WELL COMPLETION REPORT

WEST MOONFISH-1

VOLUME 2
INTERPRETIVE DATA

GIPPSLAND BASIN
VICTORIA

ESSO AUSTRALIA PTY LTD

Compiled by Simon Grope and Sheryl Sazenis
August 2005

WELL COMPLETION RPEORT
WEST MOONFISH-1

VOLUME 2:

INTEPRETATIVE DATA

WELL COMPLETION RPEORT
WEST MOONFISH -1

VOLUME 2:

INTEPRETATIVE DATA (cont'd)

I. WELL INDEX SHEET

WELL & RIG DATA

WELL NAME: West Moonfish– 1
OPERATOR: Esso Australia Resources Pty Ltd
CLASSIFICATION: Wildcat

SURFACE LOCATION						GENERAL	
LATITUDE		**LONGITUDE**		**UTM CO-ORDS**		**Rig Name:**	Ensco 102
DEG:	38	DEG:	147	NORTH:	5777075.49	**Basin:**	Gippsland Basin
MIN:	9	MIN:	58	EAST:	585687.25	**Status:**	Plugged and Abandon Well
SEC:	00.48S	SEC:	40.63E	Geodetic Datum: Zone / Meridian :	GDA 94(GRS80) Zone 55, South		

Rig on location:	00:30 hours, 25 December 2005	**Total Depth (Driller):**	3369mRT
Spudded Well:	19:30 hours, 5 January 2005	**Total Depth (Logger):**	3370.5mRT
TD Reached:	18:45 hours, 5 February 2005	**RT to Sea level:**	39m
Rig Released:	13:00 hours, 17 February 2005	**RT to Seafloor:**	91m
Trap Style:	Structural trap	**Datum:**	MSL
		Seismic:	G01

Cuttings Samples: 5,10 and 30m intervals from 761 to 3369mRT.

Hole Size (inch)	Hole TD (m)	Casing Size (inch)	Shoe Depth (m)
26”	160	20 x 13.375"	155
17.5"	761	9.625”	2527
12.5"	2078		
8.5	3369		

Abandonment Plugs	
1	2461-2235
2	840-693
3	230-112

WEST MOONFISH –1 FORMATION TOPS

Age	Formation	Measured Depth (mRT)	Depth (mTVD)	Depth (mSS)
OLIGOCENE-EOCENE	Latrobe Group (TOL)	1579.7	-1579.7	-1540.5
EOCENE	Top Coarse Clastics	1591.9	-1591.9	-1552.7
EOCENE	Top N-1.4 coal	1662.9	-1662.9	-1623.6
EOCENE	Top N-1.4 sand	1670.3	-1670.3	-1631.0
EOCENE	Top N-1.9 coal	1754.2	-1754.1	-1714.9
EOCENE	Top N-1.9 sand	1771.3	-1771.1	-1731.9
EOCENE	Base N-1.9 sand	1786.5	-1786.2	-1747.0
EOCENE	Top M-2 sand	1816.9	-1816.2	-1776.9
EOCENE	Top M-2 coal	1840.7	-1839.4	-1800.1
PALEOCENE	Top Moonfish Volcanics	2044.3	-2023.7	-1984.4
PALEOCENE	Base Moonfish Volcanic	2072.5	-2047.2	-2008.0
PALEOCENE	Top subvolc reservoir	2082.7	-2055.7	-2016.5
PALEOCENE	Sub-Moonfish Volcanic GOC	2119.8	-2086.7	-2047.5
PALEOCENE	Sub-Moonfish Volcanic OWC	2122.4	-2088.9	-2049.7
PALEOCENE	Base subvolc reservoir	2143.0	-2106.2	-2066.9
CRETACEOUS	Top Remora Volcanic	2715.0	-2602.3	-2563.1
CRETACEOUS	Mid Remora Volcanic	2719.5	-2606.3	-2567.1
CRETACEOUS	Base Remora Volcanic	2724.0	-2610.4	-2571.2
	Total Depth	3369.0	-3149.5	3110.2

I. WELL INDEX SHEET (cont'd)

LWD LOGS			
Suite / Run	**Type of Log**	**Interval (mRT)**	**BHT °C / Time since circ.(Hrs)**
1/1	POWERPULSE D&I-GR	155.3-719.8	35.25 hr/ 46.27°C
1/2	POWERPULSE D&I-GR	755.4-1717.2	66.75 hr/ 72.16°C
1/3	POWERPULSE D&I-GR	1717.2-2053.2	70.5 hr/ 83.14°C
1/4	POWERPULSE D&I-GR	2053.2-2518.8	50 hr / 92.55°C
1/5	POWERPULSE D&I-GVR6-ADN6	2527.0-2681.9	74.08 hr / 86.3°C
1/6	POWERPULSE D&I-GVR6-ADN6	2660.4-2859.9	79 hrs/ 84.71°C
1/7	POWERPULSE D&I-GVR6-ADN6	2832.8-3015.2	49.75 hrs / 85.49°C
1/8	POWERPULSE D&I-GVR6-ADN6	2990.8-3360.2	60.5 hrs / 97.25°C

WIRELINE LOGS			
Suite / Run	**Type of Log**	**Interval (mRT)**	**BHT °C / Time since circ.(Hrs)**
1/1	HRLA-HNGS-LEHQT	755-2524	9.10 hr/ 93.8°C
1/2	PEX150-LEHQT	755-2522	16.3 hr/ 103.9°C
1/3	DSI-FMI-LEHQT	755-2519	42.3 hr/ 104.4°C
1/4	MDT-GR-LEHQT	1647.3-2517.0	11.15 hr / 92.8°C
1/5	CST-GR	1634-2515	n/a
2/1	DSI-HNGS-MSFL-LEHQT	2444-3369	15.10 hrs/ 116.7°C
2/2	MDT-GR-LEHQT	2583-3018	21.50 hrs / 117.2°C
2/3	VI-VSP	805-3285	38.10 hrs / 123.9°C
2/4	CST-GR	2561.5-3363.8	n/a

II. INTRODUCTION

The West Moonfish-1 well was drilled as a wildcat exploration well, approximately 4 km west of the Moonfish Field and 7 km north-west of the Snapper Platform (Figure 1). The well was located in 52 metres of water, within the VIC/L10 licence area of the Gippsland Basin, and was drilled to a TD of 3369m MD (3110m TVDss).

The well spudded on 5th January 2005, and TD was reached on the 5th February 2005. The well was plugged and abandoned and the rig was released on the 17th February 2005.

The West Moonfish-1 well tested a structural trap west of the Moonfish Field that was predicted to have potential to contain hydrocarbons at two levels. The first target was reservoirs in the Latrobe Group that are Lower *L. balmei* in age. These reservoirs were expected to be top sealed by volcanics, which are referred to as the Moonfish Volcanics. The second target was reservoirs in the Golden Beach Group of *N. senectus / T. apoxyexinus* age which were also expected to occur below volcanics. These volcanics are referred to as the Remora Volcanics.

The key risk for the shallower *L. balmei* target was expected to be fault seal while the key risks for the deeper Golden Beach Group target were expected to be reservoir presence, reservoir quality and fault seal.
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III. SUMMARY OF WELL RESULTS

West Moonfish-1 intersected gas with a minor oil leg in the *L. balmei* aged Latrobe Group below the Moonfish Volcanics. The well penetrated a gross 31 m gas column and 2.1 m (TVD) oil column. The reservoir top came in 11.5 m deep to prediction. The reservoir consists of fluvial and bayhead delta deposits with a net to gross in the gas column of 93% and average porosity of 19%. The volcanics and claystones above the reservoir form an effective top seal. The field is not full to structural spill and it is interpreted that cross-fault leak is the element that controls the field contact.

The *N. senectus* aged Remora Volcanics were only 8 metres thick at the well location which is significantly thinner than the surrounding wells. The Golden Beach Group below the Remora Volcanics consisted of sediments that were alluvial plain, lacustrine and overbank facies that were very low net to gross; only 7%. Three minor gas sands were intersected. Minor water sands in the section may indicate that limited sand connectivity due to very low net to gross has inhibited extensive hydrocarbon migration into the structure.

The stratigraphy intersected by the West Moonfish-1 well is summarised in Figure 2. A comparison of prognosed versus actual formation tops is summarised in Table 1.

IV. GEOLOGICAL DISCUSSION

OVERVIEW

The West Moonfish-1 well was drilled to test hydrocarbon potential at two levels. Closure was mapped at the *L. balmei* aged intra-Latrobe Group level below the Moonfish Volcanics and at the *N. senectus* aged Golden Beach Group below the Remora Volcanics. At both levels the structure consists of two fault blocks. West Moonfish-1 was drilled as a deviated well that tested near the crest of the southern fault block at both levels.

The G01 (Northern Fields) seismic survey shot in 2001 / 2002 provided good quality coverage over the prospect area and allowed ties to regionally important wells. In particular the difficult task of tying the deeper Golden Beach Group markers was made possible by having a consistent, contiguous seismic data set between the widely spaced wells that penetrate to these depths.

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REGIONAL SETTING

The initial formation of the Gippsland Basin was associated with rifting and subsidence that extended along the southern margins of Australia during the Jurassic to Early Cretaceous. During this period, deposition of predominantly volcanoclastic successions occurred in alluvial and fluvial environments, in NE trending en-echelon graben systems (Otway and Strzelecki Groups). A phase of structuring and localised uplift of the Strzelecki Group occurred around 100-95Ma.

A renewed phase of Late Cretaceous (approximately 90 Ma) rifting coincided with the onset of Tasman seafloor spreading to the east of Tasmania. This resulted in the rapid development of extensional basins in the Gippsland area, with active extensional faults oriented WNW/ESE (oblique to the earlier extensional event). A thick (overall coarsening-up) succession was deposited in these tectonically active depocentres (Golden Beach Group and Emperor Subgroup). Initial rift deposition included marine and lacustrine shales in distal parts of the basin, while deltaic successions and alluvial fans developed along basin margins. The rift fill succession gradually evolved into a fluvial-dominated system. The upper parts of the Golden Beach Group were predominantly braided fluvial to delta plain in character. As the northward migrating Tasman spreading centre passed by the Gippsland Basin around 85-80Ma, the eruption of mafic volcanics and emplacement of related intrusions occurred across the Gippsland basin. These volcanics form the topseal for several hydrocarbon accumulations (eg. the Kipper Field volcanics).

The active rift phase in the Gippsland Basin ceased at approximately 80 Ma, as the Tasman Rift proceeded to migrate further northwards towards Queensland. From this time onwards, the Gippsland Basin essentially evolved into a failed arm of the Tasman rift system. The Latrobe Group was deposited in this sag phase basin setting, with fault controlled subsidence continuing until the Late Paleocene Most of the Latrobe Group was deposited in a non-marine setting behind a NE-SW trending beach-barrier complex. During the Early Eocene, the Tuna/Flounder Channel eroded down into the underlying Latrobe Group sediments and filled with predominantly marine to marginal marine sediments of the Flounder Formation. As sedimentation rates declined across the basin, the strandline moved to the northwest, depositing a thin, time-transgressive unit of glauconitic green sands (Gurnard Formation) over a wide area including the Tuna/Flounder Channel. The top of the Gurnard Formation forms the Top of Latrobe Group. In the Middle Eocene, another major channelling event, the Marlin Channel, occurred to the west of the Kipper area and partially filled with distal marine sediment of the Turrum Formation. Erosion associated with these channelling events and the top of Latrobe unconformity resulted in the formation of many of the hydrocarbon traps in the basin.

The end of the Latrobe Group is marked by deposition of marl and calcareous siltstone of the Lakes Entrance Formation in response to continued marine transgression in the Oligocene. Prograding limestone and calcareous siltstone wedges of the Gippsland Limestone resulted in the formation of the present day shelf.

Compressional events in the late Eocene to mid Miocene caused selective inversion of faults around the basin and the establishment of the major ENE-WSW anticlinal trends in the basin

STRATIGRAPHY

The prognosed stratigraphy of the West Moonfish-1 well was based on The prognosed stratigraphy of the West Moonfish-1 well was based on adjacent well data (Moonfish-1, Moonfish-1 ST1, Moonfish-2, Emperor-1, Wirrah-3, Snapper-1 and Remora-1,) and regional seismic correlations.

A summary of the actual stratigraphic section intersected is shown in Figure 2. The well penetrated the expected thick sequence of limestones and marls of the Gippsland Limestone and the Lakes Entrance Formation. The Top of the Latrobe Group came in 0.5m deep to prognosis. The Latrobe Group *P. asperopolus* to *L. balmei* section above the Moonfish Volcanics consists of marginal marine to fluvial deposits including bay head deltas, tidal and fluvial channels, coals and floodplain shales. The top of the reservoir below the Moonfish Volcanics came in 11.5 m deep to prognosis due to the velocities between the top Latrobe and the volcanics being slightly faster than was observed at the Moonfish Field wells. The sub-volcanic reservoir section consists of *L. balmei* aged fluvial and bayhead delta deposits. The net to gross within the gas section is 93% and the average porosity is 19%. The remainder of the Latrobe Group (*L. balmei to T. lililei*) consists of marginal marine to fluvial deposits.

The second well objective was the Golden Beach Group below the Remora Volcanics. These volcanics were much thinner than predicted from control provided by the closest relevant wells (Remora-1, Snapper-1 and Wirrah-3 wells). The predicted thickness was 60 meters and the actual was 8 meters. This puts the volcanics at the limits of seismic detection at these depths. As the well was drilled on the southern of the two fault blocks that make up the structure, it is not certain that the volcanics are present across the entire closure area. The base of the volcanics came in 12 meters shallow to prediction. The volcanics are *N. senectus* in age. The *N. senectus* and *T. apoxyexinus* sections have extremely low net to gross. Of the 472 m gross section below the volcanics only 33m was net, giving a net to gross of 7% (using 8% porosity cut-off). These sediments were deposited in an alluvial plain setting and consist predominantly of lacustrine and overbank facies with minor channel facies. The sands have a high clay content and the thinner sands tend to be cemented (possibly by siderite). The average porosity of the net section was 11%.

STRUCTURE

The trap at the West Moonfish prospect is bound to the north by the Rosedale Fault. The same fault also bounds the Moonfish and Wirrah Field discoveries. The Rosedale Fault accommodates growth of the Golden Beach and Intra-latrobe section, separating the northern terrace from the central deep. Over the West Moonfish prospect area the Rosedale Fault is interpreted to relay from a northerly location at Moonfish Field to a more southerly location at Wirrah Field. At the West Moonfish Prospect location this relay results in a fault splay with two branches. The northern branch is referred to as F1 and the southern branch as F2 (Enclosure-1). Northwesterly directed, Eocene-Miocene compression of the Gippsland Basin has partially inverted both the F1 and F2 portions of the Rosedale Fault. The West Moonfish-1 well drilled the southern of the two fault blocks, south of the F2 fault.

At the level of the *L. balmei* reservoir beneath the Moonfish Volcanics the inversion has resulted in a small 4-way dip closure (approximatly 10 metres) and a larger fault dependant closure. West Moonfish-1 is interpreted to have drilled on the crest of this closure and have a 32.5 m hydrocarbon column which has partially filled the available 55 m of structural closure. From analysis of fault juxtaposition it is believed that the F2 fault cross-leaks and that the hydrocarbon system discovered in West Moonfish-1 extends into the northern fault block. Fault juxtaposition analysis of the F1 fault indicates that this fault may also leak and may be the controlling factor for the field oil / water contact, where hydrocarbon may cross-leak to the north into the North Moonfish Prospect. Further fault juxtaposition analysis indicates that the northern bounding fault of the North Moonfish Prospect is also likely to leak and this limits the expected hydrocarbon volume in this fault bloc.

At the level of the *N. senectus* section below the Remora Volcanics West Moonfish-1 has also drilled into the southern fault block south of the F2 fault (Enclosures 2 and 3). The closure is fault dependent with the well drilling 200 metres downdip from the mapped crest, on the northern fault block, and 155 metres above structural spill.

HYDROCARBON DISTRIBUTION

West Moonfish-1 intersected 31 metres of gross gas column and 2.1 metres (TVD) of gross oil with a gas / oil contact of 2047.5 metres and oil / water contact of 2049.7 metres TVD ss within the *L. balmei* section of the Latrobe Group, beneath the Moonfish Volcanics. These contacts were established using a combination of log analysis and MDT pressure data. Fluid sampling confirmed the presence of the oil and gas columns. A residual oil column extends 7.3 metres below the live oil to 2057 metres TVD ss.

MDT fluid samples were further analysed in the laboratory. Oil sample analyses provide measurements of a GOR of 593 scf/stb and 36.8 API gravity. Gas sample analysis indicates that the gas is moderately liquids-rich (total liquids yield 44.7 stb/mscf, condensate yield 19 stb/mscf) and has CO_2 concentrations of 12.4% (refer to Appendix 4 Geochemistry).

Hydrocarbon shows and petrophysical analysis indicates the presence of separate relic hydrocarbon zones below the *L. balmei* live hydrocarbons. These occur over four intervals (refer to Appendix 2 Quantatative Petrophysical Interpretation). Of particular interest is the interval 2046.3 – 2512.4 m MD where significant mud gas and cutting shows were encountered. There is interpreted to be fault dependant closure at these levels and it may be that hydrocarbon was pooled here prior to fault re-activation, which may have resulted in fault leak.

Pre-drill, the gas-to-oil fill volume anticipated for West Moonfish was based on that observed for the nearby Moonfish Field at the same stratigraphic level, where the majority of the fill is oil. The fetch areas for hydrocarbon migration are similar for these structures. It is possible that gas migrating vertically from deeper breached Latrobe Group reservoirs below the *L. balmei* section may have displaced oil.

In the deeper *N. senectus* section petrophysical analysis and mud logs indicate the possible presence of three thin hydrocarbon zones below the Remora volcanics. Pressure testing was attempted over the upper of these zones in the interval 2801.2mTVD ss to 2804mTVD ss but no valid pressure tests could be obtained due to poor rock quality. The interpretation confirmed by log analysis is that these are tight gas sands. One of the better developed sands in the *N. senectus* section below the volcanics was found to be water wet (2599 m to 2606 m TVD ss). Lack of hydrocarbon in this sand is believed to possibly be due to lack of migration pathways in the extremely low net to gross sectionis believed to possibly be due to lack of migration pathways in the extremely low net to gross section.

V. GEOPHYSICAL DISCUSSION

GEOPHYSICAL DATA

The West Moonfish prospect was originally interpreted at the Moonfish Volcanic level on the 1993 Moonfish 3D seismic survey. Subsequent interpretation on the 2003 G01A 3D seismic survey confirmed the presence of the Moonfish Volcanic trap and also a new deeper sub-Remora Volcanic trap. The seismic data quality of the G01 survey exhibits improved multiple suppression and signal-to-noise ratios compared to previous 1993 Moonfish survey. An intermediate product from the G01 data was used for the interpretation (named, intermediate_raw2). These data were processed with quadrature phase. Seismic data quality of the upper Latrobe Group is good with little ambiguity in the correlations. The seismic data quality at the Remora Volcanic level is adequate to map the large structure, but may not be adequate to directly map the distribution of the volcanic or the sedimentary section beneath. Subsequent processing of the G01 data (stack_raw) shows no changes that are significant for this area.

Wells in the survey area that were tied to the seismic data using synthetic seismograms and provided control for interpretation included Moonfish-1, Moonfish-1 ST1 Moonfish-2, the Wirrah Field wells, Snapper-1, Remora-1, Emperor-1 and Sweetlips-1.

A synthetic seismogram was created in IESX using good quality log and VSP/checkshot data, and is displayed along with a seismic tie line in Enclosure 4. A VSP corridor stack was used to help tie the well to the seismic.

TIME INTERPRETATION

Time interpretation was initiated using Voxelgeo, where faults were interpreted every 10th inline. An in-house interpolation routine was used to interpolate the faults to every second line. The interpretation was transferred to IESX. The interpolation was found to be not well controlled and manual edits of the faults were completed in IESX using Geoviz for QC. Horizon interpretation was carried out in IESX.

The three Moonfish exploration and appraisal wells were the main tie points for the horizon interpretation of the shallow section. These included Top of the Latrobe Group, Top of N1.9 reservoir, Top of M3 reservoir, Top of L8 reservoir and Moonfish Volcanics. Seismod was used to produce synthetics and make ties for all wells mentioned in this section.

While the seismic data quality allows confident structural interpretation at these levels, the seismic response of the thick coals dominate the section and as the coal stratigraphy changes so does the seismic stratigraphic response. This may mask the relatively weaker response of any clastic stratigraphic changes.

The Remora volcanic reflection was tied at the Remora-1 well where deep data quality is good. This reflection was also tied to the Snapper-1 and Wirrah-3 wells although at these locations the data quality is poor. Data quality at this level over West Moonfish is only fair. The Remora Volcanics were found to be only 8 metres thick at West Moonfish-1 and this is close to the limits of seismic detection at this depth in this area. Top *P. mawsonii* and Top Strezlecki interpretations were tied to the Emperor-1 and Sweetlips-1 wells.

DEPTH CONVERSION

The Moonfish area appears to be located in a region of relatively low lateral velocity gradients. No major Miocene channels that have significant velocity effects were mapped. The Top of Latrobe Group and Top of N1.9 reservoir interpretations were depth converted using seismic Vrms velocities. These velocities were taken from the intermediate_raw2 processing and were located on a 500m grid. They were smoothed using a Lowess 2000m filter and after a single conversion factor of 91.4% was applied to the latter horizon the errors at the Moonfish wells were small (mean error 0.9m, standard deviation 2.2m). The top of the Latrobe Group was intersected very close to prediction.

The deeper horizons have lower confidence seismic velocities as the primary reflections become weaker and interbed multiples from the coals affect the seismic response. As the West Moonfish prospect occurs at similar depths to the Moonfish Field depth conversion of the deeper horizons was produced using well based interval velocities to construct isopachs from the N1.9 horizon. As a check, seismic velocities were also used to depth convert the deeper horizons in a similar manner to that used for the upper horizons. While the predicted depths varied from those produced using the primary method to a minor degree, the structure was not significantly changed. The top of the *L. balmei* sub-Moonfish Volcanic reservoir was intersected 11.5 metres deep to prediction. The base of the *N. senectus* aged Remora Volcanics was intersected 11.8 metres shallow to prediction.

West Moonfish-1

Formation / Zone Tops

Predicted vs Actual

Formation / Zone		TVD SS Actual m	TVD SS Predicted m	Difference m	MDRT Actual m
Top Lakes Entrance Formation		701.8	800	-98.3	741.0
Top Latrobe		1540.5	1540	0.5	1579.7
Top of Coarse Clastics		1550.9			1590.2
Top N-1.4 coal		1623.6			1662.9
Top N-1.4 sand		1631.0			1670.3
Top N-1.9 coal		1714.9			1754.2
Top N-1.9 sand		1731.9			1771.3
Base N-1.9 sand		1747.0			1786.5
Top M-2 sand		1776.9			1816.9
Top M-2 coal		1800.1			1840.7
Top Moonfish Volcanic		1984.4	1966	18.4	2044.3
Base Moonfish Volcanic		2008.0	1988	20.0	2072.5
Top subvolc reservoir		2016.5	2005	11.5	2082.7
Sub-Moonfish Volcanic GOC		2047.5			2119.8
Sub-Moonfish Volcanic OWC		2049.7			2122.4
K/T boundary		2230.4			2335.0
Top N. senectus		2500.2			2645.0
Top Remora Volcanic		2563.1	2523	40.1	2715.0
Mid-Remora Volcanic		2567.1	2553	14.1	2719.5
Base Remora Volcanic		2571.2	2583	-11.8	2724.0
Top T. apoxyexinus		3075.3			3327.0
TD		3110.2	3110		3369.0

TABLE 1

FIGURES

West Moonfish-1 Location Map

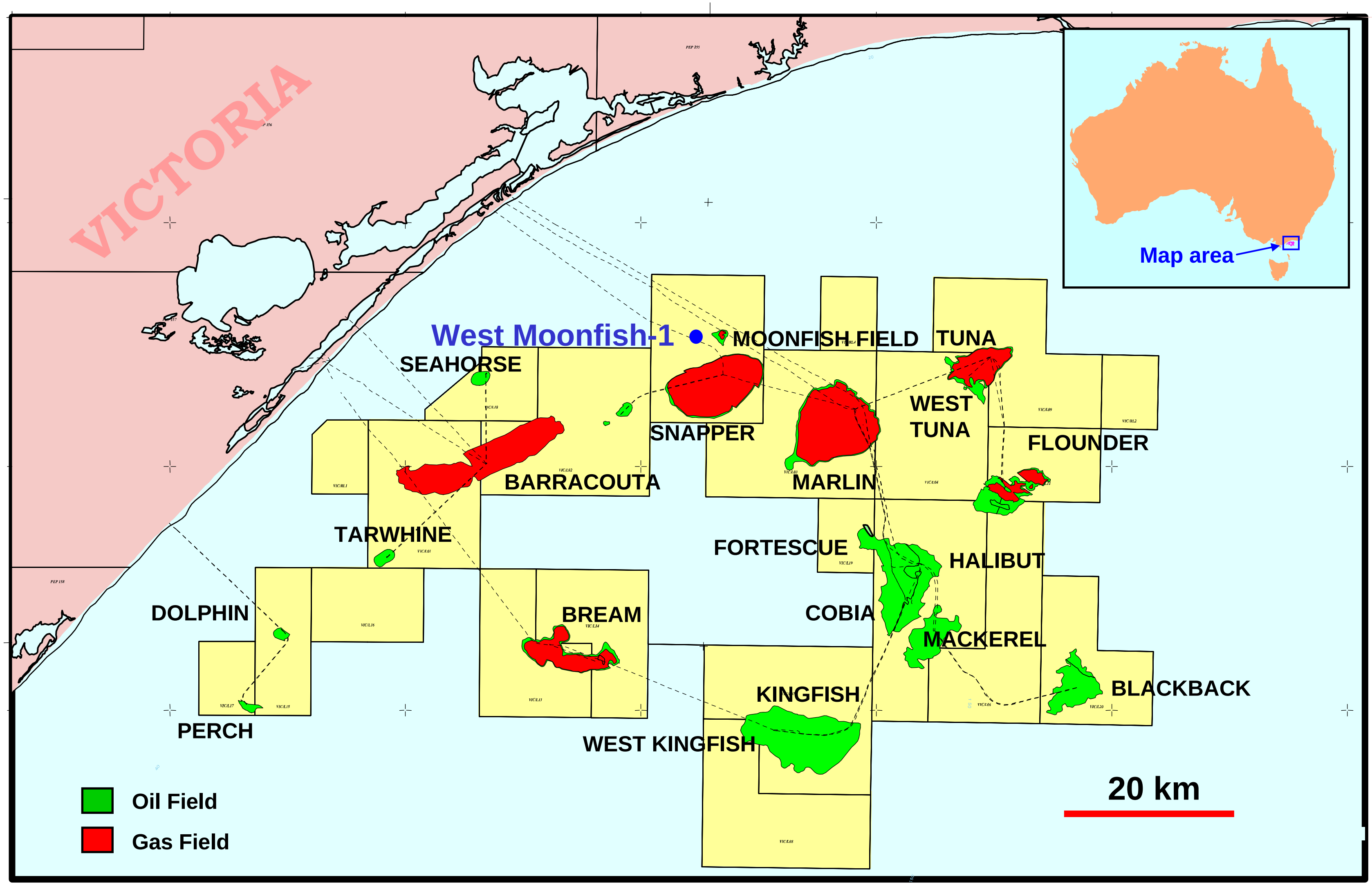
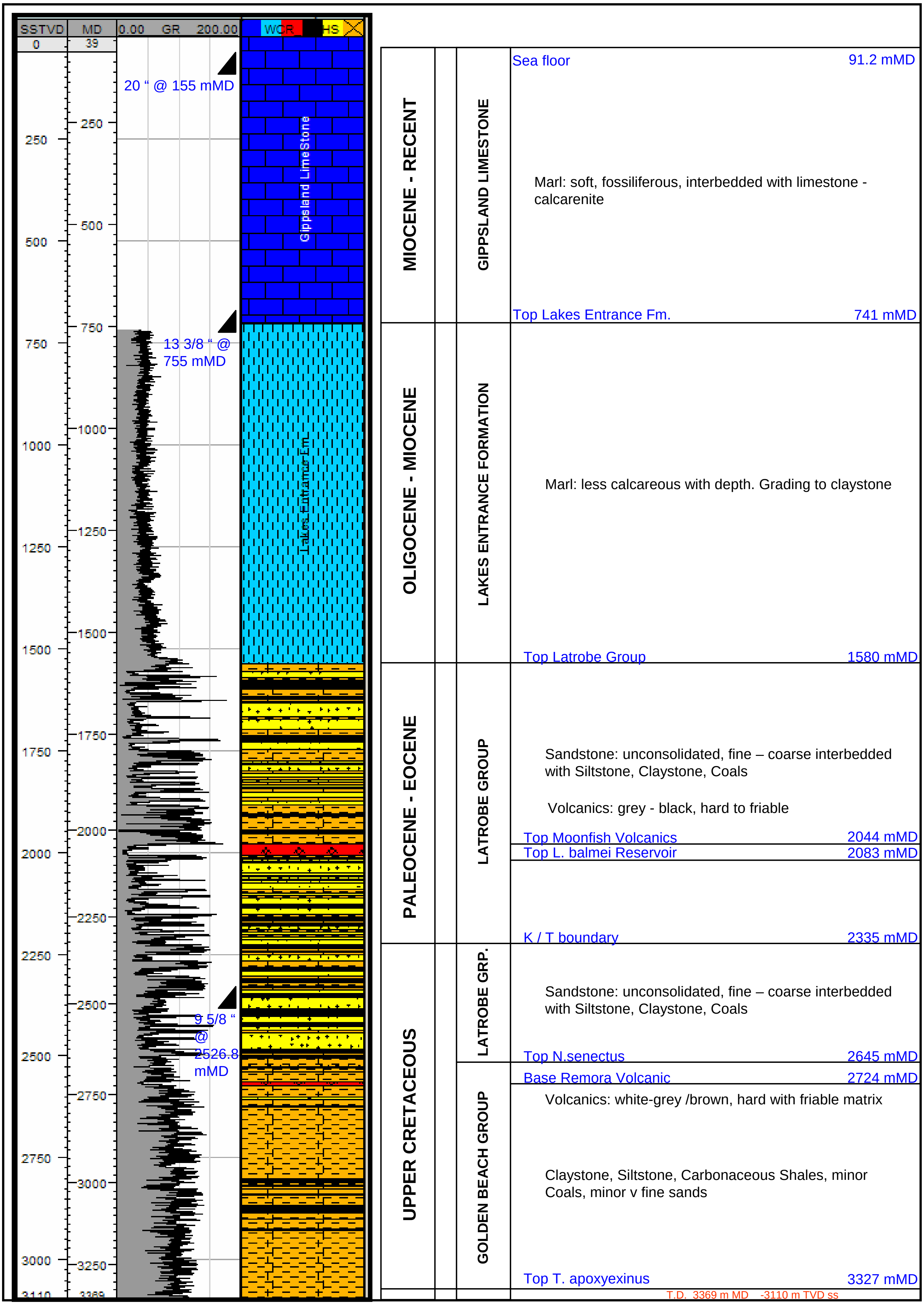


Figure 1

Figure 2 **West Moonfish -1 Stratigraphic Column**



ATTACHMENT 1

COMPOSITE WELL LOG

ESSO AUSTRALIA RESOURCES PTY LTD.

WELL COMPLETION LOG

WELL COMPLETION LOG Scale - 1:200

WEST MOONFISH -1

Gippsland Basin, Victoria
Concession: VIC/L10

POST-DRILL (surface) **LOCATION:**	Latitude: 38º 9' 00.48"S Longitude: 147º 58' 40.63"E AMG X: 585,687.25 mE AMG Y: 5,7777,075.49 mN Datum: GDA94 (GRS80) Projection: MGA/ UTM Zone 55 (S)	**COMPILED BY:**	Sheryl Sazenis
		DRAFTED BY:	Andrew Hodgson
		DRILLED BY:	ENSCO 102
ELEVATION:	G.L.: -52.0m R.T.: 39.0m Water Depth: 52.0m	**TOTAL DEPTH:**	3369m MDRT
		PLUGGED BACK T.D.:	112m MDRT
DATES:	Spudded: 05/01/2005 Rig Released: 17/02/2005 I.P. Established: Plugged & Abandoned	**CLASSIFICATION:**	Wildcat
		STATUS:	Plugged & Abandoned

SERVICE COMPANIES:

DRILLING CONTRACTOR:	ENSCO Australia (ENSCO 102)	PRODUCTION TESTING:	Not tested
MWD:	Schlumberger	ROV:	Global Offshore ROV
GYRO SURVEYING:	Not Run	MUD LOGGING:	Geoservices
CORING:	No cores cut	PRESSURE RECORDING:	Schlumberger
WIRELINE LOGGING:	Schlumberger	WELL VELOCITY SURVEY:	Schumberger
CEMENTING:	Dowell Schlumberger	MUD ENGINEERING:	Baroid Australia
CASING:	Weatherford Australia	LINER:	Not run
DRILLING CONTRACTOR:	ENSCO Australia (ENSCO 102)		

LEGEND

2.7m NOS
Ø = 17%
Sw = 32%

LOG ANALYSIS DATA
NS - Net Sand
NOS - Net Oil Sand
NGS - Net Gas Sand
Sw - Water Saturation

No Rec.
CORE
Rec.

MUD DATA
Ø - Porosity
Snd - Sand
MW - Mud Weight
FV - Funnel Velocity
PV - Plastic Velocity
YP - Yield Point
Gel - Gel Strength
pH - Acidity/Alkalinity
WL - Water Loss
Cl - Chloride
Ca - Calcium
Sol - Solids
H2O - Water
Oil -Oil

PERFORATED INTERVAL

PLUG

SST — RECOVERED SIDE WALL CORE LITHOLOGY

SST - Sandstone	CLST - Claystone
SLST - Siltstone	LMST - Limestone
MST - Mudstone	ML - Marl
SH - Shale	COAL - Coal

SIDE WALL CORE - NO RECOVERY

FIT

P2/11 — MDT/RFT PRETEST RUN/SEAT NUMBER

S11/2 — MDT/RFT SAMPLE RUN/SAMPLE NUMBER

P2/40 — MDT VERTICAL/HORIZONTAL PERMEABILITY TEST

PACKER

BRIDGE PLUG

SHOW OR STAIN

HYDROCARBON CUT

FLUORESCENCE

GAS SHOW

OIL PRODUCTIVE

GAS PRODUCTIVE

INTERPRETED OIL PRODUCTION

INTERPRETED GAS PRODUCTION

INTERPRETED WATER PRODUCTION

WATER PRODUCTIVE

CONDENSATE PRODUCTION

INTEPRETED CONDENSATE BEARING

DSTG — DST WITH GAS RECOVERED

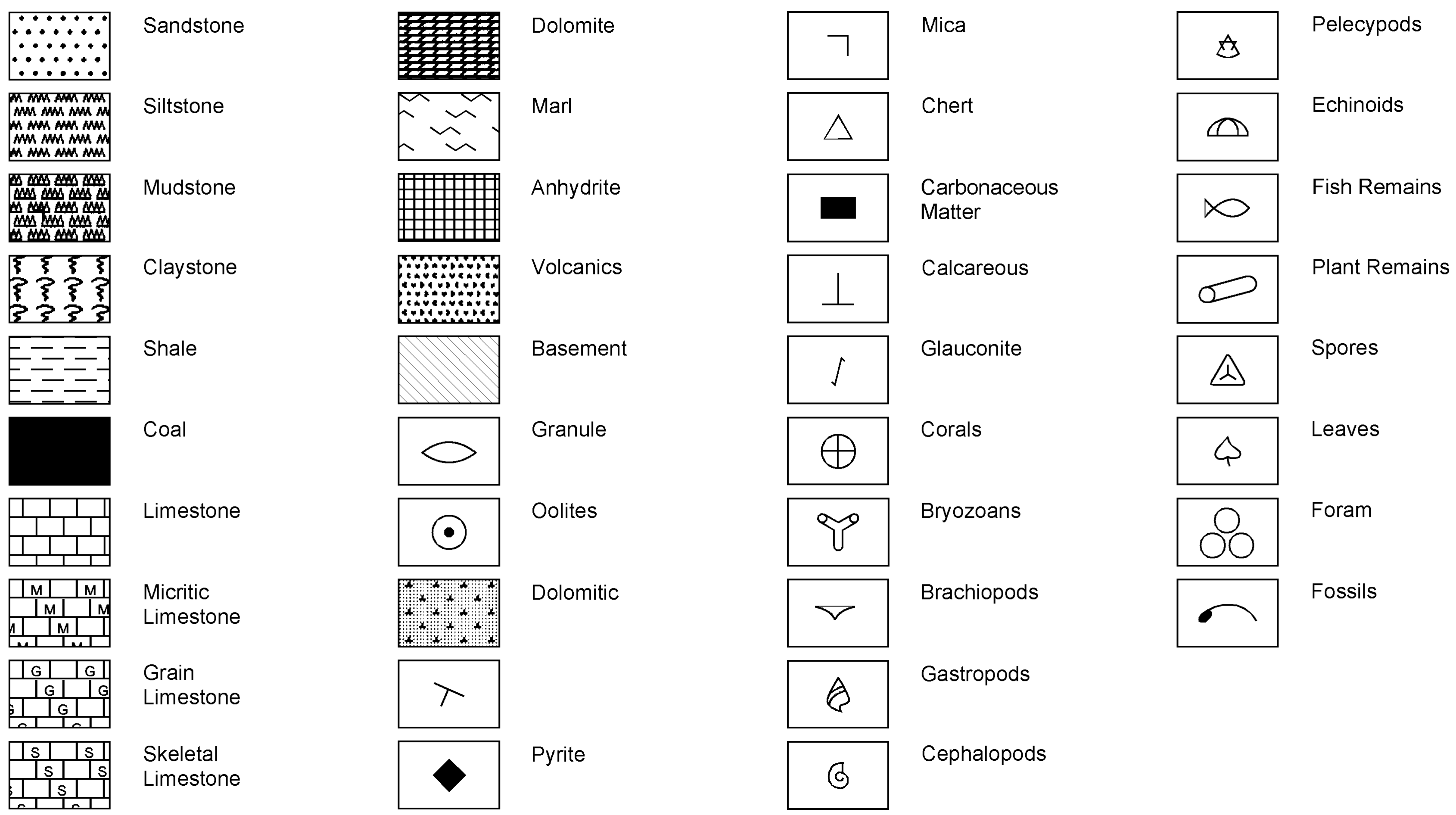
DSTO — DST WITH OIL RECOVERED

SURVEY POINT

13-3/8" — CASING SHOE

MUD

LITHOLOGICAL SYMBOLS



LOGGING AND SURVEYING

Log Suite #1	Interval (mMDRT)	Survey	Interval (mMDRT)
RUN #1 HRLA-HNGS-LEHQT	3550m - 755m 2170m - 2065m Repeat Section	Anderdrift	160m - 3350.0m
RUN #2 PEX150-LEHQT	3550m - 755m 2170m - 2065m Repeat Section		
RUN #3 DSI-FMI-LEHQT	2519m- 755m 2170m - 2065m Repeat Section		
RUN #4 MDT-GR-LEHQT	2517m - 1647m		
RUN #5 CST-GR	2515m - 1634 Shot 60 cores; Recovered 44; Lost 11; Empty 2; Misfired 3		
Log Suite #2	**Interval (mMDRT)**		
RUN #1 **DSI-HNGS-MSFL-LEHQT**	3369m - 2444m 3035m - 2965m Repeat Section		
RUN #2 **MDT-GR-LEHQT**	3018m - 2583m		
RUN #3 **VI-VSP**	3285m - 805m		
RUN #4 **CST-GR**	3363.8m - 2561.5m		

MWD WELL DATA

Date	8-Jan-05/10-Jan-05	11-Jan-05/14-Jan-05	14-Jan-05/18-Jan-05	17-Jan-05/19-Jan-05
Run	MWD #1	MWD #2	MWD#3	MWD#4
Log	Powerpulse Directional & GR	Powerpulse Directional & GR	Powerpulse Directional & GR	Powerpulse Directional & GR
Depth Driller	761 m MDRT	1737 m MDRT	2072m MDRT	2532m MDRT
Depth Logger	761 m MDRT	1737 m MDRT	2073m MDRT	2532m MDRT
Bottom Log Interval	741 m MDRT	1717m MDRT	2053m MDRT	2518
Top Log Interval	160 m MDRT	755.4 m MDRT	1717m MDRT	2053
Casing Driller	155.4 m MDRT	755.4 m MDRT	755.4m MDRT	755.4m MDRT
Casing Logger	----	----	------	-------
Casing Size	20"	13 3/8"	13 3/8"	13 3/8"
Casing Weight	129.3ppf	68.0ppf	68.0ppf	68.0ppf
Bit Size	17.5"	12.25"	12.25"	12 1/4"
Type of Fluid in Hole	Sea water/ Hi-vis sweeps	KCl/PHPA/GLYCOL	KCl/PHPA/GLYCOL	KCl/PHPA/GLYCOL
Density	8.5 ppg	9.5 ppg	9.65 ppg	9.75
Rm @ Measured Temp.	N/A	N/A	N/A	N/A
Rmf @ Measured Temp.	N/A	N/A	N/A	N/A
Rmc @ Measured Temp.	N/A	N/A	N/A	N/A
Max. Recorded Temp.	46.27°C	72.16°C	83.14°C	92.55°C
Equipment / Location	Sale	Sale	Sale	Sale

MWD WELL DATA cont'd

Date	26-Jan-05/29-Jan-05	29-Jan-05/01-Feb-05	01-Feb-05/03-Feb-05	04-Feb-05/06-Feb-05
Run	MWD #5 / LWD#1	MWD #6 / LWD#2	MWD #7 / LWD#3	MWD #8 / LWD#3
Log	Powerpulse GVR6 ADN6	Powerpulse GVR6 ADN6	Powerpulse GVR6 ADN6	Powerpulse GVR6 ADN6
Depth Driller	2688m MDRT	2866m MDRT	3024m MDRT	3369m MDRT
Depth Logger	2688m MDRT	2866m MDRT	3024m MDRT	3369m MDRT
Bottom Log Interval	2688m MDRT	2853m MDRT	3005m MDRT	3350m MDRT
Top Log Interval	2532m MDRT	2674m MDRT	2861m MDRT	2990m MDRT
Casing Driller	2527 m MDRT	2527 m MDRT	2527 m MDRT	2527 m MDRT
Casing Logger	----	----	----	----
Casing Size	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Casing Weight	47.0ppf	47.0ppf	47.0ppf	47.0ppf
Bit Size	8.5"	8.5"	8.5"	8.5"
Type of Fluid in Hole	KCl/PHPA/GLYCOL	KCl/PHPA/GLYCOL	KCl/PHPA/GLYCOL	KCl/PHPA/GLYCOL

Density	10.2 ppg	10.0 ppg	10.2 ppg	10.2 ppg
Rm @ Measured Temp.	0.1133 ohms @ 25.2 deg C	0.143 ohms @ 25.3 deg C	0.1103 ohms @ 22.9 deg C	0.1623 ohms @ 23.6 deg C
Rmf @ Measured Temp.	0.0862 ohms @ 24.6 deg C	0.0898 ohms @ 24.1 deg C	0.0926 ohms @ 22.3 deg C	0.0868 ohms @ 23.3 deg C
Rmc @ Measured Temp.	0.1845 ohms @ 25.8 deg C	0.1058 ohms @ 24.7 deg C	0.148 ohms @ 23.8 deg C	0.1065 ohms @ 23.4 deg C
Max. Recorded Temp.	86.3°C	84.7°C	85.5°C	85.5°C
Equipment / Location	Sale	Sale	Sale	Sale
Recorded By	J. Dolan/K. Handley/M. Y. Tan	J. Dolan/K. Handley/M. Y. Tan	J. Dolan/K. Handley/M. Y. Tan	J. Dolan/K. Handley/M. Y. Tan
Witnessed By	S.Duff / Antonio Ribeiro	Antonio Ribeiro / G.O'Neill	Antonio Ribeiro / G.O'Neill	Antonio Ribeiro / G.O'Neill

WIRELINE WELL DATA

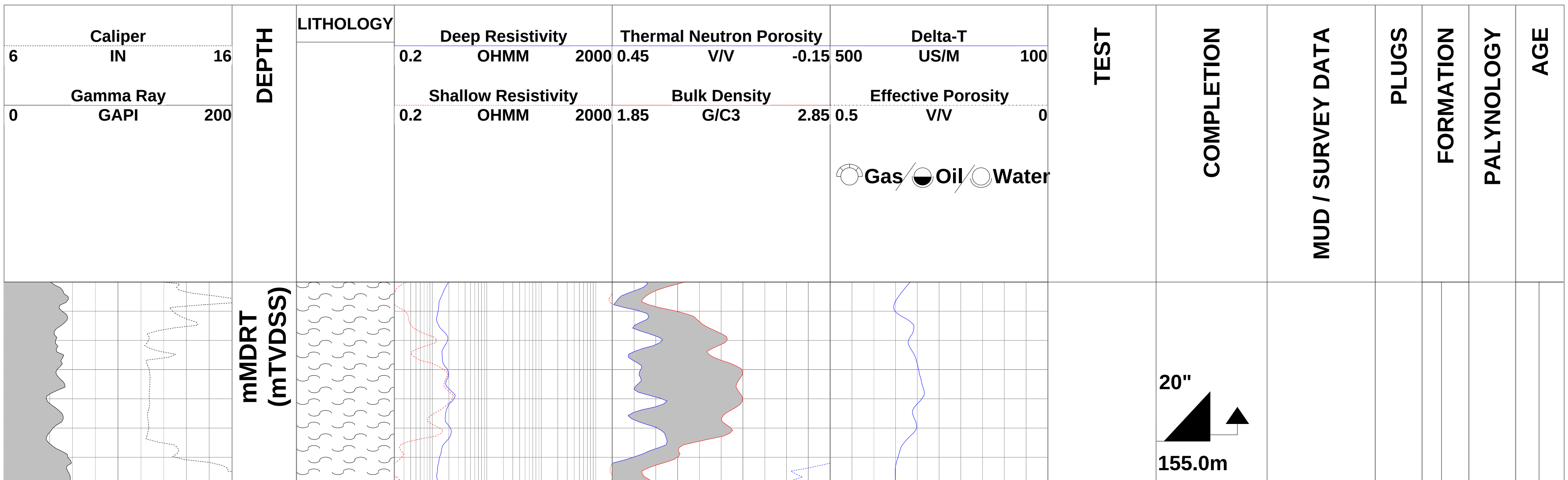
Date	19-Jan 05	20-Jan 05	23-Jan 05	23-Jan 05
Run	1&2	3	4	5
Log	HRLA-HNGS-PEX150	DSI-FMI-LEHQ	MDT-GR	CST-GR
Depth Driller	2532m MDRT	2532m MDRT	2532m MDRT	2532m MDRT
Depth Logger	2524m MDRT	2524m MDRT	2524m MDRT	2524m MDRT
Bottom Log Interval	2523.27m MDRT	2524m MDRT	2517m MDRT	2515m MDRT
Top Log Interval	752m MDRT	91.2m MDRT	1647.25m MDRT	1634m MDRT
Casing Driller	755.4m MDRT	755.4m MDRT	755.4m MDRT	755.4m MDRT
Casing Logger	752.0m MDRT	752.0m MDRT	752.0m MDRT	752.0m MDRT
Casing Size	13.3/8"	13.3/8"	13.3/8"	13.3/8"
Casing Weight	68.0ppf	68.0ppf	68.0ppf	68.0ppf
Bit Size	12.25"	12.25"	12.25"	12.25"
Type of Fluid in Hole	KCL/POLYMER	KCL/POLYMER	KCL/POLYMER	KCL/POLYMER
Density	9.8 ppg	9.8 ppg	9.8 ppg	--
Rm @ Measured Temp.	0.095 ohms @ 27deg C	0.095 ohms @ 27deg C	0.100 ohms @ 27deg C	0.100 ohms @ 27deg C

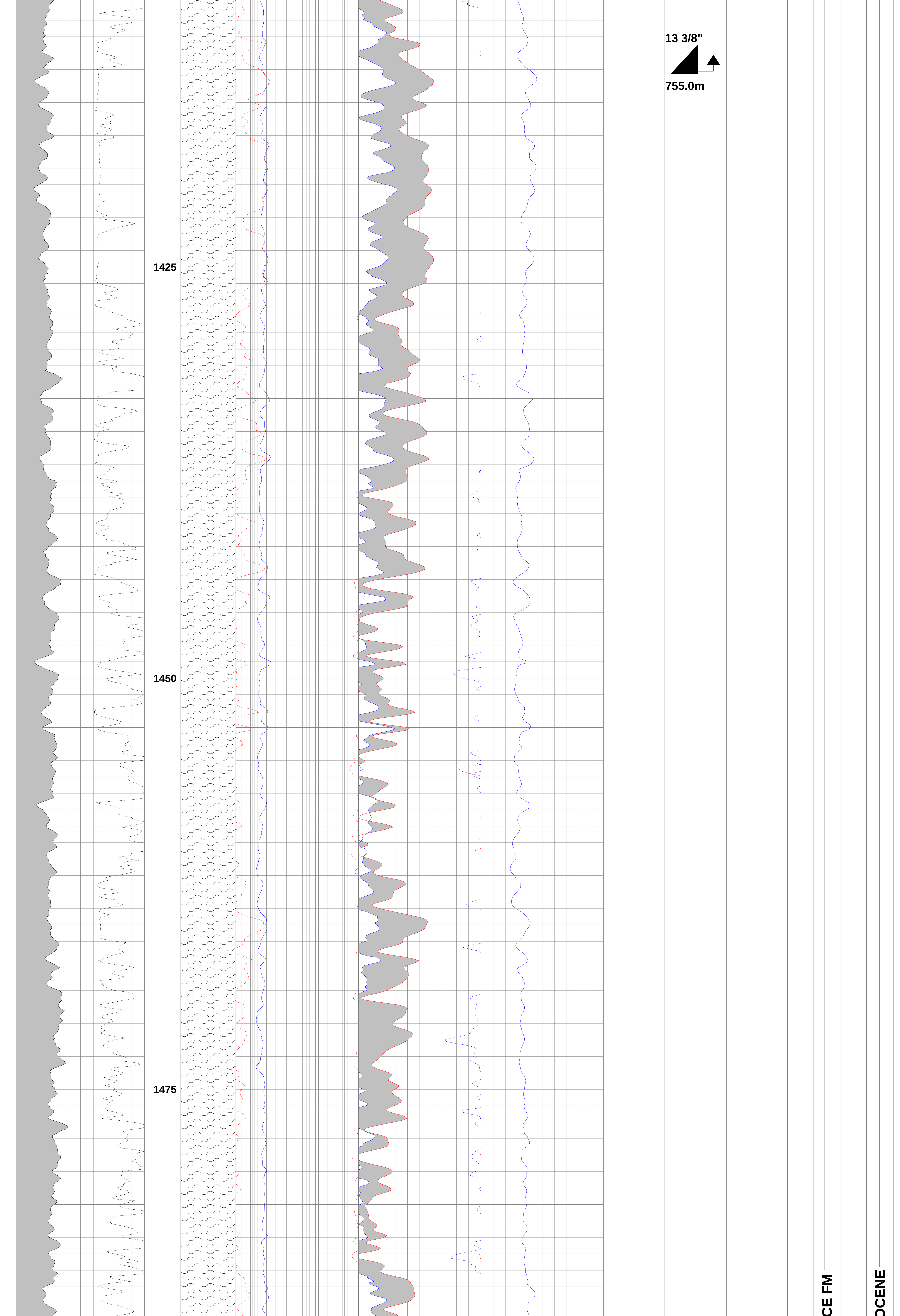
WIRELINE WELL DATA

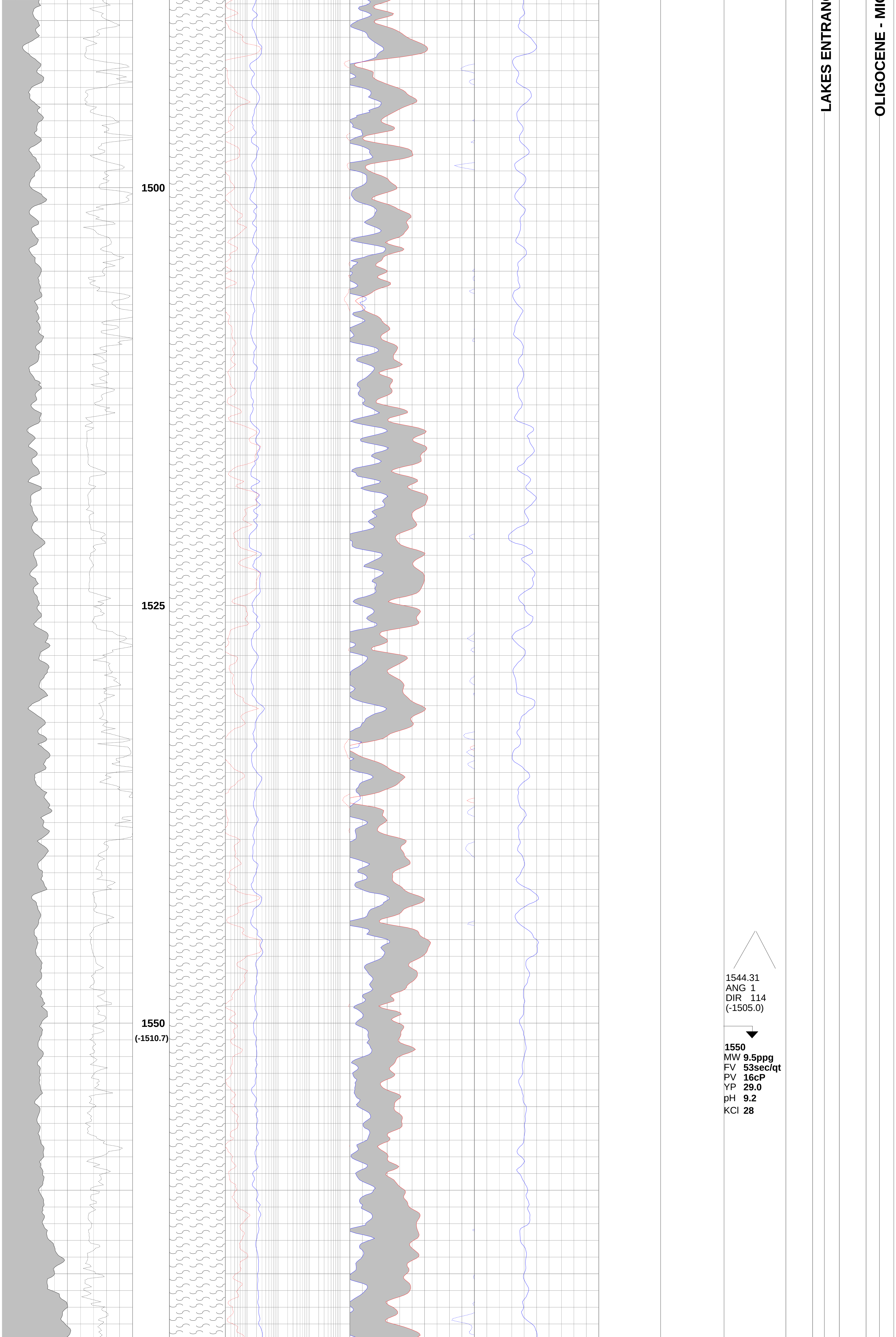
Date	6-Feb 05	7-Feb 05	7-Feb 05	8-Feb 05
Run	1	2	3	4
Log	DSI-MSFL-HNGS	MDT-GR	VI-VSP	CST-GR
Depth Driller	3369m MDRT	3369m MDRT	3369m MDRT	3369m MDRT
Depth Logger	3370.5m MDRT	3370.5m MDRT	3370.5m MDRT	3370.5m MDRT
Bottom Log Interval	3370.5m MDRT	3211.1 MDRT	3363.5m MDRT	3369.1m MDRT
Top Log Interval	2527 m MDRT	2583m MDRT	824.8m MDRT	2568.3m MDRT
Casing Driller	2527m MDRT	2527 m MDRT	2527 m MDRT	2527 m MDRT
Casing Logger	2527m MDRT	2527m MDRT	2527m MDRT	2527m MDRT
Casing Size	9 5/8"	9 5/8"	9 5/8"	9 5/8"
Casing Weight	47.0ppf	47.0ppf	47.0ppf	47.0ppf
Bit Size	8.5"	8.5"	8.5"	8.5"
Type of Fluid in Hole	KCl/POLYMER	KCl/POLYMER	KCl/POLYMER	KCl/POLYMER
Density	10.3 ppg	10.3 ppg	10.3 ppg	10.3 ppg
Rm @ Measured Temp.	0.102 ohms @ 23 deg C	0.102 ohms @ 23 deg C	0.102 ohms @ 23 deg C	0.102 ohms @ 23 deg C
Rmf @ Measured Temp.	0.077 ohms @ 23 deg C	0.077 ohms @ 23 deg C	0.077 ohms @ 23 deg C	0.077 ohms @ 23 deg C
Rmc @ Measured Temp.	0.137 ohms @ 23 deg C	0.137 ohms @ 23 deg C	0.137 ohms @ 23 deg C	0.137 ohms @ 23 deg C
Max. Recorded Temp.	---	117°C	117°C	117°C
Equipment / Location	Sale	Sale	Sale	Sale
Recorded By	D. Moloknov/G.Ruthven/C. Bassignana	D. Moloknov/G.Ruthven/C. Bassignana	D. Moloknov/G.Ruthven/C. Bassignana	D. Moloknov/G.Ruthven/C. Bassignana
Witnessed By	G. O'Neill / Antonio Ribeiro	G. O'Neill / Antonio Ribeiro	G. O'Neill / Antonio Ribeiro	G. O'Neill / Antonio Ribeiro

