality estuarine and braided stream sandstones, commonly bounded by thick coal beds in the coastal plain. Many of the reservoirs exhibit fining upward sequences which result in a gradation from good quality sandstone to low quality silty sands and shales. The MRIL was used to improve characterisation of porosity and permeability in poorer quality hydrocarbon bearing sands. Additionally, the carefully designed MRIL logging programme was successful in measuring the hydrocarbon filled pore volume in these low quality reservoirs which are difficult to assess with conventional logging suites. Following is a description of the oil bearing hydrocarbon reservoirs in Turrum 5 based on information from conventional core and logs:

Turrum 5 petrophysical log measurements in Figure 1 show three hydrocarbon bearing reservoirs. The L-360 reservoir from 2525 to 2550 metres contains a high porosity gas sand and an underlying poor quality oil sand. Core fluorescence, MDT pressures and samples were used to confirm the presence of oil and identify a gas-oil contact at 2540 metres. An MDT sample, which took 11 hours to recover, was required to prove oil in this sand at 2548.6 metres which has a low core air permeability of 21 md.

In the underlying L-400 reservoir from 2566 to 2573 metres, oil was identified from core fluorescence as well as MDT pressure gradients and a fluid sample. From these data alone, it was believed that this reservoir was in the same hydrodynamic fluid system as the overlying L-360 reservoir. However the MRIL identified a gas-oil contact, which has significant implications on oil volumes in this reservoir.

The L-500 reservoir from 2599 to 2623 metres contains oil with an associated gas cap. The gas cap was identified by crossover of the bulk density and neutron porosity in a clean sand at the top of the L-500 at 2602 metres. Lower formation resistivity suggests that the lower portion of the reservoir from 2610 to 2623 metres is in a transition zone. This would indicate that the oil-water contact is near the base of the sand and if perforated the oil sand would produce oil and mobile formation water. The basal L-520 reservoir from 2628 to 2642 metres is wet and is in a separate hydrodynamic fluid system from the L-500 (determined from other field wells).

Identification of Hydrocarbon Pore Fluids with the MRIL

The MRIL logging programme in Turrum 5 was designed to acquire T2 relaxation data which could be used to identify hydrocarbon fluid type. The theory and procedures are described by *Akkurt, 1995* and *Prammer, 1995* who explain that the T1 longitudinal relaxation mechanism of hydrocarbon filled pores is dominated by bulk relaxation, rather than surface relaxation, as observed for water filled rocks, Equation 1.

$$\frac{1}{T_1} = \frac{1}{T_{1B}} + \frac{1}{T_{1S}} \qquad (1)$$

where subscripts B and S refer to bulk and surface relaxation.

In the past, NMR measurements on water saturated rocks exhibit T1 longitudinal relaxation which is dominated by the surface-to-volume ratio, S/V, Equation 2. Surface relaxivity, ρ, is a constant in non-paramagnetic rocks, however it has been shown that it can vary by a factor of 4 in iron-rich sandstones (Dodge, 1995).

$$\frac{1}{T_{1S}} = \rho \times \frac{S}{V} \qquad (2)$$

The understanding of NMR response to hydrocarbon filled pores has not been well understood, but industry research is beginning to explain some of these effects. Gas is always a non-wetting phase while oil reservoirs may be either water wet, oil wet or mixed wet. When the hydrocarbon phase is present as the non-wetting phase, the T1 is always that of bulk relaxation, T1B, since the hydrocarbon molecules are not in contact with grain surfaces. The T1 relaxation for methane has been characterised in the laboratory (Gerritsma, 1971, Rajan, 1974) and is shown to increase linearly with density at constant temperature. The T1 of supercritical methane varies from 3 to 6 seconds and undergoes a relaxation mechanism termed spin-rotation. Liquid hydrocarbons and dissolved gas relax primarily by dipole-dipole relaxation where $T_1 \approx 1 / viscosity$.

The transverse relaxation time T2 in a magnetic field gradient is also affected by diffusion, in addition to bulk and surface relaxation, equation 3.

$$\frac{1}{T_2} = \frac{1}{T_{2B}} + \frac{1}{T_{2S}} + \frac{1}{T_{2D}} \qquad (3)$$

Under typical reservoir conditions, methane diffuses an order of magnitude faster than water or oil. Unrestricted diffusion, Do, of methane has been measured by *Harris, 1978* and *Oosting, 1971* and is shown to range from 70 to 150(10^{-5}) cm^2/s. Physical properties of the hydrocarbons and water for Turrum 5 are shown in Table 1.

Table 1 Properties of Turrum Reservoir Fluids

Fluid	Density (g/cc)	T1 (msec)	T2 (msec)	Do 10^{-5} (cm^2/s)
Brine	1.02	13000	13000	8.7
Oil	0.8	5100	460	5.7
Gas	0.25	4400	37	130

NUMAR "Method A" or Akkurt "Differential Spectrum Method" is a data acquisition procedure which broadcasts two Carr-Purcell-Meiboom-Gill (Carr, 1954 and Meiboom, 1958), CPMG, pulse sequences using a long and short recovery period, TR, to isolate the hydrocarbon relaxation response. Equation 4 is designed into the logging programme to permit complete T1 relaxation recovery for the water and hydrocarbon phases prior to the long TR pulse train, and complete T1 recovery of the water filled pores, T1max, in the short TR pulse train.

$$TR_{long} \rangle T1_{gas,oil} \rangle TR_{short} \rangle 3 \times T1_{max} \qquad (4)$$

The Method A or Differential Spectrum Method is the result of a bin-to-bin difference between the CPMG TR long pulse train and TR short pulse train. The difference yields a hydrocarbon signal, if present, which has a T2 relaxation of the gas or oil. The Turrum 5 Method A acquisition used a TR long of 8 seconds and TR short of 2 seconds. The TR long should achieve complete T1 recovery of the longitudinal magnetisation of the hydrocarbon and water, while the TR short is obtained by logging over a water sand to measure the maximum TR to achieve complete T1 recovery.

L-500 Reservoir Fluid Identification

The MRIL T2 variable density log, VDL, acquired from the 8 second TR long CPMG pulse train is shown in Figure 2. At each depth, the colours correspond to the amount of porosity which occupies pores with a specific T2 relaxation time and surface-to-volume ratio as described by Equation 2. Integration of the porosity over all T2 time yields the MRIL porosity, MPHI. MRIL porosity is subdivided into bulk volume irreducible pore volume, MBVI, and free fluid index (producible porosity), MFFI. This subdivision of porosity occurs by applying a T2 cut-off of 30 msec such that the amplitude below this cut-off represents the BVI water filled porosity. This signal amplitude plot represents pore size distribution of the formation when it is completely water filled as is the case of the L-520 water sand.

In the upper most L-500 oil reservoir from 2602.5 to 2610 metres, the T2 relaxation reflects the bulk relaxation of the 41° API oil filled pores occurring at a T2 time of 500 msec. This is in contrast to similar water saturated rock in the L-520 reservoir which shows a range of T2 relaxation times from 20 to 1000 msec and reflects the pore size distribution.

The oil-water transition zone from 2612 to 2623 metres shows the dominant oil signal at 500 msec as well as "producible water" signal from 30 to 100 msec. This indication of producible water supports the interpretation that the lower formation resistivities reflect a transition zone which is proximal to the oil-water contact in the reservoir.

The T2 differential spectrum "Method A" processing shown in Figure 3 reveals the dominant oil signal that was observed in the TR long CPMG pulse train. Most of the water signal is removed in the differential spectrum processing, except for a small residual signal at 500 msec. This residual water signal could have been eliminated by acquiring the TR short CPMG pulse train with a marginally longer recovery time than 2 seconds. Also a residual signal occurs between 3 and 20 msec which is likely caused by small statistical differences in the BVI region.

The GOC identified from the bulk density and neutron crossover above 2602 metres is seen by a reduction in T2 amplitude. Turrum gas has a hydrogen index of 0.38 which results in an apparent reduction of T2 amplitude by this ratio as compared to water filled porosity. The T2 bulk relaxation of the gas is 37 msec and a reduction in T2 time is also observed at this depth.

The oil-water transition zone between 2612 to 2623 metres shows the same dominant T2 oil signal as in the overlying oil column. Processing of this differential spectrum has successfully removed the water signal in the transition zone.

L-360 Reservoir Fluid Identification

The L-360 reservoir was originally expected to be gas bearing; however upon coring the reservoir, fluorescence was observed below 2540 metres. Fluid identification of gas or oil would be difficult using conventional logs in this poor quality silty sand. The MRIL T2 VDL in Figure 4 shows a strong oil signal at 2548 metres which is at the same depth where the MDT recovered a 1 gallon oil sample. Over the low permeability silty sand no oil signal is observed, but the T2 distribution reflects lower relaxation times representative of poorer rock quality and smaller pore sizes.

The L-360 gas sand from 2525 to 2528 metres does not show a strong amplitude peak at lower T2 relaxation times as expected for a gas sand. Core analysis shows a "sweet spot" only 1.5 metres thick corresponding to formation permeability of 5000 md and 27 percent porosity. A significant difference of oil versus gas detection is in the hydrogen index of the fluid. This low density gas with a hydrogen index of 0.38 will have a signal amplitude 3 times smaller than that of the oil filled porosity. Therefore the dominant oil peak observed in the oil reservoirs will not be observed in this gas sand.

The T2 differential spectrum in Figure 5 shows good removal of the water signal in the lower L-360 reservoir with only the oil signal present at 2548 metres. Although the entire reservoir is hydrocarbon bearing, no oil signal is observed in the low permeability silty sandstone from 2533 to 2547 metres. Two factors to consider for detection of hydrocarbons with the MRIL are invasion and reservoir quality. The MRIL sensitive volume is in the shape of a cylinder, approximately 1 mm thick and a length of 24 inches with the diameter dependent upon the operating frequency of the tool. In Turrum 5 a low frequency version of the MRIL C tool was used to achieve a larger diameter due to drilling the well with a 12.25 inch bit. The low frequency MRIL C tool operating at 600 kHz has a sensitive diameter of 18 inches, which places the measurement cylinder surface 3 inches into the formation from the wellbore.

Although mud filtrate invasion was estimated to be as deep as 1 metre based on the DLL resistivity profile, good oil signal was observed in both the L-500, L-400 and L-360 reservoirs. Therefore enough oil filled pore volume within the sensitive volume of the tool permitted detection of hydrocarbon. Core permeability measurements in the L-360 silty sandstone yielded low values ranging from 0.1 to 1 md. This low permeability is expected to contain oil saturations no higher than 20 percent estimated from drainage capillary pressure. This small volume of oil is reaching the detection limits of the measurement.

The L-360 gas sand shows a residual water signal resulting from incomplete T1 recovery with the 2 second TR short CPMG pulse train as explained earlier. However in the 1.5 metre "sweet spot" of the gas sand the T2 relaxation time of the differential spectrum is 100 msec. Although the computed T2 response of this gas is 37 msec, the logged T2 response is about 5 times shorter than that of oil. This difference is the basis for identifying gas from oil using T2 relaxation time.

CONCLUSION

The MRIL low frequency, 24 inch C tool was run in Turrum 5 to obtain a number of petrophysical parameters. However fluid identification became an important objective as a result of the complex hydrodynamic fluid system with multiple gas-oil contacts. The MRIL logging programme was designed to measure the relaxation time and pore volume of the hydrocarbon phases using the Method A, or Differential Spectrum Method. Very good results were achieved in measuring the T2 oil signal in three oil reservoirs, while gas-oil-contacts and gas bearing sandstones could be differentiated from oil bearing zones. Identification of the L-400 and L-500 reservoir gas-oil contacts from the MRIL plays an important role in determining hydrocarbon reserves at Turrum.

Successfully detecting oil in the poor quality sandstones of the L-360 is important when it was unclear from conventional logs that this sand contained oil. The MDT sample which recovered oil in this same sand cost Esso $350,000 in rig time associated with sampling and fishing costs. With more experience using the MRIL, real cost savings will be realised from less MDT sampling to verify fluid type.

Logging programme design is critical to successfully achieving the desired petrophysical objectives with the MRIL. Very few logging tools require such detailed pre-job planning and well site procedures as well as follow-up with NMR core measurements. However the benefits obtained from NMR logging are numerous, many of which are not available from conventional logging suites.

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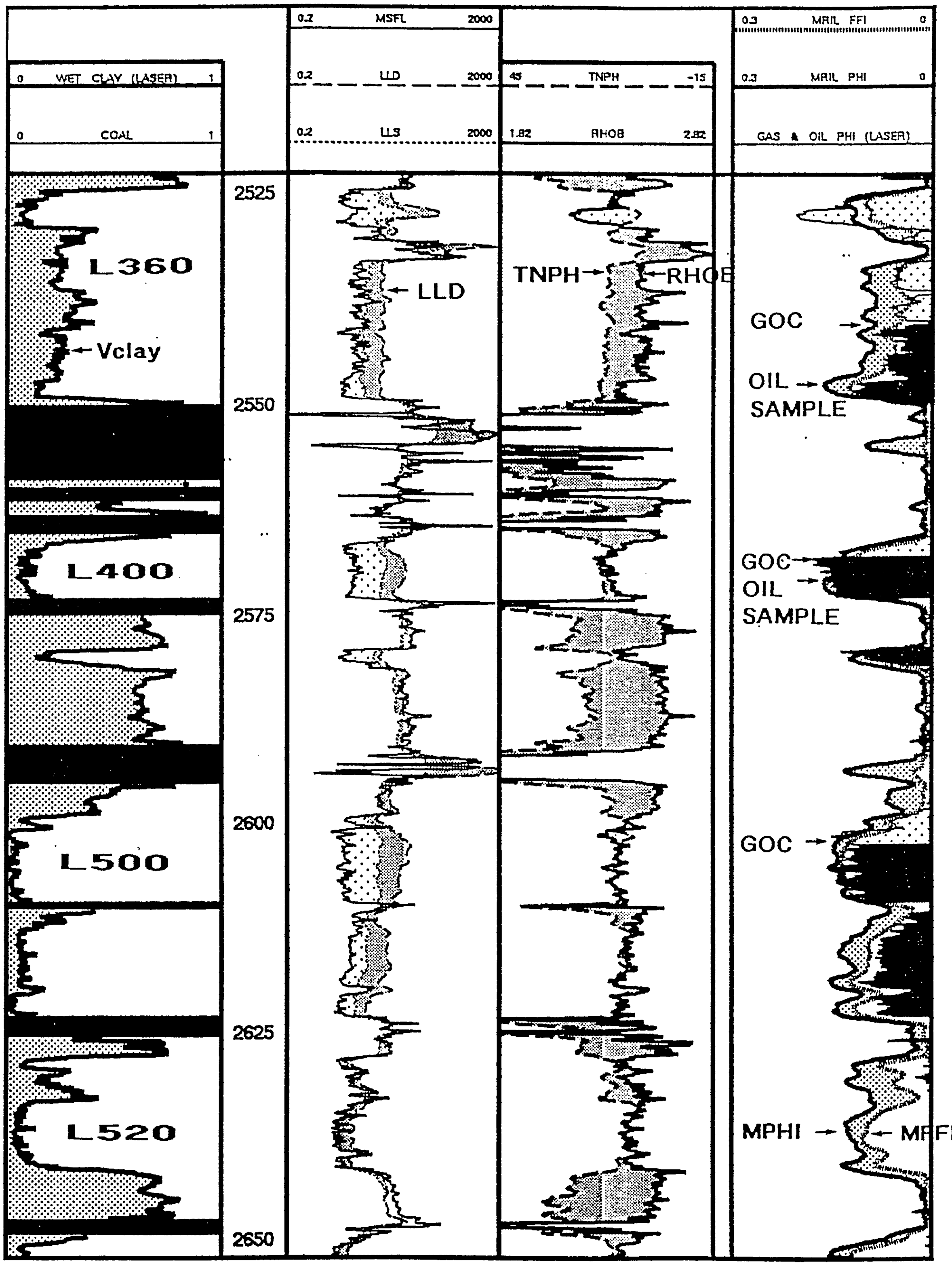

Figure 1	Turrum 5 reservoir sequence containing individual gas-oil hydrocarbon systems. L-360 Reservoir: Gas-Oil Contact -2540.0 metres (MDT pressures) L-400 Reservoir: Gas-Oil Contact -2568.0 metres (MRIL T2) L-500 Reservoir: Gas-Oil Contact -2602.5 metres (MRIL T2, TNPH porosity) L-520 Reservoir: Water bearing - 2628.0 metres to 2641.5 metres

PE906496

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The enclosure PE906496 is enclosed within the container PE900858 at this location in this document.

The enclosure PE906496 has the following characteristics:

ITEM_BARCODE =	PE906496
CONTAINER_BARCODE =	PE900858
NAME =	Log Analysis Diagram, Figure 2
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Log Analysis Diagram, (Figure 2, Appendix 2 of WCR vol.2) for Turrum-5
REMARKS =	
DATE_CREATED =	31/01/96
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	TURRUM-5
CONTRACTOR =	ESSO AUSTRALIA LTD.
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

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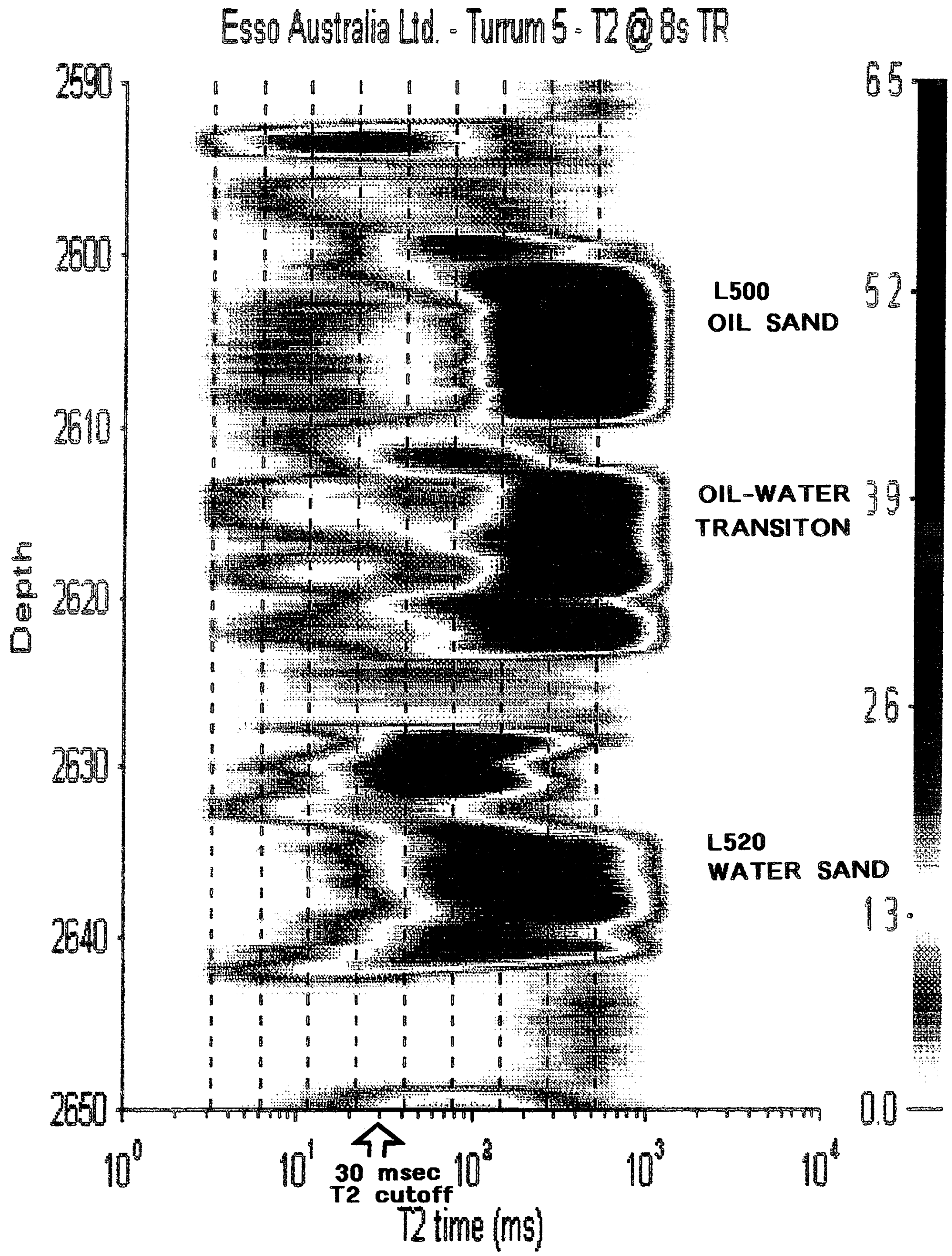

Figure 2	Turrum 5 MRIL T2 distribution shows strong oil peak at 500 msec in the L-500 reservoir above 2623 metres which overlies the L-520 water bearing reservoir. An oil-water transition zone occurs from 2612 to 2623 metres indicated by T2 amplitude less than the oil signal (< 100 msec). This is in contrast to the overlying oil reservoir from 2602.5 to 2610 metres.

PE906497

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ITEM_BARCODE =	PE906497
CONTAINER_BARCODE =	PE900858
NAME =	Log Analysis Diagram, Figure 3
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
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REMARKS =	
DATE_CREATED =	31/01/96
DATE_RECEIVED =	29/11/96
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CONTRACTOR =	ESSO AUSTRALIA LTD.
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

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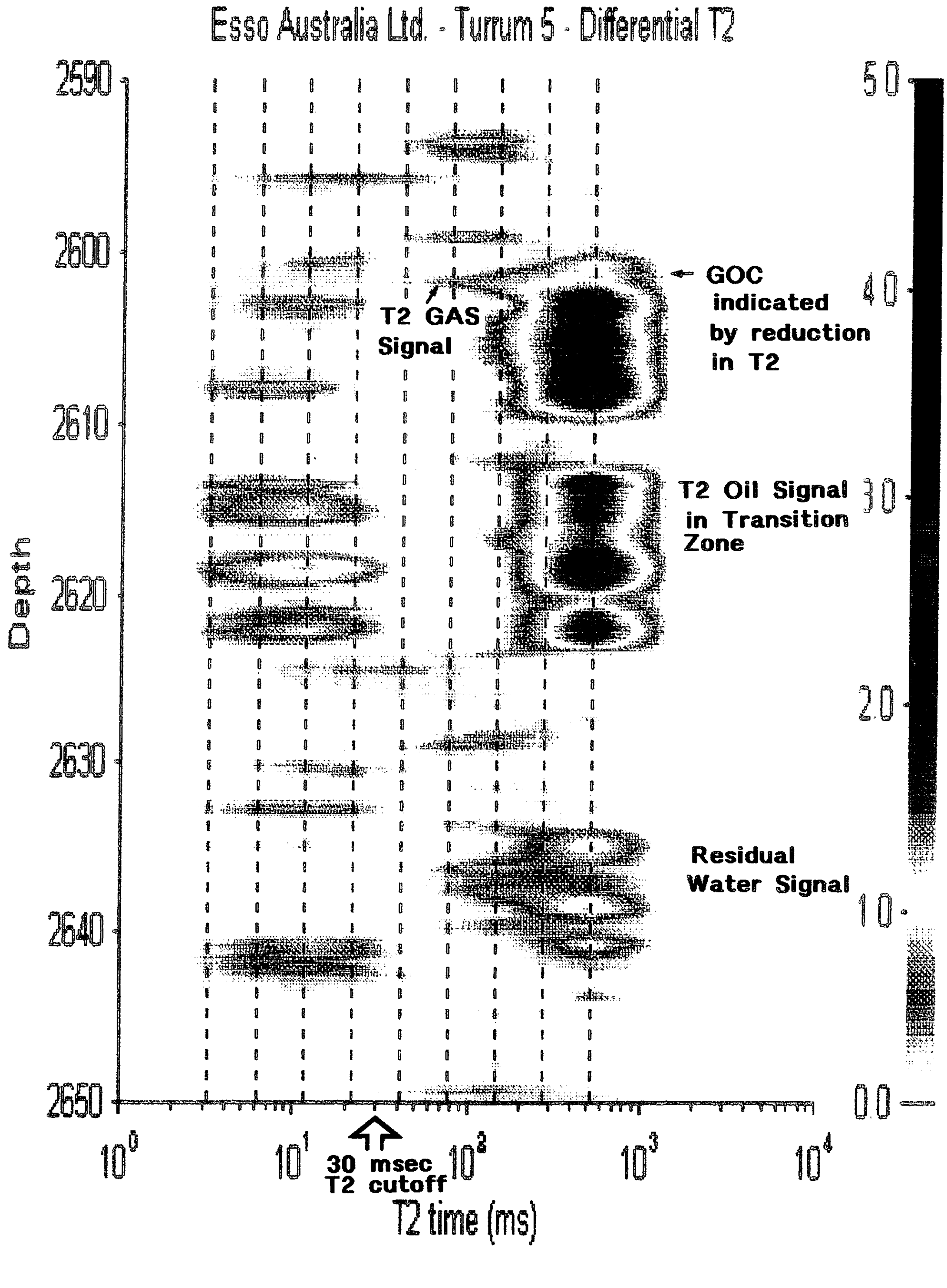

Figure 3	Turrum 5 MRIL T2 differential spectrum (Method A) removes most of the water signal and shows a strong oil signal at 500 msec. The L500 GOC is identified by reduction in T2 at 2602 metres. A small residual water signal remains in the water leg below 2628 metres. Note the absence of the free water signal in the transition zone between 2612 to 2623 metres.

PE906498

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ITEM_BARCODE =	PE906498
CONTAINER_BARCODE =	PE900858
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BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Log Analysis Diagram, (Figure 4, Appendix 2 of WCR vol.2) for Turrum-5
REMARKS =	
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CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

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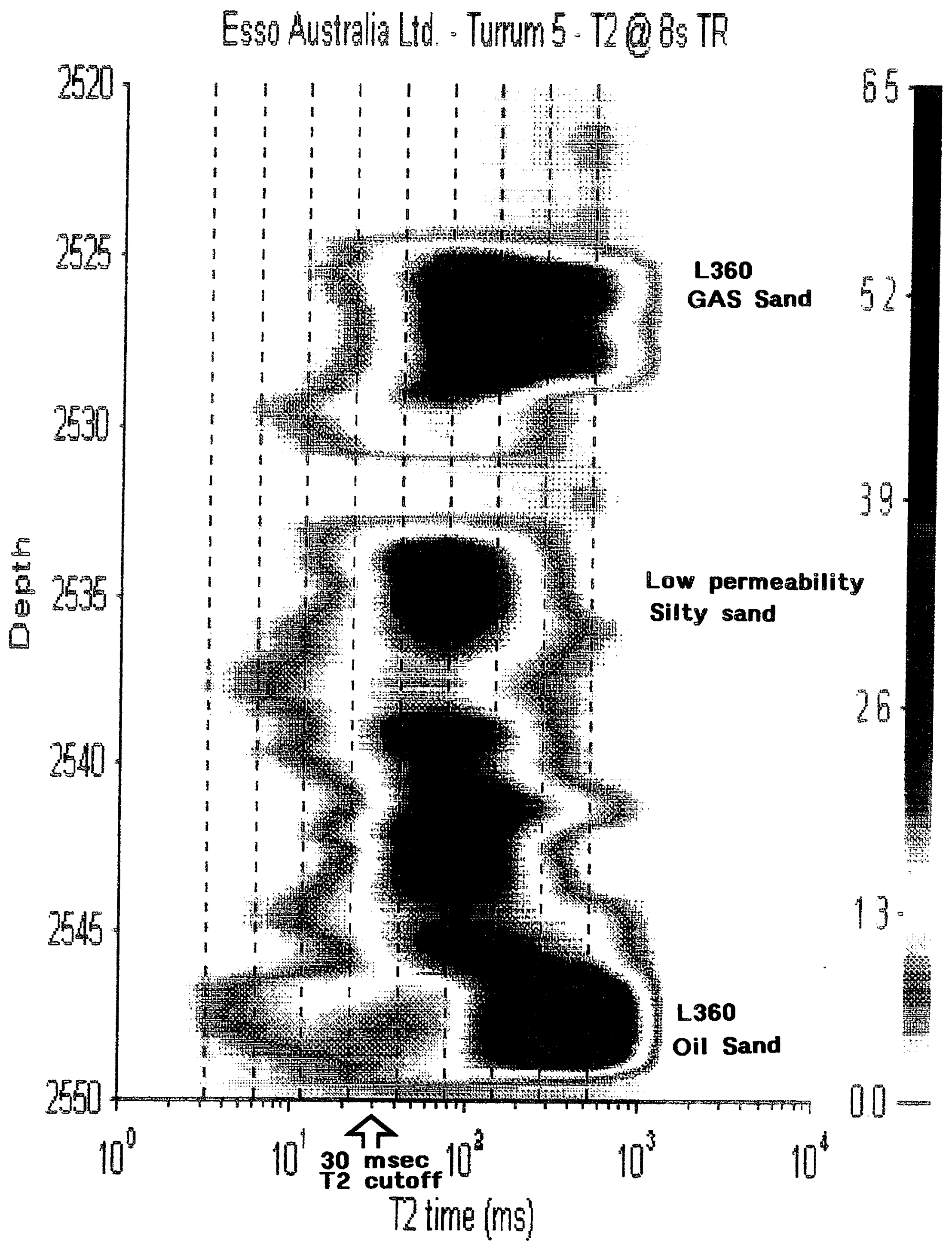

Figure 4	Turrum 5 MRIL T2 distribution in the L-360 reservoir shows oil peak at 500 msec where MDT recovered 1 gallon of 41° API oil at 2548.6 metres (21md). Absence of oil peak above 2547 metres due to low permeability (< 0.5 md), low oil saturation.

PE906499

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The enclosure PE906499 has the following characteristics:

ITEM_BARCODE =	PE906499
CONTAINER_BARCODE =	PE900858
NAME =	Log Analysis Diagram, Figure 5
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Log Analysis Diagram, (Figure 5, Appendix 2 of WCR vol.2) for Turrum-5
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DATE_RECEIVED =	29/11/96
W_NO =	W1145
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CONTRACTOR =	ESSO AUSTRALIA LTD.
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

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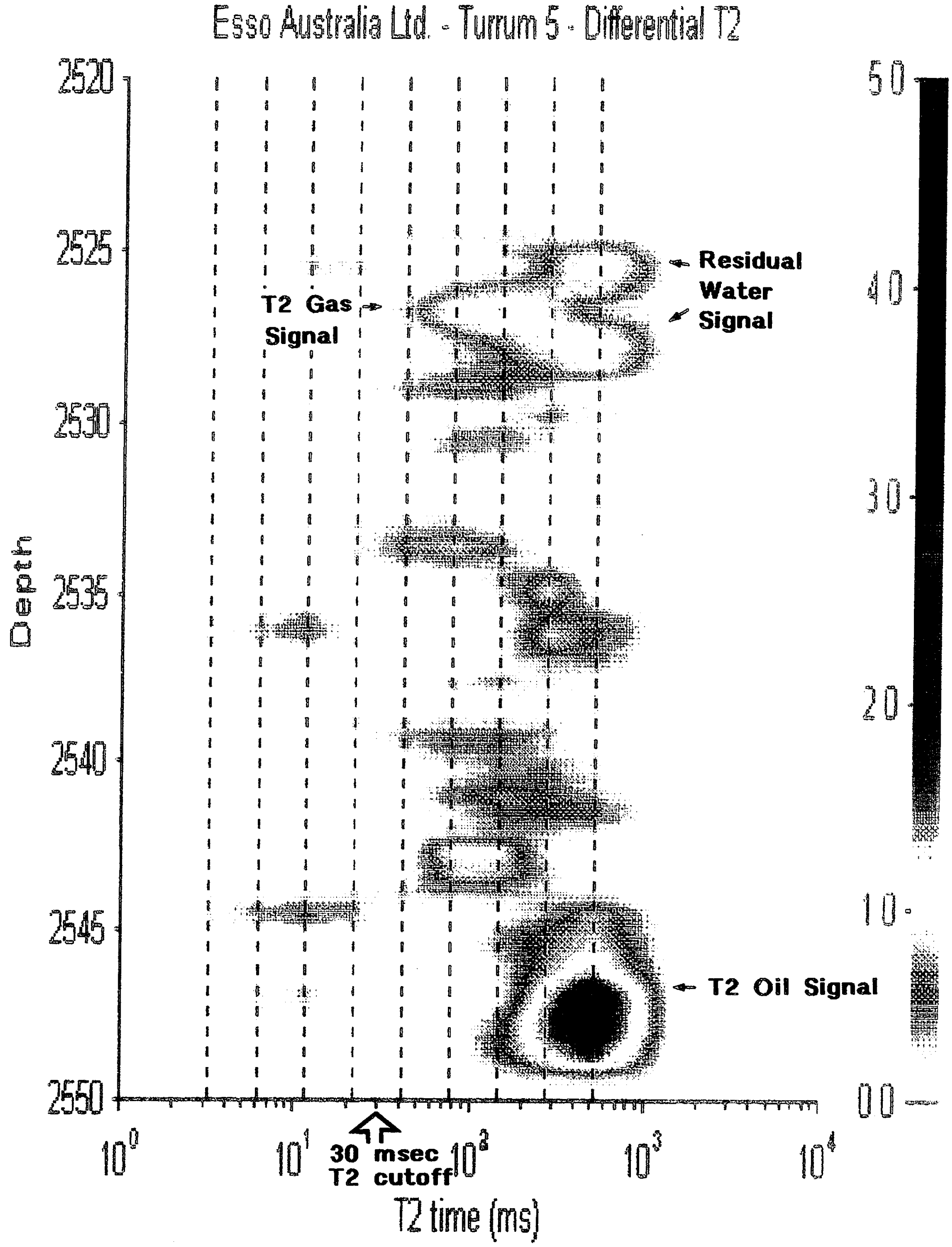


Figure 5	Turrum 5 MRIL T2 differential spectrum (Method A) exhibits good removal of water signal with remaining signal due to oil bulk relaxation at 500 msec. Gas reservoir between 2525 to 2530 metres shows indication of 100 msec gas bulk relaxation bounded by a residual water signal.

