Apache ENERGY

COMPOSITE WELL LOG

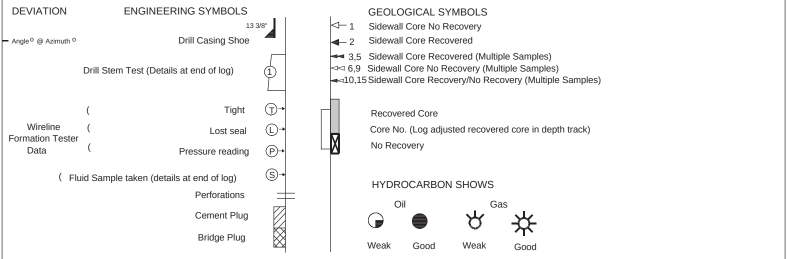
FUR SEAL-1

GIPPSLAND BASIN
OFFSHORE VICTORIA

Latitude:	38 deg 07' 47.91" S	Well Status:	Plugged & Abandoned, Dry Hole
Longitude:	148 deg 09' 08.44" E	Date Spudded:	24 October 2005 @ 03:00 hrs
Datum:	GDA 94	Date at TD:	1 November 2005 @ 01:30 hrs
Permit:	VIC/P54	Date Rig Released:	5 November 2005 @ 18:00 hrs
Sheet:	Melbourne NE SJ55	Geologist(s):	R. Blackmore / M. Woodmansee
Block Number:	1850	Casing:	762 mm (30") Casing @ -89.5 mTVDAHD (111.0 mMDRT) 340 mm (13 3/8") Casing @ -796.1 mTVDAHD (817.6 mMDRT)
Water Depth:	56.6 m below AHD		
RT-AHD:	21.5 m		
Total Depth:	-2588.2 mTVDAHD (2610.0 mMDRT)		

Remarks: The surface location is 3.5 m on a bearing of 223.4° from the proposed Fur Seal-1 location.

Drafted: 8 March 2007 CLu9464


DEVIATION
Angle o @ Azimuth o
ENGINEERING SYMBOLS
13 3/8"
Drill Casing Shoe
Drill Stem Test (Details at end of log)
1
Wireline Formation Tester Data
Tight
T
Lost seal
L
Pressure reading
P
Fluid Sample taken (details at end of log)
S
Perforations
Cement Plug
Bridge Plug
GEOLOGICAL SYMBOLS
1 Sidewall Core No Recovery
2 Sidewall Core Recovered
3,5 Sidewall Core Recovered (Multiple Samples)
6,9 Sidewall Core No Recovery (Multiple Samples)
10,15 Sidewall Core Recovery/No Recovery (Multiple Samples)
Recovered Core
Core No. (Log adjusted recovered core in depth track)
No Recovery
HYDROCARBON SHOWS
Oil
Gas
Weak
Good
Weak
Good

MWD LOGS

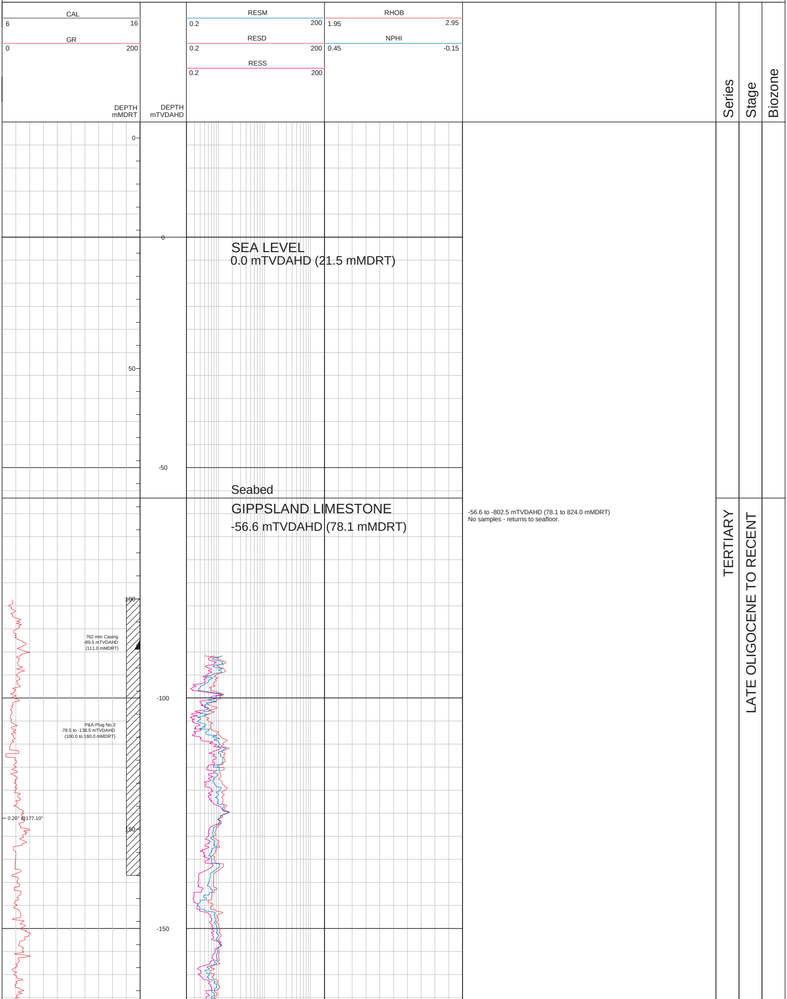
Bit #	Hole Size (mm)	Logging Suite	Interval mTVDAHD (mMDRT)	Max (deg C)	Remarks
1	311	DGR-EWRP4-BAT-DDS-PM	-90.2 to -802.5 (111.7 to 824.0)	25	All recorded data recovered at surface.
2	216	DGR-EWRP4-SLD-CNP-BAT-DDS-PM	-802.5 to -2588.2 (824.0 to 2610.0)	75.5	All recorded data recovered at surface.