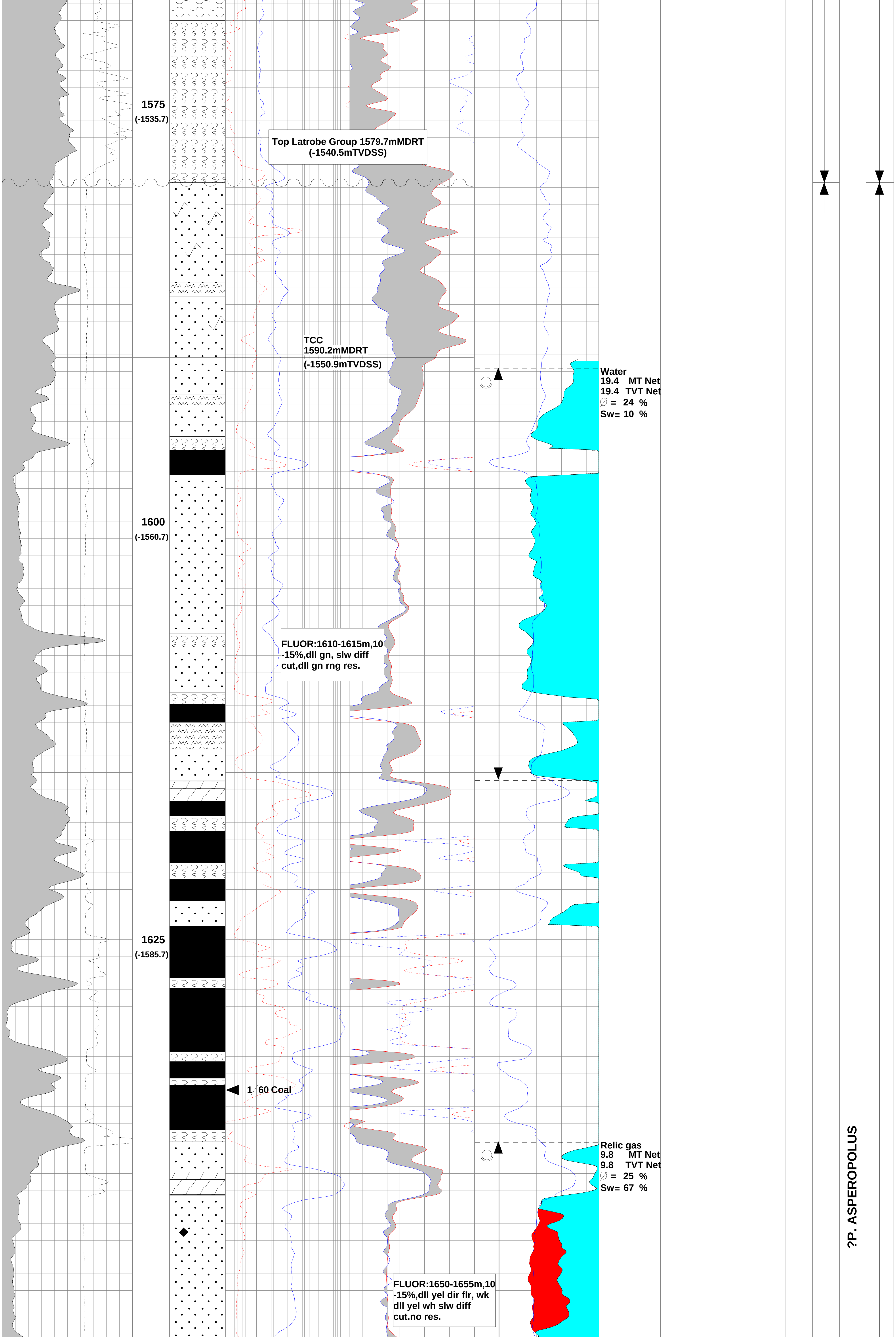
CORES			PERFORATIONS		
From (mMDRT)	To (mMDRT)	Rec %	From (mMDRT)	To (mMDRT)	Shots/ft
No cores were cut	---		No perforations		

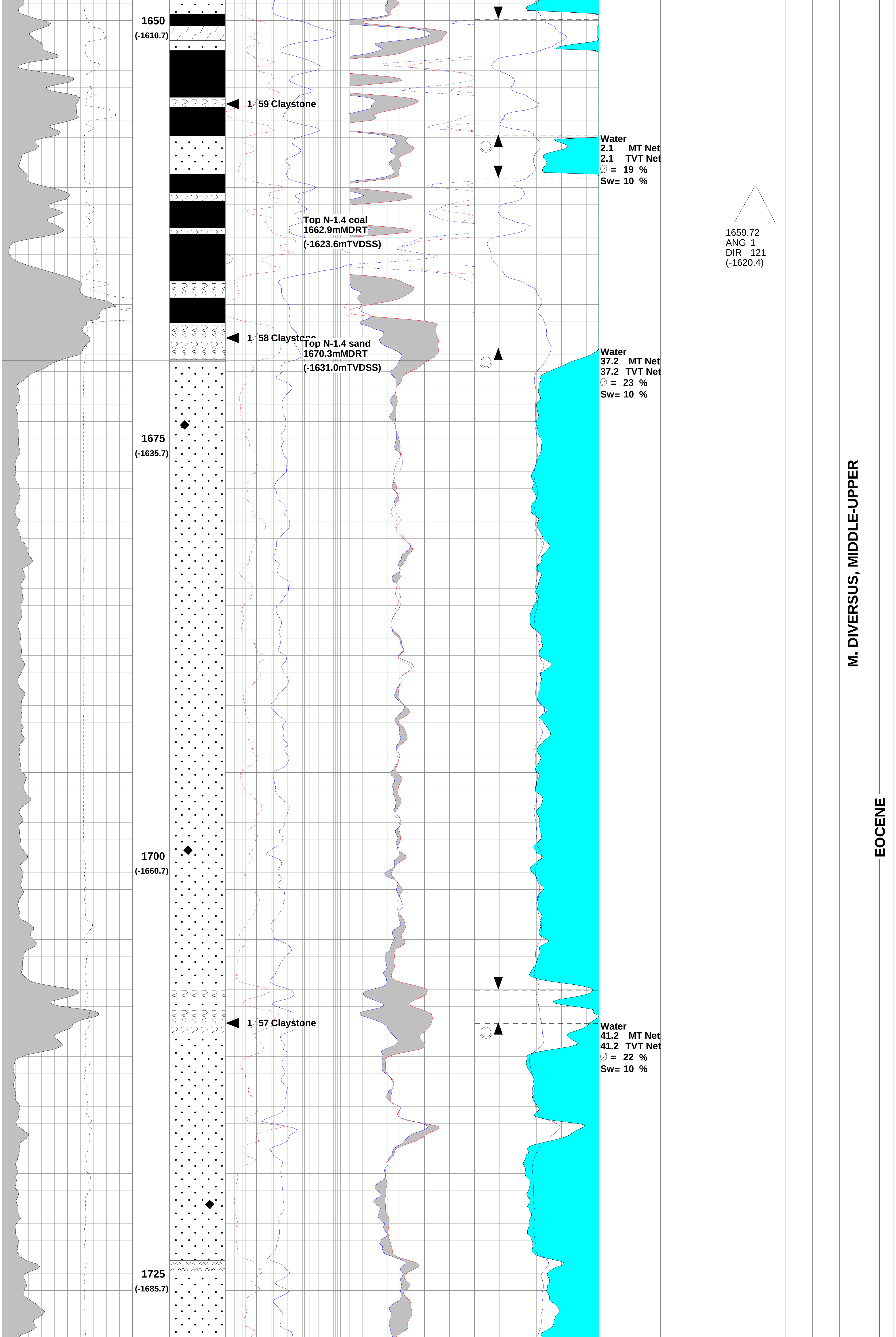
CASING				PLUGS		
Size	Set @ (mMDRT)	Sx Cmt	Formation	From (mMDRT)	To (mMDRT)	Sx Cmt
20"	155.0	960	Gippsland Limestone	2235	2461	242
13.375"	755.0	1037	Gippsland Limestone	693	840	335
9.625"	2527.0	1212	Latrobe Group	112	230	752

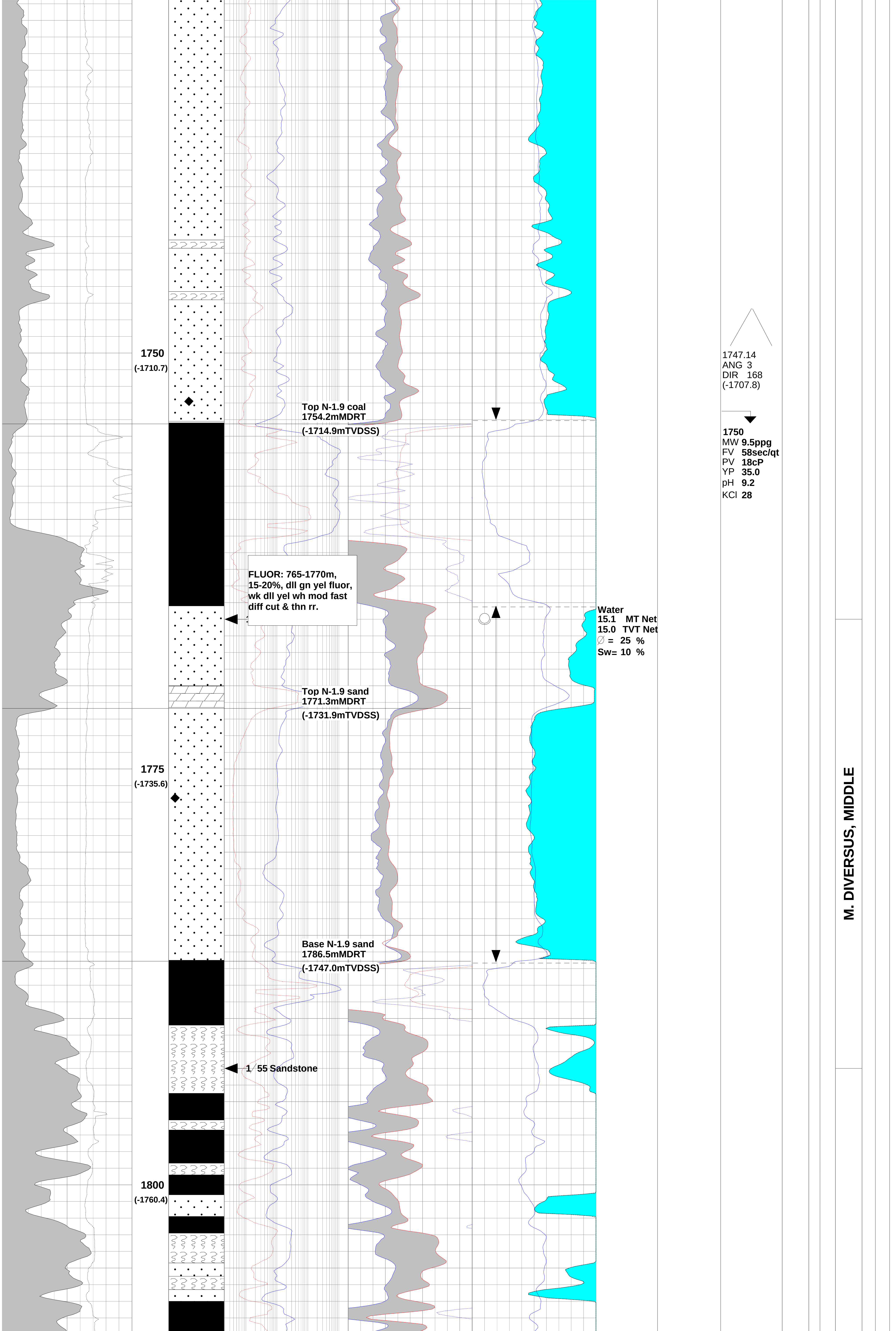



13 3/8"
755.0m
1425
1450
1475
CE FM
OCENE

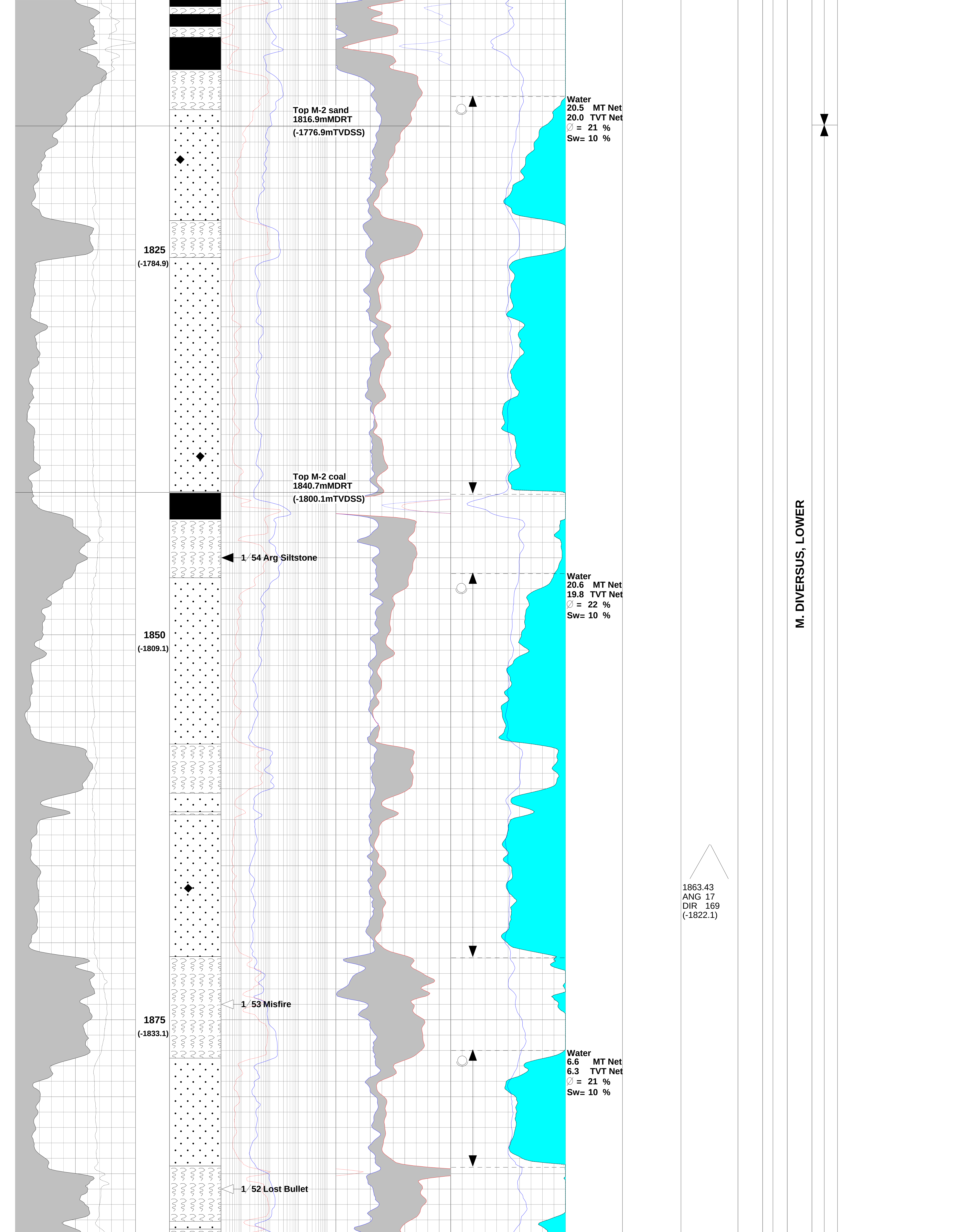

1500
1525
1550
(-1510.7)
1544.31
ANG 1
DIR 114
(-1505.0)
1550
MW 9.5ppg
FV 53sec/qt
PV 16cP
YP 29.0
pH 9.2
KCl 28
LAKES ENTRAN
OLIGOCENE - MI

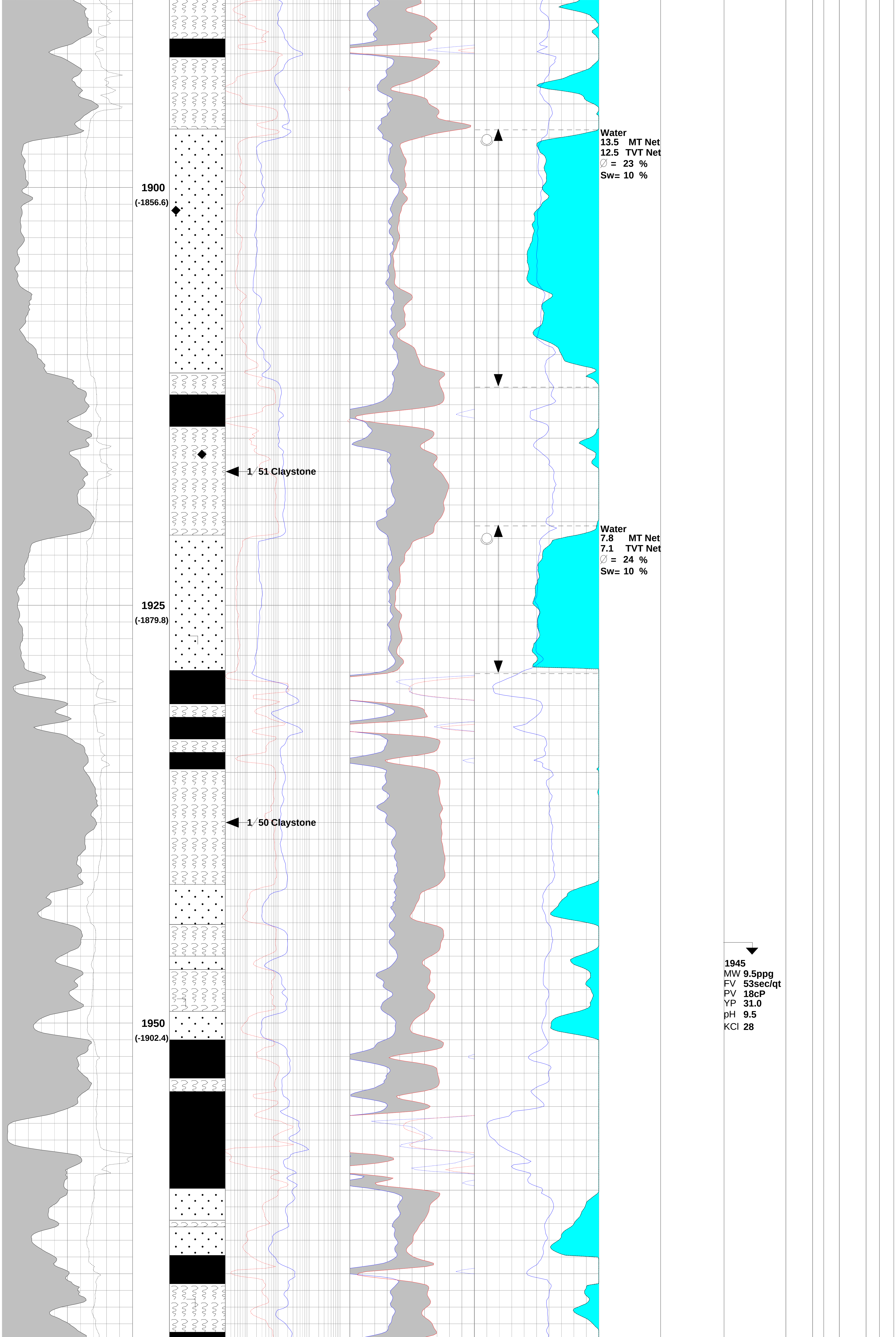

1575
(-1535.7)
Top Latrobe Group 1579.7mMDRT
(-1540.5mTVDSS)
TCC
1590.2mMDRT
(-1550.9mTVDSS)
Water
19.4 MT Net
19.4 TVT Net
∅ = 24 %
Sw= 10 %
1600
(-1560.7)
FLUOR:1610-1615m,10
-15%,dll gn, slw diff
cut,dll gn rng res.
1625
(-1585.7)
1/60 Coal
Relic gas
9.8 MT Net
9.8 TVT Net
∅ = 25 %
Sw= 67 %
FLUOR:1650-1655m,10
-15%,dll yel dir flr, wk
dll yel wh slw diff
cut.no res.
?P. ASPEROPOLUS

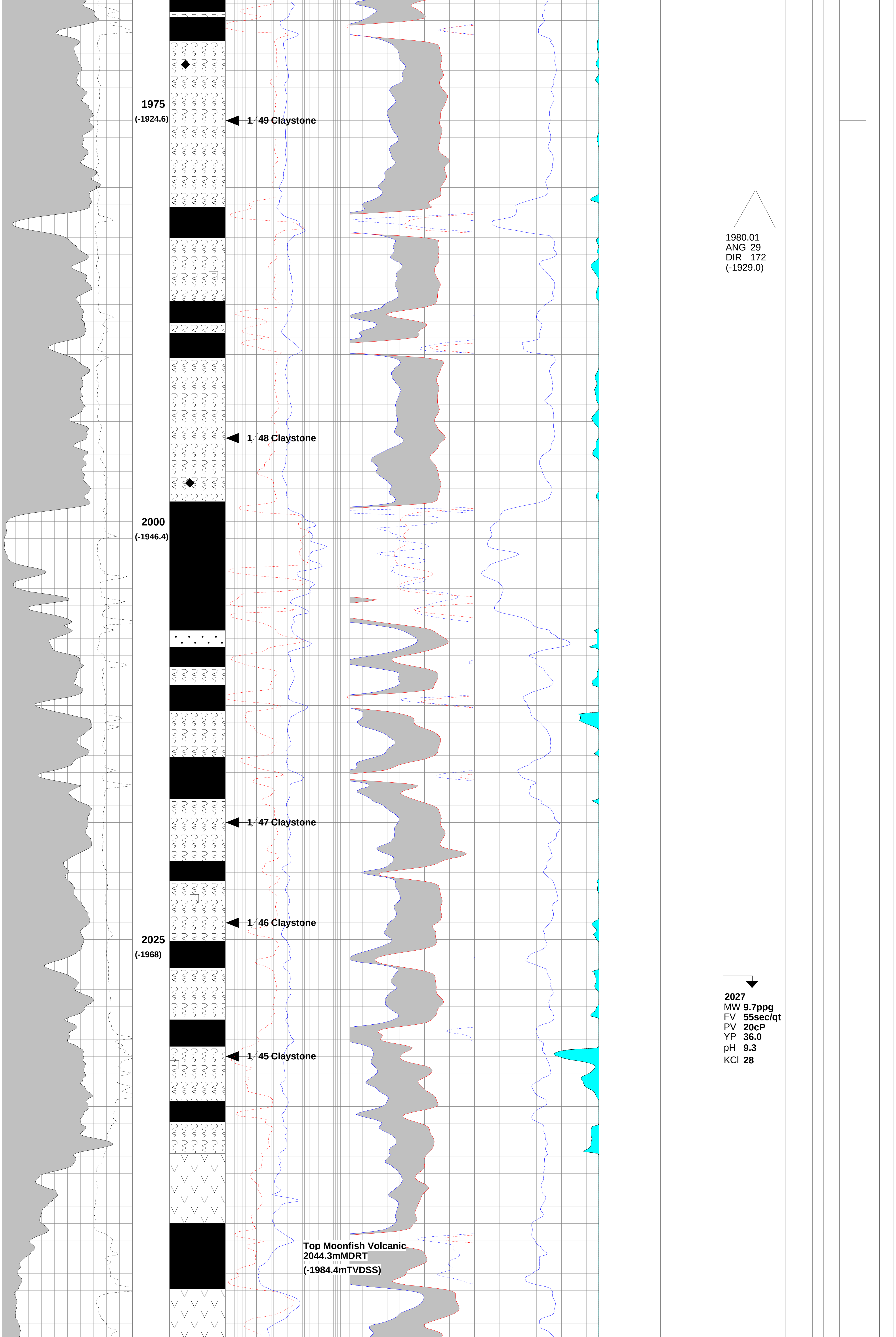

1650
(-1610.7)
1/59 Claystone
Water
2.1 MT Net
2.1 TVT Net
∅ = 19 %
Sw= 10 %
1659.72
ANG 1
DIR 121
(-1620.4)
Top N-1.4 coal
1662.9mMDRT
(-1623.6mTVDSS)
1/58 Claystone
Top N-1.4 sand
1670.3mMDRT
(-1631.0mTVDSS)
Water
37.2 MT Net
37.2 TVT Net
∅ = 23 %
Sw= 10 %
1675
(-1635.7)
M. DIVERSUS, MIDDLE-UPPER
EOCENE
1700
(-1660.7)
1/57 Claystone
Water
41.2 MT Net
41.2 TVT Net
∅ = 22 %
Sw= 10 %
1725
(-1685.7)

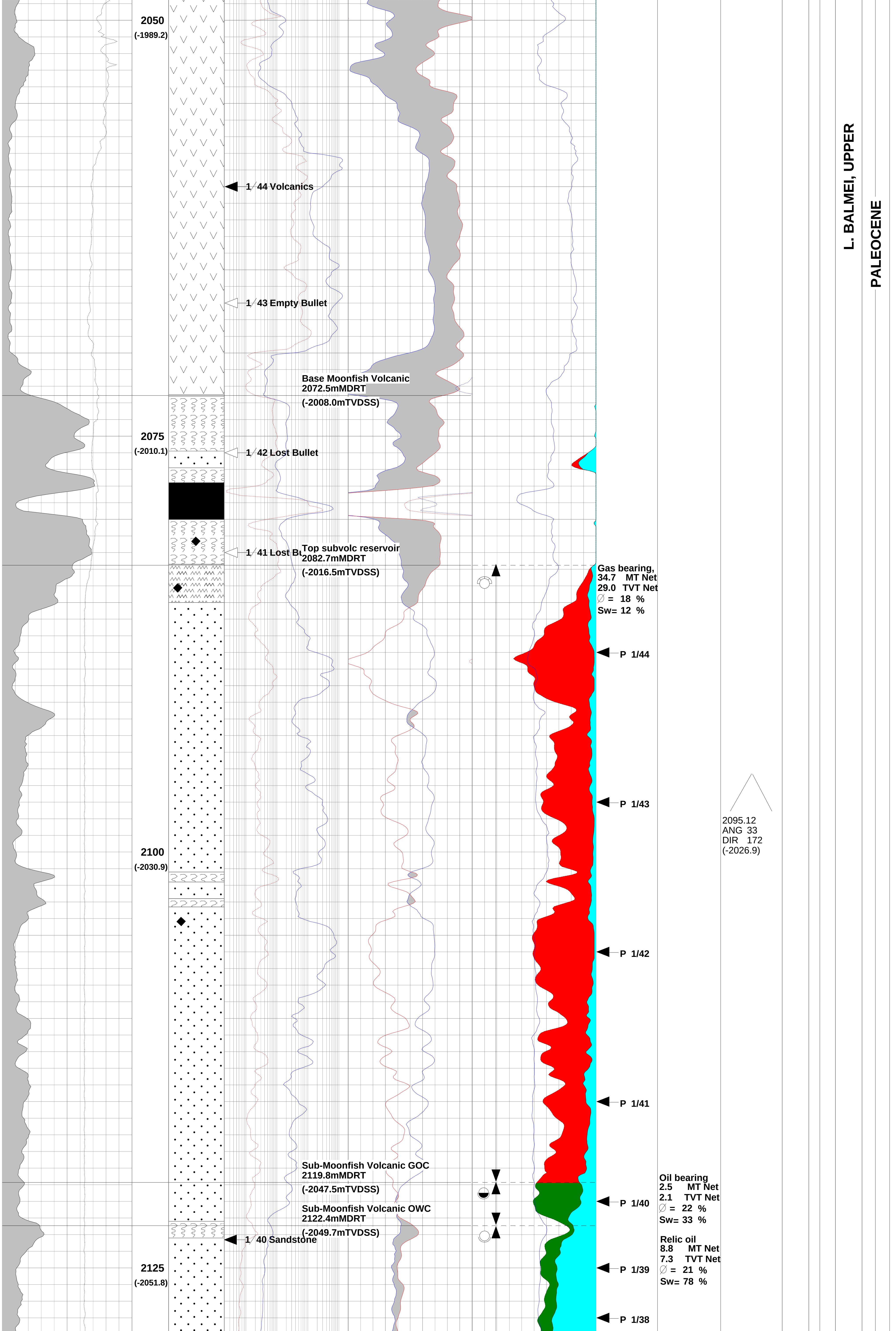


1750
(-1710.7)
Top N-1.9 coal
1754.2mMDRT
(-1714.9mTVDSS)
FLUOR: 765-1770m,
15-20%, dll gn yel fluor,
wk dll yel wh mod fast
diff cut & thn rr.
Water
15.1 MT Net
15.0 TVT Net
∅ = 25 %
Sw= 10 %
Top N-1.9 sand
1771.3mMDRT
(-1731.9mTVDSS)
1775
(-1735.6)
Base N-1.9 sand
1786.5mMDRT
(-1747.0mTVDSS)
1 55 Sandstone
1800
(-1760.4)
1747.14
ANG 3
DIR 168
(-1707.8)
1750
MW 9.5ppg
FV 58sec/qt
PV 18cP
YP 35.0
pH 9.2
KCl 28
M. DIVERSUS, MIDDLE

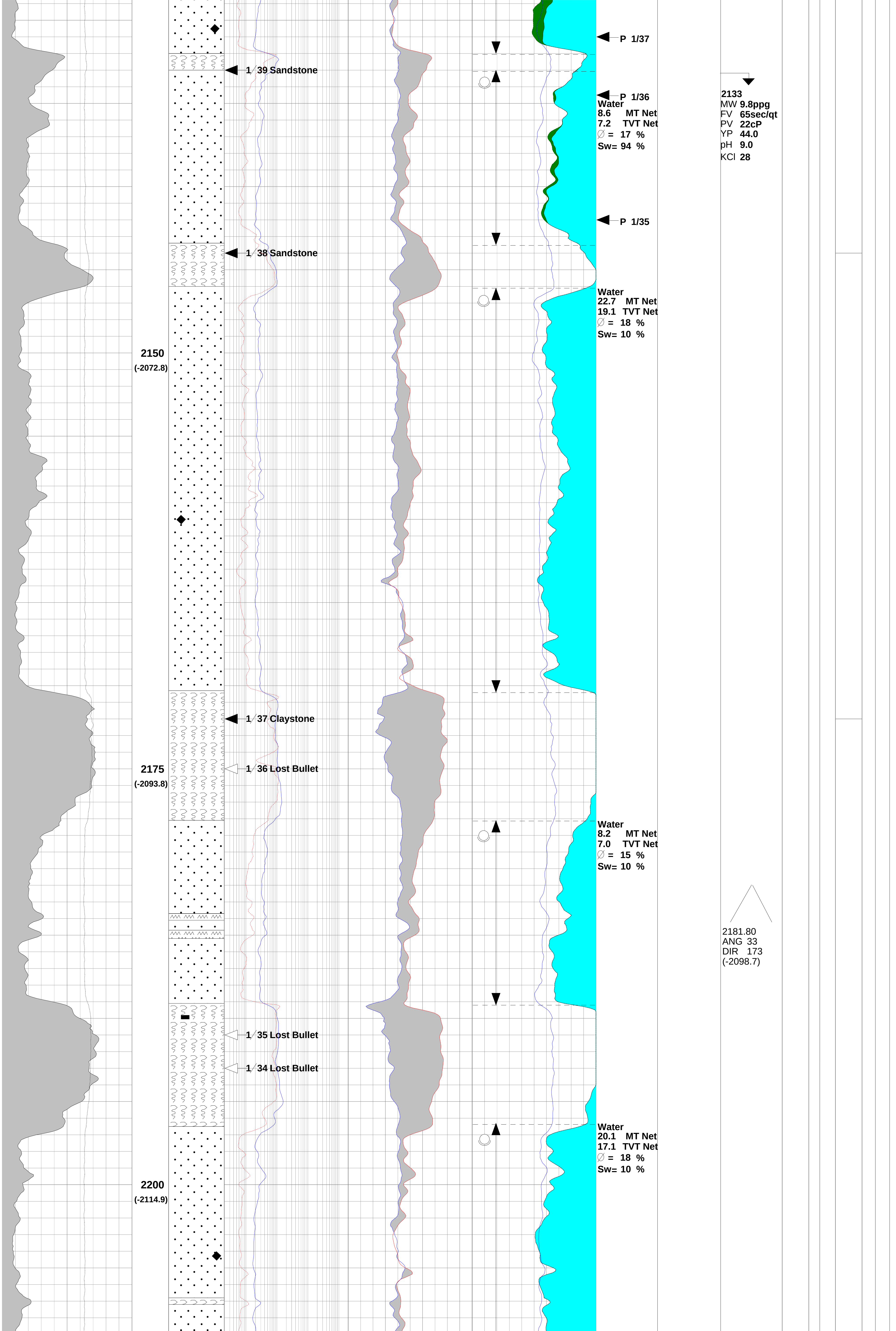

Top M-2 sand
1816.9mMDRT
(-1776.9mTVDSS)
Water
20.5 MT Net
20.0 TVT Net
∅ = 21 %
Sw= 10 %
1825
(-1784.9)
Top M-2 coal
1840.7mMDRT
(-1800.1mTVDSS)
1/54 Arg Siltstone
Water
20.6 MT Net
19.8 TVT Net
∅ = 22 %
Sw= 10 %
1850
(-1809.1)
M. DIVERSUS, LOWER
1863.43
ANG 17
DIR 169
(-1822.1)
1/53 Misfire
1875
(-1833.1)
Water
6.6 MT Net
6.3 TVT Net
∅ = 21 %
Sw= 10 %
1/52 Lost Bullet


1900
(-1856.6)
1925
(-1879.8)
1950
(-1902.4)
1/51 Claystone
1/50 Claystone
Water
13.5 MT Net
12.5 TVT Net
∅ = 23 %
Sw= 10 %
Water
7.8 MT Net
7.1 TVT Net
∅ = 24 %
Sw= 10 %
1945
MW 9.5ppg
FV 53sec/qt
PV 18cP
YP 31.0
pH 9.5
KCl 28

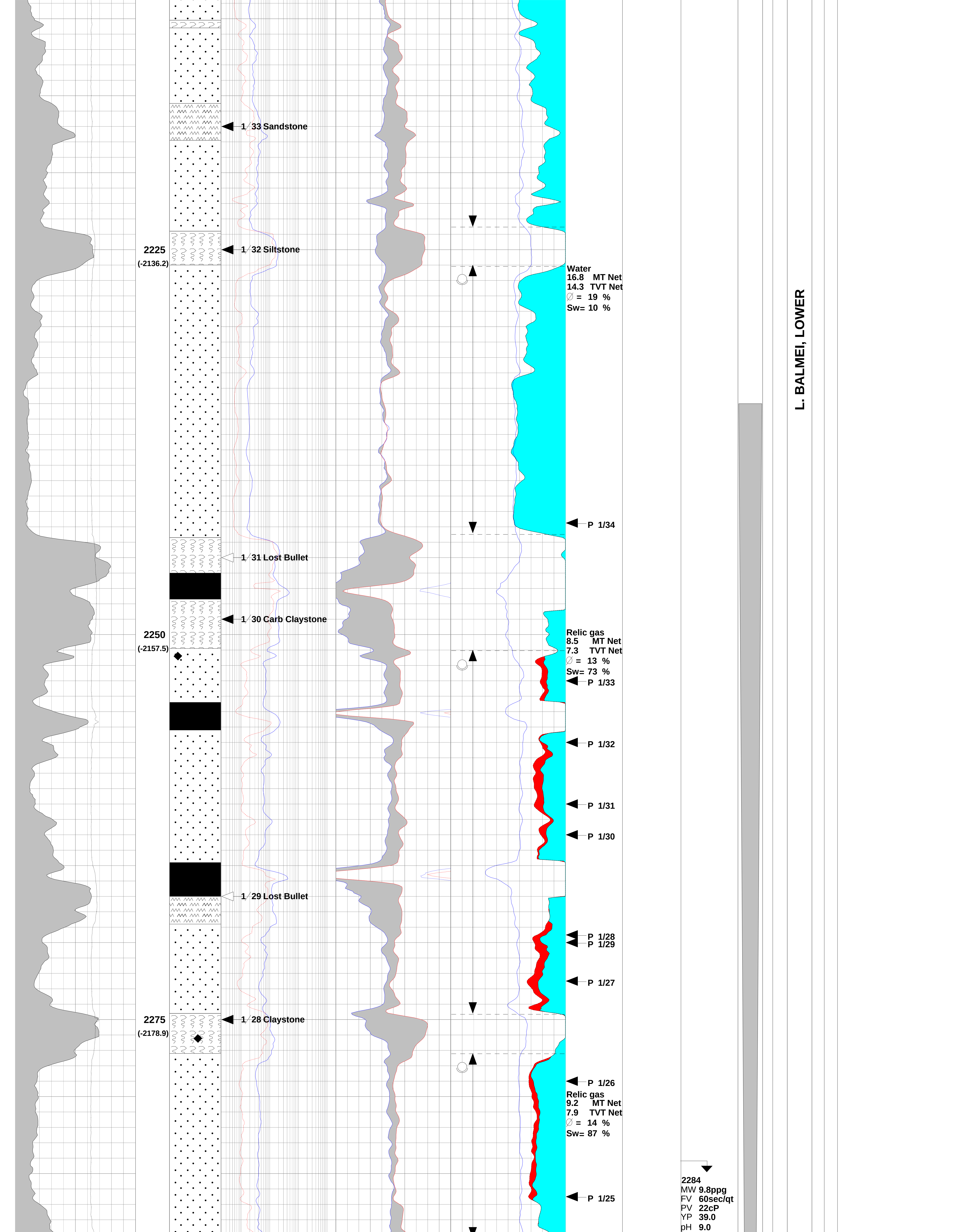

1975
(-1924.6)
1/49 Claystone
1980.01
ANG 29
DIR 172
(-1929.0)
1/48 Claystone
2000
(-1946.4)
1/47 Claystone
1/46 Claystone
2025
(-1968)
2027
MW 9.7ppg
FV 55sec/qt
PV 20cP
YP 36.0
pH 9.3
KCl 28
1/45 Claystone
Top Moonfish Volcanic
2044.3mMDRT
(-1984.4mTVDSS)



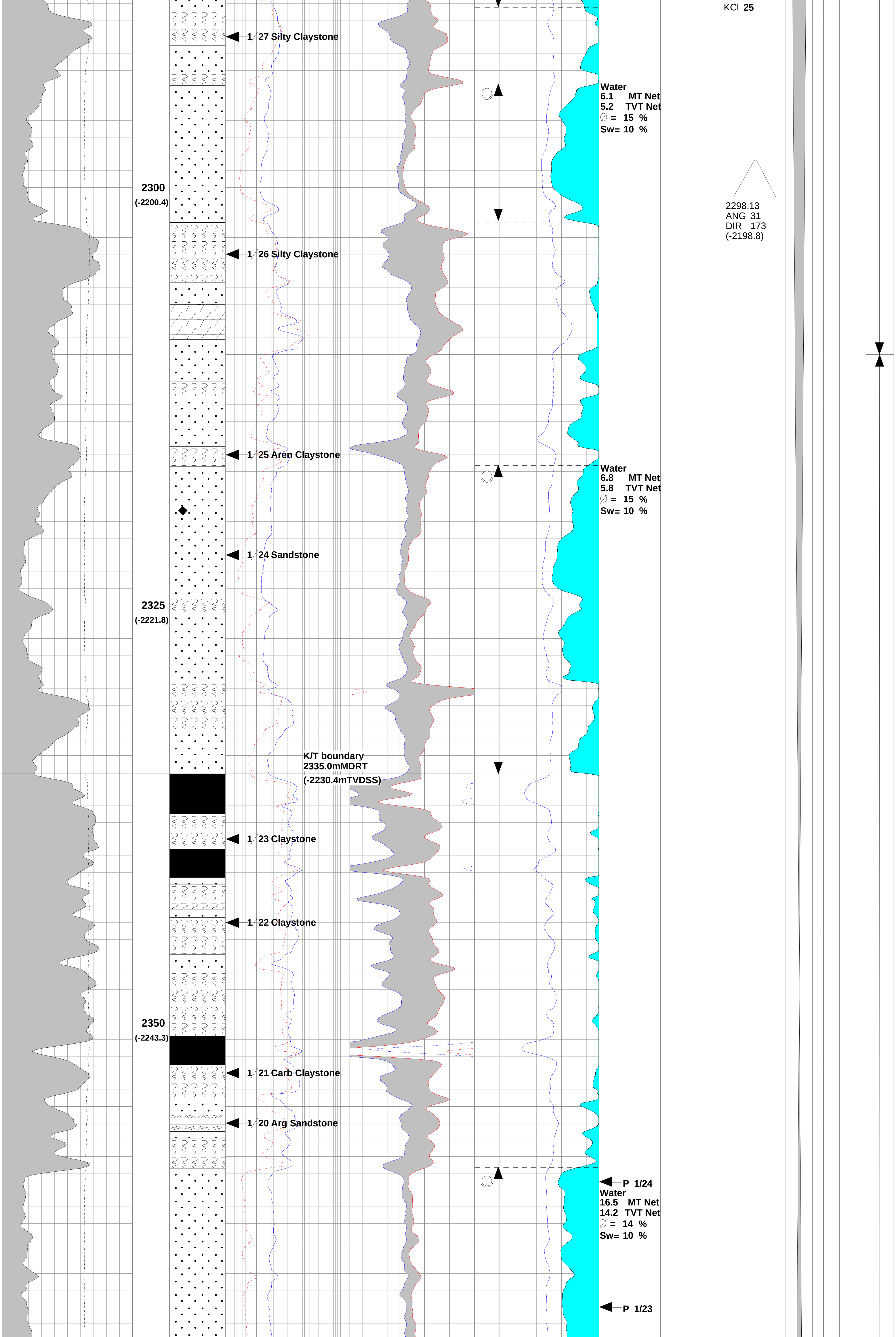
2050
(-1989.2)
1/44 Volcanics
1/43 Empty Bullet
Base Moonfish Volcanic
2072.5mMDRT
(-2008.0mTVDSS)
2075
(-2010.1)
1/42 Lost Bullet
1/41 Lost Bu
Top subvolc reservoir
2082.7mMDRT
(-2016.5mTVDSS)
Gas bearing,
34.7 MT Net
29.0 TVT Net
∅ = 18 %
Sw= 12 %
P 1/44
P 1/43
2095.12
ANG 33
DIR 172
(-2026.9)
2100
(-2030.9)
P 1/42
P 1/41
Sub-Moonfish Volcanic GOC
2119.8mMDRT
(-2047.5mTVDSS)
Oil bearing
2.5 MT Net
2.1 TVT Net
∅ = 22 %
Sw= 33 %
P 1/40
Sub-Moonfish Volcanic OWC
2122.4mMDRT
(-2049.7mTVDSS)
1/40 Sandstone
Relic oil
8.8 MT Net
7.3 TVT Net
∅ = 21 %
Sw= 78 %
2125
(-2051.8)
P 1/39
P 1/38
L. BALMEI, UPPER
PALEOCENE



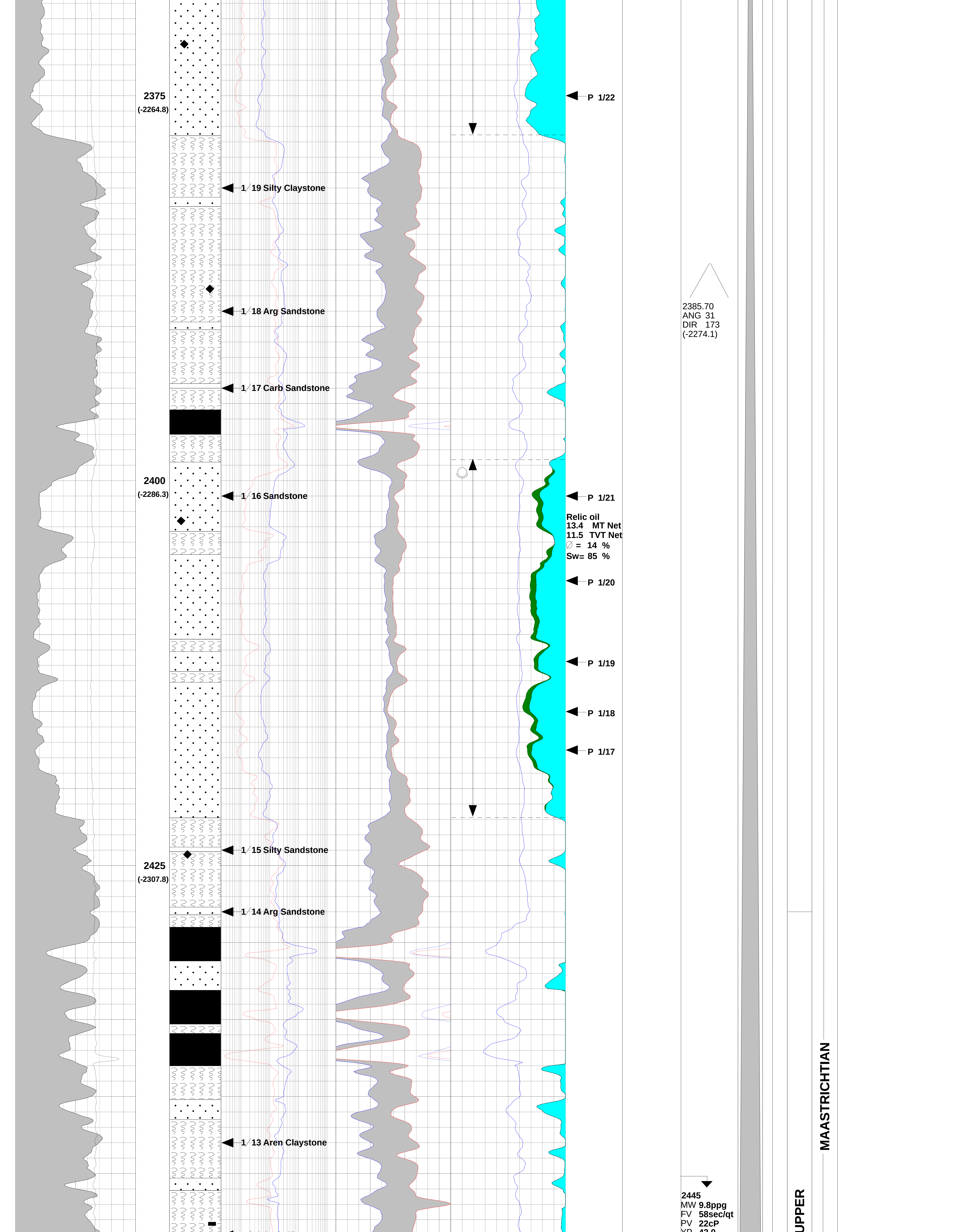
P 1/37
1/39 Sandstone
P 1/36
Water
8.6 MT Net
7.2 TVT Net
∅ = 17 %
Sw= 94 %
2133
MW 9.8ppg
FV 65sec/qt
PV 22cP
YP 44.0
pH 9.0
KCl 28
P 1/35
1/38 Sandstone
Water
22.7 MT Net
19.1 TVT Net
∅ = 18 %
Sw= 10 %
2150
(-2072.8)
1/37 Claystone
2175
(-2093.8)
1/36 Lost Bullet
Water
8.2 MT Net
7.0 TVT Net
∅ = 15 %
Sw= 10 %
2181.80
ANG 33
DIR 173
(-2098.7)
1/35 Lost Bullet
1/34 Lost Bullet
Water
20.1 MT Net
17.1 TVT Net
∅ = 18 %
Sw= 10 %
2200
(-2114.9)



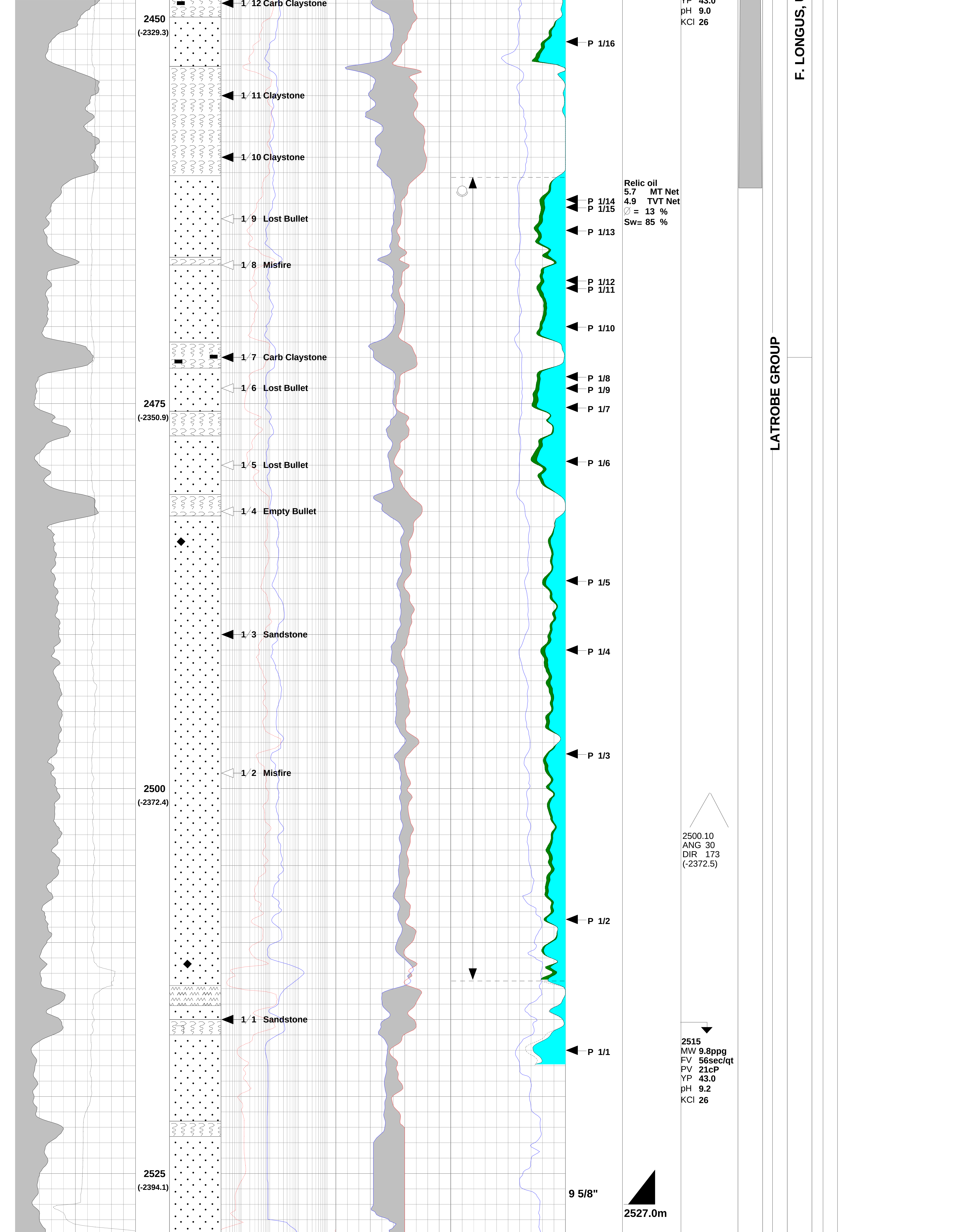
1/33 Sandstone
2225
(-2136.2)
1/32 Siltstone
Water
16.8 MT Net
14.3 TVT Net
∅ = 19 %
Sw= 10 %
L. BALMEI, LOWER
P 1/34
1/31 Lost Bullet
1/30 Carb Claystone
2250
(-2157.5)
Relic gas
8.5 MT Net
7.3 TVT Net
∅ = 13 %
Sw= 73 %
P 1/33
P 1/32
P 1/31
P 1/30
1/29 Lost Bullet
P 1/28
P 1/29
P 1/27
2275
(-2178.9)
1/28 Claystone
P 1/26
Relic gas
9.2 MT Net
7.9 TVT Net
∅ = 14 %
Sw= 87 %
P 1/25
2284
MW 9.8ppg
FV 60sec/qt
PV 22cP
YP 39.0
pH 9.0



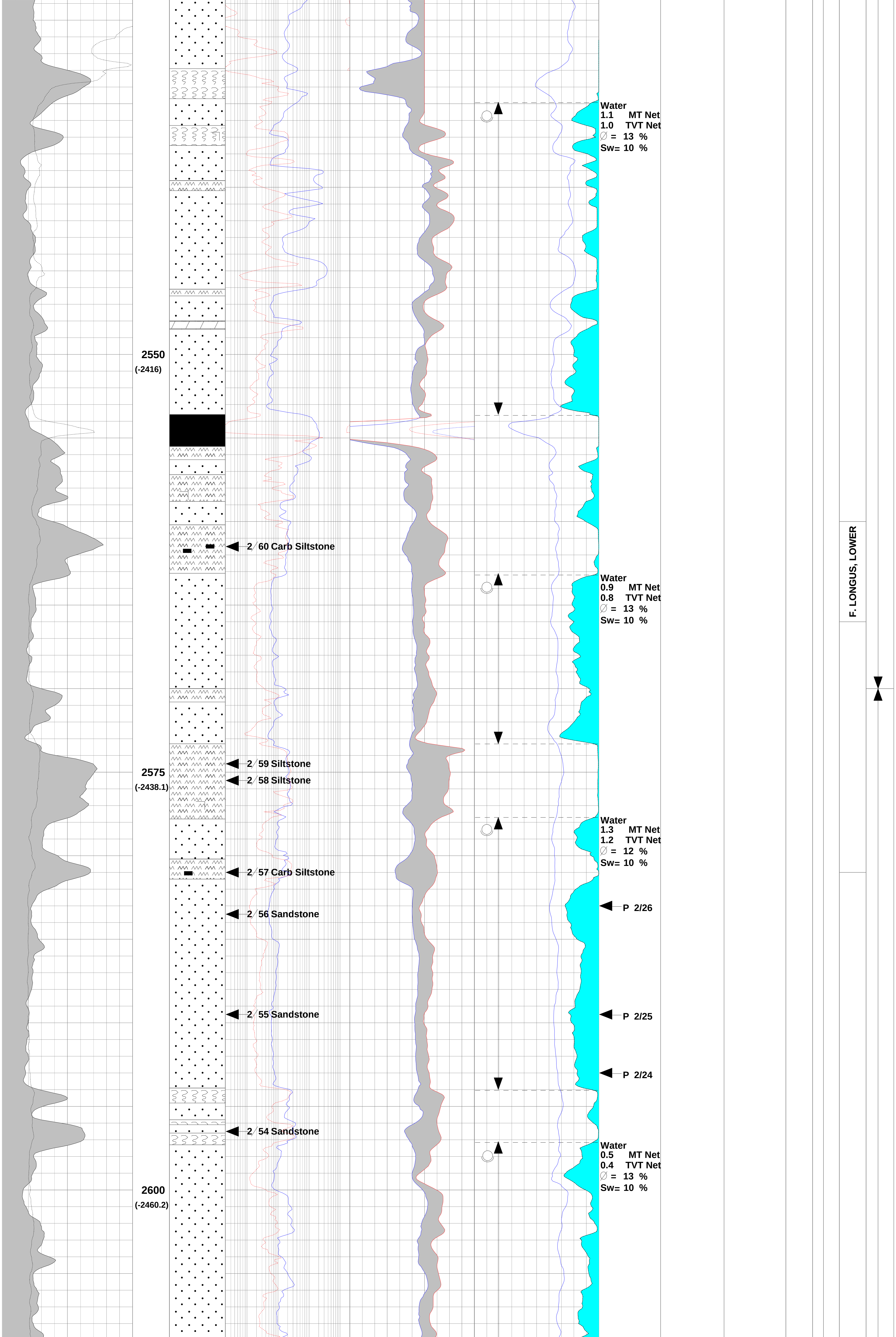
KCl 25
1/27 Silty Claystone
Water
6.1 MT Net
5.2 TVT Net
∅ = 15 %
Sw= 10 %
2300
(-2200.4)
2298.13
ANG 31
DIR 173
(-2198.8)
1/26 Silty Claystone
1/25 Aren Claystone
Water
6.8 MT Net
5.8 TVT Net
∅ = 15 %
Sw= 10 %
1/24 Sandstone
2325
(-2221.8)
K/T boundary
2335.0mMDRT
(-2230.4mTVDSS)
1/23 Claystone
1/22 Claystone
2350
(-2243.3)
1/21 Carb Claystone
1/20 Arg Sandstone
P 1/24
Water
16.5 MT Net
14.2 TVT Net
∅ = 14 %
Sw= 10 %
P 1/23

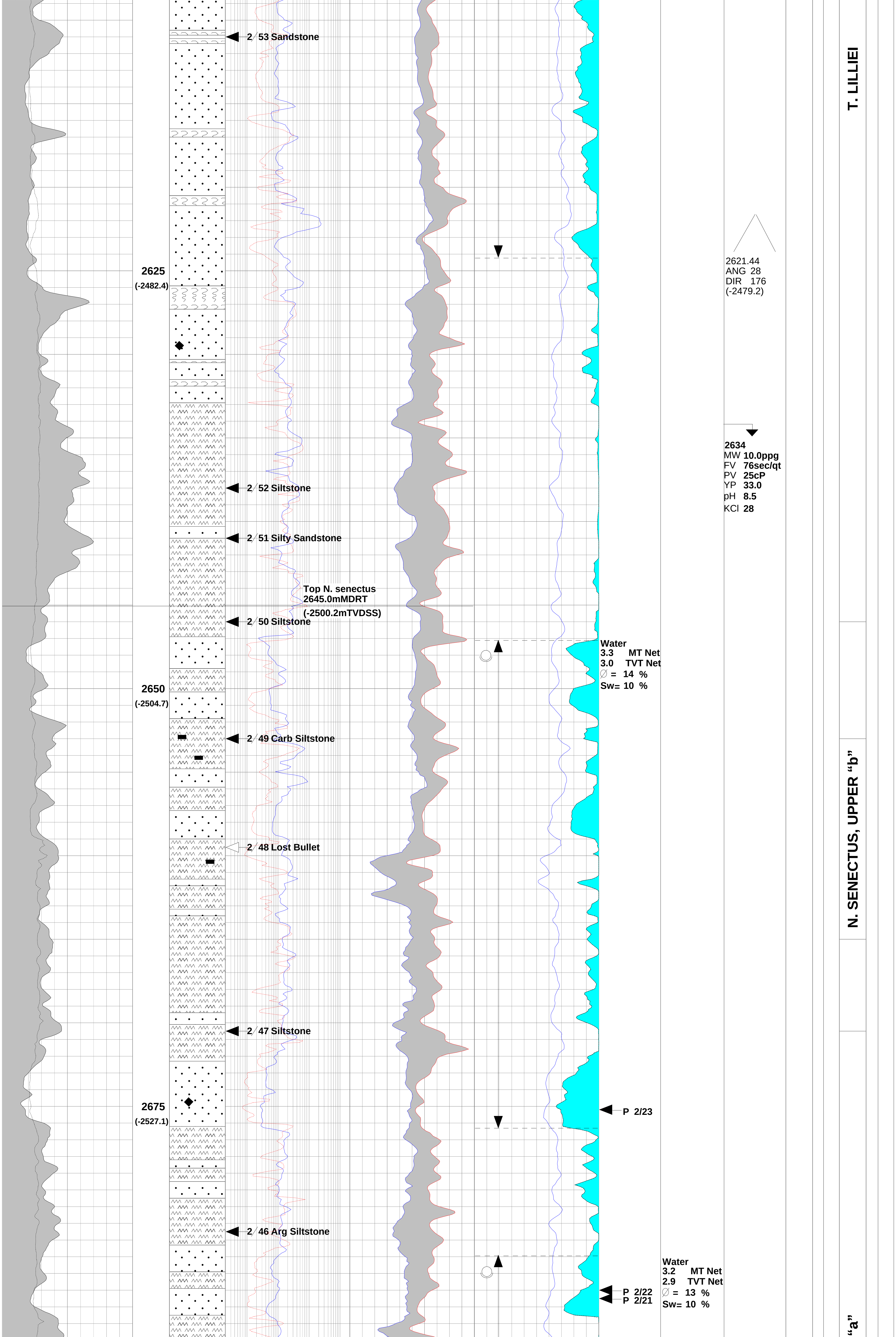


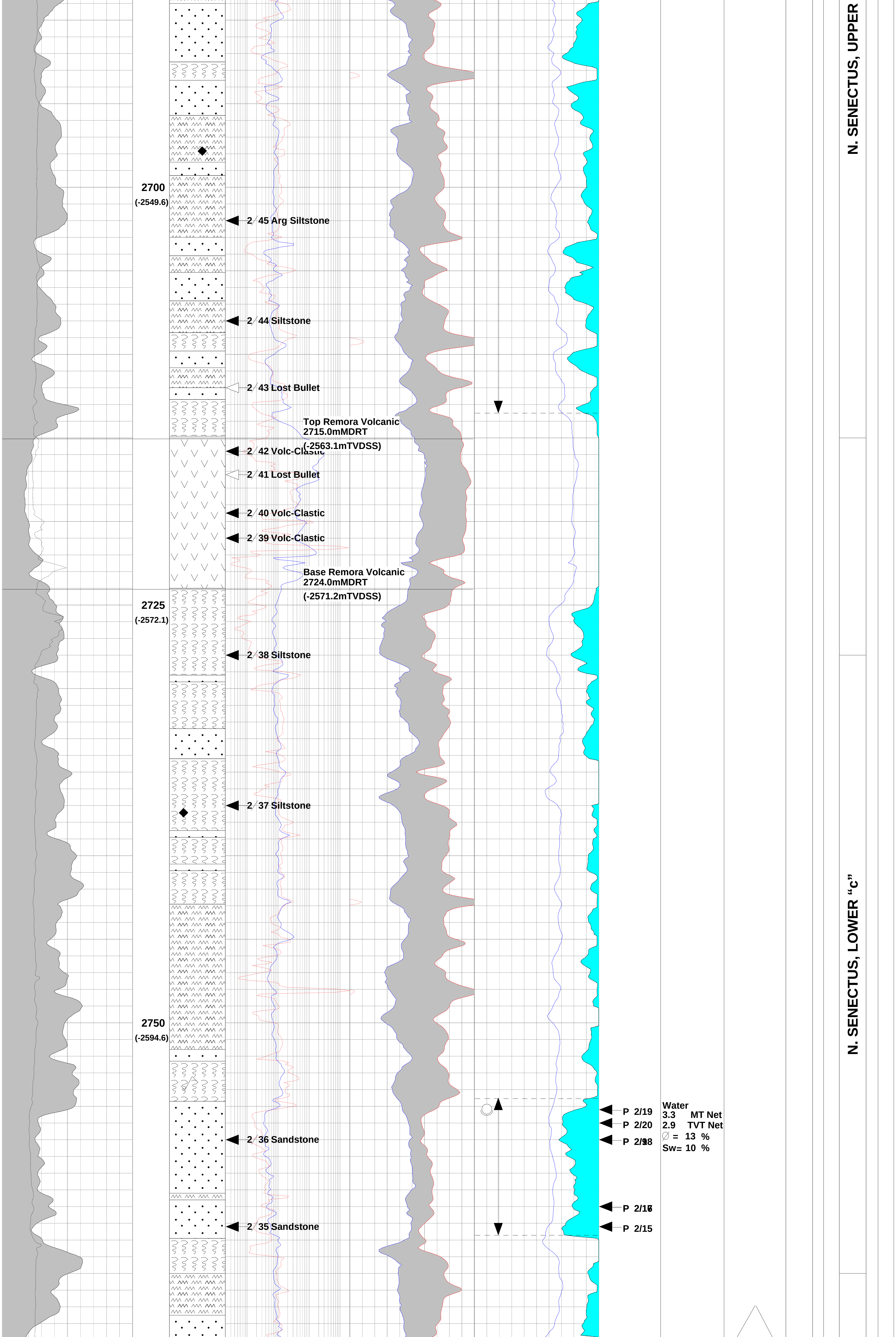
2375
(-2264.8)
1/19 Silty Claystone
1/18 Arg Sandstone
1/17 Carb Sandstone
2400
(-2286.3)
1/16 Sandstone
1/15 Silty Sandstone
2425
(-2307.8)
1/14 Arg Sandstone
1/13 Aren Claystone
P 1/22
P 1/21
Relic oil
13.4 MT Net
11.5 TVT Net
∅ = 14 %
Sw= 85 %
P 1/20
P 1/19
P 1/18
P 1/17
2385.70
ANG 31
DIR 173
(-2274.1)
2445
MW 9.8ppg
FV 58sec/qt
PV 22cP
UPPER
MAASTRICHTIAN