TURRUM 5 LOG ANALYSIS LISTING

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1385	102	2.1	2.401	0.385	108	Coal		
1386	92	3.8	2.631	0.275	88	Coal		
1387	173	2.4	2.642	0.407	99	Coal		
1388	100	2.3	2.750	0.590	100	Coal		
1389	100	3.2	2.767	0.623	93	Coal		
1390	97	4.4	2.786	0.586	89	Coal		
1391	88	2.6	2.492	0.354	95	Coal		
1392	79	3.9	2.666	0.353	79	Coal		
1393	71	3.0	2.910	0.288	82	Coal		
1394	74	3.5	2.391	0.253	107	0.240	0.180	0.748
1395	70	4.8	2.477	0.219	121	Coal		
1396	89	5.7	2.097	0.452	107	Coal		
1397	79	7.8	2.203	0.362	125	Coal		
1398	58	22.8	2.207	0.131	101	Coal		
1399	63	21.0	2.134	0.101	110	0.118	0.244	0.216
1400	84	10.6	2.179	0.212	113	0.189	0.252	0.290
1401	99	7.7	2.297	0.266	110	Coal		
1402	87	30.4	1.384	0.822	152	Coal		
1403	161	8.3	2.080	0.594	145	Coal		
1404	130	11.3	2.385	0.374	106	Coal		
1405	169	15.8	2.395	0.412	106	0.687	0.008	1.000
1406	65	49.6	2.136	0.150	129	0.125	0.281	0.134
1407	59	588.1	2.107	0.058	129	0.112	0.274	0.041
1408	57	1414.1	2.016	0.078	128	0.127	0.294	0.025
1409	61	1131.9	2.150	0.101	117	0.157	0.249	0.032
1410	60	1246.1	2.250	0.085	97	0.160	0.187	0.040
1411	59	803.0	2.216	0.082	101	0.167	0.185	0.053
1412	67	651.8	2.177	0.179	87	0.113	0.217	0.047
1413	63	534.1	2.210	0.135	102	0.170	0.213	0.054
1414	69	557.0	2.114	0.135	111	0.133	0.250	0.046
1415	93	47.7	2.290	0.215	98	0.259	0.186	0.206
1416	53	1740.6	2.104	0.119	100	0.047	0.253	0.026
1417	58	1935.1	2.037	0.074	110	0.095	0.266	0.023
1418	63	1913.6	1.943	0.060	111	0.071	0.287	0.022
1419	59	2295.0	2.046	0.049	108	0.104	0.256	0.023
1420	56	1204.1	2.084	0.079	107	0.101	0.251	0.032
1421	54	1567.9	2.174	0.071	108	0.125	0.222	0.031
1422	60	1449.4	2.057	0.100	108	0.114	0.262	0.027
1423	64	950.6	2.071	0.090	108	0.130	0.252	0.035
1424	70	467.7	2.158	0.150	109	0.150	0.241	0.051
1425	65	931.0	2.053	0.138	114	0.125	0.275	0.033
1426	71	750.3	2.070	0.152	115	0.148	0.271	0.036
1427	77	502.9	2.121	0.211	115	0.148	0.272	0.044
1428	73	337.0	2.056	0.171	117	0.161	0.278	0.054
1429	86	221.5	2.085	0.175	115	0.209	0.261	0.070
1430	73	464.2	2.175	0.142	111	0.227	0.228	0.055
1431	92	88.7	2.241	0.178	107	0.270	0.203	0.139

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1432	87	287.2	2.021	0.145	120	0.277	0.260	0.062
1433	168	300.1	2.186	0.207	112	0.583	0.099	0.149
1434	110	87.7	2.049	0.167	116	0.321	0.243	0.119
1435	136	39.6	2.324	0.293	114	0.459	0.175	0.232
1436	124	77.4	2.244	0.244	112	0.423	0.193	0.158
1437	78	803.1	2.062	0.109	112	0.175	0.258	0.038
1438	70	1485.7	1.963	0.091	113	0.090	0.288	0.024
1439	63	980.7	2.012	0.080	105	0.054	0.271	0.032
1440	54	570.5	2.069	0.059	113	0.053	0.267	0.042
1441	56	674.9	2.014	0.099	116	0.053	0.293	0.036
1442	61	643.5	2.045	0.135	117	0.080	0.290	0.037
1443	68	815.5	2.075	0.134	113	0.113	0.272	0.035
1444	59	1038.2	1.998	0.082	119	0.089	0.288	0.030
1445	60	802.4	2.025	0.124	117	0.089	0.291	0.033
1446	59	839.5	2.045	0.201	116	0.052	0.303	0.031
1447	59	974.0	2.197	0.211	106	0.101	0.252	0.034
1448	57	892.5	2.083	0.188	111	0.098	0.277	0.033
1449	56	756.3	2.135	0.160	110	0.125	0.257	0.038
1450	52	776.1	2.151	0.192	105	0.105	0.257	0.038
1451	55	1015.7	2.208	0.154	100	0.094	0.216	0.038
1452	51	2014.5	2.168	0.068	56	0.076	0.168	0.040
1453	40	3144.0	2.613	-0.005	54	0.035	0.006	1.000
1454	46	3898.4	2.626	-0.006	55	0.036	0.002	1.000
1455	41	4758.8	2.659	-0.015	54	0.045	0.001	1.000
1456	40	5205.5	2.589	-0.012	57	0.039	0.017	0.266
1457	40	3704.2	2.500	0.004	59	0.045	0.052	0.079
1458	40	4167.0	2.500	-0.005	62	0.031	0.053	0.076
1459	42	4884.7	2.424	0.017	67	0.035	0.089	0.041
1460	41	3110.6	2.471	0.019	63	0.039	0.070	0.066
1461	42	10280.4	2.575	-0.002	56	0.042	0.021	0.105
1462	44	7475.6	2.565	-0.001	57	0.041	0.024	0.107
1463	40	10987.4	2.435	0.014	72	0.046	0.085	0.028
1464	41	12648.7	2.654	0.004	47	Coal		
1465	70	19.9	2.341	0.044	101	Coal		
1466	32	478.8	1.228	0.910	141	Coal		
1467	28	465.8	1.250	0.755	145	Coal		
1468	31	506.4	1.236	0.679	145	Coal		
1469	54	55.2	1.395	0.622	138	Coal		
1470	27	279.0	1.231	0.724	147	Coal		
1471	98	23.3	1.550	0.744	129	Coal		
1472	122	31.1	2.076	0.482	126	Coal		
1473	150	13.6	2.507	0.414	102	Coal		
1474	97	9.0	2.325	0.267	104	0.336	0.179	0.365
1475	163	17.5	2.455	0.374	105	0.766	0.000	1.000
1476	127	16.9	2.433	0.342	100	Coal		
1477	111	17.0	1.863	0.763	126	Coal		
1478	140	12.6	2.473	0.328	95	0.711	0.000	1.000
1479	117	25.6	1.872	0.474	128	Coal		
1480	76	18.5	2.167	0.235	111	Coal		
1481	144	46.3	1.797	0.772	145	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1482	153	13.5	2.437	0.466	109	Coal		
1483	162	12.5	2.424	0.325	95	0.692	0.003	1.000
1484	65	103.2	1.865	0.105	116	0.106	0.305	0.091
1485	56	1281.2	1.887	0.060	116	0.053	0.307	0.027
1486	50	1406.4	1.907	0.068	114	0.036	0.307	0.024
1487	55	909.5	1.904	0.079	115	0.053	0.306	0.030
1488	61	882.4	2.024	0.087	114	0.128	0.272	0.033
1489	49	1407.2	1.926	0.070	116	0.059	0.302	0.024
1490	52	1098.5	1.889	0.065	117	0.036	0.313	0.027
1491	55	282.9	1.967	0.075	112	0.072	0.286	0.058
1492	83	34.7	2.046	0.130	111	0.219	0.250	0.184
1493	207	28.4	2.382	0.270	108	0.791	0.000	1.000
1494	127	46.5	2.163	0.226	114	0.388	0.217	0.072
1495	126	44.6	2.236	0.231	112	0.426	0.193	0.067
1496	113	41.5	2.224	0.216	107	0.384	0.195	0.087
1497	98	74.6	2.261	0.154	106	0.311	0.183	0.059
1498	59	2095.2	1.939	0.040	110	0.098	0.276	0.022
1499	60	166.3	2.025	0.063	104	0.129	0.251	0.048
1500	60	115.7	1.974	0.066	108	0.098	0.272	0.070
1501	63	342.9	1.936	0.062	107	0.065	0.282	0.039
1502	64	316.3	1.967	0.063	107	0.073	0.274	0.041
1503	147	11.7	2.112	0.182	114	0.383	0.219	0.244
1504	115	11.0	2.227	0.227	111	0.333	0.211	0.280
1505	125	12.6	2.351	0.280	104	0.446	0.159	0.290
1506	121	14.6	2.391	0.285	109	0.487	0.149	0.241
1507	109	14.1	2.295	0.269	109	0.376	0.192	0.242
1508	116	14.1	2.376	0.296	109	0.477	0.156	0.248
1509	120	11.9	2.334	0.289	107	0.435	0.171	0.280
1510	129	11.3	2.475	0.319	102	0.582	0.058	0.588
1511	150	11.6	2.491	0.309	99	0.648	0.019	0.899
1512	151	9.7	2.493	0.342	98	0.696	0.002	1.000
1513	135	7.1	2.431	0.313	101	0.578	0.069	0.708
1514	141	3.6	2.301	0.419	123	Coal		
1515	83	37.3	1.354	0.747	146	Coal		
1516	154	4.4	2.179	0.502	145	Coal		
1517	163	4.2	2.243	0.483	138	0.649	0.000	1.000
1518	172	9.4	2.051	0.509	121	Coal		
1519	120	4.5	2.391	0.349	109	0.538	0.118	1.000
1520	73	4.4	2.164	0.275	115	0.176	0.267	0.947
1521	79	5.3	2.195	0.268	111	0.151	0.260	0.881
1522	65	9.7	2.137	0.269	112	0.059	0.290	0.618
1523	62	8.2	2.122	0.258	114	0.059	0.297	0.654
1524	61	5.7	2.165	0.237	104	0.076	0.267	0.854
1525	61	8.4	2.130	0.251	113	0.099	0.285	0.656
1526	59	8.2	2.140	0.246	114	0.108	0.281	0.668
1527	59	7.9	2.127	0.247	110	0.074	0.282	0.689
1528	74	4.6	2.204	0.234	113	0.104	0.263	0.938
1529	71	4.7	2.119	0.244	113	0.102	0.287	0.879
1530	60	9.5	2.099	0.223	113	0.051	0.296	0.611
1531	60	8.1	2.084	0.217	114	0.056	0.296	0.660

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1532	63	7.2	2.135	0.217	112	0.092	0.278	0.735
1533	61	7.5	2.052	0.218	113	0.057	0.299	0.691
1534	60	5.3	2.162	0.193	107	0.099	0.257	0.918
1535	56	4.0	2.003	0.238	110	0.057	0.309	0.930
1536	60	3.7	2.089	0.211	115	0.087	0.292	0.996
1537	72	4.0	2.127	0.265	108	0.059	0.284	0.997
1538	76	21.0	1.295	0.633	148	Coal		
1539	88	7.2	1.711	0.678	118	Coal		
1540	48	19.7	1.222	0.597	149	Coal		
1541	122	5.9	2.401	0.416	104	Coal		
1542	151	6.7	2.175	0.525	116	Coal		
1543	38	26.1	1.220	0.832	146	Coal		
1544	29	51.3	1.205	0.940	147	Coal		
1545	155	17.9	1.937	0.591	132	Coal		
1546	129	5.3	2.236	0.263	104	Coal		
1547	144	11.1	2.347	0.219	84	0.529	0.084	0.990
1548	119	79.2	2.662	0.123	69	0.439	0.001	1.000
1549	142	8.0	2.366	0.375	106	Coal		
1550	119	31.0	2.067	0.266	111	Coal		
1551	90	8.2	2.091	0.274	110	0.163	0.274	0.641
1552	151	25.7	2.350	0.418	117	Coal		
1553	61	31.6	1.282	0.615	140	Coal		
1554	69	55.1	1.274	0.763	137	Coal		
1555	107	7.2	2.151	0.163	110	Coal		
1556	124	7.4	2.155	0.489	122	Coal		
1557	145	5.7	2.311	0.473	130	Coal		
1558	116	27.8	1.514	0.733	138	Coal		
1559	137	9.8	2.445	0.325	95	Coal		
1560	142	13.4	2.464	0.301	96	0.573	0.059	0.927
1561	49	8.9	2.207	0.204	105	0.078	0.249	0.733
1562	43	9.8	2.124	0.202	106	0.017	0.284	0.640
1563	43	7.2	2.097	0.198	104	Coal		
1564	114	39.9	1.743	0.721	144	Coal		
1565	60	28.1	1.287	0.989	132	Coal		
1566	114	13.4	2.608	0.281	82	Coal		
1567	137	13.0	2.200	0.475	130	Coal		
1568	27	79.9	1.176	1.062	148	Coal		
1569	29	82.7	1.202	0.821	149	Coal		
1570	39	61.1	1.209	0.726	146	Coal		
1571	60	43.8	1.220	0.698	145	Coal		
1572	29	104.4	1.172	0.787	148	Coal		
1573	34	164.3	1.211	0.827	147	Coal		
1574	29	25.4	1.238	0.805	150	Coal		
1575	109	16.2	2.069	0.584	118	Coal		
1576	144	11.7	2.334	0.427	106	Coal		
1577	90	6.9	2.324	0.299	95	0.330	0.173	1.000
1578	155	14.6	2.422	0.347	111	Coal		
1579	124	7.4	2.177	0.468	108	Coal		
1580	134	9.6	2.507	0.333	99	Coal		
1581	143	7.7	2.493	0.380	98	0.690	0.004	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1582	158	12.8	2.426	0.353	99	0.734	0.000	1.000
1583	115	5.9	2.301	0.365	98	Coal		
1584	144	8.7	2.529	0.399	98	Coal		
1585	162	11.0	2.444	0.394	106	0.758	0.000	1.000
1586	126	5.8	2.461	0.346	95	0.544	0.079	1.000
1587	167	9.9	2.450	0.433	108	0.813	0.000	1.000
1588	158	10.5	2.387	0.461	107	0.699	0.001	1.000
1589	148	8.7	2.464	0.372	103	0.652	0.023	1.000
1590	154	7.3	2.392	0.404	107	0.643	0.038	1.000
1591	151	10.3	2.386	0.473	108	Coal		
1592	94	7.4	1.571	0.632	112	Coal		
1593	108	7.5	2.361	0.315	96	Coal		
1594	144	13.5	2.456	0.365	98	Coal		
1595	145	22.0	1.984	0.545	125	Coal		
1596	82	3.2	2.177	0.329	99	Coal		
1597	118	8.5	2.307	0.371	98	0.423	0.185	0.842
1598	163	9.5	2.402	0.383	98	0.705	0.000	0.988
1599	164	12.2	2.428	0.402	103	0.733	0.000	1.000
1600	143	9.7	2.447	0.371	100	0.672	0.014	0.999
1601	124	11.1	2.459	0.332	95	0.552	0.075	0.978
1602	122	4.8	2.417	0.363	99	0.532	0.108	1.000
1603	132	6.5	2.206	0.422	106	0.379	0.151	1.000
1604	122	5.8	2.343	0.315	96	0.450	0.147	1.000
1605	160	13.2	2.418	0.375	98	0.744	0.000	1.000
1606	119	11.2	2.388	0.299	91	0.496	0.120	0.908
1607	129	10.1	2.432	0.311	96	0.592	0.053	0.992
1608	132	7.3	2.421	0.337	98	0.568	0.077	1.000
1609	140	11.0	2.487	0.324	96	0.659	0.015	1.000
1610	140	10.2	2.402	0.381	99	0.652	0.028	0.991
1611	130	4.4	2.290	0.318	93	0.386	0.161	1.000
1612	158	12.9	2.434	0.409	96	0.756	0.000	1.000
1613	131	13.3	2.437	0.296	88	0.520	0.079	1.000
1614	121	6.1	2.353	0.296	95	0.431	0.147	1.000
1615	154	8.9	2.487	0.352	98	0.708	0.000	1.000
1616	106	10.7	2.351	0.448	117	Coal		
1617	39	95.3	1.209	0.879	138	Coal		
1618	117	3.6	2.251	0.337	100	Coal		
1619	121	6.0	2.358	0.336	97	0.507	0.137	1.000
1620	157	14.3	2.409	0.429	111	0.780	0.000	1.000
1621	106	4.6	2.273	0.322	95	0.315	0.185	1.000
1622	109	14.2	2.589	0.286	73	0.591	0.006	1.000
1623	148	12.0	2.431	0.427	98	0.736	0.000	1.000
1624	142	10.6	2.500	0.384	96	0.762	0.000	1.000
1625	151	10.2	2.499	0.401	103	0.787	0.000	1.000
1626	151	10.2	2.487	0.381	97	0.747	0.000	1.000
1627	105	5.0	1.936	0.448	121	Coal		
1628	61	6.2	1.485	0.548	128	Coal		
1629	139	9.2	2.430	0.533	114	Coal		
1630	125	6.3	2.493	0.380	99	0.612	0.043	1.000
1631	110	2.8	2.282	0.305	101	0.359	0.186	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1632	100	4.7	2.370	0.273	96	0.431	0.136	1.000
1633	105	6.4	2.419	0.274	95	0.479	0.114	1.000
1634	97	4.8	2.262	0.313	99	0.282	0.205	1.000
1635	82	4.9	2.368	0.291	95	0.288	0.174	1.000
1636	47	3.7	2.089	0.367	110	0.075	0.305	0.973
1637	56	3.3	2.208	0.269	97	0.060	0.254	1.000
1638	45	3.6	2.170	0.298	103	0.046	0.280	1.000
1639	48	3.6	2.179	0.282	101	0.054	0.271	1.000
1640	70	3.3	2.275	0.270	94	0.171	0.210	1.000
1641	54	4.2	2.167	0.293	98	0.084	0.261	1.000
1642	44	3.7	2.143	0.281	101	0.051	0.278	1.000
1643	45	3.2	2.136	0.293	97	0.056	0.276	1.000
1644	47	3.5	2.153	0.298	97	0.071	0.271	1.000
1645	150	6.4	2.569	0.317	89	0.812	0.000	1.000
1646	131	6.9	2.399	0.296	86	0.522	0.090	1.000
1647	153	10.0	2.543	0.330	102	Coal		
1648	157	9.3	2.481	0.427	87	Coal		
1649	147	4.9	1.873	0.525	109	Coal		
1650	165	5.1	2.130	0.500	134	Coal		
1651	174	10.6	2.555	0.496	107	Coal		
1652	125	4.4	2.361	0.367	97	Coal		
1653	156	6.8	2.481	0.403	99	Coal		
1654	156	12.4	2.717	0.382	89	0.831	0.000	1.000
1655	166	11.0	2.495	0.369	95	0.764	0.000	1.000
1656	136	11.9	2.332	0.415	107	Coal		
1657	120	8.6	2.336	0.642	108	Coal		
1658	123	3.7	2.318	0.309	93	0.407	0.152	1.000
1659	161	13.1	2.529	0.332	90	0.769	0.000	1.000
1660	144	12.2	2.334	0.428	111	Coal		
1661	29	75.1	1.221	0.845	141	Coal		
1662	137	14.5	1.990	0.813	138	Coal		
1663	159	9.6	2.517	0.374	94	Coal		
1664	148	9.3	2.512	0.303	92	0.725	0.000	1.000
1665	170	8.8	2.490	0.371	104	0.816	0.000	1.000
1666	178	8.0	2.240	0.574	120	0.719	0.000	1.000
1667	157	9.5	2.430	0.420	101	0.731	0.000	1.000
1668	128	7.2	2.331	0.451	109	Coal		
1669	118	16.1	1.863	0.641	114	Coal		
1670	178	9.0	2.396	0.402	110	Coal		
1671	164	13.9	2.513	0.415	99	Coal		
1672	136	10.8	2.408	0.344	96	0.597	0.057	0.934
1673	91	3.8	2.311	0.291	94	0.309	0.177	1.000
1674	107	4.9	2.361	0.294	92	0.411	0.147	1.000
1675	164	12.2	2.413	0.372	103	0.757	0.000	1.000
1676	83	9.2	2.012	0.546	129	Coal		
1677	113	24.4	1.441	0.751	144	Coal		
1678	118	13.1	1.628	0.739	137	Coal		
1679	88	3.4	2.294	0.285	92	Coal		
1680	111	12.7	2.238	0.397	124	Coal		
1681	33	25.0	1.213	0.765	149	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1682	34	21.3	1.230	0.872	149	Coal		
1683	32	23.1	1.203	0.774	149	Coal		
1684	70	16.4	1.298	0.766	150	Coal		
1685	111	3.9	2.400	0.302	94	Coal		
1686	158	8.3	2.458	0.350	102	0.746	0.000	1.000
1687	142	7.4	2.422	0.362	96	Coal		
1688	125	6.2	2.378	0.429	100	Coal		
1689	139	5.7	2.379	0.320	96	0.557	0.089	1.000
1690	131	8.8	2.307	0.417	105	0.560	0.082	1.000
1691	132	10.8	2.456	0.335	93	0.624	0.034	1.000
1692	148	10.5	2.434	0.325	102	0.665	0.017	1.000
1693	116	6.4	2.447	0.257	90	0.552	0.062	1.000
1694	104	5.5	2.378	0.266	91	0.413	0.130	1.000
1695	73	3.3	2.260	0.279	94	0.186	0.209	1.000
1696	90	18.4	2.970	0.255	69	0.507	0.001	1.000
1697	84	4.4	2.310	0.280	94	0.276	0.183	1.000
1698	74	4.0	2.293	0.271	95	0.221	0.199	1.000
1699	70	3.8	2.249	0.274	95	0.135	0.225	1.000
1700	73	4.2	2.257	0.299	94	0.164	0.221	1.000
1701	44	3.6	2.150	0.280	101	0.032	0.281	1.000
1702	46	3.0	2.215	0.279	96	0.052	0.254	1.000
1703	44	3.0	2.119	0.304	97	Coal		
1704	145	7.1	1.909	0.611	132	Coal		
1705	159	6.6	2.261	0.516	122	Coal		
1706	97	5.0	2.385	0.448	103	Coal		
1707	127	8.1	2.438	0.281	92	0.509	0.100	1.000
1708	165	6.1	2.238	0.434	111	0.531	0.107	1.000
1709	162	8.4	2.494	0.409	107	Coal		
1710	154	11.6	1.529	0.632	138	Coal		
1711	132	8.6	2.554	0.280	95	Coal		
1712	64	23.9	1.237	0.778	156	Coal		
1713	146	3.9	2.243	0.520	146	Coal		
1714	153	4.5	2.280	0.532	129	Coal		
1715	138	8.9	1.628	0.742	150	Coal		
1716	147	8.9	2.231	0.520	127	Coal		
1717	94	2.3	2.305	0.318	98	Coal		
1718	146	10.0	2.449	0.375	95	0.694	0.003	1.000
1719	93	19.5	1.609	0.503	121	Coal		
1720	115	5.3	2.401	0.273	91	Coal		
1721	119	4.7	2.444	0.280	94	0.515	0.093	1.000
1722	115	4.5	2.328	0.297	94	0.367	0.163	1.000
1723	144	10.1	2.435	0.353	96	Coal		
1724	94	4.9	2.232	0.445	106	Coal		
1725	129	6.2	2.366	0.368	112	Coal		
1726	34	9.9	1.262	0.713	144	Coal		
1727	148	6.2	2.263	0.644	116	Coal		
1728	153	4.7	2.456	0.341	95	0.665	0.014	1.000
1729	157	6.1	2.467	0.384	98	Coal		
1730	101	2.6	2.602	0.353	81	Coal		
1731	136	3.8	2.452	0.357	96	0.628	0.034	0.956

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1732	143	4.4	2.363	0.447	107	0.626	0.036	0.931
1733	78	1.6	2.309	0.287	94	0.260	0.146	1.000
1734	108	3.0	2.417	0.273	91	0.447	0.117	0.945
1735	150	4.8	2.508	0.355	99	Coal		
1736	122	4.8	2.351	0.473	120	Coal		
1737	130	3.0	2.284	0.563	134	Coal		
1738	174	4.8	2.566	0.411	100	0.925	0.000	1.000
1739	167	3.6	2.366	0.412	102	0.739	0.000	1.000
1740	168	3.7	2.539	0.452	99	0.929	0.000	1.000
1741	153	3.9	2.485	0.338	105	0.759	0.000	1.000
1742	179	5.4	2.496	0.370	103	0.884	0.000	1.000
1743	190	4.0	2.444	0.446	107	0.906	0.000	1.000
1744	172	5.7	2.443	0.426	98	0.868	0.000	1.000
1745	131	2.6	2.462	0.288	89	0.601	0.036	1.000
1746	136	4.1	2.556	0.300	84	0.736	0.000	1.000
1747	127	2.9	2.473	0.278	88	0.602	0.034	1.000
1748	104	2.0	2.370	0.292	91	0.414	0.139	1.000
1749	123	2.0	2.385	0.276	92	0.488	0.112	1.000
1750	120	2.6	2.464	0.275	88	0.575	0.047	1.000
1751	102	1.8	2.392	0.277	92	0.407	0.131	1.000
1752	127	4.0	2.441	0.302	85	0.543	0.070	0.962
1753	135	4.5	2.520	0.291	85	0.624	0.017	1.000
1754	114	2.5	2.402	0.231	85	0.368	0.109	1.000
1755	89	1.7	2.316	0.262	90	0.249	0.172	1.000
1756	84	1.1	2.285	0.270	96	0.217	0.201	1.000
1757	97	1.7	2.415	0.297	91	0.405	0.134	1.000
1758	73	1.0	2.247	0.301	99	0.183	0.227	1.000
1759	76	1.0	2.269	0.306	98	0.235	0.214	1.000
1760	104	1.4	2.364	0.290	96	0.431	0.150	1.000
1761	121	8.3	2.592	0.262	78	0.655	0.001	1.000
1762	138	4.1	2.580	0.318	88	0.777	0.000	1.000
1763	138	5.4	2.541	0.348	89	0.747	0.000	1.000
1764	146	5.8	2.590	0.338	89	0.773	0.000	1.000
1765	155	4.6	2.520	0.363	91	0.753	0.000	1.000
1766	163	5.3	2.581	0.404	93	0.880	0.000	1.000
1767	157	5.3	2.543	0.337	91	0.805	0.000	1.000
1768	165	5.3	2.595	0.381	93	0.935	0.000	1.000
1769	156	5.2	2.496	0.410	97	Coal		
1770	125	4.3	2.391	0.387	92	Coal		
1771	151	5.8	2.498	0.337	96	0.723	0.000	1.000
1772	154	5.8	2.456	0.424	103	0.735	0.000	1.000
1773	137	6.2	2.295	0.477	112	Coal		
1774	119	6.0	2.343	0.383	105	Coal		
1775	149	5.4	2.393	0.457	109	Coal		
1776	101	4.4	1.675	0.653	134	Coal		
1777	128	3.9	2.446	0.310	91	Coal		
1778	136	5.6	2.406	0.326	93	0.607	0.048	0.821
1779	110	1.8	2.471	0.320	92	0.540	0.076	1.000
1780	77	1.1	2.334	0.267	95	0.284	0.179	1.000
1781	71	1.2	2.295	0.279	93	0.209	0.201	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1782	61	1.2	2.252	0.275	91	0.109	0.226	0.994
1783	101	4.3	1.548	0.500	141	Coal		
1784	107	2.2	2.390	0.324	96	Coal		
1785	158	5.4	2.451	0.437	99	0.771	0.000	1.000
1786	123	3.4	2.443	0.346	90	0.550	0.078	0.950
1787	123	3.2	2.433	0.305	94	0.527	0.093	0.908
1788	89	1.6	2.345	0.284	90	0.328	0.161	1.000
1789	102	2.9	2.547	0.308	88	0.526	0.057	1.000
1790	149	4.7	2.522	0.331	96	Coal		
1791	97	3.5	1.617	0.729	113	Coal		
1792	115	2.0	2.384	0.292	91	Coal		
1793	135	2.9	2.487	0.296	92	0.604	0.035	1.000
1794	151	4.7	2.489	0.401	98	0.738	0.000	1.000
1795	141	4.8	2.350	0.390	98	0.571	0.068	0.804
1796	139	4.3	2.487	0.328	91	0.651	0.015	1.000
1797	122	1.4	2.303	0.264	92	0.320	0.154	1.000
1798	120	2.3	2.410	0.246	87	0.440	0.103	1.000
1799	96	1.5	2.315	0.281	94	0.289	0.178	1.000
1800	88	1.6	2.392	0.293	90	0.329	0.150	1.000
1801	135	4.0	2.287	0.471	99	0.518	0.001	1.000
1802	151	7.8	2.065	0.537	115	Coal		
1803	147	4.5	2.475	0.335	103	Coal		
1804	144	6.2	2.605	0.281	85	Coal		
1805	157	5.8	2.526	0.285	85	0.794	0.000	1.000
1806	142	5.3	2.529	0.260	84	0.712	0.000	1.000
1807	124	3.1	2.409	0.277	88	0.487	0.104	1.000
1808	118	3.6	2.486	0.261	86	0.588	0.034	1.000
1809	119	3.7	2.468	0.260	86	0.569	0.045	1.000
1810	127	5.1	2.525	0.302	88	0.704	0.000	1.000
1811	123	5.4	2.488	0.278	84	0.610	0.026	1.000
1812	113	4.7	2.486	0.259	79	0.535	0.050	1.000
1813	116	3.1	2.574	0.257	83	0.593	0.015	1.000
1814	94	1.3	2.375	0.259	91	0.361	0.143	1.000
1815	85	1.2	2.355	0.243	91	0.286	0.158	1.000
1816	84	1.3	2.349	0.240	90	0.262	0.163	1.000
1817	98	1.7	2.489	0.288	87	0.439	0.094	1.000
1818	174	4.8	2.528	0.415	99	Coal		
1819	72	9.6	2.089	0.680	121	Coal		
1820	89	9.7	1.801	0.483	128	Coal		
1821	100	2.3	2.389	0.274	88	Coal		
1822	96	1.9	2.281	0.279	92	0.234	0.187	0.878
1823	128	3.6	2.421	0.296	90	Coal		
1824	80	3.6	1.442	0.631	105	Coal		
1825	108	2.1	2.420	0.264	89	Coal		
1826	91	2.0	2.397	0.245	87	0.345	0.133	1.000
1827	133	5.0	2.491	0.311	86	0.630	0.022	0.942
1828	154	4.5	2.504	0.335	97	0.726	0.000	1.000
1829	142	4.6	2.482	0.369	92	0.680	0.007	0.996
1830	127	3.4	2.431	0.301	91	0.530	0.085	0.949
1831	178	5.6	2.488	0.409	103	0.829	0.000	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1832	123	4.5	2.359	0.388	111	Coal		
1833	126	6.5	2.414	0.366	99	Coal		
1834	109	1.5	2.279	0.308	94	Coal		
1835	143	2.2	2.501	0.360	96	0.713	0.000	1.000
1836	77	0.9	2.360	0.298	94	0.287	0.171	1.000
1837	95	0.9	2.284	0.288	94	0.276	0.185	1.000
1838	104	0.8	2.270	0.282	93	0.277	0.178	1.000
1839	111	0.9	2.278	0.271	95	Coal		
1840	152	5.0	2.135	0.535	119	Coal		
1841	144	6.1	2.434	0.331	99	Coal		
1842	152	5.7	2.537	0.391	87	Coal		
1843	105	6.6	2.909	0.344	77	0.650	0.000	1.000
1844	132	4.7	2.527	0.248	84	0.637	0.011	1.000
1845	123	4.1	2.495	0.273	83	0.590	0.033	1.000
1846	81	5.2	2.035	0.404	128	Coal		
1847	86	15.6	1.427	0.717	144	Coal		
1848	95	2.7	2.373	0.272	91	Coal		
1849	108	3.2	2.389	0.292	88	0.439	0.126	0.840
1850	150	7.2	2.459	0.375	99	Coal		
1851	94	1.7	2.397	0.351	84	Coal		
1852	116	2.2	2.438	0.280	90	0.534	0.081	1.000
1853	86	1.7	2.379	0.283	87	0.344	0.145	1.000
1854	134	3.3	2.421	0.298	89	0.558	0.070	0.978
1855	130	3.3	2.462	0.274	90	0.573	0.048	1.000
1856	112	4.6	2.127	0.443	92	Coal		
1857	140	4.0	2.400	0.347	95	Coal		
1858	131	3.9	2.465	0.308	89	Coal		
1859	123	5.9	2.146	0.446	113	Coal		
1860	115	2.1	2.366	0.288	89	Coal		
1861	110	2.9	2.384	0.278	70	0.322	0.108	1.000
1862	159	5.6	2.546	0.359	94	0.765	0.000	1.000
1863	152	4.8	2.507	0.371	94	0.726	0.000	1.000
1864	150	5.2	2.534	0.367	95	0.769	0.000	1.000
1865	151	5.1	2.502	0.387	93	0.760	0.000	1.000
1866	137	5.1	2.501	0.297	86	0.661	0.008	1.000
1867	143	5.8	2.488	0.384	83	0.760	0.000	1.000
1868	141	5.6	2.530	0.321	91	0.771	0.000	1.000
1869	133	5.2	2.399	0.325	100	Coal		
1870	128	6.6	2.182	0.507	101	Coal		
1871	114	2.0	2.357	0.261	88	Coal		
1872	128	3.0	2.508	0.222	84	0.571	0.026	1.000
1873	144	4.1	2.468	0.296	89	Coal		
1874	135	6.9	2.199	0.537	97	Coal		
1875	149	8.1	2.484	0.318	92	Coal		
1876	109	7.3	1.554	0.584	119	Coal		
1877	118	5.1	2.453	0.321	88	Coal		
1878	155	8.1	2.451	0.355	108	Coal		
1879	136	7.3	2.525	0.451	100	Coal		
1880	100	9.6	2.207	0.504	125	Coal		
1881	124	4.0	2.429	0.374	91	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1882	86	1.3	2.331	0.262	92	0.273	0.171	1.000
1883	106	3.3	2.608	0.281	87	0.571	0.018	1.000
1884	157	5.3	2.464	0.357	96	0.732	0.000	1.000
1885	157	6.0	2.445	0.409	97	Coal		
1886	140	5.3	2.456	0.307	89	Coal		
1887	141	5.0	2.420	0.328	91	0.646	0.023	0.997
1888	132	3.8	2.424	0.302	88	0.575	0.056	0.956
1889	101	2.1	2.407	0.255	87	0.424	0.112	1.000
1890	114	3.6	2.505	0.286	86	0.546	0.050	1.000
1891	138	5.4	2.556	0.357	90	0.752	0.000	1.000
1892	148	5.0	2.507	0.339	93	0.713	0.000	1.000
1893	145	5.2	2.525	0.369	93	0.724	0.000	1.000
1894	143	6.3	2.509	0.340	86	0.688	0.003	1.000
1895	151	6.8	2.502	0.377	93	Coal		
1896	156	6.7	2.291	0.499	110	Coal		
1897	110	3.6	2.417	0.410	94	Coal		
1898	154	4.9	2.514	0.339	88	Coal		
1899	119	3.6	2.527	0.293	88	0.540	0.043	1.000
1900	188	3.5	2.488	0.289	87	0.785	0.000	1.000
1901	154	3.3	2.467	0.273	79	0.597	0.019	1.000
1902	149	5.2	2.522	0.322	91	0.696	0.001	1.000
1903	125	5.7	2.658	0.343	87	0.693	0.000	1.000
1904	141	5.1	2.507	0.367	91	0.668	0.010	1.000
1905	147	5.3	2.515	0.387	94	0.730	0.000	1.000
1906	155	5.0	2.521	0.396	93	0.751	0.000	1.000
1907	162	5.0	2.510	0.410	97	0.796	0.000	1.000
1908	129	6.0	2.484	0.262	82	0.548	0.038	1.000
1909	145	5.4	2.519	0.377	92	0.753	0.000	1.000
1910	148	5.4	2.496	0.366	96	0.720	0.000	1.000
1911	114	4.1	2.487	0.315	85	0.503	0.083	0.943
1912	138	5.1	2.532	0.279	89	0.659	0.006	1.000
1913	155	4.8	2.492	0.313	91	0.697	0.001	1.000
1914	146	5.8	2.675	0.365	88	0.772	0.000	1.000
1915	149	5.2	2.532	0.314	91	0.676	0.005	1.000
1916	153	5.3	2.506	0.366	94	0.720	0.000	1.000
1917	137	4.7	2.551	0.352	88	0.679	0.004	1.000
1918	133	5.0	2.535	0.268	84	0.584	0.019	1.000
1919	162	5.2	2.519	0.361	95	0.775	0.000	1.000
1920	158	5.2	2.555	0.329	90	0.766	0.000	1.000
1921	157	5.7	2.521	0.417	93	0.776	0.000	1.000
1922	157	5.5	2.573	0.324	92	0.766	0.000	1.000
1923	145	5.7	2.543	0.337	91	0.704	0.000	1.000
1924	149	5.5	2.456	0.408	96	0.719	0.000	1.000
1925	159	5.7	2.441	0.456	97	0.780	0.000	1.000
1926	155	5.7	2.480	0.418	94	0.800	0.000	1.000
1927	100	2.6	2.434	0.285	82	0.415	0.106	1.000
1928	149	5.7	2.544	0.306	91	0.741	0.000	1.000
1929	150	5.2	2.491	0.412	95	0.733	0.000	1.000
1930	151	5.6	2.508	0.394	93	0.754	0.000	1.000
1931	99	1.4	2.296	0.300	90	0.290	0.174	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1932	106	2.6	2.438	0.248	83	0.453	0.092	1.000
1933	108	10.4	2.741	0.169	74	0.507	0.001	1.000
1934	149	6.4	2.548	0.336	88	0.797	0.000	1.000
1935	147	5.6	2.538	0.275	85	0.698	0.000	1.000
1936	133	5.6	2.588	0.268	85	0.689	0.000	1.000
1937	148	5.6	2.510	0.375	92	0.754	0.000	1.000
1938	154	6.2	2.539	0.377	96	Coal		
1939	62	4.4	1.227	0.621	135	Coal		
1940	98	3.0	2.433	0.238	84	Coal		
1941	118	3.8	2.440	0.271	85	0.512	0.087	0.940
1942	137	2.7	2.213	0.451	100	Coal		
1943	116	4.3	2.432	0.263	79	Coal		
1944	132	3.1	2.434	0.268	88	0.565	0.051	1.000
1945	113	2.2	2.388	0.263	88	0.402	0.121	1.000
1946	134	5.9	2.702	0.332	81	0.752	0.000	1.000
1947	145	5.6	2.515	0.360	91	0.687	0.004	1.000
1948	137	6.5	2.514	0.360	84	0.661	0.011	1.000
1949	145	5.5	2.546	0.373	92	0.725	0.000	1.000
1950	149	5.6	2.534	0.390	93	0.762	0.000	1.000
1951	142	5.8	2.572	0.356	90	0.761	0.000	1.000
1952	155	6.2	2.506	0.352	94	0.768	0.000	1.000
1953	151	6.1	2.535	0.303	87	0.766	0.000	1.000
1954	148	5.6	2.521	0.340	90	0.775	0.000	1.000
1955	149	6.7	2.726	0.366	87	0.841	0.000	1.000
1956	147	6.4	2.538	0.360	91	Coal		
1957	71	12.3	1.264	0.619	125	Coal		
1958	92	3.4	2.420	0.246	81	Coal		
1959	92	9.1	1.867	0.474	117	Coal		
1960	106	2.8	2.441	0.270	85	Coal		
1961	93	3.5	2.548	0.259	88	0.455	0.064	1.000
1962	149	6.3	2.494	0.373	90	0.754	0.000	1.000
1963	146	6.3	2.511	0.395	95	0.738	0.000	1.000
1964	147	5.1	2.578	0.342	88	0.715	0.000	1.000
1965	146	6.4	2.516	0.385	95	0.750	0.000	1.000
1966	155	6.8	2.467	0.406	96	Coal		
1967	124	5.6	1.849	0.500	103	Coal		
1968	146	5.4	2.520	0.326	90	Coal		
1969	102	1.6	2.361	0.240	88	0.306	0.139	1.000
1970	107	2.7	2.463	0.241	85	0.450	0.088	1.000
1971	106	2.1	2.441	0.262	86	0.450	0.099	1.000
1972	140	4.7	2.528	0.321	90	0.716	0.000	1.000
1973	149	4.7	2.506	0.370	92	0.793	0.000	1.000
1974	95	2.3	2.431	0.229	76	0.344	0.100	1.000
1975	134	5.2	2.544	0.263	85	0.652	0.007	1.000
1976	139	6.4	2.525	0.330	87	0.692	0.002	1.000
1977	121	3.3	2.499	0.265	83	0.555	0.044	1.000
1978	92	2.5	2.528	0.265	84	0.450	0.067	1.000
1979	153	5.5	2.518	0.302	89	0.729	0.000	1.000
1980	98	1.5	2.387	0.294	88	0.380	0.140	1.000
1981	98	1.9	2.436	0.257	84	0.414	0.108	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
1982	120	2.7	2.454	0.237	86	0.493	0.080	1.000
1983	99	1.6	2.406	0.250	85	0.387	0.115	1.000
1984	94	1.7	2.395	0.243	85	0.355	0.124	1.000
1985	130	3.3	2.459	0.260	87	0.549	0.058	1.000
1986	156	5.9	2.509	0.373	95	0.760	0.000	1.000
1987	108	2.4	2.481	0.275	86	0.474	0.084	1.000
1988	136	3.2	2.461	0.255	84	0.533	0.060	1.000
1989	128	3.3	2.434	0.278	85	0.503	0.090	1.000
1990	150	5.3	2.489	0.380	93	0.701	0.000	1.000
1991	135	3.6	2.442	0.305	90	0.549	0.070	0.965
1992	144	7.2	2.489	0.321	90	0.651	0.015	1.000
1993	145	7.0	2.462	0.336	90	0.694	0.002	1.000
1994	104	1.6	2.480	0.297	89	0.511	0.087	1.000
1995	110	1.3	2.295	0.260	93	0.244	0.181	1.000
1996	92	1.0	2.313	0.252	91	0.212	0.183	1.000
1997	96	1.2	2.355	0.257	88	0.261	0.162	1.000
1998	91	1.2	2.334	0.263	88	0.247	0.171	1.000
1999	76	0.8	2.271	0.262	92	0.144	0.209	1.000
2000	93	1.6	2.247	0.291	90	0.176	0.206	0.914
2001	119	3.4	2.449	0.325	88	0.555	0.060	1.000
2002	140	4.5	2.488	0.314	89	0.653	0.014	1.000
2003	151	6.4	2.502	0.375	94	0.747	0.000	1.000
2004	88	1.4	2.372	0.251	86	0.286	0.149	1.000
2005	79	1.9	2.420	0.240	83	0.298	0.127	1.000
2006	121	2.8	2.391	0.308	89	0.485	0.121	0.907
2007	149	6.3	2.516	0.345	92	0.722	0.000	1.000
2008	132	3.5	2.474	0.328	86	0.602	0.035	1.000
2009	138	3.8	2.470	0.286	88	0.606	0.031	1.000
2010	149	7.5	2.427	0.412	95	0.709	0.000	1.000
2011	150	6.8	2.510	0.384	92	0.745	0.000	1.000
2012	158	7.6	2.536	0.375	87	Coal		
2013	120	2.7	2.490	0.326	84	Coal		
2014	96	2.5	2.407	0.230	83	0.333	0.120	1.000
2015	89	3.1	2.547	0.249	82	0.439	0.059	1.000
2016	147	4.5	2.543	0.270	87	0.683	0.003	1.000
2017	143	5.6	2.498	0.348	88	0.714	0.000	1.000
2018	143	7.1	2.524	0.349	88	0.745	0.000	1.000
2019	149	6.7	2.529	0.373	89	0.757	0.000	1.000
2020	154	6.4	2.527	0.364	93	0.732	0.000	1.000
2021	150	6.7	2.471	0.361	93	0.643	0.023	0.985
2022	134	2.8	2.438	0.313	86	0.578	0.052	1.000
2023	124	2.5	2.435	0.233	84	0.453	0.085	1.000
2024	106	5.5	2.738	0.232	69	0.483	0.001	1.000
2025	149	5.0	2.536	0.288	85	0.644	0.011	1.000
2026	147	6.1	2.491	0.340	87	0.665	0.010	1.000
2027	145	6.3	2.522	0.335	90	0.686	0.003	1.000
2028	145	6.3	2.519	0.360	92	0.701	0.000	1.000
2029	152	7.3	2.469	0.388	92	0.690	0.003	1.000
2030	146	7.0	2.501	0.383	95	0.666	0.012	1.000
2031	149	7.3	2.504	0.366	92	0.655	0.014	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2032	150	6.7	2.512	0.358	91	0.662	0.011	1.000
2033	141	6.6	2.521	0.393	88	0.711	0.000	1.000
2034	138	6.7	2.517	0.351	90	0.717	0.000	1.000
2035	126	7.1	2.500	0.301	86	0.666	0.009	1.000
2036	136	7.2	2.545	0.276	86	0.689	0.001	1.000
2037	140	7.4	2.535	0.355	87	0.707	0.000	1.000
2038	152	6.7	2.484	0.360	92	0.713	0.000	1.000
2039	144	6.8	2.533	0.366	91	0.717	0.000	1.000
2040	138	5.0	2.498	0.322	86	0.656	0.013	1.000
2041	125	1.7	2.400	0.242	88	0.423	0.110	1.000
2042	109	2.3	2.376	0.238	84	0.327	0.126	1.000
2043	127	3.0	2.496	0.252	82	0.575	0.035	1.000
2044	111	3.1	2.418	0.229	83	0.362	0.107	1.000
2045	125	4.6	2.496	0.261	84	0.538	0.052	1.000
2046	147	7.4	2.491	0.403	93	0.674	0.007	1.000
2047	152	6.7	2.522	0.348	89	0.700	0.000	1.000
2048	155	7.0	2.512	0.401	90	0.750	0.000	1.000
2049	112	3.0	2.757	0.234	83	0.590	0.001	1.000
2050	123	2.8	2.477	0.228	85	0.500	0.073	1.000
2051	90	2.2	2.446	0.239	81	0.397	0.099	1.000
2052	136	2.7	2.425	0.255	89	0.512	0.084	1.000
2053	113	4.2	2.557	0.254	84	0.556	0.031	1.000
2054	97	2.2	2.393	0.229	84	0.309	0.124	1.000
2055	163	5.5	2.561	0.321	92	0.770	0.000	1.000
2056	122	3.1	2.474	0.283	86	0.521	0.071	1.000
2057	154	7.1	2.525	0.389	91	0.757	0.000	1.000
2058	144	6.5	2.587	0.359	88	0.775	0.000	1.000
2059	125	4.1	2.776	0.240	81	0.601	0.000	1.000
2060	160	7.6	2.502	0.355	93	0.753	0.000	1.000
2061	97	2.2	2.298	0.242	93	0.214	0.180	0.816
2062	92	2.5	2.360	0.217	84	0.255	0.144	0.896
2063	124	2.5	2.481	0.253	86	0.567	0.043	1.000
2064	145	4.4	2.541	0.317	86	0.772	0.000	1.000
2065	95	1.6	2.378	0.231	86	0.328	0.121	1.000
2066	132	2.3	2.464	0.168	80	0.437	0.032	1.000
2067	133	2.9	2.656	0.248	82	0.677	0.000	1.000
2068	140	2.8	2.431	0.251	86	0.543	0.055	1.000
2069	138	7.5	2.515	0.373	88	0.679	0.006	1.000
2070	146	7.7	2.555	0.331	89	0.715	0.000	1.000
2071	155	9.2	2.451	0.418	97	0.737	0.000	1.000
2072	125	4.4	2.415	0.255	84	0.454	0.086	0.912
2073	142	6.1	2.417	0.282	87	0.574	0.048	0.787
2074	130	3.2	2.369	0.220	89	0.396	0.106	0.967
2075	148	6.5	2.468	0.261	86	0.618	0.023	0.991
2076	96	6.0	2.587	0.209	67	0.459	0.018	1.000
2077	123	3.0	2.418	0.229	83	0.398	0.092	1.000
2078	138	4.2	2.468	0.281	88	0.632	0.021	1.000
2079	120	3.2	2.472	0.262	84	0.559	0.046	1.000
2080	123	3.2	2.422	0.249	89	0.481	0.097	0.982
2081	103	3.0	2.334	0.252	93	0.302	0.156	0.755