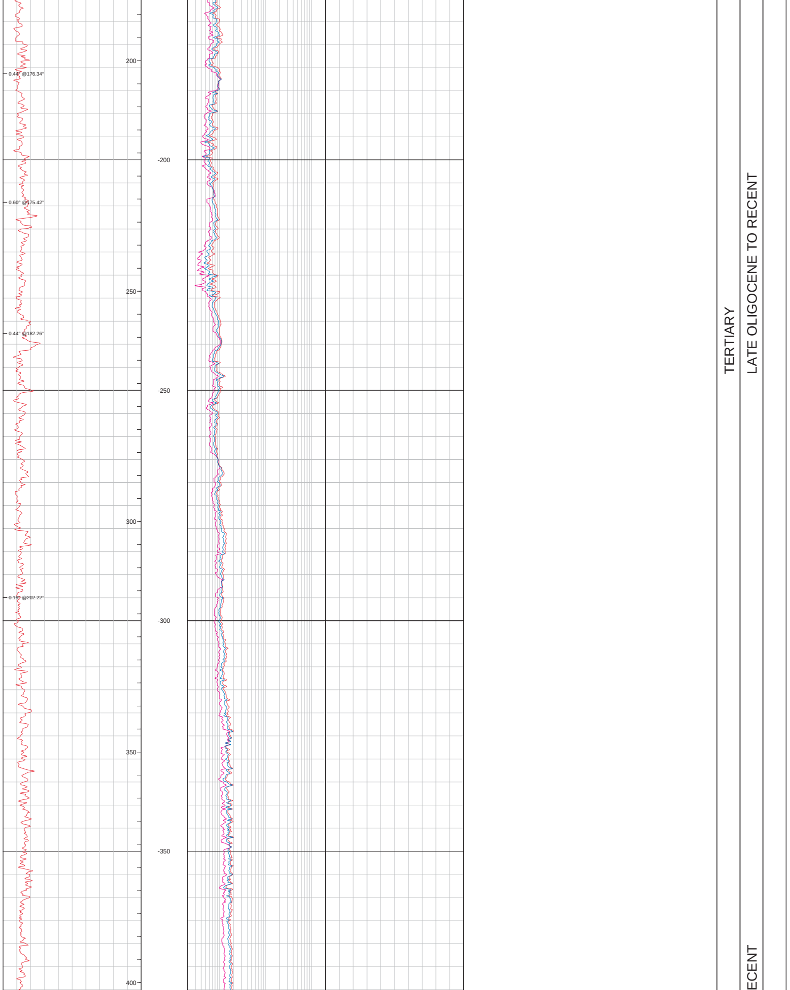
WIRELINE LOGS

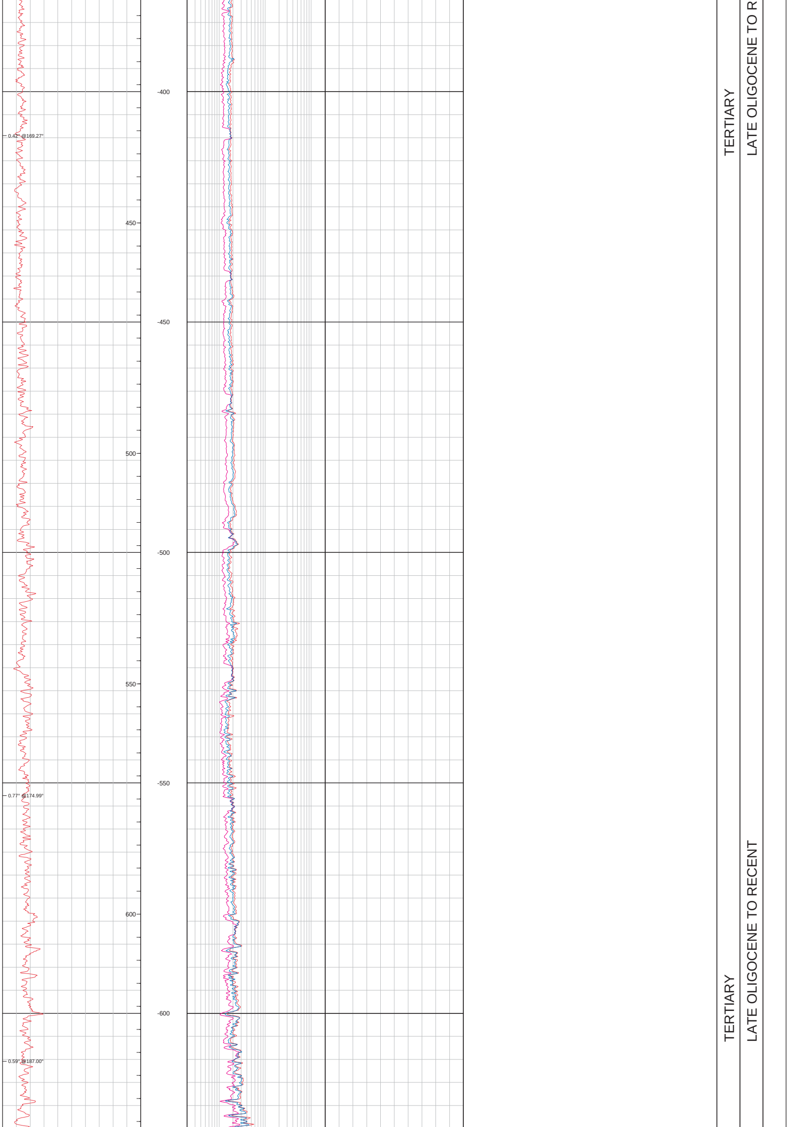
Suite	Run	Logging Suite	Interval mTVDAHD (mMDRT)	BHT (deg C)	Remarks
1	1	Dual CSAT Checkshot Survey	-2575.2 to -160.5 (2597.0 to 182.0)	109	Checkshots recorded at 15 m intervals from TD to loss of siginal.