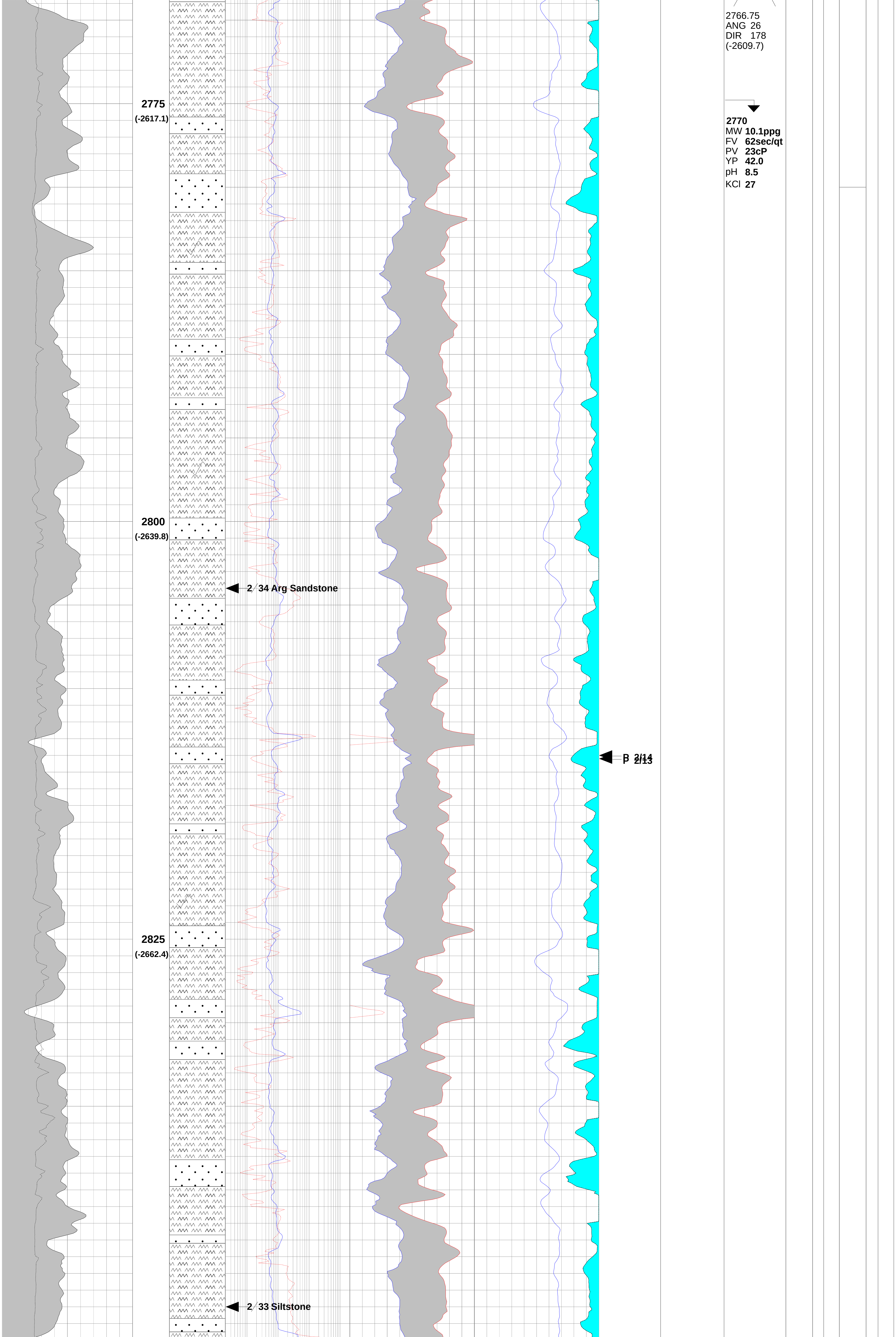


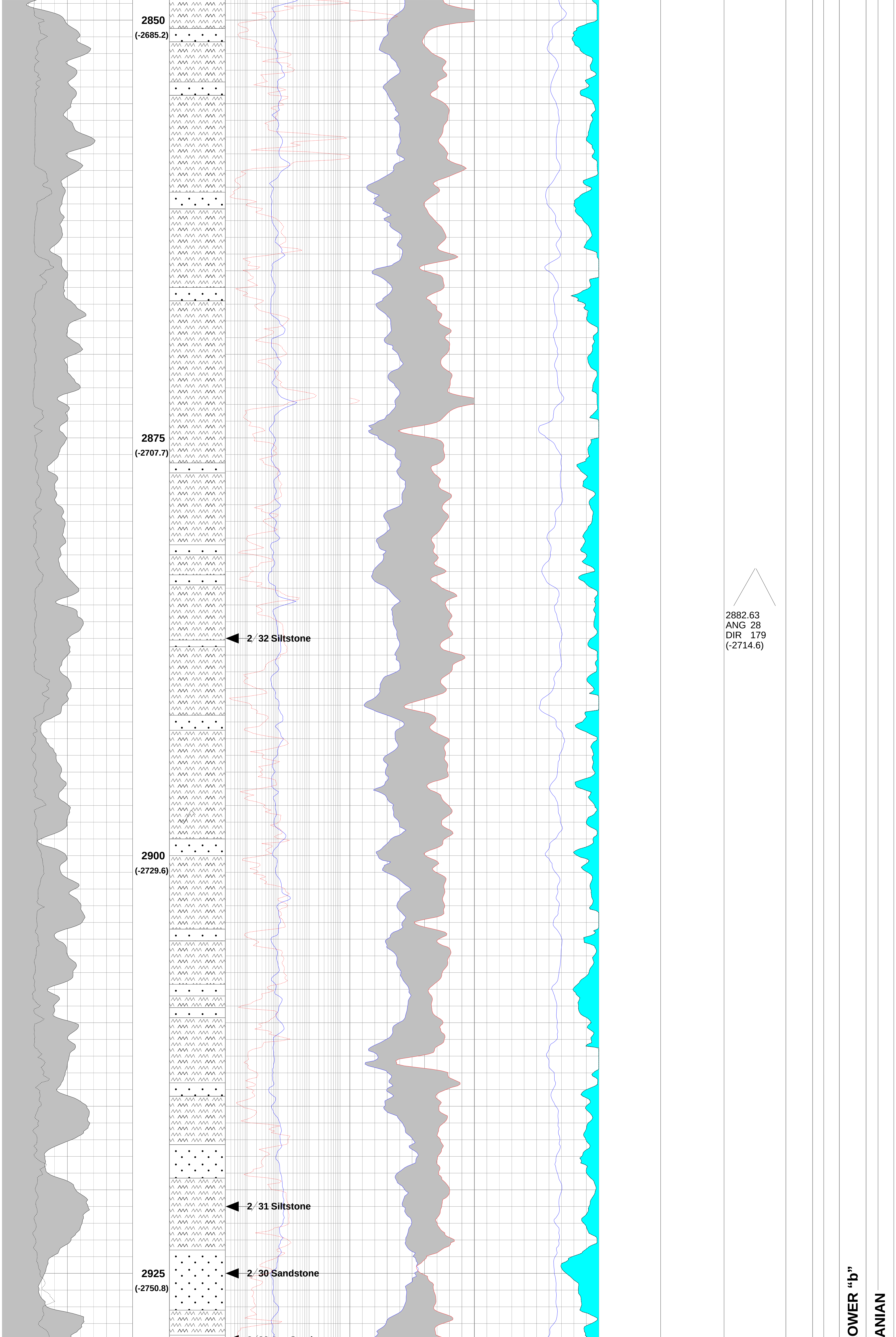
YP 43.0
pH 9.0
KCl 26
2450
(-2329.3)
1/12 Carb Claystone
1/11 Claystone
1/10 Claystone
1/9 Lost Bullet
1/8 Misfire
1/7 Carb Claystone
1/6 Lost Bullet
2475
(-2350.9)
1/5 Lost Bullet
1/4 Empty Bullet
1/3 Sandstone
1/2 Misfire
2500
(-2372.4)
1/1 Sandstone
2525
(-2394.1)
P 1/16
P 1/14
P 1/15
P 1/13
P 1/12
P 1/11
P 1/10
P 1/8
P 1/9
P 1/7
P 1/6
P 1/5
P 1/4
P 1/3
P 1/2
P 1/1
9 5/8"
Relic oil
5.7 MT Net
4.9 TVT Net
∅ = 13 %
Sw= 85 %
2500.10
ANG 30
DIR 173
(-2372.5)
2515
MW 9.8ppg
FV 56sec/qt
PV 21cP
YP 43.0
pH 9.2
KCl 26
2527.0m
LATROBE GROUP
F. LONGUS,


2550
(-2416)
2575
(-2438.1)
2600
(-2460.2)
2/60 Carb Siltstone
2/59 Siltstone
2/58 Siltstone
2/57 Carb Siltstone
2/56 Sandstone
2/55 Sandstone
2/54 Sandstone
Water
1.1 MT Net
1.0 TVT Net
∅ = 13 %
Sw= 10 %
Water
0.9 MT Net
0.8 TVT Net
∅ = 13 %
Sw= 10 %
Water
1.3 MT Net
1.2 TVT Net
∅ = 12 %
Sw= 10 %
P 2/26
P 2/25
P 2/24
Water
0.5 MT Net
0.4 TVT Net
∅ = 13 %
Sw= 10 %
F. LONGUS, LOWER

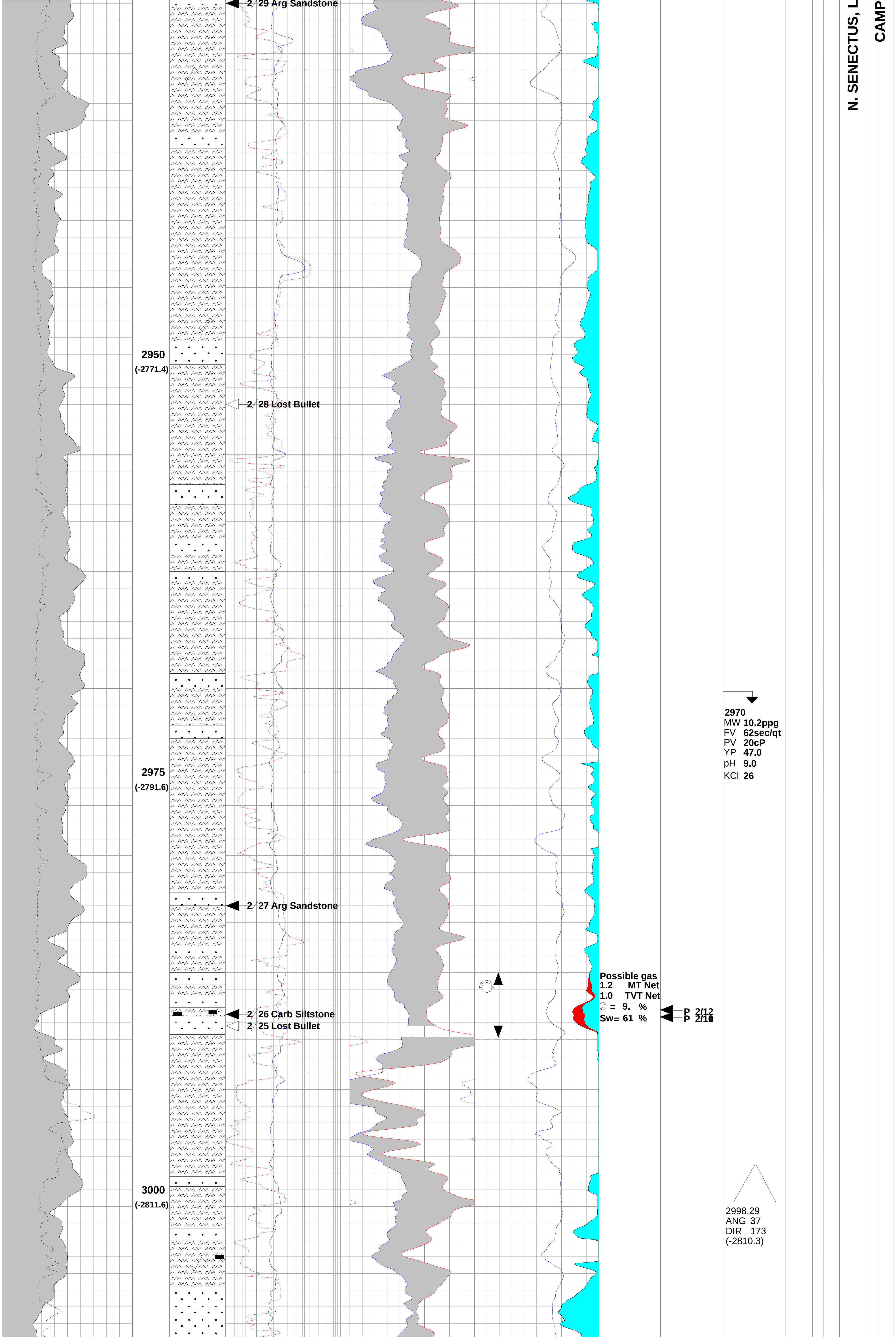

2/53 Sandstone
2625
(-2482.4)
2/52 Siltstone
2/51 Silty Sandstone
Top N. senectus
2645.0mMDRT
(-2500.2mTVDSS)
2/50 Siltstone
2650
(-2504.7)
2/49 Carb Siltstone
2/48 Lost Bullet
2/47 Siltstone
2675
(-2527.1)
2/46 Arg Siltstone
Water
3.3 MT Net
3.0 TVT Net
∅ = 14 %
Sw= 10 %
P 2/23
P 2/22
P 2/21
Water
3.2 MT Net
2.9 TVT Net
∅ = 13 %
Sw= 10 %
2621.44
ANG 28
DIR 176
(-2479.2)
2634
MW 10.0ppg
FV 76sec/qt
PV 25cP
YP 33.0
pH 8.5
KCl 28
T. LILLIEI
N. SENECTUS, UPPER “b”
“a”

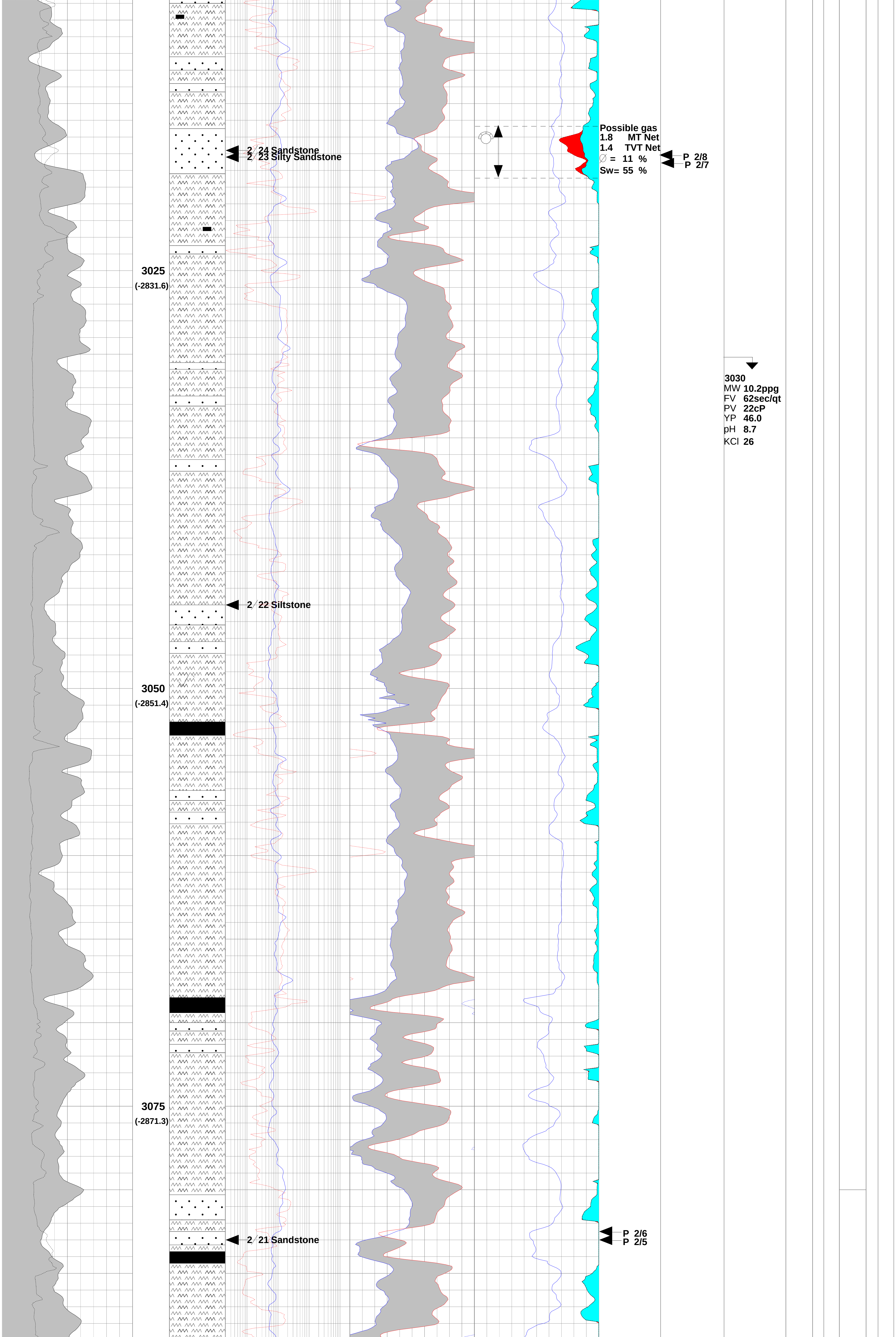

2700
(-2549.6)
2/45 Arg Siltstone
2/44 Siltstone
2/43 Lost Bullet
Top Remora Volcanic
2715.0mMDRT
(-2563.1mTVDSS)
2/42 Volc-Clastic
2/41 Lost Bullet
2/40 Volc-Clastic
2/39 Volc-Clastic
Base Remora Volcanic
2724.0mMDRT
(-2571.2mTVDSS)
2725
(-2572.1)
2/38 Siltstone
2/37 Siltstone
2750
(-2594.6)
2/36 Sandstone
2/35 Sandstone
P 2/19
P 2/20
P 2/18
P 2/16
P 2/15
Water
3.3 MT Net
2.9 TVT Net
∅ = 13 %
Sw= 10 %
N. SENECTUS, UPPER
N. SENECTUS, LOWER "c"

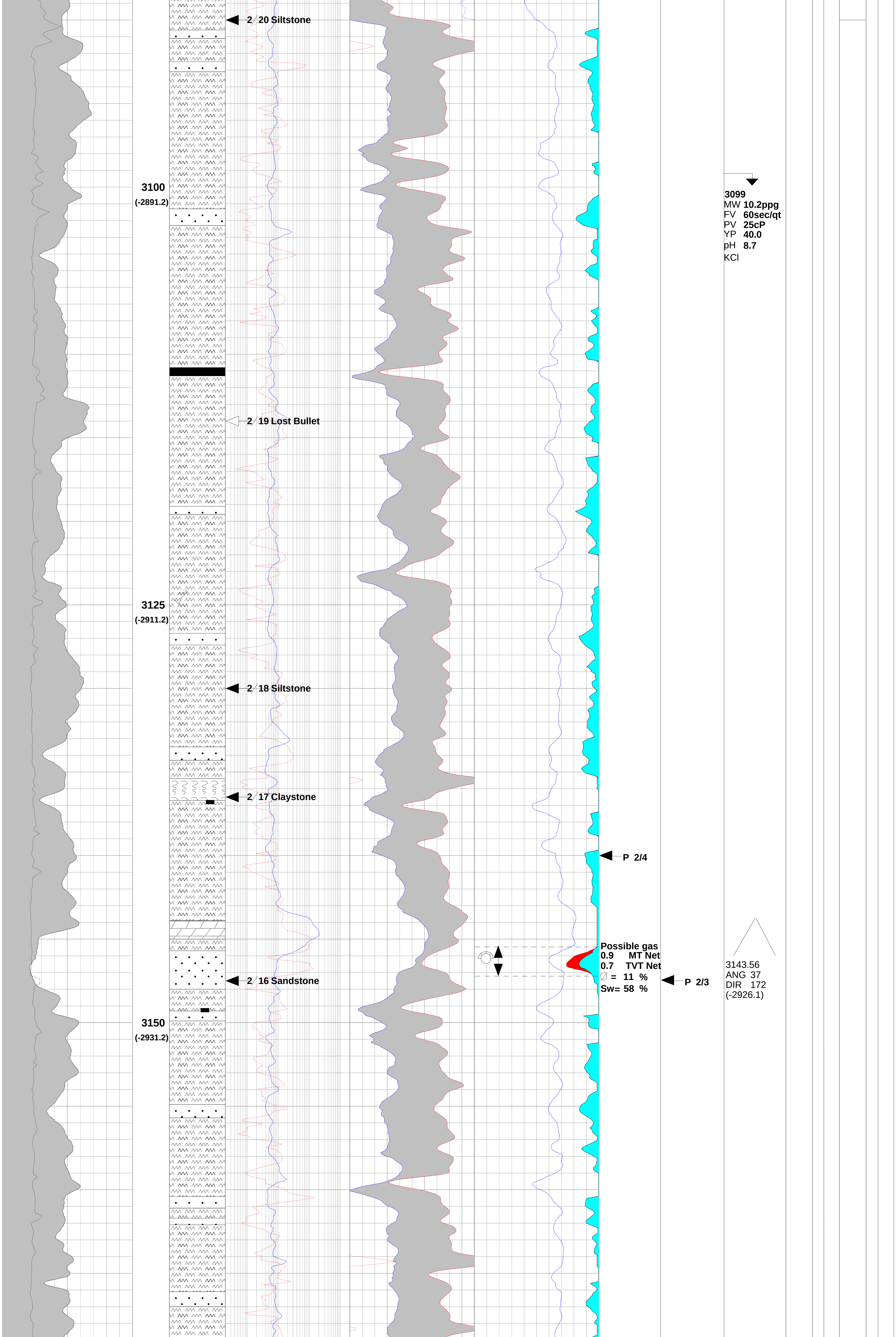

2766.75
ANG 26
DIR 178
(-2609.7)
2770
MW 10.1ppg
FV 62sec/qt
PV 23cP
YP 42.0
pH 8.5
KCl 27
2775
(-2617.1)
2800
(-2639.8)
2/34 Arg Sandstone
P 2/14
P 2/13
2825
(-2662.4)
2/33 Siltstone

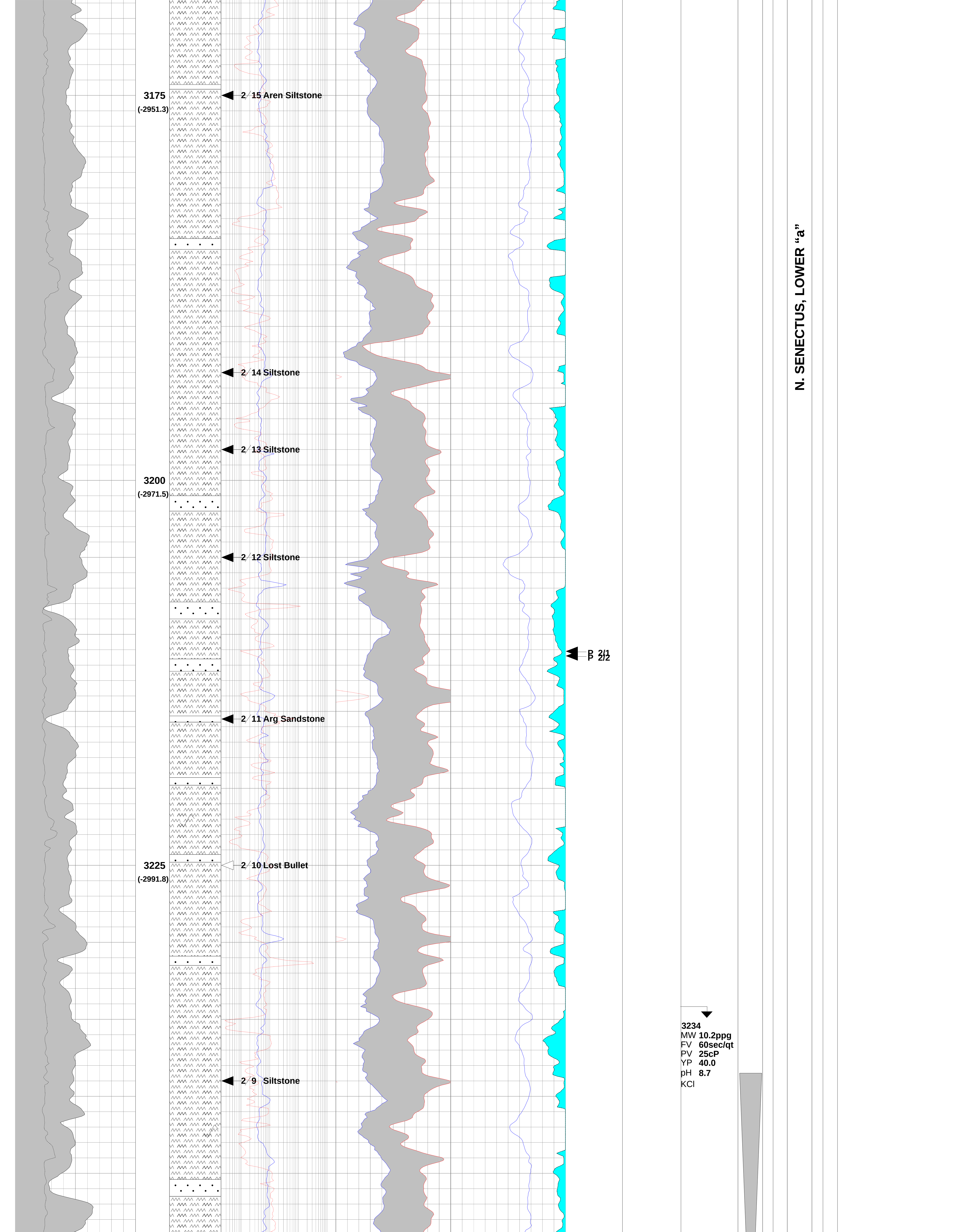


2850
(-2685.2)
2875
(-2707.7)
2/32 Siltstone
2882.63
ANG 28
DIR 179
(-2714.6)
2900
(-2729.6)
2/31 Siltstone
2925
(-2750.8)
2/30 Sandstone
OWER “b”
ANIAN

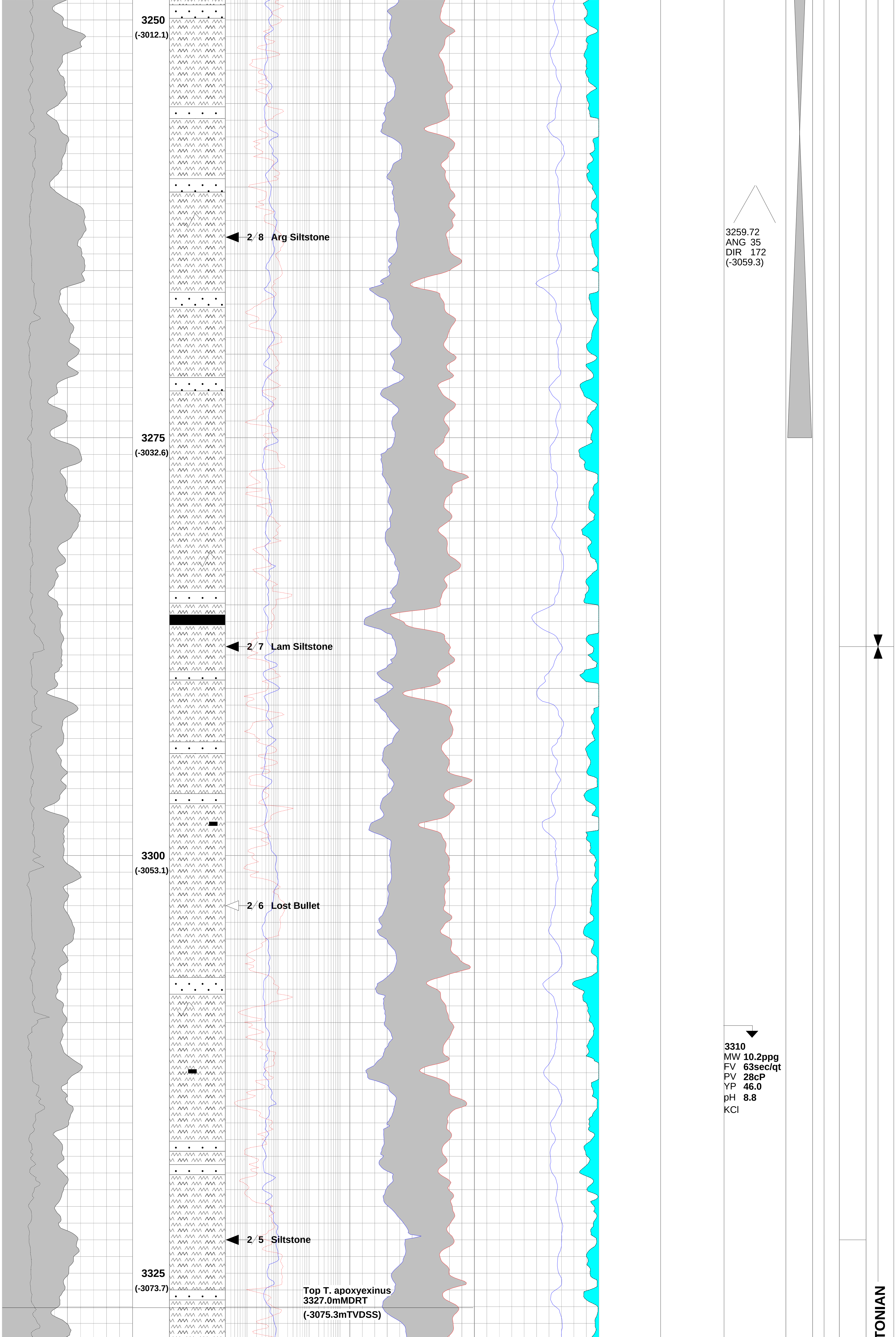

2 29 Arg Sandstone
2950
(-2771.4)
2 28 Lost Bullet
2975
(-2791.6)
2 27 Arg Sandstone
2 26 Carb Siltstone
2 25 Lost Bullet
3000
(-2811.6)
Possible gas
1.2 MT Net
1.0 TVT Net
∅ = 9. %
Sw= 61 %
P 2/12
P 2/10
2970
MW 10.2ppg
FV 62sec/qt
PV 20cP
YP 47.0
pH 9.0
KCl 26
2998.29
ANG 37
DIR 173
(-2810.3)
N. SENECTUS, L
CAMP


2/24 Sandstone
2/23 Silty Sandstone
Possible gas
1.8 MT Net
1.4 TVT Net
Ø = 11 %
Sw= 55 %
P 2/8
P 2/7
3025
(-2831.6)
3030
MW 10.2ppg
FV 62sec/qt
PV 22cP
YP 46.0
pH 8.7
KCl 26
2/22 Siltstone
3050
(-2851.4)
3075
(-2871.3)
P 2/6
P 2/5
2/21 Sandstone

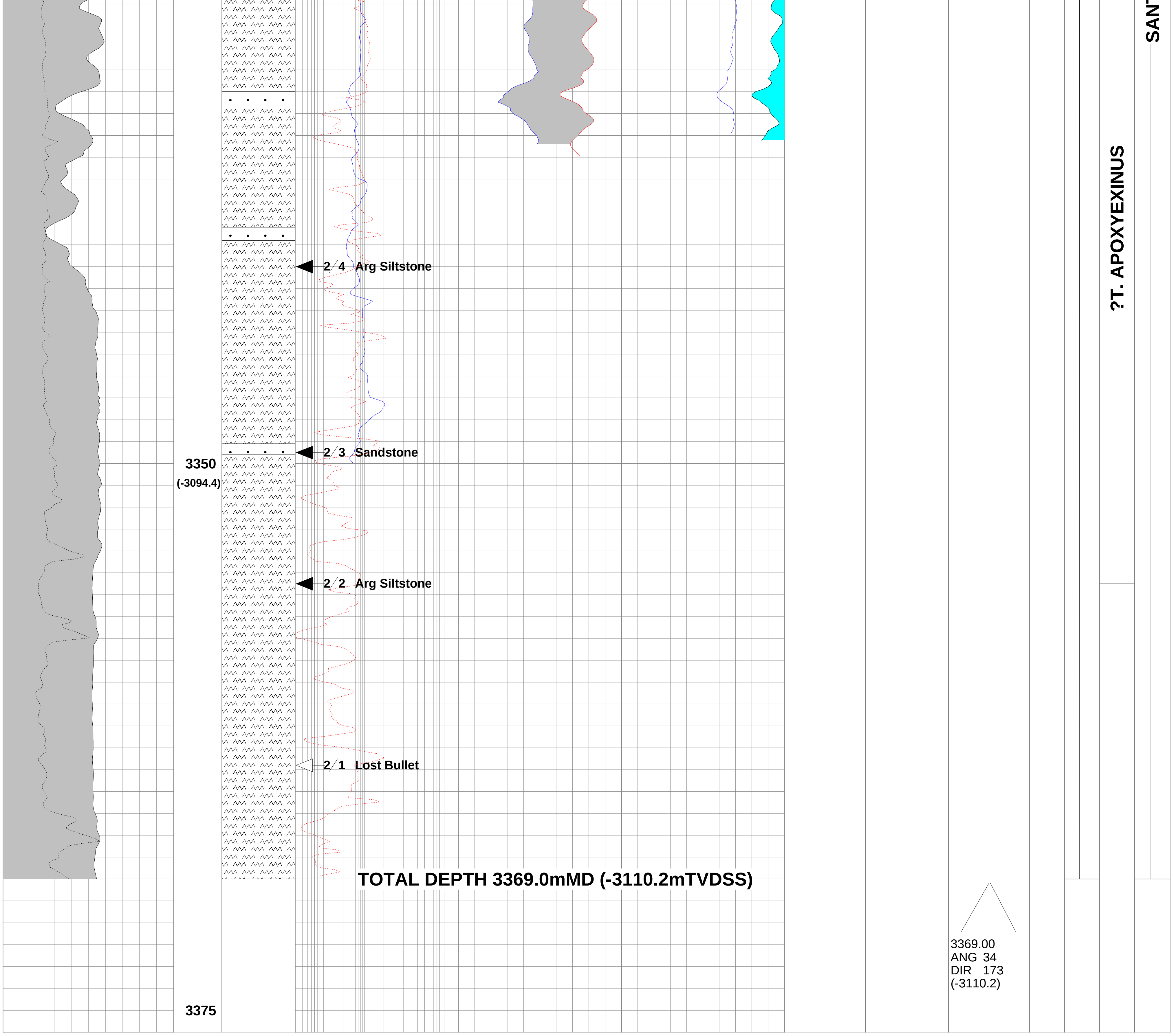

2/20 Siltstone
3100
(-2891.2)
3099
MW 10.2ppg
FV 60sec/qt
PV 25cP
YP 40.0
pH 8.7
KCl
2/19 Lost Bullet
3125
(-2911.2)
2/18 Siltstone
2/17 Claystone
P 2/4
Possible gas
0.9 MT Net
0.7 TVT Net
∅ = 11 %
Sw= 58 %
P 2/3
2/16 Sandstone
3143.56
ANG 37
DIR 172
(-2926.1)
3150
(-2931.2)



3175
(-2951.3)
2/15 Aren Siltstone
2/14 Siltstone
2/13 Siltstone
3200
(-2971.5)
2/12 Siltstone
P 2/1
P 2/2
2/11 Arg Sandstone
3225
(-2991.8)
2/10 Lost Bullet
3234
MW 10.2ppg
FV 60sec/qt
PV 25cP
YP 40.0
pH 8.7
KCl
2/9 Siltstone
N. SENECTUS, LOWER “a”



3250
(-3012.1)
2/8 Arg Siltstone
3259.72
ANG 35
DIR 172
(-3059.3)
3275
(-3032.6)
2/7 Lam Siltstone
3300
(-3053.1)
2/6 Lost Bullet
3310
MW 10.2ppg
FV 63sec/qt
PV 28cP
YP 46.0
pH 8.8
KCl
2/5 Siltstone
3325
(-3073.7)
Top T. apoxyexinus
3327.0mMDRT
(-3075.3mTVDSS)
TONIAN



GR	Gamma Ray
CALI	Caliper
RES_S	Resistivity Shallow
RES_D	Resistivity Deep
RHOB	Bulk Density
TNPH	Neutron Porosity
DELTA T	Compressional Sonic
PIGN	Effective Porosity
VUWA	Volume Water

Plugged and Abandoned
17 February 2005

APPENDIX 1

MDT ANALYSIS

Esso Australia Ltd

Exploration Department

WEST MOONFISH-1

WIRELINE FORMATON TESTING

Andrew Miller & Kumar Kuttan

February 2005

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SUMMARY

Schlumberger's MDT was used in obtaining formation pressures and fluid samples in West Moonfish 1. A total of 71 pressure and 6 fluid tests were attempted. Only 41 of the pressure tests were successful and hydrocarbon samples from one hydrocarbon bearing zone (1 gas and 1 oil) were successfully recovered.

The pressure data suggests that there are at least 10 aquifer and 1 hydrocarbon pressure systems. The hydrocarbon column consists of 30.8m tvd of gas and 2.2m tvd of oil.

The pressure data indicates that above 2667.1mRT (2520mTVDSS) the aquifers are drawn down from the original basin gradient as a result of production in the basin. Below 2571mTVDSS the aquifer pressures are above the original basin gradient and this depth is approximately the base of the Remora volcanics.

The water gradient in the sands of 1.42psi/m matches the established water gradient for the basin. The gas sand has a sufficient spread of pressure data for determining a gas gradient, which was calculated to be 0.2 psi/m. It was not possible to determine the oil gradient because the thin column which is interpreted to about 2.5m thick. No PVT analysis of recovered samples had been conducted at the time this report was written.

An analysis of the pressure data for the water sands below the Remora volcanics suggests that these sands systems are probably separate and appear to be overpressured when compared to the pressure predicted by the original basin gradient. Potential hydrocarbon zones below the Remora volcanics, as indicated by logs were shown to be “tight” by the pressure testing.

1.0 Operational Summary

Schlumberger's MDT (Modular Formation Dynamic Tester) was used to obtain formation pressures and fluid samples in the West Moonfish 1 exploration well. Two runs were made - one in the 12 1/4" hole followed by one in the 8 1/2" hole.

Run 1

The tool was configured with the following modules for Run 1:

- Single large area probe with large area packer
- Pump-out module
- Live Fluid Analyser (LFA)
- 1 x Multi-chamber module (MRMS)
- One 1-gallon chamber

When the MDT was run in to 82m and tested, it was not possible to power up the tool. The main power panel and telemetry modules in the wireline unit (2 modules) were changed out, however the tool would still not power up. The tool was returned to surface and checked. It was found that a conductor wire in the cable head had shorted out. This was repaired and the tool function was rechecked at the surface. It was subsequently found that the upper and lower valves on the #216 Mutli Sampler Chamber were not functioning. The decision was made to take #216 MRMS out of the MDT string. The tool was then powered up and checked at the surface and it was found that various components of the tool string were not communicating. All of the tool modules were separated and the connections were cleaned and reconnected. The tool was then powered up and checked again. The tool was functioning correctly and was run in the hole.

A total of 45 pressure tests were attempted with 36 successful tests obtained on run 1 in the 12 1/4" hole section. The results are listed in Table 1.1. "Pump-outs" at 5 different depths were attempted for fluid identification and obtaining fluid samples. The results of the "pump-outs" and fluid sampling are shown in Table 1.2. A total of 2 fluid samples from 2 zones (1 gas and 1 oil) were obtained.

Run 2

The tool was configured with the following modules for Run 2:

- Single large area probe with large area packer
- Pump-out module
- Live Fluid Analyser (LFA)
- 1 x Multi-chamber module (MRMS)
- One 1-gallon chamber

The tool was run in the hole and pretests were commenced at the deepest measurement point at 3211.1mRT. Measurements were taken up to 3147.5mRT. At this point it was thought that the packer may be leaking so the tool was pulled to 3140m and checked. The packer did appear to leaking so it was pulled up inside the casing and tested again. Following this test, the packer appeared to be functioning correctly so the tool was run in to 3080mRT where the pre-test programme was re-commenced.

A total of 26 pressure tests were attempted with 7 successful tests obtained on run 2 in the 8 1/2" hole section. The results are listed in Table 1.3. "Pump-outs" were not attempted in this hole section.

2.0 Pressure Data Observations and Interpretation

Fig.1.1 is a plot of the pressure data from 2062.9mRT (2000mTVDSS) down to 2866.2mRT (2700mTVDSS). Fig. 1.2 is a plot of the pressure data above 2531.79mRT (2400mTVDSS).

The pressure data indicates that there are at least 10 aquifer and 1 hydrocarbon pressure systems in the well. Logs and pressure data suggest that the main hydrocarbon system consists of 30.8m tvd gas and 2.2m tvd oil columns. Petrophysical analysis suggests there may be three other possible hydrocarbon zones beneath the Remora volcanics, however pressure and sample data could not be obtained in these zones.

Above 2667.1mRT (2520mTVDSS) the pressure data indicates that the reservoir pressures are drawn down below the original basin aquifer gradient. This behaviour is ascribed to production in the basin. Below 2723.8mRT (2571mTVDSS), that is below the Remora volcanics, only two valid pressure tests were obtained in a water-bearing sand. One of these appears to be supercharged. Although it is not certain that the other valid test is also supercharged, it is likely that the sands are overpressured (above the established original basin gradient). This is supported by the fact that the overpressure below the Remora volcanics has been observed in other parts of the basin, namely in the East Pilchard and Scallop areas.

The water gradient over the interval 2062.9 - 2866.2mRT (2000 - 2700mTVDSS) is 1.42 psi/m and this is the same as the established basin aquifer gradient, which has been used for drawing all other aquifer gradients shown on the pressure plots. Using the gas pre-test points a gas gradient of 0.2psi/m was established. It was not possible to establish a oil gradient because of the thinness of the column. As no PVT analysis was available at the time this report was written the approximate positions of the GOC and OWC are indicated by using a oil gradient of 1.0 psi/m. These closely match those observed on the logs. Based predominantly on petrophysical analysis the GOC is interpreted to be at 2119.8mRT(2047.5mTVDSS) and the OWC at 2122.4mRT (2049.7mTVDSS). The fluid contacts suggest the presence of a 30.8 m tvd gas and 2.2m oil columns. Fluid sampling confirmed the presence of the gas and oil columns.

Hydrocarbon shows and resistivity anomalies were observed over the intervals 1640 - 1650mRT (1600.7 - 1610.7mTVDSS), 2123.5-2131mRT (2050.6 - 2056.8mTVDSS) and 2460 - 2510mRT (2337.9 - 2381mTVDSS). Using the shows and logs as guides, "pump-outs" for fluid identification were carried out at 1647.3mRT (1608mTVDSS), 2125mRT (2051mTVDSS) and 2475.3mRT (2351.1mTVDSS) with all three tests only showing water.

Petrophysical analysis and mud logs indicate the presence of three possible hydrocarbon zones below the Remora volcanics. Pressure testing was attempted in the interval 2987mRT (2801.2mTVDSS) to 2990.5mRT (2804mTVDSS but no valid tests could not be obtained due to poor rock quality. Subsequently, no "pump out" was attempted in this interval.

ESSO AUSTRALIA PTY LTD				
Well:	West Moonfish-1			
Date:	20/01/2005		Geologist-Engineer	Cliff Menhennitt - Stuart Duff
Tool Type (MDT-GR-LEHQT)		**Deviated Well**	KB (metres):	39.2
Gauge Type: CQG		**Inclination average 31deg**	Probe type	Large
Pressure units (psia, psig)			Temperature units	Deg C

Point No	Schlumberger Depth mMD	Schlumberger Depth mTVDSS	Strain Gauge				Quartz Gauge					Strain	Qtz	Mobility Ratio	Comments
			Hydrostatic Before	PPG	Reservoir	PPG	Hydrostatic Before	PPG	Reservoir	PPG	Temp	hyd after	hyd after		
1	2517.00	2387.10	4122.80	10.1	3398.10	8.35	4130.85	10.2	3405.88	8.37	92.84	4123.00	4131.48	20.9	10cc drawdown, good test
1	2517.00	2387.10		0.0	3398.20	8.35		0.0	3405.75	8.37					Repeat 10cc drawdown
2	2508.50	2379.77	4110.40	10.1	3418.30	8.43	4118.10	10.2	3425.92	8.45	94.12	4110.60	4117.82	2.3	10cc dd, didn't stabilise after 10 minutes, tight formation
3	2497.75	2370.50	4095.20	10.1		0.00	4102.68	10.2		0.00	94.15	4095.20	4102.42	0.1	Very tight, only 5cc ddown 1st attempt and 2.5cc ddown 2nd attermpt
4	2491.00	2364.70	4085.00	10.1	3393.20	8.42	4092.52	10.2	3400.66	8.44	95.53	4085.00	4092.30	1.5	10cc dd, appeared to be ??good test, stable QG pressure
5	2486.50	2360.80	4078.60	10.1		0.00	4086.29	10.2		0.00	96.09	4078.60	4085.96	0.1	only 4.8cc dd 1st attempt, 2.1cc 2nd dd, very tight
6	2478.75	2354.10	4067.20	10.1	3347.00	8.34	4074.78	10.2	3354.38	8.36	96.43	4067.10	4074.53	105.6	10cc ddown, good test
7	2475.25	2351.10	4061.90	10.1	3342.40	8.34	4069.49	10.2	3349.78	8.36	96.72	4061.90	4069.28	402.2	10cc ddown, good test
8	2473.25	2349.40	4058.40	10.1		0.00	4066.29	10.2		0.00	97.37	4058.80	4066.04	1.9	4cc ddown only, tight formation/lith boundary, move down 2474m
9	2474.00	2350.00	4059.70	10.1	3340.50	8.34	4067.18	10.2	3348.00	8.36	97.60	4059.70	4067.20	51.0	10cc ddown, good test
10	2470.00	2346.60	4054.40	10.1	3336.10	8.34	4062.10	10.2	3343.61	8.36	97.73	4054.40	4062.01	9.6	10cc ddown, good test
11	2467.50	2344.40	4050.70	10.1		0.00	4058.43	10.2		0.00	97.84	4050.70	4058.32	0.1	5.1 cc ddown, not stabilising, abort after 10 mins, move up 0.5m
12	2467.00	2343.98	4049.70	10.1	3332.50	8.34	4057.46	10.2	3340.08	8.36	97.98	4049.70	4057.40	13.1	10cc ddown, good test
13	2463.75	2341.20	4045.20	10.1	3327.70	8.34	4052.88	10.2	3335.30	8.36	98.11	4045.10	4052.67	16.2	10cc ddown, good test
14	2461.75	2339.46	4042.10	10.1		0.00	4049.93	10.2		0.00	98.09	4042.10	4049.76		Tight
15	2462.25	2339.89	4042.60	10.1	3341.20	8.38	4050.51	10.2	3348.90	8.40	98.16	4042.60	4050.36	8.2	Supercharged
16	2451.50	2369.86	4027.20	10.0		0.00	4035.08	10.0		0.00	98.35	4027.20	4035.01	1.0	Supercharged (3689.6?)
17	2417.50	2301.37	3977.00	10.1	3258.20	8.31	3984.74	10.2	3265.65	8.33	98.32	3977.10	3984.66	90.0	10cc ddown, good test
18	2415.00	2299.22	3974.10	10.1	3255.60	8.31	3981.79	10.2	3263.28	8.33	98.15	3973.90	3981.68	578.4	20cc ddown, good test
19	2411.75	2296.42	3968.70	10.1	3251.40	8.31	3976.47	10.2	3259.13	8.33	98.20	3968.60	3976.37	137.0	20cc ddown, good test
20	2406.50	2291.92	3961.30	10.1	3245.40	8.31	3969.07	10.2	3253.01	8.33	98.23	3961.20	3968.95	73.6	20cc ddown, good test
21	2401.00	2287.19	3954.80	10.1	3241.50	8.32	3961.13	10.2	3249.07	8.34	98.19	3953.30	3961.02	39.6	20cc ddown, good test
22	2375.00	2264.84	3915.30	10.1	3193.30	8.27	3923.29	10.2	3201.27	8.29	97.10	3915.00	3923.10	5076.1	20cc ddown, good test
23	2367.00	2257.95	3903.40	10.1	3183.70	8.27	3911.67	10.2	3191.82	8.30	97.10	3903.30	3911.51	510.8	20cc ddown, good test
24	2359.50	2251.50	3892.70	10.1	3175.10	8.28	3901.54	10.2	3183.54	8.30	97.36	3892.90	3901.34	60.6	20cc ddown, good test
25	2286.50	2188.79	3785.40	10.1	3079.80	8.26	3793.39	10.2	3087.53	8.28	97.57	3785.50	3793.33	40.2	20cc ddown, good test
26	2279.00	2182.37	3774.90	10.2	3071.10	8.26	3782.82	10.2	3078.93	8.28	97.27	3774.80	3782.80	97.9	20cc ddown, good test
27	2272.50	2176.80	3765.20	10.2	3063.30	8.26	3773.22	10.2	3071.14	8.28	97.01	3765.20	3773.20	11.1	20cc ddown, good test
28	2269.50	2174.23	3760.60	10.2		0.00	3768.61	10.2		0.00	96.99	3760.70	3769.49		Tight
29	2270.00	2174.65	3761.80	10.2	3060.30	8.26	3769.77	10.2	3068.27	8.28	96.74	3761.60	3769.60	13.4	20cc ddown, good test
30	2263.00	2168.66	3751.20	10.2	3053.40	8.26	3759.44	10.2	3061.49	8.28	96.77	3751.20	3759.36	2.0	20cc ddown, good test
31	2261.00	2166.95	3748.50	10.2	3049.00	8.26	3756.83	10.2	3057.27	8.28	96.95	3748.40	3756.67	63.0	20cc ddown, good test
32	2257.00	2163.53	3742.20	10.2		0.00	3750.39	10.2		0.00	96.86	3742.30	3750.27		Tight
33	2253.00	2160.10	3736.70	10.2	3038.80	8.26	3744.93	10.2	3046.97	8.28	96.87	3736.80	3744.90	5.3	20cc ddown, good test
34	2242.75	2151.30	3721.80	10.2	3019.50	8.24	3729.99	10.2	3027.67	8.26	96.73	3721.80	3729.91	803.2	20cc ddown, good test
35	2142.00	2066.07	3578.20	10.2	2900.90	8.24	3585.39	10.2	2908.44	8.26	94.51	2577.80	3585.52	1744.9	20cc ddown, good test
36	2134.50	2059.79	3566.80	10.2	2892.30	8.24	3574.84	10.2	2900.34	8.26	93.97	3566.60	3574.91	6.5	20cc ddown, good test
37	2131.00	2056.87	3561.50	10.2	2887.30	8.24	3569.90	10.2	2895.54	8.26	94.28	3561.60	3569.86	883.6	20cc ddown, good test
38	2128.00	2054.35	3557.40	10.2	2883.80	8.24	3565.65	10.2	2892.08	8.26	94.15	3557.40	3565.68	1435.7	20cc ddown, good test
39	2125.00	2051.84	3553.40	10.2	2880.50	8.24	3561.64	10.2	2888.77	8.26	94.23	3553.40	3561.65	135.1	20cc ddown, good test
40	2121.00	2048.50	3547.70	10.2	2876.40	8.24	3555.85	10.2	2884.62	8.26	94.08	3547.60	3555.87	567.8	20cc ddown, good test
41	2115.00	2043.48	3539.10	10.2	2875.20	8.26	3547.41	10.2	2883.37	8.28	94.02	3539.20	3547.42	212.0	20cc ddown, good test
42	2106.00	2035.95	3526.50	10.2	2873.50	8.28	3534.72	10.2	2881.84	8.31	93.91	3526.40	3534.88	7563.9	20cc ddown, good test
43	2097.00	2028.42	3514.30	10.2	2871.80	8.31	3522.74	10.2	2880.43	8.33	93.67	3514.20	3522.85	3475.5	20cc ddown, good test
44	2088.00	2020.91	3501.60	10.2	2870.20	8.33	3510.26	10.2	2878.89	8.36	93.63	3501.60	3510.32	11278.8	20cc ddown, good test

Table 1.1 - MDT Pre-tests conducted in the 12 1/4" hole section

EAL - WEST MOONFISH-1 MDT FLUID SAMPLE DATA							
Well: West Moonfish -1							
A. Sample Identification							
Run/seat number	#/#	1/1	1/2	1/3	1/4	1/5	1/6
Sample depth	**m MDRT**	**2121**	**2121.0**	**2125.0**	**2106.0**	**2475.3**	**1647.3**
Pretest volume	cc	20 cc	20cc	20cc	20cc	20cc	20cc
Chamber size	cc/litre/gallon	450cc	x2 450cc	pumpout only	x2 450cc	pumpout only	pumpout only
Chamber serial number	#		66/122		113/123		
Probe type		Large					
Choke size		n/a					
B. Sampling History							
Date	dd/mm/yy	22/01/05	22/01/05	22/01/05	22/01/05	22/01/05	22/01/05
Initial hydrostatic	psia	3556.32	3555.9	3562.2	3534.9	4070.5	2812.5
Tool Set	hh:mm	7:46	8:31	10:36	11:41	13:02	14:43
Pretest start	hh:mm	7:47	8:32	10:38	11:42	13:04	14:45
Initial formation pressure (pre	psia	2885.13	2884.6	2889.5	2882.0	3350.7	2223.0
Pretest end	hh:mm	7:52	8:33	10:41	11:44	13:08	14:47
Pretest duration	*hh:mm*	*5min*	*1min*	*3min*	*2min*	*4 min*	*2 min*
Pumpout start	hh:mm	7:52	8:33	10:43	11:44	13:10	14:49
Pumpout end	hh:mm	8:15	9:48	11:28	12:05	14:03	15:40
Pumpout duration	*hh:mm*	Probe blocked	*1:15*	*0:45*	*0:21*	*0:53*	*12:14*
Pumpout volume	litres	Abort and	29.25	38.61	19.89	55	45.6
OFA indication	colour	reset probe	green/pink	blue	pink/red	blue	blue
Interpreted fluid at OFA	-		oil/gas	water	gas	water	water
Maximum resisitivity at probe	ohm-m		26	0.051	0.325	0.066	0.079
Chamber open	hh:mm		9:48	pumpout only	12:06	pumpout only	pumpout only
Minimum sampling pressure	psia		2849.1				
Final formation pressure	psia		2885.1	2889.5	2882.5	3350.3	2223.0
Seal chamber	hh:mm		9:58		12:14		
Chamber fill time	*hh:mm*		*0:10*		*0:08*		
Tool retract	hh:mm		10:01	11:35	12:18	14:07	15:45
Final hydrostatic	psia		3555.9	3562.0	3534.6	4069.6	2812.4
Total time	*hh:mm*		*1:30*	*1:00*	*0:37*	*1:05*	*1:02*

Table 1.2 - MDT Fluid samples conducted in the 12 1/4" hole section

ESSO AUSTRALIA PTY LTD			
Well: West Moonfish-1			
Date:		Geologist-Engineer	Antonio Ribeiro - Greg O'Neill
Tool Type (MDT-GR-LEHQT)	**Deviated Well**	KB (metres):	39.2
Gauge Type: CQG	**Inclination average 31deg**	Probe type	Large
Pressure units (psia, psig)		Temperature units	Deg C