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2082	90	3.3	2.312	0.240	92	0.247	0.173	0.671
2083	141	7.5	2.509	0.286	91	0.661	0.009	1.000
2084	120	2.7	2.397	0.230	86	0.407	0.101	1.000
2085	130	4.8	2.490	0.248	83	0.599	0.024	1.000
2086	139	4.7	2.458	0.281	86	0.645	0.016	1.000
2087	126	4.3	2.543	0.245	82	0.635	0.007	1.000
2088	146	6.8	2.493	0.375	95	0.830	0.000	1.000
2089	87	2.9	2.334	0.226	90	0.236	0.158	0.765
2090	107	3.9	2.456	0.234	83	0.444	0.091	0.942
2091	127	3.7	2.451	0.254	85	0.514	0.074	1.000
2092	142	6.3	2.514	0.281	86	0.693	0.001	1.000
2093	89	5.9	2.650	0.163	75	0.417	0.001	1.000
2094	141	6.2	2.553	0.274	86	0.697	0.000	1.000
2095	146	4.3	2.480	0.315	84	0.717	0.000	1.000
2096	132	3.0	2.441	0.296	84	0.555	0.061	1.000
2097	92	2.3	2.444	0.213	84	0.341	0.107	1.000
2098	80	1.9	2.380	0.213	84	0.230	0.145	1.000
2099	120	2.0	2.498	0.251	84	0.498	0.069	1.000
2100	91	2.2	2.427	0.214	81	0.317	0.112	1.000
2101	129	3.9	2.502	0.248	82	0.575	0.033	1.000
2102	133	5.4	2.463	0.323	91	0.633	0.014	1.000
2103	67	4.1	2.342	0.192	89	0.160	0.164	0.627
2104	92	4.0	2.400	0.192	83	0.278	0.131	0.753
2105	140	5.6	2.532	0.296	91	0.667	0.008	0.963
2106	126	4.3	2.389	0.226	84	0.384	0.113	0.770
2107	93	4.3	2.522	0.242	80	0.419	0.069	1.000
2108	142	5.7	2.496	0.289	85	0.660	0.011	1.000
2109	145	7.8	2.533	0.279	86	0.692	0.001	1.000
2110	139	12.5	2.479	0.399	91	0.698	0.000	1.000
2111	71	4.0	2.272	0.167	96	0.089	0.199	0.559
2112	99	3.8	2.426	0.194	84	0.340	0.103	0.904
2113	133	5.9	2.488	0.271	86	0.597	0.030	0.992
2114	85	2.6	2.329	0.245	90	0.245	0.171	0.760
2115	72	2.3	2.280	0.204	88	0.099	0.197	0.759
2116	135	6.0	2.521	0.254	81	0.602	0.019	1.000
2117	136	6.2	2.541	0.267	89	0.636	0.013	1.000
2118	117	3.9	2.563	0.228	80	0.538	0.019	1.000
2119	140	7.2	2.540	0.264	81	0.653	0.005	1.000
2120	136	5.2	2.509	0.305	88	0.623	0.020	1.000
2121	147	5.2	2.457	0.321	84	0.645	0.018	0.997
2122	113	2.7	2.472	0.249	81	0.499	0.069	1.000
2123	119	3.8	2.666	0.255	83	0.650	0.000	1.000
2124	138	7.2	2.563	0.305	82	0.766	0.000	1.000
2125	147	6.2	2.594	0.361	89	0.872	0.000	1.000
2126	107	2.0	2.349	0.247	86	0.327	0.137	1.000
2127	83	1.7	2.302	0.249	87	0.189	0.184	0.908
2128	90	1.9	2.439	0.245	82	0.352	0.114	1.000
2129	129	4.3	2.559	0.274	84	0.652	0.007	1.000
2130	149	7.4	2.543	0.362	84	0.772	0.000	1.000
2131	138	8.4	2.541	0.270	81	0.673	0.003	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2132	145	7.0	2.559	0.328	86	0.732	0.000	1.000
2133	151	7.5	2.515	0.323	90	0.728	0.000	1.000
2134	138	6.2	2.482	0.289	84	0.645	0.015	1.000
2135	89	3.1	2.365	0.226	90	0.269	0.146	0.795
2136	86	3.4	2.391	0.213	88	0.304	0.137	0.754
2137	99	3.5	2.548	0.237	84	0.503	0.048	1.000
2138	140	6.3	2.485	0.255	83	0.607	0.022	1.000
2139	144	7.4	2.488	0.339	93	Coal		
2140	112	8.5	1.868	0.455	107	Coal		
2141	104	5.1	2.431	0.205	84	Coal		
2142	143	5.6	2.556	0.278	87	0.721	0.000	1.000
2143	154	8.5	2.508	0.352	90	0.738	0.000	1.000
2144	154	7.6	2.573	0.319	86	0.780	0.000	1.000
2145	104	9.5	3.011	0.300	77	0.600	0.001	1.000
2146	116	2.8	2.403	0.285	88	0.484	0.106	0.954
2147	133	4.5	2.499	0.226	83	0.595	0.023	1.000
2148	104	3.5	2.499	0.247	81	0.505	0.064	1.000
2149	140	6.5	2.514	0.267	84	0.662	0.007	0.993
2150	140	7.8	2.541	0.299	83	0.702	0.000	1.000
2151	156	8.2	2.558	0.338	91	0.779	0.000	1.000
2152	145	8.1	2.568	0.379	88	0.773	0.000	1.000
2153	83	4.0	2.446	0.200	81	0.288	0.113	0.803
2154	112	5.1	2.525	0.248	82	0.501	0.056	1.000
2155	157	8.0	2.529	0.312	85	0.751	0.000	1.000
2156	157	8.8	2.506	0.368	95	0.745	0.000	1.000
2157	146	7.9	2.578	0.399	94	0.766	0.000	1.000
2158	119	9.0	2.638	0.246	82	0.600	0.000	1.000
2159	154	9.2	2.528	0.323	86	0.770	0.000	1.000
2160	149	9.0	2.561	0.318	88	Coal		
2161	80	17.6	1.888	0.471	132	Coal		
2162	89	4.4	2.512	0.231	85	Coal		
2163	111	5.0	2.404	0.210	86	0.339	0.113	0.688
2164	135	8.0	2.511	0.243	82	0.593	0.023	0.954
2165	153	9.9	2.525	0.342	92	Coal		
2166	106	12.7	1.642	0.535	96	Coal		
2167	100	3.0	2.488	0.203	83	Coal		
2168	127	3.7	2.443	0.241	84	0.508	0.067	1.000
2169	159	9.6	2.501	0.340	91	0.858	0.000	1.000
2170	104	3.4	2.462	0.242	81	0.460	0.082	1.000
2171	147	6.1	2.565	0.265	85	0.741	0.000	1.000
2172	81	2.0	2.335	0.213	84	0.191	0.164	0.956
2173	104	5.7	2.648	0.134	73	0.471	0.001	1.000
2174	108	4.9	2.486	0.203	80	0.434	0.061	1.000
2175	161	8.4	2.514	0.341	87	0.832	0.000	1.000
2176	135	8.1	2.500	0.277	79	0.627	0.016	1.000
2177	124	3.2	2.432	0.195	83	0.374	0.075	1.000
2178	86	28.6	2.713	0.114	59	0.383	0.001	1.000
2179	135	7.2	2.499	0.240	81	0.586	0.021	1.000
2180	144	7.7	2.507	0.248	80	0.653	0.005	1.000
2181	139	8.8	2.530	0.238	79	0.629	0.005	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2182	105	4.2	2.451	0.221	80	0.398	0.083	1.000
2183	136	9.1	2.556	0.254	82	0.652	0.005	1.000
2184	129	8.5	2.496	0.266	86	Coal		
2185	141	10.8	2.357	0.417	93	Coal		
2186	129	9.5	2.398	0.318	89	0.535	0.018	1.000
2187	137	11.9	2.443	0.290	78	0.573	0.013	1.000
2188	109	7.8	2.504	0.175	74	0.408	0.044	1.000
2189	139	9.4	2.552	0.241	81	0.694	0.000	1.000
2190	151	15.7	2.532	0.311	87	0.742	0.000	1.000
2191	150	15.6	2.487	0.384	92	0.726	0.000	1.000
2192	151	13.0	2.559	0.320	87	0.755	0.000	1.000
2193	134	9.4	2.520	0.318	84	0.645	0.013	0.959
2194	140	11.7	2.464	0.288	90	Coal		
2195	141	15.4	2.417	0.443	93	Coal		
2196	142	23.0	2.265	0.413	101	Coal		
2197	123	17.3	2.496	0.244	81	Coal		
2198	116	14.8	2.477	0.218	83	0.504	0.056	0.462
2199	107	16.2	2.445	0.213	83	0.419	0.082	0.349
2200	92	17.1	2.469	0.201	85	0.377	0.090	0.313
2201	89	27.5	2.416	0.181	71	0.245	0.116	0.231
2202	91	38.9	2.590	0.134	69	0.333	0.007	0.965
2203	120	27.1	2.506	0.203	81	0.491	0.054	0.309
2204	86	17.7	2.420	0.203	87	0.302	0.120	0.279
2205	94	30.3	2.349	0.217	95	0.273	0.161	0.150
2206	79	32.1	2.278	0.182	94	0.107	0.204	0.164
2207	78	36.0	2.300	0.176	96	0.129	0.195	0.154
2208	69	39.8	2.271	0.186	97	0.087	0.210	0.145
2209	81	36.2	2.288	0.182	98	Coal		
2210	86	34.6	2.179	0.313	119	Coal		
2211	148	17.1	2.315	0.377	87	Coal		
2212	133	13.1	2.493	0.279	86	Coal		
2213	115	12.2	2.565	0.303	101	Coal		
2214	107	65.4	2.086	0.470	118	Coal		
2215	107	71.4	1.921	0.475	125	Coal		
2216	112	56.3	2.093	0.489	120	Coal		
2217	123	18.4	2.301	0.453	104	Coal		
2218	112	24.6	2.068	0.399	99	Coal		
2219	126	20.8	2.338	0.339	93	Coal		
2220	136	18.7	2.331	0.431	94	0.607	0.000	1.000
2221	96	9.5	2.517	0.233	81	0.498	0.025	1.000
2222	108	11.6	2.627	0.174	83	0.543	0.001	1.000
2223	107	20.6	2.505	0.200	75	0.455	0.056	0.356
2224	89	20.5	2.543	0.140	70	0.339	0.039	0.727
2225	141	13.8	2.543	0.294	83	0.725	0.000	1.000
2226	134	12.9	2.541	0.279	80	0.695	0.001	1.000
2227	142	14.2	2.578	0.288	82	0.767	0.000	1.000
2228	136	12.6	2.586	0.338	85	0.764	0.000	1.000
2229	149	13.0	2.553	0.364	88	0.834	0.000	1.000
2230	142	15.1	2.436	0.345	89	0.634	0.026	0.974
2231	96	12.6	2.470	0.231	91	0.409	0.091	0.358

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2232	108	9.9	2.457	0.198	80	0.432	0.090	0.474
2233	117	11.6	2.528	0.149	75	0.367	0.008	1.000
2234	130	8.9	2.457	0.258	87	0.583	0.036	0.873
2235	156	13.8	2.561	0.342	86	0.835	0.000	1.000
2236	150	15.6	2.697	0.325	85	Coal		
2237	120	48.1	2.128	0.453	124	Coal		
2238	127	19.6	2.613	0.437	93	Coal		
2239	129	14.3	2.415	0.278	88	0.524	0.001	1.000
2240	124	14.0	2.405	0.292	89	0.501	0.001	1.000
2241	110	29.3	2.701	0.232	65	0.596	0.001	1.000
2242	135	10.9	2.527	0.228	81	0.617	0.009	0.989
2243	123	9.1	2.521	0.225	81	0.573	0.025	0.962
2244	133	13.9	2.541	0.242	81	0.663	0.004	1.000
2245	142	16.5	2.561	0.273	81	0.702	0.000	1.000
2246	137	12.7	2.519	0.265	82	0.640	0.011	1.000
2247	115	11.8	2.520	0.236	83	0.528	0.047	0.587
2248	113	16.3	2.390	0.262	90	0.412	0.116	0.258
2249	83	9.3	2.339	0.225	85	0.198	0.150	0.419
2250	146	14.3	2.604	0.281	79	0.797	0.000	1.000
2251	140	15.3	2.585	0.315	78	0.791	0.000	1.000
2252	120	14.3	3.012	0.372	77	0.784	0.000	1.000
2253	157	12.6	2.572	0.327	87	0.852	0.000	1.000
2254	151	12.9	2.546	0.345	88	0.755	0.000	1.000
2255	157	14.9	2.553	0.347	85	0.803	0.000	1.000
2256	145	19.9	2.524	0.331	88	0.719	0.000	1.000
2257	108	9.5	2.563	0.226	81	0.503	0.033	0.901
2258	104	9.5	2.375	0.218	94	0.330	0.125	0.404
2259	96	9.5	2.339	0.214	86	0.269	0.152	0.366
2260	125	36.7	2.642	0.176	64	0.586	0.001	1.000
2261	140	12.9	2.503	0.214	75	0.489	0.017	1.000
2262	93	6.1	2.490	0.212	84	0.350	0.087	0.734
2263	118	9.1	2.518	0.265	81	0.558	0.032	0.862
2264	139	11.4	2.534	0.262	80	0.654	0.005	1.000
2265	146	14.4	2.545	0.304	82	0.690	0.001	1.000
2266	148	14.4	2.605	0.308	81	0.779	0.000	1.000
2267	139	15.9	2.578	0.313	76	0.747	0.000	1.000
2268	139	13.1	2.569	0.292	84	0.713	0.000	1.000
2269	143	13.8	2.550	0.331	83	0.737	0.000	1.000
2270	148	12.4	2.561	0.308	81	Coal		
2271	98	25.1	2.242	0.390	81	Coal		
2272	115	22.3	1.796	0.547	94	Coal		
2273	114	27.8	2.031	0.426	117	Coal		
2274	115	10.7	2.450	0.295	90	Coal		
2275	132	13.7	2.652	0.257	77	0.703	0.000	1.000
2276	140	11.4	2.579	0.251	78	0.739	0.000	1.000
2277	125	9.9	2.564	0.219	77	0.616	0.000	1.000
2278	155	14.0	2.569	0.282	80	0.799	0.000	1.000
2279	148	12.8	2.540	0.343	87	0.776	0.000	1.000
2280	146	14.3	2.559	0.273	81	0.773	0.000	1.000
2281	122	11.6	2.582	0.224	72	0.673	0.000	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2282	133	14.1	2.568	0.265	78	0.746	0.000	1.000
2283	123	16.1	2.782	0.272	75	0.704	0.000	1.000
2284	130	11.0	2.684	0.251	75	0.690	0.000	1.000
2285	148	12.9	2.565	0.279	80	0.765	0.000	1.000
2286	147	13.4	2.558	0.357	84	0.756	0.000	1.000
2287	168	11.7	2.563	0.361	88	0.847	0.000	1.000
2288	167	11.8	2.567	0.333	82	Coal		
2289	51	285.6	1.220	0.759	141	Coal		
2290	132	43.2	2.378	0.520	99	Coal		
2291	91	14.2	2.398	0.190	86	0.311	0.124	0.319
2292	90	15.4	2.340	0.184	89	0.178	0.150	0.302
2293	93	16.1	2.410	0.186	85	0.285	0.117	0.306
2294	91	14.3	2.395	0.170	84	0.253	0.121	0.344
2295	99	48.1	2.646	0.169	67	0.531	0.001	0.974
2296	125	16.9	2.617	0.186	77	0.613	0.000	1.000
2297	145	16.2	2.562	0.305	82	0.755	0.000	1.000
2298	143	13.3	2.589	0.316	82	0.768	0.000	1.000
2299	119	20.0	2.864	0.282	74	0.650	0.000	1.000
2300	114	10.1	2.490	0.216	79	0.483	0.059	0.656
2301	149	18.8	2.252	0.428	97	Coal		
2302	133	10.1	2.603	0.291	80	Coal		
2303	138	15.7	2.535	0.274	81	0.663	0.004	1.000
2304	143	12.5	2.521	0.281	81	0.647	0.008	1.000
2305	162	16.8	2.576	0.341	82	0.826	0.000	1.000
2306	145	17.5	2.597	0.323	80	0.728	0.000	1.000
2307	148	18.4	2.567	0.320	81	0.747	0.000	1.000
2308	104	10.5	2.459	0.262	82	0.461	0.056	0.634
2309	100	9.8	2.477	0.168	79	0.299	0.065	0.950
2310	140	17.3	2.548	0.263	80	0.723	0.000	1.000
2311	122	20.4	2.564	0.246	71	0.662	0.000	1.000
2312	129	12.5	2.553	0.249	80	0.663	0.001	1.000
2313	130	13.4	2.518	0.245	79	0.598	0.018	0.983
2314	140	11.8	2.527	0.233	79	0.633	0.005	1.000
2315	132	14.9	2.556	0.281	81	0.659	0.003	1.000
2316	137	18.8	2.545	0.283	74	0.701	0.000	1.000
2317	148	16.2	2.545	0.336	85	0.796	0.000	1.000
2318	146	15.6	2.573	0.331	84	0.844	0.000	1.000
2319	126	16.9	2.669	0.316	80	0.762	0.000	1.000
2320	145	15.6	2.593	0.341	83	0.831	0.000	1.000
2321	148	15.5	2.532	0.325	87	0.757	0.000	1.000
2322	139	15.0	2.580	0.289	76	Coal		
2323	128	17.6	1.840	0.542	117	Coal		
2324	135	13.9	2.612	0.308	80	Coal		
2325	149	20.2	2.526	0.337	113	Coal		
2326	43	786.4	1.227	0.650	144	Coal		
2327	51	623.0	1.277	0.651	143	Coal		
2328	119	31.3	2.140	0.582	108	Coal		
2329	143	13.9	2.519	0.234	78	Coal		
2330	139	20.8	2.535	0.256	77	0.695	0.000	1.000
2331	133	19.2	2.492	0.234	78	0.554	0.019	0.971

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2332	106	14.9	2.415	0.187	78	0.314	0.088	0.411
2333	74	10.5	2.385	0.182	87	0.192	0.132	0.415
2334	100	19.0	2.438	0.178	77	0.304	0.087	0.367
2335	106	12.5	2.509	0.211	81	0.454	0.060	0.513
2336	110	16.0	2.529	0.233	80	0.493	0.048	0.608
2337	143	26.9	2.562	0.282	79	0.718	0.000	1.000
2338	150	23.4	2.571	0.346	81	0.771	0.000	1.000
2339	130	27.5	2.808	0.310	74	0.718	0.000	1.000
2340	116	10.1	2.447	0.247	83	0.474	0.079	0.508
2341	95	10.4	2.447	0.209	83	0.387	0.089	0.506
2342	128	9.0	2.453	0.223	84	0.487	0.064	0.696
2343	111	14.8	2.598	0.214	80	0.530	0.008	0.998
2344	133	17.0	2.580	0.235	81	0.638	0.002	1.000
2345	108	9.3	2.446	0.216	81	0.424	0.082	0.570
2346	134	17.1	2.520	0.277	83	0.642	0.009	1.000
2347	112	23.2	2.327	0.455	119	Coal		
2348	141	29.4	2.290	0.437	94	Coal		
2349	141	25.9	2.450	0.312	84	0.687	0.000	1.000
2350	137	25.6	2.551	0.282	79	0.728	0.000	1.000
2351	142	23.2	2.531	0.284	80	Coal		
2352	117	67.9	1.673	0.594	119	Coal		
2353	113	17.4	2.543	0.297	74	Coal		
2354	165	30.6	2.501	0.337	86	0.815	0.000	1.000
2355	145	17.1	2.541	0.304	80	0.729	0.000	1.000
2356	157	30.8	2.506	0.280	81	0.719	0.000	1.000
2357	146	24.5	2.591	0.234	76	0.731	0.000	1.000
2358	94	18.1	2.444	0.215	84	0.356	0.094	0.302
2359	63	23.3	2.294	0.130	77	0.067	0.180	0.241
2360	98	108.6	2.706	0.107	58	0.407	0.001	1.000
2361	93	13.1	2.423	0.213	86	0.319	0.111	0.357
2362	99	22.9	2.376	0.206	82	0.254	0.137	0.219
2363	68	15.2	2.345	0.151	92	0.134	0.168	0.300
2364	132	27.3	2.674	0.225	109	Coal		
2365	68	68.3	1.391	0.682	176	Coal		
2366	37	299.3	1.769	0.631	144	Coal		
2367	101	34.4	1.760	0.710	156	Coal		
2368	154	22.5	2.406	0.460	100	Coal		
2369	151	25.7	2.551	0.290	76	Coal		
2370	121	19.7	2.528	0.224	77	0.566	0.016	1.000
2371	113	23.1	2.509	0.214	80	0.524	0.040	0.380
2372	107	16.9	2.480	0.217	80	0.442	0.067	0.388
2373	157	24.7	2.503	0.237	82	0.613	0.016	1.000
2374	103	26.1	2.487	0.173	78	0.382	0.069	0.265
2375	114	21.8	2.488	0.195	81	0.443	0.060	0.316
2376	108	23.9	2.416	0.237	85	0.406	0.109	0.181
2377	108	27.0	2.383	0.265	86	0.396	0.124	0.149
2378	85	44.5	2.642	0.150	68	0.423	0.001	1.000
2379	84	20.0	2.431	0.244	81	0.351	0.108	0.294
2380	71	13.2	2.408	0.188	89	0.239	0.135	0.325
2381	85	30.3	2.472	0.241	70	0.358	0.086	0.202

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2382	143	34.5	2.624	0.253	70	0.721	0.000	1.000
2383	143	41.9	2.211	0.403	93	Coal		
2384	153	28.6	2.604	0.226	72	0.758	0.000	1.000
2385	104	37.6	2.746	0.218	73	0.547	0.001	1.000
2386	88	14.5	2.419	0.180	85	0.302	0.102	0.377
2387	70	21.8	2.403	0.143	86	0.195	0.130	0.260
2388	56	25.6	2.281	0.121	91	0.028	0.198	0.220
2389	74	28.1	2.454	0.156	85	0.226	0.109	0.230
2390	61	33.7	2.377	0.150	90	0.129	0.156	0.188
2391	55	38.2	2.326	0.145	92	0.134	0.174	0.158
2392	45	96.8	2.165	0.079	93	0.078	0.216	0.083
2393	156	29.3	2.311	0.360	102	Coal		
2394	104	46.3	1.457	0.591	117	Coal		
2395	126	81.2	1.690	0.614	132	Coal		
2396	169	22.5	2.530	0.408	90	Coal		
2397	155	29.5	2.174	0.449	102	Coal		
2398	145	23.4	2.528	0.270	79	Coal		
2399	143	27.9	2.047	0.386	95	Coal		
2400	148	21.7	2.570	0.287	76	Coal		
2401	93	22.9	2.471	0.399	84	Coal		
2402	130	29.6	1.717	0.565	111	Coal		
2403	95	41.5	1.606	0.637	99	Coal		
2404	139	28.0	2.591	0.287	72	Coal		
2405	98	17.6	2.579	0.203	76	0.521	0.017	0.801
2406	56	10.5	2.369	0.152	87	0.129	0.158	0.382
2407	48	28.9	2.200	0.091	82	0.040	0.201	0.190
2408	61	175.0	2.689	0.020	61	0.178	0.001	1.000
2409	138	50.8	2.565	0.218	71	0.602	0.000	1.000
2410	95	16.9	2.443	0.209	79	0.334	0.093	0.343
2411	75	15.2	2.475	0.176	84	0.261	0.103	0.371
2412	116	19.0	2.425	0.164	83	0.311	0.097	0.301
2413	72	13.5	2.363	0.181	84	0.152	0.156	0.318
2414	60	11.5	2.399	0.152	86	0.137	0.145	0.384
2415	71	15.4	2.388	0.165	82	0.173	0.142	0.315
2416	84	13.9	2.415	0.164	82	0.230	0.118	0.366
2417	68	11.3	2.402	0.178	82	0.192	0.134	0.407
2418	57	9.6	2.397	0.160	82	0.144	0.145	0.428
2419	78	9.8	2.378	0.137	81	0.148	0.139	0.444
2420	136	21.8	2.604	0.217	74	0.633	0.000	1.000
2421	174	31.3	2.657	0.322	80	0.870	0.000	1.000
2422	156	29.6	2.636	0.308	79	0.810	0.000	1.000
2423	121	47.9	2.235	0.456	108	Coal		
2424	92	27.8	2.481	0.469	97	Coal		
2425	138	14.7	2.522	0.199	81	Coal		
2426	174	19.3	2.586	0.308	77	0.928	0.000	1.000
2427	167	19.2	2.587	0.275	74	0.846	0.000	1.000
2428	143	21.0	2.597	0.217	73	0.671	0.000	1.000
2429	165	22.6	2.612	0.266	75	0.834	0.000	1.000
2430	159	23.1	2.546	0.250	76	Coal		
2431	69	92.4	2.176	0.617	121	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2432	172	26.6	2.465	0.394	76	Coal		
2433	118	25.9	2.721	0.263	68	0.636	0.000	1.000
2434	113	10.6	2.538	0.197	73	0.502	0.020	1.000
2435	101	11.7	2.553	0.175	73	0.460	0.027	1.000
2436	87	7.2	2.448	0.227	79	0.357	0.099	0.592
2437	96	10.8	2.463	0.235	83	0.414	0.089	0.467
2438	68	3.4	2.459	0.191	79	0.264	0.106	0.948
2439	64	3.1	2.426	0.174	74	Coal		
2440	105	12.1	2.052	0.366	119	Coal		
2441	158	11.1	2.470	0.426	90	Coal		
2442	153	14.7	2.578	0.234	73	0.725	0.000	1.000
2443	161	15.0	2.588	0.238	73	0.729	0.000	1.000
2444	161	12.4	2.560	0.221	73	0.719	0.000	1.000
2445	104	4.6	2.470	0.196	80	0.379	0.074	0.979
2446	106	6.2	2.536	0.202	77	0.461	0.038	1.000
2447	150	10.0	2.556	0.215	76	0.645	0.000	1.000
2448	152	13.9	2.568	0.224	74	0.676	0.000	1.000
2449	135	10.4	2.549	0.206	75	0.579	0.004	1.000
2450	115	9.0	2.512	0.210	74	0.460	0.042	0.955
2451	101	25.3	2.758	0.151	62	0.455	0.001	1.000
2452	94	12.9	2.717	0.224	68	0.485	0.001	0.946
2453	104	29.3	2.808	0.156	55	0.450	0.001	1.000
2454	152	26.2	2.608	0.210	71	0.697	0.000	1.000
2455	155	26.3	2.618	0.265	76	0.740	0.000	1.000
2456	150	26.2	2.610	0.308	77	0.752	0.000	1.000
2457	150	22.5	2.600	0.311	80	0.758	0.000	1.000
2458	152	22.2	2.610	0.330	82	0.793	0.000	1.000
2459	152	23.0	2.589	0.311	81	0.799	0.000	1.000
2460	152	23.8	2.570	0.332	83	0.820	0.000	1.000
2461	153	25.0	2.589	0.331	79	0.844	0.000	1.000
2462	151	23.1	2.615	0.298	79	0.780	0.000	1.000
2463	154	22.0	2.585	0.302	83	Coal		
2464	131	45.3	1.859	0.429	110	Coal		
2465	159	28.6	2.068	0.525	99	Coal		
2466	120	76.5	1.764	0.474	152	Coal		
2467	61	422.9	1.284	0.692	134	Coal		
2468	77	104.4	1.261	0.669	120	Coal		
2469	140	41.9	1.693	0.542	108	Coal		
2470	159	25.5	2.607	0.243	70	Coal		
2471	143	28.0	2.591	0.207	71	0.715	0.000	1.000
2472	147	35.4	2.614	0.236	72	0.735	0.000	1.000
2473	147	27.2	2.569	0.232	73	0.740	0.000	1.000
2474	115	7.2	2.428	0.180	79	0.343	0.077	0.787
2475	81	7.0	2.442	0.186	84	Coal		
2476	137	38.9	1.753	0.515	99	Coal		
2477	157	27.7	2.461	0.275	79	Coal		
2478	163	25.7	2.497	0.324	87	0.790	0.000	1.000
2479	163	20.0	2.455	0.309	76	0.682	0.000	1.000
2480	161	26.7	2.485	0.447	101	Coal		
2481	127	125.8	1.534	0.642	117	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2482	135	31.2	2.092	0.557	104	Coal		
2483	142	26.0	2.595	0.239	73	Coal		
2484	136	24.8	2.584	0.204	73	0.621	0.000	1.000
2485	137	26.2	2.598	0.204	75	0.627	0.000	1.000
2486	134	29.7	2.586	0.206	74	0.630	0.000	1.000
2487	143	24.9	2.582	0.205	74	0.647	0.000	1.000
2488	131	24.2	2.590	0.261	76	0.688	0.000	1.000
2489	114	10.6	2.530	0.214	78	0.507	0.036	0.873
2490	130	21.8	2.520	0.191	75	0.505	0.016	1.000
2491	155	33.8	2.587	0.233	75	0.737	0.000	1.000
2492	140	20.2	2.578	0.243	76	0.714	0.000	1.000
2493	130	20.8	2.527	0.214	76	0.548	0.019	1.000
2494	108	21.3	2.542	0.214	78	0.524	0.027	0.863
2495	82	224.2	2.774	0.163	59	0.376	0.001	1.000
2496	113	13.6	2.528	0.177	74	0.445	0.025	1.000
2497	132	22.9	2.555	0.190	74	0.573	0.001	1.000
2498	126	23.3	2.563	0.183	74	0.567	0.001	1.000
2499	165	33.5	2.600	0.278	75	0.826	0.000	1.000
2500	181	27.5	2.580	0.331	88	Coal		
2501	102	32.7	2.039	0.587	129	Coal		
2502	152	18.2	2.513	0.477	83	Coal		
2503	118	73.9	1.586	0.536	125	Coal		
2504	36	510.4	1.218	0.757	137	Coal		
2505	79	199.6	1.367	0.646	134	Coal		
2506	85	129.7	1.368	0.679	119	Coal		
2507	119	48.8	1.696	0.555	128	Coal		
2508	41	650.0	1.176	0.725	137	Coal		
2509	112	88.6	1.504	0.780	117	Coal		
2510	165	21.3	2.455	0.365	88	Coal		
2511	155	29.9	2.438	0.352	101	Coal		
2512	133	62.5	2.047	0.538	117	Coal		
2513	155	39.2	2.442	0.368	90	Coal		
2514	142	38.1	2.565	0.272	73	Coal		
2515	128	35.4	2.599	0.224	78	0.649	0.000	1.000
2516	150	23.6	2.545	0.291	88	0.806	0.000	1.000
2517	158	35.2	2.029	0.459	102	Coal		
2518	121	32.1	1.680	0.532	115	Coal		
2519	141	31.5	2.205	0.584	94	Coal		
2520	153	23.7	1.937	0.546	100	Coal		
2521	153	25.6	2.089	0.455	115	Coal		
2522	109	46.4	1.385	0.619	123	Coal		
2523	169	47.8	2.452	0.344	86	Coal		
2524	161	53.4	2.619	0.290	77	0.815	0.000	1.000
2525	84	24.0	2.433	0.122	82	0.210	0.101	0.285
2526	59	25.2	2.329	0.126	91	0.067	0.174	0.224
2527	46	151.5	2.180	0.074	91	0.085	0.207	0.061
2528	47	69.8	2.174	0.073	95	0.071	0.214	0.104
2529	79	20.7	2.387	0.114	80	0.102	0.127	0.325
2530	93	22.0	2.529	0.142	76	0.355	0.045	0.467
2531	73	173.8	2.735	0.080	57	0.287	0.001	1.000