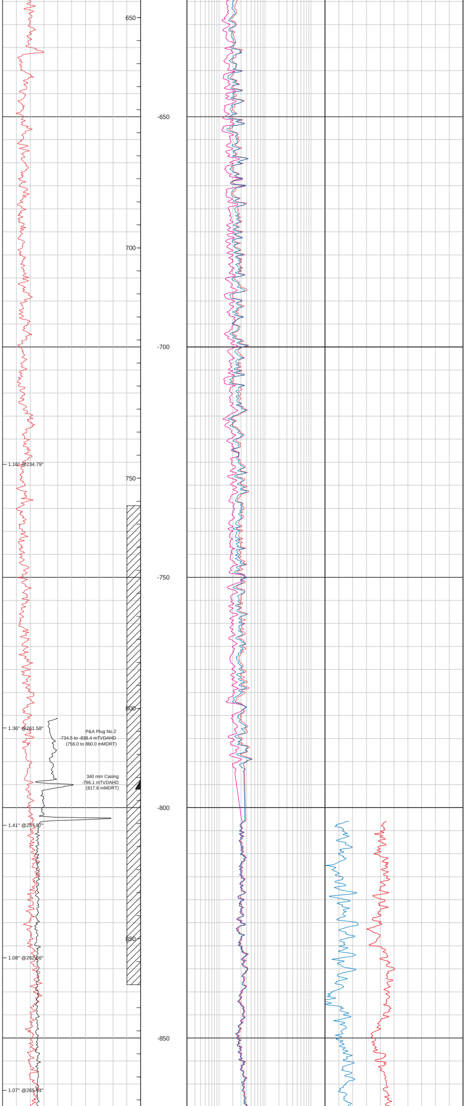
LOG DESCRIPTION

GR	Gamma-Ray (BHI GRAFM)
CAL	Acoustic Caliper (Sperry-Sun ACAL)
RESD	Deep Resistivity (BHI RACELM)
RESM	Medium Resistivity (BHI RPCELM)
RESX	Extra Shallow Resistivity (BHI RPCEHM)
RESS	Shallow Resistivity (BHI RACEHM)
RHOB	Bulk Density (Sperry-Sun SBD2)
NPHI	Neutron Porosity (Sperry-Sun NUCL)
DTC	Compressional Slowness (Sperry-Sun BATC)
ROP	Rate of Penetration







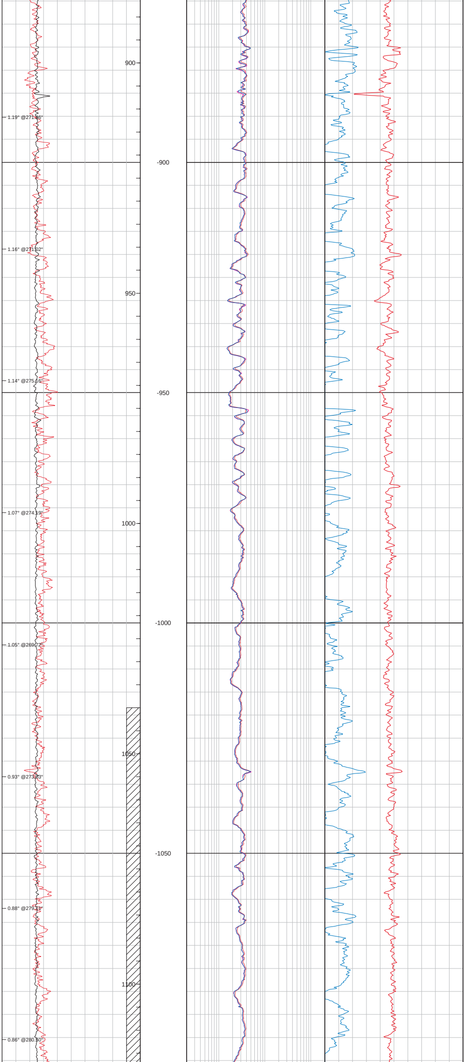


-802.5 to -818.5 mTVDAHD (824.0 to 840.0 mMDRT)
Massive ARGILLACEOUS CALCILUTITE.
ARGILLACEOUS CALCILUTITE (100%): Medium grey to light grey, rarely pale brown to yellowish brown, soft to firm, amorphous to locally sub-blocky, dominantly argillaceous with trace fine quartz silt, trace micropyrite, trace pyrite nodules, trace forams and assorted fossil fragments. Minor cement contamination.