Point No	Schlumberger Depth mMD	Schlumberger Depth mTVDSS	Strain Gauge				Quartz Gauge					Strain	Qtz	Mobility Ratio	Comments
			Hydrostatic Before	PPG	Reservoir	PPG	Hydrostatic Before	PPG	Reservoir	PPG	Temp	hyd after	hyd after		
1	3211.10	2980.50	5362.60	10.6		0.00	5373.13	10.6		0.00	115.60				2 x 10cc drawdown, no seal
2	3211.40	2980.74	5363.30	10.6		0.00	5373.62	10.6		0.00	117.20				2 x 10cc drawdown, no seal
3	3147.50	2929.22	5272.10	10.6		0.00	5281.50	10.6		0.00	116.90				20cc drawdown, no seal
4	3140.00	2923.20		0.0		0.00		0.0		0.00					Testing seal. No seal
5	3083.00	2877.65	5177.20	10.6		0.00	5189.29	10.6		0.00	111.20				20cc drawdown, no seal
6	3082.50	2877.26	5177.60	10.6		0.00	5189.00	10.6		0.00	113.30				20cc drawdown, no seal
7	3018.30	2826.23	5087.90	10.6		0.00	5098.50	10.6		0.00	114.50				20cc drawdown, no seal
8	3018.00	2825.99	5087.40	10.6		0.00	5097.53	10.6		0.00	114.10				20cc drawdown, no seal
9	2757.00	2600.89	4688.90	10.6	3820.10	8.62	4697.60	10.6	3829.18	8.64	112.00	4687.90	4697.44	2.4	20cc ddown, good test
10	2989.50	2803.20	5046.30	10.6		0.00	5057.26	10.6		0.00	110.40				20cc drawdown, no seal
11	2989.50	2803.20	5045.70	10.6		0.00	5057.07	10.6		0.00	111.20				Supercharged
12	2989.20	2802.96	5046.30	10.6		0.00	5057.40	10.6		0.00	112.00				Supercharged
13	2814.20	2652.63	4778.40	10.6		0.00	4787.43	10.6		0.00	111.30				20cc drawdown, no seal
14	2814.00	2652.45	4777.70	10.6		0.00	4787.55	10.6		0.00	110.20				20cc drawdown, no seal
15	2762.20	2605.58	4694.30	10.6	3850.40	8.67	4704.16	10.6	3860.35	8.69	109.80	4693.80	4704.08	1.3	20cc ddown, good test
16	2761.00	2604.50	4691.40	10.6		0.00	4701.88	10.6		0.00					Supercharged (3914.13)?
17	2761.00	2604.50	4691.20	10.6		0.00	4701.80	10.6		0.00		4691.10	4701.70		Supercharged (3914.52)?
18	2757.00	2600.89	4685.40	10.6	3820.10	8.62	4695.53	10.6	3830.10	8.64	109.50	4685.00	4695.55	2.2	20cc ddown, good test
19	2755.20	2599.27	4683.00	10.6		0.00	4693.35	10.6		0.00	109.30				Supercharged (3926.49 after 8 minutes)?
20	2756.00	2599.99	4683.30	10.6		0.00	4693.89	10.6		0.00	109.50				Tight
21	2686.50	2537.41	4579.90	10.6		0.00	4584.53	10.6		0.00	108.60				20cc drawdown, no seal
22	2686.00	2536.96	4570.00	10.6		0.00	4580.57	10.6		0.00	107.60				Tight
23	2675.20	2527.25	4553.30	10.6	3647.70	8.47	4564.03	10.6	3657.79	8.49	107.90	4553.40	4564.05	7.2	20cc ddown, good test
24	2593.00	2454.04	4423.40	10.6	3498.20	8.37	4433.50	10.6	3507.95	8.39	107.60	4423.20	4433.22	2.5	20cc ddown, good test
25	2589.50	2450.94	4417.40	10.6	3493.70	8.37	4427.68	10.6	3503.80	8.39	106.50	4417.20	4427.48	4.5	20cc ddown, good test
26	2583.00	2445.19	4406.80	10.6	3486.40	8.37	4417.30	10.6	3496.60	8.39	106.10	4406.80	4417.18	4.0	20cc ddown, good test

Table 1.3 - MDT Pre-tests conducted in the 8 1/2" hole section

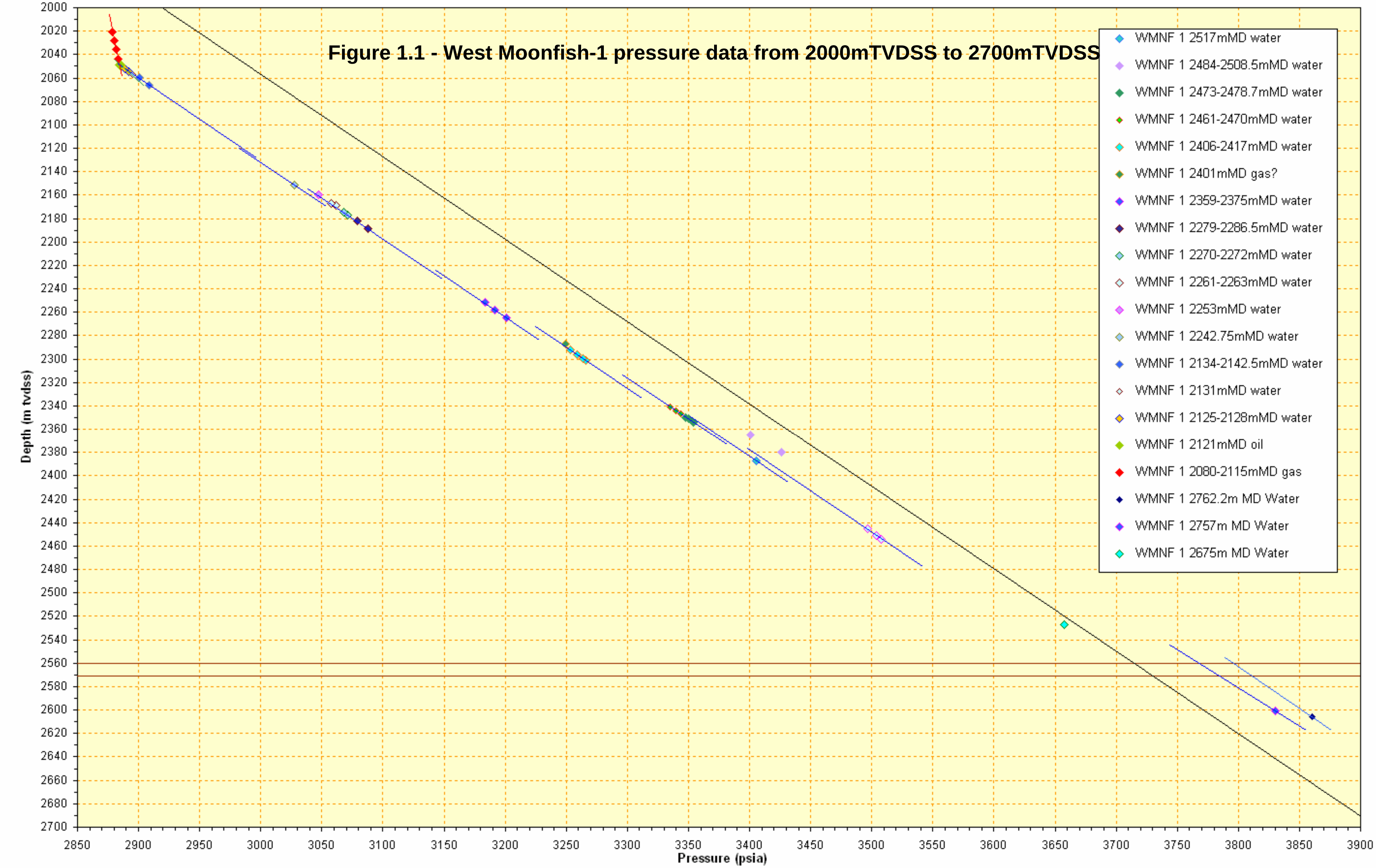


Figure 1.1 - West Moonfish-1 pressure data from 2000mTVDSS to 2700mTVDSS

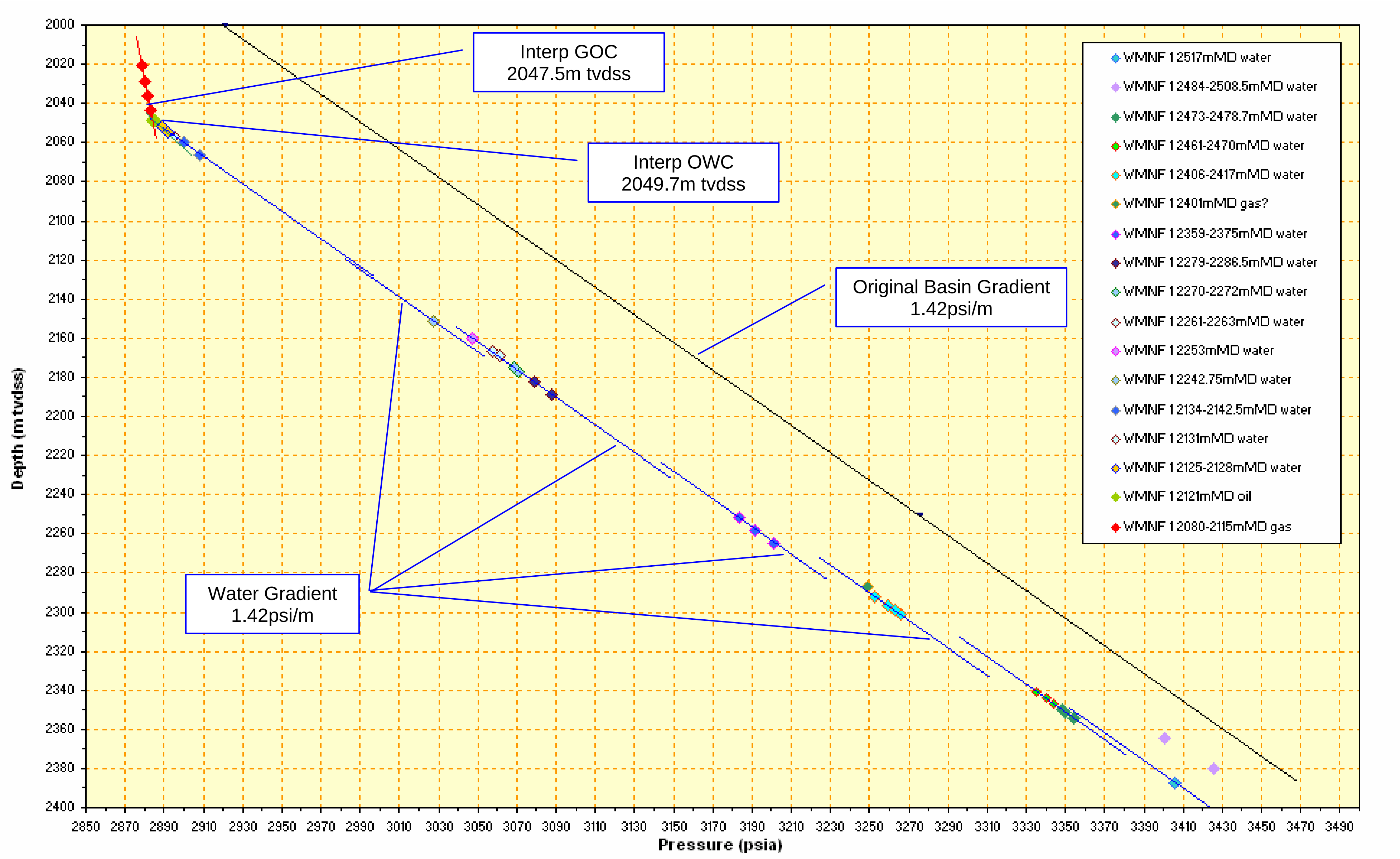


Figure 1.2 - West Moonfish-1 pressure data from 2000mTVDSS to 2400mTVDSS

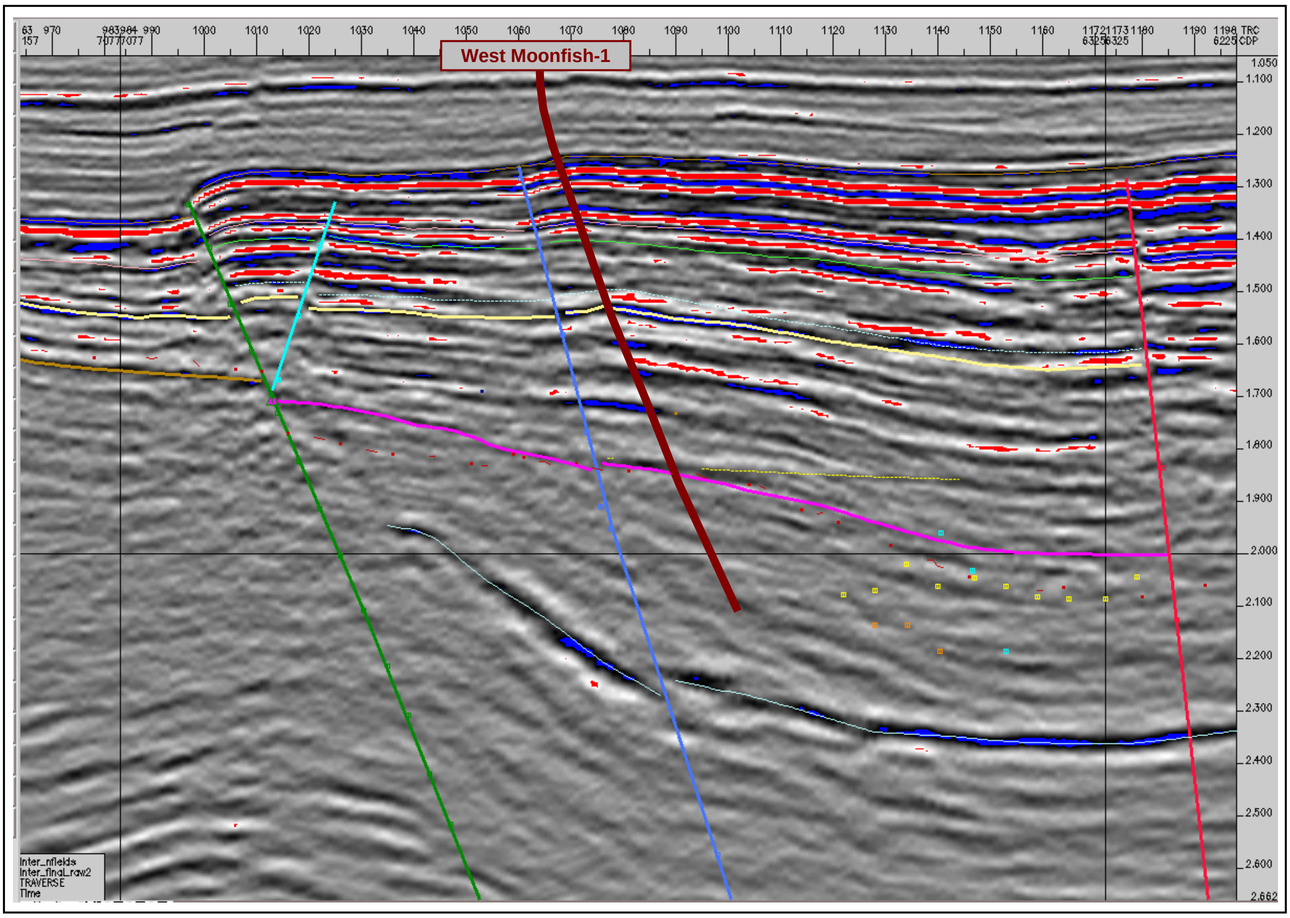
APPENDIX 2

QUANTITATIVE FORMATION EVALUATION

Esso Australia Pty Ltd
Exploration Department

West Moonfish-1

Quantitative Petrophysical Interpretation



Petrophysicists: K. Kuttan, Andrew Miller and Janelle Lawer

July 2005

Contents

1.0 Introduction

1.1 General

The West Moonfish-1 near field wildcat exploration well, is located in VIC/L10 (Fig. 1.1) 4 km west of the Moonfish 1 discovery. The well was spudded on the 5^{h} of January 2005 and was drilled to a total depth of 3369mRT (Driller) 3370.5mRT (Logger) and plugged and abandoned. The primary objective of this quantitative petrophysical interpretation was to evaluate the reservoirs for porosity, water saturation and net pay.

Note: All depths quoted in this report are logged mMD (or mMDRT) unless otherwise specified.

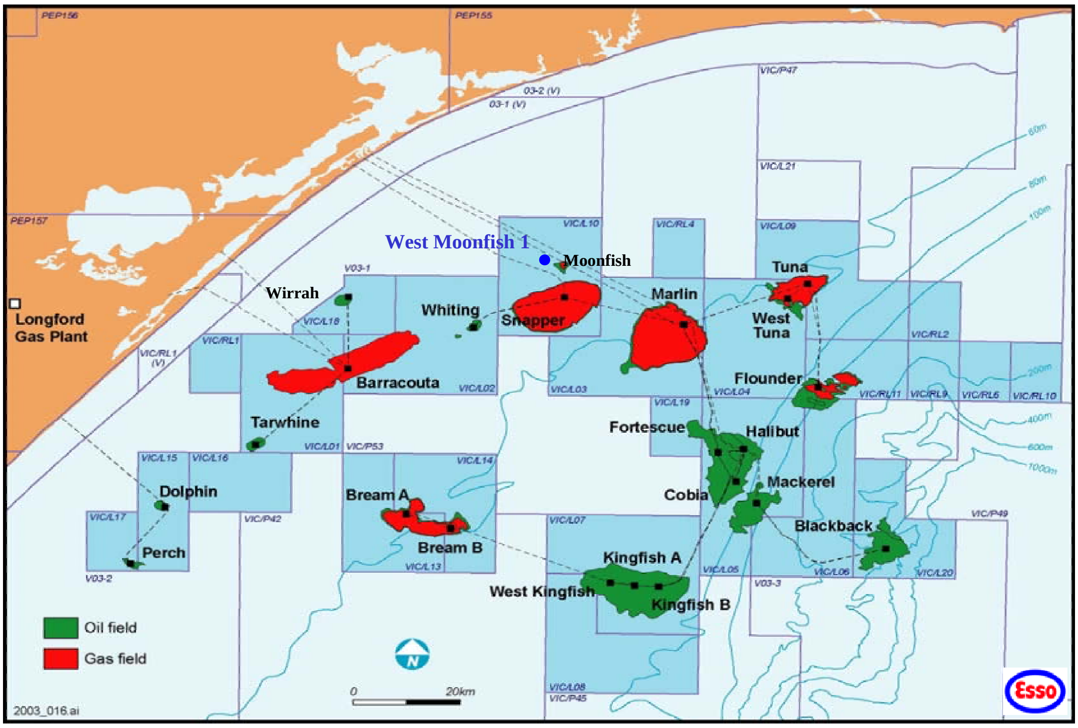


Figure 1.1 - West Moonfish-1 location map

2.0 Data

2.1 Measurement While Drilling/Logging While Drilling Logs

The Measurement While Drilling (MWD)/Logging While Drilling (LWD) logs run in the well are listed in Table 2.1.

Table 2.1 - Summary of LWD Logs

Run Number	Hole size	Survey /Log	Company	Top (m MDRT)	Bottom (m MDRT)
1	12¼	GR-D&I	Anadrill	160	761
2	12¼	GR-D&I	Anadrill	761	1737
3	12¼	GR-D&I	Anadrill	1737	2073
4	12¼	GR-D&I	Anadrill	2073	2532
5	8½	GVR6-ADN6	Anadrill	2532	2688
6	8½	GVR6-ADN6	Anadrill	2688	2866
7	8½	GVR6-ADN6	Anadrill	2866	3024
8	8½	GVR6-ADN6	Anadrill	3024	3369

Gamma ray logs and directional/survey information were recorded in the 12¼" hole section. Gamma ray, resistivity, density, neutron porosity logs and directional/survey information was recorded in the 8½" hole section using Anadrill's GVR6 and ADN6 LWD tools.

2.2 Wireline Logs – Suite 1

The first suite of wireline logs run in the well are listed in Table 2.2.

Table 2.2 - Summary of Wireline Logs (Suite 1)

Suite 1: Run No.	Survey /Log	Company	Top (m MDRT)	Bottom (m MDRT)
1	HRLA-HNGS-LEHQT	Schlumberger	755	2524
2	PEX150-LEHQT	Schlumberger	755	2522
3	DSI-FMI-LEHQT	Schlumberger	755	2519
4	MDT-GR-LEHQT	Schlumberger	1647.3	2517
5	CST-GR	Schlumberger	1634	2515

Logging suite 1 was run in the 12¼" hole section. The resistivity, gamma ray and PEX (Platform Express) density-neutron logs were acquired in high-resolution mode from 2532mMD to 1500mMD at 1800ft/hr, after which logging speed increased up to the casing shoe at 755.4mMD. DSI (Dipole Shear Sonic Imager) and GR (Gamma Ray) logs were recorded from the casing shoe to sea bed at 3000ft/hr. A repeat section was logged using the resistivity and gamma ray tools on run 1 from 2170mMD to 2065mMD and using the DSI and FMI (Formation MicroImager) tools from 2150m to 2065mMD as per Esso's request.

2.3 Mud Data – Suite 1

Table 2.3 Summary of mud properties (Suite 1)

Property	Value
Mud Type	KCL / PHPA / Polymer / Glycol
Mud Weight	9.85 ppg
Rm	0.095 ohm.m @ 26.5^{o}C
Rmf	0.081 ohm.m @ 25.6^{o}C
Rmc	0.121 ohm.m @ 26.8C
BHT	104.4 ^{o}C

2.5 Wireline Logs – Suite 2

The second suite of wireline logs run in the well are listed in Table 2.4.

Table 2.4 - Summary of Wireline Logs (Suite 2)

Suite 2: Run No.	Survey /Log	Company	Top (m MDRT)	Bottom (m MDRT)
1	DSI-HNGS-MSFL-LEHQT	Schlumberger	2444	3369
2	MDT-GR-LEHQT	Schlumberger	2583	3018
3	VI-VSP	Schlumberger	805	3285
4	CST-GR	Schlumberger	2561.5	3363.8

Logging suite 2 was run in the 8½" hole section. The sonic, gamma ray and microresistivity tools in run 1 were run in high-resolution mode from 3369mMD to the casing shoe at 2527mMD and then the GR and DSI tools were run inside 9⅝" casing to 2444mMD at 1800ft/hr. A repeat section was logged from 3035mMD to 2065mMD as per Esso's request.

2.6 Mud Data – Suite 2

Table 2.5 Summary of mud properties (Suite 2)

Property	Value
Mud Type	KCL / PHPA / Polymer / Glycol
Mud Weight	10.3 ppg
Rm	0.103 ohm.m @ 23.2°C
Rmf	0.080 ohm.m @ 22.9°C
Rmc	0.137 ohm.m @ 22.7°C
BHT	116.6 °C

2.7 Log Quality

The overall data quality of both the LWD/MWD and wireline gamma ray, density-neutron, resistivity and sonic logs appears to be good and the calibration data appears to be acceptable.

2.8 Data Processing

The standard resolution (6 inch sample rate) for both the LWD and wireline logs were used for the final petrophysical evaluation. The wireline GR was adjusted to match the LWD GR according to the following equation:

Adjusted wireline = -19.9291 + 0.799038 * original wireline

The adjusted GR curve was then spliced to create a single curve. The spliced GR log was then chosen as the base log for depth matching purposes. The remaining logs, including the TNPH (Thermal Neutron Porosity), RT_HRLT (Real Time_High Resolution Laterolog Tool True Formation Resistivity), RES_RING (Ring Resistivity), RHOB and RHOBB (Bulk Density, Bottom) curves were then depth matched to the spliced GR log.

3.0 Interpretation

3.1 Methodology

Schlumberger's Geoframe ELAN+ module was used to determine mineral volumes, Total Porosity, (PHIT), Effective Porosity (PHIE or PIGN), Total Water Saturation (SWT) and Effective Water Saturation (SUWI or SWE). Net reservoir and net pay were then calculated using a PHIE cut-off of 0.08 (8%) for gas reservoirs and a PHIE cut-off of 0.12 (12%) for oil reservoirs.

Three separate ELAN models were constructed (Upper, Middle and Lower) across the zones of interest. The ELAN+ models and their input parameters are described in Appendices 1 (Upper zone), 2 (Middle zone) and 3 (Lower zone).

3.2 Logs Used

The primary logs used in this interpretation were:

- Upper Zone – GR, RHOB, TNPH and RT_HRLT;
- Middle Zone – GR_RAB, RHOBB, TNPH and RES_RING ; and
- Lower Zone – GR_RAB, RHOBB, TNPH and RES_RING logs.

A temperature log was created using the data in Table 3.1.

Table 3.1 Temperate data

Depth (m)	Temperature (^{O}C)
91	12.8
3369	117

The maximum temperature used in creating the temperature curve was obtained from the maximum recorded temperature from the DSI-HNGS-MSFL-LEHQT log.

All coal and carbonaceous shaly units were identified using a coal flag (FLAG_COAL) and volcanic units were identified by a volcanic flag (FLAG_VOLC).

3.3 Formation Water Salinity

An apparent formation water salinity (FWS) curve was created using the R_{wa} salinity method with inputs of m=2, a=1 and BHT=117^{O}C. This curve was used to quantify salinity in sandy intervals within the borehole. All sands above 1900mMD appear to contain relatively fresh connate water. Sands below this depth show an apparent salinity from the R_{wa} calculation of 25,000 ppm NaCl equivalent and this value was used in all of the ELAN models.

3.4 Hydrocarbon Type

Using a combination of density-neutron crossover effect, MDT recoveries, mud log and cuttings shows, the hydrocarbon types present in the reservoirs were identified. Logs, MDT pressure testing and sampling indicated that there was only one reservoired gas-bearing and one oil-bearing zone over the logged interval above the Remora volcanics. Below the Remora volcanics, mudlogs suggest that the hydrocarbon present is probably gas.

3.5 Results and Observations

The interval between the Moonfish Volcanics and the Remora Volcanics (2073mMD to 2715mMD) contains a single hydrocarbon bearing sand in the interval 2082.7mMD to 2132mMD (see Figure 3.1). This hydrocarbon zone consists of a 34.7mMD gas zone underlain by a 2.5mMD thick oil zone. The average effective porosity and average effective water saturation in the gas zone is 18.6% and 12.4% respectively. In the oil zone the average effective porosity and average effective water saturation is 22.5% and 33.5% respectively.
Based primarily on the petrophysical analysis the GOC is interpreted to be at 2119.8mMD (2047.5mTVDSS) and the OWC at 2122.4mMD (2049.7mTVDSS). Below the OWC is a relict oil zone with an average effective water saturation of 78.2%.

Relict hydrocarbon zones are present in the intervals 1637.1 - 1649.9mMD, 2251 – 2274.6mMD, 2277.2 – 2289.2mMD, 2398.1 – 2421.8mMD, 2460.3 – 2512.4mMD. Of particular interest is the interval 2460.3 – 2512.4mMD (Figure 3.2). In this interval significant gas and cuttings shows were encountered, suggesting that at some time in the past oil was reservoired in this sand.

Below the Remora volcanics, reservoir quality is very poor and the petrophysical analysis indicates the presence of three thin possible gas sands (Fig.3.3). Wireline formation testing of these sands was unsuccessful due to seal failures.

A petrophysical summary of the analysis is detailed in Table 3.1

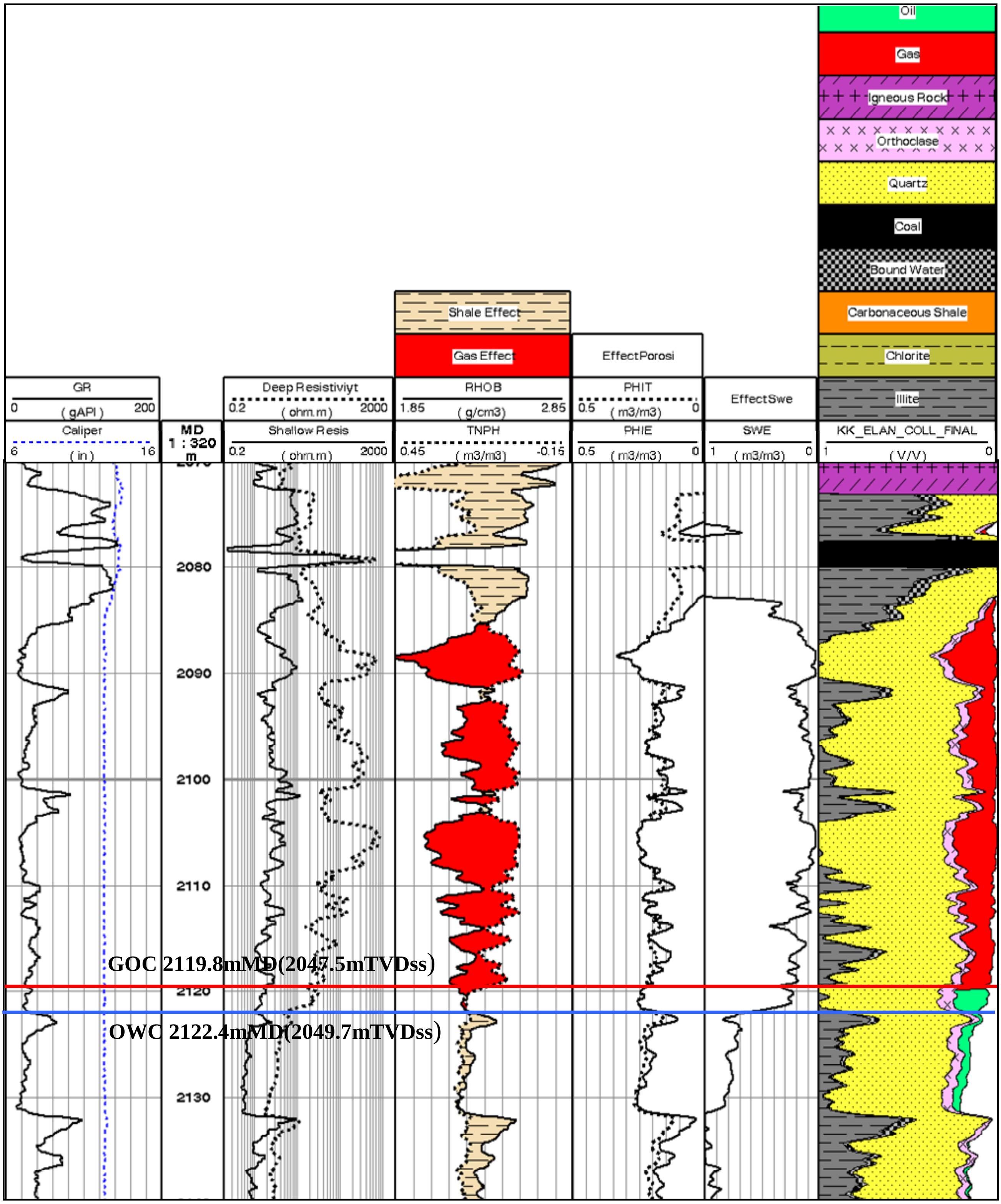


Figure 3.1: Elan+ results in the interval 2082 – 2134mMD

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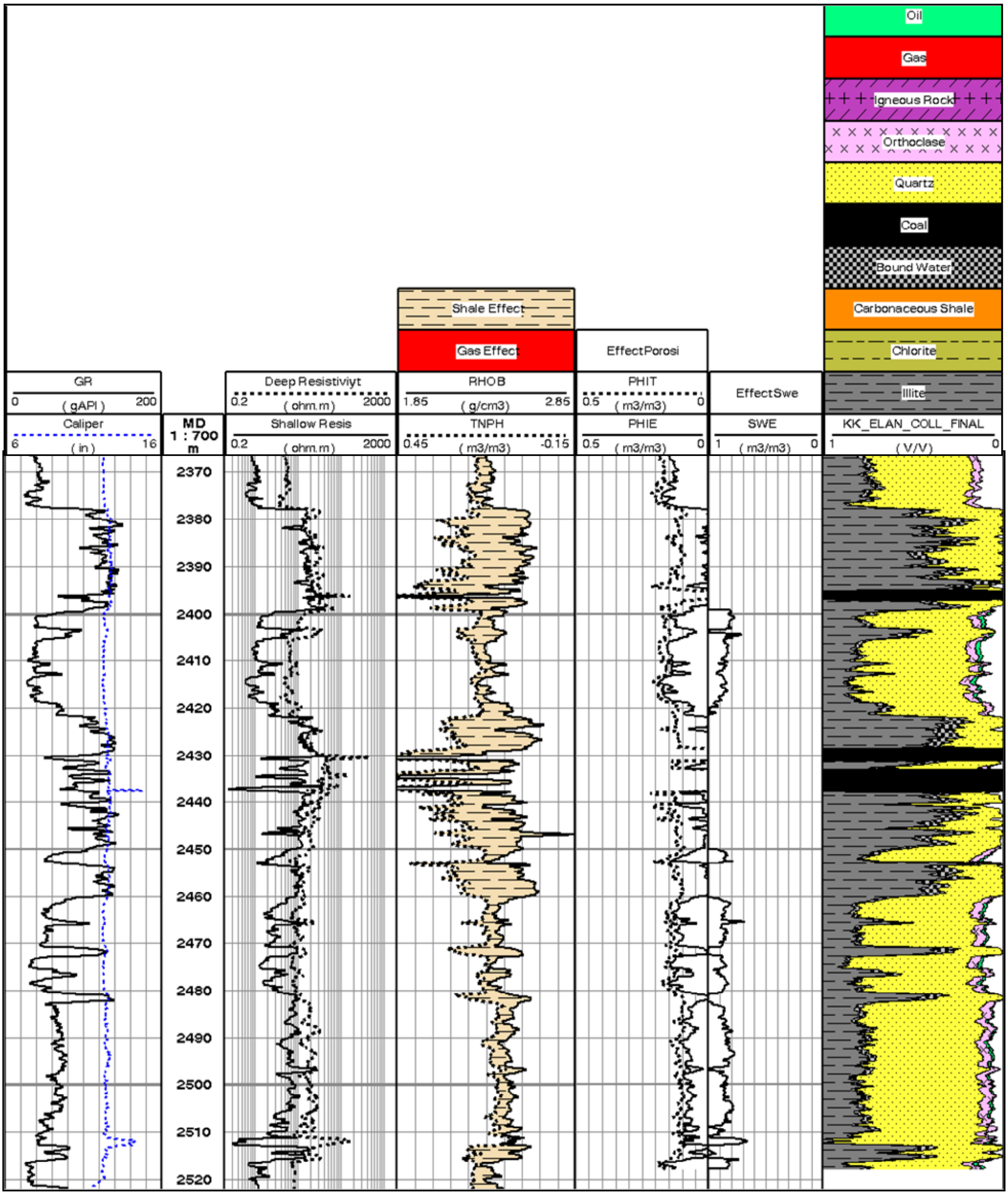


Figure 3.2: Elan+ results in the relict oil zone 2398 – 2512mMD

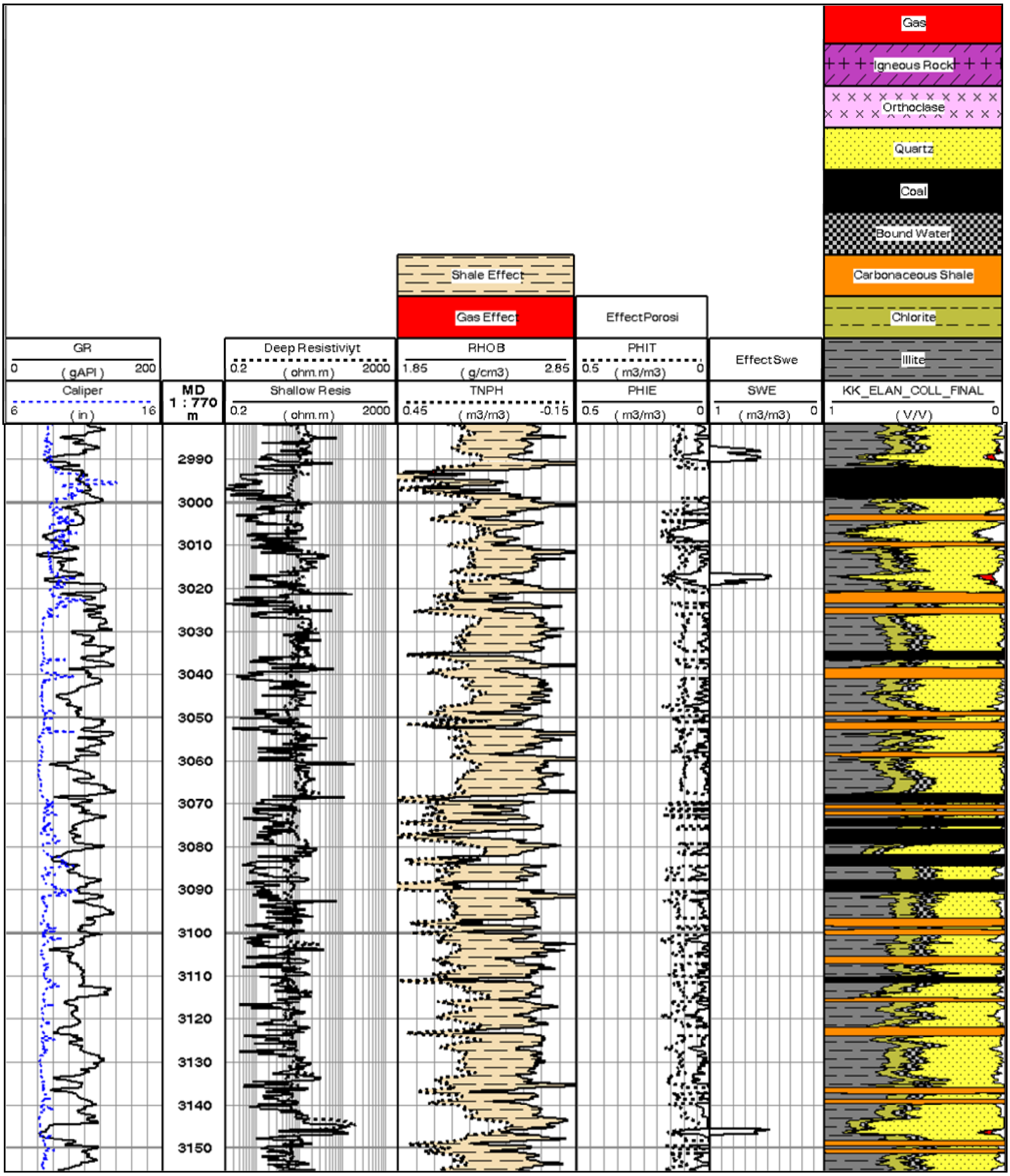


Figure 3.3: Elan+ results in the interval 2980 – 3150mMD (Below the Remora Volcanics)

Table 3.1

West Moonfish 1

Petrophysical Summary 1590 - 3150m MD

Depth Reference: Primary: MDKB
Net Reservoir,Mean VCL, Mean PHIE (or PIGN), Mean SWE (or SUWI) is based on a PHIE or PIGN cutoff 0.08 for Gas, 0.12 for oil and water
Net Pay is based on PHIIE cut-off in hydrocarbon bearing zones only

Name	Top Depth mMD	Top Depth mTVDss	Bottom Depth mMD	Bottom Depth mTVDss	Gross Thickness mMD	Gross Thickness mTVD	Net Reservoir m MD	Net Reservoir mTVDss	Net/Gross	Mean VCL	Mean PHIE	Mean SWE	Comments	Net Pay m MD	Net Pay mTVDss
Zone_1590.78_1615.42	1590.8	1551.5	1615.4	1576.1	24.6	24.6	19.4	19.4	0.787	0.149	0.248	1.000	Water bearing		
Zone_1637.08_1649.89	1637.1	1597.8	1649.9	1610.6	12.8	12.8	9.8	9.8	0.765	0.170	0.253	0.674	Water bearing with relict gas		
Zone_1656.84_1659.41	1656.8	1617.6	1659.4	1620.1	2.6	2.6	2.1	2.1	0.817	0.247	0.190	1.000	Water bearing		
Zone_1669.60_1707.98	1669.6	1630.3	1708.0	1668.7	38.4	38.4	37.2	37.2	0.969	0.075	0.239	1.000	Water bearing		
Zone_1709.96_1754.00	1710.0	1670.7	1754.0	1714.7	44.0	44.0	41.2	41.2	0.936	0.229	0.224	1.000	Water bearing		
Zone_1765.20_1786.61	1765.2	1725.8	1786.6	1747.1	21.4	21.3	15.1	15.0	0.705	0.182	0.254	1.000	Water bearing		
Zone_1814.99_1840.82	1815.0	1775.1	1840.8	1800.3	25.8	25.2	20.5	20.0	0.794	0.215	0.219	1.000	Water bearing		
Zone_1845.97_1870.92	1846.0	1805.3	1870.9	1829.2	25.0	24.0	20.6	19.8	0.826	0.182	0.228	1.000	Water bearing		
Zone_1876.94_1884.53	1876.9	1834.9	1884.5	1842.1	7.6	7.2	6.6	6.3	0.870	0.184	0.217	1.000	Water bearing		
Zone_1896.49_1911.89	1896.5	1853.4	1911.9	1867.7	15.4	14.3	13.5	12.5	0.877	0.134	0.235	1.000	Water bearing		
Zone_1920.19_1929.03	1920.2	1875.4	1929.0	1883.4	8.8	8.0	7.8	7.1	0.882	0.132	0.242	1.000	Water bearing		
Zone_2082.70_2119.80	2082.7	2016.5	2119.8	2047.5	37.1	31.0	34.7	29.0	0.934	0.125	0.186	0.124	Gas bearing, GOC at 2119.8mMD (2047.5m TVDss)	**34.7**	**29.0**
Zone_2119.85_2122.40	2119.9	2047.5	2122.4	2049.7	2.5	2.1	2.5	2.1	1.000	0.059	0.225	0.335	Oil bearing, OWC at 2122.4m MD (2049.7m TVDss)	**2.5**	**2.1**
Zone_2122.45_2132.00	2122.5	2049.7	2132.0	2057.7	9.6	8.0	8.8	7.3	0.919	0.129	0.219	0.782	Water bearing with relict oil		
Zone_2133.02_2143.48	2133.0	2058.6	2143.5	2067.3	10.5	8.8	8.6	7.2	0.822	0.212	0.177	0.950	Water bearing		
Zone_2146.05_2170.36	2146.1	2069.5	2170.4	2089.9	24.3	20.4	22.7	19.1	0.933	0.200	0.182	1.000	Water bearing		
Zone_2178.08_2189.15	2178.1	2096.4	2189.2	2105.7	11.1	9.4	8.2	7.0	0.743	0.247	0.153	1.000	Water bearing		
Zone_2196.32_2223.47	2196.3	2111.8	2223.5	2134.9	27.2	23.1	20.1	17.1	0.741	0.165	0.183	1.000	Water bearing		
Zone_2226.03_2243.43	2226.0	2137.1	2243.4	2151.9	17.4	14.9	16.8	14.3	0.966	0.134	0.197	1.000	Water bearing		
Zone_2250.98_2274.60	2251.0	2158.4	2274.6	2178.6	23.6	20.2	8.5	7.3	0.360	0.274	0.135	0.735	Water bearing with relict gas		
Zone_2277.16_2289.18	2277.2	2180.8	2289.2	2191.1	12.0	10.3	9.2	7.9	0.765	0.185	0.145	0.879	Water bearing with relict gas		
Zone_2293.75_2302.03	2293.8	2195.0	2302.0	2202.1	8.3	7.1	6.1	5.2	0.737	0.228	0.159	1.000	Water bearing		
Zone_2316.58_2335.10	2316.6	2214.6	2335.1	2230.5	18.5	15.9	6.8	5.8	0.367	0.248	0.155	1.000	Water bearing		
Zone_2358.60_2377.49	2358.6	2250.7	2377.5	2267.0	18.9	16.3	16.5	14.2	0.873	0.272	0.141	1.000	Water bearing		
Zone_2398.58_2421.82	2398.6	2285.1	2421.8	2305.1	23.2	20.0	13.4	11.5	0.577	0.200	0.147	0.852	Water bearing with relict oil		
Zone_2460.25_2512.44	2460.3	2338.2	2512.4	2383.2	52.2	45.0	5.7	4.9	0.109	0.171	0.132	0.858	Water bearing with relict oil		
Zone_2534.87_2553.59	2534.9	2402.7	2553.6	2419.2	18.7	16.5	1.1	1.0	0.059	0.162	0.133	1.000	Water bearing		
Zone_2563.14_2573.25	2563.1	2427.6	2573.3	2436.6	10.1	8.9	0.9	0.8	0.089	0.165	0.138	1.000	Water bearing		
Zone_2577.65_2593.98	2577.7	2440.5	2594.0	2454.9	16.3	14.5	1.3	1.2	0.080	0.176	0.128	1.000	Water bearing		
Zone_2597.10_2624.18	2597.1	2457.7	2624.2	2481.7	27.1	24.0	0.5	0.4	0.018	0.200	0.133	1.000	Water bearing		
Zone_2647.06_2676.25	2647.1	2502.0	2676.3	2528.2	29.2	26.2	3.3	3.0	0.114	0.168	0.142	1.000	Water bearing		
Zone_2683.89_2713.46	2683.9	2535.1	2713.5	2561.7	29.6	26.6	3.2	2.9	0.111	0.194	0.133	1.000	Water bearing		
Zone_2754.48_2762.66	2754.5	2598.6	2762.7	2606.0	8.2	7.4	3.3	2.9	0.397	0.157	0.139	1.000	Water bearing		
Zone_2986.97_2990.93	2987.0	2801.2	2990.9	2804.4	4.0	3.2	1.2	1.0	0.303	0.290	0.097	0.616	Possible gas bearing sand	1.2	1.0
Zone_3016.30_3019.40	3016.3	2824.6	3019.4	2827.1	3.1	2.5	1.8	1.4	0.581	0.259	0.118	0.557	Possible gas bearing sand	1.8	1.4
Zone_3145.41_3147.16	3145.4	2927.5	3147.2	2928.9	1.8	1.4	0.9	0.7	0.506	0.195	0.115	0.583	Possible gas bearing sand	0.9	0.7

Appendix 1

Upper Zone ELAN+ Model and Parameters

A-1 Mid-Zone ELAN+ Model

The Schlumberger ELAN+ West Moonfish-1 Upper Zone model input parameters are described below.

A 1.1 ELAN Processes

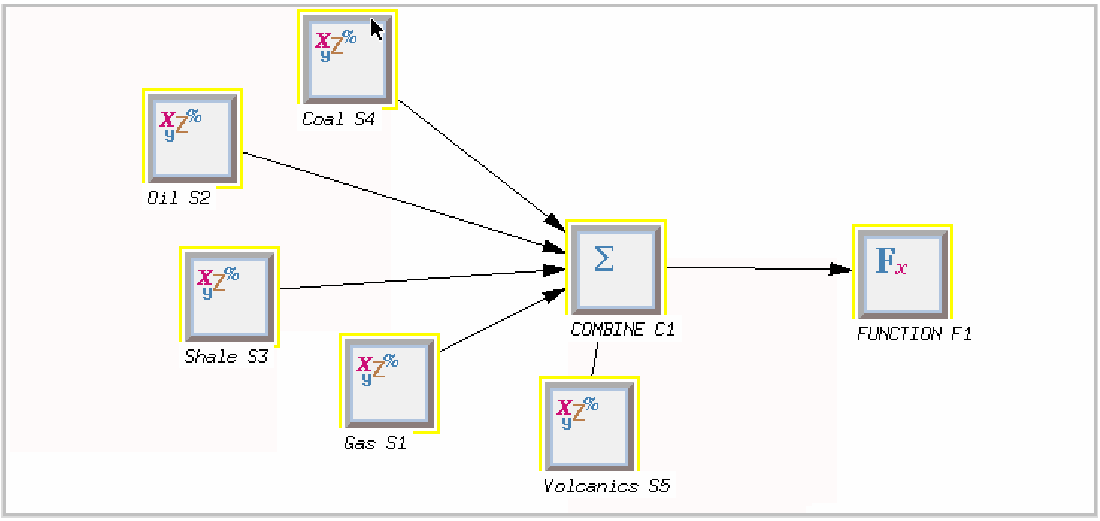


Figure A1.1 details the ELAN+ process definition.

Section A1.9 lists the parameters used over the entire borehole. A value of -999.25 in all tables indicates a null value.

A 1.2 ELAN Input Channels

	Compound Name Spec	WEST MOONFISH 1
TEMP_CH	TEMP;*	TEMP@ElanInput;8 .WELLEDIT [A1537219]
RHOB_IFAC_CH	IFRH;*	
NPHI_IFAC_CH	INPH;*	
RHOB_CH	RHOB;*	RHOB@ElanInput;1 [A1471525]
NPHI_CH	TNPH;*	TNPH@ElanInput;2 [A1471531]
PHIT_CH	TNPH;*	TNPH@ElanInput;2 [A1471531]
CUDC_CH/RT_CH	RLA3;*	RLA3@GR-RES_Raw_Prelim;1 [A1456513]
M_CH	MXP;*	
N_CH	SXP;*	
PRB1_CH	FLAG_RHOH;*	FLAG_RHOH@ElanInput;3 .WELLEDIT .WELLEDIT
PRB2_CH	PRB2;*	
PRB3_CH	PRB3;*	
PRB4_CH	FLAG_COAL;*	FLAG_COAL@ElanInput;7 [A1537224]
PRB5_CH	FLAG_VOLC;*	FLAG_VOLC@ElanInput;5 .WELLEDIT .WELLEDIT .

A 1.3 ELAN Global Parameters

Reference Index	MD
Processing Interval	708.9648(m) To 2526.4873(m)
Sampling Rate	0.1(m)
Uncertainty Channel	FALSE
Clay Input	DRY
Special Fluids	IMMOVABLE_HYDROCARBON

A 1.4 ELAN Zone Definitions

Name	Bottom To Top
25,000	2526.4873(m) To 708.9648(m)

A 1.5 ELAN Process Definitions

Process: SOLVE2 "Oil"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	XWAT
CT2	UWAT
	XOIL
	UOIL

User constraints: constraint(maxDolmite, DOLO<0)

Constraint Zones:	Bottom	Top
UNDEFINED	2526.4873(m)	708.9648(m)

Constraints applied:

UNDEFINED	IrreducibleXWater
UNDEFINED	IrreducibleUWater
UNDEFINED	WaterBaseMud_SXO_gt_SW

Process: SOLVE3 "Shale"

Equations	Volumes
RHOB	QUAR
NPHI	ILLI
CUDC_DWA	XWAT
	UWAT

Constraint Zones:	Bottom	Top
UNDEFINED	2526.4873(m)	708.9648(m)

Process: SOLVE4 "Coal"

Equations	Volumes
RHOB	COAL

Constraint Zones: Bottom Top
UNDEFINED 2526.4873(m) 708.9648(m)

Process: SOLVE1 "Gas"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	XWAT
CT2	UWAT
	XGAS
	UGAS

Constraint Zones: Bottom Top
UNDEFINED 2526.4873(m) 708.9648(m)

Constraints applied:
UNDEFINED IrreducibleXWater
UNDEFINED IrreducibleUWater
UNDEFINED WaterBaseMud_SXO_gt_SW

Process: SOLVE5 "Volcanincs"

Equations	Volumes
RHOB	IGNE

Constraint Zones: Bottom Top
UNDEFINED 2526.4873(m) 708.9648(m)

Process: COMBINE1 "COMBINE"

Order SOL.2 → SOL.1 → SOL.3 → SOL.4 → SOL.5
Combine Method:
"UNDEFINED" 8289.0000(m) Internal Average

A 1.6 ELAN Probability Expressions

Probability Functions:

Probability (SOL.5, PRB5_CH)

Probability (SOL.4, PRB4_CH)

prob3 = linear(ILLI_VOL.SOL.3, 0.4, 0, 0.5, 1)
probability (SOL.3, prob3)

prob1 = If (PRB_CH <=0.25, 1, 0)
probability (SOL.1, prob1)

Process: **FUNCTION1 "FUNCTION"**

Outputs: VCL, SXWI, SWT, SUWI, PIGN, PHIT
User-defined Function/n:
swt_cmp = if((PRB4_CH>0), 1, (UWAT_VOL + XBWA_VOL) / (UWAT_VOL + XBWA_VOL + UOIL_VOL + UGAS_VOL))
output (SWT, swt_cmp)

A 1.7 ELAN Model Constraints

Model 2: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	8289.0000	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 3: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	8289.0000	-999.25
constraints		

Model 4: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	8289.0000	-999.25
constraints		

Model 1: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	8289.0000	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 5: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	8289.0000	-999.25
constraints		

A 1.8 ELAN Different Parameters

Parameters	25,000
n********************	*********

A 1.9 ELAN Same Parameters

Parameter	Value	Parameter	Value
RHOB_QUAR	2.650 (g/cm3)	RHOB_CALC	2.710 (g/cm3)
RHOB_DOLO	2.847 (g/cm3)	RHOB_ORTH	2.570 (g/cm3)
RHOB_ILLI	2.780 (g/cm3)	RHOB_KAOL	2.620 (g/cm3)
RHOB_COAL	1.200 (g/cm3)	RHOB_IGNE	3.000 (g/cm3)
RHOB_XWAT	1.004 (g/cm3)	RHOB_UWAT	0.987 (g/cm3)
RHOB_XOIL	0.700 (g/cm3)	RHOB_UOIL	0.700 (g/cm3)
RHOB_XGAS	0.011 (g/cm3)	RHOB_UGAS	0.011 (g/cm3)
RHOB_XBWA	1.000 (g/cm3)	NPHI_QUAR	-0.059 (m3/m3)
NPHI_CALC	0.000 (m3/m3)	NPHI_DOLO	0.032 (m3/m3)
NPHI_ORTH	-0.010 (m3/m3)	NPHI_ILLI	0.247 (m3/m3)
NPHI_KAOL	0.450 (m3/m3)	NPHI_COAL	0.450 (m3/m3)
NPHI_IGNE	0.000 (m3/m3)	NPHI_XWAT	1.000 (m3/m3)
NPHI_UWAT	1.000 (m3/m3)	NPHI_XOIL	1.000 (m3/m3)
NPHI_UOIL	1.000 (m3/m3)	NPHI_XGAS	0.143 (m3/m3)
NPHI_UGAS	0.143 (m3/m3)	NPHI_XBWA	1.000 (m3/m3)
DT_QUAR	55.500 (us/m)	DT_CALC	47.800 (us/m)
DT_DOLO	43.500 (us/m)	DT_ORTH	60.000 (us/m)
DT_ILLI	60.000 (us/m)	DT_KAOL	91.318 (us/m)
DT_COAL	121.920 (us/m)	DT_IGNE	16.916 (us/m)
DT_XWAT	0.000 (us/m)	DT_UWAT	220.000 (us/m)
DT_XOIL	0.000 (us/m)	DT_UOIL	240.000 (us/m)
DT_XGAS	0.000 (us/m)	DT_UGAS	289.865 (us/m)
DT_XBWA	189.000 (us/m)	U_QUAR	5.000
U_CALC	14.100	U_DOLO	9.100
U_ILLI	9.900	U_KAOL	5.100
U_COAL	1.000	U_XWAT	0.692
U_UWAT	0.000	U_XOIL	0.136
U_UOIL	0.000	U_XGAS	0.012
U_UGAS	0.000	U_XBWA	0.398
CXDC_QUAR	0.000 (mS/m)	CXDC_ILLI	-999.250 (mS/m)
CXDC_KAOL	-999.250 (mS/m)	CXDC_COAL	0.000 (mS/m)
CXDC_XWAT	15.266 (mS/m)	CXDC_UWAT	0.000 (mS/m)
CXDC_XOIL	0.000 (mS/m)	CXDC_UOIL	0.000 (mS/m)
CXDC_XGAS	0.000 (mS/m)	CXDC_UGAS	0.000 (mS/m)
CXDC_XBWA	1.960 (mS/m)	CUDC_QUAR	0.000 (mS/m)
CUDC_ILLI	-999.250 (mS/m)	CUDC_KAOL	-999.250 (mS/m)
CUDC_COAL	0.000 (mS/m)	CUDC_XWAT	0.000 (mS/m)
CUDC_UWAT	12.168 (mS/m)	CUDC_XOIL	0.000 (mS/m)
CUDC_UOIL	0.000 (mS/m)	CUDC_XGAS	0.000 (mS/m)
CUDC_UGAS	0.000 (mS/m)	CUDC_UBWA	1.819 (mS/m)
GR_QUAR	60.000 (gAPI)	GR_CALC	11.000 (gAPI)
GR_DOLO	3.000 (gAPI)	GR_ORTH	230.000 (gAPI)
GR_ILLI	230.000 (gAPI)	GR_KAOL	98.000 (gAPI)
GR_COAL	40.000 (gAPI)	GR_IGNE	40.000 (gAPI)
GR_XWAT	0.000 (gAPI)	GR_UWAT	0.000 (gAPI)
GR_XOIL	0.000 (gAPI)	GR_UOIL	0.000 (gAPI)
GR_XGAS	0.000 (gAPI)	GR_UGAS	0.000 (gAPI)
GR_XBWA	0.000 (gAPI)	CT1_QUAR	0.000
CT1_CALC	0.000	CT1_DOLO	0.000
CT1_ORTH	0.000	CT1_ILLI	0.000
CT1_KAOL	0.000	CT1_COAL	0.000
CT1_IGNE	0.000	CT1_XWAT	0.000
CT1_UWAT	0.000	CT1_XOIL	1.000
CT1_UOIL	0.600	CT1_XGAS	1.000
CT1_UGAS	-0.500	CT1_XBWA	0.000
CT2_QUAR	-0.080	CT2_CALC	0.000
CT2_DOLO	0.000	CT2_ORTH	1.000
CT2_ILLI	0.000	CT2_KAOL	0.000
CT2_COAL	0.000	CT2_IGNE	0.000
CT2_XWAT	0.000	CT2_UWAT	0.000
CT2_XOIL	1.000	CT2_UOIL	-0.200
CT2_XGAS	0.000	CT2_UGAS	0.000
CT2_XBWA	0.000	ARHOB_ILLI	2.780 (g/cm3)
ARHOB_KAOL	2.620 (g/cm3)	WCLP_ILLI	0.154 (m3/m3)

Parameter	Value	Parameter	Value
WCLP_KAOL	0.058 (m3/m3)	CBWA_ILLI	-999.250 (mS/m)
CBWA_KAOL	-999.250 (mS/m)	CECA_ILLI	0.200 (meq/g)
CECA_KAOL	0.090 (meq/g)	RMF	0.211 (ohm.m)
MST	61.880 (degC)	RW	0.388 (ohm.m)
RWT	-999.250 (degC)	SALIN_ISOL	-999.250 (ppk)
SALIN_PARA	-999.250 (ppk)	SALIN_XWAT	12.924 (ppk)
SALIN_UWAT	30.000 (ppk)	SALIN_XIWA	-999.250 (ppk)
SALIN_UIWA	-999.250 (ppk)	SALIN_XOIL	0.000 (ppk)
SALIN_UOIL	0.000 (ppk)	SALIN_XGAS	0.000 (ppk)
SALIN_UGAS	0.000 (ppk)	SALIN_XSFL	-999.250 (ppk)
SALIN_USFL	-999.250 (ppk)	CT1_ZP	0.000
CT2_ZP	0.000	RHOB_UNC_ZP	0.027 (g/cm3)
NPHI_UNC_ZP	0.015 (m3/m3)	DT_UNC_ZP	2.250 (us/m)
U_UNC_ZP	0.225	CXDC_UNC_ZP	0.059 (mS/m)
CUDC_UNC_ZP	0.054 (mS/m)	GR_UNC_ZP	2.250 (gAPI)
CT1_UNC_ZP	0.015	CT2_UNC_ZP	0.015
VOLS_UNC_ZP	0.015 (m3/m3)	RHOB_UNC_WM	1.000
NPHI_UNC_WM	1.000	DT_UNC_WM	0.300
U_UNC_WM	0.400	CXDC_UNC_WM	0.500
CUDC_UNC_WM	0.500	GR_UNC_WM	0.200
CT1_UNC_WM	1.000	CT2_UNC_WM	0.800
VOLS_UNC_WM	1.000	RHOB_IFAC_ZP	1.000
NPHI_IFAC_ZP	1.000	A_ZP	1.000
N_ZP	2.000	C_DWA	0.000
M_DWA	2.000	BVIRR	0.007 (m3/m3)

Appendix 2

Mid-Zone ELAN+ Model and Parameters

A-2 Mid-Zone ELAN+ Model

The Schlumberger ELAN+ West Moonfish-1 Mid-Zone model input parameters are described below. This model uses the Dual Water Archie equation saturation model for determining water saturation in both the invaded and uninvaded zones. Illite is used to represent all shale volumes and quartz to represent all sand volumes.