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2532	64	258.6	2.791	0.064	58	0.223	0.001	1.000
2533	81	51.0	2.557	0.078	66	0.190	0.024	0.799
2534	81	15.3	2.477	0.152	80	0.243	0.092	0.415
2535	81	18.5	2.494	0.150	79	0.246	0.084	0.388
2536	80	15.0	2.478	0.156	79	0.224	0.095	0.407
2537	85	16.3	2.545	0.145	77	0.299	0.054	0.666
2538	98	20.7	2.528	0.173	78	0.397	0.050	0.411
2539	80	18.1	2.485	0.165	80	0.306	0.083	0.362
2540	78	16.6	2.531	0.137	71	0.305	0.052	0.685
2541	78	17.9	2.480	0.154	79	0.241	0.091	0.399
2542	82	15.2	2.501	0.155	79	0.262	0.081	0.468
2543	86	18.3	2.509	0.161	77	0.254	0.078	0.413
2544	79	17.2	2.456	0.164	79	0.205	0.107	0.359
2545	75	16.6	2.461	0.163	77	0.207	0.103	0.367
2546	79	17.9	2.482	0.157	79	0.237	0.090	0.379
2547	63	14.8	2.499	0.169	81	0.207	0.098	0.421
2548	59	15.8	2.381	0.174	85	0.149	0.154	0.287
2549	82	15.2	2.387	0.165	85	0.198	0.134	0.307
2550	148	60.4	2.533	0.256	88	Coal		
2551	154	46.0	2.414	0.387	107	Coal		
2552	33	593.7	1.232	0.680	133	Coal		
2553	36	1120.0	1.683	0.509	81	Coal		
2554	33	1993.0	1.225	0.633	143	Coal		
2555	144	29.2	2.017	0.471	96	Coal		
2556	150	43.6	2.140	0.632	114	Coal		
2557	140	46.2	2.179	0.533	120	Coal		
2558	143	36.8	1.983	0.443	106	Coal		
2559	167	22.9	2.598	0.309	81	Coal		
2560	165	30.9	2.449	0.394	96	Coal		
2561	161	28.8	2.509	0.457	92	Coal		
2562	106	18.9	2.550	0.170	76	0.408	0.030	0.862
2563	195	8.4	2.563	0.396	95	Coal		
2564	130	55.5	1.516	0.484	120	Coal		
2565	156	65.1	2.548	0.366	81	Coal		
2566	111	27.9	2.530	0.190	74	0.444	0.041	0.393
2567	69	18.1	2.408	0.139	88	0.171	0.137	0.283
2568	67	33.6	2.335	0.162	94	0.144	0.175	0.161
2569	58	44.6	2.301	0.173	91	0.076	0.195	0.140
2570	58	51.4	2.373	0.170	87	0.131	0.161	0.132
2571	56	42.4	2.361	0.164	88	0.094	0.170	0.157
2572	60	28.9	2.343	0.162	88	0.090	0.175	0.197
2573	90	36.0	2.443	0.172	95	Coal		
2574	138	75.3	1.946	0.553	109	Coal		
2575	126	35.1	2.620	0.291	81	Coal		
2576	124	41.7	2.601	0.245	76	0.662	0.000	1.000
2577	127	62.1	2.585	0.234	73	0.655	0.000	1.000
2578	134	47.7	2.587	0.263	79	0.717	0.000	1.000
2579	107	24.7	2.388	0.307	97	0.466	0.139	0.286
2580	63	11.6	2.371	0.141	89	0.140	0.156	0.346
2581	95	18.2	2.595	0.186	79	0.476	0.018	0.844

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2582	151	45.2	2.529	0.299	82	0.758	0.000	1.000
2583	128	34.7	2.576	0.231	77	0.645	0.000	1.000
2584	121	35.1	2.596	0.192	74	0.592	0.001	1.000
2585	125	38.6	2.598	0.203	75	0.625	0.000	1.000
2586	130	36.4	2.586	0.211	73	0.632	0.000	1.000
2587	113	66.3	2.718	0.203	67	0.572	0.001	1.000
2588	134	43.2	2.589	0.223	75	0.664	0.000	1.000
2589	132	39.5	2.563	0.239	78	0.657	0.002	1.000
2590	133	32.8	2.530	0.263	84	0.638	0.009	0.993
2591	145	38.0	2.478	0.314	92	Coal		
2592	97	188.3	1.498	0.561	125	Coal		
2593	54	814.1	1.327	0.666	132	Coal		
2594	38	2754.0	1.201	0.699	136	Coal		
2595	160	28.8	2.465	0.480	96	Coal		
2596	115	22.0	2.575	0.156	72	0.497	0.001	1.000
2597	106	20.3	2.537	0.148	72	0.403	0.021	0.987
2598	97	23.7	2.566	0.142	72	0.407	0.019	0.999
2599	116	23.6	2.461	0.150	74	0.274	0.067	0.379
2600	87	15.5	2.435	0.098	76	0.105	0.102	0.448
2601	77	26.7	2.313	0.124	86	0.033	0.173	0.233
2602	74	43.6	2.367	0.104	84	0.043	0.151	0.197
2603	69	61.1	2.357	0.120	80	0.019	0.156	0.168
2604	71	53.3	2.366	0.129	78	0.029	0.150	0.183
2605	68	50.7	2.342	0.118	82	0.011	0.165	0.183
2606	74	39.7	2.393	0.117	80	0.048	0.138	0.224
2607	71	35.5	2.329	0.142	79	0.022	0.169	0.209
2608	75	38.6	2.395	0.119	78	0.056	0.134	0.227
2609	64	25.6	2.394	0.114	77	Coal		
2610	105	30.5	2.419	0.373	88	Coal		
2611	90	10.8	2.488	0.129	73	0.237	0.069	0.627
2612	92	11.2	2.398	0.135	74	0.118	0.110	0.532
2613	63	22.1	2.484	0.082	70	0.084	0.081	0.454
2614	74	21.4	2.417	0.105	75	0.060	0.115	0.359
2615	75	21.1	2.405	0.109	76	0.051	0.123	0.351
2616	74	21.3	2.417	0.115	76	0.079	0.118	0.341
2617	72	25.9	2.415	0.104	73	0.060	0.114	0.331
2618	70	20.8	2.407	0.119	77	0.079	0.123	0.331
2619	76	14.7	2.358	0.141	82	0.068	0.151	0.339
2620	92	25.9	2.498	0.090	69	0.152	0.063	0.465
2621	66	10.6	2.400	0.114	76	0.024	0.137	0.469
2622	61	7.9	2.398	0.111	77	0.016	0.140	0.540
2623	72	8.9	2.396	0.131	82	Coal		
2624	153	16.0	2.381	0.403	93	Coal		
2625	101	18.6	1.858	0.450	105	Coal		
2626	144	10.0	2.617	0.207	88	Coal		
2627	151	11.0	2.616	0.228	78	0.736	0.000	1.000
2628	99	4.0	2.449	0.168	76	0.277	0.083	0.984
2629	80	2.8	2.393	0.107	76	0.080	0.120	1.000
2630	102	3.7	2.438	0.161	78	0.246	0.098	0.916
2631	91	3.2	2.412	0.137	76	0.133	0.112	0.990

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2632	114	5.6	2.497	0.147	77	0.335	0.057	1.000
2633	81	6.2	2.541	0.163	74	0.310	0.051	1.000
2634	66	3.5	2.467	0.063	70	0.061	0.080	1.000
2635	66	2.7	2.491	0.074	71	0.093	0.074	1.000
2636	70	2.0	2.414	0.103	75	0.047	0.118	1.000
2637	73	2.0	2.388	0.100	75	0.033	0.130	1.000
2638	67	2.2	2.437	0.095	74	0.047	0.111	1.000
2639	76	2.2	2.426	0.098	74	0.055	0.107	1.000
2640	80	2.9	2.476	0.100	74	0.121	0.087	1.000
2641	82	2.5	2.442	0.118	76	0.143	0.100	1.000
2642	156	6.7	2.572	0.190	77	0.605	0.000	1.000
2643	150	10.9	2.571	0.244	81	0.710	0.000	1.000
2644	141	13.5	2.555	0.254	79	0.620	0.009	1.000
2645	160	13.2	2.557	0.313	85	0.759	0.000	1.000
2646	156	15.1	2.545	0.291	84	0.722	0.000	1.000
2647	164	15.4	2.527	0.337	85	0.773	0.000	1.000
2648	99	30.0	1.916	0.333	72	Coal		
2649	162	5.7	2.171	0.314	84	Coal		
2650	104	4.2	2.472	0.156	76	0.275	0.080	1.000
2651	72	2.0	2.372	0.135	78	0.062	0.143	1.000
2652	79	1.9	2.378	0.150	81	0.106	0.144	1.000
2653	72	2.1	2.403	0.134	79	0.103	0.133	1.000
2654	94	2.9	2.452	0.151	79	0.255	0.094	1.000
2655	85	1.9	2.426	0.162	84	0.233	0.117	1.000
2656	92	3.3	2.495	0.153	78	0.296	0.074	1.000
2657	92	2.6	2.445	0.180	80	0.284	0.102	1.000
2658	70	1.8	2.404	0.144	80	0.144	0.127	1.000
2659	128	8.8	2.505	0.211	80	0.512	0.042	0.840
2660	91	5.6	2.443	0.108	79	0.179	0.089	0.874
2661	88	5.1	2.415	0.125	68	0.121	0.097	0.908
2662	102	5.0	2.473	0.184	75	0.293	0.087	0.867
2663	79	2.3	2.421	0.156	81	0.164	0.124	1.000
2664	76	2.8	2.513	0.137	70	0.217	0.070	1.000
2665	123	3.4	2.443	0.126	76	0.219	0.072	1.000
2666	117	4.4	2.523	0.193	79	0.432	0.051	1.000
2667	68	2.3	2.413	0.123	76	0.086	0.122	1.000
2668	80	2.1	2.525	0.127	78	0.192	0.071	1.000
2669	72	1.9	2.400	0.103	77	0.029	0.129	1.000
2670	70	2.0	2.405	0.120	76	0.049	0.132	1.000
2671	84	1.8	2.393	0.128	76	0.051	0.132	1.000
2672	71	2.5	2.466	0.088	70	0.055	0.096	1.000
2673	75	1.4	2.377	0.140	79	0.064	0.145	1.000
2674	82	1.7	2.348	0.147	76	0.083	0.146	1.000
2675	135	2.5	2.628	0.162	78	0.546	0.001	1.000
2676	145	11.4	2.588	0.255	74	0.663	0.000	1.000
2677	77	4.4	2.444	0.101	74	0.099	0.098	0.968
2678	81	3.9	2.469	0.123	75	0.168	0.095	0.969
2679	144	3.8	2.497	0.253	82	Coal		
2680	89	29.9	1.458	0.647	132	Coal		
2681	117	19.2	2.449	0.184	80	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2682	131	33.7	2.466	0.286	83	Coal		
2683	147	14.4	2.552	0.325	95	Coal		
2684	146	21.8	2.552	0.222	75	Coal		
2685	156	35.5	2.335	0.350	111	Coal		
2686	153	17.5	2.573	0.194	71	0.633	0.000	1.000
2687	131	17.0	2.529	0.189	75	0.521	0.016	1.000
2688	125	17.8	2.567	0.197	75	0.593	0.003	0.816
2689	114	13.3	2.543	0.153	77	Coal		
2690	152	9.2	2.049	0.390	99	Coal		
2691	125	21.3	2.498	0.190	79	Coal		
2692	135	24.8	2.093	0.429	98	Coal		
2693	124	17.4	2.237	0.299	82	Coal		
2694	114	14.7	-2.394	0.163	83	Coal		
2695	164	13.9	2.167	0.209	76	Coal		
2696	147	16.4	-0.924	0.229	76	Coal		
2697	146	15.1	2.001	0.351	88	Coal		
2698	96	9.6	2.033	0.155	80	Coal		
2699	114	10.6	4.749	0.169	78	Coal		
2700	155	17.6	2.601	0.216	73	Coal		
2701	148	14.4	2.602	0.226	78	Coal		
2702	136	16.7	2.163	0.443	106	Coal		
2703	146	20.5	2.647	0.231	74	Coal		
2704	154	20.2	2.623	0.229	74	0.723	0.000	1.000
2705	142	13.8	2.546	0.209	79	0.616	0.004	0.925
2706	148	19.4	2.500	0.262	79	Coal		
2707	153	18.1	2.186	0.343	87	Coal		
2708	118	10.2	2.440	0.159	79	0.309	0.078	0.614
2709	118	26.9	2.700	0.153	64	0.551	0.001	1.000
2710	112	11.4	2.494	0.182	71	0.383	0.055	0.689
2711	69	4.7	2.393	0.162	82	0.174	0.138	0.632
2712	110	11.0	2.778	0.191	72	0.532	0.001	1.000
2713	95	4.7	2.405	0.157	77	0.195	0.102	0.912
2714	109	6.4	2.460	0.179	76	0.343	0.068	0.874
2715	119	6.4	2.609	0.193	75	0.546	0.001	1.000
2716	146	12.6	2.556	0.194	74	0.577	0.001	1.000
2717	141	17.4	2.462	0.262	79	Coal		
2718	142	27.5	1.694	0.507	107	Coal		
2719	124	14.7	2.502	0.172	78	Coal		
2720	126	19.9	2.613	0.214	76	0.627	0.000	1.000
2721	147	15.3	2.368	0.299	82	0.459	0.033	0.941
2722	100	19.5	2.503	0.136	77	0.336	0.057	0.412
2723	88	13.7	2.514	0.153	80	0.320	0.064	0.528
2724	128	17.5	4.072	0.247	74	Coal		
2725	170	11.2	2.582	0.403	93	Coal		
2726	133	22.7	2.518	0.200	74	Coal		
2727	104	15.0	2.442	0.175	80	0.328	0.083	0.373
2728	129	17.2	2.653	0.222	78	Coal		
2729	102	19.6	2.448	0.269	93	Coal		
2730	98	17.1	2.213	0.199	83	0.189	0.122	0.313
2731	167	24.8	1.816	0.495	92	Coal		

DEPTH (mRKB)	GR api	RT ohmm	RHOB g/cc	NPHI frac	DT us/m	VWCLAY frac	PHIE frac	SWE frac
2732	143	8.3	2.492	0.277	91	Coal		
2733	162	16.1	2.561	0.196	75	0.656	0.000	1.000
2734	126	16.5	2.594	0.195	73	0.571	0.001	1.000
2735	94	9.8	2.440	0.198	82	0.338	0.098	0.469
2736	174	25.0	2.525	0.227	76	Coal		
2737	105	20.2	2.631	0.136	76	Coal		
2738	115	21.0	2.496	0.193	80	Coal		
2739	168	21.7	2.545	0.266	77	0.734	0.000	1.000
2740	127	N	2.529	0.177	72	Nul	0.000	0.000

APPENDIX 3

APPENDIX 3

APPENDIX 3

TURRUM 5

MDT Analysis

TURRUM-5 MDT INTERPRETATION

VIC/L3 Bass Strait

Ocean Bounty

13th-16th September 1995

Mike Scott

Reservoir Technology

Production Department

Contents

Attachments:

1.0 Summary and Conclusions

Turrum-5 was spud 08:00hrs 23rd September 1995, reached TD at 11:30hrs 11th October 1995 and the rig was released from location at 22:30hrs 23rd October 1995. The well is located in VIC production licence L3 at 5765878 m North and 605099 m East (Latitude: 38 14' 55.83"N, Longitude: 148 12' 3.99"E) and lies approximately 1.9 km west of the Marlin-A platform in 60m of water.

Turrum-5 is a vertical well, drilled to a total depth of 2755 m with a KB height of 25 metres. The well encountered the Marlin gas reservoir with top of latrobe group at 1386.5 m MDRKB (1361.5 m TVDSS), top of coarse clastics at 1395 m MDRKB (1370 m TVDSS) and a number of Turrum oil and gas reservoirs were encountered between 2075 m MDRKB (2050 m TVDSS) and TD.

The MDT obtained 71 pressure survey points (54 apparently valid, 12 tight, 2 potentially supercharged, 2 seal failures and 1 repeated due to operator error) and attempted 28 samples in 6 runs. The full MDT pressure dataset is demonstrated in Figure 1.

The conclusions of the MDT interpretation are:

1. A gas-water contact for the Marlin reservoir is interpreted at 1493.4 m TVDSS. The gas bearing sands above this depth are all in communication which is demonstrated by the common gas pressure gradient (Figure 2). The aquifer sands below the gas-water contact are also in good communication. The Marlin gas cap at this location demonstrates a 226 psi pressure drop (89 psi hydrostatic and 137 psi aquifer decline).

2. Relative to the original aquifer, the current aquifer pressures in the Turrum reservoirs range from drawn-down by 38 psi to over-pressured by 8 psi (Figures 3 & 6). Because of this complex pressure regime it is difficult to interpret definitive free water contacts for the Turrum hydrocarbon systems.

3. In the Turrum reservoirs the MDT interpretation has identified 4 gas reservoirs, 1 potential gas cap and 3 oil reservoirs. In combination with the preliminary log analysis, an interpretation for 1 potential gas reservoir and 2 potential oil or gas reservoirs is also proposed. Figures 3 to 6 detail the interpretations.

4. The sampling program planned for Turrum-5 was relatively unsuccessful. This was caused by problems with the MDT power supply, telemetry system, bottle operation and the low permeable formations. However, the MDT was successful in capturing oil in the reservoirs at 2523 m TVDSS and 2545 m TVDSS.

2.0 Marlin @ TOL Interpretation

Figure 2 details the MDT interpretation for the Marlin reservoir at TOL. As can be seen from Figure 2, a gas-water contact is interpreted at 1493.4 m TVDSS. The gas sands above this depth are all in communication, which is demonstrated by the common gas gradient of 0.19 psi/m. The water sands below the gas-water contact are also in good communication.

The gas contact for Marlin has risen 62.6 m since discovery - original gas contact is interpreted to be 1556m TVDSS. This rise of water contact represents a hydrostatic head pressure decline of 89 psi. The total pressure drop in the gas sands from original to current is 226 psi (89 psi hydrostatic and 137 psi aquifer decline).

3.0 Figure 3 - Turrum-5 MDT 2150-2300 m TVDSS Interpretation

Figure 3 shows the upper Turrum reservoirs.

The upper sand in Figure 3 has an calculated gas gradient of 0.25 psi/m. Extrapolating the gas gradient to the original aquifer pressure results in a gas-water contact at 2224.64 m TVDSS.

An apparently valid pretest (#1/24) at 2233.5 m TVDSS would indicate that the aquifer in this area may be slightly overpressured and an equally likely gas-water contact for this upper sand could be interpreted at 2217.88 m TVDSS.

Connecting the two pretests (#1/26 & #1/28) at approximately 2268 m TVDSS results in a gradient of 0.947 psi/m which suggests that this interval could be oil. Although the pretests appear valid, pretest #1/26 has a calculated mobility of 65.4 md/cp and pretest #1/28 has a calculated mobility of 9.1 md/cp and therefore there exists the potential that this formation is slightly supercharged. Extrapolating the 0.947 psi/m gradient to the original aquifer pressure yields a potential oil-water contact at 2414.9 m TVDSS. Preliminary log analysis reveals that this sand could however be a gas sand. Using a gas gradient of 0.25 psi/m with pretest #1/26 (which has a larger mobility than #1/28) yields a potential gas-water contact with the original aquifer pressure at 2326.9 m TVDSS. This formation was not sampled and therefore the hydrocarbon content of the reservoir cannot be confirmed. Due to the unknown aquifer pressure in this area and the potential that the sand is supercharged there is low confidence in the interpretation.

4.0 Figure 4 - Turrum-5 MDT 2325-2450 m TVDSS Interpretation

Figure 4 summarises the central Turrum gas reservoirs. As can be seen from Figure 4, potentially up to 5 gas sands have been identified.

Pretests #1/32 and #1/33 yield a gas gradient of 0.319 psi/m and a potential gas-water contact with the original aquifer pressure at 2361.0 m TVDSS.

Pretest #1/34 at 2354.4 m TVDSS may indicate a separate gas system to the gas reservoir identified by points #1/36, #1/37 and #1/38 at 2365.0 m TVDSS. Point #1/34 has a calculated mobility of 0.5 md/cp however and has the potential to be supercharged. Using the original aquifer pressure and a gas gradient of 0.268 psi/m (calculated using points #1/36, 37 and 38), the lower gas sand has a calculated gas-water contact at 2389.9 m TVDSS and the upper gas sand has a calculated contact at 2392.4 m TVDSS. An alternate explanation is that the lower sand is better quality than the upper sand and the difference in pressures is due to differential drawdown.

Pretests #1/40 to #1/42 yield a gas gradient of 0.316 psi/m and a potential gas-water contact with the original aquifer pressure of 2408.97 m TVDSS.

Pretest #1/68 at 2413.3 m TVDSS has been identified a a hydrocarbon sand by preliminary log analysis. However, as there is only one pretest in the sand, there is insufficient data to calculate a gradient or hydrocarbon-water contact. The sand is assumed to be gas and therefore applying an average gas gradient of 0.3 psi/m yields a gas-water contact with the original aquifer pressure at 2473.83 m TVDSS. Pretest #1/68 has a calculated mobility of 11.2 md/cp and has the potential to be supercharged. This sand was not sampled to confirm the hydrocarbon content.

As can be seen from Figure 4, there are no aquifer pressures through this section. Because the aquifer pressure is therefore unknown, the calculated gas-water contacts are open to interpretation.

5.0 Figure 5a, 5b, 5c - Turrum-5 MDT 2490-2570 m TVDSS Interpretation

Figure 5a summarises a complicated system of oil and gas reservoirs.

At 2502 m TVDSS, pretests #1/44 and #1/45 return a calculated gas gradient of 0.467 psi/m. This gradient indicates that this is a very heavy gas system - potentially caused by a high concentration of CO_2, high liquids content, combination of both CO_2 and liquids or invalid pretest pressures. If the gas is not in communication with the oil system below, the gas-water contact with the original aquifer pressure would be at 2582.8 m TVDSS.

The most likely interpretation, inferred from the lack of obvious seal, is that the gas reservoir at 2502 m TVDSS is in communication with the oil reservoir below at 2522 m TVDSS.

It is difficult to make a definitive interpretation in the oil system at 2522 m TVDSS. The gradient between pretests #1/71 and #1/49 is 1.286 psi/m which is too heavy to be an oil gradient and, as can be seen from Figure 5a, the other pressure data points scatter around 3723 psia and no pressure gradient can be logically calculated from the dataset. The data scatter has potentially three causes:

1. The formation is poor quality and some, or all, of the pretests are supercharged.

2. Sample runs 2 to 6 had the primary objective of confirming the hydrocarbon content of the formation and therefore the MDT tool did not have sufficient time for temperature stabilisation prior to obtaining the pretest pressures.

3. Due to the tight nature of the formation the samples were not permitted sufficient time to buildup to original reservoir pressure before the chambers were sealed and/or the tool retracted.

In the absence of any other data, it has been assumed that pretest #1/49 is more representative of the formation pressure than pretest #1/71 because pretest #1/49 has a higher mobility than #1/71 (123.1 md/cp compared to 63.5 md/cp).

There are two other data points introducing further complexity to the interpretation:

1. Fluid analysis data on preserved sample #S6/5 at 2548.6 m MDRKB indicates that the oil density at reservoir conditions is 0.705 gm/cc, which is equivalent to an oil gradient of 1.0 psi/m. Using this gradient with pretest #1/49, the interpreted OWC with the original aquifer pressure is calculated to be 2672.1 m TVDSS. This depth however conflicts with the current geological interpretation and would place low proved oil below high proved water (2653 m TVDSS) in the Turrum-4 well according to the current geological correlation, and assuming that the eastern flank of the field has the same fluid contacts as the western flank.

In addition, sample #6/5 only recovered 100cc of oil and was the last chamber to be filled following extensive sampling and pressure drawdown and therefore this oil may not be representative of the reservoir fluids. Visual inspection of the dead crude from the reservoirs at 2522 m TVDSS and 2545 m TVDSS also indicates that they are very similar in appearance which throws further doubt on the validity of the preserved sample. As a sensitivity, an oil gradient of 0.833 psi/m (which is the gradient from the oil reservoir at 2545 m TVDSS) would yield an OWC with the original aquifer pressure at 2629.7 m TVDSS, which does not conflict with the Turrum-4 data. Both interpretations are detailed in Figure 5a.

2. The well-site core description sheets for Core 4 (2526.8-2544.8 m MDRKB) in Turrum-5 reports the start of oil fluorescence around 2518 m TVDSS and this has been interpreted to be a potential gas-oil-contact. The data from the well-site core description sheets is as follows:

Core depth (m MDRKB)	Core shift (metres)	Core Depth (m TVDSS)	Fluorescence Description
2538.65	+3.4	2517.05	0% fluorescence
2539.65	+3.4	2518.05	"pinpoint" fluorescence
2540.65	+3.4	2519.05	80% fluorescence

As can be seen from Figure 5a, using pretest #1/49 and oil gradients of 1.0 psi/m and 0.833 psi/m, the interpreted gas-oil contacts lie above 2518 m TVDSS. This has two potential explainations:

a) Pretest #1/49 is slightly supercharged and the actual reservoir pressure is lower.

b) Pretest #1/49 is valid and either the core fluorescence is not a gas-oil indicator or the gas and oil systems are not in communication.

If the core fluorescence is a gas oil indicator, then the gas-oil contact could be assessed to lie at 2518 m TVDSS ± 1 metre. Forcing the oil gradients of 1.0 psi/m and 0.833 psi/m through 2518 m TVDSS results in OWC's with the original aquifer at 2664.9 m TVDSS and 2623.1 m TVDSS respectively. Figure 5b details this interpretation.

The UV photographs of the slabbed core will aid in identifying the actual fluorescence start depth.

As can be seen from above, the MDT data does not aid in confirming if the gas and oil systems are in communication.

Figure 5c shows the intersection of the oil gradients with the original aquifer pressure and the table below summarises the interpretations.

Anchor point	Oil Gradient (psi/m)	GOC (m TVDSS)	OWC (m TVDSS)
Pretest #1/49	1.0	2512.4	2672.1
Pretest #1/49	0.833	2507.5	2629.7
Core fluorescence @ 2518.0 m TVDSS	1.0	2518.0	2664.9
Core fluorescence @ 2518.0 m TVDSS	0.833	2518.0	2623.1

Due to the poor quality and conflicting data no definitive interpretation can be made for the reservoir at 2522 m TVDSS.

The reservoir at 2545 m TVDSS has an interpreted oil gradient of 0.833 psi/m, between pretests #1/52 and #1/51, and this yields an oil-water contact with the original aquifer pressure at 2621.1 m TVDSS. Log analysis indicates a gas-oil contact at 2543.0 m TVDSS but there is no pressure data to confirm this. Sample #S2/7 recovered oil with an API of 43.2 degrees.

Preliminary log analysis indicates that pretest #1/53 is most probably in a hydrocarbon system. A light gas gradient of 0.25 psi/m would yield a gas-water contact with the original aquifer pressure at 2590.1 and an oil gradient of 0.833 psi/m would yield an oil-water contact with the original aquifer pressure at 2624.8 m TVDSS.

6.0 Figure 6 - Turrum-5 MDT 2570-2650 m TVDSS Interpretation

Figure 6 demonstrates the interpretation for the lower Turrum oil system. As can be seen from Figure 6 there would appear to be two reservoirs at a very similar pressure - the pressure difference between the reservoirs is only 2.22 psi. A more likely interpretation is that the reservoir system is common and that the upper reservoir, which is slightly better quality, is more drawn down than the lower reservoir.

Based on the maximum drawndown aquifer pressure (pretest #1/66), the maximum interpreted oil-water contact (at 2596.59 m TVDSS) is slightly shallower than the log analysis oil on rock depth (at 2598.0 m TVDSS). This discrepancy is probably caused by using the incorrect aquifer pressure related to this oil reservoir. It is recommended that the lowest proven oil depth of 2598.0 m TVDSS is used as the hydrocarbon-water contact.

As can be seen from Figure 6, the aquifer below 2600 m TVDSS is in variable communication to the Gippsland aquifer. In general the deeper sections appear to be in better communication than the shallower sections.

7.0 Turrum-5 MDT Sampling

The MDT attempted to capture twenty eight (28) samples in six (6) runs. However, due to problems with the MDT power supply, telemetry system, bottle operation and the low permeable reservoirs, the sampling was relatively unsuccessful. Out of 28 attempted samples; 7 samples returned measurable hydrocarbons, 7 samples were empty, 7 samples returned mud filtrate, 3 samples were unsuccessful due to tool failure, 2 samples were not obtained because the probe set was unsuccessful, 1 sample could not be taken because of tool plugging and 1 sample was aborted because the OFA indicated only filtrate.

Sample #2/7 captured 100cc of oil at 2545.5 m TVDSS. The gas volume associated with this oil was too small to measure and the oil volume too small to obtain an accurate API gravity. The average oil density was measured by weighing the volume of oil recovered. This resulted in a calculated oil density of 0.81 g/cc which yields an API gravity of 43.2 degrees.

Sample #2/8 successfully sampled 121.4 cuft of gas at 2576.5 m TVDSS. The reported CO_2 concentration in the gas sample is 10 MOL%.

Run #6 successfully demonstrated the presence of hydrocarbons in the reservoirs at 2545 m TVDSS and 2523 m TVDSS.

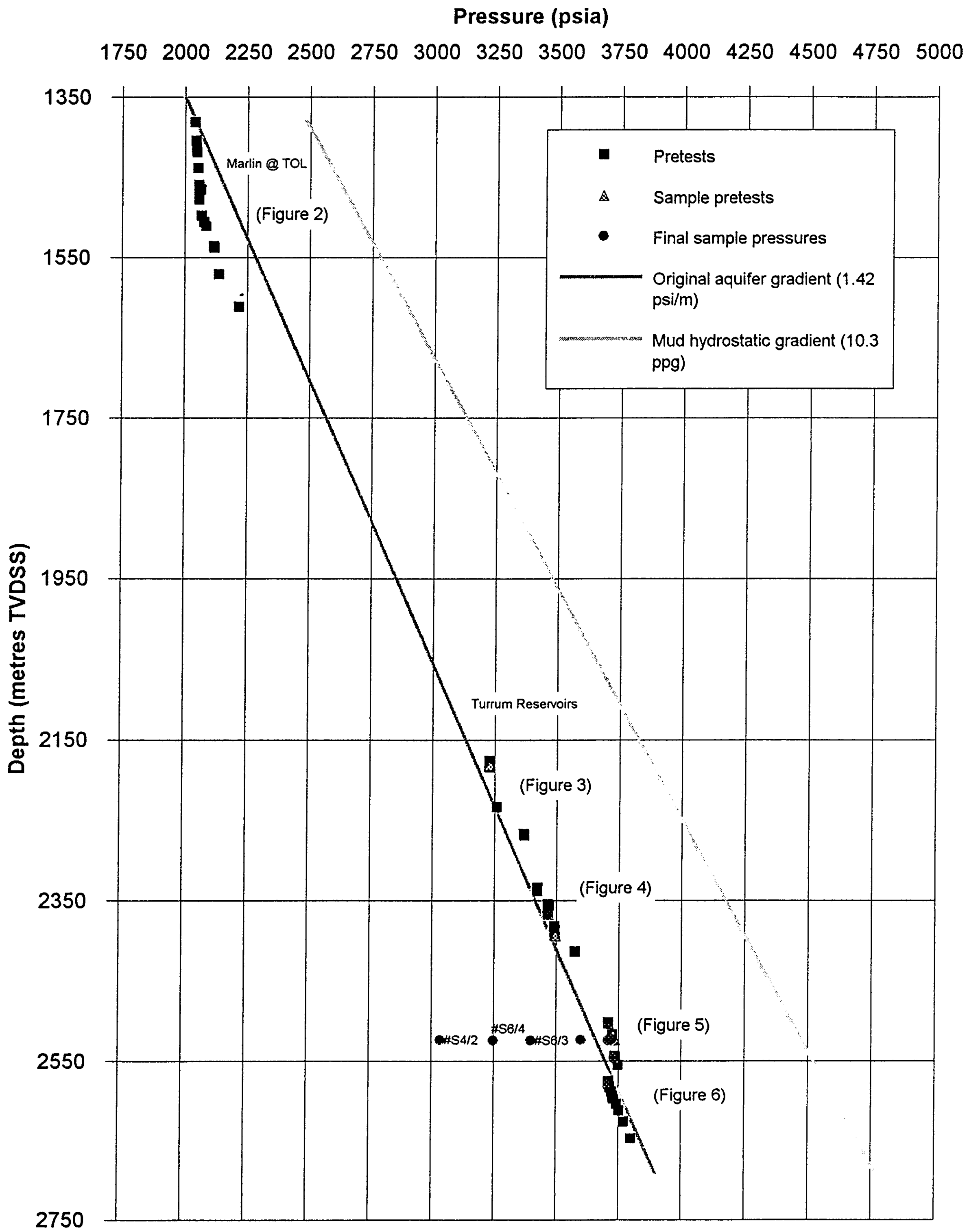
At 2545 m TVDSS, the MDT pump out module pumped 60 litres from the reservoir and then captured two 1 gallon chambers of oil (samples #6/1 and #6/2). The total time to capture this oil from tool set to tool retract was 1 hour and 36 minutes. The oil recovered has an API gravity of 42 degrees and a GOR of 1248.7 scf/stb. The reported CO_2 concentration is 10 MOL%.