-818.5 to -898.4 mTVDAHD (840.0 to 920.0 mMDRT)
Interbedded ARGILLACEOUS CALCILUTITE with minor CALCARENITE and CALCISILTITE.
ARGILLACEOUS CALCILUTITE (80 to 90%): Light grey to white, rarely pale brown to yellowish brown, occasionally light olive grey, very soft to dispersive, rarely firm to locally sub-blocky, dominantly argillaceous with trace fine quartz silt, trace micropyrite, trace pyrite nodules, trace forams and assorted fossil fragments.
CALCARENITE (Nil to 10%): Light brown to yellowish brown, firm to moderately hard, occasionally brittle, massive to blocky, moderately argillaceous with trace fine quartz silt, trace micropyrite, trace pyrite nodules, trace assorted fossil fragments.
CALCISILTITE (Nil to 10%): Light brown-grey to pale yellowish brown, firm to moderately hard, amorphous to locally sub-blocky, moderately argillaceous, trace micropyrite, trace black lithic specks.

TERTIARY

LATE OLIGOCENE TO RECENT

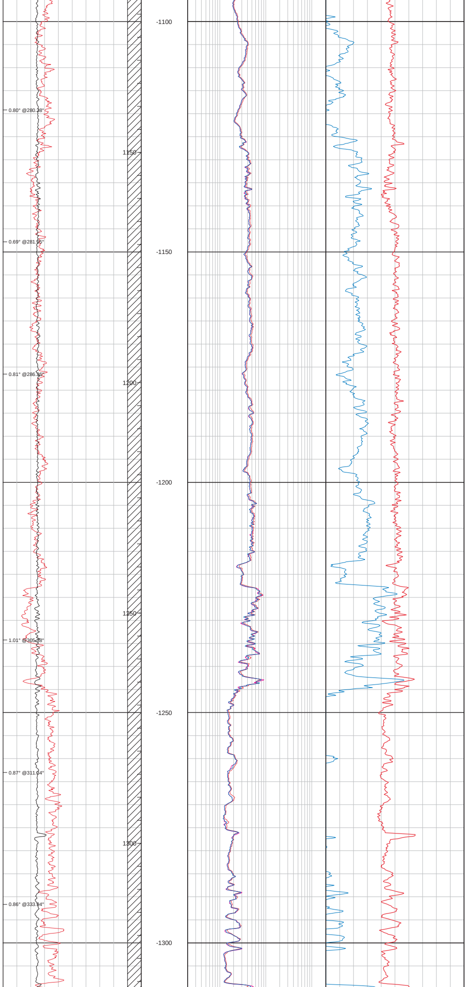


-898.4 to -958.4 mTVDAHD (920.0 to 980.0 mMDRT)
Interbedded MARL with minor ARGILLACEOUS CALCILUTITE and CALCISILTITE.
MARL (20 to 100%): Greenish grey to light olive grey, very soft to dispersive, rarely firm to locally sub-blocky, trace fine quartz silt, trace micropyrite, trace black lithic specks, trace pyrite nodules, trace forams and assorted fossil fragments.
ARGILLACEOUS CALCILUTITE (Nil to 80%): Light grey to white, rarely pale brown to yellowish brown, occasionally light olive grey, very soft to dispersive, rarely firm to locally sub-blocky, dominantly argillaceous with trace fine quartz silt, trace micropyrite, trace pyrite nodules, trace forams and assorted fossil fragments.
CALCISILTITE (Nil to 20%): Light brown-grey to pale yellowish brown, firm to moderately hard, amorphous to locally sub-blocky, moderately argillaceous, trace micropyrite, trace black lithic specks.

-958.4 to -1110.4 mTVDAHD (980.0 to 1132.0 mMDRT)
Massive MARL.
MARL (100%): Greenish grey to light olive grey, soft to dispersive, rarely firm to locally sub-blocky, trace fine quartz silt, trace micropyrite, trace black lithic specks, trace pyrite nodules, trace forams and assorted fossil fragments.