A 2.1 ELAN Processes

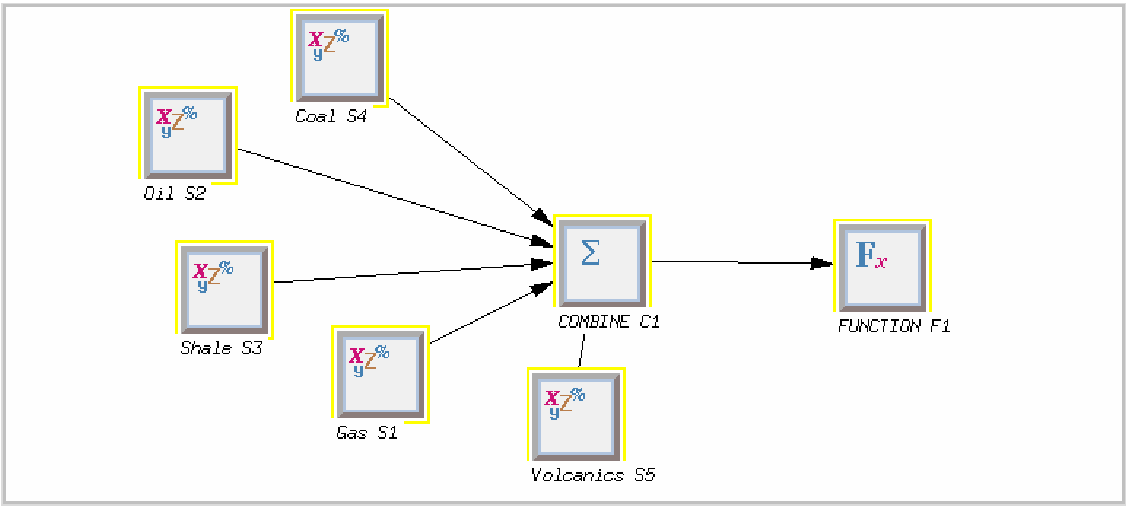


Figure A2.1 details the ELAN+ process definition.

Section A2.9 lists the parameters used over the entire borehole. A value of -999.25 in all tables indicates a null value.

A 2.2 ELAN Input Channels

	Compound Name Spec	WEST MOONFISH 1
TEMP_CH	TEMP;*	TEMP@ElanInput;8 .WELLEDIT [A1537219]
RHOB_IFAC_CH	IFRH;*	
NPHI_IFAC_CH	INPH;*	
RHOB_CH	ROBB;*	ROBB@ElanInput;9 [A1537233]
NPHI_CH	TNPH;*	TNPH@ElanInput;13 [A1537231]
PHIT_CH	TNPH;*	TNPH@ElanInput;13 [A1537231]
CUDC_CH/RT_CH	RES_RING;*	RES_RING@ElanInput;6 [A1537237]
M_CH	MXP;*	
N_CH	SXP;*	
PRB1_CH	FLAG_RHOH;*	FLAG_RHOH@ElanInput;5 .WELLEDIT .WELLEDIT
PRB2_CH	PRB2;*	
PRB3_CH	PRB3;*	
PRB4_CH	FLAG_COAL;*	FLAG_COAL@ElanInput;7 [A1537224]
PRB5_CH	FLAG_VOLC;*	FLAG_VOLC@ElanInput;5 .WELLEDIT .WELLEDIT .

A 2.3 ELAN Global Parameters

Reference Index	MD
Processing Interval	2527.2002(m) To 2635.1499(m)
Sampling Rate	0.1(m)
Uncertainty Channel	FALSE
Clay Input	DRY
Special Fluids	IMMOVABLE_HYDROCARBON

A 2.4 ELAN Zone Definitions

Name	Bottom To Top
25,000	3368.4001(m) To 2527.2002(m)

A 2.5 ELAN Process Definitions

Process: SOLVE2 "Oil"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	XWAT
CT2	UWAT
	XOIL
	UOIL

User constraints: constraint(maxDolmite, DOLO<0)

Constraint Zones:	Bottom	Top
UNDEFINED	3368.4001(m)	2527.2002(m)

Constraints applied:

UNDEFINED	IrreducibleXWater
UNDEFINED	IrreducibleUWater
UNDEFINED	WaterBaseMud_SXO_gt_SW

Process: SOLVE3 "Shale"

Equations	Volumes
RHOB	QUAR
NPHI	ILLI
CUDC_DWA	XWAT
	UWAT

Constraint Zones:	Bottom	Top
UNDEFINED	3368.4001(m)	2527.2002(m)

Process: SOLVE4 "Coal"

Equations	Volumes
RHOB	COAL

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2527.2002(m)

Process: SOLVE1 "Gas"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	XWAT
CT2	UWAT
	XGAS
	UGAS

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2527.2002(m)

Constraints applied:
UNDEFINED IrreducibleXWater
UNDEFINED IrreducibleUWater
UNDEFINED WaterBaseMud_SXO_gt_SW

Process: SOLVE5 "Volcanincs"

Equations	Volumes
RHOB	IGNE

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2527.2002(m)

Process: COMBINE1 "COMBINE"

Order SOL.2 → SOL.1 → SOL.3 → SOL.4 → SOL.5
Combine Method:
"UNDEFINED" 11051.1816(m) Internal Average

A 2.6 ELAN Probability Expressions

Probability Functions:
Probability (SOL.5, PRB5_CH)

Probability (SOL.4, PRB4_CH)

prob3 = linear(ILLI_VOL.SOL.3, 0.4, 0, 0.5, 1)
probability (SOL.3, prob3)

prob1 = If (PRB_CH <=0.25, 1, 0)
probability (SOL.1, prob1)

Process: FUNCTION1 "FUNCTION"

Outputs: VCL, SXWI, SWT, SUWI, PIGN, PHIT
User-defined Function/n:
swt_cmp = if((PRB4_CH>0), 1, (UWAT_VOL + XBWA_VOL) / (UWAT_VOL + XBWA_VOL + UOIL_VOL + UGAS_VOL))
output (SWT, swt_cmp)

A 2.7 ELAN Model Constraints

Model 2: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 3: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

Model 4: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

Model 1: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 5: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

A 2.8 ELAN Different Parameters

Parameters	25,000
n********************	*********

A 2.9 ELAN Same Parameters

Parameter	Value	Parameter	Value
RHOB_QUAR	2.650 (g/cm3)	RHOB_CALC	2.710 (g/cm3)
RHOB_DOLO	2.847 (g/cm3)	RHOB_ORTH	2.570 (g/cm3)
RHOB_ILLI	2.780 (g/cm3)	RHOB_KAOL	2.620 (g/cm3)
RHOB_COAL	1.200 (g/cm3)	RHOB_IGNE	3.000 (g/cm3)
RHOB_XWAT	1.004 (g/cm3)	RHOB_UWAT	0.987 (g/cm3)
RHOB_XOIL	0.700 (g/cm3)	RHOB_UOIL	0.700 (g/cm3)
RHOB_XGAS	0.011 (g/cm3)	RHOB_UGAS	0.011 (g/cm3)
RHOB_XBWA	1.000 (g/cm3)	NPHI_QUAR	-0.059 (m3/m3)
NPHI_CALC	0.000 (m3/m3)	NPHI_DOLO	0.032 (m3/m3)
NPHI_ORTH	-0.010 (m3/m3)	NPHI_ILLI	0.247 (m3/m3)
NPHI_KAOL	0.450 (m3/m3)	NPHI_COAL	0.450 (m3/m3)
NPHI_IGNE	0.000 (m3/m3)	NPHI_XWAT	1.000 (m3/m3)
NPHI_UWAT	1.000 (m3/m3)	NPHI_XOIL	1.000 (m3/m3)
NPHI_UOIL	1.000 (m3/m3)	NPHI_XGAS	0.143 (m3/m3)
NPHI_UGAS	0.143 (m3/m3)	NPHI_XBWA	1.000 (m3/m3)
DT_QUAR	55.500 (us/m)	DT_CALC	47.800 (us/m)
DT_DOLO	43.500 (us/m)	DT_ORTH	60.000 (us/m)
DT_ILLI	60.000 (us/m)	DT_KAOL	91.318 (us/m)
DT_COAL	121.920 (us/m)	DT_IGNE	16.916 (us/m)
DT_XWAT	0.000 (us/m)	DT_UWAT	220.000 (us/m)
DT_XOIL	0.000 (us/m)	DT_UOIL	240.000 (us/m)
DT_XGAS	0.000 (us/m)	DT_UGAS	289.865 (us/m)
DT_XBWA	189.000 (us/m)	U_QUAR	5.000
U_CALC	14.100	U_DOLO	9.100
U_ILLI	9.900	U_KAOL	5.100
U_COAL	1.000	U_XWAT	0.692
U_UWAT	0.000	U_XOIL	0.136
U_UOIL	0.000	U_XGAS	0.012
U_UGAS	0.000	U_XBWA	0.398
CXDC_QUAR	0.000 (mS/m)	CXDC_ILLI	-999.250 (mS/m)
CXDC_KAOL	-999.250 (mS/m)	CXDC_COAL	0.000 (mS/m)
CXDC_XWAT	15.266 (mS/m)	CXDC_UWAT	0.000 (mS/m)
CXDC_XOIL	0.000 (mS/m)	CXDC_UOIL	0.000 (mS/m)
CXDC_XGAS	0.000 (mS/m)	CXDC_UGAS	0.000 (mS/m)
CXDC_XBWA	1.960 (mS/m)	CUDC_QUAR	0.000 (mS/m)
CUDC_ILLI	-999.250 (mS/m)	CUDC_KAOL	-999.250 (mS/m)
CUDC_COAL	0.000 (mS/m)	CUDC_XWAT	0.000 (mS/m)
CUDC_UWAT	13.870 (mS/m)	CUDC_XOIL	0.000 (mS/m)
CUDC_UOIL	0.000 (mS/m)	CUDC_XGAS	0.000 (mS/m)
CUDC_UGAS	0.000 (mS/m)	CUDC_UBWA	2.735 (mS/m)
GR_QUAR	60.000 (gAPI)	GR_CALC	11.000 (gAPI)
GR_DOLO	3.000 (gAPI)	GR_ORTH	230.000 (gAPI)
GR_ILLI	230.000 (gAPI)	GR_KAOL	98.000 (gAPI)
GR_COAL	40.000 (gAPI)	GR_IGNE	40.000 (gAPI)
GR_XWAT	0.000 (gAPI)	GR_UWAT	0.000 (gAPI)
GR_XOIL	0.000 (gAPI)	GR_UOIL	0.000 (gAPI)
GR_XGAS	0.000 (gAPI)	GR_UGAS	0.000 (gAPI)
GR_XBWA	0.000 (gAPI)	CT1_QUAR	0.000
CT1_CALC	0.000	CT1_DOLO	0.000
CT1_ORTH	0.000	CT1_ILLI	0.000
CT1_KAOL	0.000	CT1_COAL	0.000
CT1_IGNE	0.000	CT1_XWAT	0.000
CT1_UWAT	0.000	CT1_XOIL	1.000
CT1_UOIL	0.600	CT1_XGAS	1.000
CT1_UGAS	-0.500	CT1_XBWA	0.000
CT2_QUAR	-0.080	CT2_CALC	0.000
CT2_DOLO	0.000	CT2_ORTH	1.000
CT2_ILLI	0.000	CT2_KAOL	0.000
CT2_COAL	0.000	CT2_IGNE	0.000
CT2_XWAT	0.000	CT2_UWAT	0.000
CT2_XOIL	1.000	CT2_UOIL	-0.200
CT2_XGAS	0.000	CT2_UGAS	0.000
CT2_XBWA	0.000	ARHOB_ILLI	2.780 (g/cm3)
ARHOB_KAOL	2.620 (g/cm3)	WCLP_ILLI	0.154 (m3/m3)

Parameter	Value	Parameter	Value
WCLP_KAOL	0.058 (m3/m3)	CBWA_ILLI	-999.250 (mS/m)
CBWA_KAOL	-999.250 (mS/m)	CECA_ILLI	0.200 (meq/g)
CECA_KAOL	0.090 (meq/g)	RMF	0.211 (ohm.m)
MST	61.880 (degC)	RW	0.389 (ohm.m)
RWT	-999.250 (degC)	SALIN_ISOL	-999.250 (ppk)
SALIN_PARA	-999.250 (ppk)	SALIN_XWAT	12.924 (ppk)
SALIN_UWAT	30.000 (ppk)	SALIN_XIWA	-999.250 (ppk)
SALIN_UIWA	-999.250 (ppk)	SALIN_XOIL	0.000 (ppk)
SALIN_UOIL	0.000 (ppk)	SALIN_XGAS	0.000 (ppk)
SALIN_UGAS	0.000 (ppk)	SALIN_XSFL	-999.250 (ppk)
SALIN_USFL	-999.250 (ppk)	CT1_ZP	0.000
CT2_ZP	0.000	RHOB_UNC_ZP	0.027 (g/cm3)
NPHI_UNC_ZP	0.015 (m3/m3)	DT_UNC_ZP	2.250 (us/m)
U_UNC_ZP	0.225	CXDC_UNC_ZP	0.059 (mS/m)
CUDC_UNC_ZP	0.056 (mS/m)	GR_UNC_ZP	2.250 (gAPI)
CT1_UNC_ZP	0.015	CT2_UNC_ZP	0.015
VOLS_UNC_ZP	0.015 (m3/m3)	RHOB_UNC_WM	1.000
NPHI_UNC_WM	1.000	DT_UNC_WM	0.300
U_UNC_WM	0.400	CXDC_UNC_WM	0.500
CUDC_UNC_WM	0.500	GR_UNC_WM	0.400
CT1_UNC_WM	1.000	CT2_UNC_WM	0.800
VOLS_UNC_WM	1.000	RHOB_IFAC_ZP	1.000
NPHI_IFAC_ZP	1.000	A_ZP	1.000
N_ZP	2.000	C_DWA	0.000
M_DWA	2.000	BVIRR	0.007 (m3/m3)

Appendix 3

Deep Zone ELAN+ Model and Parameters

A-3 Deep Zone ELAN+ Model

The Schlumberger ELAN+ West Moonfish-1 Deep Zone model input parameters are described below. This model uses the Dual Water Archie equation saturation model for determining water saturation in both the invaded and uninvaded zones. Illite and chlorite are used to represent all shale volumes and quartz to represent all sand volumes.

A 3.1 ELAN Processes

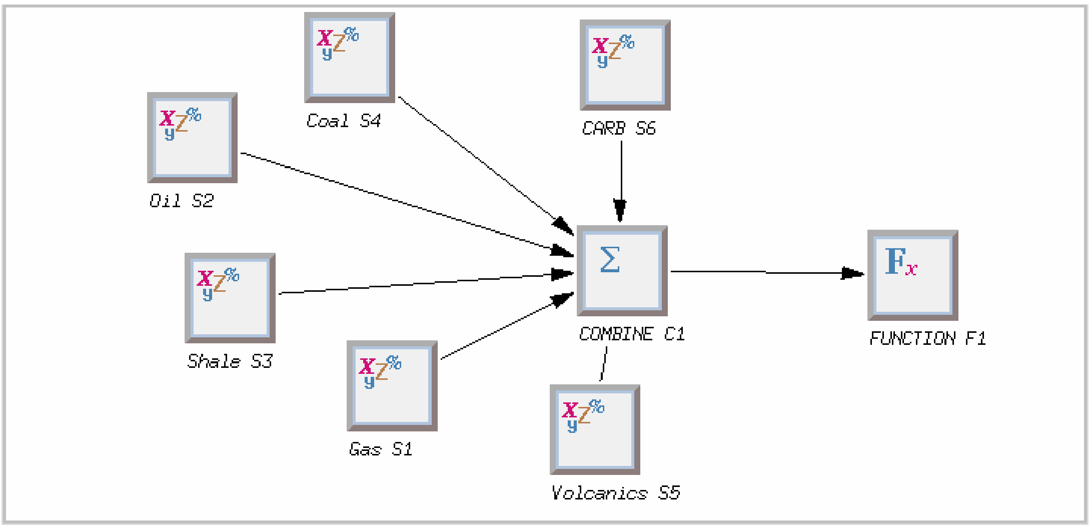


Figure A1.1 details the ELAN+ process definition.

Section A3.9 lists the parameters used over the entire borehole. A value of -999.25 in all tables indicates a null value.

A 3.2 ELAN Input Channels

	Compound Name Spec	WEST MOONFISH 1
TEMP_CH	TEMP;*	TEMP@ElanInput;8 .WELLEDIT [A1537219]
RHOB_IFAC_CH	IFRH;*	
NPHI_IFAC_CH	INPH;*	
RHOB_CH	ROBB;*	ROBB@ElanInput;9 [A1537233]
NPHI_CH	TNPH;*	TNPH@ElanInput;13 [A1537231]
PHIT_CH	TNPH;*	TNPH@ElanInput;13 [A1537231]
CUDC_CH/RT_CH	RES_RING;*	RES_RING@ElanInput;6 [A1537237]
M_CH	MXP;*	
N_CH	SXP;*	
PRB1_CH	FLAG_RHOH;*	FLAG_RHOH@ElanInput;5 .WELLEDIT .WELLEDIT
PRB2_CH	FLAG;*	FLAG@ElanInput;4 .CarbonaceousShale [A153722
PRB3_CH	PRB3;*	
PRB4_CH	FLAG_COAL;*	FLAG_COAL@ElanInput;7 [A1537224]
PRB5_CH	FLAG_VOLC;*	FLAG_VOLC@ElanInput;5 .WELLEDIT .WELLEDIT .
PRB6_CH	PRB6;*	

A 3.3 ELAN Global Parameters

Reference Index	MD
Processing Interval	2687.0000(m) To 3368.0000(m)
Sampling Rate	0.1(m)
Uncertainty Channel	FALSE
Clay Input	DRY
Special Fluids	IMMOVABLE_HYDROCARBON

A 3.4 ELAN Zone Definitions

Name	Bottom To Top
N.Sen	3368.4001(m) To 2687.0000(m)

A 3.5 ELAN Process Definitions

Process: SOLVE2 "Oil"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	CHLO
CT2	XWAT
CT3	UWAT
	XOIL
	UOIL

User constraints:	constraint(maxDolmite, DOLO<0)	
Constraint Zones:	Bottom	Top
UNDEFINED	3368.4001(m)	2687.0000(m)

Constraints applied:

UNDEFINED	IrreducibleXWater
UNDEFINED	IrreducibleUWater
UNDEFINED	WaterBaseMud_SXO_gt_SW

Process: SOLVE3 "Shale"

Equations	Volumes
RHOB	QUAR
NPHI	ILLI
CUDC_DWA	CHLO
CT3	XWAT
	UWAT

Constraint Zones:	Bottom	Top
UNDEFINED	3368.4001(m)	2687.0000(m)

Process: SOLVE4 "Coal"

Equations	Volumes
RHOB	COAL

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2687.0000(m)

Process: SOLVE1 "Gas"

Equations	Volumes
RHOB	QUAR
NPHI	ORTH
CUDC_DWA	ILLI
CT1	CHLO
CT2	XWAT
CT3	UWAT
	XGAS
	UGAS

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2687.0000(m)

Constraints applied:
UNDEFINED IrreducibleXWater
UNDEFINED IrreducibleUWater
UNDEFINED WaterBaseMud_SXO_gt_SW

Process: SOLVE5 "Volcanincs"

Equations	Volumes
RHOB	IGNE

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2687.0000(m)

Process: SOLVE6 "CARB"

Equations	Volumes
RHOB	SHAL

Constraint Zones: Bottom Top
UNDEFINED 3368.4001(m) 2687.0000(m)

Process: COMBINE1 "COMBINE"

Order SOL.2 → SOL.1 → SOL.3 → SOL.6 → SOL.4 → SOL.5
Combine Method:
"M" 11051.1816(m) Internal Average

A 3.6 ELAN Probability Expressions

Probability Functions:

Probability (SOL.5, PRB5_CH)

Probability (SOL.4, PRB4_CH)

Probability (SOL.6, PRB2_CH)

prob3 = linear(ILLI_VOL.SOL.3, 0.3, 0, 0.5, 1)
probability (SOL.3, prob3)

prob1 = If (PRB_CH <=0.25, 1, 0)
probability (SOL.1, prob1)

Process: FUNCTION1 "FUNCTION"

Outputs: VCL, SXWI, SWT, SUWI, PIGN, PHIT
User-defined Function/n:
swt_cmp = if((PRB4_CH>0), 1, (UWAT_VOL + XBWA_VOL) / (UWAT_VOL + XBWA_VOL + UOIL_VOL + UGAS_VOL))
output (SWT, swt_cmp)

A 3.7 ELAN Model Constraints

Model 2: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 3: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

Model 4: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

Model 1: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		
UNDEFINED	- IrreducibleXWater	
UNDEFINED	- IrreducibleUWater	
UNDEFINED	- WaterBaseMud_SXO_gt_SW	

Model 5: Constraint Zones

Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

Model 6:	Constraint Zones	
Name	Boundary	Temperature
UNDEFINED	11051.1816	-999.25
constraints		

A 3.8 ELAN Different Parameters

Parameters	N.Sen
n********************	*********

A 3.9 ELAN Same Parameters

Parameter	Value	Parameter	Value
RHOB_QUAR	2.680 (g/cm3)	RHOB_CALC	2.710 (g/cm3)
RHOB_DOLO	2.847 (g/cm3)	RHOB_ORTH	2.570 (g/cm3)
RHOB_PYRI	4.990 (g/cm3)	RHOB_GLAU	2.850 (g/cm3)
RHOB_ILLI	2.780 (g/cm3)	RHOB_KAOL	2.620 (g/cm3)
RHOB_CHLO	3.420 (g/cm3)	RHOB_CLA1	1.200 (g/cm3)
RHOB_SHAL	1.200 (g/cm3)	RHOB_CARB	1.200 (g/cm3)
RHOB_SILT	1.200 (g/cm3)	RHOB_COAL	1.200 (g/cm3)
RHOB_IGNE	3.000 (g/cm3)	RHOB_XWAT	1.004 (g/cm3)
RHOB_UWAT	0.987 (g/cm3)	RHOB_XOIL	0.700 (g/cm3)
RHOB_UGAS	0.011 (g/cm3)	RHOB_XBWA	1.000 (g/cm3)
NPHI_QUAR	-0.059 (m3/m3)	NPHI_CALC	0.000 (m3/m3)
NPHI_DOLO	0.032 (m3/m3)	NPHI_ORTH	-0.010 (m3/m3)
NPHI_PYRI	0.008 (m3/m3)	NPHI_GLAU	0.410 (m3/m3)
NPHI_ILLI	0.247 (m3/m3)	NPHI_KAOL	0.450 (m3/m3)
NPHI_CHLO	0.583 (m3/m3)	NPHI_CLA1	0.450 (m3/m3)
NPHI_SHAL	0.450 (m3/m3)	NPHI_CARB	0.450 (m3/m3)
NPHI_SILT	0.450 (m3/m3)	NPHI_COAL	0.450 (m3/m3)
NPHI_IGNE	0.000 (m3/m3)	NPHI_XWAT	1.000 (m3/m3)
NPHI_UWAT	1.000 (m3/m3)	NPHI_XOIL	1.000 (m3/m3)
NPHI_UOIL	1.000 (m3/m3)	NPHI_XGAS	0.143 (m3/m3)
NPHI_UGAS	0.143 (m3/m3)	NPHI_XBWA	1.000 (m3/m3)
DT_QUAR	55.500 (us/m)	DT_CALC	47.800 (us/m)
DT_DOLO	43.500 (us/m)	DT_ORTH	60.000 (us/m)
DT_ILLI	60.000 (us/m)	DT_KAOL	91.318 (us/m)
DT_COAL	121.920 (us/m)	DT_IGNE	16.916 (us/m)
DT_XWAT	0.000 (us/m)	DT_UWAT	220.000 (us/m)
DT_XOIL	0.000 (us/m)	DT_UOIL	240.000 (us/m)
DT_XGAS	0.000 (us/m)	DT_UGAS	289.865 (us/m)
DT_XBWA	189.000 (us/m)	U_QUAR	5.000
U_CALC	14.100	U_DOLO	9.100
U_ILLI	9.900	U_KAOL	5.100
U_COAL	1.000	U_XWAT	0.692
U_UWAT	0.000	U_XOIL	0.136
U_UOIL	0.000	U_XGAS	0.012
U_UGAS	0.000	U_XBWA	0.398
CXDC_QUAR	0.000 (mS/m)	CXDC_ILLI	-999.250 (mS/m)
CXDC_KAOL	-999.250 (mS/m)	CXDC_COAL	0.000 (mS/m)
CXDC_XWAT	14.484 (mS/m)	CXDC_UWAT	0.000 (mS/m)
CXDC_XOIL	0.000 (mS/m)	CXDC_UOIL	0.000 (mS/m)
CXDC_XGAS	0.000 (mS/m)	CXDC_UGAS	0.000 (mS/m)
CXDC_XBWA	1.861 (mS/m)	CUDC_QUAR	0.000 (mS/m)
U_CALC	14.100	U_DOLO	9.100
CUDC_GLAU	-999.250 (mS/m)	CUDC_ILLI	-999.250 (mS/m)
CUDC_KAOL	-999.250 (mS/m)	CUDC_CHLO	-999.250 (mS/m)
CUDC_CLA1	5.000 (mS/m)	CUDC_COAL	0.000 (mS/m)
CUDC_XWAT	0.000 (mS/m)	CUDC_UWAT	12.700 (mS/m)
CUDC_XOIL	0.000 (mS/m)	CUDC_UOIL	0.000 (mS/m)
CUDC_XGAS	0.000 (mS/m)	CUDC_UGAS	0.000 (mS/m)
CUDC_UBWA	5.635 (mS/m)	GR_QUAR	60.000 (gAPI)
GR_CALC	11.000 (gAPI)	GR_DOLO	3.000 (gAPI)
GR_ORTH	230.000 (gAPI)	GR_PYRI	0.000 (gAPI)
GR_ILLI	230.000 (gAPI)	GR_KAOL	98.000 (gAPI)
GR_CHLO	74.000 (gAPI)	GR_COAL	40.000 (gAPI)
GR_IGNE	40.000 (gAPI)	GR_XWAT	0.000 (gAPI)
GR_UWAT	0.000 (gAPI)	GR_XOIL	0.000 (gAPI)
GR_UOIL	0.000 (gAPI)	GR_XGAS	0.000 (gAPI)
GR_UGAS	0.000 (gAPI)	GR_XBWA	0.000 (gAPI)
CT1_QUAR	0.000	CT1_CALC	0.000
CT1_DOLO	0.000	CT1_ORTH	0.000
CT1_PYRI	0.000	CT1_GLAU	0.000
CT1_ILLI	0.000	CT1_KAOL	0.000
CT1_CHLO	0.000	CT1_CLA1	0.000
CT1_SHAL	0.000	CT1_CARB	0.000
CT1_SILT	0.000	CT1_COAL	0.000

Parameter	Value	Parameter	Value
CT1_IGNE	0.000	CT1_XWAT	0.000
CT1_UWAT	0.000	CT1_XOIL	1.000
CT1_UOIL	0.200	CT1_XGAS	1.000
CT1_UGAS	-0.500	CT1_XBWA	0.000
CT2_QUAR	-0.030	CT2_CALC	0.000
CT2_DOLO	0.000	CT2_ORTH	1.000
CT2_PYRI	0.000	CT2_GLAU	0.000
CT2_ILLI	0.000	CT2_KAOL	0.000
CT2_CHLO	0.000	CT2_CLA1	0.000
CT2_SHAL	0.000	CT2_CARB	0.000
CT2_SILT	0.000	CT2_COAL	0.000
CT2_IGNE	0.000	CT2_XWAT	0.000
CT2_UWAT	0.000	CT2_XOIL	0.000
CT2_UOIL	0.000	CT2_XGAS	0.000
CT2_UGAS	0.000	CT2_XBWA	0.000
CT3_QUAR	0.000	CT3_ORTH	0.000
CT3_PYRI	1.000	CT3_GLAU	1.000
CT3_ILLI	-0.300	CT3_CHLO	1.000
CT3_CLA1	0.000	CT3_SHAL	0.000
CT3_CARB	0.000	CT3_SILT	0.000
CT3_COAL	0.000	CT3_IGNE	0.000
CT3_XWAT	0.000	CT3_UWAT	0.000
CT3_XOIL	0.000	CT3_UOIL	0.000
CT3_XGAS	0.000	CT3_UGAS	0.000
CT3_XBWA	0.000	ARHOB_GLAU	2.960 (g/cm3)
ARHOB_ILLI	2.780 (g/cm3)	ARHOB_KAOL	2.620 (g/cm3)
ARHOB_CHLO	3.420 (g/cm3)	ARHOB_CLA1	1.200 (g/cm3)
WCLP_GLAU	0.156 (m3/m3)	WCLP_ILLI	0.167 (m3/m3)
WCLP_KAOL	0.058 (m3/m3)	WCLP_CHLO	0.129 (m3/m3)
WCLP_CLA1	0.080 (m3/m3)	CBWA_GLAU	-999.250 (mS/m)
CBWA_ILLI	-999.250 (mS/m)	CBWA_KAOL	-999.250 (mS/m)
CBWA_CHLO	-999.250 (mS/m)	CBWA_CLA1	-999.250 (mS/m)
CECA_GLAU	0.233 (meq/g)	CECA_ILLI	0.250 (meq/g)
CECA_KAOL	0.090 (meq/g)	CECA_CHLO	0.150 (meq/g)
CECA_CLA1	0.250 (meq/g)	RMF	0.211 (ohm.m)
MST	61.880 (degC)	RW	0.461 (ohm.m)
RWT	-999.250 (degC)	SALIN_ISOL	-999.250 (ppk)
SALIN_PARA	-999.250 (ppk)	SALIN_XWAT	12.924 (ppk)
SALIN_UWAT	30.000 (ppk)	SALIN_XIWA	-999.250 (ppk)
SALIN_UIWA	-999.250 (ppk)	SALIN_XOIL	0.000 (ppk)
SALIN_UOIL	0.000 (ppk)	SALIN_XGAS	0.000 (ppk)
SALIN_UGAS	0.000 (ppk)	SALIN_XSFL	-999.250 (ppk)
SALIN_USFL	-999.250 (ppk)	CT1_ZP	0.000
CT2_ZP	0.000	CT3_ZP	0.000
RHOB_UNC_ZP	0.027 (g/cm3)	NPHI_UNC_ZP	0.015 (m3/m3)
DT_UNC_ZP	2.250 (us/m)	U_UNC_ZP	0.225
CXDC_UNC_ZP	0.059 (mS/m)	CUDC_UNC_ZP	0.053 (mS/m)
GR_UNC_ZP	2.250 (gAPI)	CT1_UNC_ZP	0.015
CT2_UNC_ZP	0.015	CT3_UNC_ZP	0.015
VOLS_UNC_ZP	0.015 (m3/m3)	RHOB_UNC_WM	1.000
NPHI_UNC_WM	1.000	DT_UNC_WM	0.300
U_UNC_WM	0.400	CXDC_UNC_WM	0.500
CUDC_UNC_WM	0.800	GR_UNC_WM	0.400
CT1_UNC_WM	1.000	CT2_UNC_WM	0.100
CT3_UNC_WM	0.500	VOLS_UNC_WM	1.000
RHOB_IFAC_ZP	1.000	NPHI_IFAC_ZP	1.000
A_ZP	1.000	N_ZP	2.000
C_DWA	0.000	M_DWA	2.000

APPENDIX 3

PALYNOLOGY ANALYSIS

PALYNOLOGY OF

WEST MOONFISH-1

GIPPSLAND BASIN, AUSTRALIA

CONTENTS **PAGE**

1 SUMMARY

1634.0 m (swc) : ?*P. asperopolus* Zone : Early Eocene : marginal marine : immature

1655.0 m (swc) – 1793.0 m (swc) : *M. diversus* Zone, middle to upper subzones : Early Eocene : marginal marine to non-marine : immature

1845.0 m (swc) : *M. diversus* Zone, lower subzone : Early Eocene : marginal marine : immature

1917.0 m (swc) : Indeterminate near barren sand

1938.0 m (swc) – 2144.0 m (swc) : *L. balmei* Zone, upper subzone : Paleocene : non-marine : early marginal mature for oil, immature for gas/condensate

2172.0 m (swc) – 2304.0 m (swc) : *L. balmei* Zone, lower subzone : Paleocene : non-marine : marginal mature for oil, early marginal mature for gas/condensate

2316.0 m (swc) – 2472.0 m (swc) : *F. longus* Zone, upper subzone : Maastrichtian : non-marine : marginal mature for oil with a fully mature thermal spike at 2459.0 m

2490.0 m (swc) – 2555 m (cutts) : Indeterminate near barren sands

2561.5 m (swc) - 2565 m (cutts) : *F. longus* Zone, lower subzone : Maastrichtian : non-marine : early mature for oil, early marginal maturity for gas/condensate

2574.5 m (swc) - 2646.0 m (swc) : *T. lilliei* Zone : Campanian : non-marine : early mature for oil, early marginal mature for gas/condensate

2653.0 m (swc) – 2715 m (cutts) : *N. senectus* Zone, upper subzone (2653.0 m – 2665 m upper “b” ; 2670.5 m – 2715 m upper “a”) : Campanian : non-marine : mature for oil, marginal mature for gas/condensate

2728.0 m (swc) – 3287.5 m (swc) : *N. senectus* Zone, lower subzone (2728 m – 2765 m lower “c”; 2780 m – 3080 m lower “b”, 3090 m – 3263 m lower “a”) : mature for oil, marginal mature for gas/condensate

3323.0 m (swc) – 3355.5 m (swc) : ?*T. apoxyexinus* Zone : ?Santonian : non-marine : mature for oil, marginal mature for gas/condensate

2 INTRODUCTION

Study of the West Moonfish-1 well was partly performed in Sale on an urgent basis by Alan Partridge who studied bottom hole cuttings during drilling plus some sidewall cores from 2515.0 m and above. Subsequent study of the rest of the swc suite was performed by Roger Morgan. Twelve daily provisional reports were provided by Partridge and one followup report by Morgan following study of the bottomhole swcs. This report covers all the samples studied by both palynologist. Missofossil yields from many samples are very poor but examination of the swc lithologies suggest these are mostly pallid shales of sands. Better data might be generated from cuttings of dark shale.

The overall full zone framework is that of Helby, Morgan and Partridge (1987) and is shown in Figure 1. Tentative subdivision of the *F. longus* to *T. apoxyexinus* zones has been attempted by Morgan (2004) as in Figure 2, and applied where possible.

Palaeoenvironmental assessments are based on specimen counts of 100 specimens, also providing a percentage content of all species. Criteria for the palaeo-environmental subdivisions are given on Table 1. In running text, rare = <1-3%, frequent = 4-10%, common = 11-30%, abundant = 31-50% and superabundant = 51-100%.

Confidence ratings include the factor of sample type, and distinctiveness of the fossil event, according to the scheme shown on Table 1. This is the STRATDAT scheme used by Esso.

Maturity data were generated in the form of Spore Colour Index, and are plotted on Figure 3 Maturity Profile : West Moonfish-1. The oil and gas windows follow the general concensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (Staplin Spore Colour Index of 2.7) to dark brown (3.6) equal to vitrinite reflectance values of 0.6% to 1.3%. Geochemists argue variations on kerogen type, basin type and basin history. The maturity data is thus open to reinterpretation using the basic colour observations as reworked. However, the range of interpretation philosophies is not great, and probably would not move the oil window by more than 200 m.

TABLE 1

SUMMARY OF PALYNOLOGICAL DATA : WEST MOONFISH-1

DEPTH (m)	SAMPLE TYPE	MICROFOSSIL YIELD	PERCENTAGE				DIVERSITY *1		SPORE-POLLEN ZONE	CR *2	ENVIRONMENT *3
			MICROPLANKTON			SPORE-POLLEN-	SALINE MICROPLANKTON	SPORE-POLLEN			
			DINOFLAG	SPINY AC.	FRESH ALGAE						
1634.0	SWC	LOW	<1	0	2	98	EX LOW	HIGH	?P. ASPEROPOLUS	Bp4	MARGINAL MARINE
1655.0	SWC	EX LOW	<1	0	6	94	EX LOW	HIGH	M. DIVERUS, MIDDLE-UPPER	Bp4	MARGINAL MARINE
1669.0	SWC	EX LOW	0	0	0	100	NIL	MODERATE	M. DIVERSUS, MIDDLE-UPPER		NON-MARINE
1710.0	SWC	HIGH	37	0	10	53	EX LOW	MODERATE	M. DIVERSUS, MIDDLE-UPPER		?MARGINAL MARINE
1766.0	SWC	LOW	0	0	22	73	NIL	MODERATE	M. DIVERSUS, MIDDLE		LAKE
1793.0	SWC	LOW	<1	0	1	99	EX LOW	HIGH	M. DIVERSUS, MIDDLE	Bp2	MARGINAL MARINE
1845.0	SWC	LOW	<1	0	20	80	EX LOW	HIGH	M. DIVERSUS, LOWER	Bp2	MARGINAL MARINE
1917.0	SWC	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
1938.0	SWC	NEAR BARREN	-	-	-	-	NIL	EX LOW	L. BALMEI	Bp3	NON-MARINE
1976.0	SWC	MODERATE	0	0	4	96	NIL	MODERATE	L. BALMEI, UPPER		NON-MARINE
1995.0	SWC	MODERATE	0	0	0	100	NIL	MODERATE	L. BALMEI, UPPER		NON-MARINE
2024.0	SWC	LOW	0	0	11	89	NIL	MODERATE	L. BALMEI, UPPER		NON-MARINE
2060.0	SWC	NEAR BARREN					NIL	EX LOW	L. BALMEI, UPPER		NON-MARINE
2133.0	SWC	EX LEAN	0	0	0	100	NIL	EX LOW	L. BALMEI, UPPER		NON-MARINE
2144.0	SWC	EX LEAN	0	0	6	94	NIL	EX LOW	L. BALMEI, UPPER	Bp5	NON-MARINE
2172.0	SWC	LEAN	0	0	0	100	NIL	MODERATE	L. BALMEI, LOWER	Bp2	NON-MARINE
2217.0	SWC	EX LEAN	-	-	-	-	NIL	EX LOW	L. BALMEI, LOWER		NON-MARINE
2225.0	SWC	EX LEAN	0	0	16	84	NIL	EX LOW	L. BALMEI, LOWER		NON-MARINE
2249.0	SWC	LOW	0	0	1	99	NIL	HIGH	L. BALMEI, LOWER		NON-MARINE
2275.0	SWC	LOW	0	0	0	100	NIL	MODER	L. BALMEI, LOWER		NON-MARINE
2291.0	SWC	VERY LOW	0	0	0	100	NIL	MODERATE	L. BALMEI, LOWER	Bp5	NON-MARINE
2304.0	SWC	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
2316.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER	Bp3	NON-MARINE
2322.0	SWC	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
2339.0	SWC	VERY LOW	0	0	0	100	NIL	MOERATE	INDETERMINATE		INDETERMIANTE
2353.0	SWC	LOW	0	0	3	97	NIL	HIGH	INDETERMINATE		NON-MARINE
2381.0	SWC	VERY LOW	0	0	0	100	NIL	MODERATE	INDETERMINATE		NON-MARINE
2394.0	SWC	LOW	0	0	10	90	NIL	HIGH	INDETERMINATE		NON-MARINE
2428.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER	Bp1	NON-MARINE
2443.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER		NON-MARINE
2449.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER		NON-MARINE
2455.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER		NON-MARINE
2459.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER		NON-MARINE
2472.0	SWC	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, UPPER	Bp1	NON-MARINE
2490.0	SWC	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
2515.0	SWC	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
2555	CUTTS	BARREN	-	-	-	-	NIL	NIL	INDETERMINATE		INDETERMINATE
2561.5	SWC	LOW	0	0	3	97	NIL	HIGH	F. LONGUS, LOWER	Bp3	NON-MARINE
2565	CUTTS	LOW	0	0	0	100	NIL	HIGH	F. LONGUS, LOWER	D1	NON-MARINE
2575	CUTTS	LOW	-	-	-	-	NIL	EX LOW	INDETERMINATE		INDETERMINATE
2574.5	SWC	EX LOW	-	-	-	-	NIL	EX LOW	INDETERMINATE		INDETERMINATE
2575.5	SWC	EX LOW	-	-	-	-	NIL	EX LOW	INDETERMINATE		INDETERMINATE
2581.0	SWC	LOW	0	0	9	91	NIL	HIGH	T. LILLIEI	Bp4	NON-MARINE
2596.5	SWC	LOW	0	0	5	95	NIL	MODERATE	T. LILLIEI		NON-MARINE

2611.0	SWC	LOW	0	0	10	90	NIL	HIGH	T. LILLIEI		NON-MARINE
2620	CUTTS	LOW	0	0	0	100	NIL	HIGH	T. LILLIEI		NON-MARINE
2635	CUTTS	LOW	0	0	0	100	NIL	HIGH	?T. LILLIEI		NON-MARINE
2638.0	SWC	LOW	0	0	4	96	NIL	MODERATE	?T. LILLIEI		NON-MARINE
2640	CUTTS	LOW	0	0	0	100	NIL	MODERATE	?T. LILLIEI		NON-MARINE
2641.0	SWC	EX LOW	-	-	-	-	NIL	LOW	INDETERMINATE		INDETERMINATE
2646.0	SWC	MODERATE	0	0	0	100	NIL	HIGH	T. LILLIEI	Bp1	NON-MARINE
2653.0	SWC	MODERATE	0	0	7	93	NIL	HIGH	N. SENECTUS, UPPER “b”	Bp4	NON-MARINE
2665	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, UPPER “b”	D2	NON-MARINE
2670.5	SWC	MODERATE	0	0	2	98	NIL	HIGH	N. SENECTUS, UPPER “a”	Bp4	NON-MARINE
2682.5	SWC	MODERATE	0	0	6	94	NIL	HIGH	N. SENECTUS, UPPER “a”		NON-MARINE
2690	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, UPPER “a”		NON-MARINE
2702.0	SWC	MODERATE	0	0	2	98	NIL	HIGH	N. SENECTUS, UPPER “a”		NON-MARINE
2705	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, UPPER “a”		NON-MARINE
2708.0	SWC	MODERATE	0	0	0	100	NIL	MODERATE	N. SENECTUS, UPPER “a”		NON-MARINE
2715	CUTTS	LOW	0	0	0	100	NIL	MODERATE	N. SENECTUS, UPPER “a”	D2	NON-MARINE
2728.0	SWC	MODERATE	0	0	12	88	NIL	MODERATE	N. SENECTUS, LOWER “c”	Bp4	NON-MARINE
2737.0	SWC	EX LOW	0	0	6	94	NIL	LOW	N. SENECTUS, LOWER “c”		NON-MARINE
2750	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “c”		NON-MARINE
2765	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “c”	D2	NON-MARINE
2780	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”	D4	NON-MARINE
2800	CUTTS	MODERATE	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
2804.0	SWC	LOW	0	0	4	96	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
2847.0	SWC	LOW	0	0	4	96	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
2887.0	SWC	LOW	0	0	2	98	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
2905	CUTTS	LOW	0	0	0	100	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
2921.0	SWC	EX LOW	-	-	-	-	NIL	LOW	N. SENECTUS, LOWER “b”		NON-MARINE
2929.0	SWC	LOW	0	0	11	89	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
2975	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
2983.0	SWC	LOW	0	0	12	88	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
2990	CUTTS	LOW	0	0	0	100	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
3000	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
3025	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
3035	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
3045.0	SWC	LOW	0	0	6	94	NIL	MODERATE	N. SENECTUS, LOWER “b”		NON-MARINE
3070	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”		NON-MARINE
3080	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “b”	D2	NON-MARINE
3090.0	SWC	LOW	0	0	1	99	NIL	HIGH	N. SENECTUS, LOWER “a”	Bp4	NON-MARINE
3130.0	SWC	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3175.0	SWC	LOW	0	0	7	93	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3185	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3193.0	SWC	LOW	0	0	4	96	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3198.0	SWC	LOW	0	0	0	100	NIL	MODERATE	N. SENECTUS, LOWER “a”		NON-MARINE
3230	CUTTS	LOW	0	0	0	100	NIL	MODERATE	N. SENECTUS, LOWER “a”		NON-MARINE
3239.0	SWC	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3250	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3260	CUTTS	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3263.0	SWC	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”		NON-MARINE
3287.5	SWC	LOW	0	0	0	100	NIL	HIGH	N. SENECTUS, LOWER “a”	Bp2	NON-MARINE
3323.0	SWC	EX LOW	0	0	0	100	NIL	HIGH	?T. APOXYEXINUS	Bp5	NON-MARINE
3341.0	SWC	LOW	0	0	0	100	NIL	LOW	?T. APOXYEXINUS		NON-MARINE
3349.0	SWC	LOW	0	0	0	100	NIL	MODERATE	?T. APOXYEXINUS		NON-MARINE
3355.5	SWC	LOW	0	0	0	100	NIL	LOW	?T. APOXYEXINUS	Bp5	NON-MARINE

*1 DIVERSITY	
V HIGH	30+ SPECIES
HIGH	20-29 SPECIES
MOD	10-19 SPECIES
LOW	5-9 SPECIES
EX LOW	1-4 SPECIES

*2 CONFIDENCE RATINGS	
A = Core Bp = Sidewall core (percussion)	1 = Excellent Confidence High diversity with key species
Br = Sidewall core (rotary/mechanical) C = Coal cuttings	2 = Good Confidence Moderate diversity with key species
D = Ditch cuttings E = Junk basket	3 = Fair Confidence Low diversity with key species
F = Miscellaneous/unknown G = Outcrop	4 = Poor Confidence Moderate to high diversity without key species
	5 = Very Low Confidence Low diversity without key species

*3 ENVIRONMENTS	DINOFLAGELLATE CONTENT%	DINOFLAGELLATE DIVERSITY	FRESHWATER ALGAE CONTENT%
OFFSHORE MARINE	67 to 100	VERY HIGH	LOW
SHELFAL MARINE	34 to 66	HIGH	“
NEARSHORE MARINE	11 to 33	MODERATE	“
VERY NEARSHORE MARINE	5 to 10	MODERATE-LOW	“
MARGINAL MARINE	<1 to 4	LOW-VERY LOW	“
BRACKISH	0, SPINY ACRITARCHS ONLY	EXTREMELY LOW	“
NON-MARINE (UNDIFF)	0, NO SPINY ACRITARCHS	NIL	LOW
NON-MARINE (LACUSTRINE)	0, NO SPINY ACRITARCHS	NIL	MODERATE 10%+

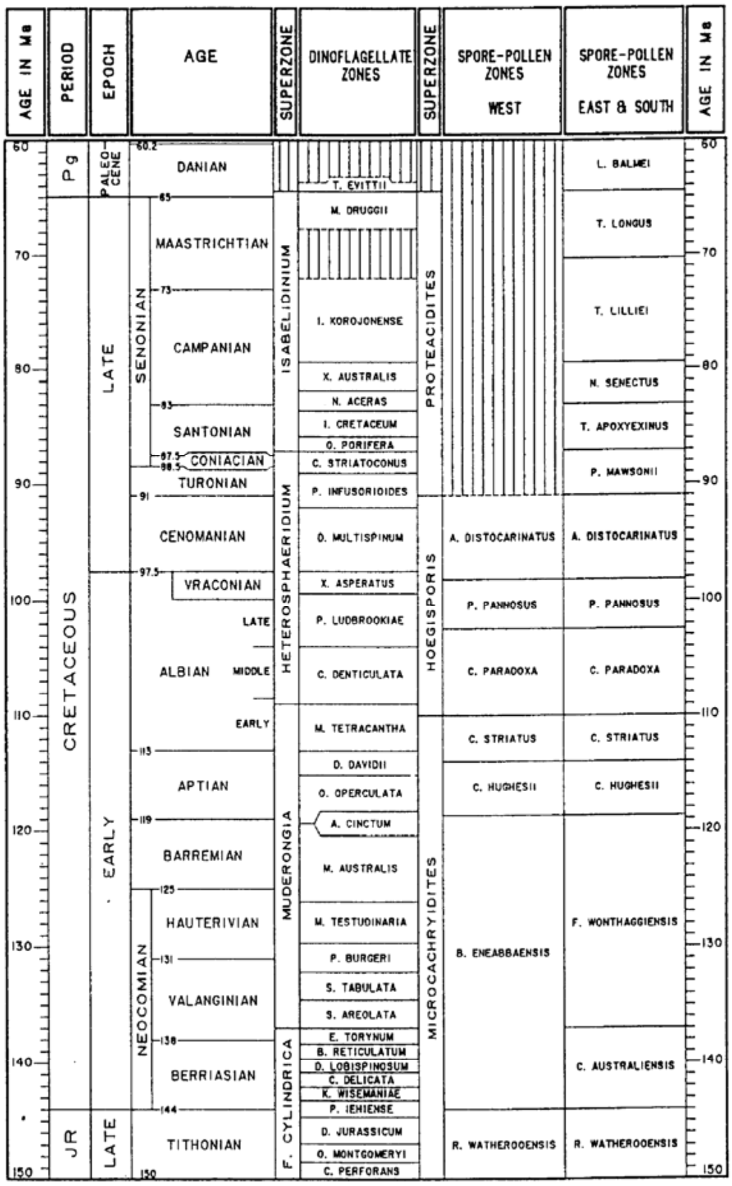


Figure 1a ZONATION FRAMEWORK - LATEST JURASSIC TO PALEOCENE

(from Helby et al, 1987)

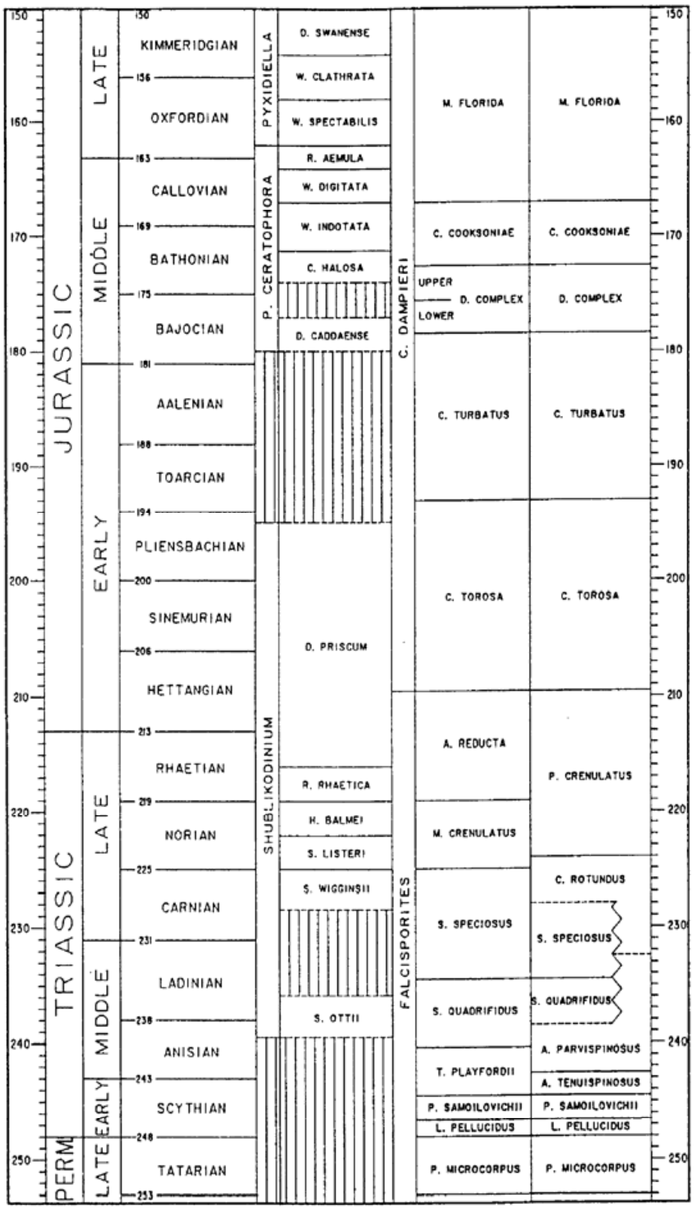


Figure 1b ZONATION FRAMEWORK - LATE PERMIAN TO LATE JURASSIC
(from Helby et al, 1987)

No.	SPORE-POLLEN EVENTS	SPORE-POLLEN SUBZONES		No.	DINOFLAGELLATE EVENTS	DINOFLAGEL-LATE SUBZONES	DINOFLAGELLATE SUBZONE (SENSU PARTRIDGE)
	base *P. grandis* *	Upper *L. balmei*				*A. hyperacanthum*	
	top *I. "antipoda"*		c				
	top frequent *A. obscurus*		b		top *E. crassitabulata*	*E. crassitabulata*	
	base frequent *A. obscurus*	Lower *L. balmei*			base *E. crassitabulata*		
	base common *L. balmei*						
	base *I. "antipoda"*		a		top *T. evittii*	*T. evittii*	
	top consistent *G. rudata*				base *T. evittii*		
	top *T. confessus* *				top *M. conorata*	*M. druggii*	
	top *T. verrucosus*		c		base *M. conorata*		
	top *T. sectilis, T. lilliei, F. longus*						
	top frequent *G. rudata*	Upper *F. longus*					
	top common *A. obscurus*		b				
	base common *A. obscurus*						
	base *G. rudata* > *N. endurus*		a				
	base *S. puncatus*						
	top common *N. endurus* *		c				
	base common *G. rudata* **						
			b				
	top *T. "megasectilis"* **	Lower *F. longus*					
	base *T. "megasectilis"*		a				
1.	base *F. longus* *						
2.	base *T. verrucosus* *						
3.	base *T. waipawaensis*		b				
4.	top *F. sabulosus*						
5.	more consistent *F. sabulosus* **						
		Upper *T. lilliei*		6.	consistent dinoflagellates *		
			a	7.	freq/common dinoflagellates	Upper *I. marshallii*	
				8.	top *I. marshallii*		
				9.	base *C. bretonica*		
10.	*N. endurus* influx *		c				
				11.	top common *I. marshallii* *	Middle *I. marshallii*	
12.	top consist/frequent *F. sabulosus* **		b				*V. spinulosa*
		Lower *T. lilliei*		13.	base common *I. marshallii* *		
14.	top *G. rudata* increase **						
			a	15.	base *I. marshallii*		
16.	base *B. sectilis* *					Lower *I. marshallii*	
17.	base *T. lilliei* *						
				18.	base *V. spinulosa*		
			b	19.	top frequent *I. variabile*		
				20.	top *T. suspectum* *	Upper *I. variabile*	
21.	top frequent *F. sabulosus* **	Upper *N. senectus*					
				22.	top common *I. variabile* *	Middle *I. variabile*	
			a	23.	top *Nelsoniella* spp. *		*T. suspectum*
				24.	top frequent *Chatangiella* spp.	Lower *I. variabile*	
25.	base *G. rudata* *						
26.	base frequent *Nothofagidites* **		c				
27.	base frequent *F. sabulosus* **	Lower *N. senectus*	b				
				28.	top common *C. arvensis* *	*C. arvensis*	*C. arvensis*
			a	29.	base common *C. arvensis* *		
30.	base consist *Nothofagidites* *						
31.	base *F. sabulosus*					*I. ponticum*	*I. ponticum*
				32.	top common *I. ponticum*		
		Upper *T. apoxyexinus*		33.	base *T. suspectum*		
				34.	top common *C. porosa* *	*C. porosa*	*C. porosa*
				35.	base common *C. porosa*		
36.	base frequent *Proteacidites* *						
		lower *T. apoxyexinus*					
	base *T. gillii**						
37.	base *C. ohaiensis, Proteacidites*spp.						

FIGURE 2 **DETAILED SUBZONATION SUMMARY (MORGAN 2003)**

Single Asterisk * shows defining event for upper/lower subzone
Double Asterisk ** shows defining event for a/b/c sub-subzones

FIGURE 3 MATURITY PROFILE : WEST MOONFISH-1

3 PALYNOSTRATIGRAPHY

3.1 1634.0 m (swc) : ?*P. asperopolus* Zone

Recognisable palynomorphs are rare amongst the totally dominant plant debris. Assignment is suggested by the influx of *Haloragacidites harrisii* and possible *Proteaceacidites asperopolus* in a non-descript assemblage. Very common is *Phyllocladidites mawsonii* with common *Falcisporites similis* and *Gleicheniidites* spp. Frequent are *Araucariacites australis, Cyathidites spendens, Dilwynites granulatus* and *H. harrisii*. Rare elements include *Clavifera triplex*, *Malvacipollis subtilis, Nothofagidites* spp., *Myrtaceidites parvus, Proteacidites kopiensis, Proteacidites rectomargimus* and *Verrucosisporites kopukuensis*.

Very rare dinoflagellates comprise only the long-ranging *Spiniferites ramosus*.

Marginal marine environments are indicated by the extremely rare dinoflagellates amongst the dominant and diverse spores and pollen.

Yellow spore colours indicate early immaturity for oil and immaturity for gas/condensate.

3.2 1655.0 m (swc) – 1793.0 m (swc) : *M. diversus* Zone, middle to upper subzones

Plant debris dominates these assemblages. Assignment is indicated by the oldest occurrences of markers confirned to the middle subzone and younger (*Proteacidites ornatus* at 1793.0 m, *Proteacidites tuberculiformis* at 1766.0 m, *Proteacidites leightonii* at 1710.0 m). It seems highly likely that the upper part of this interval should belong to the upper subzone, but the key markers were not seen. Overall, common elements are *Cyathidites australis* (1655.0 m) *Araucariacites australis* and *Dilwynites granulatus* with abundant dinoflagellates (1710.0 m), *Falcisporites similis* (1766.0 m) and *Proteacidites grandis* (1793.0 m). Frequent taxa include *A. australis, Cyathidites* spp., *D. granulatus, F. similis* and *Proteacidites* spp. Rare element include *H. harrisii, Intratriporopollenites notabilis, P. grandis, P. leightonii, P. tuberculiformis* and *Nothofagidites* spp. Minor reworking of *Gambierina rudata* seems to have occurred at 1669.0 m and be responsible for the *L. balmei* Zone assignment previously assigned to that swc.

Microplankton occur in most samples but are not zone diagnostic. At 1634.0 m, freshwater *Botryococcus* is frequent with single marine *Apectodinium homomorphum* and *Cordosphaeridium* sp. seen suggesting marginal marine environments. At 1669.0 m, no dinoflagellates were seen, suggesting non-marine environments. At 1710.0 m, dinoflagellates are extremely common but comprise only the two species *Morkallacysta pyramidalis* and *Palaeoperidinium tasmaniense* which are considered to bloom in freshwater or brackish lakes and is often seen in the middle *M. diversus* Zone in the Gippsland and Bass Basins. Also present is common freshwater *Botryococcus*. At 1766.0 m, dinoflagellates are absent, indicating non-marine environments, and common freshwater *Botrococcus* suggests lake environments. At 1793.0 m, a single *Deflandrea flounderensis* suggests marginal marine environments.

Yellow spore colours indicate immaturity for oil and immaturity for gas/condensate.

3.3 1845.0 m (swc) : *M. diversus* Zone, lower subzone

Plant debris is abundant in these samples. Assignment is based on *Proteacidites grandis* without older markers. Common are *Cyathidites minor, C. australis* and *Proteacidites* spp. with frequent *A. australis*, *F. similis*, *Laevigatosporites ovatus* and *V. kopukuensis*. Rare elements include *Camarazonosporites ohaiensis* and *P. grandis*.

Microplankton include one marine dinoflagellate *Ceratiopsis ?speciosus* indicating marginal marine environments, and common freshwater algae indicating a nearby lake system. A back barrier coastal lagoon with tidal washover or similar is possible.

Yellow to light brown spore colours indicate immaturity for oil and immaturity for gas/condensate.

3.4 1917.0 m (swc) : Indeterminate

Organic yield from this sample is extremely low with inertinite and cuticle dominant and almost no recognisable palynomorphs. The lithology is very unfavourable, being a pallid claystone.