At 2523 m TVDSS, the 12 gallon chamber (sample #6/3) was used as a dump chamber to flush the mud filtrate from the formation, the MDT pump out module then pumped approximately 4 litres of fluid and then two 2-3/4 gallon chambers of oil were captured (samples #6/4, #6/5). The total time to capture this oil from tool set to tool retract was 11 hours and 7 minutes. The oil recovered has an API gravity of 41 degrees and a GOR of 504 scf/stb. The reported CO_2 concentration varies between 5 MOL% and 20 MOL% and demonstrates the inadequacies of the MDT for sampling critical fluid concentrations.

Sample #6/5 was preserved and sent to Core Laboratories in Perth for further analysis.

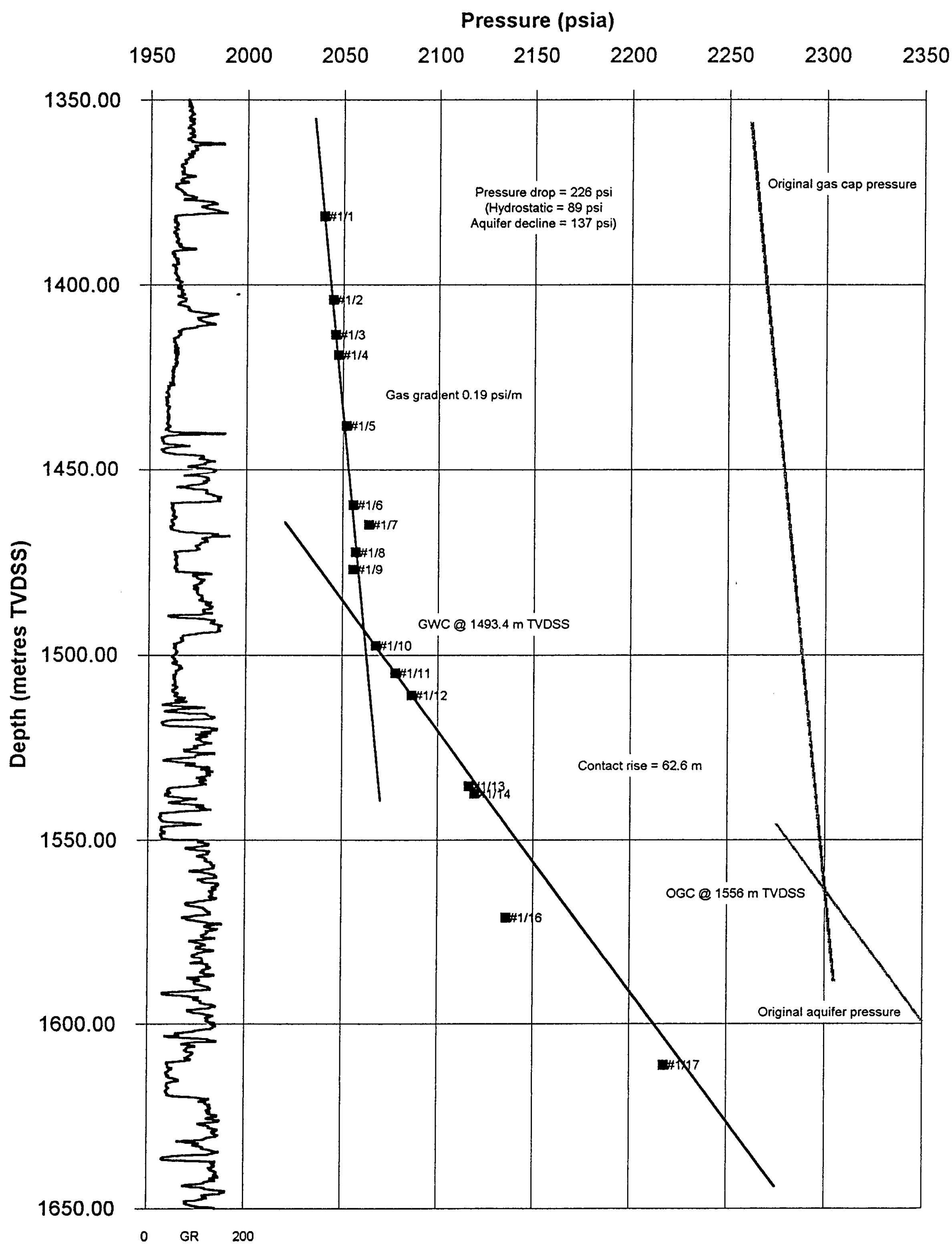
Table 1, attached with the MDT fluid sampling sheets, summarises the MDT fluid sampling.

Figure 1 - Turrum-5 MDT - Full Pressure Dataset



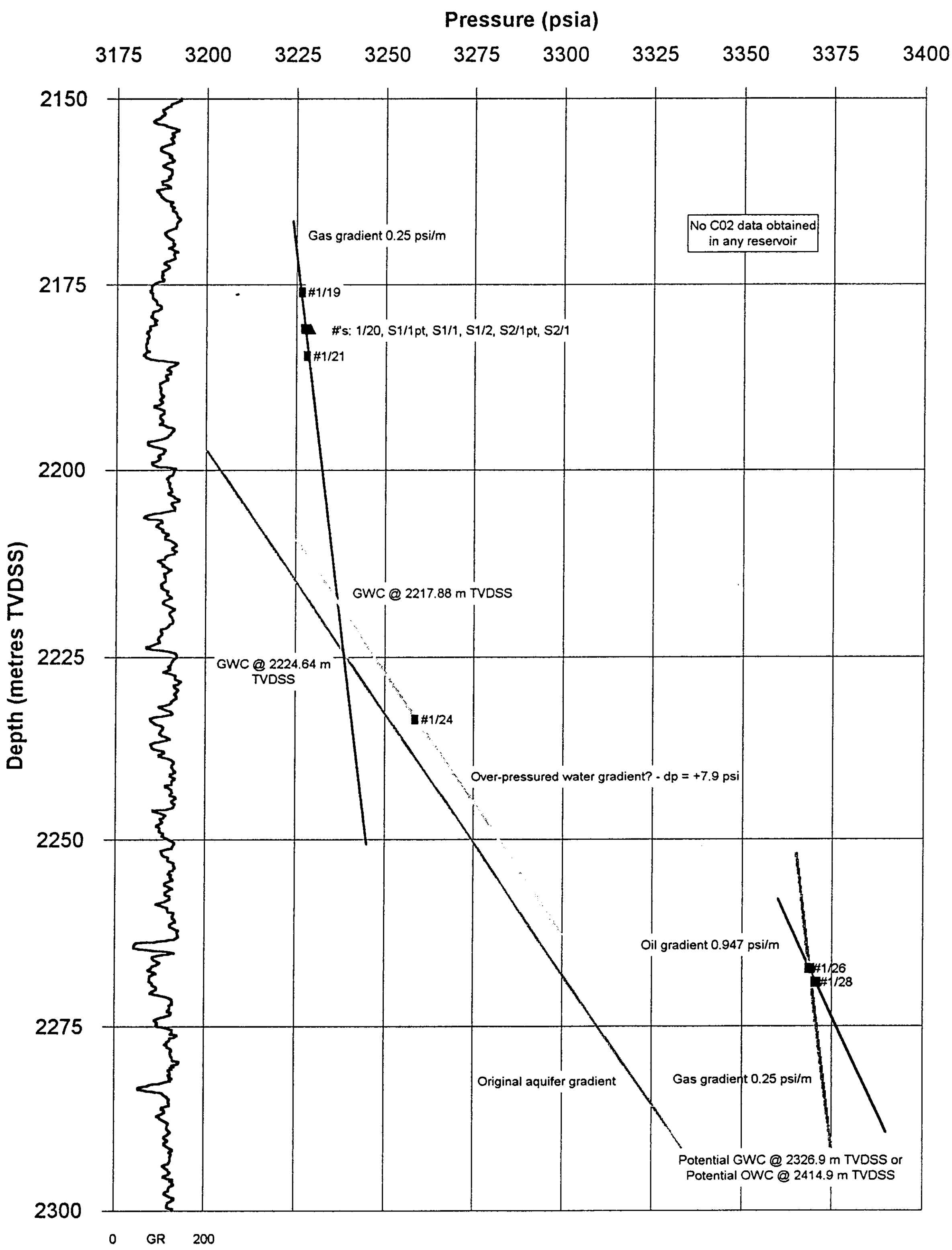
(MTS/ResTech/T5_MDTF1.XLS/8/12/95)

Figure 2 - Turrum-5 MDT - MARLIN @ TOL



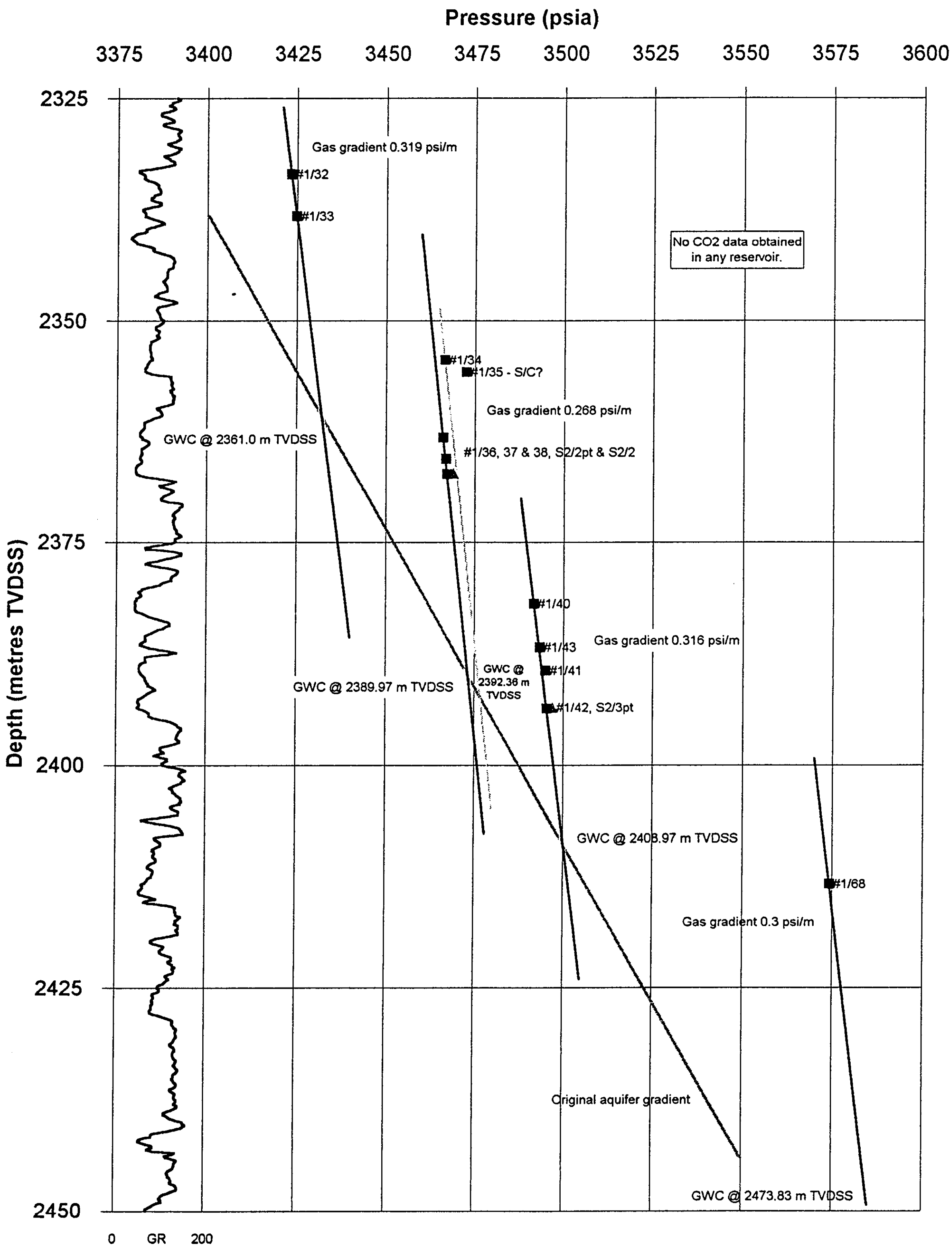
(MTS/ResTech/T5_TOL.XLS/8/12/95)

Figure 3 - Turrum-5 MDT - 2150-2300 m TVDSS



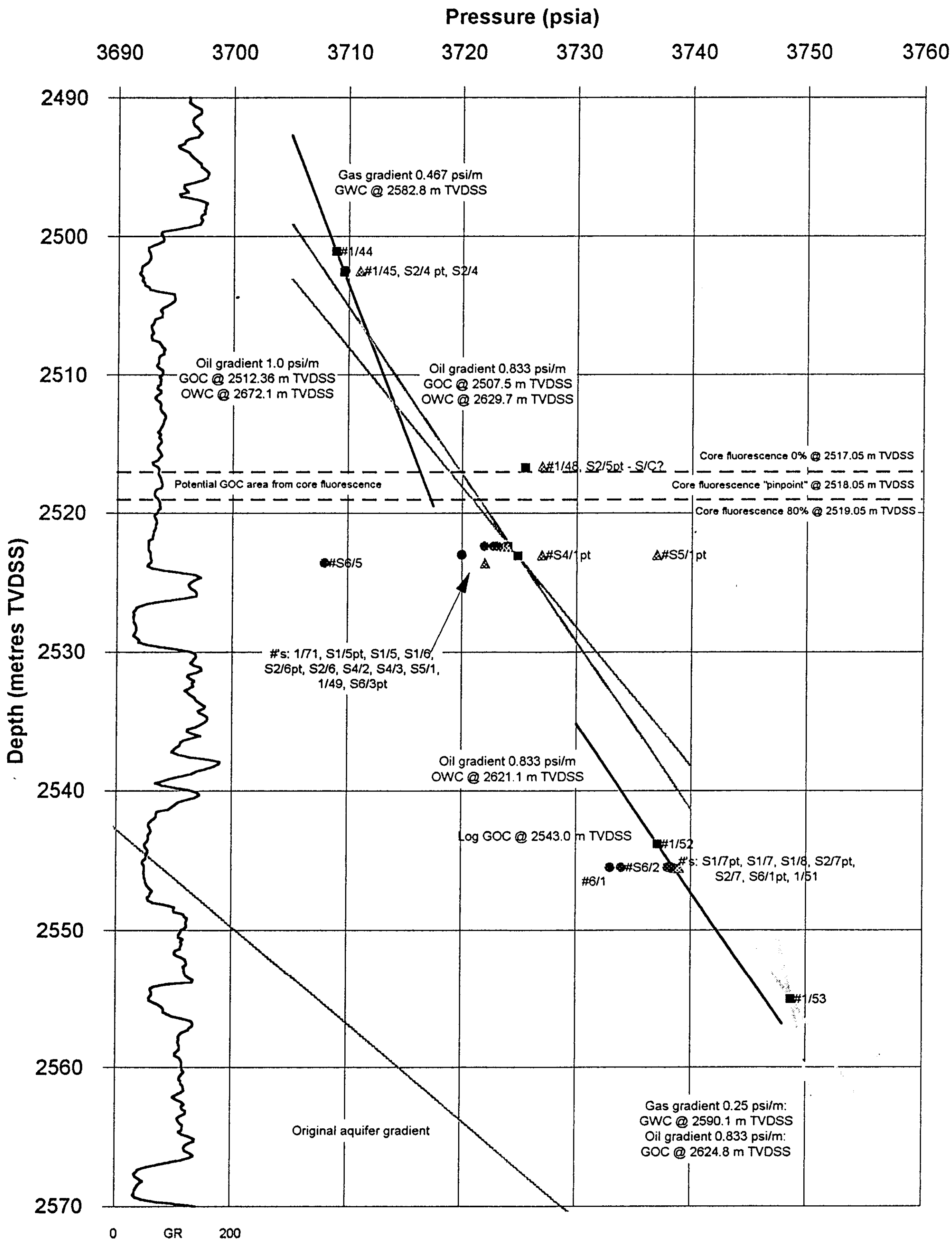
(MTS/ResTech/T5_MDTF3.XLS/18/01/96)

Figure 4 - Turrum-5 MDT - 2325-2450 m TVDSS



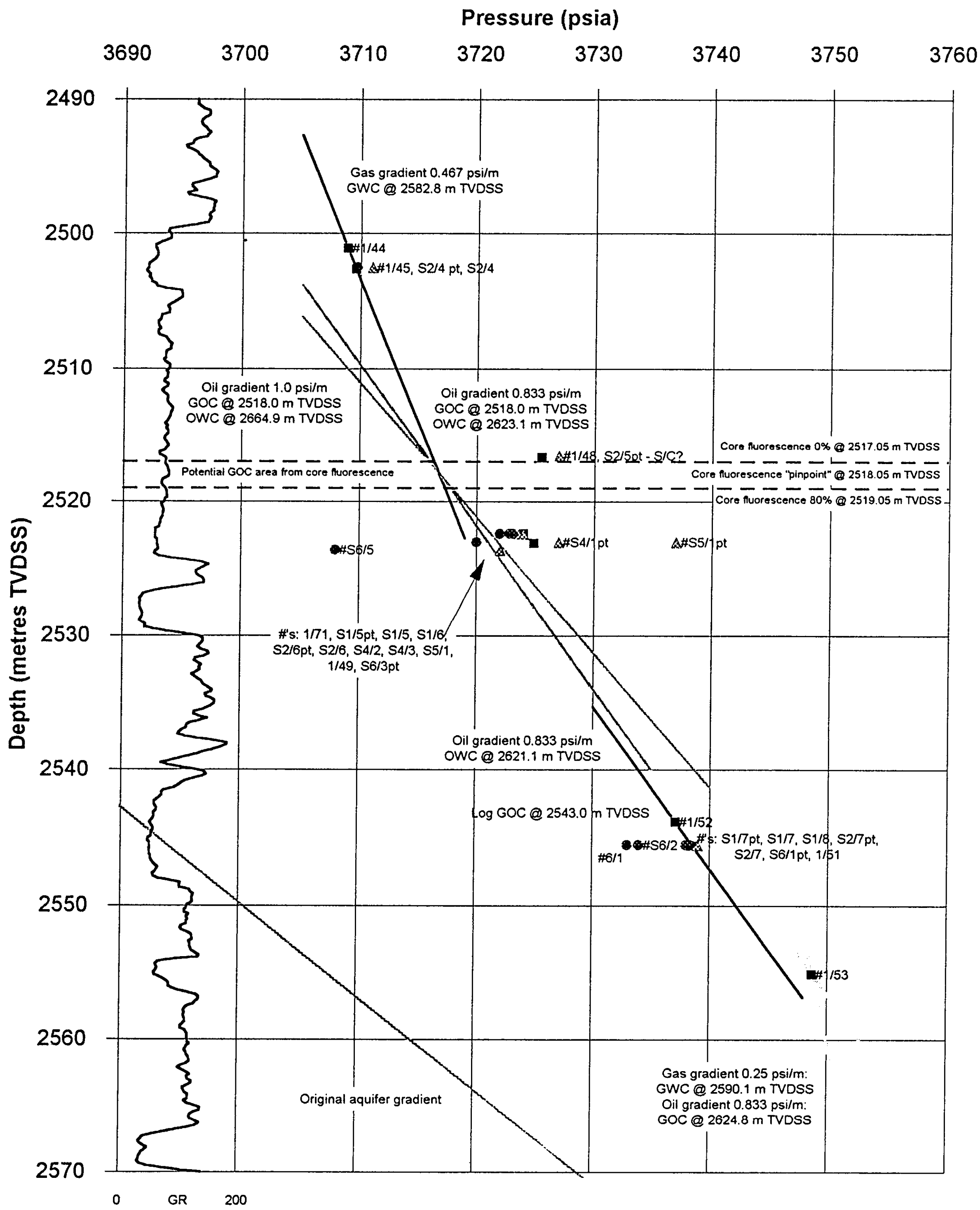
(MTS/ResTech/T5_MDTF4.XLS/12/12/95)

Figure 5a - Turrum-5 MDT - 2490-2570 m TVDSS



(MTS/ResTech/T5_MDTF5.XLS/31/01/96)

Figure 5b - Turrum-5 MDT - 2490-2570 m TVDSS. Alternative interpretation matching core fluorescence @ 2518.0 m TVDSS.



(MTS/ResTech/T5_MDTF5.XLS/1/02/96)

Figure 5c - Turrum-5 MDT - 2490-2570 m TVDSS. Depth scale extended to show OWC intersections with original aquifer.

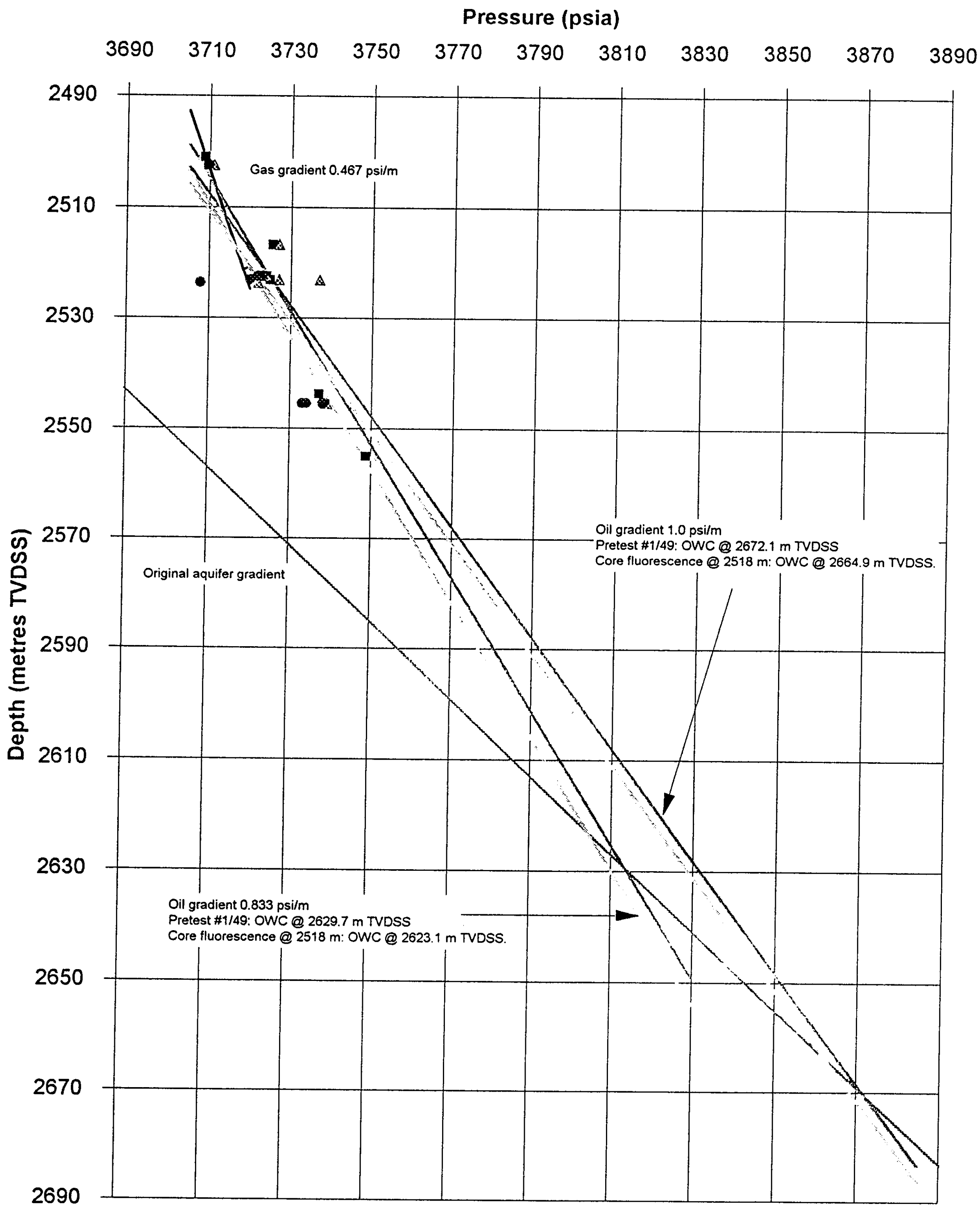
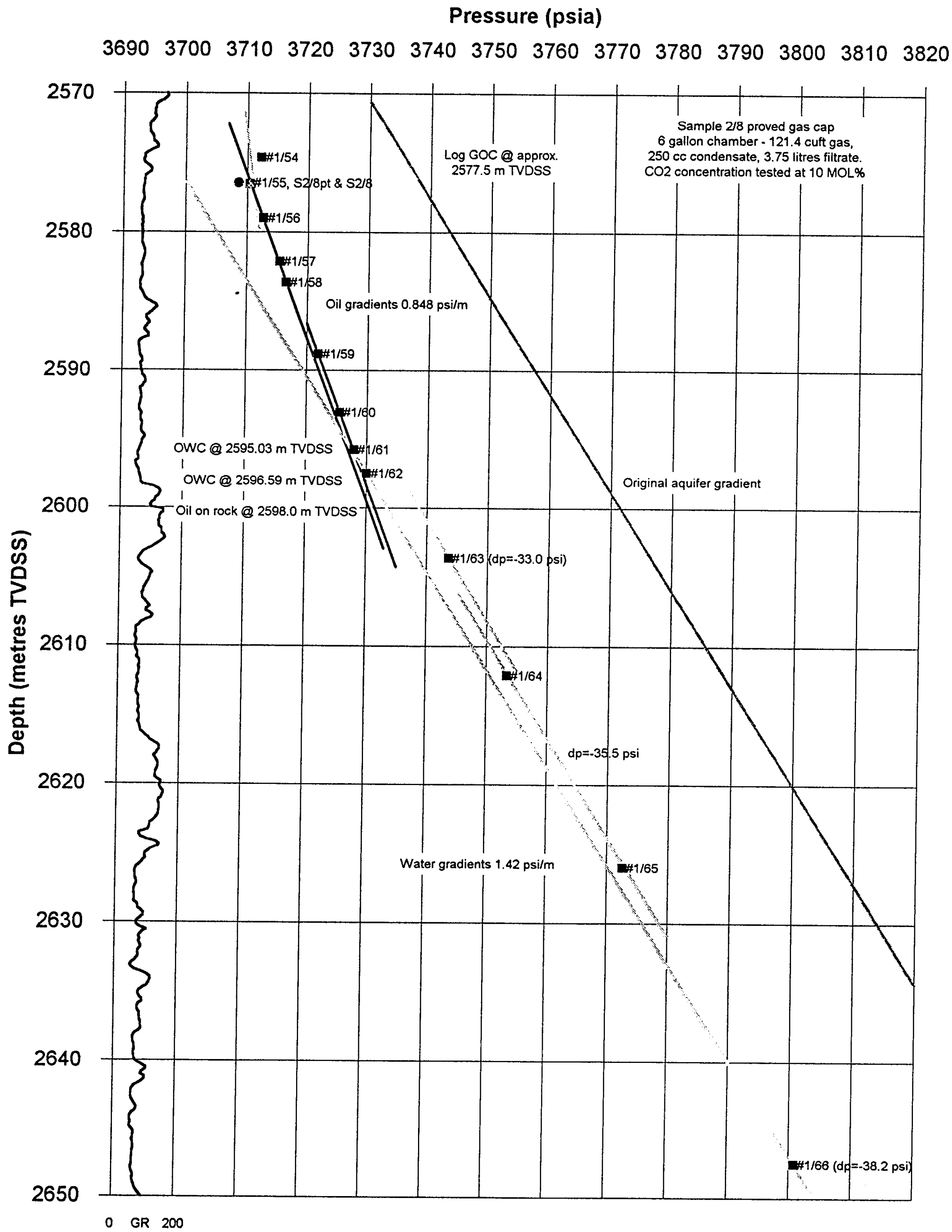


Figure 6 - Turrum-5 MDT - 2570-2650 m TVDSS



(MTS/ResTech/T5_MDTF6.XLS/29/11/95)

ESSO AUSTRALIA LTD - PRESSURE DATA FORM

Well	**TURRUM-5**	Page	**1 of 8**
Date	**13-Sep-95**	Geologist-Engineer	**Mike Scott**
Tool Type (MDT, RFT)	**Schlumberger MDT**	KB (metres):	**25**
Gauge Type	**CQG**	Probe type	**Long nose**
Pressure units (psia, psig)	**PSIA**	Temperature units (degF, degC)	**degC**

Run-Seat Number (P=Pretest S=Sample)	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/1 P	1406.5	1381.5	2482	10.4	4:14	410.1	2040.0	8.5	72.7	4:19	2481	10.4	05:00	20cc pretests set MD/CP=12.8
1/2 P	1429.1	1404.1	2521	10.4	4:29	2040.8	2044.6	8.4	73.0	4:32	2521	10.4	03:00	MD/CP=1494.5
1/3 P	1438.6	1413.6	2537	10.3	4:37	2023.1	2046.1	8.3	73.4	4:41	2536	10.3	04:00	MD/CP=175.8
1/4 P	1444.1	1419.1	2547	10.4	4:45	2040.5	2047.7	8.3	73.5	4:48	2546	10.3	03:00	MD/CP=520.2
1/5 P	1463.4	1438.4	2580	10.3	4:53	2036.6	2051.7	8.2	73.8	4:57	2580	10.3	04:00	MD/CP=425.2
1/6 P	1484.6	1459.6	2617	10.3	5:04	2051.2	2055.6	8.1	74.4	5:09	2617	10.3	05:00	MD/CP=569.7
1/7 P	1490.0	1465.0	2627	10.3	5:13	2052.8	2063.7	8.1	74.9	5:21	2626	10.3	08:00	Slow buildup but apparently good pt. MD/CP=149.6
1/8 P	1497.5	1472.5	2640	10.3	5:25	2054.6	2056.9	8.1	75.3	5:30	2640	10.3	05:00	MD/CP=795.6
1/9 P	1502.1	1477.1	2648	10.3	5:34	2055.4	2055.6	8.0	75.7	5:37	2648	10.3	03:00	MD/CP=37067.3
1/10 P	1522.6	1497.6	2685	10.3	5:48	2067.0	2067.3	8.0	76.2	5:51	2684	10.3	03:00	MD/CP=25031.0

ESSO AUSTRALIA LTD - PRESSURE DATA FORM

Well	**TURRUM-5**	Page	2 of 8
Date	**13-Sep-95**	Geologist-Engineer	**Mike Scott**
Tool Type (MDT, RFT)	**Schlumberger MDT**	KB (metres):	**25**
Gauge Type	**CQG**	Probe type	**Long nose**
Pressure units (psia, psig)	**PSIA**	Temperature units (degF, degC)	**degC**

Run-Seat Number	P=Pretest S=Sample	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/11	P	1530.0	1505.0	2697	10.3	5:54	2077.5	2077.7	8.0	76.4	5:57	2697	10.3	03:00	MD/CP=40138.5
1/12	P	1536.0	1511.0	2707	10.3	6:01	2084.3	2086.1	8.0	76.6	6:05	2707	10.3	04:00	MD/CP=4406.3
1/13	P	1560.5	1535.5	2751	10.3	6:11	2067.6	2116.4	8.0	76.9	6:14	2751	10.3	03:00	MD/CP=143.7
1/14	P	1562.6	1537.6	2754	10.3	6:17	2118.9	2119.3	8.0	77.1	6:20	2754	10.3	03:00	MD/CP=36390.6
1/15	P	1573.0	1548.0	2773	10.3	6:24	414.3	-	-	77.2	6:27	2773	10.3	03:00	Aborted - tight coal bed MD/CP=0
1/16	P	1596.1	1571.1	2812	10.3	6:33	2121.8	2136.0	7.9	77.7	6:36	2812	10.3	03:00	MD/CP=497.3
1/17	P	1636.3	1611.3	2883	10.3	6:42	2216.9	2217.7	8.0	78.6	6:45	2883	10.3	03:00	MD/CP=7281.5
1/18	P	2196.0	2171.0	3859	10.3	7:34	384.0	-	-	91.4	7:37	3859	10.3	03:00	Aborted - tight MD/CP=0
1/19	P	2201.0	2176.0	3868	10.3	7:42	2866.6	3227.0	8.6	92.6	7:47	3868	10.3	05:00	10cc pretests set MD/CP=11.9
1/20	P	2206.0	2181.0	3877	10.3	7:50	3215.5	3227.6	8.6	93.0	7:53	3877	10.3	03:00	20cc pretests set MD/CP=582.0

ESSO AUSTRALIA LTD - PRESSURE DATA FORM

Well	**TURRUM-5**	Page	**3 of 8**
Date	**13-Sep-95**	Geologist-Engineer	**Mike Scott**
Tool Type (MDT, RFT)	**Schlumberger MDT**	KB (metres):	**25**
Gauge Type	**CQG**	Probe type	**Long nose**
Pressure units (psia, psig)	**PSIA**	Temperature units (degF, degC)	**degC**

Run-Seat Number (P=Pretest S=Sample)	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/21 P	2209.6	2184.6	3883	10.3	7:57	3182.0	3228.5	8.6	93.2	8:00	3883	10.3	03:00	MD/CP=165.5
1/22 P	2221.6	2196.6	3904	10.3	8:06	293.3	-	-	92.9	8:09	3904	10.3	03:00	Aborted - tight MD/CP=0
1/23 P	2236.3	2211.3	3930	10.3	8:15	311.2	-	-	93.2	8:18	3929	10.3	03:00	Aborted - tight MD/CP=0
1/24 P	2258.5	2233.5	3969	10.3	8:26	3231.6	3259.0	8.5	94.2	8:30	3969	10.3	04:00	10cc pretests set MD/CP=255.7
1/25 P	2290.9	2265.9	4025	10.3	8:36	441.1	-	-	95.2	8:46	4025	10.3	10:00	Aborted - tight MD/CP=0
1/26 P	2292.2	2267.2	4028	10.3	8:50	3273.5	3368.8	8.6	95.3	8:53	4028	10.3	03:00	MD/CP=65.4
1/27 P	2294.1	2269.1	4032	10.3	8:57	2576.1	-	-	95.4	9:01	4032	10.3	04:00	Lost seat MD/CP=n/a
1/28 P	2294.1	2269.1	4031	10.3	9:00	2688.0	3370.6	8.6	95.6	9:08	4031	10.3	08:00	MD/CP=9.1
1/29 P	2299.6	2274.6	4041	10.3	9:14	273.1	-	-	95.9	9:18	4041	10.3	04:00	Aborted - tight MD/CP=0
1/30 P	2332.0	2307.0	4091	10.3	9:27	307.7	-	-	95.6	9:32	4091	10.3	05:00	Aborted - tight MD/CP=0

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Well	TURRUM-5	Page	4 of 8
Date	13-Sep-95	Geologist-Engineer	Mike Scott
Tool Type (MDT, RFT)	Schlumberger MDT	KB (metres):	25
Gauge Type	CQG	Probe type	Long nose
Pressure units (psia, psig)	PSIA	Temperature units (degF, degC)	degC