TERTIARY

LATE OLIGOCENE TO RECENT



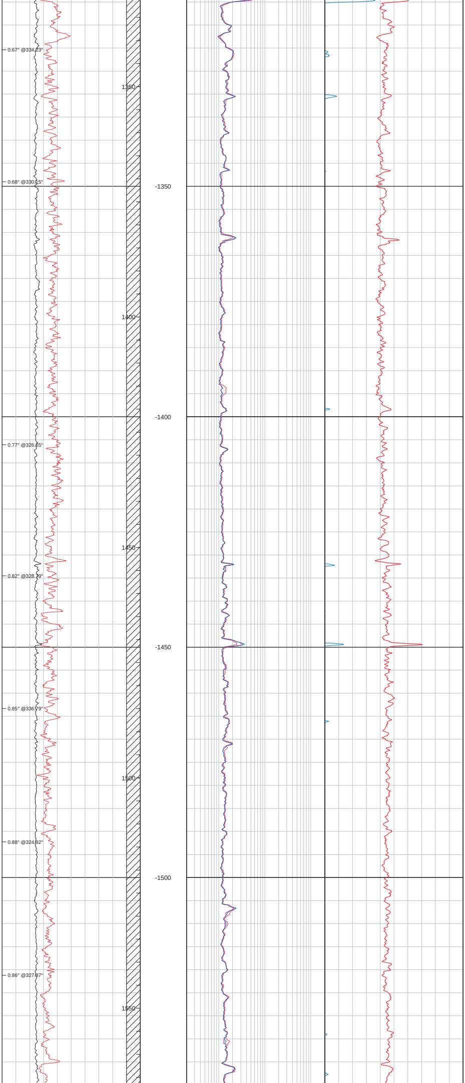
-1110.4 to -1138.4 mTVDAHD (1132.0 to 1160.0 mMDRT)
Massive MARL.
MARL (100%): light grey, light olive grey, very soft, sticky, sub-blocky to dominantly amorphous, trace very fine carbonaceous / lithic fragments, trace very fine pyrite, trace calcareous silt.

-1138.4 to -1248.4 mTVDAHD (1160.0 to 1270.0 mMDRT)
Dominantly MARL with minor ARGILLACEOUS CALCILUTITE.
MARL (80 to 95%): light olive grey to slightly greenish grey, soft, sticky, trace quartz silt, trace carbonaceous specks, trace very fine disseminated pyrite.
ARGILLACEOUS CALCILUTITE (5 to 20%): off white, very light grey, very soft, sub-blocky to dominantly amorphous, trace carbonaceous specks.

-1248.4 to -1338.4 mTVDAHD (1270.0 to 1360.0 mMDRT)
Massive MARL.
MARL (100%): medium grey to light medium grey, soft, sub-blocky, trace very fine pyrite in part, trace carbonaceous specks, trace micro fossils including forams and echinoids.

TERTIARY

LATE OLIGOCENE TO RECENT

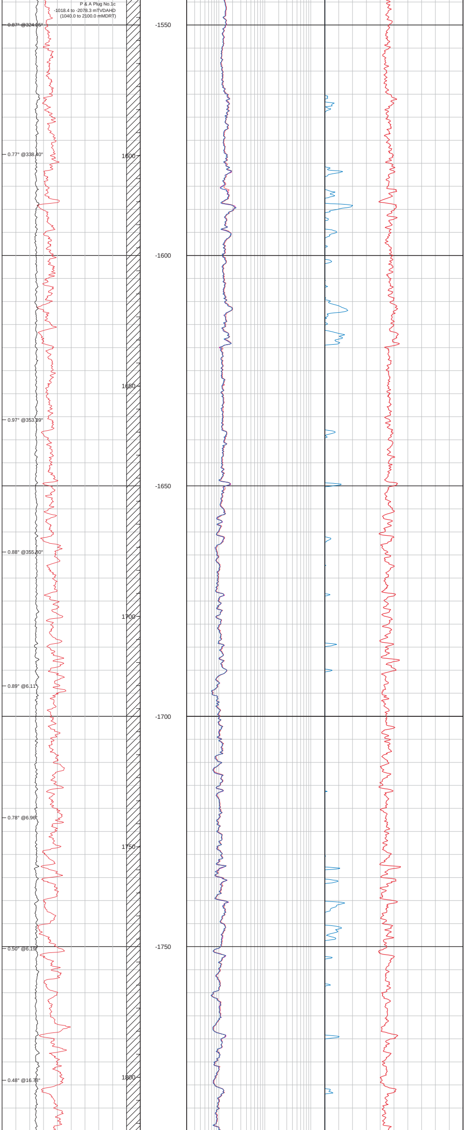


-1338.4 to -1378.4 mTVDAHD (1360.0 to 1400.0 mMDRT)
Interbedded MARL and CALCAREOUS CLAYSTONE.
CALCAREOUS CLAYSTONE (30 to 40%): medium light grey to medium grey, soft, sub-blocky, trace carbonaceous specks, trace forams and micro fossils, trace glauconite.
MARL (60 to 70%): medium light grey to medium grey, soft, sub blocky, trace very fine pyrite in part, trace carbonaceous specks, trace micro-fossils including forams and echinoids.

-1378.4 to -1578.4 mTVDAHD (1400.0 to 1600.0 mMDRT)
Massive CALCAREOUS CLAYSTONE.
CALCAREOUS CLAYSTONE (100%): light grey to medium grey, soft to firm, sub-blocky to blocky, trace carbonaceous specks, common forams and micro-fossils, trace micro-pyrite, trace glauconite and rare hard brittle shelly material.