3.5 1938.0 m (swc) – 2144.0 m (swc) : *L. balmei* Zone, upper subzone

Plant debris is abundant with variable fossil yields due to unfavourable lithologies. Assignment is indicated at the top by youngest *Lygistepollenites balmei* and at the base by the absence of older markers. For this reason and the poor yields, the interval base is poorly constrained. Within the interval, common are *Cyathidites* spp., *F. similis, L. balmei* and *Phyllocladidites mawsonii* with frequent *A. australis, Triletes tuberculiformis* and *Vitreisporites pallidus* and rare *Proteacidites tenuiexinus* and *V. kopukuensis*.

Microplankton comprise only freshwater *Botryococcus*, indicating non-marine environments with common *Botryococcus* at 2024.0 m suggesting lake deposition.

Light brown spore colours indicate marginal maturity for oil and immaturity for gas/condensate.

3.6 2172.0 m (swc) – 2304.0 m (swc) : *L. balmei* Zone, lower subzone

Inertinite is abundant with poor to very poor palynomorph yields due to unfavourable lithologies. Assignment is indicated at the top by youngest *Proteacidites angulatus* as recorded by Partridge at 2172.0 m and youngest *Tetracolporites verruocusus* herein at 2249.0 m and at the base by oldest *L. balmei* without older markers. Common are *C. minor, F. similis* and *L. balmei* with frequent *A. australis, Cyathidites spendens, P. mawsonii* and *V. pallidus.* Rare elements include *Cicatricosisporites australiensis, C. ohaiensis* and *N. endurus*.

Microplankton comprise only minor freshwater *Botryococcus,* with no saline dinoflagellates seen amongst the dominant spores and pollen.

Light brown spore colours indicate marginal maturity for oil and early marginal maturity for gas/condensate

3.7 2316.0 m (swc) – 2472.0 m (swc) : *F. longus* Zone, upper subzone

Yields in this interval were again variable from fair to very poor due to unfavourable lithologies. The zone top is taken on youngest *Tubulifloridites lilliei* with *Tricolpites confessus* at 2316.0 m as recorded by Partridge but given the poor yields immediately below, it could be as low as 2428.0 m where *Gambierina rudata* is common and associated with youngest *Battenipollis sectilis* and *Forcipites longus*. The base is taken on the base of frequent *G. rudata* and rare *Stereisporites punctatus*. Common are *A. australis, Cyathidites* spp., *F. similis* and *G. rudata* with frequent M. *antarcticus* and *P. mawsonii*. Rare elements include *L. balmei, S. punctatus, T. lilliei*, *B. sectilis*, *F. longus* and *N. endurus.*

Microplankton comprise only freshwater *Botryococcus*, indicating non-marine environments and some lakes.

Spore colours show a thermal spike as described by Partridge from light brown at the top, increasing to dark brown/black at 2459.0 m, then passing back to the well trend of light-mid brown by 2515.0 m. Partridge suggests that such a spike might be caused by a thin intrusion, very high temperature fluid flow along a fault or joint plane or particularly permeable reservoir bed.

3.8 2490.0 m (swc) – 2555 m (swc) : Indeterminate

Inertinite dominates the samples in this interval with palynomorphs rare and non-descript, or absent. The key markers are absent. In the better yielding samples, common are *A. australis, Cyathidites* spp., *F. similis* and *Gleicheniidites* spp. Frequent are *C. ohaiensis, Osmundacidites wellmanii* and *Proteacidites* spp. Rare elements include *Gambierina edwardsii, G. rudata, T. confessus* and *P. mawsonii*.

Microplankton include only freshwater *Botryococcus* suggesting non-marine environments.

Mid brown spore colours suggest maturity for oil and early maturity for gas/condensate.

3.9 2561.5 m (swc) - 2565 m (cutts) : *F. longus* Zone, lower subzone

Assignment is indicated by oldest *F. longus* and *T. verrucosus* in this cuttings sample, without younger markers. Common are *F. similis* and *P. mawsonii* with frequent *C. minor, Gleicheniidites* spp. and *L. ovatus*. Rare elements include *G. rudata, T. confessus, F. longus, N. endurus* and *T. verrucosus*.

Non-marine environments are indicated by the totally dominant and diverse spores and pollen, and absence of saline markers.

Light to mid brown spore colours indicate early maturity for oil and early marginal maturity for gas/condensate.

3.10 2574.5 m (swc) – 2646.0 m (swc) : *T. lilliei* Zone

Plant debris continues to be dominant. Assignment is based at the top on the absence of younger markers and confirmed by youngest *Forcipites sabulosus* at 2581.0 m. The base is defined on oldest definite *Battenipollis sectilis* (2620.0 m) and *T. lilliei* (2646.0 m). Common taxa include *C. minor, F. similis, P. mawsonii* and *Proteacidites* spp. with frequent *A. australis*, *D. granulatus, L. ovatus* and *V. pallidus.* Rare but key elements include *B. sectilis, N. endurus, Peninsulapollis gillii, T. confessus, Tricolporites apoxyexinus* and *T. lilliei*.

Non-marine environments are indicated by the absence of saline markers amongst the dominant and highly diverse pollen and spores. Freshwater *Botrococcus* is a consistent component but does not achieve high proportions.

Light to mid brown spore colours indicate early maturity for oil and immaturity for gas/condensate.

3.11 2653.0 m (swc) – 2715 m (cutts) : *N. senectus* Zone, upper subzone

Plant debris continues to dominate samples. Subzonal assignment is based on the absence of younger markers at the top, and oldest *G. rudata* at the base. Since *G. rudata* tends to be intermittent in occurrence, the zonal base has some associated error. Common are *C. australis*, *C. minor*, *F. similis* with frequent *A. australis, N. endurus*, *P. mawsonii* and *V. pallidus*. Rare elements include *C. ohaiensis, C. rudata*, *Forcipites stipulatus* and *T. confessus*. Within the subzone, top frequent *F. sabulosus* occurs at 2670.5 m and it continues to be frequent to the base suggesting the following subdivision, as defined on Figure 2.

2653.0 m (swc) – 2665 m (cutts : *N. senectus* Zone, upper “b” sub-subzone
2670.5 m (swc) – 2715 m (cutts) : *N. senectus* Zone, upper “a” sub-subzone

3.12 2728.0 m (swc) – 3287.5 m (swc) : *N. senectus* Zone, lower subzone

Yields are mostly good, with plant debris dominant. Assignment is indicated at the top by the absence of younger markers, and at the base by oldest *F. sabulosus*. Within the interval, oldest frequent *N. endurus* occurs at 2765 m and oldest frequent

F. sabulosus occurs at 3080 m, providing the following subdivisions, as defined on Figure 2.

2728 m (cutts) – 2765 m (cutts) : *N. senectus* Zone, lower "c" subzone
2780 m (cutts) – 3080 m (cutts) : *N. senectus* Zone, lower "b" subzone
3090.0 m (swc) – 3263.0 m (swc) : *N. senectus* Zone, lower "a" subzone

Common to abundant is *F. similis* with frequent *A. australis, C. minor, M. antarcticus, O. wellmanii, P. mawsonii, Proteacidites* spp., and *V. pallidus*. In the upper subzone, *N. endurus* and *F. sabulosus* are also frequent. In the middle subzone, *F. sabulosus* is also frequent, but it becomes rare but continues consistent in the lower subzone. Oldest *N. endurus* occurs at 2847.0 m (swc) and oldest *N. senectus* occurs at 3080 m (cutts). Rare elements include *P. gillii, T. confessus* and some undescribed pollen noted by Partridge which may have potential in the future. The subzone is very thick, similar to that in Snapper-1.

The absence of saline markers indicate non-marine environments, and is supported by frequent freshwater *Botryococcus* amongst the totally dominant spores and pollen.

Mid brown spore colours indicate maturity for oil and marginal maturity for gas/condensate.

3.13 3323.0 m (swc) – 3355.5 m (swc) : ?*T. apoxyexinus* Zone

Inertinite dominates these samples. Very poor yields feature abundant *Falcisporites similis* with common *A. australis, Cyathidites* spp., *Microcachryidites antarcticus* and *Osmundacidites wellmanii*. Rare elements include *Cicatricosisporites australiensis, P. mawsonii, Proteacidites* spp. and *Triporoletes reticulatus.* Assignment is tentative and based on the absence of younger markers.

Non-marine environments are indicated by the absence of saline markers and the dominant spores and pollen.

Mid brown spore colours indicate maturity for oil and early maturity for gas/condensate.

4 REFERENCES

Helby, R.J, Morgan, R.P and Partridge, A D (1987) A Palynological Zonation of the Australian Mesozoic *In* Studies in Australian Mesozic Palynology *Assoc. Australas. Palaeontols. Mem. 4, 1-94*

Morgan, R.P. (2004) Palynology of the bottomhole of Conger-1, Gippsland Basin, Australia *unpubl. rept.* for Esso Australia

Well Name : WEST MOONFISH-1

Operator : ESSO

Interval : 1614m - 3376m

Scale : 1:5000

Chart date: 07 July 2005

Palynological Data Chart : INTERPRETIVE DATA

% Abundance histogram : Highest occurrence

Roger Morgan

WEST MOONFISH-1

Morgan Palaeo Associates
Maitland, South Australia

Enclosure 1

Sampling
Cutting
Core
Sidewall core

Text Keys
*1 % within discipline (40mm=100%)
*2 In-Situ occurrences

APPENDIX 4

VELOCITY SURVEY REPORT

Q-Borehole Survey Report

Schlumberger

Survey type: VI-VSP Report

Company: ESSO Australia Pty Ltd

Well: West Moonfish-1

Field: West Moonfish

Country: Australia

Run: 3

Date: 7-Feb-2005

Recorded by: D.Molokhov/S. Nakanishi

Witnessed by: Mike Power/ Greg O'Neill

Introduction

On the 7 of February 2005 a Vertical Incident VSP survey using a boat source was carried out for Esso Australia Pty Ltd on the WSET MOONFISH-1 well in the offshore, West Moonfish Field.

A triple G-Gun cluster was deployed from a source vessel (Ray J. Hope). The source (air-gun) was positioned using DGPS system (Fugro survey). The position of the source was recorded with each shot of downhole signal. The guns were submerged from a buoy to 5.5 meters below water surface. 1 hydrophone was deployed 5 meters below the center of the gun cluster.

Survey Results

Total acquisition time for the survey was recorded as 12 hrs from rig up to full rig down. Very slow running-in speed (500 ~ 2000 ft/hr) below 2790 m.

Data quality generally for the Vertical Incident VSP considered to be good throughout the survey; data was recorded from 3364 to 1065 MD. At least 5 good repeatable shots were recorded at each VSP level (3364 m to 1225 m) and Check-Shot level (1205 m to 1065 m). the Check-Shot survey was ended by the loss of signal due to strong casing arrival (noise).

Casing arrivals were evident above on levels above 1045 MD and a decision was made to pull out of the hole when is was decided that no useable data even for first break picking, on either X, Y, and Z components was being recorded.

Macha TGS-8 Gun controller was used for the auto-tuning of cluster gun. Depth and Pressure of Cluster gun were monitored by TGS-8 at each shot for source QC purpose.

The record of stack No 5 and 7 has wrong depth stamp. Correct depth is

Stack No 5,

VSIS-1 3225 m , VSIS-2 3245 m, VSIS-3 3265m, VSIS-4 3285 m

Stack No 7

VSIS-1 3065 m , VSIS-2 3085 m, VSIS-3 3105m, VSIS-4 3125 m

Shot summary also shows wrong listing. VSP processing is done excluding theses stations. Final report will be corrected these record.

Depth offset is observed from GR Log (1.5 m shallow). This depth offset is not corrected in this report.

Conclusions and Recommendations

Good quality VSP data was acquired providing accurate Time-Depth information and corridor Stack.

This VSP dataset can also be used as input for advance VSP Processing products. Recommended further processing options:

- Sonic Calibration and Synthetic Seismogram generation
- Surface seismic Composite Displays
- Phase Matching
- Q-Analysis

Well Information

Company	**ESSO Australia Pty Ltd**
Well	**West Moonfish-1**
Field	**West Moonfish**
Country	Australia
State	Victoria
Logging Date	7-Feb-2005
Run Number	3
Service Order	
Well Head (Latitude)	32 9' 0.48" S
Well Head (Longitude)	147 58' 40.63" E
Well Head (X Coordinate)	585687.3 UTM
Well Head (Y Coordinate)	5777075.5 UTM
Total Depth - Driller	3369.0 m
Total Depth - Logger	3370.5 m
Maximum Hole Deviation	37.5 deg
Azimuth of Maximum Deviation	
Program Version	13C0-300
Bit Size	8.500 in
Recorded by	D.Molokhov/S. Nakanishi
Witnessed by	Mike Power/ Greg O'Neill

Elevation Information

Permanent Datum	MEAN SEA LEVEL
Elevation Permanent Datum	0.0 m
Above Permanent Datum	39.2 m
Drilling Measured From	DRILL FLOOR (RT)
Derrick Floor	39.2 m
Ground Level	-52.0 m
Kelly Bush	39.2 m
Log Measured From	DRILL FLOOR (RT)
Elevation Log Zero	39.2 m

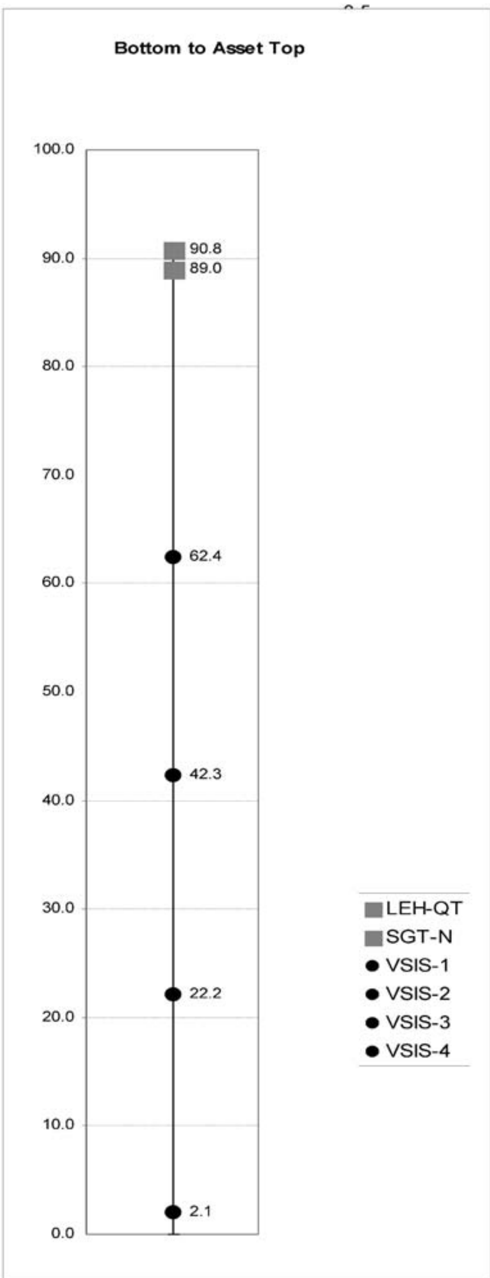
Depth Corrected Information

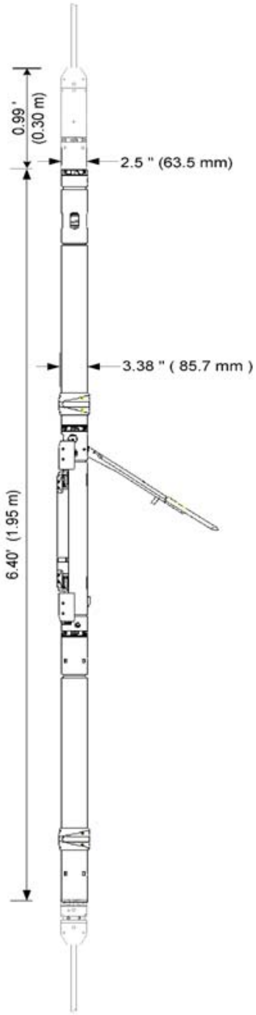
Water Velocity	1524.0 m/s
Seismic Reference Datum	0.0 m

Remarks

Well Sketch

	meter
LEH-QT	0.89
DTC-H	0.91
SGT-N	1.68
AH199	0.31
VSIC (PS)	6.40
VSII-1	18.17
VSIS-1	1.95
VSII-2	18.17
VSIS-2	1.95
VSII-3	18.17
VSIS-3	1.95
VSII-4	18.17
VSIS-4	1.95
VSIA	0.10
TOTAL	**90.77**





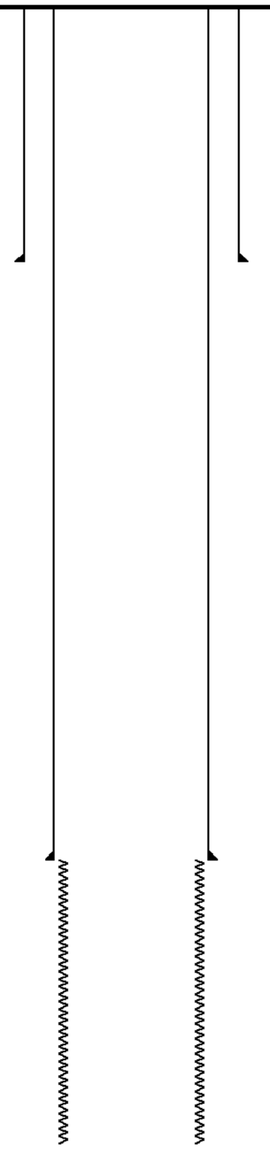
Tool Sketch

Client: ESSO Australia Pty Ltd
Well: West Moonfish-1
Field: West Moonfish
State: Victoria
Country: Australia

Drawing Date: 2/6/2005
API #:

Rig Name: ENSCO 102
Reference Datum: Mean Sea Level
Elevation: 52.0 m

Production String	OD (in)	ID (in)	MD (m)	Well Schematic	MD (m)	OD (in)	ID (in)	Casing String
					0.0	13.375		Casing String
					0.0	9.625		Casing String
					755.4	13.375		Casing Shoe
					2527.0	9.625		Casing Shoe
					2527.0	8.500		Borehole Segment
					3369.0	8.500		Borehole Segment Bottom



ALL DEPTHS ARE DRILLERS DEPTHS

Well Information

Well Type	Deviated Exploration Well
Rig / Platform Type	ENSCO 102
Well Reference Azimuth (Magnetic, True, or Grid North)	Grid North

Elevation Information

Water Depth	52 meters

Sea Condition

Sea Condition	Slight
Wave Height	0.5 m
Tide Level	0.8 m

Velocity Information

Water Velocity	1524 m/sec used for static correction

Remarks:

- The tide level used “zero” for the static correction.
- Static correction of transit time does not use tide correction in this report.

Downhole Equipment Information

Tool Type	VSIT
Surface Equipment	WASM-AB sn838, TGS-8 sn118741, 118741
Combined Tool	DTC-H 8457, SGT-N 9901
Number of Shuttles	4
Nominal Receiver Spacing	20.0 m
Gimbaled (Y/N)	No
Downhole Geophone Type	GAC-D 3-axis orthogonal
Sensitivity	0.5 V/G 3%
Natural Frequency	20 Hz
Damping Factor	N/A
DC Resistance	1500 Ohms 3% @25 degC
Measurement Specification	
Dynamic range	> 105 dB at 36 dB
Distortion	< -90 dB
Analog Low-Cut filter	0.3 Hz, -6 dB/Oct
Digital Low-Cut filter	None
DC Offset removal	Averaging by surface software
Digital High-Cut filter	Linear phase at down hole
Pass band ripple	+- 0.01 dB
Stop band attenuation	< -130 dB
Bandwidth	80% of Nyquist frequency
Test Signal harmonic distortion	< -110 dB
Tool SN	
VSPC-AA	8074
VSCC-BA	8074
VSII-AB (13.17 m)	8233
Receiver #1 (VSIS-CA)	8313
VSII-AB (13.17 m)	8223
Receiver #2 (VSIS-CA)	8312
VSII-AB (13.17 m)	8234
Receiver #3 (VSIS-CA)	8314
VSII-AB (13.17m)	8235
Receiver #4 (VSIS-CA)	8315
VSIA	8086

General Information

Survey Type	Vertical Incidence VSP
Surface Recording Length	1000.0 ms
Suface Sampling Rate	1.0 ms
Downhole Recording Length	5000.0 ms
Downhole Sampling Rate	1.0 ms
Top of Survey	824.8 m
Bottom of Survey	3363.5 m
Number of Shots	163
Number of Downhole Traces	652
Number of Downhole Traces used for Processing	537

Source Configuration (Air Gun)

Source Location (Rig, Boat, Pit, Borehole)	Boat
Source Group ID (A, B, C, …)	Boat
Source Offset (for fixed offset)	N/A
Source Azimuth (for fixed offset)	N/A
Source Depth from Surface	5.5 m
Source Depth from Logging Zero	44.7 m

Gun Controller Type	Macha TGS-8
Gun Controller Model Name	TGS-8
Gun Controller Serial Number	MWA 118771, 118741
Gun Type	G-Gun
Gun Serial Number(s)	2817G, 2818H, 1819I
Gun Configuration (3 Gun Cluster, Gun Array, etc.)	3 Gun Delta Cluster 90 cm spacing (WSGC-T90)
Gun Chamber Volumes	3 x 250 cubic Inch
Gun Pit/Borehole Information	N/A
Compressor Type	N2 Gas Bottles 6 racks (16 x 44 lts) @4000psi
Compressor Flow Rate	N/A
Air Regulator Pressure	1800 psi

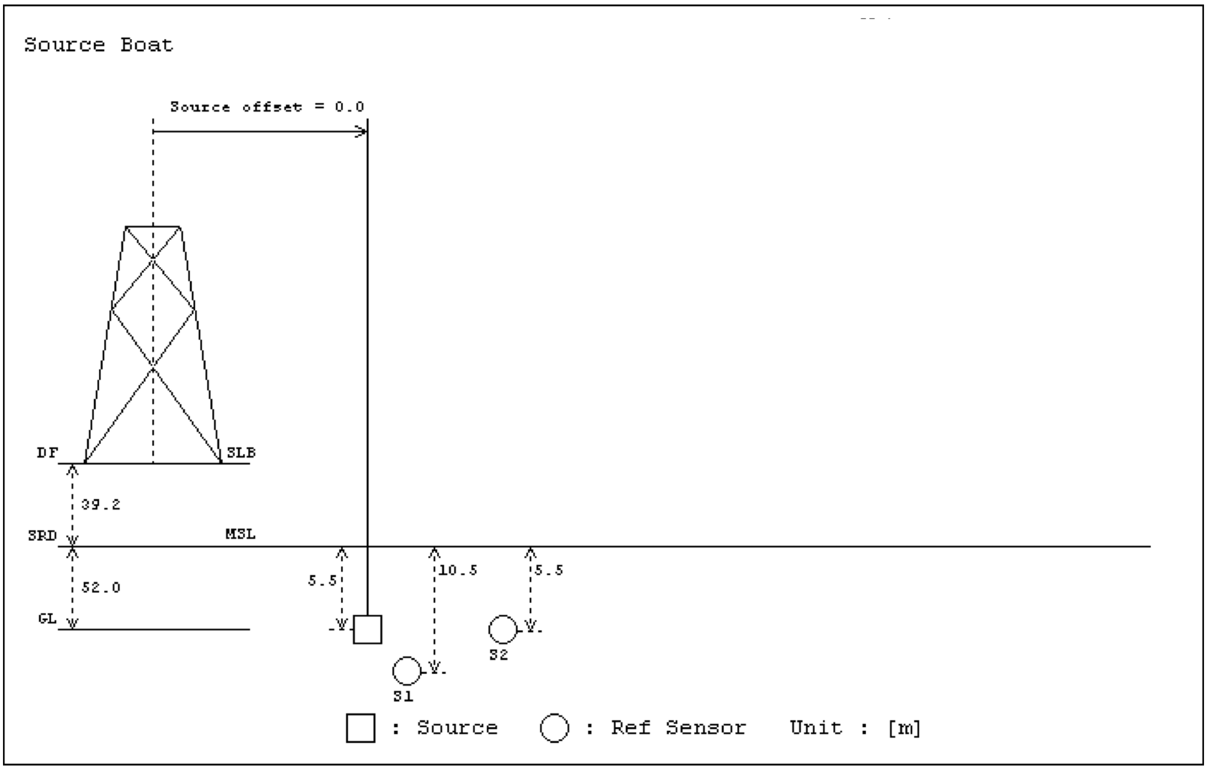
Surface Sensor Configuration

Number of Surface Reference Sensors	2
Surface Recording Length	1000 msec
Surface Sampling Rate	1 msec
Sensor Type (S1)	MP24-L3 (UH signal through TGS-8)
Sensor Type (S2)	PF signal provided by TGS-8
Sensor Type (S3)	None
Sensor Depth from Surface (S1)	10.5 m
Sensor Depth from Surface (S2)	5.5 m
Sensor Depth from Surface (S3)	N/A
Sensor Depth from Logging Zero (S1)	49.7 m
Sensor Depth from Logging Zero (S2)	44.7
Sensor Depth from Logging Zero (S3)	N/A
Sensor Offset from Source (S1)	N/A
Sensor Offset from Source (S2)	N/A
Sensor Offset from Source (S3)	N/A

Remarks

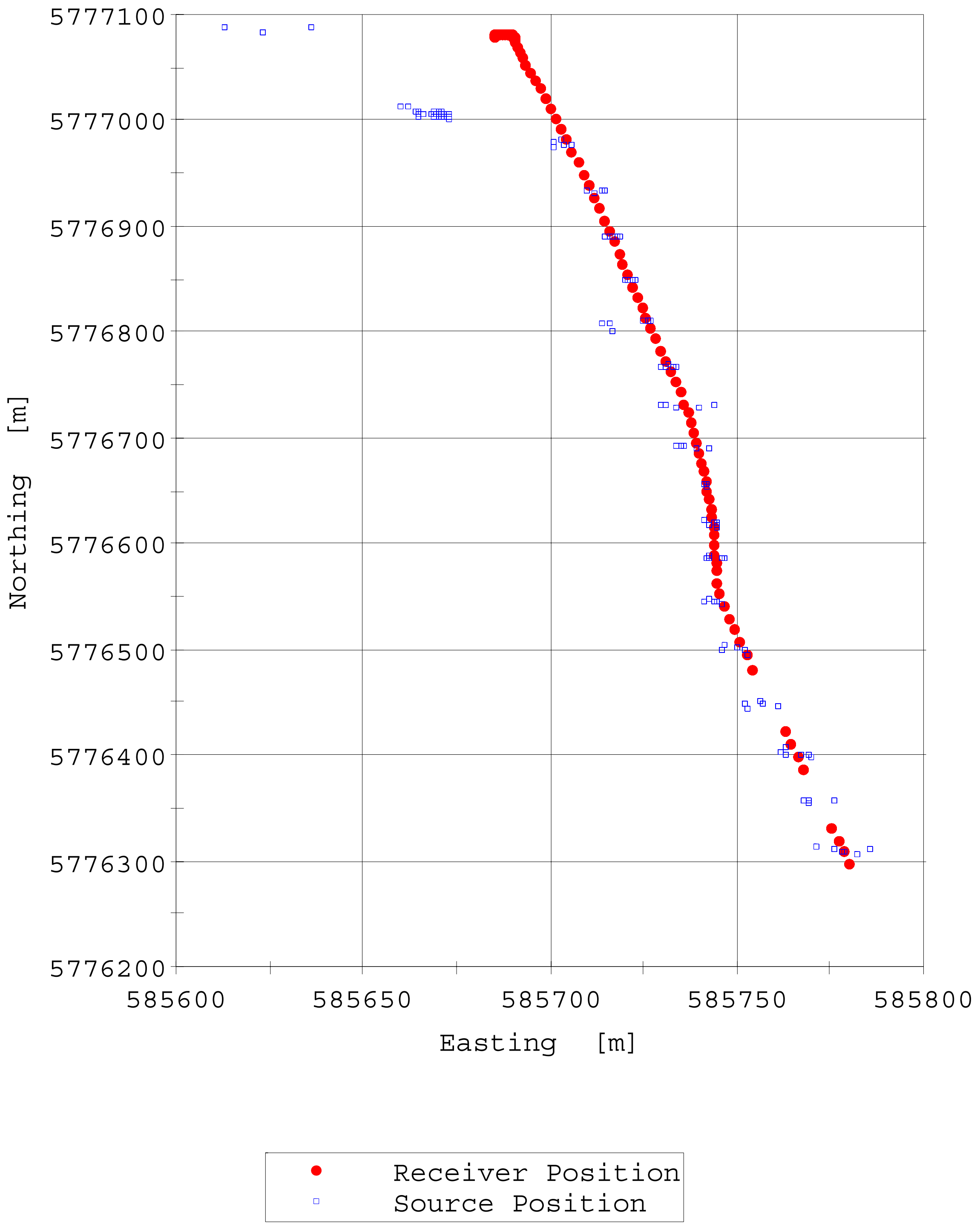
- The Delta Cluster Gun was suspended by floatation Buoys.
- Auto-tuning function by Gun Controller TGS-8 was utilized for 3 gun cluster using M/P Time-Break sensor of each gun.

Source Geometry Sketch



Schlumberger

Geometry Infomation Page (X-Y)



Schlumberger

Shot Summary Listing (1/5)

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
1065.0	1	32	-1.1	9.5	762.6	163, 164, 165, 166, 167
1085.0	2	32	6.4	9.5	698.0	163, 164, 165, 166, 167
1105.0	3	32	-2.6	9.5	813.2	163, 164, 165, 166, 167
1125.0	4	32	-19.6	9.5	669.9	163, 164, 165, 166, 167
1145.0	1	31	-3.0	9.5	744.4	160, 161, 162
1165.0	2	31	6.6	9.5	689.7	160, 161, 162
1185.0	3	31	-2.7	9.5	814.0	160, 161, 162
1205.0	4	31	-38.9	9.5	670.4	160, 161, 162
1225.0	1	30	-11.3	9.4	741.1	155, 156, 157, 158, 159
1245.0	2	30	8.0	9.5	667.8	155, 156, 157, 158, 159
1265.0	3	30	-2.9	9.5	802.2	155, 156, 157, 158, 159
1285.0	4	30	-41.5	9.5	669.5	155, 156, 157, 158, 159
1304.9	1	29	-12.1	9.5	740.4	150, 151, 152, 153, 154
1324.9	2	29	5.5	9.5	674.9	150, 151, 152, 153, 154
1344.9	3	29	9.6	9.5	794.3	150, 151, 152, 153, 154
1364.9	4	29	-48.6	9.5	661.6	150, 151, 152, 153, 154
1384.9	1	28	-23.8	9.5	717.6	145, 146, 147, 148, 149
1404.9	2	28	11.4	9.5	658.7	145, 146, 147, 148, 149
1424.9	3	28	9.3	9.5	808.3	145, 146, 147, 148, 149
1444.9	4	28	-47.5	9.5	631.4	145, 146, 147, 148, 149
1465.0	1	27	-24.3	9.4	723.8	140, 141, 142, 143, 144
1485.0	2	27	18.1	9.5	655.9	140, 141, 142, 143, 144
1505.0	3	27	17.8	9.5	787.1	140, 141, 142, 143, 144
1525.0	4	27	-56.7	9.5	654.1	140, 141, 142, 143, 144
1544.9	1	26	-24.0	9.5	704.7	135, 136, 137, 138, 139
1564.9	2	26	70.7	9.5	647.7	135, 136, 137, 138, 139
1584.9	3	26	29.4	9.5	801.2	135, 136, 137, 138, 139
1604.9	4	26	-80.9	9.5	623.6	135, 136, 137, 138, 139

Shot Summary Listing (2/5)

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
1624.9	1	25	-34.4	9.4	691.4	130, 131, 132, 133, 134
1644.9	2	25	119.0	9.5	651.2	130, 131, 132, 133, 134
1664.9	3	25	30.4	9.5	771.3	130, 131, 132, 133, 134
1684.9	4	25	25.4	9.4	611.1	130, 131, 132, 133, 134
1705.0	1	24	-113.6	9.4	692.5	125, 126, 127, 128, 129
1725.0	2	24	146.2	9.5	651.2	125, 126, 127, 128, 129
1745.0	3	24	42.9	9.5	779.5	125, 126, 127, 128, 129
1765.0	4	24	-1.0	9.4	598.8	125, 126, 127, 128, 129
1784.8	1	23	154.5	9.5	692.7	120, 121, 122, 123, 124
1804.8	2	23	75.8	9.4	652.6	120, 121, 122, 123, 124
1824.8	3	23	-1.7	9.5	722.8	120, 121, 122, 123, 124
1844.8	4	23	-13.6	9.4	572.7	120, 121, 122, 123, 124
1865.0	1	22	34.0	9.3	651.6	115, 116, 117, 118, 119
1885.0	2	22	14.4	9.3	634.0	115, 116, 117, 118, 119
1905.0	3	22	-10.7	9.4	738.3	115, 116, 117, 118, 119
1925.0	4	22	-14.6	9.4	575.8	115, 116, 117, 118, 119
1945.0	1	21	24.4	9.2	654.9	110, 111, 112, 113, 114
1965.0	2	21	13.0	9.3	600.0	110, 111, 112, 113, 114
1985.0	3	21	-10.9	9.4	708.3	110, 111, 112, 113, 114
2005.0	4	21	-14.9	9.4	554.8	110, 111, 112, 113, 114
2024.9	1	20	27.8	9.2	661.8	105, 106, 107, 108, 109
2044.9	2	20	12.5	9.3	609.7	105, 106, 107, 108, 109
2064.9	3	20	-11.1	9.4	703.3	105, 106, 107, 108, 109
2084.9	4	20	-15.0	9.4	570.0	105, 106, 107, 108, 109
2104.9	1	19	23.3	9.2	651.6	100, 101, 102, 103, 104
2124.9	2	19	13.0	9.4	603.9	100, 101, 102, 103, 104
2144.9	3	19	-11.0	9.4	693.8	100, 101, 102, 103, 104
2164.9	4	19	-15.0	9.4	556.8	100, 101, 102, 103, 104

Shot Summary Listing (3/5)

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
2184.9	1	18	26.6	9.2	647.3	95, 96, 97, 98, 99
2204.9	2	18	12.8	9.4	591.9	95, 96, 97, 98, 99
2224.9	3	18	-11.1	9.3	718.1	95, 96, 97, 98, 99
2244.9	4	18	-15.5	9.4	550.5	95, 96, 97, 98, 99
2265.0	1	17	26.2	9.2	600.1	90, 91, 92, 93, 94
2285.0	2	17	13.4	9.4	582.0	90, 91, 92, 93, 94
2305.0	3	17	-11.0	9.4	691.5	90, 91, 92, 93, 94
2325.0	4	17	-16.1	9.4	552.8	90, 91, 92, 93, 94
2345.0	1	16	25.7	9.2	570.2	85, 86, 87, 88, 89
2365.0	2	16	12.7	9.4	597.0	85, 86, 87, 88, 89
2385.0	3	16	-11.2	9.3	624.6	85, 86, 87, 88, 89
2405.0	4	16	-15.5	9.4	557.7	85, 86, 87, 88, 89
2424.9	1	15	24.2	9.2	577.4	80, 81, 82, 83, 84
2444.9	2	15	11.3	9.4	595.0	80, 81, 82, 83, 84
2464.9	3	15	-11.4	9.4	702.2	80, 81, 82, 83, 84
2484.9	4	15	-15.2	9.4	548.5	80, 81, 82, 83, 84
2505.0	1	14	22.4	9.2	605.5	75, 76, 77, 78, 79
2525.0	2	14	2.2	9.7	575.6	75, 76, 77, 78, 79
2545.0	3	14	-8.2	9.5	676.4	75, 76, 77, 78, 79
2565.0	4	14	-12.1	9.1	543.8	75, 76, 77, 78, 79
2585.0	1	13	19.4	9.1	595.4	70, 71, 72, 73, 74
2605.0	2	13	11.3	9.4	563.7	70, 71, 72, 73, 74
2625.0	3	13	-12.1	9.8	626.1	70, 71, 72, 73, 74
2645.0	4	13	-16.6	9.5	515.9	70, 71, 72, 73, 74
2665.0	1	12	28.2	9.8	588.0	65, 66, 67, 68, 69
2685.0	2	12	14.6	9.4	573.4	65, 66, 67, 68, 69
2705.0	3	12	-12.3	9.7	668.0	65, 66, 67, 68, 69
2725.0	4	12	-5.6	9.8	508.9	65, 66, 67, 68, 69

Shot Summary Listing (4/5)

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
2744.9	1	11	28.3	9.3	593.8	59, 60, 61, 62, 63, 64
2764.9	2	11	14.0	9.5	579.0	59, 60, 61, 62, 63, 64
2784.9	3	11	-12.2	9.7	651.3	59, 60, 61, 62, 63, 64
2804.9	4	11	-15.3	9.5	503.4	59, 60, 61, 62, 63, 64
2825.0	1	10	27.0	9.2	581.7	54, 55, 56, 57, 58
2845.0	2	10	16.8	9.4	550.5	54, 55, 56, 57, 58
2865.0	3	10	-14.3	9.6	677.5	54, 55, 56, 57, 58
2885.0	4	10	-15.4	9.5	494.9	54, 55, 56, 57, 58
2905.0	1	9	26.0	9.6	594.7	49, 50, 51, 52, 53
2925.0	2	9	20.8	10.3	503.3	49, 50, 51, 52, 53
2945.0	3	9	-5.8	9.5	627.9	49, 50, 51, 52, 53
2965.0	4	9	-12.5	9.7	470.8	49, 50, 51, 52, 53
2985.0	1	8	27.7	9.3	565.0	44, 45, 46, 47, 48
3005.0	2	8	15.0	9.6	533.9	44, 45, 46, 47, 48
3025.0	3	8	-3.9	9.6	632.5	44, 45, 46, 47, 48
3045.0	4	8	-18.5	9.1	450.9	44, 45, 46, 47, 48
3145.0	1	6	35.9	9.2	550.0	31, 32, 33, 34, 35, 36, 37
3165.0	2	6	15.6	9.2	433.3	31, 32, 33, 34, 35, 36, 37
3185.0	3	6	-2.6	10.2	593.8	35
3205.0	4	6	-12.3	9.3	453.2	31, 32, 33, 34, 35, 36, 37
3303.5	1	4	59.0	8.1	473.2	21, 22, 23, 24, 25
3323.5	2	4	94.8	7.6	394.6	21, 22, 23, 24, 25
3343.5	3	4	64.1	8.8	491.9	21, 22, 23, 24, 25
3363.5	4	4	72.0	7.9	429.1	21, 22, 24, 25
2825.0	1	10	27.0	9.2	581.7	54, 55, 56, 57, 58
2845.0	2	10	16.8	9.4	550.5	54, 55, 56, 57, 58
2865.0	3	10	-14.3	9.6	677.5	54, 55, 56, 57, 58
2885.0	4	10	-15.4	9.5	494.9	54, 55, 56, 57, 58

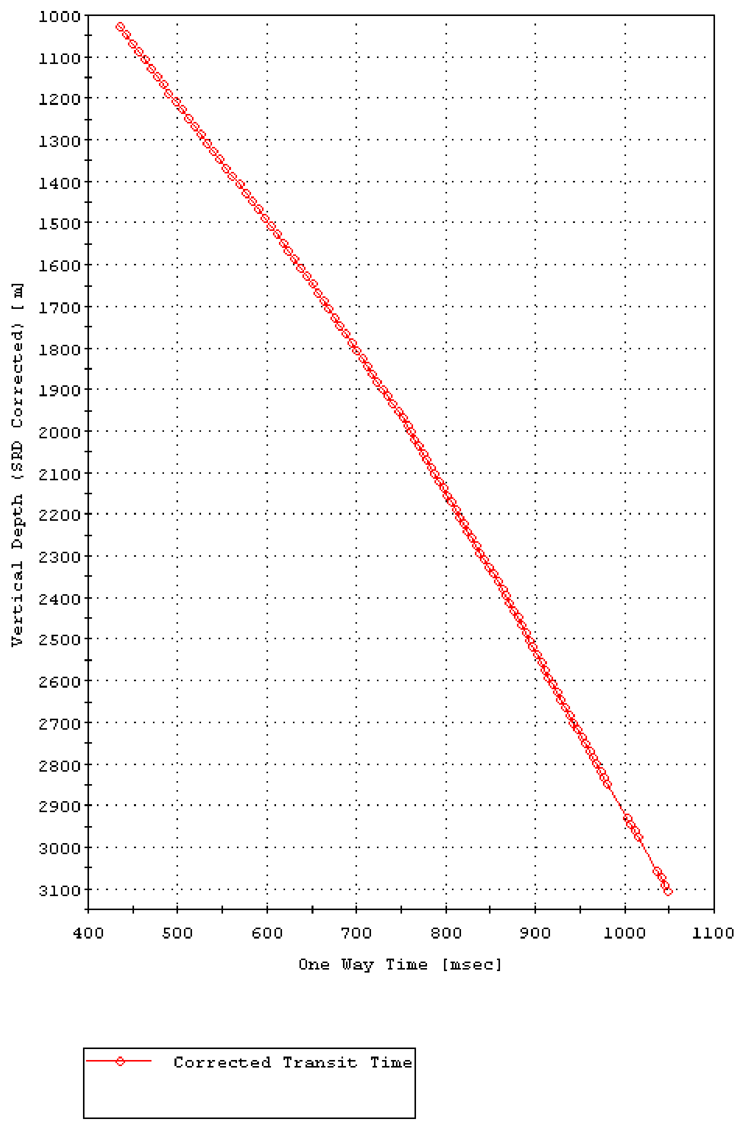
Shot Summary Listing (5/5)

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
2905.0	1	9	26.0	9.6	594.7	49, 50, 51, 52, 53
2925.0	2	9	20.8	10.3	503.3	49, 50, 51, 52, 53
2945.0	3	9	-5.8	9.5	627.9	49, 50, 51, 52, 53
2965.0	4	9	-12.5	9.7	470.8	49, 50, 51, 52, 53
2985.0	1	8	27.7	9.3	565.0	44, 45, 46, 47, 48
3005.0	2	8	15.0	9.6	533.9	44, 45, 46, 47, 48
3025.0	3	8	-3.9	9.6	632.5	44, 45, 46, 47, 48
3045.0	4	8	-18.5	9.1	450.9	44, 45, 46, 47, 48
3145.0	1	6	35.9	9.2	550.0	31, 32, 33, 34, 35, 36, 37
3145.0	1	7	25.6	9.0	542.4	31, 32, 33, 34, 35, 36, 37
3165.0	2	6	15.6	9.2	433.3	31, 32, 33, 34, 35, 36, 37
3165.0	2	7	17.6	10.0	459.9	31, 32, 33, 34, 35, 36, 37
3185.0	3	7	-11.1	9.2	563.7	35
3185.0	3	6	-2.6	10.2	593.8	35
3205.0	4	6	-12.3	9.3	453.2	31, 32, 33, 34, 35, 36, 37
3205.0	4	7	-15.2	9.2	482.4	31, 32, 33, 34, 35, 36, 37
3303.5	1	5	15.8	9.3	538.6	21, 22, 23, 24, 25
3303.5	1	4	59.0	8.1	473.2	21, 22, 23, 24, 25
3323.5	2	4	94.8	7.6	394.6	21, 22, 23, 24, 25
3323.5	2	5	8.2	9.4	517.0	21, 22, 23, 24, 25
3343.5	3	4	64.1	8.8	491.9	21, 22, 23, 24, 25
3343.5	3	5	-14.2	9.1	465.2	21, 22, 23, 24, 25
3363.5	4	5	-16.0	9.4	443.3	21, 22, 24, 25
3363.5	4	4	72.0	7.9	429.1	21, 22, 24, 25

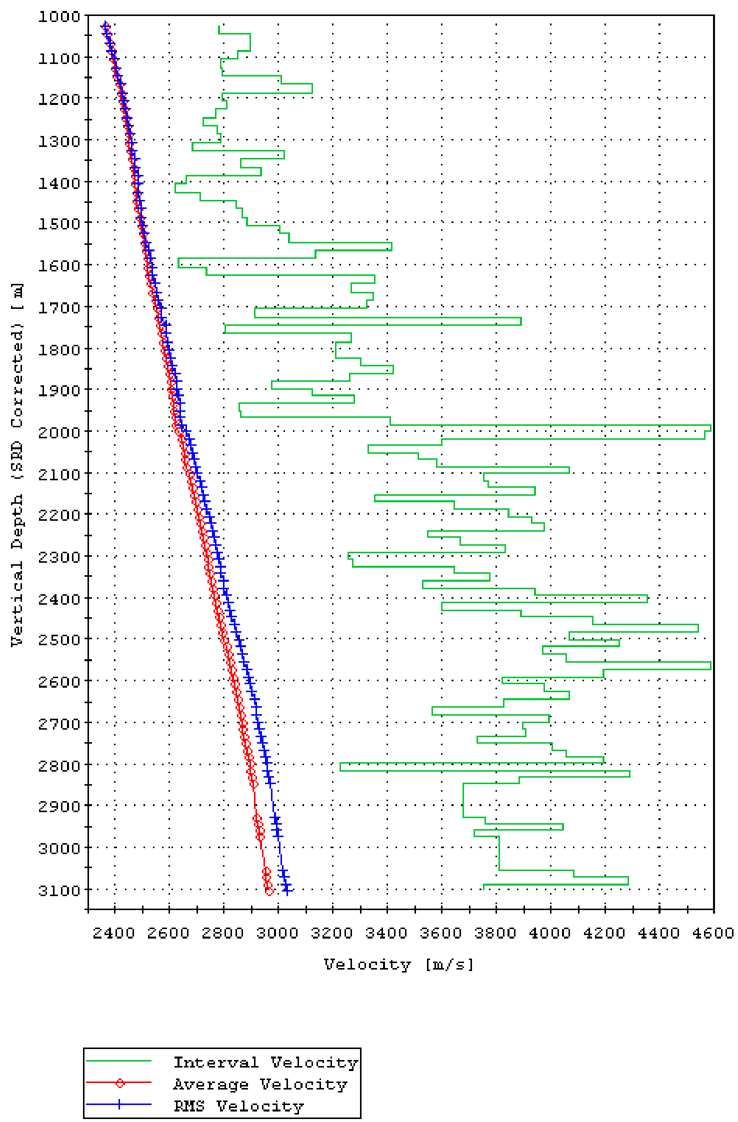
Stack number	Well depth[m]	TVD from SRD[m]	TT [ms]	TT (TVD Corrected)[ms]	TWT (TVD Corrected) [ms]	Interval Velocity[m/s]	Average Velocity[m/s]	RMS Velocity[m/s]
32	1065	1025.8	431.7	434.1	868.2	2781.4	2362.9	2362.9
32	1085	1045.8	438.9	441.3	882.6	2892.2	2369.7	2370.3
32	1105	1065.8	445.8	448.2	896.4	2892.8	2377.8	2379.2
32	1125	1085.8	452.7	455.1	910.3	2852	2385.6	2387.9
31	1145	1105.7	459.7	462.1	924.3	2785.4	2392.7	2395.6
31	1165	1125.7	466.8	469.3	938.6	2793.4	2398.7	2402
31	1185	1145.7	474	476.5	952.9	3008.2	2404.6	2408.4
31	1205	1165.7	480.6	483.1	966.2	3125.7	2412.9	2417.6
30	1225	1185.8	487	489.5	979.1	2792.7	2422.2	2428.2
30	1245	1205.8	494.1	496.7	993.4	2810.2	2427.6	2433.9
30	1265	1225.8	501.2	503.8	1007.6	2772	2433	2439.6
30	1285	1245.8	508.4	511	1022	2726.1	2437.8	2444.6
29	1304.9	1265.7	515.7	518.3	1036.7	2777.6	2441.8	2448.8
29	1324.9	1285.7	522.9	525.5	1051.1	2787.1	2446.4	2453.6
29	1344.9	1305.7	530	532.7	1065.4	2681.5	2451	2458.4
29	1364.9	1325.7	537.5	540.2	1080.3	3022.3	2454.2	2461.6
28	1384.9	1345.7	544	546.8	1093.6	2858.2	2461.1	2469.2
28	1404.9	1365.7	551	553.8	1107.6	2933.6	2466.1	2474.5
28	1424.9	1385.7	557.8	560.6	1121.2	2663.1	2471.8	2480.5
28	1444.9	1405.7	565.3	568.1	1136.2	2621.2	2474.3	2483.1
27	1465	1425.8	573	575.8	1151.5	2711.5	2476.3	2484.9
27	1485	1445.7	580.4	583.1	1166.3	2842.3	2479.3	2487.9
27	1505	1465.7	587.4	590.2	1180.3	2868.2	2483.6	2492.5
27	1525	1485.7	594.4	597.1	1194.3	2881.6	2488.1	2497.2
26	1544.9	1505.6	601.3	604	1208.1	3000.9	2492.6	2501.9
26	1564.9	1525.6	607.9	610.7	1221.4	3036.5	2498.1	2507.9
26	1584.9	1545.6	614.5	617.3	1234.6	3415.5	2503.9	2514.1
26	1604.9	1565.6	620.3	623.2	1246.3	3136.5	2512.4	2524.1
25	1624.9	1585.6	626.7	629.5	1259.1	2634.1	2518.8	2531
25	1644.9	1605.6	634.3	637.1	1274.3	2734.2	2520.1	2532.3
25	1664.9	1625.6	641.6	644.4	1288.9	3351.4	2522.6	2534.7
25	1684.9	1645.6	647.5	650.4	1300.8	3269	2530.2	2543.3
24	1705	1665.7	653.7	656.6	1313.1	3344.8	2537.1	2551.1
24	1725	1685.7	659.6	662.5	1325.1	3326.3	2544.4	2559.4
24	1745	1705.7	665.6	668.5	1337.1	2913.6	2551.4	2567.3
24	1765	1725.7	672.4	675.4	1350.8	3887.9	2555.1	2571
23	1784.8	1745.4	677.5	680.5	1360.9	2805.7	2565	2583.3
23	1804.8	1765.2	684.5	687.5	1375	3267.4	2567.5	2585.7
23	1824.8	1784.8	690.4	693.5	1387	3208.3	2573.5	2592.4
23	1844.8	1804.2	696.4	699.6	1399.1	3210.3	2579	2598.3
22	1865	1823.6	702.4	705.6	1411.2	3299.5	2584.4	2604.2
22	1885	1842.6	708.1	711.4	1422.7	3419.1	2590.2	2610.5
22	1905	1861.3	713.5	716.8	1433.7	3260	2596.5	2617.6
22	1925	1879.7	719.1	722.5	1445	2977	2601.7	2623.3
21	1945	1897.9	725.2	728.6	1457.2	3124.9	2604.9	2626.5
21	1965	1915.8	730.8	734.3	1468.6	3278.2	2608.9	2630.7
21	1985	1933.4	736.2	739.7	1479.4	2857.1	2613.8	2636
21	2005	1950.8	742.3	745.8	1491.6	2863.2	2615.8	2637.9
20	2024.9	1967.9	748.2	751.8	1503.5	3409.9	2617.8	2639.7
20	2044.9	1985	753.1	756.8	1513.5	4588.5	2623	2645.6
20	2064.9	2001.7	756.8	760.4	1520.8	4564.3	2632.4	2658.3
20	2084.9	2018.4	760.5	764.1	1528.1	3600.4	2641.6	2670.6
19	2104.9	2035.1	765.1	768.7	1537.4	3329.7	2647.4	2677.2
19	2124.9	2051.8	770.1	773.7	1547.5	3513.7	2651.9	2682
19	2144.9	2068.6	774.9	778.5	1557	3582.4	2657.1	2687.8

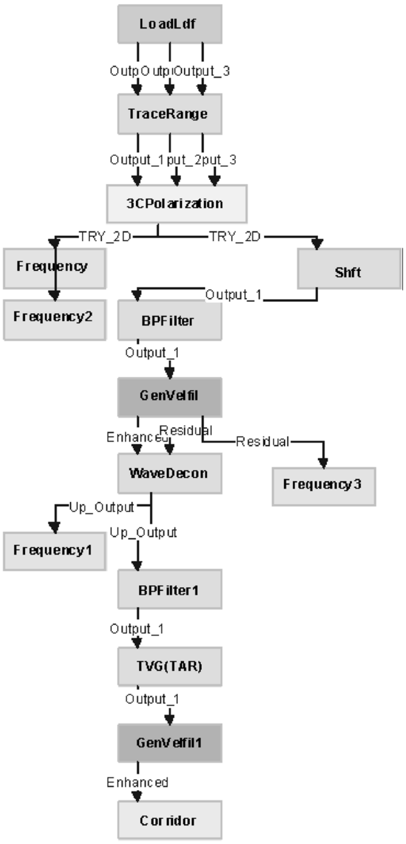
19	2164.9	2085.4	779.6	783.2	1566.4	4065.2	2662.7	2694.1
18	2184.9	2102.2	783.7	787.3	1574.6	3756.1	2670.1	2703.1
18	2204.9	2119.1	788.2	791.8	1583.7	3770.1	2676.2	2710.3
18	2224.9	2136.2	792.7	796.4	1592.7	3942.4	2682.5	2717.4
18	2244.9	2153.3	797.1	800.7	1601.4	3350.4	2689.3	2725.5
17	2265	2170.4	802.2	805.8	1611.6	3641.9	2693.5	2730
17	2285	2187.5	806.9	810.5	1621	3844.7	2699	2736.1
17	2305	2204.7	811.4	815	1629.9	3930.5	2705.2	2743.4
17	2325	2221.9	815.7	819.3	1638.7	3974.6	2711.8	2751.1
16	2345	2239	820.1	823.7	1647.3	3545.7	2718.4	2758.9
16	2365	2256.2	824.9	828.5	1657	3669.6	2723.2	2764.2
16	2385	2273.5	829.6	833.2	1666.4	3831.9	2728.6	2770.1
16	2405	2290.6	834.1	837.7	1675.4	3256.3	2734.5	2776.9
15	2424.9	2307.8	839.4	843	1685.9	3273.5	2737.7	2780.2
15	2444.9	2325	844.6	848.2	1696.4	3644.5	2741.1	2783.5
15	2464.9	2342.2	849.3	852.9	1705.9	3776.6	2746.1	2789
15	2484.9	2359.5	853.9	857.5	1715	3528.8	2751.6	2795.2
14	2505	2376.8	858.8	862.4	1724.8	3941.8	2756	2799.9
14	2525	2394.1	863.2	866.8	1733.6	4354.9	2762	2806.9
14	2545	2411.6	867.2	870.8	1741.7	3596.4	2769.4	2816
14	2565	2429.3	872.1	875.7	1751.5	3893	2774	2820.9
13	2585	2447	876.7	880.3	1760.6	4150.9	2779.8	2827.5
13	2605	2464.7	880.9	884.5	1769.1	4542.6	2786.4	2835.4
13	2625	2482.4	884.8	888.5	1776.9	4068.6	2794.1	2845.1
13	2645	2500.2	889.2	892.8	1785.7	4253.6	2800.3	2852.4
12	2665	2518.2	893.4	897	1794.1	3971.5	2807.2	2860.6
12	2685	2536.1	898	901.6	1803.1	4058.6	2813	2867.2
12	2705	2554.1	902.4	906	1812	4591.1	2819.1	2874.3
12	2725	2572.1	906.3	909.9	1819.8	4196.3	2826.8	2883.9
11	2744.9	2590.1	910.6	914.2	1828.4	3820.4	2833.2	2891.4
11	2764.9	2608.1	915.3	918.9	1837.8	3978.4	2838.2	2896.9
11	2784.9	2626.2	919.9	923.5	1846.9	4065.8	2843.8	2903.2
11	2804.9	2644.3	924.3	927.9	1855.8	3828.2	2849.7	2909.9
10	2825	2662.5	929.1	932.7	1865.3	3562.2	2854.7	2915.3
10	2845	2680.7	934.2	937.8	1875.6	3993.8	2858.5	2919.2
10	2865	2698.8	938.7	942.3	1884.6	3898.7	2864	2925.4
10	2885	2716.7	943.3	946.9	1893.8	3907.7	2869	2930.9
9	2905	2734	947.7	951.3	1902.7	3731.1	2873.9	2936.2
9	2925	2750.9	952.2	955.9	1911.7	4006.5	2877.9	2940.4
9	2945	2767.4	956.4	960	1919.9	4053.6	2882.8	2945.8
9	2965	2783.6	960.4	964	1927.9	4193.9	2887.6	2951.3
8	2985	2799.6	964.2	967.8	1935.6	3224.6	2892.8	2957.2
8	3005	2815.6	969.2	972.8	1945.5	4292.2	2894.5	2958.6
8	3025	2831.6	972.9	976.5	1953	3884.9	2899.8	2964.9
8	3045	2847.5	977	980.6	1961.1	3680.2	2903.9	2969.3
6	3145	2927.2	998.7	1002.2	2004.5	3760.4	2920.7	2986.5
6	3165	2943.3	1002.9	1006.5	2013	4043.7	2924.2	2990.2
6	3185	2959.4	1006.9	1010.5	2021	3719.9	2928.7	2995
6	3205	2975.6	1011.2	1014.8	2029.7	3811.6	2932.1	2998.5
4	3303.5	3056	1032.4	1035.9	2071.9	4084.3	2950	3017.3
4	3323.5	3072.5	1036.4	1040	2080	4284.7	2954.4	3022.1
4	3343.5	3089	1040.2	1043.8	2087.7	3753	2959.3	3027.8
4	3363.5	3105.7	1044.7	1048.3	2096.6		2962.7	3031.2

Source Depth (from SRD) = 5.50 m



SRD below Measured Depth Zero = 39.20 m



Process Flow	Parameter
	**[LoadLdf]** Input 1: VSI_002_Boat_raw_stack_geo_x.ldf Input 2: VSI_002_Boat_raw_stack_geo_y.ldf Input 3: VSI_002_Boat_raw_stack_geo_z.ldf **[Frequency2]** Process all samples Apply FZ **[BPFilter]** Phase: Zero Band Width: 3.0 - 120.0Hz **[GenVelfil]** Apply internal Normalization/Denormalization 7 Traces **[Frequency3]** Process all samples Apply FK **[WaveDecon]** Waveshape Deconvolution Design Filter trace Input start at TRANSIT_TIME wavelet: 8.0 - 65.0 Hz zero-phase Polarity: Positive **[Frequency1]** Process all samples Apply FK **[BPFilter1]** Phase: Zero Band Width: 3.0 - 70.0Hz **[TVG(TAR)]** Travel time exponent = 1.40 **[GenVelfil1]** Median Filter 7 Traces **[Corridor]** Window Start: TRANSIT_TIME - 0.000 (s) Window End: TRANSIT_TIME - -0.100 (s) (Deepest 10 traces remain) Mean Stack BPF 5.0 - 90.0Hz **[Frequency]** Process all samples Apply FK