Run-Seat Number	P=Pretest S=Sample	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/31	P	2333.6	2308.6	4101	10.3	9:36	381.1	-	-	95.9	9:40	4101	10.3	04:00	Aborted - tight MD/CP=0
1/32	P	2358.6	2333.6	4144	10.3	9:47	3418.5	3423.4	8.5	96.9	9:50	4144	10.3	03:00	MD/CP=939.2
1/33	P	2363.3	2338.3	4153	10.3	9:54	3415.7	3424.9	8.5	97.3	9:58	4153	10.3	04:00	MD/CP=162
1/34	P	2379.4	2354.4	4181	10.3	10:03	1736.7	3466.5	8.5	98.0	10:16	4181	10.3	13:00	Tight sand but apparently good pt. MD/CP=0.5
1/35	P	2380.8	2355.8	4184	10.3	10:20	1423.5	3472.5	8.6	98.5	10:34	4184	10.3	14:00	Tight sand - potential seal leak MD/CP=0.5
1/36	P	2388.2	2363.2	4197	10.3	10:41	3190.3	3466.1	8.5	99.0	10:46	4197	10.3	05:00	MD/CP=18.5
1/37	P	2390.6	2365.6	4202	10.3	10:54	3100.4	3466.9	8.5	99.4	10:57	4202	10.3	03:00	MD/CP=14.4
1/38	P	2392.3	2367.3	4205	10.3	11:01	3464.1	3467.2	8.5	99.7	11:05	n/a	######	04:00	Final hydrostatic not observed-operator error MD/CP=n/a
1/39	P	2392.3	2367.3	4205	10.3	11:10	3464.7	3467.2	8.5	99.8	11:14	4205	10.3	04:00	Point 1/38 re-done MD/CP=1491.3
1/40	P	2406.9	2381.9	4230	10.3	11:20	3347.4	3491.7	8.5	99.8	11:23	4230	10.3	03:00	MD/CP=51.2

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Well	**TURRUM-5**	Page	**5 of 8**
Date	**13-Sep-95**	Geologist-Engineer	**Mike Scott**
Tool Type (MDT, RFT)	**Schlumberger MDT**	KB (metres):	**25**
Gauge Type	**CQG**	Probe type	**Long nose**
Pressure units (psia, psig)	**PSIA**	Temperature units (degF, degC)	**degC**

Run-Seat Number	P=Pretest S=Sample	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/41	P	2414.3	2389.3	4242	10.3	11:28	3441.5	3495.1	8.5	100.1	11:33	4243	10.3	05:00	MD/CP=96.7
1/42	P	2418.6	2393.6	4251	10.3	11:38	3492.0	3495.4	8.5	100.6	11:42	4251	10.3	04:00	MD/CP=1235.2
1/43	P	2411.7	2386.7	4239	10.3	11:46	3485.4	3493.4	8.5	100.7	11:49	4239	10.3	03:00	MD/CP=516.4
1/44	P	2526.1	2501.1	4438	10.3	12:17	3584.6	3708.9	8.6	103.9	12:21	4437	10.3	04:00	MD/CP=37.4
1/45	P	2527.6	2502.6	4440	10.3	12:25	3654.9	3709.6	8.6	104.1	12:29	4439	10.3	04:00	MD/CP=87.3
1/46	P	2534.1	2509.1	4451	10.3	12:32	1932.7	-	-	105.0	12:40	4451	10.3	08:00	Aborted - supercharged MD/CP=0.3
1/47	P	2538.5	2513.5	4458	10.3	12:44	1717.8	-	-	104.8	12:50	4458	10.3	06:00	Aborted - tight MD/CP=2.5
1/48	P	2541.7	2516.7	4464	10.3	12:54	3462.8	3725.5	8.6	106.1	12:58	4464	10.3	04:00	MD/CP=26.2
1/49	P	2548.1	2523.1	4476	10.3	13:02	3694.4	3724.9	8.6	106.8	13:06	4476	10.3	04:00	MD/CP=123.1
1/50	P	2568.3	2543.3	4511	10.3	13:12	1754.3	-	-	107.1	13:16	4511	10.3	04:00	Aborted - tight MD/CP=53.0

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Well	TURRUM-5	Page	6 of 8
Date	13-Sep-95	Geologist-Engineer	Mike Scott
Tool Type (MDT, RFT)	Schlumberger MDT	KB (metres):	25
Gauge Type	CQG	Probe type	Long nose
Pressure units (psia, psig)	PSIA	Temperature units (degF, degC)	degC

Run-Seat Number	P=Pretest S=Sample	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/51	P	2570.6	2545.6	4515	10.3	13:24	3702.5	3738.6	8.5	108.5	13:28	4515	10.3	04:00	MD/CP=127.6
1/52	P	2568.8	2543.8	4512	10.3	13:31	3663.8	3737.1	8.5	109.0	13:34	4512	10.3	03:00	MD/CP=21.5
1/53	P	2580.1	2555.1	4532	10.3	13:41	3610.9	3748.7	8.5	109.7	13:44	4532	10.3	03:00	MD/CP=38.5
1/54	P	2599.7	2574.7	4566	10.3	13:51	2358.8	3712.3	8.4	111.0	13:57	4566	10.3	06:00	MD/CP=3.2
1/55	P	2601.6	2576.6	4569	10.3	14:01	3679.1	3710.4	8.4	111.7	14:04	4569	10.3	03:00	MD/CP=214.9
1/56	P	2604.0	2579.0	4574	10.3	14:09	3562.9	3712.7	8.4	112.4	14:14	4574	10.3	05:00	MD/CP=33.9
1/57	P	2607.1	2582.1	4579	10.3	14:18	3598.8	3715.4	8.4	113.0	14:22	4579	10.3	04:00	MD/CP=40.5
1/58	P	2608.6	2583.6	4582	10.3	14:26	3478.4	3716.5	8.4	113.6	14:31	4582	10.3	05:00	MD/CP=22.3
1/59	P	2613.8	2588.8	4591	10.3	14:36	3503.0	3721.9	8.4	113.9	14:40	4591	10.3	04:00	MD/CP=18.7
1/60	P	2618.1	2593.1	4599	10.3	14:45	3295.7	3725.5	8.4	114.5	14:50	4598	10.3	05:00	MD/CP=14.6

ESSO AUSTRALIA LTD - PRESSURE DATA FORM

Well	TURRUM-5	Page	7 of 8
Date	13-Sep-95	Geologist-Engineer	Mike Scott
Tool Type (MDT, RFT)	Schlumberger MDT	KB (metres):	25
Gauge Type	CQG	Probe type	Long nose
Pressure units (psia, psig)	PSIA	Temperature units (degF, degC)	degC

Run-Seat Number (P=Pretest S=Sample)	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/61 P	2620.8	2595.8	4604	10.3	14:54	3548.9	3727.9	8.3	115.0	14:57	4604	10.3	03:00	MD/CP=38.2
1/62 P	2622.5	2597.5	4607	10.3	15:02	3395.3	3730.0	8.3	115.3	15:05	4607	10.3	03:00	MD/CP=14.6
1/63 P	2628.6	2603.6	4619	10.3	15:10	2434.6	3743.6	8.4	115.6	15:14	4619	10.3	04:00	MD/CP=3.4
1/64 P	2637.1	2612.1	4633	10.3	15:21	3707.3	3753.4	8.4	116.0	15:24	4633	10.3	03:00	MD/CP=91.7
1/65 P	2651.0	2626.0	4658	10.3	15:33	3634.0	3772.6	8.4	116.6	15:36	4658	10.3	03:00	MD/CP=36.6
1/66 P	2672.5	2647.5	4695	10.3	15:44	3508.6	3800.8	8.3	117.2	15:48	4695	10.3	04:00	MD/CP=20.1
1/67 P	2711.1	2686.1	4762	10.3	15:56	1317.1	-	-	118.6	16:01	4762	10.3	05:00	Aborted - tight MD/CP=0
1/68 P	2438.3	2413.3	4284	10.3	18:31	2937.7	3574.2	8.6	102.1	18:37	4284	10.3	06:00	20cc pretests set MD/CP=11.2
1/69 P	2475.1	2450.1	4348	10.3	18:46	1276.1	-	-	104.2	18:54	4347	10.3	08:00	Aborted - supercharged MD/CP=1.0
1/70 P	2545.1	2520.1	4469	10.3	18:58	761.8	-	-	106.5	19:07	4469	10.3	09:00	Aborted - tight MD/CP=0

ESSO AUSTRALIA LTD - PRESSURE DATA FORM

Well	**TURRUM-5**	Page	**8 of 8**
Date	**13-Sep-95**	Geologist-Engineer	**Mike Scott**
Tool Type (MDT, RFT)	**Schlumberger MDT**	KB (metres):	**25**
Gauge Type	**CQG**	Probe type	**Long nose**
Pressure units (psia, psig)	**PSIA**	Temperature units (degF, degC)	**degC**

Run-Seat Number	P=Pretest S=Sample	Depth m MDRKB	Depth m TVDSS	Initial Hydrostatic Pressure	PPg	Time Set (HH:MM)	Minimum Flowing Pressure	Formation Pressure	PPg	Temp	Time Retract (HH:MM)	Final Hydrostatic Pressure	PPg	Delta Time (MM:SS)	Comments Including Test Quality and Fluid Type.
1/71	P	2547.4	2522.4	4473	10.3	19:11	3619.9	3724.0	8.6	107.9	19:15	4473	10.3	04:00	10cc pretests set MD/CP=63.5

TABLE 1 - TURRUM-5 MDT FLUID SAMPLE SUMMARY

Run/Sample	Depth (m MDRKB)	Depth (m TVDSS)	Sample Size	Expected Fluid	Result
1/1	2206.0	2181.0	450cc	gas	250cc filtrate
1/2	2206.0	2181.0	450cc	gas	450cc filtrate
1/3	2548.0	2523.0	450cc (not used)	oil	Probe set unsuccessful
1/4	2548.2	2523.2	450cc (not used)	oil	Probe set unsuccessful
1/5	2547.4	2522.4	450cc	oil	450cc filtrate
1/6	2547.4	2522.4	450cc	oil	Chamber empty
1/7	2570.5	2545.5	450cc	oil	Trace gas and filtrate
1/8	2570.5	2545.5	450cc	oil	Chamber empty
2/1	2206.0	2181.0	450cc (preserved)	gas	Laboratory reported chamber empty
2/2	2392.2	2367.2	450cc (preserved)	gas	Laboratory reported chamber empty
2/3	2418.5	2393.5	450cc (not used)	gas	Tool plugged no sample obtained
2/4	2527.5	2502.5	450cc (preserved)	gas	Laboratory reported chamber empty
2/5	2541.6	2516.6	not used	gas	OFA indicated only filtrate - no sample attempted
2/6	2547.4	2522.4	450cc	oil	Chamber empty
2/7	2570.5	2545.5	1 gallon	oil	0.7 cuft gas, 100cc oil, 3 litres filtrate
2/8	2601.5	2576.5	6 gallon	gas	121.4 cuft gas, 250cc condensate, 3.75 litres filtrate
2/9	2620.7	2595.7	2-3/4 gallon (not used)	oil	Tool failed - POOH
3/1	2548.1	2523.1	6 gallon (not used)	oil	Packer failure - POOH
4/1	2548.0	2523.0	6 gallon	oil	19 litres filtrate
4/2	2548.0	2523.0	2-3/4 gallon	oil	9.6 litre filtrate
4/3	2548.0	2523.0	Not reported	oil	Chamber empty
5/1	2548.0	2523.0	12 gallon	oil	36 litres filtrate + oil scum
5/2	2570.5	2545.5	2-3/4 gallon (not used)	oil	Tool failure - POOH
6/1	2570.5	2545.5	1 gallon	oil	10.1 cuft gas, 1.25 litres oil, 1.25 litres filtrate
6/2	2570.5	2545.5	1 gallon	oil	1.5 litres oil, 1.5 litres filtrate
6/3	2548.6	2523.6	12 gallon	oil	2.5 cuft gas, 38 litres filtrate + oil scum
6/4	2548.6	2523.6	2-3/4 gallon	oil	11.9 cuft gas, 3.75 litres oil, 4.5 litres filtrate
6/5	2548.6	2523.6	2-3/4 gallon (preserved)	oil	Laboratory volumes: 100cc oil, 250cc filtrate

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	1/1	1/2
Sample depth		m mdrkb	2206.0	2206.0
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	(1) AA485	(2) AA 487
Probe type			LONG NOSE	LONG NOSE
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	13/9/95	13/9/95
Initial hydrostatic		psia	3879.0	
Tool Set		hh:mm	17:53	
Pretest start		hh:mm	17:55	
Initial formation pressure (pretest)		psia	3228.0	
Pretest end		hh:mm	17:56	
Pretest duration		*hh:mm*	*0:01*	
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*		
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	17:57	18:03
Minimum sampling pressure		psia	2949.4	2937.7
Final formation pressure		psia	3228.0	3227.8
Seal chamber		hh:mm	18:02	18:08
Chamber fill time		*hh:mm*	*0:05*	*0:05*
Tool retract		hh:mm		18:11
Final hydrostatic		psia		3879.0
Total time		*hh:mm*		*0:18*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	94.6	95.9
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psig	800	0
Volume gas		cuft	TSTM	0
Volume oil/condensate		litres	-	-
Volume water/filtrate		litres	250cc	450cc
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.102 @ 18	0.102 @ 17
	K+ ion calculated from KCL%	ppm	23500	23800
	Chlorides titrated	ppm	38000	36000
	Tritium	DPM	Not used	Not used
	pH		7.5	6.35
	Type		Filtrate	Filtrate
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	3872	3872

H. Remarks and Comments

General	*Sample specific*	
Pump out chamber inoperable. One 450cc used as dump chamber	1st dump chamber	Sample?
in attempt to capture gas samples.		

(MTS/ResTech/T5_S112.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	1/3	1/4
Sample depth		m mdrkb	2548.0	2548.2
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	Not used	Not used
Probe type			LONG NOSE	LONG NOSE
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	13/9/95	13/9/96
Initial hydrostatic		psia	4474.0	4475.0
Tool Set		hh:mm	19:19	19:36
Pretest start		hh:mm	19:23	19:37
Initial formation pressure (pretest)		psia		
Pretest end		hh:mm		
Pretest duration		*hh:mm*		
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	*0:00*
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm		
Minimum sampling pressure		psia		
Final formation pressure		psia		
Seal chamber		hh:mm		
Chamber fill time		*hh:mm*	*0:00*	*0:00*
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	108.9	110.8
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psig		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		**psia**	**4472**	**4472**
H. Remarks and Comments				
General			*Sample specific*	
Pump out inoperable. Depth correlation after 1/3.			Probe set unsuccessful	Probe set unsuccessful

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	1/5	1/6
Sample depth		m mdrkb	2547.4	2547.4
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	(5) AA479	(6) AA478
Probe type			LONG NOSE	LONG NOSE
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	13/09/95	13/09/95
Initial hydrostatic		psia	4473.0	
Tool Set		hh:mm	19:43	
Pretest start		hh:mm	19:44	
Initial formation pressure (pretest)		psia	3723.6	
Pretest end		hh:mm	19:46	
Pretest duration		*hh:mm*	*0:02*	*0:00*
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	*0:00*
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	19:47	19:53
Minimum sampling pressure		psia	2003.2	3421.6
Final formation pressure		psia	3722.8	3723.1
Seal chamber		hh:mm	19:52	19:55
Chamber fill time		*hh:mm*	*0:05*	*0:02*
Tool retract		hh:mm		19:56
Final hydrostatic		psia		4473.0
Total time		*hh:mm*		*0:13*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	111.0	111.3
Rm@sample depth (AMS)		ohm-m	0.05	0.05
D. Sample Recovery At Surface				
Surface opening pressure		psig	25	0
Volume gas		cuft	0	0
Volume oil/condensate		litres	0	0
Volume water/filtrate		litres	450cc	0
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.099@19	@
	K+ ion calculated from KCL%	ppm	24700	
	Chlorides titrated	ppm	37000	
	Tritium	DPM	Not used	
	pH		7.4	
	Type		Filtrate	
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4471	4471
H. Remarks and Comments				
General			*Sample specific*	
Pump out inoperable.				Chamber empty

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification			
Run/seat number	#/#	1/7	1/8
Sample depth	m mdrkb	2570.5	2570.5
Pretest volume	cc	20cc	20cc
Chamber size	cc/litre/gallon	450cc	450cc
Chamber serial number	#	(3) AA477	(4) AA482
Probe type		LONG NOSE	LONG NOSE
Choke size		4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History			
Date	dd/mm/yy	13/09/95	13/09/95
Initial hydrostatic	psia	4516.0	
Tool Set	hh:mm	20:02	
Pretest start	hh:mm	20:03	
Initial formation pressure (pretest)	psia	3738.5	
Pretest end	hh:mm	20:05	
Pretest duration	*hh:mm*	*0:02*	*0:00*
Pumpout start	hh:mm		
Pumpout end	hh:mm		
Pumpout duration	*hh:mm*	*0:00*	*0:00*
Pumpout volume	litres		
OFA indication	colour		
Interpreted fluid at OFA	-		
Maximum resisitivity at probe	ohm-m		
Chamber open	hh:mm	20:06	20:08
Minimum sampling pressure	psia	3240.6	3734.5
Final formation pressure	psia	3738.2	3788.2
Seal chamber	hh:mm	20:07	20:09
Chamber fill time	*hh:mm*	*0:01*	*0:01*
Tool retract	hh:mm		
Final hydrostatic	psia		Not recorded
Total time	*hh:mm*		Not recorded
C. Sample Downhole Temperature And Resistivity			
At sample depth (AMS)	degC	112.0	112.0
Rm@sample depth (AMS)	ohm-m	0.03	0.03
D. Sample Recovery At Surface			
Surface opening pressure	psig	1500	0
Volume gas	cuft	TSTM	0
Volume oil/condensate	litres		0
Volume water/filtrate	litres	Not recorded	0

E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm	181891	
	C2	ppm	68798	
	C3	ppm	53533	
	C4	ppm	28461	
	C5	ppm	4767	
	C6+	ppm	N/A	
	CO2	%	4%	
	H2S	ppm	0	
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			

F. Mud Filtrate Properties			
Rmud @ degC	ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%	ppm	26400	26400
Chlorides titrated	ppm	35500	35500
pH		9	9
Tritium	DPM	Not used	Not used
G. General Calibration			
Reported mud weight	ppg	10.3	10.3
Calculated hydrostatic	psia	4512	4512

H. Remarks and Comments		
General	*Sample specific*	
Pump out inoperable.		Chamber empty

(MTS/ResTech/T5_S178.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	2/1	2/2
Sample depth		m mdrkb	2206.0	2392.2
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	(2) AA162	(3) AA192
Probe type			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	14/09/95	14/09/95
Initial hydrostatic		psia	3888.0	4211.0
Tool Set		hh:mm	2:44	3:19
Pretest start		hh:mm	2:46	3:20
Initial formation pressure (pretest)		psia	3229.0	3469.0
Pretest end		hh:mm	2:47	3:21
Pretest duration		*hh:mm*	*0:01*	*0:01*
Pumpout start		hh:mm	2:48	3:22
Pumpout end		hh:mm	3:00	3:25
Pumpout duration		*hh:mm*	*0:12*	*0:03*
Pumpout volume		litres	8.2	2.9
OFA indication		colour	RED	GREEN/PURPLE
Interpreted fluid at OFA		-	GAS	OIL+FILTRATE
Maximum resisitivity at probe		ohm-m	22	22
Chamber open		hh:mm	3:01	3:26
Minimum sampling pressure		psia	3211.7	3464.2
Final formation pressure		psia	3227.8	3468.1
Seal chamber		hh:mm	3:04	3:28
Chamber fill time		*hh:mm*	*0:03*	*0:02*
Tool retract		hh:mm	3:06	3:29
Final hydrostatic		psia	3886.0	4211.0
Total time		*hh:mm*	*0:22*	*0:10*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	97.3	101.4
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psia		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	3872	4199
H. Remarks and Comments				
General			*Sample specific*	
Depth correlation prior to 2/1.			Sample preserved	Sample preserved
Bottle (1) did not function for 2/1 - bottle (2) used.				

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	2/3	2/4
Sample depth		m mdrkb	2418.5	2527.5
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	Not used	(5) AA160
Probe type			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	14/09/95	14/09/95
Initial hydrostatic		psia	4257.0	4447.0
Tool Set		hh:mm	3:43	4:01
Pretest start		hh:mm	3:45	4:03
Initial formation pressure (pretest)		psia	3497.0	3711.0
Pretest end		hh:mm	3:47	4:04
Pretest duration		*hh:mm*	*0:02*	*0:01*
Pumpout start		hh:mm	3:48	4:04
Pumpout end		hh:mm	3:52	4:08
Pumpout duration		*hh:mm*	*0:04*	*0:04*
Pumpout volume		litres	2.3	4.1
OFA indication		colour	GREEN/BLUE	GREEN/PURPLE
Interpreted fluid at OFA		-	OIL+FILTRATE	OIL+FILTRATE
Maximum resisitivity at probe		ohm-m	22	22
Chamber open		hh:mm	-	4:10
Minimum sampling pressure		psia	-	3709.0
Final formation pressure		psia	-	3709.7
Seal chamber		hh:mm	-	4:14
Chamber fill time		*hh:mm*	-	*0:04*
Tool retract		hh:mm	3:52	4:15
Final hydrostatic		psia	4257.0	4445.0
Total time		*hh:mm*	*0:09*	*0:14*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	100.6	106.7
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psia		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4245	4436
H. Remarks and Comments				
General			*Sample specific*	
Depth correlation prior to 2/3.			Tool plugged	Sample preserved
Bottle (4) did not function for 2/4 - bottle (5) used.			No sample obtained	

(MTS/ResTech/T5_S234.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	2/5	2/6
Sample depth		m mdrkb	2541.6	2547.4
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	450cc	450cc
Chamber serial number		#	Not used	(6) AA193
Probe type			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	14/09/95	14/09/95
Initial hydrostatic		psia	4471.0	4480.0
Tool Set		hh:mm	4:20	4:35
Pretest start		hh:mm	4:22	4:36
Initial formation pressure (pretest)		psia	3727.0	3724.0
Pretest end		hh:mm	4:23	4:38
Pretest duration		*hh:mm*	*0:01*	*0:02*
Pumpout start		hh:mm	4:23	4:38
Pumpout end		hh:mm	4:29	4:45
Pumpout duration		*hh:mm*	*0:06*	*0:07*
Pumpout volume		litres	2.9	4.7
OFA indication		colour	BLUE	BLUE
Interpreted fluid at OFA		-	FILTRATE	FILTRATE
Maximum resisitivity at probe		ohm-m	0.03	0.03
Chamber open		hh:mm	-	4:45
Minimum sampling pressure		psia	-	3048.3
Final formation pressure		psia	-	3722.0
Seal chamber		hh:mm	-	4:52
Chamber fill time		*hh:mm*	-	*0:07*
Tool retract		hh:mm	4:30	4:53
Final hydrostatic		psia	4470.0	4480.0
Total time		*hh:mm*	*0:10*	*0:18*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	110.0	112.0
Rm@sample depth (AMS)		ohm-m	0.03	0.03
D. Sample Recovery At Surface				
Surface opening pressure		psia		Chamber empty
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m	0.96 @ 21	0.96 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4461	4471
H. Remarks and Comments				
General			*Sample specific*	
			Sample aborted	Sample attempted
			only water indicated	even though OFA=blue

(MTS/ResTech/T5_S256.XLS/20/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	2/7	2/8
Sample depth		m mdrkb	2570.5	2601.5
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	1 Gallon	6 Gallon
Chamber serial number		#	MRSC-BB90	MRSC-BB22
Probe type			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	14/09/95	14/09/95
Initial hydrostatic		psia	4520.0	4573.0
Tool Set		hh:mm	4:59	5:23
Pretest start		hh:mm	5:01	5:23
Initial formation pressure (pretest)		psia	3738.6	3710.4
Pretest end		hh:mm	5:02	5:26
Pretest duration		*hh:mm*	*0:01*	*0:03*
Pumpout start		hh:mm	5:02	5:26
Pumpout end		hh:mm	5:11	5:30
Pumpout duration		*hh:mm*	*0:09*	*0:04*
Pumpout volume		litres	9.4	4.1
OFA indication		colour	BLUE	RED
Interpreted fluid at OFA		-	FILTRATE	GAS
Maximum resisitivity at probe		ohm-m	0.03	22
Chamber open		hh:mm	5:13	5:30
Minimum sampling pressure		psia	514.8	677.9
Final formation pressure		psia	3738.0	3708.6
Seal chamber		hh:mm	5:16	5:38
Chamber fill time		*hh:mm*	*0:03*	*0:08*
Tool retract		hh:mm	5:18	5:40
Final hydrostatic		psia	4520.0	4575.0
Total time		*hh:mm*	*0:19*	*0:17*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	114.0	116.0
Rm@sample depth (AMS)		ohm-m	0.03	0.03
D. Sample Recovery At Surface				
Surface opening pressure		psig	1475	1925
Volume gas		cuft	0.7	121.4
Volume oil/condensate		litres	100cc (oil)	250cc (cond)
Volume water/filtrate		litres	3	3.75
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm	TSTM	188817
	C2	ppm		61923
	C3	ppm		32654
	C4	ppm		12115
	C5	ppm		1720
	C6+	ppm		-
	CO2	%		10%
	H2S	ppm		0
Oil/Condensate	API @ degC	degrees	0.81g/cc @ 25	49.15 @ 60deg F
	Colour		LT BRN	CLR-LT BRN
	Fluorescence		YELLOW/STRAW	BL/WHITE
	GOR or CGR	cuft/bbl or mmscf/bbl	1113	0.07732
	Pour point	degC	22.2	>0
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.111@19	0.110@16
	K+ ion calculated from KCL%	ppm	17500	16900
	Chlorides titrated	ppm	36000	35500
	Tritium	DPM	Not used	Not used
	pH		6.45	6
	Type		Filtrate	Filtrate
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4512	4566
H. Remarks and Comments				
General			*Sample specific*	
			API too small to measure	Incomplete sample

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	2/9	/
Sample depth		m mdrkb	2620.7	
Pretest volume		cc	20cc	
Chamber size		cc/litre/gallon	2-3/4 Gallon	
Chamber serial number		#	MRSC-DB68	
Probe type			MARTINEAU	
Choke size			4 x 20/1000 ths	
B. Sampling History				
Date		dd/mm/yy	14/09/95	
Initial hydrostatic		psia	4610.0	
Tool Set		hh:mm	5:46	
Pretest start		hh:mm	5:47	
Initial formation pressure (pretest)		psia	5:55	
Pretest end		hh:mm		
Pretest duration		*hh:mm*		
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm		
Minimum sampling pressure		psia		
Final formation pressure		psia		
Seal chamber		hh:mm		
Chamber fill time		*hh:mm*	*0:00*	
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC		
Rm@sample depth (AMS)		ohm-m		
D. Sample Recovery At Surface				
Surface opening pressure		psig		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	
K+ ion calculated from KCL%		ppm	26400	
Chlorides titrated		ppm	35500	
pH			9	
Tritium		DPM	Not used	
G. General Calibration				
Reported mud weight		ppg	10.3	
Calculated hydrostatic		psia	4600	
H. Remarks and Comments				
General			*Sample specific*	
Tool failed after 2/9 - pooh.			Aborted tight	

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE SHEET

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	3/1	
Sample depth		m mdrkb	2548.1	
Pretest volume		cc	20cc	
Chamber size		cc/litre/gallon	6 Gallon	
Chamber serial number		#	Not used	
Probe type			MARTINEAU	
Choke size			4 x 20/1000 ths	
B. Sampling History				
Date		dd/mm/yy	14/09/95	
Initial hydrostatic		psia	4489.0	
Tool Set		hh:mm	11:08	
Pretest start		hh:mm	11:10	
Initial formation pressure (pretest)		psia		
Pretest end		hh:mm	11:12	
Pretest duration		*hh:mm*	*0:02*	
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	11:12	
Minimum sampling pressure		psia		
Final formation pressure		psia		
Seal chamber		hh:mm		
Chamber fill time		*hh:mm*		
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC		
Rm@sample depth (AMS)		ohm-m		
D. Sample Recovery At Surface				
Surface opening pressure		psig		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	
K+ ion calculated from KCL%		ppm	26400	
Chlorides titrated		ppm	35500	
pH			9	
Tritium		DPM	Not used	
G. General Calibration				
Reported mud weight		ppg	10.3	
Calculated hydrostatic		**psia**	**4472**	
H. Remarks and Comments				
General			*Sample specific*	
MDT pump out and OFA inoperable. 6 gallon used as dump chamber.			Seat Failure.	
Possible packer failure at 3/1 - POOH.				

(MTS/ResTech/T5_S312.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	4/1	4/2
Sample depth		m mdrkb	2548.0	2548.0
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	6 Gallon	2 3/4 Gallon
Chamber serial number		#	Not reported	Not reported
Probe type (Long nose, MARTINEAU)			MARTINEAU	MARTINEAU
Choke size			4x20/1000 ths	4x20/1000 ths
B. Sampling History				
Date		dd/mm/yy	14/09/95	14/09/95
Initial hydrostatic		psia	4487.0	
Tool Set		hh:mm	13:42	
Pretest start		hh:mm	13:43	
Initial formation pressure (pretest)		psia	3727.0	
Pretest end		hh:mm	13:44	
Pretest duration		*hh:mm*	*0:01*	*0:00*
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*		
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	13:48	14:18
Minimum sampling pressure		psia	1008.0	194.0
Final formation pressure		psia	Not reported	3035.0
Seal chamber		hh:mm	14:18	14:47
Chamber fill time		*hh:mm*	*0:30*	*0:29*
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		*0:00*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	108.0	108.0
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psig	425	145
Volume gas		cuft	-	-
Volume oil/condensate		litres	-	-
Volume water/filtrate		litres	19	9.6
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.110 @ 21	0.108 @ 22
	K+ ion calculated from KCL%	ppm	17,200	17,800
	Chlorides titrated	ppm	37,000	37,000
	Tritium	DPM	Not used	Not used
	pH		6.4	6.35
	Type		Filtrate	Filtrate
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4472	4472
H. Remarks and Comments				
General			*Sample specific*	
Pump out inoperable				

(MTS/ResTech/T5_S412.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE SHEET

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	4/3	
Sample depth		m mdrkb	2548.0	
Pretest volume		cc	20cc	
Chamber size		cc/litre/gallon	Not reported	
Chamber serial number		#	Not reported	
Probe type			MARTINEAU	
Choke size			4 x 20/1000 ths	
B. Sampling History				
Date		dd/mm/yy	14/09/95	
Initial hydrostatic		psia		
Tool Set		hh:mm		
Pretest start		hh:mm		
Initial formation pressure (pretest)		psia		
Pretest end		hh:mm		
Pretest duration		*hh:mm*	*0:00*	
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	14:50	
Minimum sampling pressure		psia	1130.0	
Final formation pressure		psia	3720.0	
Seal chamber		hh:mm	14:51	
Chamber fill time		*hh:mm*	*0:01*	
Tool retract		hh:mm	14:57	
Final hydrostatic		psia	4481.0	
Total time		*hh:mm*		
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	108.0	
Rm@sample depth (AMS)		ohm-m	0.04	
D. Sample Recovery At Surface				
Surface opening pressure		psig	125	
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	
K+ ion calculated from KCL%		ppm	26400	
Chlorides titrated		ppm	35500	
pH			9	
Tritium		DPM	Not used	
G. General Calibration				
Reported mud weight		ppg	10.3	
Calculated hydrostatic		psia	4472	
H. Remarks and Comments				
General			*Sample specific*	
Chamber 4/3 plugged - no recovery			Final flowing pressure	
			=3091 psia	

(MTS/ResTech/T5_S43.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	5/1	5/2
Sample depth		m mdrkb	2548.0	2570.5
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	12 Gallon	2 3/4 Gallon
Chamber serial number		#	Not reported	Not used
Probe type (Long nose, MARTINEAU)			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	15/09/95	15/09/95
Initial hydrostatic		psia	4481.0	
Tool Set		hh:mm	15:36	
Pretest start		hh:mm	15:36	
Initial formation pressure (pretest)		psia	3737.0	
Pretest end		hh:mm	15:37	
Pretest duration		*hh:mm*	*0:01*	*0:00*
Pumpout start		hh:mm		
Pumpout end		hh:mm		
Pumpout duration		*hh:mm*	*0:00*	*0:00*
Pumpout volume		litres		
OFA indication		colour		
Interpreted fluid at OFA		-		
Maximum resisitivity at probe		ohm-m		
Chamber open		hh:mm	15:42	
Minimum sampling pressure		psia	164.0	
Final formation pressure		psia	3097.0	
Seal chamber		hh:mm	18:50	
Chamber fill time		*hh:mm*	*3:08*	*0:00*
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		*0:00*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	110.0	
Rm@sample depth (AMS)		ohm-m	0.04	
D. Sample Recovery At Surface				
Surface opening pressure		psig	500	
Volume gas		cuft	-	
Volume oil/condensate		litres	Trace oily scum	
Volume water/filtrate		litres	36	
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour		BROWN	
	Fluorescence		BLUE/WHITE	
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.114 @ 22	@
	K+ ion calculated from KCL%	ppm	18,300	
	Chlorides titrated	ppm	37,000	
	Tritium	DPM	-	
	pH		6.1	
	Type		Filtrate	
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.096 @ 21	0.096 @ 21
K+ ion calculated from KCL%		ppm	26400	26400
Chlorides titrated		ppm	35500	35500
pH			9	9
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	0	0

H. Remarks and Comments

General	*Sample specific*	
50 volt power supply halting telemetry. Lost seat when sealing chamber 5/1. Pooh at 5/2.	Lost seat when sealing chamber.	Tool would not seat. POOH.