TERTIARY

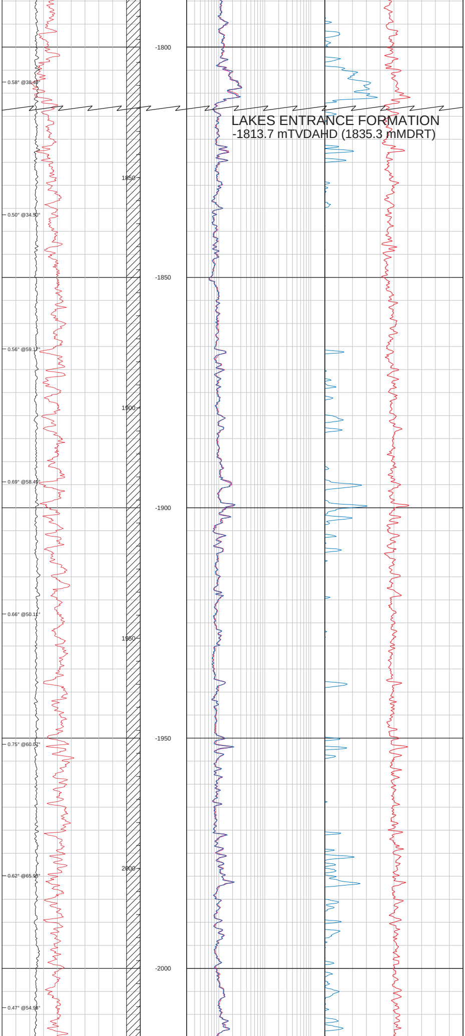
LATE OLIGOCENE TO RECENT



-1578.4 to -1798.3 mTVDAHD (1600.0 to 1820.0 mMDRT)
Massive CALCAREOUS CLAYSTONE.
CALCAREOUS CLAYSTONE (100%): dominantly light medium grey - medium grey, soft to occasionally firm, sub-blocky to amorphous, trace very fine disseminated pyrite, trace micro-fossils, trace dark grey to black streaks and specks of carbonaceous material.

ENE TO RECENT

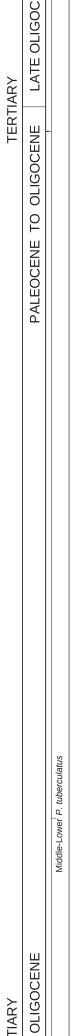
T. bellus - Upper *P. tuberculatus*

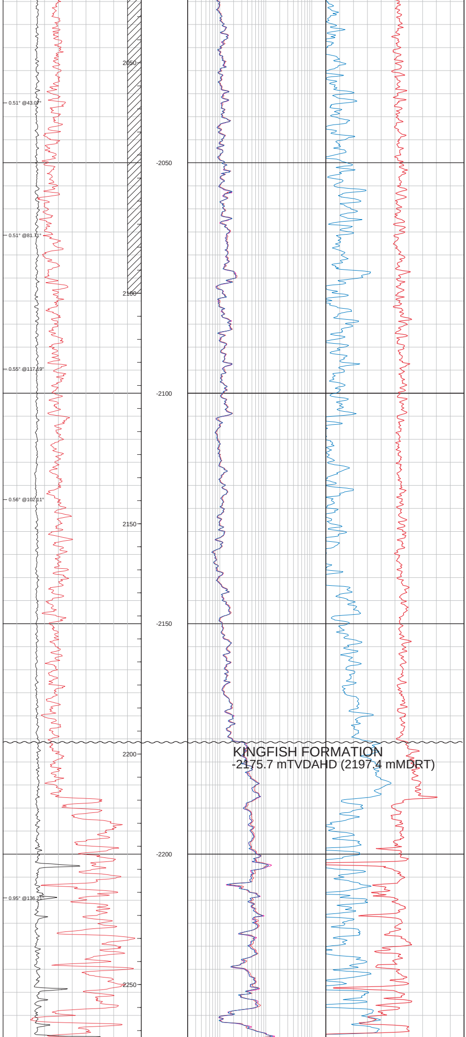


-1798.3 to -1858.3 mTVDAHD (1820.0 to 1880.0 mMDRT)
Predominantly Massive CALCAREOUS CLAYSTONE with trace CALCISILTITE.
CALCAREOUS CLAYSTONE (100%): light grey - medium grey, soft to rarely firm, sub-blocky to amorphous, trace very fine disseminated pyrite, very rare micro-fossils, commonly homogenous, becoming less calcareous and lighter in colour with depth.
CALCISILTITE (Nil to Trace): predominantly off white to very light grey, occasionally very pale grey-brown, very soft to moderately firm, amorphous, trace calcareous silt grains, trace carbonaceous specks, grading into Calcareous Claystone.

-1858.3 to -1998.3 mTVDAHD (1880.0 to 2020.0 mMDRT)
Massive CALCAREOUS CLAYSTONE.
CALCAREOUS CLAYSTONE (100%): light medium grey - medium grey, soft - rarely firm, sub-blocky, commonly amorphous, trace very fine disseminated pyrite, very rare micro-fossils, commonly homogenous,becoming less calcareous and lighter in colour with depth.

-1998.3 to -2176.3 mTVDAHD (2020.0 to 2198.0 mMDRT)
Massive CALCAREOUS CLAYSTONE.
CALCAREOUS CLAYSTONE (100%): light grey - medium light grey, rare medium grey, soft to occasionally firm, sub blocky, trace disseminated pyrite, trace dark carbonaceous and pyritic patches, rare glauconite.