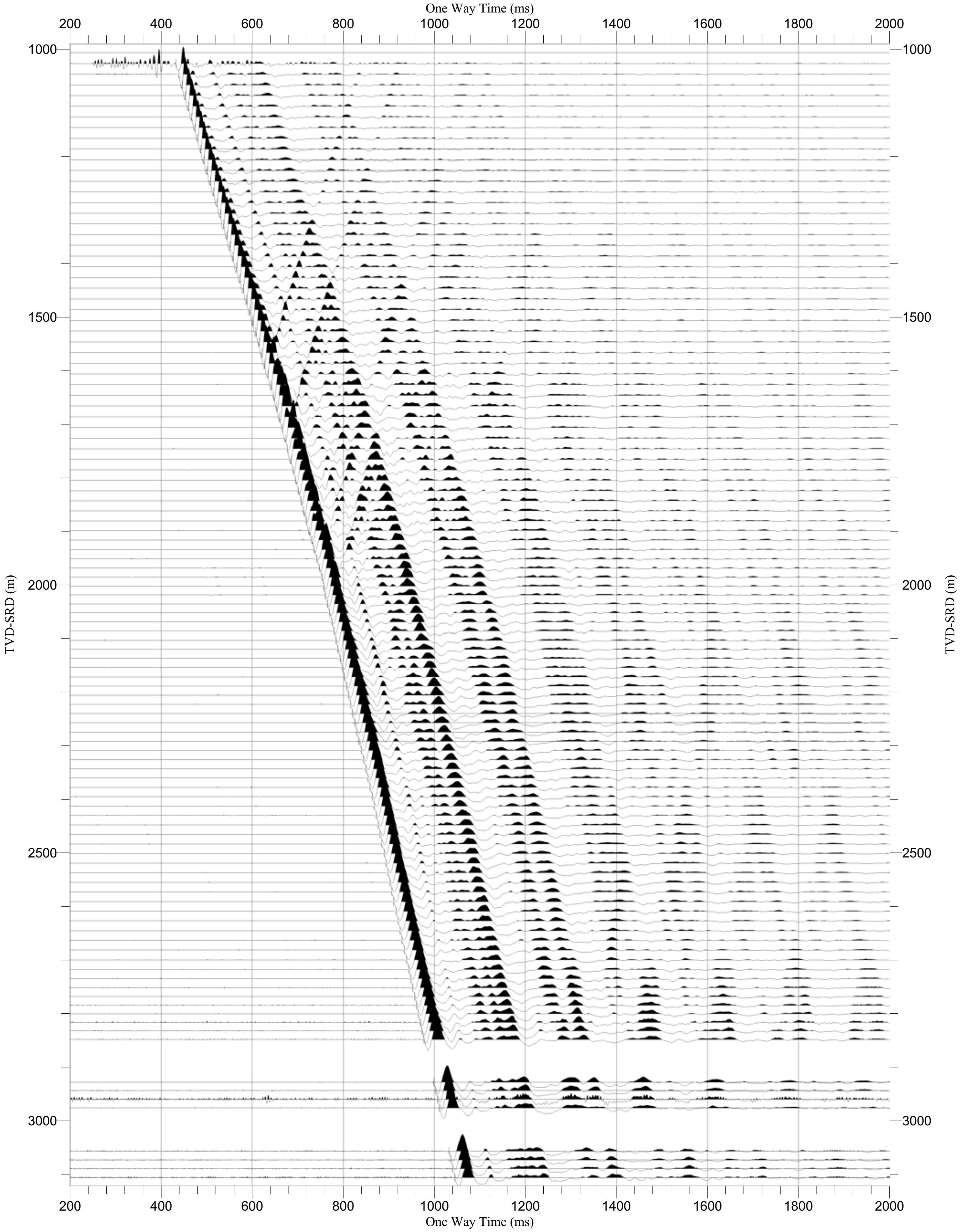
Schlumberger

```
[LoadLdf]

FileLoadLdf Parameters
    Input 1:  VSI_002_Boat_raw_stack_geo_x.ldf
    Input 2:  VSI_002_Boat_raw_stack_geo_y.ldf
    Input 3:  VSI_002_Boat_raw_stack_geo_z.ldf

[TraceRange]

Trace Range Set Manual Parameters
    Trace Range Set Parameters
        Remove Bad Trace

[3CPolarization]

Polarizations Parameters
    Compute polarization from TRANSIT_TIME -  0.005000 s for  0.045 s using thres
    Apply rotation on traces
    2D rotation
        save Hmn/Hmx angle  in POLARIZATION_1 and rectilinearity in USER_KEY_1
        save Try/Nry angle in POLARIZATION_2 and rectilinearity in USER_KEY_2
    Reference to Z

[Frequency2]

Spectral Analyser Parameters
    Process all samples
    Depth/Offset header =  RECEIVER_POSITION_Z
    Output is Frequency Domain
    Compute Amplitude spectrum  in dB

[Shft]

Shift Parameters
    Shift: +  TRANSIT_TIME_ACCURACY -  0 s
     Update selected headers

[BPFilter]

BPF Parameters
    Butterworth Filter,  Zero Phase
    Charasteristic:  3.000 Hz  to  120.000 Hz  Order  3

[GenVelfil]

Mean/Median Generalized Velocity Filter Parameters
    Align events using times of  TRANSIT_TIME x 1.000
    Compute both enhanced and residual output
    Apply internal Normalization/Denormalization based on RMS of time window
       From  TRANSIT_TIME  -  0.020 s
       Windown length =  0.500 s
    Tuckey's trimean Stacking
     Stacking window (traces):  7
    Stacking window (samples):  1
    Source and receiver coordinates Parameters
        Source Offset:   SOURCE_LINE_POSITION_RHO
        Source Depth:    SOURCE_LINE_POSITION_Z
        Receiver Offset: RECEIVER_LINE_POSITION_RHO
        Receiver Depth:  RECEIVER_LINE_POSITION_Z

[Frequency3]

Spectral Analyser Parameters
    Process all samples
```

```
        Depth/Offset header =  RECEIVER_POSITION_Z
        Output is FK Domain
        Compute Amplitude spectrum  in dB

    [WaveDecon]

    Waveshaping deconvolution Parameters
        Design Filter trace by trace
        Filter input start at TRANSIT_TIME  -  0.020 s
        Filter input window: 1.000 s
        Filter Length is filter input window
        Desired wavelet created by filtered unit impulse from   8.000 Hz  to  65.000
        Positive wavelet polarity
        Wavelet delay time = Filter Length / 2
        White noise (%): 10.000
        Waveshaping optimization Parameters

    [Frequency1]

    Spectral Analyser Parameters
        Process all samples
        Depth/Offset header =  RECEIVER_POSITION_Z
        Output is FK Domain
        Compute Amplitude spectrum  in dB

    [BPFilter1]

    BPF Parameters
        Butterworth Filter,  Zero Phase
        Charasteristic:  3.000 Hz  to  70.000 Hz  Order  3

    [TVG(TAR)]

    Time-Varying Gain Parameters
        Window start at  TRANSIT_TIME - 0.000000
        Window length = 4.999000
        Travel time exponent = 1.400000
        Exponential Weighting = 0.000000

    [GenVelfil1]

    Mean/Median Generalized Velocity Filter Parameters
        Align events using times of  TRANSIT_TIME x -1.000
        Compute both enhanced and residual output
        Median Stacking
         Stacking window (traces):  7
        Stacking window (samples):  1
        Source and receiver coordinates Parameters
            Source Offset:   SOURCE_LINE_POSITION_RHO
            Source Depth:    SOURCE_LINE_POSITION_Z
            Receiver Offset: RECEIVER_LINE_POSITION_RHO
            Receiver Depth:  RECEIVER_LINE_POSITION_Z

    [Corridor]

    Corridor stack Parameters
        Mute before  TRANSIT_TIME  -  0 s
        Mute after  TRANSIT_TIME  -  -0.100 s
            All traces except the deepest (traces):  10
            Depth header:  RECEIVER_POSITION_Z
        Mean stack
        Apply +TT with  TRANSIT_TIME
        Replicate corridor stack x  10
        BPF Parameters
```

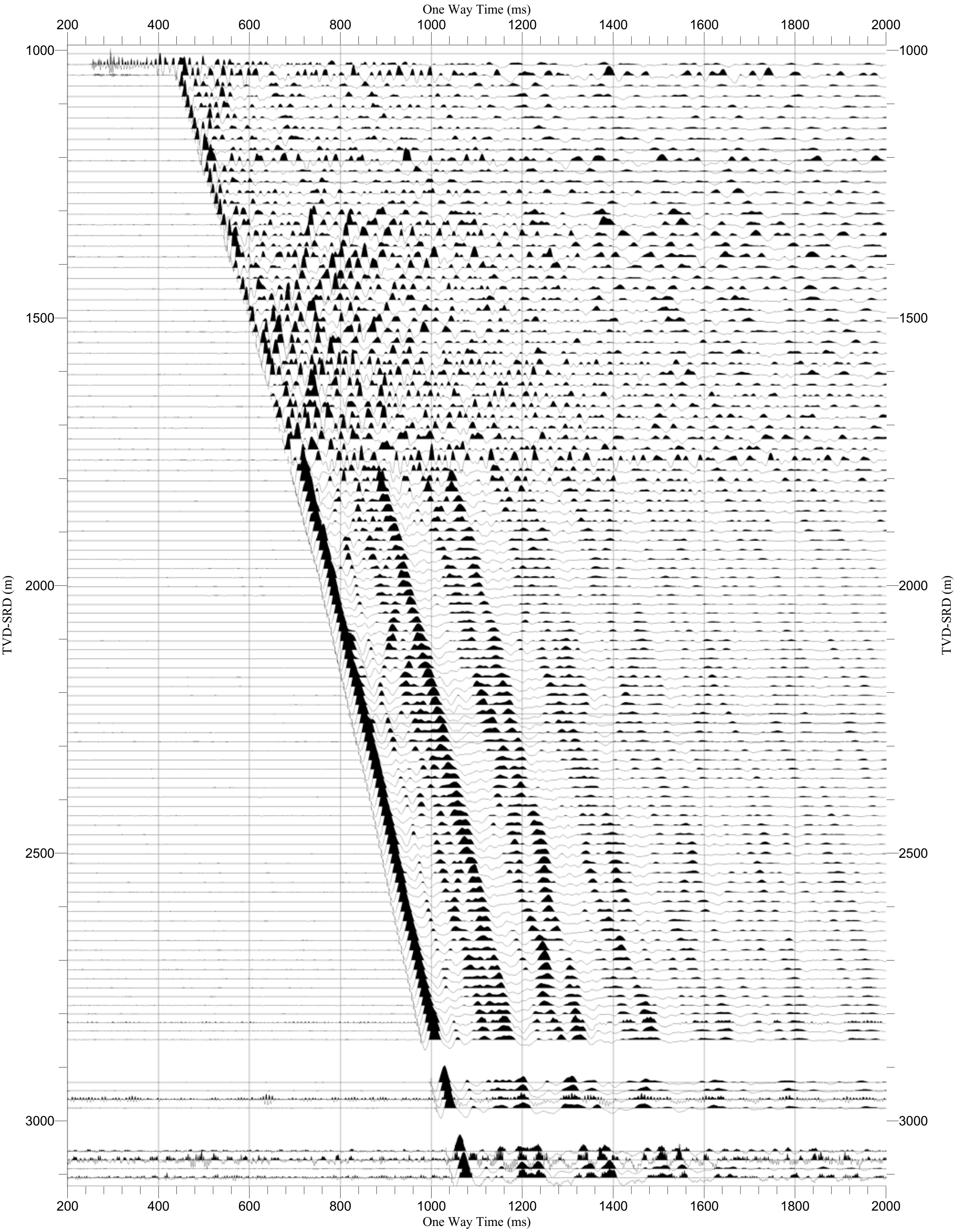
```
        Butterworth Filter,  Zero Phase
        Charasteristic:  5.000 Hz  to  90.000 Hz  Order  3

[Frequency]

Spectral Analyser Parameters
    Process all samples
    Depth/Offset header =  RECEIVER_POSITION_Z
    Output is FK Domain
    Compute Amplitude spectrum  in dB
```

Raw Stack (Z)	Normalization Trace by Trace (200%) Polarity Normal One Way Time (ms) Scaling 8.4 cm/sec, 1/10070	

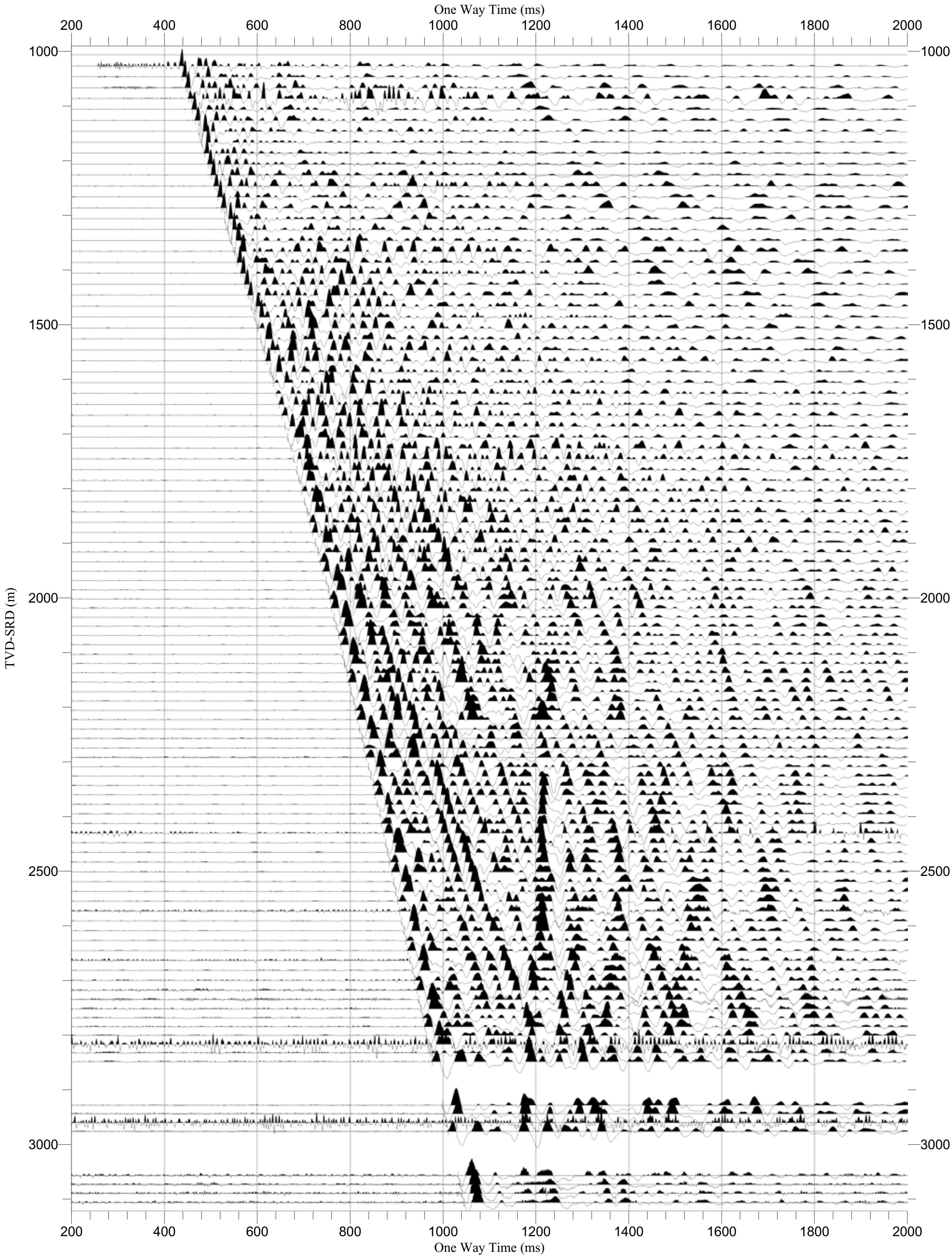


Schlumberger

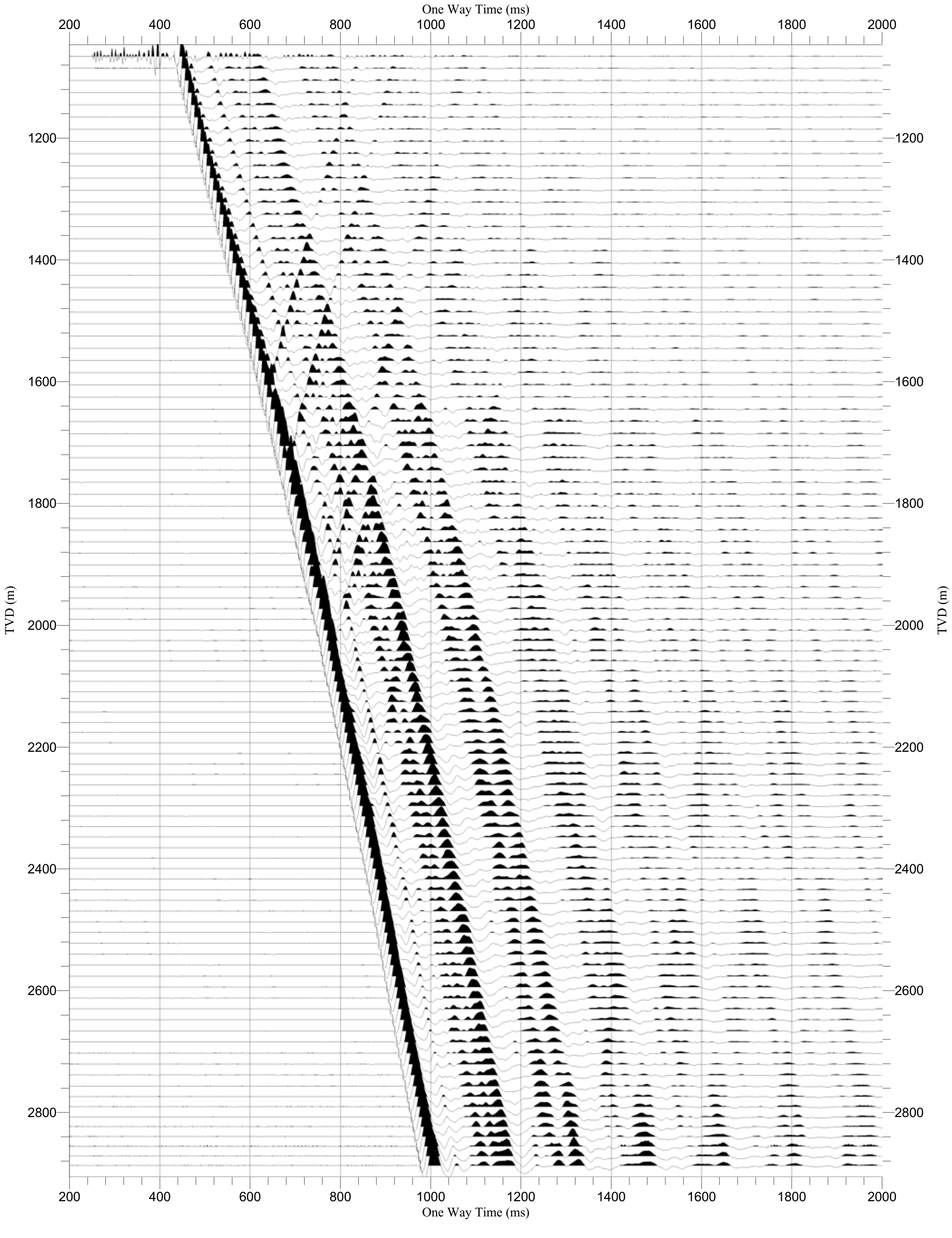
Raw Stack (X)	Normalization Trace by Trace (200%) Polarity Normal One Way Time (ms) Scaling 8.4 cm/sec, 1/10070	



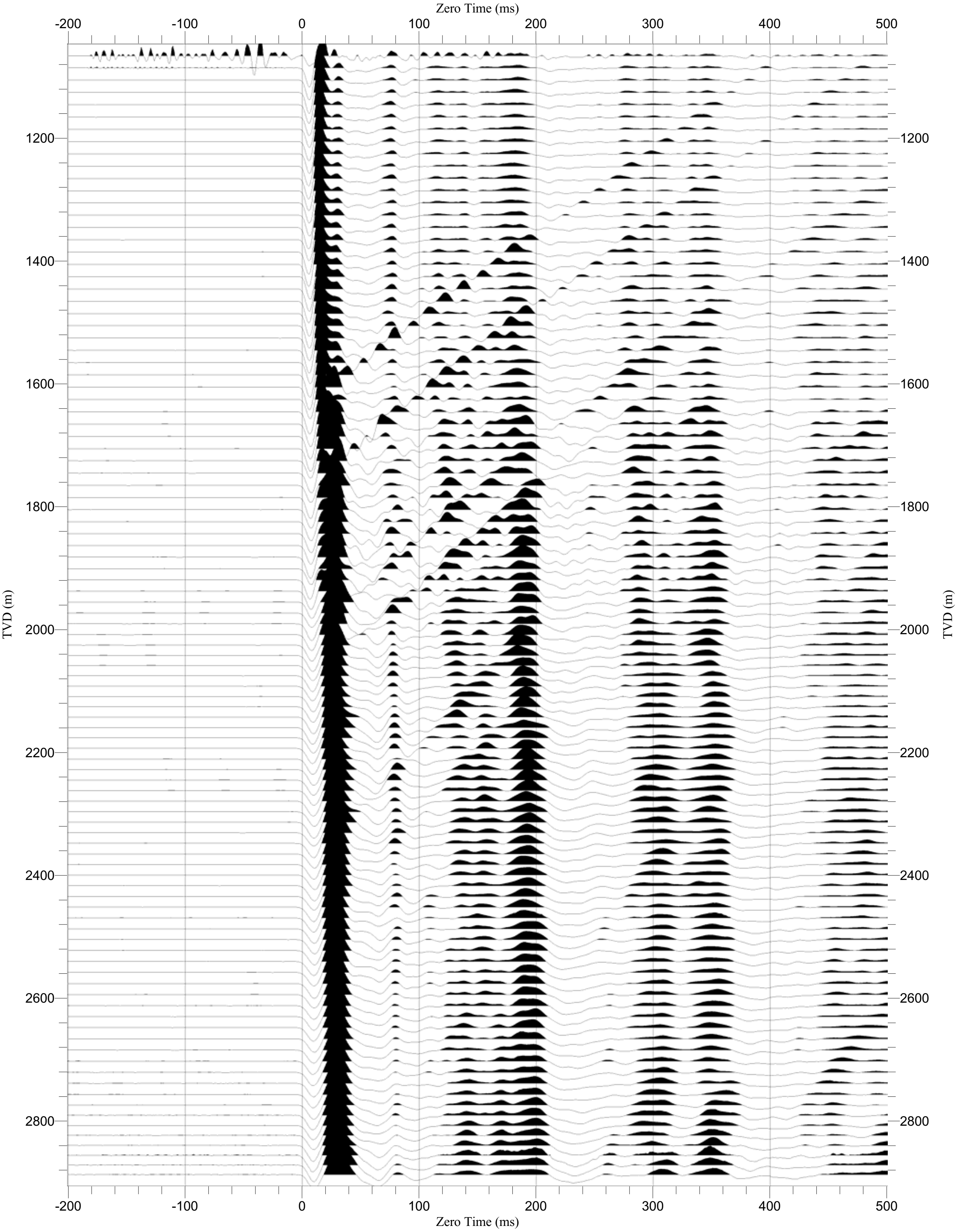
Raw Stack (Y)	Normalization Trace by Trace (200%) Polarity Normal One Way Time (ms) Scaling 8.4 cm/sec, 1/10070	



Raw Stack (TRY)	Normalization Trace by Trace (200%) Polarity Normal One Way Time (ms) Scaling 8.4 cm/sec, 1/8780

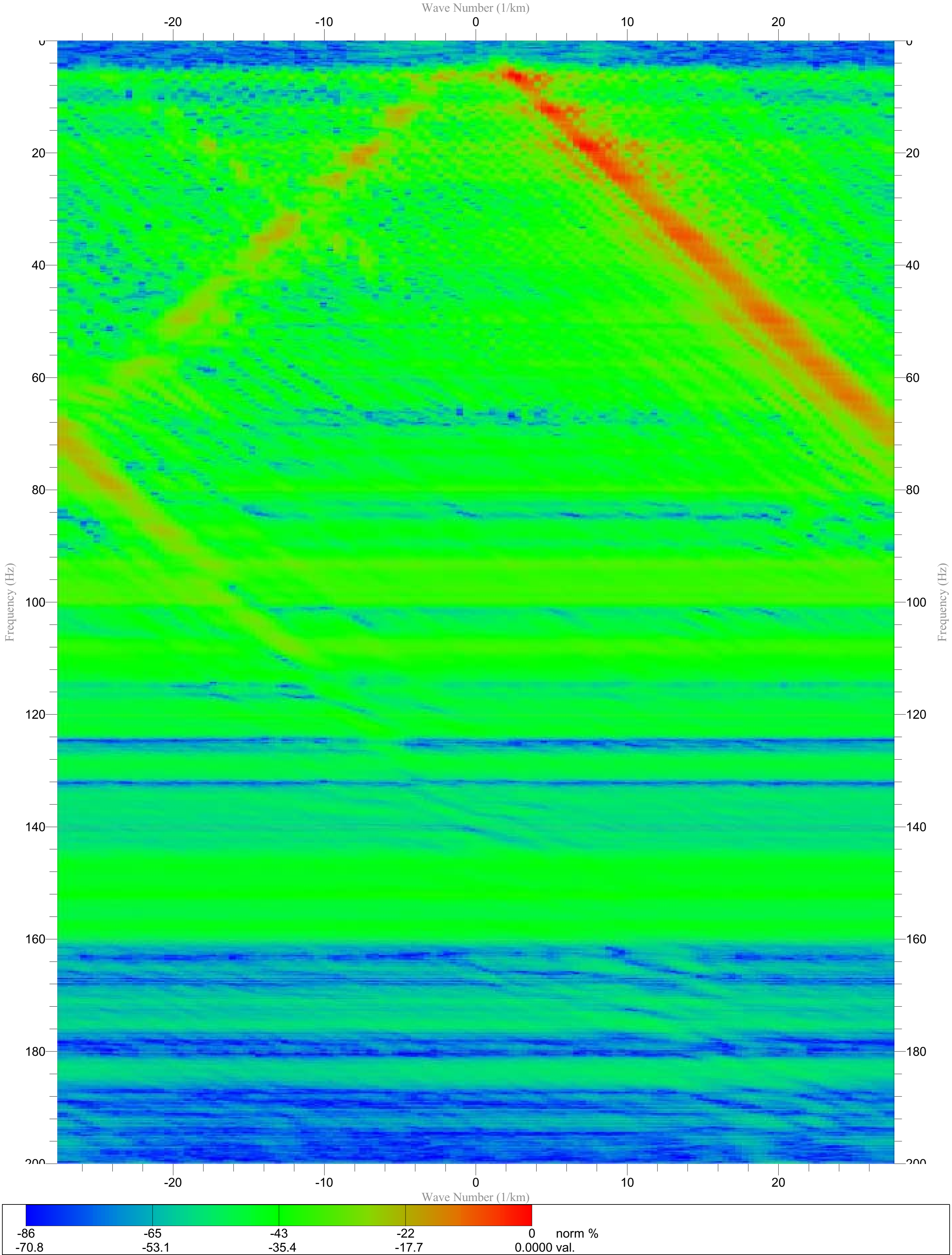


Raw Stack (TRY) (Magnified)	Normalization Trace by Trace (200%) Polarity Normal Zero Time (ms) Scaling 21.7 cm/sec, 1/8780	

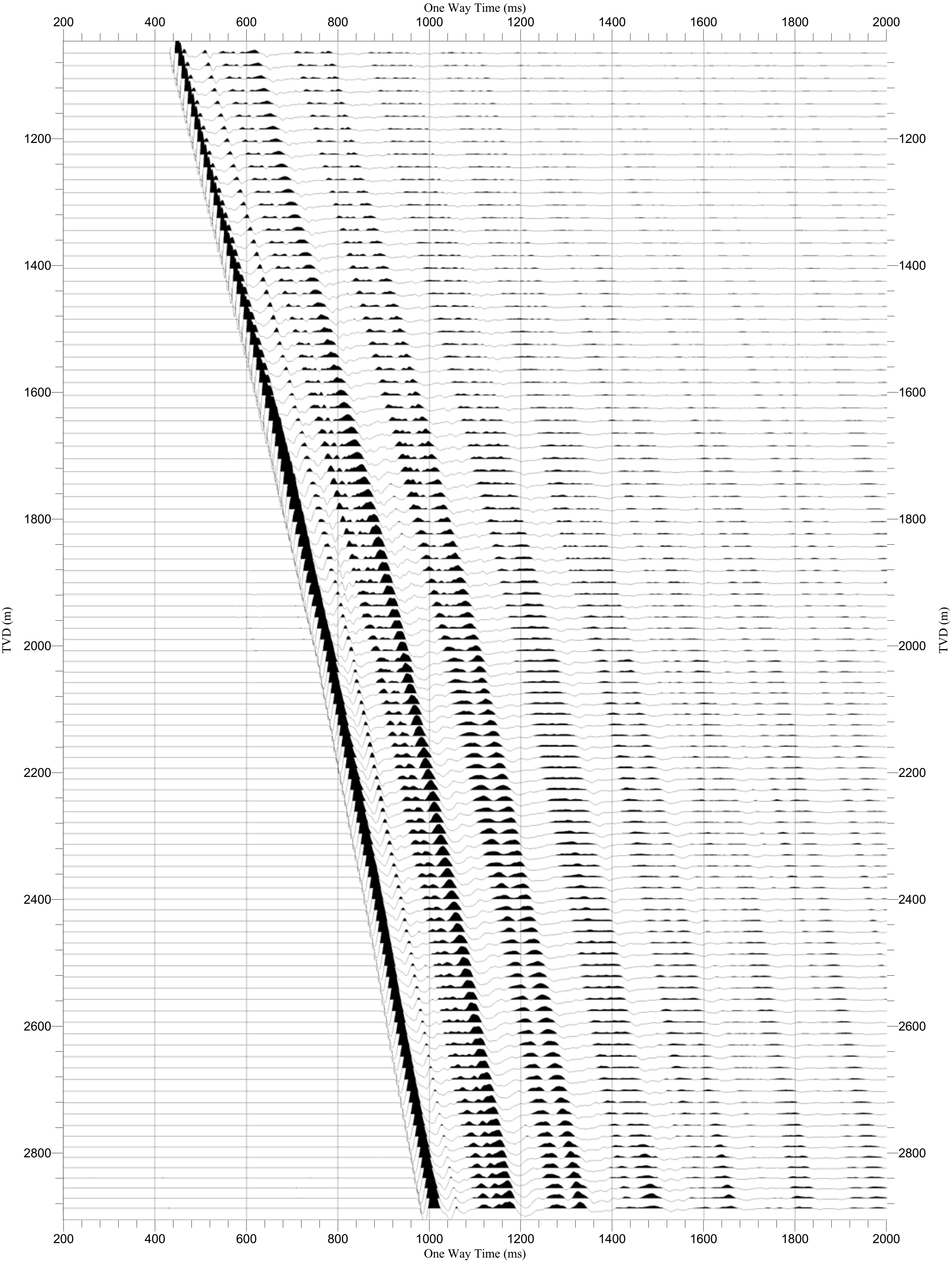


Schlumberger

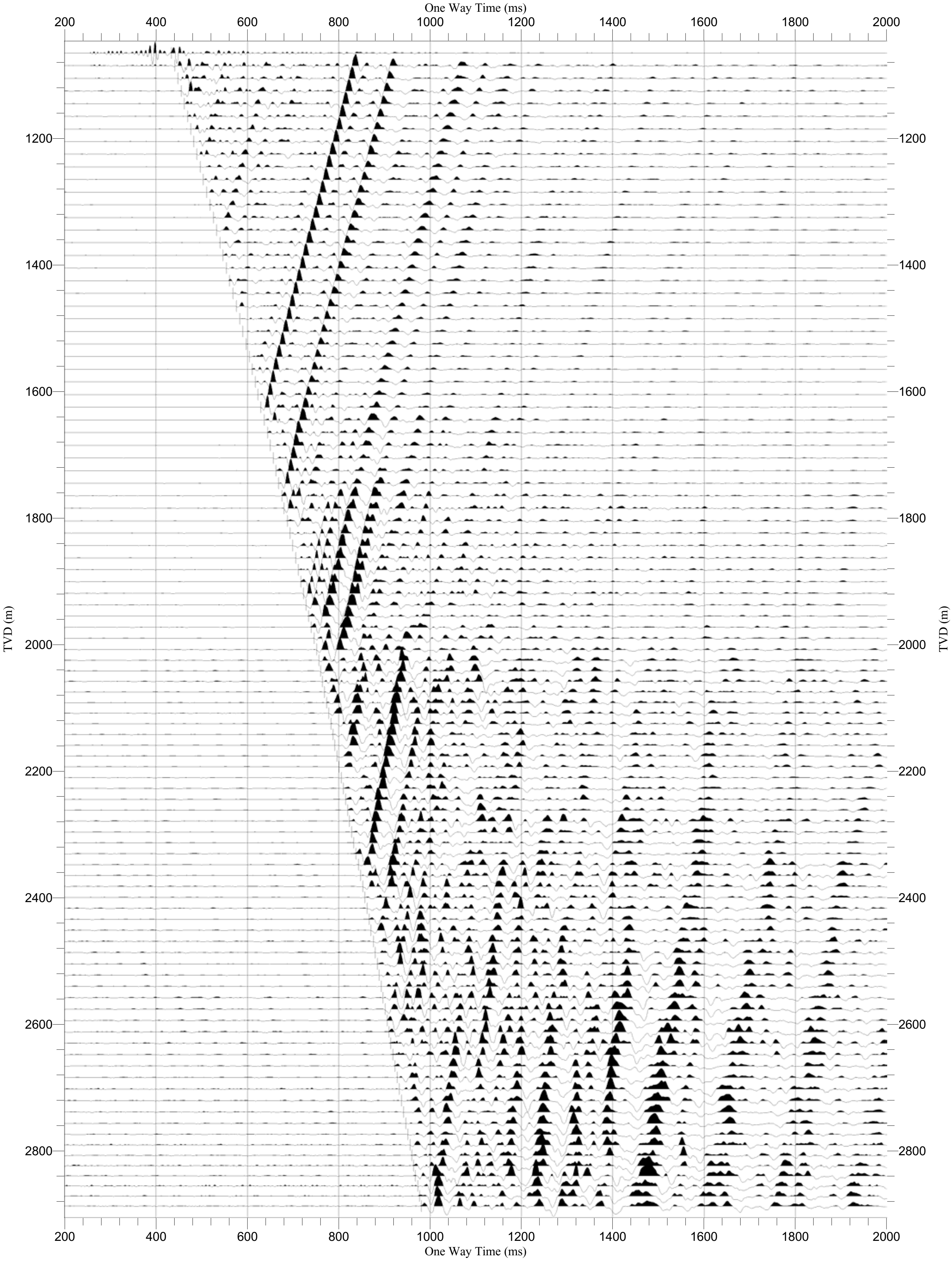
VSP Raw Stack (TRY) FK Apply FK	Normalization First Trace in Gather (100%) Polarity Normal Frequency (Hz) Scaling 0.12 cm/Hz, 0.30(1/km)/cm



VSP Downgoing BPF 3.0 - 120.0Hz 7 Traces	Normalization Trace by Trace (200%) Polarity Normal One Way Time (ms) Scaling 9.0 cm/sec, 1/8020

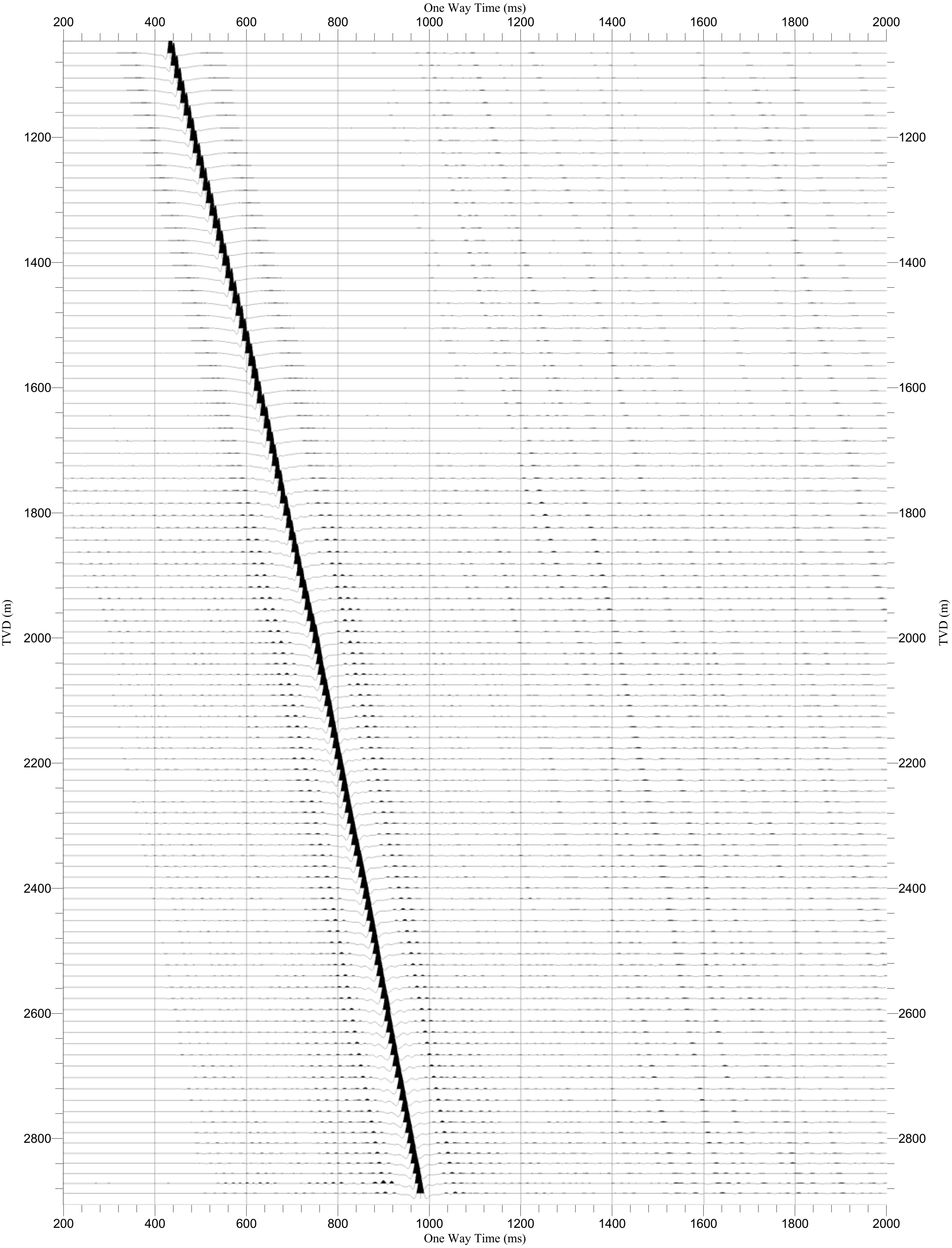


VSP Upgoing BPF 3.0 - 120.0Hz 7 Traces	Normalization Trace by Trace (100%) Polarity Normal One Way Time (ms) Scaling 9.0 cm/sec, 1/8020



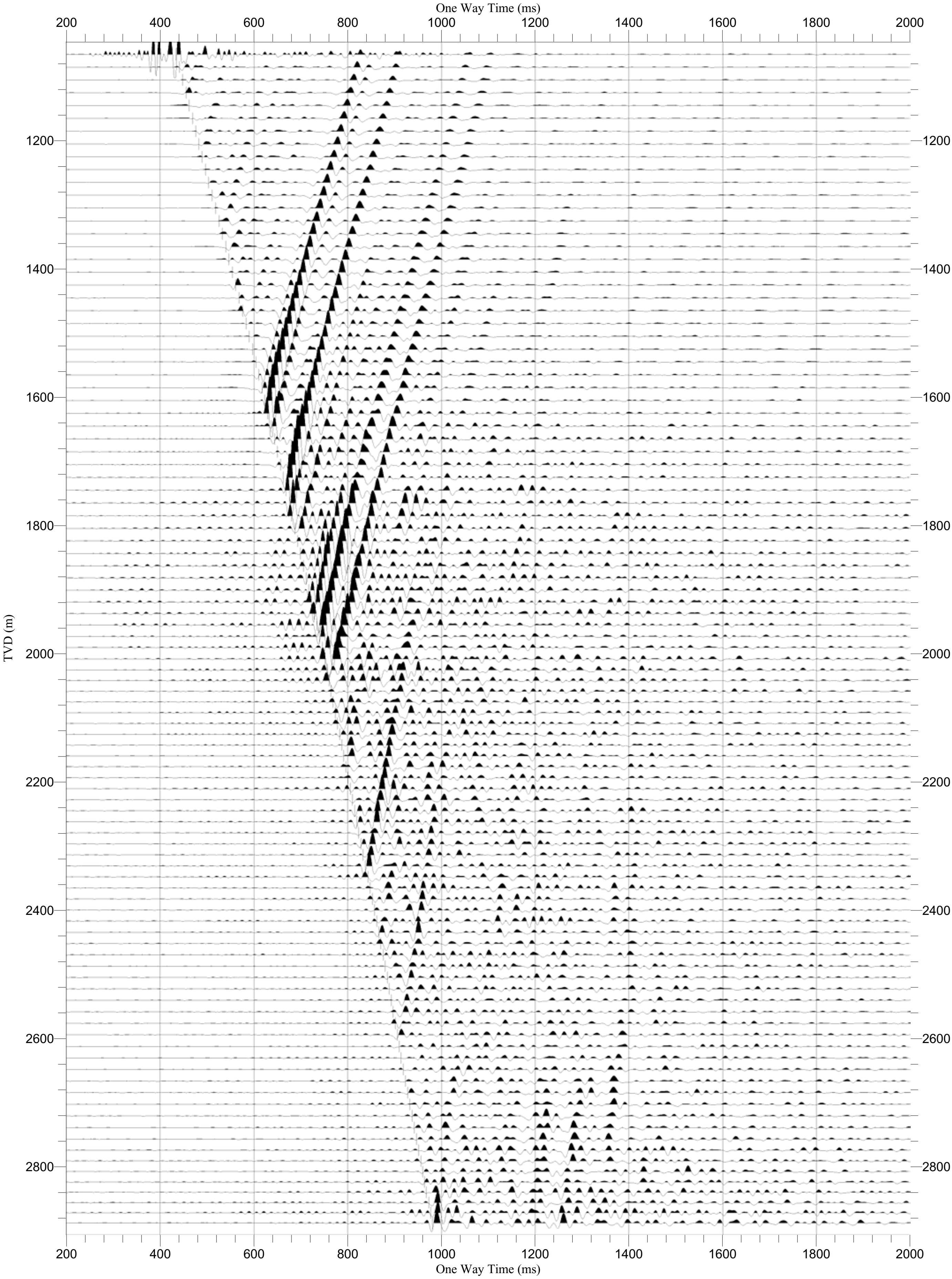
Schlumberger

VSP Waveshape decon downgoing BPF 3.0 - 120.0Hz 7 Traces Waveshape Decon.(wavelet: 8.0 - 65.0 Hz zero-phase)	Normalization Largest Trace in Gather (200%) Polarity Normal One Way Time (ms) Scaling 9.0 cm/sec, 1/8120

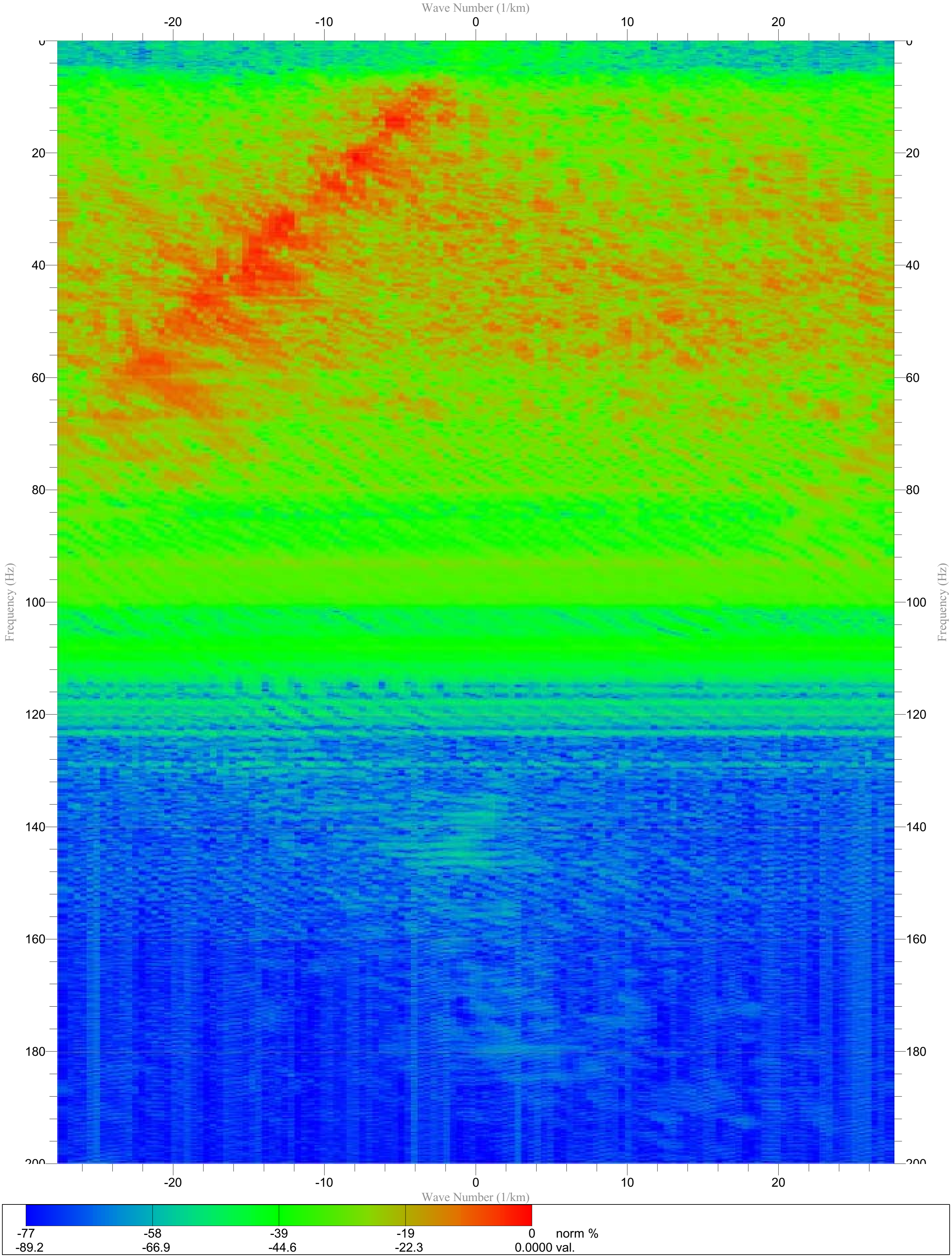


Schlumberger

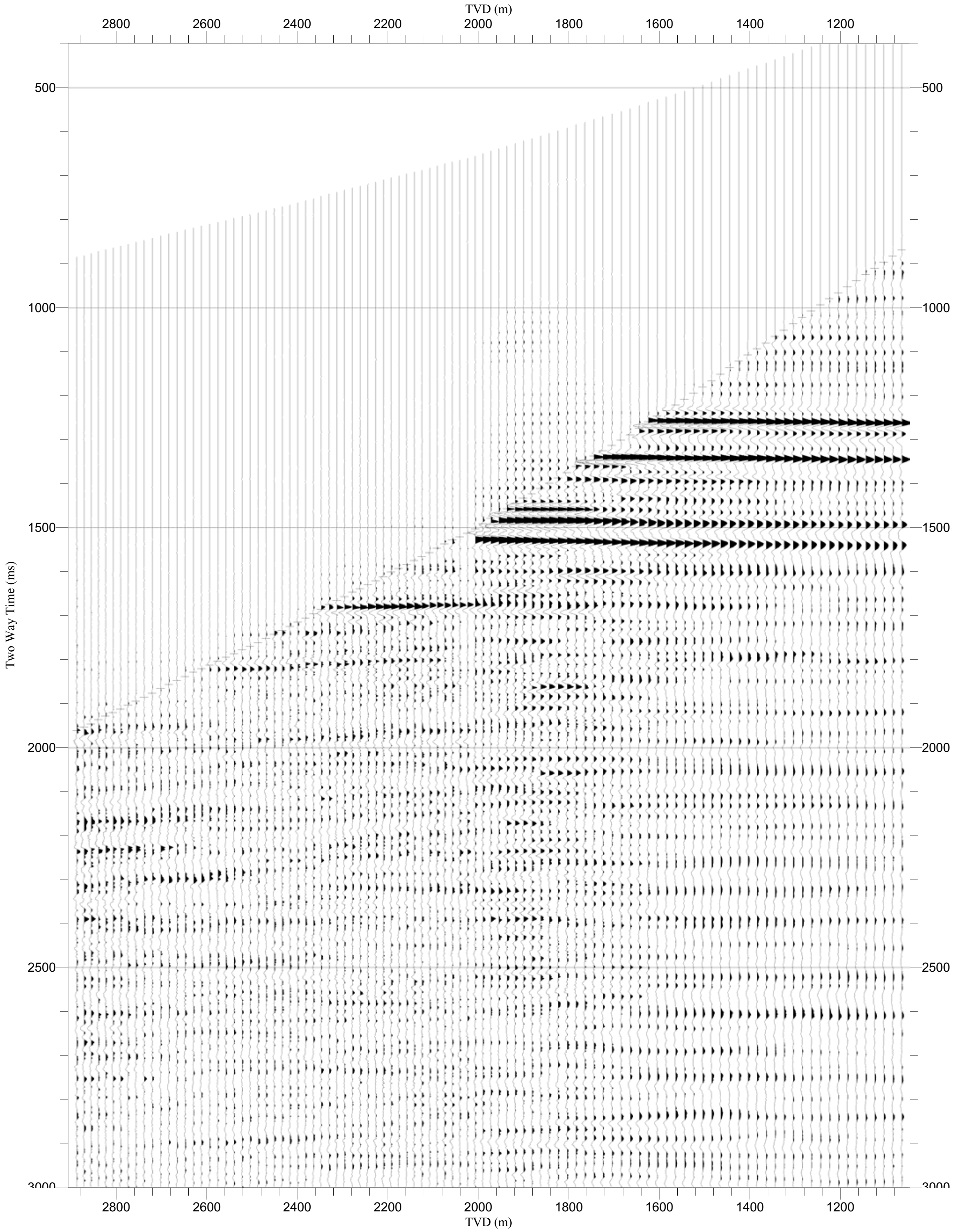
VSP Waveshape decon upgoing BPF 3.0 - 120.0Hz 7 Traces Waveshape Decon.(wavelet: 8.0 - 65.0 Hz zero-phase)	Normalization Largest Trace in Gather (300%) Polarity Normal One Way Time (ms) Scaling 9.0 cm/sec, 1/8120	



VSP Waveshape decon upgoing FK Apply FK	Normalization First Trace in Gather (100%) Polarity Normal Frequency (Hz) Scaling 0.12 cm/Hz, 0.30(1/km)/cm	

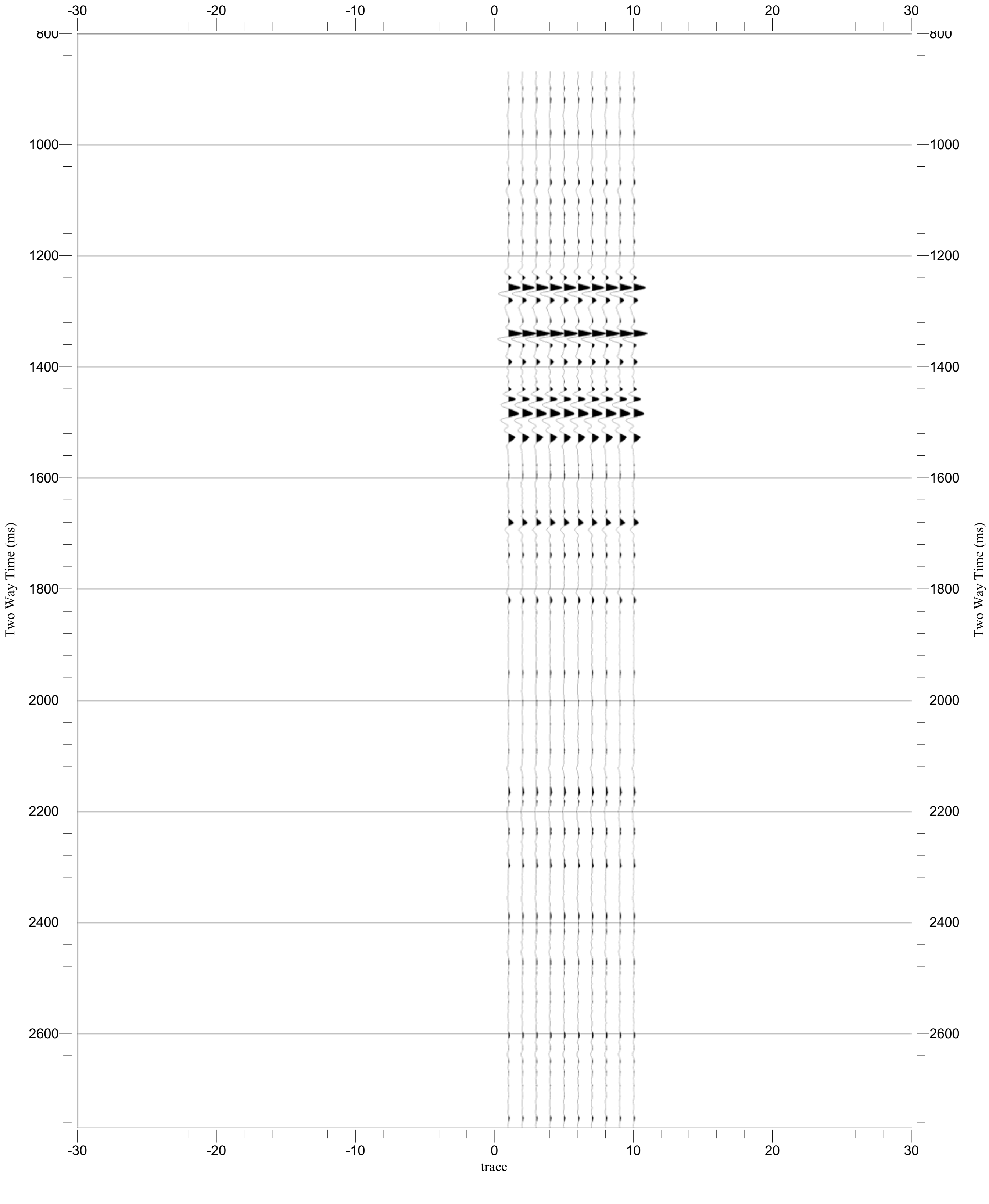


VSP Corridor Stack (Input) BPF 3.0 - 120.0Hz 7 Traces Waveshape Decon.(wavelet: 8.0 - 65.0 Hz zero-phase) BPF 3.0 - 70.0Hz Travel time exponent = 1.40 Median Filter 7 Traces	Normalization Largest Trace in Gather (300%) Polarity Normal Two Way Time (ms) Scaling 8.5 cm/sec, 1/11480	

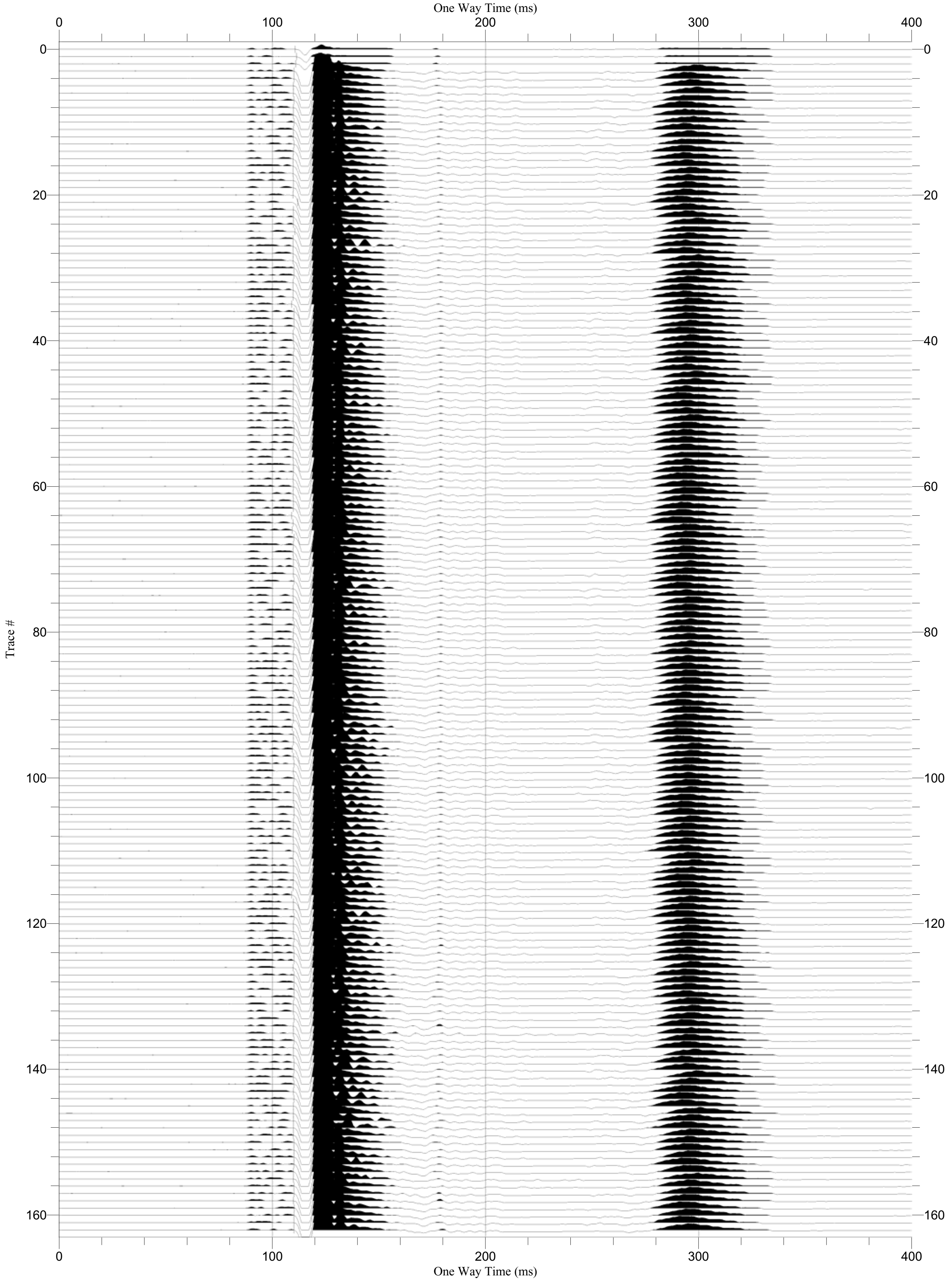


Schlumberger

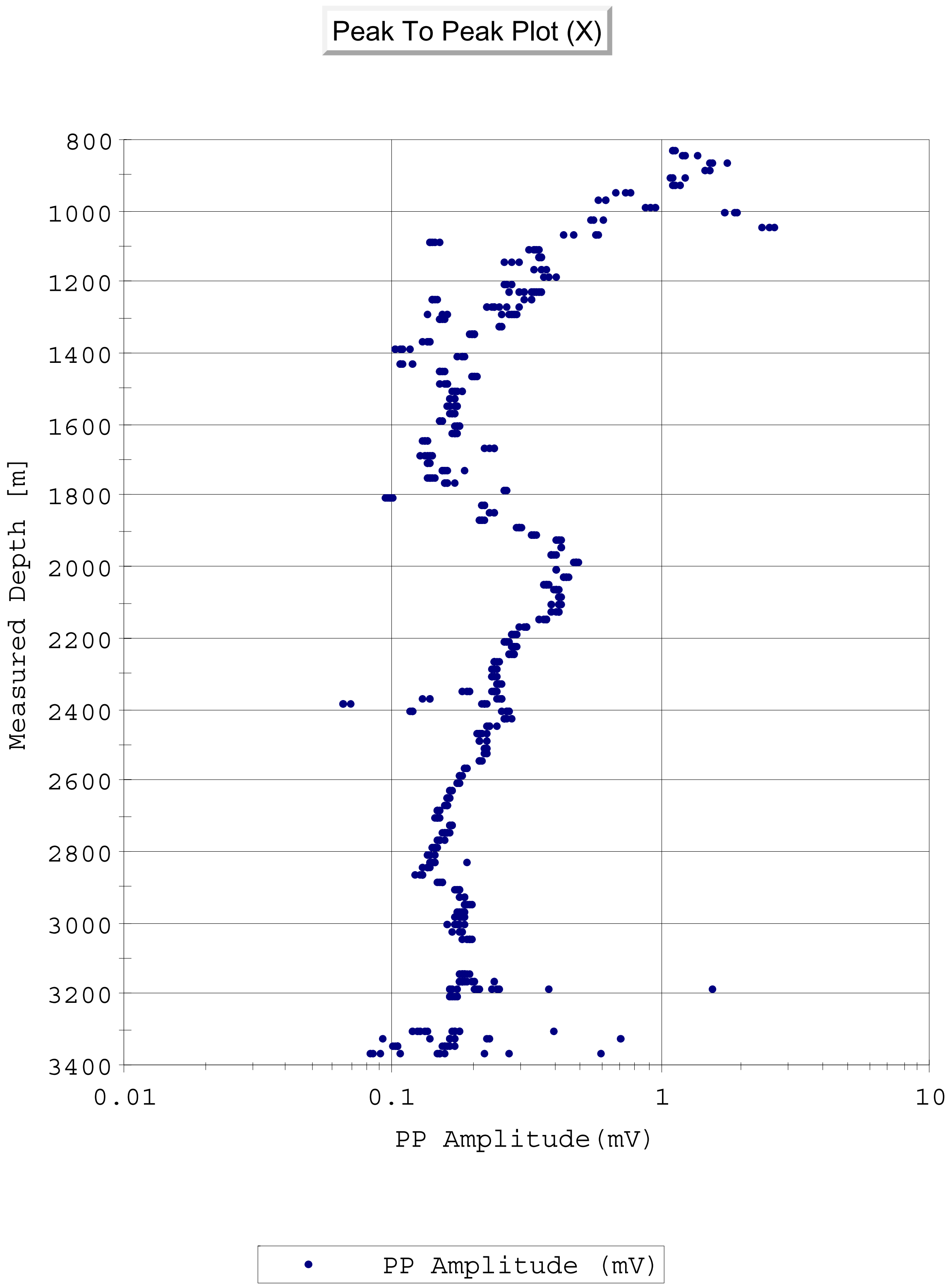
VSP Corridor Stack (output) BPF 3.0 - 120.0Hz 7 Traces Waveshape Decon.(wavelet: 8.0 - 65.0 Hz zero-phase) BPF 3.0 - 70.0Hz Travel time exponent = 1.40 Median Filter 7 Traces Corridor Stack (Mean): BPF 5.0 - 90.0Hz	Normalization Trace by Trace (100%) Polarity Normal Two Way Time (ms) Scaling 10.0 cm/sec, 4.0 traces/cm	