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5

A. Sample Identification				
Run/seat number		#/#	6/1	6/2
Sample depth		m mdrkb	2570.5	2570.5
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	1 Gallon	1 Gallon
Chamber serial number		#	Not reported	Not reported
Probe type (Long nose, Martineau)			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	16/09/95	16/09/95
Initial hydrostatic		psia	4514.0	
Tool Set		hh:mm	15:45	
Pretest start		hh:mm	15:46	
Initial formation pressure (pretest)		psia	3739.0	
Pretest end		hh:mm	15:48	
Pretest duration		*hh:mm*	*0:02*	*0:00*
Pumpout start		hh:mm	15:49	
Pumpout end		hh:mm	16:54	
Pumpout duration		*hh:mm*	*1:05*	*0:00*
Pumpout volume		litres	60	
OFA indication		colour	NOT REPORTED	
Interpreted fluid at OFA		-	NOT REPORTED	
Maximum resisitivity at probe		ohm-m	NOT REPORTED	
Chamber open		hh:mm	16:55	17:08
Minimum sampling pressure		psia	1949.0	2182.0
Final formation pressure		psia	3733.0	3734.0
Seal chamber		hh:mm	17:07	17:19
Chamber fill time		*hh:mm*	*0:12*	*0:11*
Tool retract		hh:mm		17:21
Final hydrostatic		psia		4514.0
Total time		*hh:mm*		*1:36*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	88.0	94.0
Rm@sample depth (AMS)		ohm-m	0.05	0.05
D. Sample Recovery At Surface				
Surface opening pressure		psig	1725	Seal failed
Volume gas		cuft	10.1	Not available
Volume oil/condensate		litres	1.25	1.5
Volume water/filtrate		litres	1.25	1.5
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm	62006	
	C2	ppm	31474	
	C3	ppm	15907	
	C4	ppm	1974	
	C5	ppm	129	
	C6+	ppm	-	
	CO2	%	10%	
	H2S	ppm	0	
Oil/Condensate	API @ degC	degrees	41.7 @ 15.5	41.7 @ 15.5
	Colour		GRN/BRN	GRN/BRN
	Fluorescence		PALE YELLOW	PALE YELLOW
	GOR or CGR	cuft/bbl or mmscf/bbl	1248.7	-
	Pour point	degC	21	-
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.127 @ 17	0.127 @ 17
	K+ ion calculated from KCL%	ppm	16900	16900
	Chlorides titrated	ppm	34000	34000
	Tritium	DPM	Not used	Not used
	pH		6.0	6.0
	Type		Filtrate	Filtrate
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.109 @ 19	0.109 @ 19
K+ ion calculated from KCL%		ppm	21480	21480
Chlorides titrated		ppm	34500	34500
pH			9.1	9.1
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4512	4512
H. Remarks and Comments				
General			*Sample specific*	
			Final sample pressure	Final sample pressure
			=3349	=3238

(MTS/ResTech/T5_S612.XLS/20/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	6/3	6/4
Sample depth		m mdrkb	2548.6	2548.6
Pretest volume		cc	20cc	20cc
Chamber size		cc/litre/gallon	12 Gallon	2 - 3/4 Gallon
Chamber serial number		#	Not reported	Not reported
Probe type (Long nose, Martineau)			MARTINEAU	MARTINEAU
Choke size			4 x 20/1000 ths	4 x 20/1000 ths
B. Sampling History				
Date		dd/mm/yy	16/09/95	17/09/95
Initial hydrostatic		psia	4468.0	
Tool Set		hh:mm	17:38	
Pretest start		hh:mm	17:38	
Initial formation pressure (pretest)		psia	3722.0	
Pretest end		hh:mm	17:40	
Pretest duration		*hh:mm*	*0:02*	*0:00*
Pumpout start		hh:mm		0:22
Pumpout end		hh:mm		0:44
Pumpout duration		*hh:mm*	*0:00*	*0:22*
Pumpout volume		litres		3.57
OFA indication		colour		Not reported
Interpreted fluid at OFA		-		Not reported
Maximum resisitivity at probe		ohm-m		Not reported
Chamber open		hh:mm	17:40	0:45
Minimum sampling pressure		psia	175.0	278.0
Final formation pressure		psia	3399.0	3248.0
Seal chamber		hh:mm	0:21	3:25
Chamber fill time		*hh:mm*		*2:40*
Tool retract		hh:mm		
Final hydrostatic		psia		
Total time		*hh:mm*		*0:00*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	95.0	103.0
Rm@sample depth (AMS)		ohm-m	0.04	0.04
D. Sample Recovery At Surface				
Surface opening pressure		psig	825	1525
Volume gas		cuft	2.5	11.9
Volume oil/condensate		litres	Trace oil scum	3.75
Volume water/filtrate		litres	38	4.5
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm	37167	20577
	C2	ppm	6706	2020
	C3	ppm	2071	783
	C4	ppm	444	200
	C5	ppm	3	15
	C6+	ppm	-	-
	CO2	%	20%	12%
	H2S	ppm	0	-
Oil/Condensate	API @ degC	degrees	TSTM	40.9 @ 15.5
	Colour		GRN/BRN	GRN/BRN
	Fluorescence		PALE YELLOW	PALE YELLOW
	GOR or CGR	cuft/bbl or mmscf/bbl	TSTM	504.6
	Pour point	degC	TSTM	24
Water/Filtrate	Rmud @ degC	ohm-m@degC	0.131 @ 20	0.126 @ 20
	K+ ion calculated from KCL%	ppm	18100	17500
	Chlorides titrated	ppm	33540	34000
	Tritium	DPM	-	-
	pH		6.3	6.1
	Type		Filtrate	Filtrate
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.109 @ 19	0.109 @ 19
K+ ion calculated from KCL%		ppm	21480	21480
Chlorides titrated		ppm	34500	34500
pH			9.1	9.1
Tritium		DPM	Not used	Not used
G. General Calibration				
Reported mud weight		ppg	10.3	10.3
Calculated hydrostatic		psia	4473	4473
H. Remarks and Comments				
General			*Sample specific*	
Final pressure for 6/3 & 6/4 incomplete.			Final sample pressure	Final sample pressure
3.57l pumped after sealing 6/3, 0.5l pumped after sealing 6/4.			=2680 psia	= 2722 psia

(MTS/ResTech/T5_S634.XLS/19/12/95)

ESSO AUSTRALIA LTD - MDT FLUID SAMPLE DATA

Well: Turrum-5				
A. Sample Identification				
Run/seat number		#/#	6/5	/
Sample depth		m mdrkb	2548.6	
Pretest volume		cc	20cc	
Chamber size		cc/litre/gallon	2 - 3/4 Gallon	
Chamber serial number		#	DA -16	
Probe type (Long nose, Martineau)			MARTINEAU	
Choke size			4 x 20/1000 ths	
B. Sampling History				
Date		dd/mm/yy	17/09/95	
Initial hydrostatic		psia		
Tool Set		hh:mm		
Pretest start		hh:mm		
Initial formation pressure (pretest)		psia		
Pretest end		hh:mm		
Pretest duration		*hh:mm*	*0:00*	*0:00*
Pumpout start		hh:mm	3:25	
Pumpout end		hh:mm	3:28	
Pumpout duration		*hh:mm*	*0:03*	*0:00*
Pumpout volume		litres	0.5	
OFA indication		colour	Not reported	
Interpreted fluid at OFA		-	Not reported	
Maximum resisitivity at probe		ohm-m	Not reported	
Chamber open		hh:mm	3:28	
Minimum sampling pressure		psia	681.0	
Final formation pressure		psia	3708.0	
Seal chamber		hh:mm	4:45	
Chamber fill time		*hh:mm*	*1:17*	*0:00*
Tool retract		hh:mm	4:45	
Final hydrostatic		psia	Not reported	
Total time		*hh:mm*	*11:07*	*0:00*
C. Sample Downhole Temperature And Resistivity				
At sample depth (AMS)		degC	10.3	
Rm@sample depth (AMS)		ohm-m	0.04	
D. Sample Recovery At Surface				
Surface opening pressure		psig		
Volume gas		cuft		
Volume oil/condensate		litres		
Volume water/filtrate		litres		
E. Sample Properties Measured On-Site				
Gas via chromatograph	C1	ppm		
	C2	ppm		
	C3	ppm		
	C4	ppm		
	C5	ppm		
	C6+	ppm		
	CO2	%		
	H2S	ppm		
Oil/Condensate	API @ degC	degrees	@	@
	Colour			
	Fluorescence			
	GOR or CGR	cuft/bbl or mmscf/bbl		
	Pour point	degC		
Water/Filtrate	Rmud @ degC	ohm-m@degC	@	@
	K+ ion calculated from KCL%	ppm		
	Chlorides titrated	ppm		
	Tritium	DPM		
	pH			
	Type			
F. Mud Filtrate Properties				
Rmud @ degC		ohm-m@degC	0.109 @ 19	@
K+ ion calculated from KCL%		ppm	21480	
Chlorides titrated		ppm	34500	
pH			9.1	
Tritium		DPM	Not used	
G. General Calibration				
Reported mud weight		ppg	10.3	
Calculated hydrostatic		psia	4473	0
H. Remarks and Comments				
General			*Sample specific*	
			Sample preserved.	
			Final pressure = 2478.	

(MTS/ResTech/T5_S65.XLS/20/12/95)

APPENDIX 4

APPENDIX 4

APPENDIX 4

TURRUM 5

Core Analysis

ROUTINE CORE ANALYSIS REPORT
of
TURRUM NO. 5
for
ESSO AUSTRALIA LIMITED
by
ACS LABORATORIES PTY LTD

22nd March, 1996

ACS LABORATORIES PTY. LTD.

Esso Australia Limited
360 Elizabeth Street
MELBOURNE VIC 3000

Attention: A. Mills

REPORT: 002-232 - WELL NAME: TURRUM NO.5

CLIENT REFERENCE:	Contract No. 2710080 RFS No. 5
MATERIAL:	Core Plugs
LOCALITY:	Gippsland Basin VIC-L-3
WORK REQUIRED:	Routine Core Analysis

Please direct technical enquiries regarding this work to the signatory below under whose supervision the work was carried out.

W J (Bill) DERKSEMA
Laboratory Supervisor
on behalf of ACS Laboratories Pty. Ltd.

Address: P.O. Box 396, Chermside, Qld. 4032 Australia
Telephone: 61 7 3350 1222 Facsimile: 61 7 3359 0666
E-mail: acs.bris@b022.aone.net.au

ACS Laboratories Pty. Ltd.
ACN: 008 273 005

CONTENTS

PLOTS

22nd March, 1996

ACS LABORATORIES PTY. LTD.

Esso Australia Limited
360 Elizabeth Street
MELBOURNE VIC 3000

Attention: A. Mills

FINAL DATA REPORT - ROUTINE CORE ANALYSIS

REPORT: 002-232 WELL NAME: TURRUM NO. 5

LOGISTICS

346 core plugs were delivered to ACS Laboratories, Brisbane on 17th December, 1995. The plugs (including vertical plugs) arrived stored in vials and consisted of 48 plugs from Core No. 1, 82 plugs from Core No. 2, 42 plugs from Core No. 3, 79 plugs from Core No. 4, 17 core plugs from Core No. 5 and 78 plugs from Core No. 6.

INTRODUCTION

The following report includes tabular data of permeability to air, helium injection porosity and density determinations. Data presented graphically includes a core log plot of the above and a porosity versus permeability to air plot.

Analysis commenced after pilot study on Turrum No. 6.

STUDY AIMS

The analyses were performed with the following aims:

1. To provide overburden air permeability, helium injection porosity and density data.

Samples were prepared and analysed as follows:

1. SAMPLE EXTRACTION

Cleaning was performed in a soxhlet system using a refluxing azeotropic solvent of 3:1 chloroform: methanol. This technique was utilised such that the samples and the condensing solvent were not exposed to heating elements and therefore at room temperature. Cleaning continued until tests for oil (fluorescence under UV light) and salt (silver nitrate precipitation) showed negative.

2. SAMPLE DRYING

After cleaning, all plugs were dried in a controlled humidity environment at 50°C and 50% relative humidity. The plugs were stored in an airtight plastic container and allowed to cool to room temperature before analysis.

3. OVERBURDEN AIR PERMEABILITY

The plugs are placed in a heavy duty Hassler sleeve. The assembly is loaded into a thick walled hydrostatic cell capable of withstanding the simulated reservoir overburden stress. The overburden pressure used, as supplied by Esso, was 3750 psi for Cores 1 and 2 and 4250 psi for Cores 3, 4, 5 and 6.

During the measurement a known air pressure is applied to the upstream face of the sample, creating a flow of air through the sample. Permeability for each sample is then calculated using Darcy's Law through knowledge of the upstream pressure and flow rate during the test, the viscosity of air and the plug dimensions.

4. OVERBURDEN HELIUM INJECTION POROSITY

Overburden Helium Injection Porosities are determined indirectly by the following method.

The apparent grain volume of each sample was measured by expansion of helium into the sample loaded in a matrix cup. The grain volume is derived by application of Boyle's law. The bulk volume of the sample is determined by mercury immersion. The sample is then loaded into a hydrostatic cell where the pore volume reduction, from ambient to the applied overburden stress is determined by measuring changes in the helium pressure within the pore space and applying Boyle's law. The reduction in the bulk volume is assumed to be equivalent to a reduction in the pore volume. Grain volume remains constant.

5. **APPARENT GRAIN DENSITY**

The apparent grain density is determined by dividing the weight of the plug by the grain volume determined from the helium injection porosity measurement.

6. **ABSOLUTE GRAIN DENSITY**

A plug offcut, uncleaned and oven dried, is used for this measurement. The sample is crushed to approximately grain size or a little coarser and the granular material weighed. The volume of the grains is determined by pyconometry. By this means the actual density of the grains is determined.

On completion of the analysis the plug samples were re-wrapped in gladwrap and tissue, and are presently stored at ACS Laboratories for possible future studies..

We have enjoyed working for Esso look forward to working with you in the near future.

END OF REPORT

ACS LABORATORIES PTY. LTD.
ACN: 008 273 005
Petroleum Reservoir Engineering Data

OVERBURDEN ANALYSIS FINAL REPORT

Overburden Pressure: Core 1& 2 3750 psi
Core 3,4,5 & 6 4250 psi

Company	ESSO AUSTRALIA LTD.		**Date**	6-Feb-96
Well	TURRUM # 5		**File**	002 - 232
Field	TURRUM		**Location**	Vic - L - 3
Core Int.	C#1: 2197.00 - 2205.30m	C#4: 2526.80 - 2543.50m	**ACS Lab.**	Brisbane - 002
	C#2: 2205.50 - 2222.80m	C#5: 2544.80 - 2549.80m	**Analyst**	WJD. IJM
	C#3: 2508.50 - 2526.80m	C#6: 2568.00 - 2586.50m		

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
1	2197.04	1.07	11.5	2.66	2.69	C#1
3	2197.20	0.05	7.4	2.64	2.64	
5	2197.40	2.57	13.9	2.67	2.66	
7	2197.60	1.70	13.7	2.69	2.68	
9	2197.81	8.31	14.4	2.69	2.68	
11V	2197.89	0.03	11.9	2.67	2.66	Vertical
13	2198.05	20	16.1	2.68	2.68	
15	2198.20	2.51	11.8	2.67	2.66	
17	2198.38	5.02	13.8	2.67	2.67	
19	2198.60	0.58	9.3	2.66	2.66	
21	2198.81	1.96	12.7	2.66	2.65	
23V	2198.89	0.20	11.3	2.70	2.69	Vertical
25	2199.00	0.02	4.1	2.73	2.72	
27	2199.20	<0.01	2.7	2.74	2.74	
29	2199.40	<0.01	3.2	2.75	2.76	
31	2199.60	<0.01	2.6	2.74	2.75	
35V	2199.88	0.03	10.6	2.69	2.67	Vertical
37	2200.00	0.50	11.4	2.72	2.72	
39	2200.20	0.58	12.7	2.70	2.69	
41	2200.40	0.31	11.7	2.71	2.70	
43	2200.60	0.09	9.3	2.66	2.67	
45	2200.73	0.13	8.4	2.65	2.66	
47V	2200.88	0.14	12.2	2.70	2.71	Vertical
49	2201.00	0.82	12.8	2.70	2.69	
51	2201.18	0.13	8.1	2.64	2.63	
53	2201.40	0.39	11.4	2.67	2.66	
55	2201.60	9.77	16.0	2.66	2.65	
57	2201.73	3.23	15.6	2.67	2.68	
59V	2201.89	3.19	15.7	2.66	2.66	Vertical
61	2202.00	15	16.6	2.67	2.68	
63	2202.20	68	19.2	2.65	2.68	
65	2202.40	15	14.1	2.63	2.64	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
67	2202.60	282	19.3	2.63	2.65	
69	2202.70	27	17.5	2.63	2.66	
73	2203.01	408	20.8	2.66	2.64	
75	2203.20	82	15.3	2.64	2.63	
77	2203.40	573	20.9	2.65	2.66	
79	2203.60	14	14.5	2.64	2.67	
81	2203.75	226	18.9	2.65	2.64	
83V	2203.89	392	22.8	2.65	2.65	Vertical
85	2204.05	93	17.8	2.68	2.68	
87	2204.20	828	23.1	2.66	2.64	
89	2204.36	1470	25.0	2.66	2.65	
91	2204.56	56	16.4	2.66	2.66	
93	2204.86	552	21.9	2.66	2.66	
95	2205.01	844	22.6	2.66	2.65	
97	2205.19	85	13.9	2.67	2.66	
99V	2205.25	0.76	16.2	2.67	2.66	B#1 Vert.
101	2205.60	434	19.5	2.65	2.66	C#2
103	2205.80	193	18.9	2.61	2.58	
105	2206.00	596	21.5	2.67	2.66	
107	2206.22	311	19.2	2.67	2.68	
109V	2206.31	32	20.8	2.66	2.66	Vertical
111	2206.40	437	20.4	2.66	2.65	
113	2206.60	1221	24.0	2.66	2.66	
115	2206.80	488	21.8	2.68	2.70	
117	2207.00	298	20.0	2.64	2.66	
119	2207.20	425	20.9	2.65	2.67	
121V	2207.31	4.28	18.9	2.66	2.68	Vertical
123	2207.40	170	20.0	2.65	2.66	
125	2207.60	1005	22.9	2.65	2.65	
127	2207.76	232	20.5	2.63	2.62	
139	2208.80	0.01	6.3	2.61	2.61	
141	2209.00	0.02	6.9	2.66	2.65	
143	2209.20	0.03	7.4	2.67	2.70	
147	2209.40	0.07	9.1	2.67	2.67	
149	2209.60	0.01	7.9	2.62	2.63	
151	2209.80	0.01	8.6	2.63	2.62	
153	2210.00	0.01	6.9	2.65	2.69	
155	2210.15	0.03	9.0	2.64	2.67	
157V	2210.26	0.01	7.5	2.63	2.66	Vertical
159	2210.40	0.02	7.1	2.62	2.62	
161	2210.60	0.01	5.2	2.60	2.61	
163	2210.80	<0.01	5.7	2.54	2.58	
165	2211.00	<0.01	4.4	2.31	2.36	
167	2211.16	<0.01	4.5	2.28	2.37	
173	2211.60	<0.01	4.3	2.10	2.24	
175	2211.80	<0.01	4.0	2.24	2.18	
177	2212.00	<0.01	4.6	2.19	2.25	
179	2212.20	<0.01	4.4	2.16	2.25	
183	2212.45	<0.01	3.7	2.07	2.12	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
185	2212.60	<0.01	4.1	2.07	2.11	
193	2213.20	<0.01	3.9	2.09	2.12	
195	2213.40	<0.01	3.6	2.18	2.22	
197	2213.60	<0.01	4.1	2.21	2.25	
199	2213.80	<0.01	3.5	2.18	2.24	
201	2214.00	<0.01	2.0	2.05	2.11	
203	2214.17	<0.01	1.8	2.13	2.19	
211	2214.80	<0.01	4.2	2.47	2.48	
213	2214.96	0.02	6.0	2.28	2.35	
215	2215.20	<0.01	4.4	2.42	2.42	
217V	2215.26	<0.01	4.7	2.34	2.38	Vertical
221	2215.60	<0.01	5.2	2.28	2.31	
223	2215.80	<0.01	4.0	2.38	2.38	
225	2216.03	0.01	6.2	2.30	2.38	
231	2216.40	<0.01	5.8	2.34	2.45	
233	2216.60	<0.01	4.8	2.40	2.35	
235	2216.85	<0.01	3.8	2.47	2.47	
237	2217.00	<0.01	5.5	2.41	2.38	
239	2217.20	<0.01	4.7	2.45	2.50	
241V	2217.26	<0.01	3.6	2.46	2.48	Vertical
243	2217.45	0.17	5.1	2.43	2.50	VF
249	2218.00	0.02	5.0	2.43	2.45	
251	2218.20	0.04	5.6	2.44	2.44	
253V	2218.26	<0.01	5.4	2.46	2.46	Vertical
255	2218.40	0.03	6.7	2.45	2.50	
257	2218.60	0.03	6.6	2.46	2.48	
259	2218.80	0.03	5.4	2.55	2.57	
261	2219.00	0.04	9.5	2.62	2.63	
263	2219.18	0.05	10.2	2.62	2.64	
265V	2219.31	<0.01	9.2	2.62	2.62	Vertical
267	2219.40	0.33	13.4	2.63	2.62	
269	2219.60	0.12	11.4	2.62	2.63	
271	2219.80	0.73	13.0	2.65	2.65	
273	2220.00	0.01	5.4	2.53	2.56	
275	2220.20	0.02	5.9	2.51	2.53	
277V	2220.26	<0.01	7.4	2.50	2.54	Vertical
279	2220.40	0.01	6.4	2.53	2.52	
281	2220.60	<0.01	5.9	2.56	2.59	
283	2220.80	<0.01	5.4	2.57	2.61	
285	2221.00	<0.01	5.5	2.59	2.47	
287	2221.20	<0.01	5.8	2.61	2.61	
289V	2221.26	<0.01	5.2	2.58	2.56	Vertical
291	2221.40	<0.01	5.4	2.59	2.60	
293	2221.60	<0.01	6.2	2.60	2.59	
295	2221.80	<0.01	5.3	2.60	2.63	
297	2222.00	<0.01	6.1	2.60	2.61	
299	2222.15	<0.01	6.1	2.62	2.62	
301V	2222.24	<0.01	7.0	2.63	2.64	Vertical
303	2222.40	<0.01	5.4	2.61	2.64	B#2

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
319	2509.40	<0.01	1.6	2.44	2.49	C#3
321	2509.60	<0.01	1.4	2.50	2.56	
327	2510.20	<0.01	0.5	2.54	2.60	
333	2510.60	<0.01	1.8	2.59	2.60	
335	2510.80	<0.01	1.1	2.59	2.62	
341V	2511.25	<0.01	2.9	2.66	2.81	Vertical
343	2511.40	<0.01	4.2	2.64	2.65	
345	2511.60	<0.01	3.0	2.62	2.65	
349	2512.00	<0.01	1.0	2.57	2.63	
353V	2512.30	<0.01	0.7	2.56	2.59	Vertical
407	2516.80	<0.01	0.6	2.59	2.59	
441	2519.60	<0.01	0.9	2.47	2.49	
463	2521.40	452	17.6	2.65	2.64	
465	2521.64	4438	19.2	2.65	2.65	
467V	2521.70	0.22	7.9	2.66	2.66	Vertical
469	2521.80	22	13.9	2.65	2.65	
471	2522.00	30	14.5	2.65	2.65	
473	2522.20	74	16.6	2.66	2.66	
475	2522.40	13	14.0	2.65	2.65	
477	2522.60	43	15.4	2.65	2.64	
479V	2522.65	116	17.3	2.65	2.65	Vertical
481	2522.80	218	17.4	2.65	2.66	
483	2523.00	157	18.3	2.65	2.66	
485	2523.20	85	11.9	2.65	2.66	
487	2523.40	598	18.5	2.64	2.65	
489	2523.60	1340	20.1	2.66	2.65	
491V	2523.65	1300	20.1	2.64	2.66	Vertical
493	2523.80	4933	21.8	2.64	2.64	
495	2524.00	4958	21.7	2.64	2.65	
497	2524.20	5770	22.6	2.64	2.66	
499	2524.40	3012	22.1	2.65	2.65	
501	2524.60	5150	22.5	2.65	2.65	
503V	2524.70	2840	22.2	2.65	2.65	Vertical
505	2524.80	3058	21.9	2.65	2.66	
507	2525.00	3445	21.5	2.65	2.65	
509	2525.20	2086	20.5	2.65	2.65	
511	2525.40	0.95	9.4	2.62	2.62	
513	2525.60	1508	18.4	2.64	2.64	
517	2525.75	109	12.9	2.63	2.63	
519	2526.00	0.13	8.8	2.66	2.65	
523	2526.40	0.07	8.5	2.66	2.66	
525	2526.60	0.10	8.1	2.67	2.67	
527	2526.80	0.12	8.4	2.68	2.67	B#3
529V	2526.86	0.01	7.9	2.67	2.66	C#4 Vert.
531	2527.00	6.26	12.0	2.66	2.69	
533	2527.25	0.80	9.7	2.66	2.67	
535	2527.41	0.05	3.8	2.74	2.71	
565	2529.80	0.53	10.0	2.66	2.69	
567	2529.97	1.14	6.4	2.66	2.65	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
569	2530.21	3.80	12.7	2.66	2.65	
571	2530.41	1.21	11.6	2.66	2.67	
573	2530.59	0.52	10.5	2.67	2.70	
575V	2530.70	0.42	12.9	2.67	2.68	Vertical
577	2530.80	1.97	10.5	2.65	2.63	
579	2531.00	7.05	13.3	2.66	2.69	
581	2531.20	2.03	12.5	2.66	2.66	
583	2531.40	1.10	10.9	2.67	2.65	
585	2531.60	1.62	12.5	2.66	2.66	
587V	2531.70	0.03	8.2	2.68	2.68	Vertical
589	2531.80	0.05	7.3	2.68	2.67	
591	2532.00	0.61	9.9	2.66	2.64	
593	2532.20	0.59	11.0	2.67	2.71	
595	2532.40	8.20	11.0	2.66	2.68	
597	2532.60	0.03	5.8	2.59	2.63	
599V	2532.70	0.11	12.0	2.67	2.69	Vertical
601	2532.80	6.92	14.3	2.66	2.67	
603	2533.00	0.17	10.0	2.67	2.67	
605	2533.20	0.09	7.8	2.67	2.68	
607	2533.40	0.02	5.6	3.00	2.97	
609	2533.59	0.18	10.4	2.69	2.71	
615	2534.00	0.85	12.0	2.67	2.67	
617	2534.20	0.55	10.6	2.65	2.68	
619	2534.40	0.09	7.9	2.67	2.69	
621	2534.60	0.05	6.2	2.60	2.65	
624V	2534.70	0.02	9.3	2.67	2.66	Vertical
625	2534.80	0.12	8.8	2.66	2.65	
627	2535.00	0.33	10.4	2.66	2.67	
629	2535.20	0.17	9.8	2.67	2.72	
631	2535.40	0.78	11.5	2.66	2.71	
633	2535.60	0.21	10.1	2.67	2.69	
635V	2535.70	0.09	10.2	2.67	2.67	Vertical
637	2535.80	0.09	8.5	2.68	2.69	
639	2536.00	1.23	11.7	2.67	2.69	
641	2536.20	1.10	11.5	2.66	2.68	
643	2536.45	0.58	9.9	2.67	2.66	
645	2536.60	0.53	10.3	2.67	2.67	
653	2537.30	0.22	9.3	2.66	2.67	
655	2537.40	0.04	6.1	2.69	2.69	
657	2537.60	<0.01	3.2	2.71	2.71	
659V	2537.68	5.25	15.0	2.66	2.65	Vertical
661	2537.80	11	14.0	2.66	2.65	
663	2538.00	1.78	12.2	2.67	2.67	
665	2538.20	22	16.0	2.66	2.66	
667	2538.40	41	15.9	2.66	2.67	
671V	2538.68	0.98	13.9	2.66	2.67	Vertical
673	2538.80	0.30	9.9	2.67	2.68	
675	2539.00	0.29	10.4	2.67	2.66	
677	2539.20	0.12	9.3	2.68	2.67	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm³)	Grain Density Absolute (g/cm³)	Remarks
679	2539.40	0.05	6.9	2.68	2.67	
681	2539.60	0.12	9.5	2.68	2.66	
683V	2539.67	0.10	11.2	2.67	2.67	Vertical
685	2539.80	0.25	10.2	2.67	2.68	
687	2540.00	1.54	12.0	2.66	2.65	
689	2540.20	0.43	10.5	2.68	2.65	
691	2540.40	0.65	9.7	2.74	2.75	
693	2540.60	3.29	12.4	2.66	2.66	
695V	2540.67	0.16	10.6	2.66	2.67	Vertical
697	2540.80	0.27	9.6	2.66	2.68	
699	2541.00	0.33	8.6	2.68	2.68	
701	2541.20	0.37	9.7	2.67	2.68	
703	2541.34	0.03	6.7	2.68	2.70	
705	2541.60	0.07	6.9	2.69	2.71	
707V	2541.67	0.79	12.6	2.65	2.67	Vertical
709	2541.80	1.74	11.7	2.66	2.65	
711	2542.00	1.52	11.7	2.66	2.66	
713	2542.15	0.13	6.4	2.65	2.67	
717	2542.60	1.25	11.2	2.66	2.66	
721	2542.80	0.14	8.2	2.68	2.70	
723	2543.00	0.86	10.7	2.67	2.66	
725	2543.20	0.19	9.5	2.68	2.68	
727	2543.40	0.08	8.8	2.70	2.68	B#4
729	2544.85	4.78	13.3	2.71	2.75	C#5
731	2545.00	8.68	13.0	2.75	2.74	
733	2545.20	64	16.3	2.67	2.68	
735	2545.40	105	17.3	2.66	2.65	
737V	2545.46	112	18.2	2.66	2.66	Vertical
739	2545.60	24	14.9	2.69	2.67	
741	2545.80	21	14.3	2.67	2.66	
743	2546.00	192	17.8	2.66	2.65	
745	2546.20	574	18.4	2.65	2.68	
747	2546.37	86	16.7	2.67	2.66	
750V	2546.52	55	17.3	2.66	2.65	Vertical
751	2546.60	59	16.1	2.67	2.67	
753	2546.80	777	18.1	2.67	2.67	
755	2547.00	120	16.8	2.68	2.67	
757	2547.20	6.58	12.9	2.66	2.65	
759	2547.40	0.48	8.8	2.66	2.66	
761V	2547.47	0.04	9.2	3.05	2.98	B#5 Vert.
763V	2568.04	4.91	16.5	2.67	2.62	C#6 Vert.
765	2568.20	68	16.1	2.66	2.66	
767	2568.40	43	16.2	2.66	2.65	
769	2568.60	50	16.2	2.65	2.65	
771	2568.80	202	18.1	2.66	2.65	
773V	2568.92	105	18.8	2.66	2.67	Vertical
775	2569.00	47	15.2	2.68	2.67	
777	2569.20	27	15.8	2.66	2.66	
779	2569.40	192	18.9	2.66	2.64	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
781	2569.60	3.20	12.2	2.67	2.78	
783	2569.80	68	16.9	2.66	2.66	
785V	2569.91	5.13	11.8	2.67	2.69	Vertical
787	2570.00	376	10.6	2.70	2.65	
789	2570.14	21	13.1	2.59	2.58	
807	2571.80	0.15	0.9	2.49	2.54	VF
809V	2571.91	<0.01	1.7	2.51	2.53	Vertical
811	2572.00	<0.01	3.0	2.59	2.60	
813	2572.22	<0.01	3.6	2.62	2.60	
815	2572.40	<0.01	3.4	2.60	2.61	
817	2572.60	<0.01	2.7	2.59	2.59	
823	2573.00	<0.01	3.0	2.62	2.61	
825	2573.20	0.01	3.0	2.64	2.64	
831	2573.80	<0.01	1.4	2.83	2.82	
835	2574.00	<0.01	1.1	2.80	2.82	
837	2574.20	0.01	1.5	2.64	2.63	
841	2574.60	<0.01	1.4	2.60	2.62	
843	2574.80	<0.01	1.8	2.62	2.61	
847	2575.00	0.02	2.2	2.62	2.62	VF
851	2575.40	0.19	2.5	2.60	2.61	VF
860	2576.20	97	18.3	2.62	2.64	
862	2576.35	24	15.9	2.62	2.60	
864	2576.55	0.33	11.2	2.68	2.67	
866V	2576.68	0.03	9.9	2.67	2.62	Vertical
868	2576.80	42	16.8	2.66	2.68	
870	2577.00	40	17.1	2.65	2.65	
872	2577.24	8.41	15.6	2.67	2.66	
874V	2577.27	0.03	9.3	2.69	2.65	Vertical
876	2577.40	39	15.9	2.66	2.66	
878	2577.55	17	15.0	2.72	2.69	
882V	2577.90	0.05	9.6	2.67	2.69	Vertical
884	2577.98	0.08	7.9	2.66	2.64	
886	2578.20	0.03	5.5	2.67	2.66	
888	2578.43	0.09	8.6	2.67	2.68	
892	2578.80	2.57	4.1	2.65	2.64	VF
896	2579.00	0.07	1.5	2.56	2.58	VF
904	2579.80	<0.01	2.7	2.65	2.64	
906V	2579.87	<0.01	2.5	2.63	2.60	Vertical
908	2580.00	<0.01	4.0	2.67	2.64	
910	2580.20	<0.01	3.4	2.64	2.62	
912	2580.40	<0.01	3.0	2.63	2.61	
916	2580.80	<0.01	3.8	2.67	2.67	
918V	2580.87	<0.01	4.5	2.66	2.63	Vertical
920	2581.00	<0.01	3.8	2.64	2.64	
922	2581.20	<0.01	4.4	2.66	2.67	
924	2581.40	0.01	4.1	2.65	2.64	
926	2581.60	0.10	2.3	2.63	2.65	VF
930V	2581.88	<0.01	3.2	2.65	2.65	Vertical
932	2582.00	<0.01	3.0	2.64	2.65	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
934	2582.20	<0.01	4.2	2.67	2.69	
936	2582.40	<0.01	2.8	2.63	2.66	
938	2582.60	<0.01	2.4	2.60	2.62	
940	2582.80	<0.01	3.5	2.67	2.69	
942V	2582.88	<0.01	2.7	2.63	2.64	Vertical
944	2583.00	<0.01	3.3	2.64	2.65	
946	2583.20	<0.01	3.3	2.63	2.64	
952	2583.80	<0.01	3.9	2.65	2.65	
954V	2583.88	<0.01	3.2	2.64	2.67	Vertical
958	2584.20	<0.01	1.3	2.80	2.78	
960	2584.40	<0.01	1.1	2.76	2.76	
962	2584.60	<0.01	3.2	2.65	2.69	
966V	2584.88	<0.01	2.8	2.65	2.64	Vertical
968	2585.00	0.01	3.1	2.65	2.65	
970	2585.20	<0.01	2.7	2.65	2.64	
972	2585.40	0.01	1.6	2.61	2.63	
974	2585.60	0.03	3.0	2.63	2.63	VF
978V	2585.90	<0.01	3.6	2.64	2.60	Vertical
980	2586.00	<0.01	3.8	2.64	2.64	
982	2586.20	0.06	2.1	2.58	2.60	B#6, VF

VF = Vertical Fracture; C# = Top of Core; B# = Bottom of Core

ACS LABORATORIES PTY. LTD.