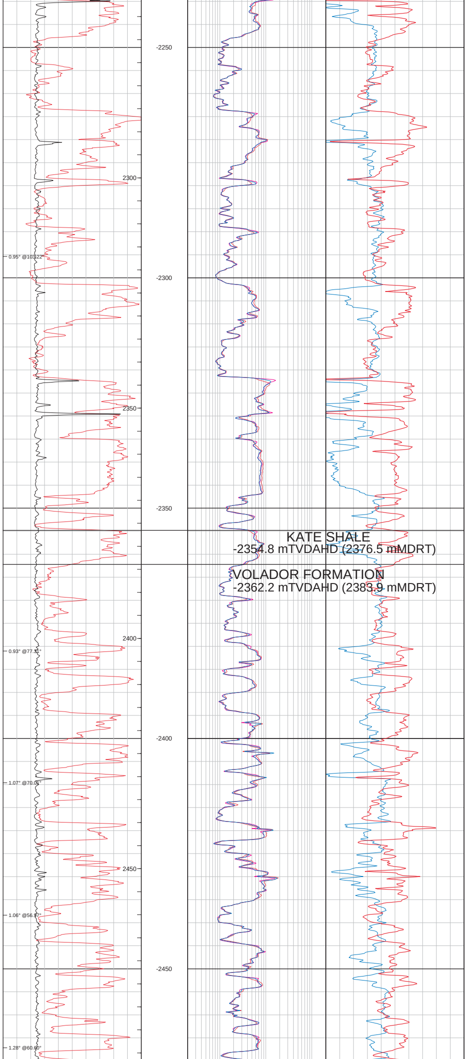
-2176.3 to -2188.3 mTVDAHD (2198.0 to 2210.0 mMDRT)
Massive CALCAREOUS CLAYSTONE with trace SANDSTONE and SILTSTONE.
CALCAREOUS CLAYSTONE (98 to 100%): light grey - medium light grey, rare medium grey, soft to occasionally firm, sub-blocky, trace disseminated pyrite, trace dark carbonaceous and pyritic patches, glauconite and small glauconite nodules.
SILTSTONE (Nil to Trace): brownish grey, very soft to firm, sub-blocky to amorphous, micro micaceous, carbonaceous specks and flakes, very argillaceous.
SANDSTONE (Nil to Trace): clear to off-white, fine to medium, moderately sorted, rounded to angular, moderate to poor sphericity, common argillaceous matrix, trace glauconite, poor to fair inferred porosity, no fluorescence.

-2188.3 to -2218.3 mTVDAHD (2210.0 to 2240.0 mMDRT)
Interbedded SILTSTONE, CARBONACEOUS SILTSTONE (occasionally grading to COAL) and CALCAREOUS CLAYSTONE, with trace SANDSTONE.
SILTSTONE (60 to 80%): brownish grey, very soft to rarely firm, sub-blocky, rarely sub-fiissile, carbonaceous specks and laminae, grading to Carbonaceous Siltstone in part.
CARBONACEOUS SILTSTONE (Trace): brownish black to black, firm, brittle in part, silty, gradational to Coal in part.
CALCAREOUS CLAYSTONE (20 to 40%): light grey, off white, very soft to firm, sub blocky to amorphous in part, glauconitic in part.
SANDSTONE (1)(Trace): very light grey, soft aggregates, very fine to fine grained, well sorted, rounded, 60% argillaceous matrix, matrix supported. No fluorescence.
SANDSTONE (2)(Trace): clear to off white, medium to coarse and loose, poorly sorted, sub rounded to very angular, commonly fractured grains, moderate to poor sphericity, fair inferred porosity. No fluorescence.

-2218.3 to -2248.3 mTVDAHD (2240.0 to 2270.0 mMDRT)
CLAYSTONE, SILTSTONE and minor SANDSTONE.
CLAYSTONE (60 to 80%): very light grey, light greyish brown, very soft to rarely firm, calcareous, rare glauconite, trace very fine sand grains.
SILTSTONE (10 to 40%): brownish grey, very soft to rarely firm, sub-blocky, rarely sub-fiissile, carbonaceous specks and laminae, grading to Carbonaceous Siltstone in part.
SANDSTONE (Nil to 10%): clear, loose, medium to coarse, moderately sorted, sub angular to rounded, moderate sphericity, fair to good inferred porosity. No fluorescence.

TER
PALEOCENE TO

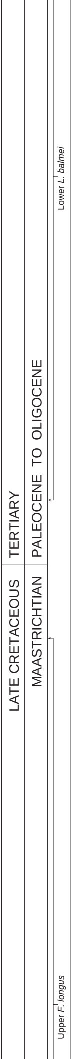
TERTIARY
PALEOCENE TO OLIGOCENE
Upper *L. balmei*