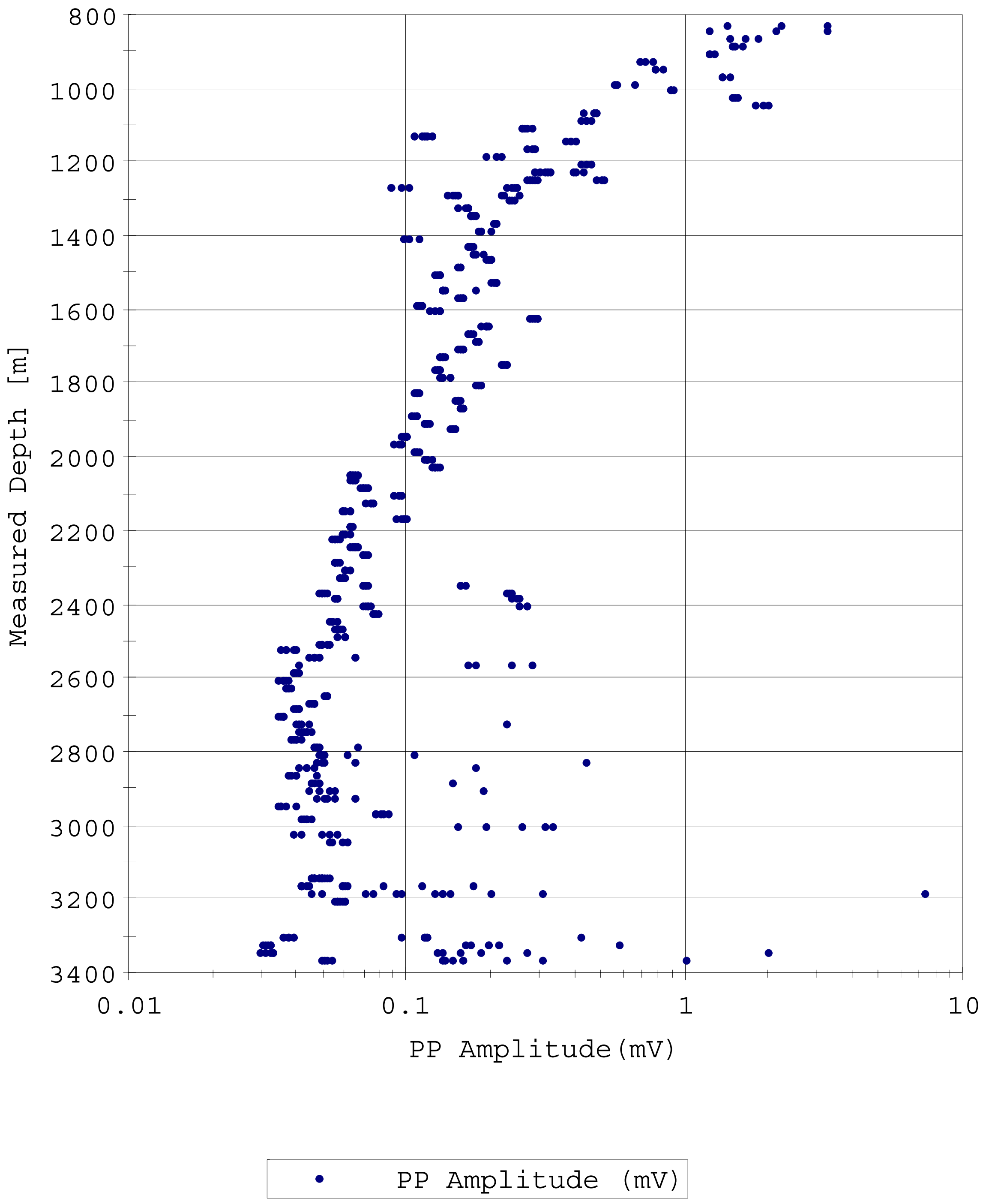
Source Sensor Signature	Normalization Largest Trace in Gather (300%) Polarity Normal One Way Time (ms) Scaling 41.32 cm/sec, 0.14/cm	

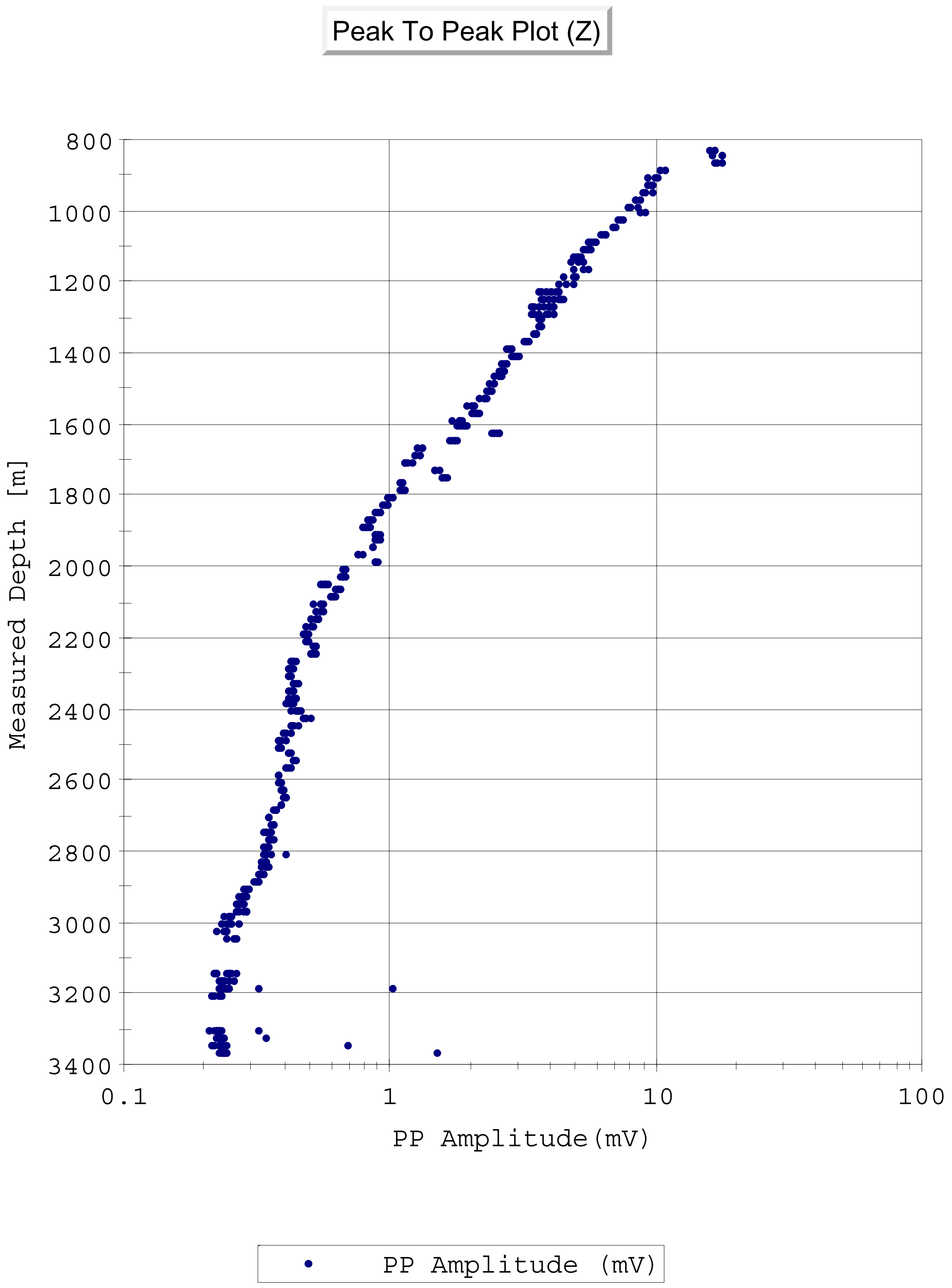


Schlumberger


Peak To Peak Plot (X)
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
Measured Depth [m]
0.01
0.1
1
10
PP Amplitude(mV)
PP Amplitude (mV)

Peak To Peak Plot (Y)





Peak To Peak Plot (Z)
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
Measured Depth [m]
0.1
1
10
100
PP Amplitude(mV)
PP Amplitude (mV)

Navigation Message Listing (1/3)

Shot #	Shot Time-UTC	Nav Shot #	Nav Fix #	Nav Shot Time	Gun East [UTM-meter]	Gun North [UTM-meter]	Distance off Line [m]	Along Track Error [m]	Distance off Target [m]
14	04:03:31	14	14	04:04:54	585636	5777088	0	0	0
15	04:05:45	15	15	04:07:08	585623	5777083	0	0	0
16	04:06:36	16	16	04:07:59	585613	5777087	0	0	0
17	05:01:28	17	17	05:02:51	585717	5776801	0	0	0
18	05:02:13	18	18	05:03:36	585716	5776808	0	0	0
19	05:02:52	19	19	05:04:15	585714	5776809	0	0	0
20	06:52:59	20	20	06:54:22	585771	5776314	0	0	0
21	06:54:06	21	21	06:55:29	585776	5776311	0	0	0
22	06:54:32	22	22	06:55:55	585778	5776308	0	0	0
23	06:55:12	23	23	06:56:35	585779	5776308	0	0	0
24	06:55:36	24	24	06:56:59	585782	5776307	0	0	0
25	06:55:56	25	25	06:57:19	585786	5776310	0	0	0
26	07:11:41	26	26	07:13:03	585776	5776356	0	0	0
27	07:12:54	27	27	07:14:17	585769	5776357	0	0	0
28	07:13:26	28	28	07:14:49	585769	5776358	0	0	0
29	07:13:49	29	29	07:15:12	585768	5776356	0	0	0
30	07:14:20	30	30	07:15:44	585769	5776354	0	0	0
31	07:24:54	31	31	07:26:17	585763	5776407	0	0	0
32	07:25:33	32	32	07:26:56	585762	5776403	0	0	0
33	07:25:57	33	33	07:27:21	585763	5776400	0	0	0
34	07:26:22	34	34	07:27:45	585767	5776401	0	0	0
35	07:26:43	35	35	07:28:05	585769	5776400	0	0	0
36	07:27:27	36	36	07:28:51	585770	5776399	0	0	0
37	07:30:04	37	37	07:31:28	585762	5776403	0	0	0
38	07:38:40	38	38	07:40:03	585753	5776443	0	0	0
39	07:39:32	39	39	07:40:55	585752	5776448	0	0	0
40	07:40:11	40	40	07:41:34	585756	5776450	0	0	0
41	07:40:32	41	41	07:41:55	585756	5776450	0	0	0
42	07:40:52	42	42	07:42:15	585757	5776448	0	0	0
43	07:41:46	43	43	07:43:09	585761	5776445	0	0	0
44	07:49:28	44	44	07:50:51	585746	5776499	0	0	0
45	07:49:56	45	45	07:51:19	585747	5776503	0	0	0
46	07:50:25	46	46	07:51:48	585750	5776502	0	0	0
47	07:50:45	47	47	07:52:08	585752	5776499	0	0	0
48	07:51:05	48	48	07:52:28	585753	5776495	0	0	0
49	08:02:31	49	49	08:03:54	585746	5776543	0	0	0
50	08:03:02	50	50	08:04:25	585745	5776544	0	0	0
51	08:03:27	51	51	08:04:50	585744	5776544	0	0	0
52	08:03:48	52	52	08:05:10	585741	5776545	0	0	0
53	08:04:42	53	53	08:06:05	585743	5776547	0	0	0
54	08:11:34	54	54	08:12:57	585743	5776585	0	0	0
55	08:12:00	55	55	08:13:22	585742	5776586	0	0	0
56	08:12:20	56	56	08:13:42	585743	5776588	0	0	0
57	08:13:10	57	57	08:14:33	585747	5776585	0	0	0
58	08:13:30	58	58	08:14:53	585746	5776585	0	0	0
59	08:20:30	59	59	08:21:53	585741	5776622	0	0	0
60	08:21:00	60	60	08:22:23	585744	5776620	0	0	0
61	08:21:20	61	61	08:22:43	585745	5776619	0	0	0
62	08:21:40	62	62	08:23:03	585745	5776617	0	0	0
63	08:22:00	63	63	08:23:23	585745	5776616	0	0	0
64	08:22:20	64	64	08:23:43	585743	5776617	0	0	0
65	08:31:14	65	65	08:32:37	585741	5776655	0	0	0
66	08:31:34	66	66	08:32:57	585741	5776655	0	0	0
67	08:31:55	67	67	08:33:18	585742	5776656	0	0	0
68	08:32:15	68	68	08:33:38	585742	5776656	0	0	0
69	08:32:35	69	69	08:33:58	585742	5776654	0	0	0
70	08:39:06	70	70	08:40:29	585743	5776690	0	0	0
71	08:39:26	71	71	08:40:49	585739	5776691	0	0	0
72	08:39:46	72	72	08:41:09	585735	5776692	0	0	0

Navigation Message Listing (2/3)

Shot #	Shot Time-UTC	Nav Shot #	Nav Fix #	Nav Shot Time	Gun East [UTM-meter]	Gun North [UTM-meter]	Distance off Line [m]	Along Track Error [m]	Distance off Target [m]
73	08:40:06	73	73	08:41:29	585734	5776692	0	0	0
74	08:40:26	74	74	08:41:49	585736	5776692	0	0	0
75	08:49:30	75	75	08:50:53	585744	5776731	0	0	0
76	08:50:24	76	76	08:51:47	585740	5776728	0	0	0
77	08:50:44	77	77	08:52:07	585734	5776728	0	0	0
78	08:51:09	78	78	08:52:31	585730	5776730	0	0	0
79	08:51:29	79	79	08:52:51	585731	5776730	0	0	0
80	09:00:57	80	80	09:02:20	585730	5776768	0	0	0
81	09:01:29	81	81	09:02:52	585731	5776768	0	0	0
82	09:01:49	82	82	09:03:12	585732	5776769	0	0	0
83	09:02:09	83	83	09:03:32	585733	5776767	0	0	0
84	09:02:29	84	84	09:03:52	585734	5776767	0	0	0
85	09:09:16	85	85	09:10:38	585725	5776810	0	0	0
86	09:09:44	86	86	09:11:07	585726	5776811	0	0	0
87	09:10:04	87	87	09:11:27	585727	5776810	0	0	0
88	09:10:24	88	88	09:11:47	585727	5776810	0	0	0
89	09:10:51	89	89	09:12:14	585726	5776810	0	0	0
90	09:17:51	90	90	09:19:14	585723	5776848	0	0	0
91	09:18:11	91	91	09:19:34	585723	5776849	0	0	0
92	09:18:31	92	92	09:19:54	585722	5776849	0	0	0
93	09:18:53	93	93	09:20:15	585721	5776850	0	0	0
94	09:19:13	94	94	09:20:35	585720	5776849	0	0	0
95	09:25:18	95	95	09:26:41	585719	5776889	0	0	0
96	09:25:41	96	96	09:27:03	585718	5776890	0	0	0
97	09:26:01	97	97	09:27:23	585717	5776890	0	0	0
98	09:26:35	98	98	09:27:57	585715	5776889	0	0	0
99	09:26:55	99	99	09:28:17	585716	5776891	0	0	0
100	09:33:23	100	100	09:34:46	585710	5776933	0	0	0
101	09:34:16	101	101	09:35:38	585712	5776932	0	0	0
102	09:34:36	102	102	09:35:59	585714	5776934	0	0	0
103	09:34:56	103	103	09:36:19	585715	5776934	0	0	0
104	09:35:16	104	104	09:36:39	585715	5776933	0	0	0
105	09:41:00	105	105	09:42:23	585706	5776976	0	0	0
106	09:42:16	106	106	09:43:39	585701	5776975	0	0	0
107	09:42:39	107	107	09:44:02	585701	5776979	0	0	0
108	09:42:59	108	108	09:44:22	585703	5776981	0	0	0
109	09:43:19	109	109	09:44:42	585704	5776978	0	0	0
110	09:51:55	110	110	09:53:18	585665	5777004	0	0	0
111	09:52:15	111	111	09:53:38	585665	5777006	0	0	0
112	09:52:35	112	112	09:53:58	585666	5777005	0	0	0
113	09:52:55	113	113	09:54:18	585669	5777006	0	0	0
114	09:53:15	114	114	09:54:38	585669	5777004	0	0	0
115	09:59:18	115	115	10:00:41	585671	5777004	0	0	0
116	09:59:38	116	116	10:01:01	585669	5777004	0	0	0
117	09:59:58	117	117	10:01:22	585668	5777006	0	0	0
118	10:00:18	118	118	10:01:41	585669	5777005	0	0	0
119	10:00:38	119	119	10:02:01	585670	5777004	0	0	0
120	10:06:21	120	120	10:07:44	585672	5777004	0	0	0
121	10:06:53	121	121	10:08:15	585671	5777006	0	0	0
122	10:07:13	122	122	10:08:36	585672	5777005	0	0	0
123	10:07:33	123	123	10:08:56	585673	5777003	0	0	0
124	10:07:53	124	124	10:09:16	585672	5777004	0	0	0
125	10:12:43	125	125	10:14:05	585671	5777005	0	0	0
126	10:13:16	126	126	10:14:39	585672	5777006	0	0	0
127	10:13:36	127	127	10:14:59	585669	5777006	0	0	0
128	10:13:56	128	128	10:15:19	585669	5777009	0	0	0
129	10:14:16	129	129	10:15:39	585671	5777008	0	0	0
130	10:19:50	130	130	10:21:12	585670	5777006	0	0	0
131	10:20:16	131	131	10:21:38	585671	5777003	0	0	0

Navigation Message Listing (3/3)

Shot #	Shot Time-UTC	Nav Shot #	Nav Fix #	Nav Shot Time	Gun East [UTM-meter]	Gun North [UTM-meter]	Distance off Line [m]	Along Track Error [m]	Distance off Target [m]
132	10:20:37	132	132	10:21:59	585673	5777003	0	0	0
133	10:20:57	133	133	10:22:19	585672	5777004	0	0	0
134	10:21:17	134	134	10:22:40	585671	5777004	0	0	0
135	10:25:38	135	135	10:27:01	585672	5777006	0	0	0
136	10:26:11	136	136	10:27:34	585672	5777005	0	0	0
137	10:26:34	137	137	10:27:56	585670	5777005	0	0	0
138	10:26:54	138	138	10:28:16	585670	5777004	0	0	0
139	10:27:14	139	139	10:28:36	585671	5777004	0	0	0
140	10:32:48	140	140	10:34:11	585673	5777002	0	0	0
141	10:33:08	141	141	10:34:30	585673	5777004	0	0	0
142	10:33:28	142	142	10:34:50	585673	5777005	0	0	0
143	10:33:48	143	143	10:35:10	585673	5777003	0	0	0
144	10:34:08	144	144	10:35:30	585673	5777004	0	0	0
145	10:38:57	145	145	10:40:20	585668	5777005	0	0	0
146	10:39:27	146	146	10:40:50	585665	5777007	0	0	0
147	10:39:47	147	147	10:41:10	585664	5777010	0	0	0
148	10:40:07	148	148	10:41:30	585662	5777012	0	0	0
149	10:40:27	149	149	10:41:50	585660	5777013	0	0	0
150	10:45:20	150	150	10:46:42	585671	5777007	0	0	0
151	10:45:44	151	151	10:47:06	585671	5777006	0	0	0
152	10:46:04	152	152	10:47:26	585671	5777005	0	0	0
153	10:46:24	153	153	10:47:46	585671	5777004	0	0	0
154	10:46:44	154	154	10:48:06	585670	5777004	0	0	0
155	10:51:07	155	155	10:52:29	585673	5777005	0	0	0
156	10:51:27	156	156	10:52:49	585672	5777004	0	0	0
157	10:51:47	157	157	10:53:09	585670	5777003	0	0	0
158	10:52:07	158	158	10:53:29	585670	5777003	0	0	0
159	10:52:27	159	159	10:53:49	585672	5777005	0	0	0
160	10:57:51	160	160	10:59:14	585671	5777003	0	0	0
161	10:58:11	161	161	10:59:34	585671	5777004	0	0	0
162	10:58:31	162	162	10:59:53	585670	5777005	0	0	0
163	11:03:31	163	163	11:04:54	585672	5777005	0	0	0
164	11:03:55	164	164	11:05:17	585671	5777006	0	0	0
165	11:04:14	165	165	11:05:37	585671	5777006	0	0	0
166	11:04:36	166	166	11:05:58	585671	5777003	0	0	0
167	11:04:56	167	167	11:06:18	585672	5777004	0	0	0
168	11:10:53	168	168	11:12:15	585672	5777005	0	0	0
169	11:11:21	169	169	11:12:44	585672	5777006	0	0	0
170	11:11:45	170	170	11:13:09	585671	5777006	0	0	0
171	11:16:55	171	171	11:18:18	585672	5777003	0	0	0
172	11:17:23	172	172	11:18:45	585673	5777005	0	0	0
173	11:17:43	173	173	11:19:06	585673	5777006	0	0	0
174	11:22:16	174	174	11:23:38	585670	5777006	0	0	0
175	11:22:36	175	175	11:24:00	585670	5777007	0	0	0
176	11:22:56	176	176	11:24:18	585671	5777006	0	0	0

Observer's Note (1/3)

Well depth [m]	Time	Shot Type	Shot#	Stack#	Source	Remarks
199.2	13:35:15	ENLO	1			
199.2	13:35:38	ENHI	2			
199.2	13:35:47	ETHD	3			
199.2	13:36:01	DRNG	4			
199.2	13:36:16	GA02	5			
199.2	13:36:26	GA04	6			
199.2	13:36:36	GA08	7			
199.2	13:36:46	GA16	8			
199.2	13:36:56	GA32	9			
199.2	13:37:11	XTLK	10			
199.2	13:37:30	XTLK	11			
199.2	13:37:49	XTLK	12			
199.2	13:38:07	EIMP	13			
1285.0	15:03:31	SHOT	14	2	Boat	Depth 1 M deepeer
1285.0	15:05:45	SHOT	15	2	Boat	
1285.0	15:06:36	SHOT	16	2	Boat	
2405.0	16:01:28	SHOT	17	3	Boat	
2405.0	16:02:13	SHOT	18	3	Boat	
2405.0	16:02:52	SHOT	19	3	Boat	
3363.5	17:52:59	SHOT	20	4	Boat	
3363.5	17:54:06	SHOT	21	4	Boat	
3363.5	17:54:32	SHOT	22	4	Boat	
3363.5	17:55:12	SHOT	23	4	Boat	
3363.5	17:55:36	SHOT	24	4	Boat	
3363.5	17:55:56	SHOT	25	4	Boat	
3363.5	18:11:41	SHOT	26	5	Boat	3285 M
3363.5	18:12:54	SHOT	27	5	Boat	3285 M
3363.5	18:13:26	SHOT	28	5	Boat	3285 M
3363.5	18:13:49	SHOT	29	5	Boat	3285 M
3363.5	18:14:20	SHOT	30	5	Boat	3285 M
3205.0	18:24:54	SHOT	31	6	Boat	3205
3205.0	18:25:33	SHOT	32	6	Boat	3205
3205.0	18:25:57	SHOT	33	6	Boat	3205
3205.0	18:26:22	SHOT	34	6	Boat	3205
3205.0	18:26:43	SHOT	35	6	Boat	3205
3205.0	18:27:27	SHOT	36	6	Boat	3205
3205.0	18:30:04	SHOT	37	6	Boat	3205
3205.0	18:38:40	SHOT	38	7	Boat	3125
3205.0	18:39:32	SHOT	39	7	Boat	3125
3205.0	18:40:11	SHOT	40	7	Boat	3125
3205.0	18:40:32	SHOT	41	7	Boat	3125
3205.0	18:40:52	SHOT	42	7	Boat	3125
3205.0	18:41:46	SHOT	43	7	Boat	3125
3045.0	18:49:28	SHOT	44	8	Boat	
3045.0	18:49:56	SHOT	45	8	Boat	
3045.0	18:50:25	SHOT	46	8	Boat	
3045.0	18:50:45	SHOT	47	8	Boat	
3045.0	18:51:05	SHOT	48	8	Boat	
2965.0	19:02:31	SHOT	49	9	Boat	
2965.0	19:03:02	SHOT	50	9	Boat	
2965.0	19:03:27	SHOT	51	9	Boat	
2965.0	19:03:48	SHOT	52	9	Boat	
2965.0	19:04:42	SHOT	53	9	Boat	
2885.0	19:11:34	SHOT	54	10	Boat	
2885.0	19:12:00	SHOT	55	10	Boat	
2885.0	19:12:20	SHOT	56	10	Boat	
2885.0	19:13:10	SHOT	57	10	Boat	
2885.0	19:13:30	SHOT	58	10	Boat	
2804.9	19:20:30	SHOT	59	11	Boat	

Observer's Note (2/3)

Well depth [m]	Time	Shot Type	Shot#	Stack#	Source	Remarks
2804.9	19:21:00	SHOT	60	11	Boat	
2804.9	19:21:20	SHOT	61	11	Boat	
2804.9	19:21:40	SHOT	62	11	Boat	
2804.9	19:22:00	SHOT	63	11	Boat	
2804.9	19:22:20	SHOT	64	11	Boat	
2725.0	19:31:14	SHOT	65	12	Boat	
2725.0	19:31:34	SHOT	66	12	Boat	
2725.0	19:31:55	SHOT	67	12	Boat	
2725.0	19:32:15	SHOT	68	12	Boat	
2725.0	19:32:35	SHOT	69	12	Boat	
2645.0	19:39:06	SHOT	70	13	Boat	
2645.0	19:39:26	SHOT	71	13	Boat	
2645.0	19:39:46	SHOT	72	13	Boat	
2645.0	19:40:06	SHOT	73	13	Boat	
2645.0	19:40:26	SHOT	74	13	Boat	
2565.0	19:49:30	SHOT	75	14	Boat	
2565.0	19:50:24	SHOT	76	14	Boat	
2565.0	19:50:44	SHOT	77	14	Boat	
2565.0	19:51:09	SHOT	78	14	Boat	
2565.0	19:51:29	SHOT	79	14	Boat	This station depth sensor depth changed 1 M deeper. Signature was not affected.
2484.9	20:00:57	SHOT	80	15	Boat	
2484.9	20:01:29	SHOT	81	15	Boat	
2484.9	20:01:49	SHOT	82	15	Boat	
2484.9	20:02:09	SHOT	83	15	Boat	
2484.9	20:02:29	SHOT	84	15	Boat	
2405.0	20:09:16	SHOT	85	16	Boat	
2405.0	20:09:44	SHOT	86	16	Boat	
2405.0	20:10:04	SHOT	87	16	Boat	
2405.0	20:10:24	SHOT	88	16	Boat	
2405.0	20:10:51	SHOT	89	16	Boat	
2325.0	20:17:51	SHOT	90	17	Boat	
2325.0	20:18:11	SHOT	91	17	Boat	
2325.0	20:18:31	SHOT	92	17	Boat	
2325.0	20:18:53	SHOT	93	17	Boat	
2325.0	20:19:13	SHOT	94	17	Boat	
2244.9	20:25:18	SHOT	95	18	Boat	
2244.9	20:25:41	SHOT	96	18	Boat	
2244.9	20:26:01	SHOT	97	18	Boat	
2244.9	20:26:35	SHOT	98	18	Boat	
2244.9	20:26:55	SHOT	99	18	Boat	
2164.9	20:33:23	SHOT	100	19	Boat	
2164.9	20:34:16	SHOT	101	19	Boat	
2164.9	20:34:36	SHOT	102	19	Boat	
2164.9	20:34:56	SHOT	103	19	Boat	
2164.9	20:35:16	SHOT	104	19	Boat	
2084.9	20:41:00	SHOT	105	20	Boat	
2084.9	20:42:16	SHOT	106	20	Boat	
2084.9	20:42:39	SHOT	107	20	Boat	
2084.9	20:42:59	SHOT	108	20	Boat	
2084.9	20:43:19	SHOT	109	20	Boat	
2005.0	20:51:55	SHOT	110	21	Boat	
2005.0	20:52:15	SHOT	111	21	Boat	
2005.0	20:52:35	SHOT	112	21	Boat	
2005.0	20:52:55	SHOT	113	21	Boat	
2005.0	20:53:15	SHOT	114	21	Boat	
1925.0	20:59:18	SHOT	115	22	Boat	
1925.0	20:59:38	SHOT	116	22	Boat	
1925.0	20:59:58	SHOT	117	22	Boat	
1925.0	21:00:18	SHOT	118	22	Boat	

Observer's Note (3/3)

Well depth [m]	Time	Shot Type	Shot#	Stack#	Source	Remarks
1925.0	21:00:38	SHOT	119	22	Boat	
1844.8	21:06:21	SHOT	120	23	Boat	
1844.8	21:06:53	SHOT	121	23	Boat	
1844.8	21:07:13	SHOT	122	23	Boat	
1844.8	21:07:33	SHOT	123	23	Boat	
1844.8	21:07:53	SHOT	124	23	Boat	
1765.0	21:12:43	SHOT	125	24	Boat	
1765.0	21:13:16	SHOT	126	24	Boat	
1765.0	21:13:36	SHOT	127	24	Boat	
1765.0	21:13:56	SHOT	128	24	Boat	
1765.0	21:14:16	SHOT	129	24	Boat	
1684.9	21:19:50	SHOT	130	25	Boat	
1684.9	21:20:16	SHOT	131	25	Boat	
1684.9	21:20:37	SHOT	132	25	Boat	
1684.9	21:20:57	SHOT	133	25	Boat	
1684.9	21:21:17	SHOT	134	25	Boat	
1604.9	21:25:38	SHOT	135	26	Boat	
1604.9	21:26:11	SHOT	136	26	Boat	
1604.9	21:26:34	SHOT	137	26	Boat	
1604.9	21:26:54	SHOT	138	26	Boat	
1604.9	21:27:14	SHOT	139	26	Boat	
1525.0	21:32:48	SHOT	140	27	Boat	
1525.0	21:33:08	SHOT	141	27	Boat	
1525.0	21:33:28	SHOT	142	27	Boat	
1525.0	21:33:48	SHOT	143	27	Boat	
1525.0	21:34:08	SHOT	144	27	Boat	
1444.9	21:38:57	SHOT	145	28	Boat	
1444.9	21:39:27	SHOT	146	28	Boat	
1444.9	21:39:47	SHOT	147	28	Boat	
1444.9	21:40:07	SHOT	148	28	Boat	
1444.9	21:40:27	SHOT	149	28	Boat	
1364.9	21:45:20	SHOT	150	29	Boat	
1364.9	21:45:44	SHOT	151	29	Boat	
1364.9	21:46:04	SHOT	152	29	Boat	
1364.9	21:46:24	SHOT	153	29	Boat	
1364.9	21:46:44	SHOT	154	29	Boat	
1285.0	21:51:07	SHOT	155	30	Boat	
1285.0	21:51:27	SHOT	156	30	Boat	
1285.0	21:51:47	SHOT	157	30	Boat	
1285.0	21:52:07	SHOT	158	30	Boat	
1285.0	21:52:27	SHOT	159	30	Boat	
1205.0	21:57:51	SHOT	160	31	Boat	From this station - 3 shots only for checkshot
1205.0	21:58:11	SHOT	161	31	Boat	
1205.0	21:58:31	SHOT	162	31	Boat	
1125.0	22:03:31	SHOT	163	32	Boat	
1125.0	22:03:55	SHOT	164	32	Boat	
1125.0	22:04:14	SHOT	165	32	Boat	
1125.0	22:04:36	SHOT	166	32	Boat	
1125.0	22:04:56	SHOT	167	32	Boat	
1044.9	22:10:53	SHOT	168	33	Boat	Strong casing arrival - No formation signal
1044.9	22:11:21	SHOT	169	33	Boat	
1044.9	22:11:45	SHOT	170	33	Boat	
964.9	22:16:55	SHOT	171	34	Boat	
964.9	22:17:23	SHOT	172	34	Boat	
964.9	22:17:43	SHOT	173	34	Boat	
884.8	22:22:16	SHOT	174	35	Boat	
884.8	22:22:36	SHOT	175	35	Boat	
884.8	22:22:56	SHOT	176	35	Boat	

VSI Seismic Evaluation Report

ELECTRICAL NOISE LOW TEST

2005/02/07 13:35:15

Shot No: 1 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
DC Offset	1	X	-25.3381	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	X	0.1225	micro V	-	0.5000	PASS
Noise Peak	1	X	0.4311	micro V	-	2.0000	PASS
DC Offset	1	Y	-25.4506	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	Y	0.1213	micro V	-	0.5000	PASS
Noise Peak	1	Y	0.4553	micro V	-	2.0000	PASS
DC Offset	1	Z	-25.3584	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	Z	0.1196	micro V	-	0.5000	PASS
Noise Peak	1	Z	0.4413	micro V	-	2.0000	PASS
DC Offset	2	X	-25.3015	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	X	0.1262	micro V	-	0.5000	PASS
Noise Peak	2	X	0.4895	micro V	-	2.0000	PASS
DC Offset	2	Y	-25.4170	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	Y	0.1218	micro V	-	0.5000	PASS
Noise Peak	2	Y	0.4260	micro V	-	2.0000	PASS
DC Offset	2	Z	-25.3334	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	Z	0.1437	micro V	-	0.5000	PASS
Noise Peak	2	Z	0.5215	micro V	-	2.0000	PASS
DC Offset	3	X	-25.2718	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	X	0.1189	micro V	-	0.5000	PASS
Noise Peak	3	X	0.4808	micro V	-	2.0000	PASS
DC Offset	3	Y	-25.3479	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	Y	0.1218	micro V	-	0.5000	PASS
Noise Peak	3	Y	0.5174	micro V	-	2.0000	PASS
DC Offset	3	Z	-25.3745	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	Z	0.1240	micro V	-	0.5000	PASS
Noise Peak	3	Z	0.4480	micro V	-	2.0000	PASS
DC Offset	4	X	-25.3925	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	X	0.1221	micro V	-	0.5000	PASS
Noise Peak	4	X	0.4494	micro V	-	2.0000	PASS
DC Offset	4	Y	-25.4413	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	Y	0.1237	micro V	-	0.5000	PASS
Noise Peak	4	Y	0.4459	micro V	-	2.0000	PASS
DC Offset	4	Z	-25.4389	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	Z	0.1221	micro V	-	0.5000	PASS
Noise Peak	4	Z	0.4995	micro V	-	2.0000	PASS

ELECTRICAL NOISE HIGH TEST

2005/02/07 13:35:38

Shot No: 2 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
DC Offset	1	X	-25.2608	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	X	0.1212	micro V	-	0.5000	PASS
Noise Peak	1	X	0.3993	micro V	-	2.0000	PASS
DC Offset	1	Y	-25.3087	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	Y	0.1217	micro V	-	0.5000	PASS
Noise Peak	1	Y	0.4699	micro V	-	2.0000	PASS
DC Offset	1	Z	-25.0543	milli V	-100.0000	100.0000	PASS
RMS Noise Level	1	Z	0.1225	micro V	-	0.5000	PASS
Noise Peak	1	Z	0.4768	micro V	-	2.0000	PASS
DC Offset	2	X	-24.9551	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	X	0.1249	micro V	-	0.5000	PASS
Noise Peak	2	X	0.4151	micro V	-	2.0000	PASS
DC Offset	2	Y	-25.3966	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	Y	0.1229	micro V	-	0.5000	PASS
Noise Peak	2	Y	0.4081	micro V	-	2.0000	PASS
DC Offset	2	Z	-24.9693	milli V	-100.0000	100.0000	PASS
RMS Noise Level	2	Z	0.1368	micro V	-	0.5000	PASS
Noise Peak	2	Z	0.4880	micro V	-	2.0000	PASS
DC Offset	3	X	-24.9349	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	X	0.1203	micro V	-	0.5000	PASS
Noise Peak	3	X	0.4320	micro V	-	2.0000	PASS

DC Offset	3	Y	-25.2060	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	Y	0.1198	micro V	-	0.5000	PASS
Noise Peak	3	Y	0.4483	micro V	-	2.0000	PASS
DC Offset	3	Z	-25.4039	milli V	-100.0000	100.0000	PASS
RMS Noise Level	3	Z	0.1210	micro V	-	0.5000	PASS
Noise Peak	3	Z	0.4565	micro V	-	2.0000	PASS
DC Offset	4	X	-25.1510	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	X	0.1229	micro V	-	0.5000	PASS
Noise Peak	4	X	0.4653	micro V	-	2.0000	PASS
DC Offset	4	Y	-25.3257	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	Y	0.1254	micro V	-	0.5000	PASS
Noise Peak	4	Y	0.4297	micro V	-	2.0000	PASS
DC Offset	4	Z	-25.1995	milli V	-100.0000	100.0000	PASS
RMS Noise Level	4	Z	0.1219	micro V	-	0.5000	PASS
Noise Peak	4	Z	0.4738	micro V	-	2.0000	PASS

ELECTRICAL DISTORTION TEST

2005/02/07 13:35:47

Shot No: 3 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Total Harmonic Distortion	1	X	-98.4438	dB	-	-90.0000	PASS
Total Harmonic Distortion	1	Y	-101.2435	dB	-	-90.0000	PASS
Total Harmonic Distortion	1	Z	-99.6059	dB	-	-90.0000	PASS
Total Harmonic Distortion	2	X	-103.0131	dB	-	-90.0000	PASS
Total Harmonic Distortion	2	Y	-100.6935	dB	-	-90.0000	PASS
Total Harmonic Distortion	2	Z	-109.5524	dB	-	-90.0000	PASS
Total Harmonic Distortion	3	X	-100.0244	dB	-	-90.0000	PASS
Total Harmonic Distortion	3	Y	-98.0277	dB	-	-90.0000	PASS
Total Harmonic Distortion	3	Z	-101.4333	dB	-	-90.0000	PASS
Total Harmonic Distortion	4	X	-107.6097	dB	-	-90.0000	PASS
Total Harmonic Distortion	4	Y	-106.1567	dB	-	-90.0000	PASS
Total Harmonic Distortion	4	Z	-106.4371	dB	-	-90.0000	PASS

SYSTEM DYNAMIC RANGE TEST

2005/02/07 13:36:01

Shot No: 4 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
System Dynamic Range	1	X	106.7787	dB	103.0000	-	PASS
System Dynamic Range	1	Y	107.4400	dB	103.0000	-	PASS
System Dynamic Range	1	Z	107.1669	dB	103.0000	-	PASS
System Dynamic Range	2	X	106.7808	dB	103.0000	-	PASS
System Dynamic Range	2	Y	106.7142	dB	103.0000	-	PASS
System Dynamic Range	2	Z	107.0372	dB	103.0000	-	PASS
System Dynamic Range	3	X	106.4049	dB	103.0000	-	PASS
System Dynamic Range	3	Y	106.6407	dB	103.0000	-	PASS
System Dynamic Range	3	Z	106.5171	dB	103.0000	-	PASS
System Dynamic Range	4	X	108.3886	dB	103.0000	-	PASS
System Dynamic Range	4	Y	108.7514	dB	103.0000	-	PASS
System Dynamic Range	4	Z	108.3699	dB	103.0000	-	PASS

AMPLIFIER GAIN 2 TEST

2005/02/07 13:36:16

Shot No: 5 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Gain Accuracy	1	X	0.1480	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	X	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Y	0.1560	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Y	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Z	0.1439	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Z	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	X	0.1600	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	X	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Y	0.1497	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Y	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Z	0.1572	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Z	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	X	0.1230	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	X	0.0000	dB	-0.5000	0.5000	PASS

Gain Accuracy	3	Y	0.1349	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Y	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Z	0.1410	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Z	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	X	0.1285	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	X	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Y	0.1250	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Y	0.0000	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Z	0.1301	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Z	0.0000	dB	-0.5000	0.5000	PASS

AMPLIFIER GAIN 4 TEST

2005/02/07 13:36:26

Shot No: 6 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Gain Accuracy	1	X	0.1452	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	X	0.0027	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Y	0.1532	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Y	0.0028	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Z	0.1421	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Z	0.0018	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	X	0.1571	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	X	0.0029	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Y	0.1469	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Y	0.0027	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Z	0.1564	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Z	0.0008	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	X	0.1183	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	X	0.0048	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Y	0.1330	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Y	0.0018	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Z	0.1464	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Z	-0.0054	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	X	0.1267	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	X	0.0018	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Y	0.1235	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Y	0.0015	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Z	0.1291	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Z	0.0010	dB	-0.5000	0.5000	PASS

AMPLIFIER GAIN 8 TEST

2005/02/07 13:36:36

Shot No: 7 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Gain Accuracy	1	X	0.1461	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	X	0.0019	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Y	0.1518	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Y	0.0041	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Z	0.1432	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Z	0.0007	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	X	0.1564	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	X	0.0035	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Y	0.1465	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Y	0.0031	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Z	0.1556	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Z	0.0016	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	X	0.1168	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	X	0.0062	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Y	0.1347	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Y	0.0001	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Z	0.1494	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Z	-0.0085	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	X	0.1263	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	X	0.0022	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Y	0.1239	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Y	0.0011	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Z	0.1295	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Z	0.0006	dB	-0.5000	0.5000	PASS

AMPLIFIER GAIN 16 TEST

2005/02/07 13:36:46

Shot No: 8 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Gain Accuracy	1	X	0.1431	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	X	0.0049	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Y	0.1484	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Y	0.0076	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Z	0.1415	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Z	0.0024	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	X	0.1526	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	X	0.0074	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Y	0.1417	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Y	0.0080	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Z	0.1530	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Z	0.0041	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	X	0.1123	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	X	0.0107	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Y	0.1290	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Y	0.0058	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Z	0.1431	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Z	-0.0022	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	X	0.1248	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	X	0.0037	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Y	0.1198	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Y	0.0052	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Z	0.1271	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Z	0.0030	dB	-0.5000	0.5000	PASS

AMPLIFIER GAIN 32 TEST

2005/02/07 13:36:56

Shot No: 9 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Gain Accuracy	1	X	0.1440	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	X	0.0040	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Y	0.1508	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Y	0.0052	dB	-0.5000	0.5000	PASS
Gain Accuracy	1	Z	0.1424	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	1	Z	0.0015	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	X	0.1558	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	X	0.0042	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Y	0.1441	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Y	0.0056	dB	-0.5000	0.5000	PASS
Gain Accuracy	2	Z	0.1546	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	2	Z	0.0026	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	X	0.1157	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	X	0.0074	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Y	0.1356	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Y	-0.0007	dB	-0.5000	0.5000	PASS
Gain Accuracy	3	Z	0.1474	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	3	Z	-0.0064	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	X	0.1257	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	X	0.0028	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Y	0.1224	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Y	0.0026	dB	-0.5000	0.5000	PASS
Gain Accuracy	4	Z	0.1325	dB	-0.5000	0.5000	PASS
Gain Step Accuracy	4	Z	-0.0024	dB	-0.5000	0.5000	PASS

CROSS TALK X TEST

2005/02/07 13:37:11

Shot No: 10 **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Cross Talk X-Y	1	-	-100.0473	dB	-	-90.0000	PASS
Cross Talk X-Z	1	-	-99.0050	dB	-	-90.0000	PASS
Cross Talk X-Y	2	-	-100.1223	dB	-	-90.0000	PASS
Cross Talk X-Z	2	-	-97.9213	dB	-	-90.0000	PASS
Cross Talk X-Y	3	-	-100.0172	dB	-	-90.0000	PASS

Cross Talk X-Z	3	-	-98.4269	dB	-	-90.0000	PASS
Cross Talk X-Y	4	-	-100.1805	dB	-	-90.0000	PASS
Cross Talk X-Z	4	-	-98.8326	dB	-	-90.0000	PASS

CROSS TALK Y TEST

2005/02/07 13:37:30

Shot No: 11 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Cross Talk Y-Z	1	-	-98.5326	dB	-	-90.0000	PASS
Cross Talk Y-X	1	-	-99.9843	dB	-	-90.0000	PASS
Cross Talk Y-Z	2	-	-97.5101	dB	-	-90.0000	PASS
Cross Talk Y-X	2	-	-99.0177	dB	-	-90.0000	PASS
Cross Talk Y-Z	3	-	-97.7995	dB	-	-90.0000	PASS
Cross Talk Y-X	3	-	-99.5226	dB	-	-90.0000	PASS
Cross Talk Y-Z	4	-	-98.6264	dB	-	-90.0000	PASS
Cross Talk Y-X	4	-	-99.7458	dB	-	-90.0000	PASS

CROSS TALK Z TEST

2005/02/07 13:37:49

Shot No: 12 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Cross Talk Z-X	1	-	-97.5197	dB	-	-90.0000	PASS
Cross Talk Z-Y	1	-	-97.0704	dB	-	-90.0000	PASS
Cross Talk Z-X	2	-	-96.7414	dB	-	-90.0000	PASS
Cross Talk Z-Y	2	-	-96.5775	dB	-	-90.0000	PASS
Cross Talk Z-X	3	-	-97.2309	dB	-	-90.0000	PASS
Cross Talk Z-Y	3	-	-96.8516	dB	-	-90.0000	PASS
Cross Talk Z-X	4	-	-97.4839	dB	-	-90.0000	PASS
Cross Talk Z-Y	4	-	-97.2563	dB	-	-90.0000	PASS

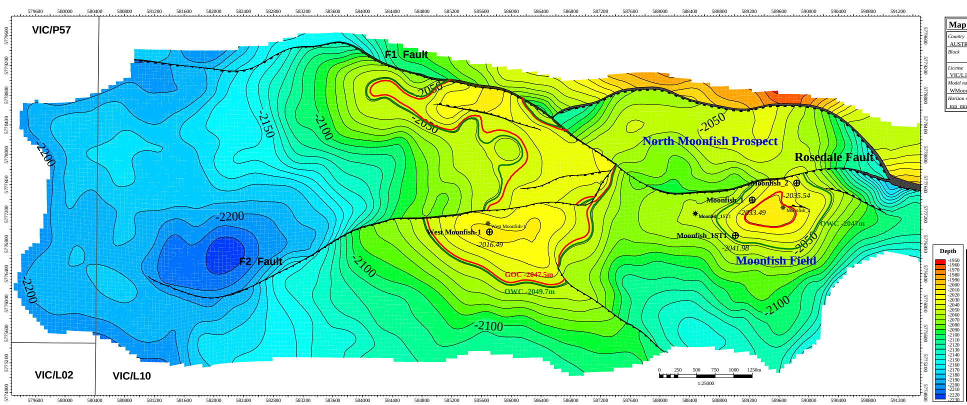
IMPULSE RESPONSE TEST

2005/02/07 13:38:07

Shot No: 13 | **Station Depth: 199.17 m**

Evaluation Item	Shuttle	Channel	Value	Unit	Lower Limit	Upper Limit	Result
Amplitude (0.3Hz)	1	X	-1.5644	dB	-5.0000	-	PASS
Amplitude (400Hz)	1	X	-3.5755	dB	-5.0000	-	PASS
Impulse Amplitude	1	X	573.9947	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	1	X	0.0000	degree	-	-	-
Amplitude (0.3Hz)	1	Y	-1.5707	dB	-5.0000	-	PASS
Amplitude (400Hz)	1	Y	-3.5767	dB	-5.0000	-	PASS
Impulse Amplitude	1	Y	574.4123	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	1	Y	0.0561	degree	-	-	-
Amplitude (0.3Hz)	1	Z	-1.7011	dB	-5.0000	-	PASS
Amplitude (400Hz)	1	Z	-3.5775	dB	-5.0000	-	PASS
Impulse Amplitude	1	Z	573.5530	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	1	Z	1.3438	degree	-	-	-
Amplitude (0.3Hz)	2	X	-1.6840	dB	-5.0000	-	PASS
Amplitude (400Hz)	2	X	-3.5714	dB	-5.0000	-	PASS
Impulse Amplitude	2	X	574.9700	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	2	X	1.1162	degree	-	-	-
Amplitude (0.3Hz)	2	Y	-1.6274	dB	-5.0000	-	PASS
Amplitude (400Hz)	2	Y	-3.5723	dB	-5.0000	-	PASS
Impulse Amplitude	2	Y	574.3322	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	2	Y	0.4778	degree	-	-	-
Amplitude (0.3Hz)	2	Z	-1.6116	dB	-5.0000	-	PASS
Amplitude (400Hz)	2	Z	-3.5720	dB	-5.0000	-	PASS
Impulse Amplitude	2	Z	574.6003	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	2	Z	0.2414	degree	-	-	-
Amplitude (0.3Hz)	3	X	-1.5779	dB	-5.0000	-	PASS
Amplitude (400Hz)	3	X	-3.5727	dB	-5.0000	-	PASS
Impulse Amplitude	3	X	571.9891	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	3	X	0.6467	degree	-	-	-
Amplitude (0.3Hz)	3	Y	-1.6578	dB	-5.0000	-	PASS
Amplitude (400Hz)	3	Y	-3.5737	dB	-5.0000	-	PASS
Impulse Amplitude	3	Y	572.6373	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	3	Y	1.4462	degree	-	-	-
Amplitude (0.3Hz)	3	Z	-1.6012	dB	-5.0000	-	PASS
Amplitude (400Hz)	3	Z	-3.5727	dB	-5.0000	-	PASS

Impulse Amplitude	3	Z	573.0610	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	3	Z	0.7986	degree	-	-	-
Amplitude (0.3Hz)	4	X	-1.6176	dB	-5.0000	-	PASS
Amplitude (400Hz)	4	X	-3.5717	dB	-5.0000	-	PASS
Impulse Amplitude	4	X	572.0369	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	4	X	0.7284	degree	-	-	-
Amplitude (0.3Hz)	4	Y	-1.4131	dB	-5.0000	-	PASS
Amplitude (400Hz)	4	Y	-3.5743	dB	-5.0000	-	PASS
Impulse Amplitude	4	Y	571.7478	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	4	Y	-1.2953	degree	-	-	-
Amplitude (0.3Hz)	4	Z	-1.6021	dB	-5.0000	-	PASS
Amplitude (400Hz)	4	Z	-3.5715	dB	-5.0000	-	PASS
Impulse Amplitude	4	Z	572.2447	milli V	-	-	-
Phase Diff. at 0.3Hz from X1	4	Z	0.5582	degree	-	-	-



Map

Country AUSTRALIA	*Scale* 1:25000
Block	*Contour inc* 10
License VIC/L10	*User name* sjgrope
Model name WMoonfish_Lbalmei_2005_01_20 (post W-Moonfish1)	*Date* 07/21/2005
Horizon name top_mnvolc_res	*Signature*

West Moonfish-1

Depth Structure Map

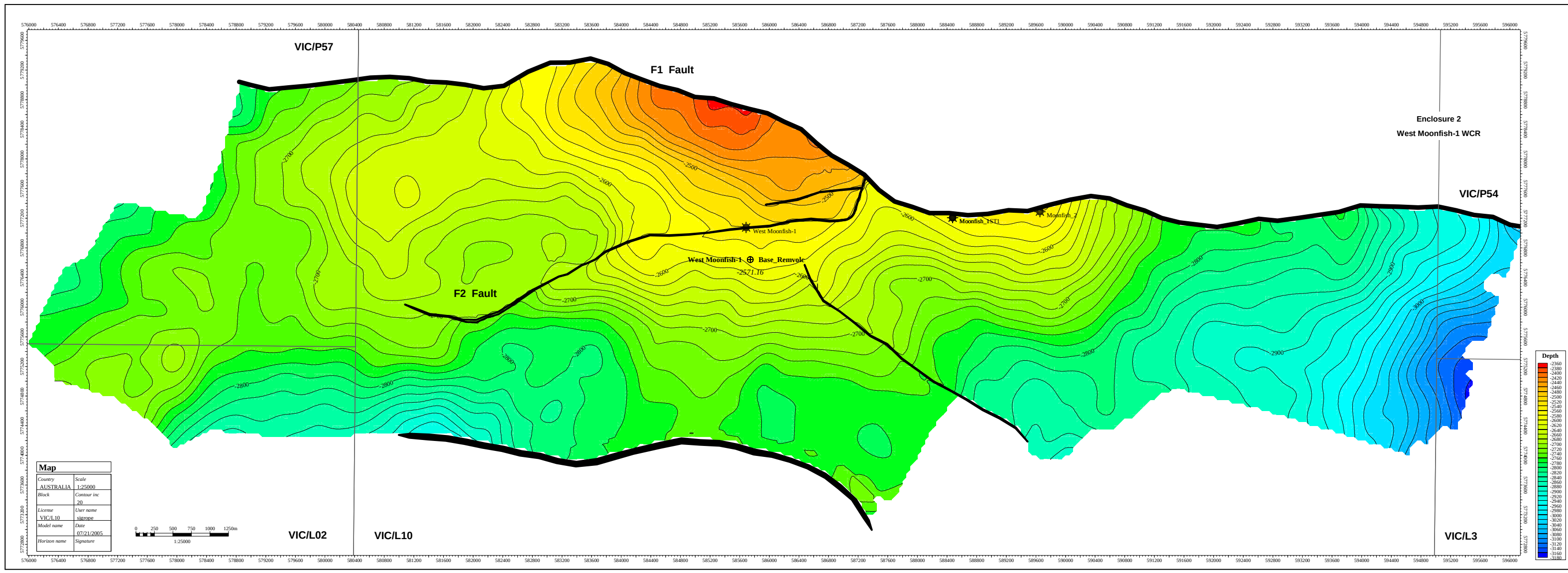
Top L. balmei Reservoir

(sub-Moonfish Volcanics)

Esso Australia

WCR Enclosure 1

S J Grope 21/7/2005



West Moonfish-1

Depth Structure Map

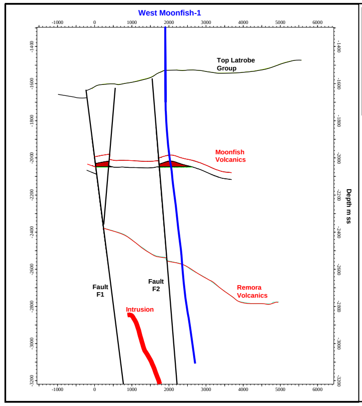
Base Remora Volcanics

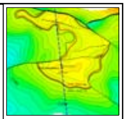
(Golden Beach Group)

Esso Australia

WCR Enclosure 2

S J Grope 21/7/2005





Depth Structure Map
Top L. balmei Reservoir
Crossection Location

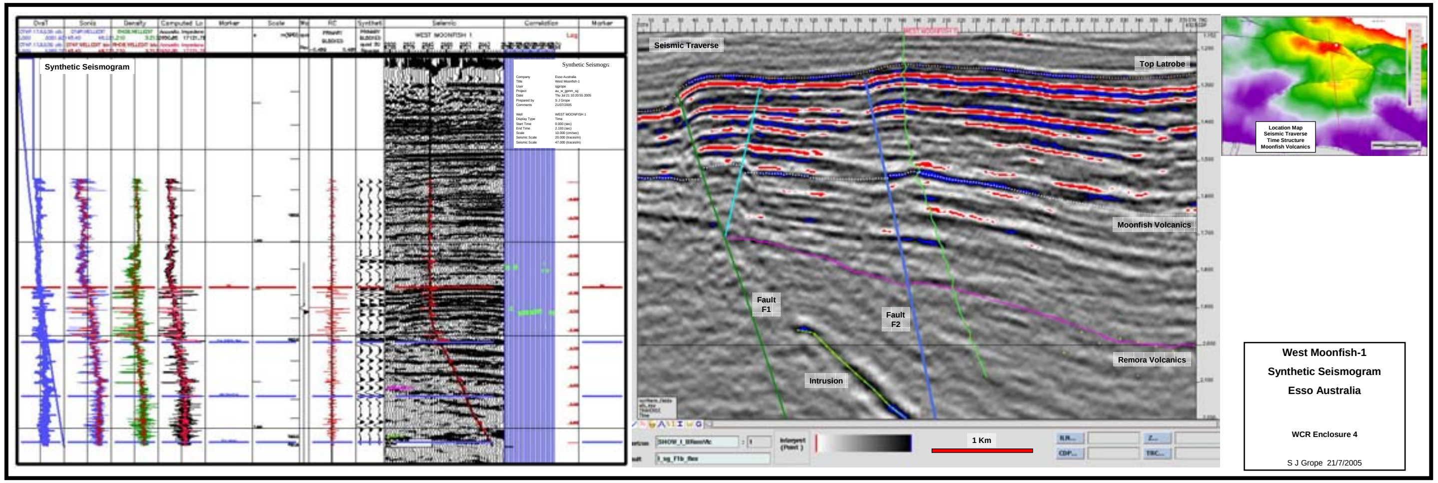
West Moonfish-1

Structural Crossection

Esso Australia

WCR Enclosure 3

S J Grope 21/7/2005


Synthetic Seismogram
Seismic Traverse
Top Latrobe
Moonfish Volcanics
Remora Volcanics
Fault F1
Fault F2
Intrusion
1 Km
Location Map
Seismic Traverse
Time Structure
Moonfish Volcanics
West Moonfish-1
Synthetic Seismogram
Esso Australia
WCR Enclosure 4
S J Grope 21/7/2005