ACN: 008 273 005

Petroleum Reservoir Engineering Data

OVERBURDEN ANALYSIS FINAL REPORT

Overburden Pressure: Core 1& 2 3750 psi
Core 3,4,5 & 6 4250 psi

Company ESSO AUSTRALIA LTD.
Well TURRUM # 5
Field TURRUM
Core Int. C#1: 2197.00 - 2205.30m C#4: 2526.80 - 2543.50m
C#2: 2205.50 - 2222.80m C#5: 2544.80 - 2549.80m
C#3: 2508.50 - 2526.80m C#6: 2568.00 - 2586.50m

Date 6-Feb-96
File 002 - 232
Location Vic - L - 3
ACS Lab. Brisbane - 002
Analyst WJD, IJM

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm³)	Grain Density Absolute (g/cm³)	Remarks
11V	2197.89	0.03	11.9	2.67	2.66	C#1
23V	2198.89	0.20	11.3	2.70	2.69	
35V	2199.88	0.03	10.6	2.69	2.67	
47V	2200.88	0.14	12.2	2.70	2.71	
59V	2201.89	3.19	15.7	2.66	2.66	
83V	2203.89	392	22.8	2.65	2.65	
99V	2205.25	0.76	16.2	2.67	2.66	
109V	2206.31	32	20.8	2.66	2.66	C#2
121V	2207.31	4.28	18.9	2.66	2.68	
157V	2210.26	0.01	7.5	2.63	2.66	
217V	2215.26	<0.01	4.7	2.34	2.38	
241V	2217.26	<0.01	3.6	2.46	2.48	
253V	2218.26	<0.01	5.4	2.46	2.46	
265V	2219.31	<0.01	9.2	2.62	2.62	
277V	2220.26	<0.01	7.4	2.50	2.54	
289V	2221.26	<0.01	5.2	2.58	2.56	
301V	2222.24	<0.01	7.0	2.63	2.64	
341V	2511.25	<0.01	2.9	2.66	2.81	C#3
353V	2512.30	<0.01	0.7	2.56	2.59	
467V	2521.70	0.22	7.9	2.66	2.66	
479V	2522.65	116	17.3	2.65	2.65	
491V	2523.65	1300	20.1	2.64	2.66	
503V	2524.70	2840	22.2	2.65	2.65	
529V	2526.86	0.01	7.9	2.67	2.66	C#4
575V	2530.70	0.42	12.9	2.67	2.68	
587V	2531.70	0.03	8.2	2.68	2.68	
599V	2532.70	0.11	12.0	2.67	2.69	
624V	2534.70	0.02	9.3	2.67	2.66	
635V	2535.70	0.09	10.2	2.67	2.67	
659V	2537.68	5.25	15.0	2.66	2.65	
671V	2538.68	0.98	13.9	2.66	2.67	
683V	2539.67	0.10	11.2	2.67	2.67	
695V	2540.67	0.16	10.6	2.66	2.67	
707V	2541.67	0.79	12.6	2.65	2.67	
737V	2545.46	112	18.2	2.66	2.66	C#5
750V	2546.52	55	17.3	2.66	2.65	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
761V	2547.47	0.04	9.2	3.05	2.98	B#5
763V	2568.04	4.91	16.5	2.67	2.62	C#6
773V	2568.92	105	18.8	2.66	2.67	
785V	2569.91	5.13	11.8	2.67	2.69	
809V	2571.91	<0.01	1.7	2.51	2.53	
866V	2576.68	0.03	9.9	2.67	2.62	
874V	2577.27	0.03	9.3	2.69	2.65	
882V	2577.90	0.05	9.6	2.67	2.69	
906V	2579.87	<0.01	2.5	2.63	2.60	
918V	2580.87	<0.01	4.5	2.66	2.63	
930V	2581.88	<0.01	3.2	2.65	2.65	
942V	2582.88	<0.01	2.7	2.63	2.64	
954V	2583.88	<0.01	3.2	2.64	2.67	
966V	2584.88	<0.01	2.8	2.65	2.64	
978V	2585.90	<0.01	3.6	2.64	2.60	

VF = Vertical Fracture; C# = Top of Core; B# = Bottom of Core

ACS LABORATORIES PTY. LTD.
ACN: 008 273 005
Petroleum Reservoir Engineering Data

OVERBURDEN ANALYSIS FINAL REPORT

Overburden Pressure: Core 1& 2 3750 psi
Core 3,4,5 & 6 4250 psi

Company ESSO AUSTRALIA LTD.
Well TURRUM # 5
Field TURRUM
Core Int. C#1: 2197.00 - 2205.30m; C#2: 2205.50 - 2222.80m; C#3: 2508.50 - 2526.80m; C#4: 2526.80 - 2543.50m; C#5: 2544.80 - 2549.80m; C#6: 2568.00 - 2586.50m

Date 6-Feb-96
File 002 - 232
Location Vic - L - 3
ACS Lab. Brisbane - 002
Analyst WJD. IJM

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm³)	Grain Density Absolute (g/cm³)	Remarks
1	2197.04	1.07	11.5	2.66	2.69	C#1
3	2197.20	0.05	7.4	2.64	2.64	
5	2197.40	2.57	13.9	2.67	2.66	
7	2197.60	1.70	13.7	2.69	2.68	
9	2197.81	8.31	14.4	2.69	2.68	
13	2198.05	20	16.1	2.68	2.68	
15	2198.20	2.51	11.8	2.67	2.66	
17	2198.38	5.02	13.8	2.67	2.67	
19	2198.60	0.58	9.3	2.66	2.66	
21	2198.81	1.96	12.7	2.66	2.65	
25	2199.00	0.02	4.1	2.73	2.72	
27	2199.20	<0.01	2.7	2.74	2.74	
29	2199.40	<0.01	3.2	2.75	2.76	
31	2199.60	<0.01	2.6	2.74	2.75	
37	2200.00	0.50	11.4	2.72	2.72	
39	2200.20	0.58	12.7	2.70	2.69	
41	2200.40	0.31	11.7	2.71	2.70	
43	2200.60	0.09	9.3	2.66	2.67	
45	2200.73	0.13	8.4	2.65	2.66	
49	2201.00	0.82	12.8	2.70	2.69	
51	2201.18	0.13	8.1	2.64	2.63	
53	2201.40	0.39	11.4	2.67	2.66	
55	2201.60	9.77	16.0	2.66	2.65	
57	2201.73	3.23	15.6	2.67	2.68	
61	2202.00	15	16.6	2.67	2.68	
63	2202.20	68	19.2	2.65	2.68	
65	2202.40	15	14.1	2.63	2.64	
67	2202.60	282	19.3	2.63	2.65	
69	2202.70	27	17.5	2.63	2.66	
73	2203.01	408	20.8	2.66	2.64	
75	2203.20	82	15.3	2.64	2.63	
77	2203.40	573	20.9	2.65	2.66	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
79	2203.60	14	14.5	2.64	2.67	
81	2203.75	226	18.9	2.65	2.64	
85	2204.05	93	17.8	2.68	2.68	
87	2204.20	828	23.1	2.66	2.64	
89	2204.36	1470	25.0	2.66	2.65	
91	2204.56	56	16.4	2.66	2.66	
93	2204.86	552	21.9	2.66	2.66	
95	2205.01	844	22.6	2.66	2.65	
97	2205.19	85	13.9	2.67	2.66	
101	2205.60	434	19.5	2.65	2.66	C#2
103	2205.80	193	18.9	2.61	2.58	
105	2206.00	596	21.5	2.67	2.66	
107	2206.22	311	19.2	2.67	2.68	
111	2206.40	437	20.4	2.66	2.65	
113	2206.60	1221	24.0	2.66	2.66	
115	2206.80	488	21.8	2.68	2.70	
117	2207.00	298	20.0	2.64	2.66	
119	2207.20	425	20.9	2.65	2.67	
123	2207.40	170	20.0	2.65	2.66	
125	2207.60	1005	22.9	2.65	2.65	
127	2207.76	232	20.5	2.63	2.62	
139	2208.80	0.01	6.3	2.61	2.61	
141	2209.00	0.02	6.9	2.66	2.65	
143	2209.20	0.03	7.4	2.67	2.70	
147	2209.40	0.07	9.1	2.67	2.67	
149	2209.60	0.01	7.9	2.62	2.63	
151	2209.80	0.01	8.6	2.63	2.62	
153	2210.00	0.01	6.9	2.65	2.69	
155	2210.15	0.03	9.0	2.64	2.67	
159	2210.40	0.02	7.1	2.62	2.62	
161	2210.60	0.01	5.2	2.60	2.61	
163	2210.80	<0.01	5.7	2.54	2.58	
165	2211.00	<0.01	4.4	2.31	2.36	
167	2211.16	<0.01	4.5	2.28	2.37	
173	2211.60	<0.01	4.3	2.10	2.24	
175	2211.80	<0.01	4.0	2.24	2.18	
177	2212.00	<0.01	4.6	2.19	2.25	
179	2212.20	<0.01	4.4	2.16	2.25	
183	2212.45	<0.01	3.7	2.07	2.12	
185	2212.60	<0.01	4.1	2.07	2.11	
193	2213.20	<0.01	3.9	2.09	2.12	
195	2213.40	<0.01	3.6	2.18	2.22	
197	2213.60	<0.01	4.1	2.21	2.25	
199	2213.80	<0.01	3.5	2.18	2.24	
201	2214.00	<0.01	2.0	2.05	2.11	
203	2214.17	<0.01	1.8	2.13	2.19	
211	2214.80	<0.01	4.2	2.47	2.48	
213	2214.96	0.02	6.0	2.28	2.35	
215	2215.20	<0.01	4.4	2.42	2.42	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
221	2215.60	<0.01	5.2	2.28	2.31	
223	2215.80	<0.01	4.0	2.38	2.38	
225	2216.03	0.01	6.2	2.30	2.38	
231	2216.40	<0.01	5.8	2.34	2.45	
233	2216.60	<0.01	4.8	2.40	2.35	
235	2216.85	<0.01	3.8	2.47	2.47	
237	2217.00	<0.01	5.5	2.41	2.38	
239	2217.20	<0.01	4.7	2.45	2.50	
243	2217.45	0.17	5.1	2.43	2.50	VF
249	2218.00	0.02	5.0	2.43	2.45	
251	2218.20	0.04	5.6	2.44	2.44	
255	2218.40	0.03	6.7	2.45	2.50	
257	2218.60	0.03	6.6	2.46	2.48	
259	2218.80	0.03	5.4	2.55	2.57	
261	2219.00	0.04	9.5	2.62	2.63	
263	2219.18	0.05	10.2	2.62	2.64	
267	2219.40	0.33	13.4	2.63	2.62	
269	2219.60	0.12	11.4	2.62	2.63	
271	2219.80	0.73	13.0	2.65	2.65	
273	2220.00	0.01	5.4	2.53	2.56	
275	2220.20	0.02	5.9	2.51	2.53	
279	2220.40	0.01	6.4	2.53	2.52	
281	2220.60	<0.01	5.9	2.56	2.59	
283	2220.80	<0.01	5.4	2.57	2.61	
285	2221.00	<0.01	5.5	2.59	2.47	
287	2221.20	<0.01	5.8	2.61	2.61	
291	2221.40	<0.01	5.4	2.59	2.60	
293	2221.60	<0.01	6.2	2.60	2.59	
295	2221.80	<0.01	5.3	2.60	2.63	
297	2222.00	<0.01	6.1	2.60	2.61	
299	2222.15	<0.01	6.1	2.62	2.62	
303	2222.40	<0.01	5.4	2.61	2.64	
319	2509.40	<0.01	1.6	2.44	2.49	C#3
321	2509.60	<0.01	1.4	2.50	2.56	
327	2510.20	<0.01	0.5	2.54	2.60	
333	2510.60	<0.01	1.8	2.59	2.60	
335	2510.80	<0.01	1.1	2.59	2.62	
343	2511.40	<0.01	4.2	2.64	2.65	
345	2511.60	<0.01	3.0	2.62	2.65	
349	2512.00	<0.01	1.0	2.57	2.63	
407	2516.80	<0.01	0.6	2.59	2.59	
441	2519.60	<0.01	0.9	2.47	2.49	
463	2521.40	452	17.6	2.65	2.64	
465	2521.64	4438	19.2	2.65	2.65	
469	2521.80	22	13.9	2.65	2.65	
471	2522.00	30	14.5	2.65	2.65	
473	2522.20	74	16.6	2.66	2.66	
475	2522.40	13	14.0	2.65	2.65	
477	2522.60	43	15.4	2.65	2.64	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
481	2522.80	218	17.4	2.65	2.66	
483	2523.00	157	18.3	2.65	2.66	
485	2523.20	85	11.9	2.65	2.66	
487	2523.40	598	18.5	2.64	2.65	
489	2523.60	1340	20.1	2.66	2.65	
493	2523.80	4933	21.8	2.64	2.64	
495	2524.00	4958	21.7	2.64	2.65	
497	2524.20	5770	22.6	2.64	2.66	
499	2524.40	3012	22.1	2.65	2.65	
501	2524.60	5150	22.5	2.65	2.65	
505	2524.80	3058	21.9	2.65	2.66	
507	2525.00	3445	21.5	2.65	2.65	
509	2525.20	2086	20.5	2.65	2.65	
511	2525.40	0.95	9.4	2.62	2.62	
513	2525.60	1508	18.4	2.64	2.64	
517	2525.75	109	12.9	2.63	2.63	
519	2526.00	0.13	8.8	2.66	2.65	
523	2526.40	0.07	8.5	2.66	2.66	
525	2526.60	0.10	8.1	2.67	2.67	
527	2526.80	0.12	8.4	2.68	2.67	
531	2527.00	6.26	12.0	2.66	2.69	C#4
533	2527.25	0.80	9.7	2.66	2.67	
535	2527.41	0.05	3.8	2.74	2.71	
565	2529.80	0.53	10.0	2.66	2.69	
567	2529.97	1.14	6.4	2.66	2.65	
569	2530.21	3.80	12.7	2.66	2.65	
571	2530.41	1.21	11.6	2.66	2.67	
573	2530.59	0.52	10.5	2.67	2.70	
577	2530.80	1.97	10.5	2.65	2.63	
579	2531.00	7.05	13.3	2.66	2.69	
581	2531.20	2.03	12.5	2.66	2.66	
583	2531.40	1.10	10.9	2.67	2.65	
585	2531.60	1.62	12.5	2.66	2.66	
589	2531.80	0.05	7.3	2.68	2.67	
591	2532.00	0.61	9.9	2.66	2.64	
593	2532.20	0.59	11.0	2.67	2.71	
595	2532.40	8.20	11.0	2.66	2.68	
597	2532.60	0.03	5.8	2.59	2.63	
601	2532.80	6.92	14.3	2.66	2.67	
603	2533.00	0.17	10.0	2.67	2.67	
605	2533.20	0.09	7.8	2.67	2.68	
607	2533.40	0.02	5.6	3.00	2.97	
609	2533.59	0.18	10.4	2.69	2.71	
615	2534.00	0.85	12.0	2.67	2.67	
617	2534.20	0.55	10.6	2.65	2.68	
619	2534.40	0.09	7.9	2.67	2.69	
621	2534.60	0.05	6.2	2.60	2.65	
625	2534.80	0.12	8.8	2.66	2.65	
627	2535.00	0.33	10.4	2.66	2.67	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
629	2535.20	0.17	9.8	2.67	2.72	
631	2535.40	0.78	11.5	2.66	2.71	
633	2535.60	0.21	10.1	2.67	2.69	
637	2535.80	0.09	8.5	2.68	2.69	
639	2536.00	1.23	11.7	2.67	2.69	
641	2536.20	1.10	11.5	2.66	2.68	
643	2536.45	0.58	9.9	2.67	2.66	
645	2536.60	0.53	10.3	2.67	2.67	
653	2537.30	0.22	9.3	2.66	2.67	
655	2537.40	0.04	6.1	2.69	2.69	
657	2537.60	<0.01	3.2	2.71	2.71	
661	2537.80	11	14.0	2.66	2.65	
663	2538.00	1.78	12.2	2.67	2.67	
665	2538.20	22	16.0	2.66	2.66	
667	2538.40	41	15.9	2.66	2.67	
673	2538.80	0.30	9.9	2.67	2.68	
675	2539.00	0.29	10.4	2.67	2.66	
677	2539.20	0.12	9.3	2.68	2.67	
679	2539.40	0.05	6.9	2.68	2.67	
681	2539.60	0.12	9.5	2.68	2.66	
685	2539.80	0.25	10.2	2.67	2.68	
687	2540.00	1.54	12.0	2.66	2.65	
689	2540.20	0.43	10.5	2.68	2.65	
691	2540.40	0.65	9.7	2.74	2.75	
693	2540.60	3.29	12.4	2.66	2.66	
697	2540.80	0.27	9.6	2.66	2.68	
699	2541.00	0.33	8.6	2.68	2.68	
701	2541.20	0.37	9.7	2.67	2.68	
703	2541.34	0.03	6.7	2.68	2.70	
705	2541.60	0.07	6.9	2.69	2.71	
709	2541.80	1.74	11.7	2.66	2.65	
711	2542.00	1.52	11.7	2.66	2.66	
713	2542.15	0.13	6.4	2.65	2.67	
717	2542.60	1.25	11.2	2.66	2.66	
721	2542.80	0.14	8.2	2.68	2.70	
723	2543.00	0.86	10.7	2.67	2.66	
725	2543.20	0.19	9.5	2.68	2.68	
727	2543.40	0.08	8.8	2.70	2.68	
729	2544.85	4.78	13.3	2.71	2.75	C#5
731	2545.00	8.68	13.0	2.75	2.74	
733	2545.20	64	16.3	2.67	2.68	
735	2545.40	105	17.3	2.66	2.65	
739	2545.60	24	14.9	2.69	2.67	
741	2545.80	21	14.3	2.67	2.66	
743	2546.00	192	17.8	2.66	2.65	
745	2546.20	574	18.4	2.65	2.68	
747	2546.37	86	16.7	2.67	2.66	
751	2546.60	59	16.1	2.67	2.67	
753	2546.80	777	18.1	2.67	2.67	

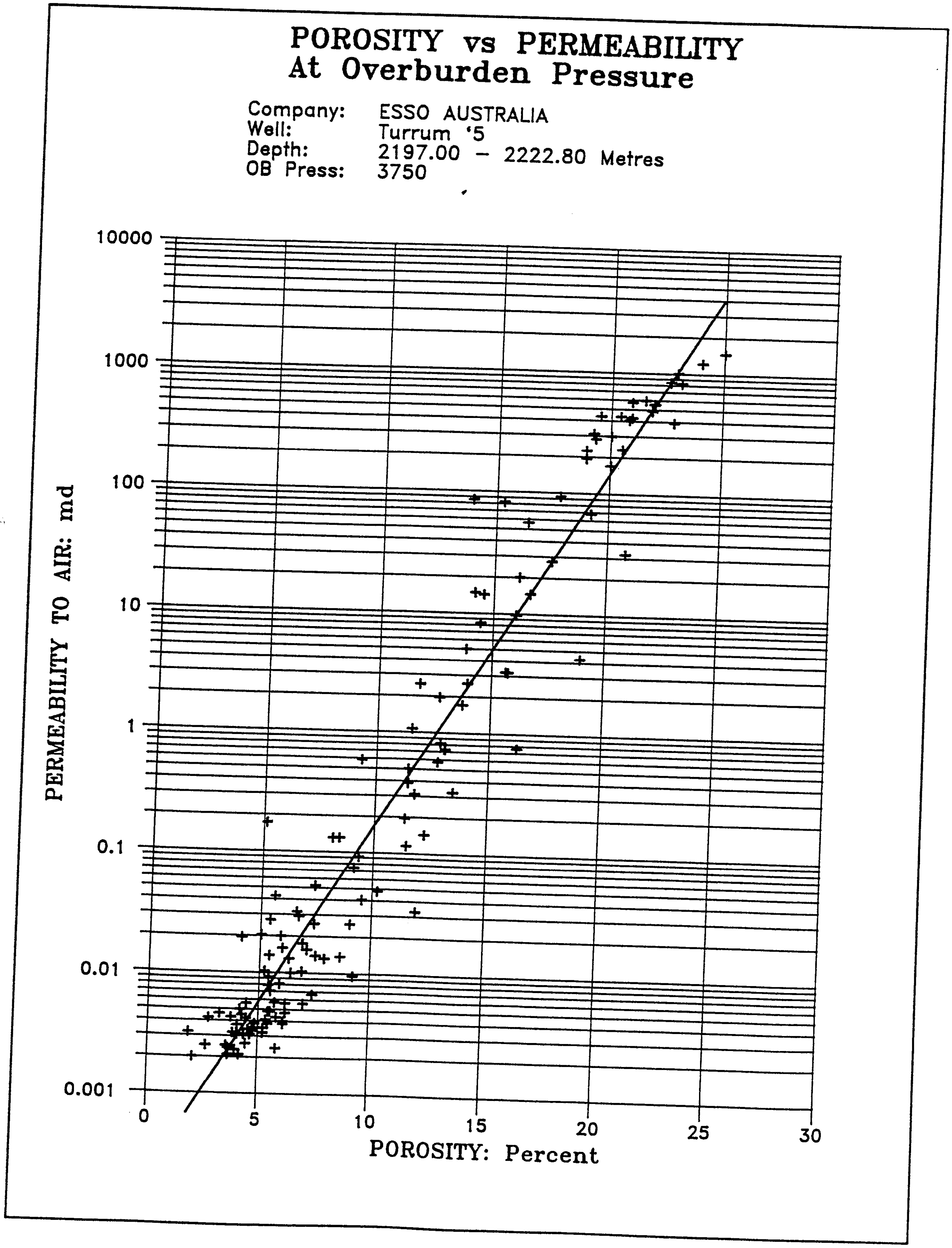
Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
755	2547.00	120	16.8	2.68	2.67	
757	2547.20	6.58	12.9	2.66	2.65	
759	2547.40	0.48	8.8	2.66	2.66	
765	2568.20	68	16.1	2.66	2.66	C#6
767	2568.40	43	16.2	2.66	2.65	
769	2568.60	50	16.2	2.65	2.65	
771	2568.80	202	18.1	2.66	2.65	
775	2569.00	47	15.2	2.68	2.67	
777	2569.20	27	15.8	2.66	2.66	
779	2569.40	192	18.9	2.66	2.64	
781	2569.60	3.20	12.2	2.67	2.78	
783	2569.80	68	16.9	2.66	2.66	
787	2570.00	376	10.6	2.70	2.65	
789	2570.14	21	13.1	2.59	2.58	
807	2571.80	0.15	0.9	2.49	2.54	VF
811	2572.00	<0.01	3.0	2.59	2.60	
813	2572.22	<0.01	3.6	2.62	2.60	
815	2572.40	<0.01	3.4	2.60	2.61	
817	2572.60	<0.01	2.7	2.59	2.59	
823	2573.00	<0.01	3.0	2.62	2.61	
825	2573.20	0.01	3.0	2.64	2.64	
831	2573.80	<0.01	1.4	2.83	2.82	
835	2574.00	<0.01	1.1	2.80	2.82	
837	2574.20	0.01	1.5	2.64	2.63	
841	2574.60	<0.01	1.4	2.60	2.62	
843	2574.80	<0.01	1.8	2.62	2.61	
847	2575.00	0.02	2.2	2.62	2.62	VF
851	2575.40	0.19	2.5	2.60	2.61	VF
860	2576.20	97	18.3	2.62	2.64	
862	2576.35	24	15.9	2.62	2.60	
864	2576.55	0.33	11.2	2.68	2.67	
868	2576.80	42	16.8	2.66	2.68	
870	2577.00	40	17.1	2.65	2.65	
872	2577.24	8.41	15.6	2.67	2.66	
876	2577.40	39	15.9	2.66	2.66	
878	2577.55	17	15.0	2.72	2.69	
884	2577.98	0.08	7.9	2.66	2.64	
886	2578.20	0.03	5.5	2.67	2.66	
888	2578.43	0.09	8.6	2.67	2.68	
892	2578.80	2.57	4.1	2.65	2.64	VF
896	2579.00	0.07	1.5	2.56	2.58	VF
904	2579.80	<0.01	2.7	2.65	2.64	
908	2580.00	<0.01	4.0	2.67	2.64	
910	2580.20	<0.01	3.4	2.64	2.62	
912	2580.40	<0.01	3.0	2.63	2.61	
916	2580.80	<0.01	3.8	2.67	2.67	
920	2581.00	<0.01	3.8	2.64	2.64	
922	2581.20	<0.01	4.4	2.66	2.67	
924	2581.40	0.01	4.1	2.65	2.64	

Sample number	Depth (meters)	Permeability to Air (millidarcys)	Porosity (percent)	Grain Density Calculated (g/cm^3)	Grain Density Absolute (g/cm^3)	Remarks
926	2581.60	0.10	2.3	2.63	2.65	VF
932	2582.00	<0.01	3.0	2.64	2.65	
934	2582.20	<0.01	4.2	2.67	2.69	
936	2582.40	<0.01	2.8	2.63	2.66	
938	2582.60	<0.01	2.4	2.60	2.62	
940	2582.80	<0.01	3.5	2.67	2.69	
944	2583.00	<0.01	3.3	2.64	2.65	
946	2583.20	<0.01	3.3	2.63	2.64	
952	2583.80	<0.01	3.9	2.65	2.65	
958	2584.20	<0.01	1.3	2.80	2.78	
960	2584.40	<0.01	1.1	2.76	2.76	
962	2584.60	<0.01	3.2	2.65	2.69	
968	2585.00	0.01	3.1	2.65	2.65	
970	2585.20	<0.01	2.7	2.65	2.64	
972	2585.40	0.01	1.6	2.61	2.63	
974	2585.60	0.03	3.0	2.63	2.63	VF
980	2586.00	<0.01	3.8	2.64	2.64	
982	2586.20	0.06	2.1	2.58	2.60	VF

VF = Vertical Fracture: C# = Top of Core: B# = Bottom of Core

POROSITY vs PERMEABILITY AT

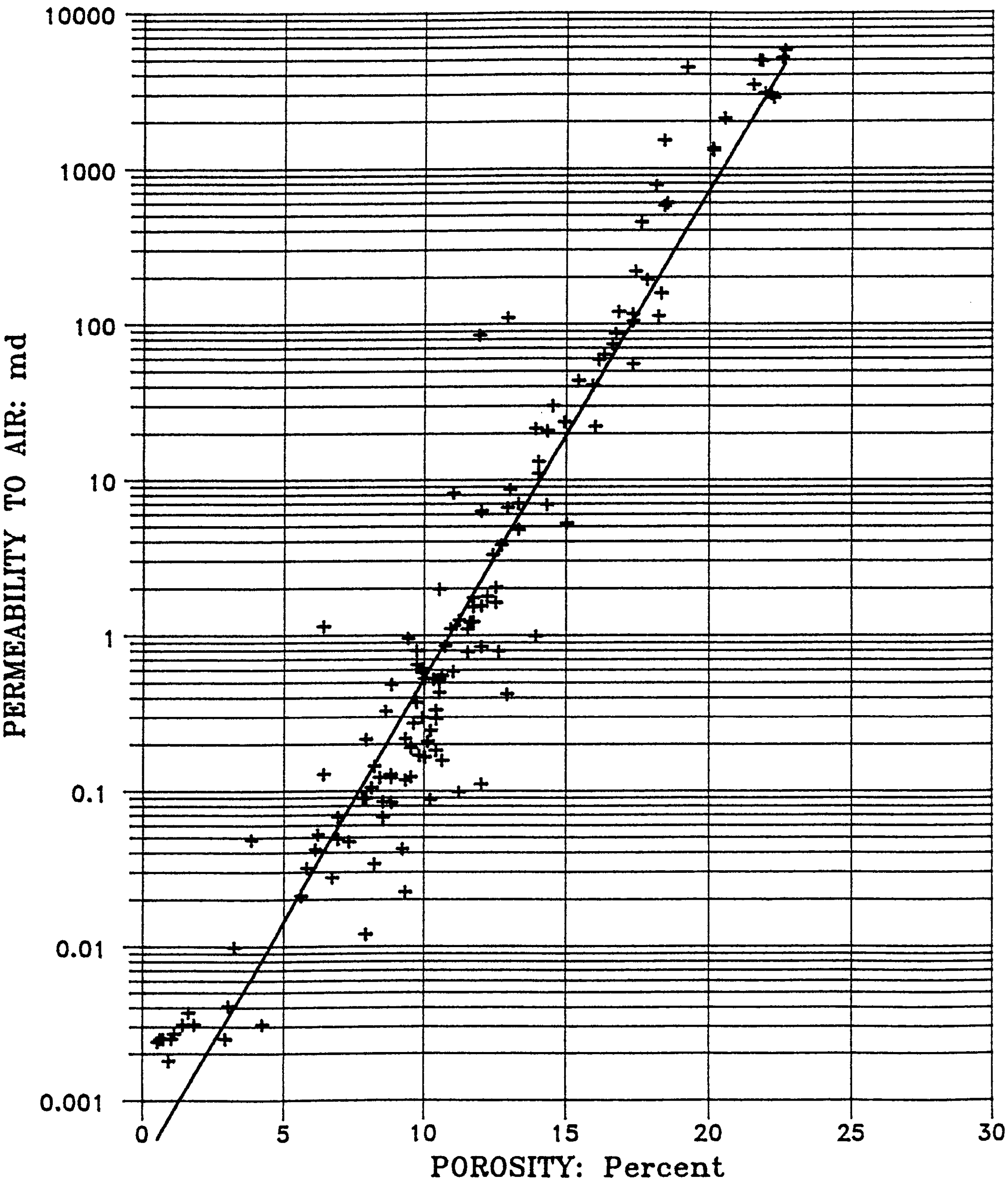
OVERBURDEN CROSSPLOTS



POROSITY vs PERMEABILITY
At Overburden Pressure
Company: ESSO AUSTRALIA
Well: Turrum '5
Depth: 2197.00 - 2222.80 Metres
OB Press: 3750
10000
1000
100
10
1
0.1
0.01
0.001
PERMEABILITY TO AIR: md
0
5
10
15
20
25
30
POROSITY: Percent

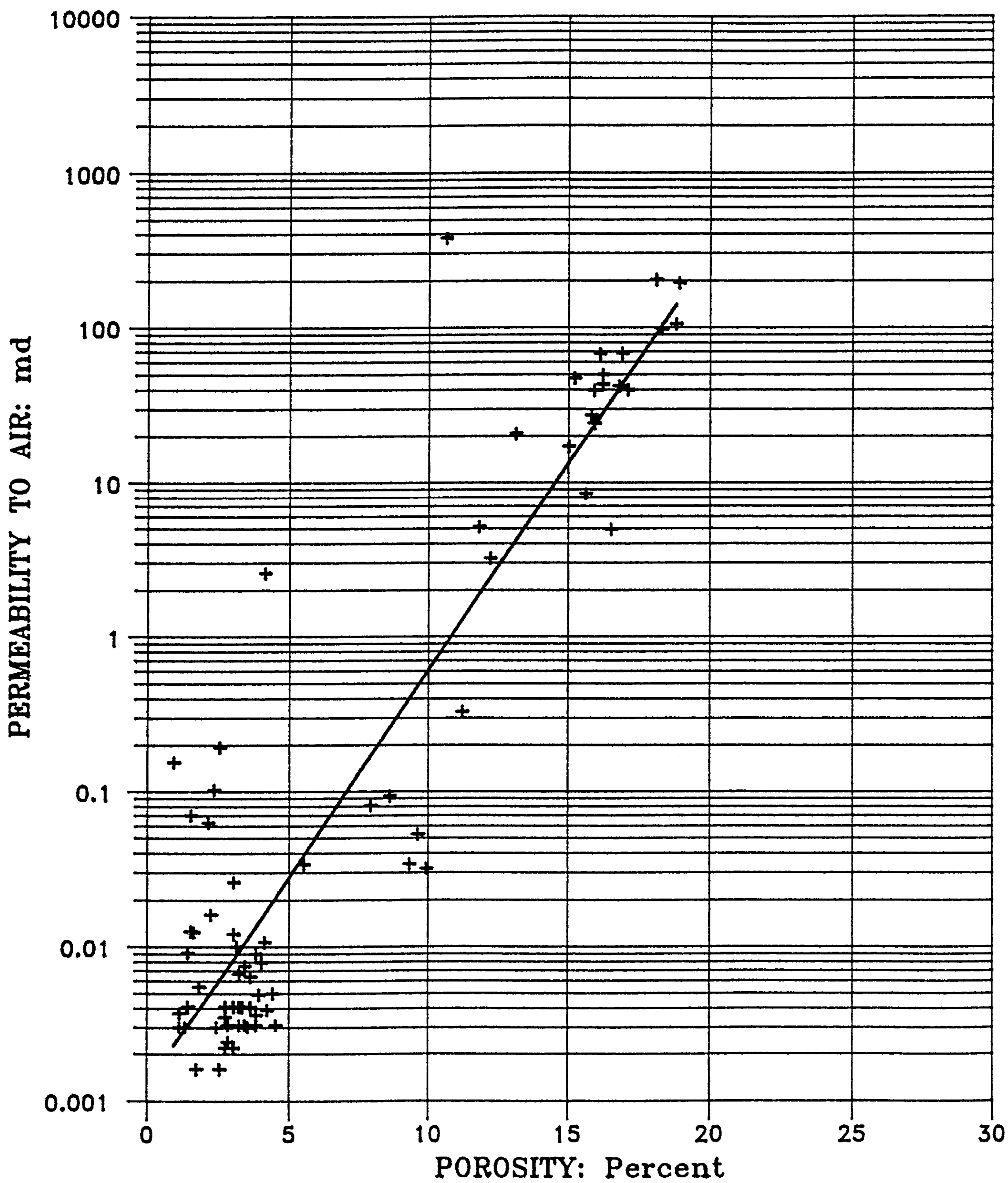
POROSITY vs PERMEABILITY At Overburden Pressure

Company: ESSO AUSTRALIA
Well: Turrum '5
Depth: 2508.50 – 2549.80 Metres
OB Press: 4250



POROSITY vs PERMEABILITY
At Overburden Pressure

Company: ESSO AUSTRALIA
Well: Turrum '5
Depth: 2568.00 - 2586.50 Metres
OB Press: 4250



CORE PLOTS

PE603874

This is an enclosure indicator page.
The enclosure PE603874 is enclosed within the container PE900858 at this location in this document.

The enclosure PE603874 has the following characteristics:

ITEM_BARCODE =	PE603874
CONTAINER_BARCODE =	PE900858
NAME =	Core Analysis Plot, 1 of 3
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Core Analysis Plot, 1 of 3, for Turrum-5
REMARKS =	
DATE_CREATED =	22/03/96
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	TURRUM-5
CONTRACTOR =	ACS LABORATORIES AUSTRALIA
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE603875

This is an enclosure indicator page.
The enclosure PE603875 is enclosed within the container PE900858 at this location in this document.

The enclosure PE603875 has the following characteristics:

ITEM_BARCODE = PE603875
CONTAINER_BARCODE = PE900858
NAME = Core Analysis Plot, 2 of 3
BASIN = GIPPSLAND
PERMIT = VIC/L3
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Core Analysis Plot, 2 of 3, for Turrum-5
REMARKS =
DATE_CREATED = 22/03/96
DATE_RECEIVED = 29/11/96
W_NO = W1145
WELL_NAME = TURRUM-5
CONTRACTOR = ACS LABORATORIES AUSTRALIA
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE604590

This is an enclosure indicator page.
The enclosure PE604590 is enclosed within the container PE900858 at this location in this document.

The enclosure PE604590 has the following characteristics:

ITEM_BARCODE =	PE604590
CONTAINER_BARCODE =	PE900858
NAME =	Core Analysis Plot, 3 of 3
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Core Analysis Plot, 3 of 3, for Turrum-5
REMARKS =	
DATE_CREATED =	22/03/96
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	TURRUM-5
CONTRACTOR =	ACS LABORATORIES AUSTRALIA
CLIENT_OP_CO =	ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 5

APPENDIX 5

APPENDIX 5

TURRUM 5

Well Seismic Processing Report: Zero Offset VSP and Geogram

(This appendix despatched 7 March, 1996)

ENCLOSURES

ENCLOSURES

ENCLOSURE 1

TURRUM 5

Post Drill L360 Depth Structure Map

PE900859

PE900859

This is an enclosure indicator page.
The enclosure PE900859 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900859 has the following characteristics:

ITEM_BARCODE =	PE900859
CONTAINER_BARCODE =	PE900858
NAME =	Post Drill L360 Depth Structure Map
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	SEISMIC
SUBTYPE =	HRZN_CNTR_MAP
DESCRIPTION =	Post Drill L360 Depth Structure Map (Enclosure 1 from WCR vol.2) for Turrum-5
REMARKS =	
DATE_CREATED =	11/12/95
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	Turrum-5
CONTRACTOR =	Esso Australia Ltd.
CLIENT_OP_CO =	Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 2

TURRUM 5

Post Drill L500 Depth Structure Map

PE900860

PE900860

This is an enclosure indicator page.
The enclosure PE900860 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900860 has the following characteristics:

ITEM_BARCODE = PE900860
CONTAINER_BARCODE = PE900858
NAME = Post Drill L500 Depth Structure Map
BASIN = GIPPSLAND
PERMIT = VIC/L3
TYPE = SEISMIC
SUBTYPE = HRZN_CNTR_MAP
DESCRIPTION = Post Drill L500 Depth Structure Map (Enclosure 2 from WCR vol.2) for Turrum-5
REMARKS =
DATE_CREATED = 13/02/98
DATE_RECEIVED = 29/11/96
W_NO = W1145
WELL_NAME = Turrum-5
CONTRACTOR = Esso Australia Ltd.
CLIENT_OP_CO = Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 3

TURRUM 5

Synthetic Seismogram

PE900861

PE900861

This is an enclosure indicator page.
The enclosure PE900861 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900861 has the following characteristics:

ITEM_BARCODE =	PE900861
CONTAINER_BARCODE =	PE900858
NAME =	Synthetic Seismogram
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	SYNTH_SEISMOGRAM
DESCRIPTION =	Synthetic Seismogram (Enclosure 3 from WCR vol.2) for Turrum-5
REMARKS =	
DATE_CREATED =	11/04/96
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	Turrum-5
CONTRACTOR =	
CLIENT_OP_CO =	Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 4

TURRUM 5

Seismic Inline 1310

PE900862

PE900862

This is an enclosure indicator page.
The enclosure PE900862 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900862 has the following characteristics:

ITEM_BARCODE = PE900862
CONTAINER_BARCODE = PE900858
NAME = Seismic Section, Line 310
BASIN = GIPPSLAND
PERMIT = VIC/L3
TYPE = SEISMIC
SUBTYPE = INTERP_SECTION
DESCRIPTION = Seismic Trace Section with Interpretation, Line 310, (enclosure 4 of WCR vol.2) for Turrum-5
REMARKS =
DATE_CREATED = 11/04/96
DATE_RECEIVED = 29/11/96
W_NO = W1145
WELL_NAME = Turrum-5
CONTRACTOR = Geoquest Systems, Inc.
CLIENT_OP_CO = Esso Australia Ltd.

ENCLOSURE 5

TURRUM 5

Stratigraphic Cross Section

PE900863

PE900863

This is an enclosure indicator page.
The enclosure PE900863 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900863 has the following characteristics:

```
     ITEM_BARCODE = PE900863
CONTAINER_BARCODE = PE900858
             NAME = Stratigraphic Cross Section
            BASIN = GIPPSLAND
           PERMIT = VIC/L3
             TYPE = WELL
          SUBTYPE = CROSS_SECTION
      DESCRIPTION = Stratigraphic Cross Section (enclosure
                    5 of WCR vol.2) for Turrum-5
          REMARKS =
     DATE_CREATED = 10/07/96
    DATE_RECEIVED = 29/11/96
             W_NO = W1145
        WELL_NAME = Turrum-5
       CONTRACTOR = Esso Australia Ltd.
     CLIENT_OP_CO = Esso Australia Ltd.
```

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 6

TURRUM 5

Structural Cross Section

PE900864

PE900864

This is an enclosure indicator page.
The enclosure PE900864 is enclosed within the container PE900858 at this location in this document.

The enclosure PE900864 has the following characteristics:

ITEM_BARCODE =	PE900864
CONTAINER_BARCODE =	PE900858
NAME =	Structural Cross Section
BASIN =	GIPPSLAND
PERMIT =	VIC/L3
TYPE =	WELL
SUBTYPE =	CROSS_SECTION
DESCRIPTION =	Structural Cross Section (enclosure 6 of WCR vol.2) for Turrum-5
REMARKS =	To accompany Turrum-5 & Turrum-6 WCR's
DATE_CREATED =	21/06/96
DATE_RECEIVED =	29/11/96
W_NO =	W1145
WELL_NAME =	Turrum-5
CONTRACTOR =	Esso Australia Ltd.
CLIENT_OP_CO =	Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)

ATTACHMENTS

ATTACHMENTS

ATTACHMENT 1

TURRUM 5

Composite Well Log

PE 600667

PE600667

This is an enclosure indicator page.
The enclosure PE600667 is enclosed within the container PE900858 at this location in this document.

The enclosure PE600667 has the following characteristics:

ITEM_BARCODE = PE600667
CONTAINER_BARCODE = PE900858
NAME = Well Completion Log
BASIN = GIPPSLAND
PERMIT = VIC/L3
TYPE = WELL
SUBTYPE = COMPLETION_LOG
DESCRIPTION = Well Completion Log (enclosure from WCR vol.2) for Turrum-5
REMARKS =
DATE_CREATED = 12/09/95
DATE_RECEIVED = 29/11/96
W_NO = W1145
WELL_NAME = Turrum-5
CONTRACTOR = Esso Australia Resources Ltd.
CLIENT_OP_CO = Esso Australia Ltd.

(Inserted by DNRE - Vic Govt Mines Dept)