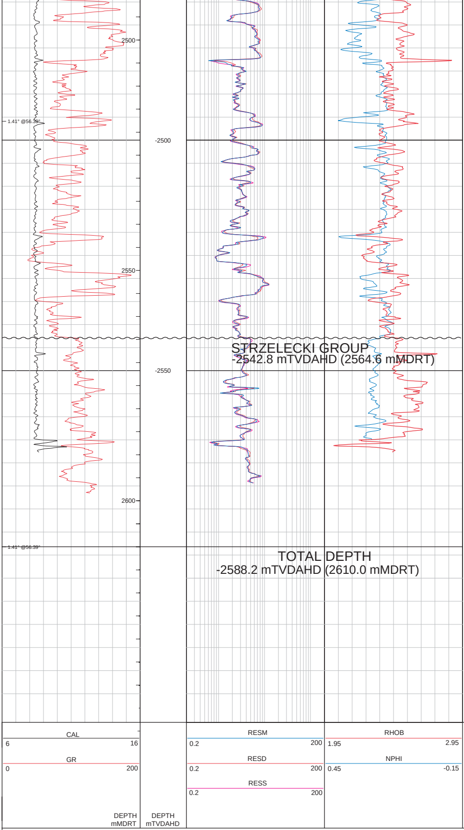


-2248.3 to -2322.3 mTVDAHD (2270.0 to 2344.0 mMDRT)
Interbedded KAOLINITIC SANDSTONE and SANDSTONE with minor interbedded SILTSTONE.
KAOLINITIC SANDSTONE (Nil to 95%): white to rarely clear, dominantly very soft aggregates to loose grains, fine - coarse, poorly sorted, locally well sorted, sub-angular to rounded, moderate to high sphericity, abundant white kaolinitic matrix to 95%, gradational to white Claystone, poor - fair inferred porosity, no fluorescence.
SANDSTONE (Nil to 90%): clear to white, very light grey, loose to very soft aggregates, fine to coarse, poorly sorted, occasionally well sorted in fine aggregates, sub angular to sub rounded, moderate sphericity, high sphericity in fine component, common white argillaceous matrix washing out in part, occasionally matrix supported in fine aggregates, poor to fair inferred porosity. No Fluorescence.
SILTSTONE (5 to 40%): brownish grey, very soft to rarely firm, sub-blocky, rarely sub-fissile, carbonaceous specks and laminae, grading to Carbonaceous Siltstone in part, trace lithic fragments and pyrite.

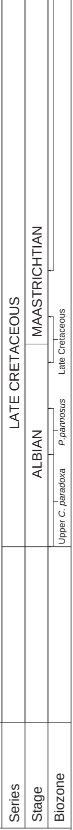
-2322.3 to -2348.3 mTVDAHD (2344.0 to 2370.0 mMDRT)
Massive SILTSTONE with interbedded minor KAOLINITIC SANDSTONE.
SILTSTONE (90 to 100%): brownish grey, very soft to rarely firm, sub-blocky, rarely sub-fissile, carbonaceous specks and laminae, grading to Carbonaceous Siltstone in part, trace lithic fragments and pyrite.
KAOLINITIC SANDSTONE (Nil to10%): white to rarely clear, dominantly very soft aggregates to loose grains, fine to coarse, poorly sorted, locally well sorted, sub-angular to rounded, moderate to high sphericity, abundant white kaolinitic matrix to 95%, gradational to white Claystone, poor to fair inferred porosity. No fluorescence.

-2348.3 to -2543.3 mTVDAHD (2370.0 to 2565.0 mMDRT)
Interbedded ARGILLACEOUS SANDSTONE with SILTSTONE, CARBONACEOUS SILTSTONE and trace COAL.
ARGILLACEOUS SANDSTONE (30 to 90%): clear to white, very light grey, loose to very soft aggregates, fine to coarse, poorly sorted, occasionally well sorted in fine aggregates, sub angular to sub rounded, common off-white argillaceous matrix washing out in part, poor to fair inferred porosity. No Fluorescence.
SILTSTONE (Nil to 70%): brownish grey, very soft to rarely firm, sub-blocky, rarely sub-fissile, carbonaceous specks and laminae, grading to Carbonaceous Siltstone in part, trace lithic fragments and pyrite.
CARBONACEOUS SILTSTONE (Nil to 10%): light grey to speckled black/white, soft to firm, sub-blocky to blocky, common platy carbonaceous specks, rare carbonaceous laminae, rare to common disseminated pyrite, grading into Siltstone.
COAL (Nil to Trace): black to dark brown, sub-blocky to platey, firm to brittle, hackly fracture, shiny lustre to dull matt colour.





-2543.3 to -2588.5 mTVDAHD (2565.0 to 2610.0 mMDRT)
Massive CLAYSTONE with minor interbedded ARGILLACEOUS SANDSTONE, SILTY CLAYSTONE and trace COAL.
CLAYSTONE (70 to 90%): light olive grey to grey, soft to firm, rare silty grains, mildly calcareous in part, trace micro-mica, trace micro-pyrite, trace carbonaceous laminae.
ARGILLACEOUS SANDSTONE (Nil to 10%): white to light grey, fine to medium grained, sub-angular to subrounded, moderately sorted, trace calcite cement, trace nodular and disseminated pyrite, local aggregates weakly cemented, moderate inferred porosity. No shows. (probably cavings).
COAL (Nil to Trace): brownish black, mainly shiny lustre, platy to blocky, firm to brittle, slightly argillaceous in part.
SILTY CLAYSTONE (10 to 30%): light brownish grey to light olive grey, occasionally white, soft to amorphous, trace carbonaceous specks, trace micromica, rare very fine sand, trace pyrite, grading into Claystone.



COMPOSITE WELL LOG

FUR SEAL-1

CLu9464