
# Esso Australia Ltd.

# WELL COMPLETION REPORT

# KINGFISH 9

## VOLUME 2

INTERPRETED DATA

GIPPSLAND BASIN, VICTORIA

ESSO AUSTRALIA LTD

RESTECH/A:WCRCOV2:BJH/JTS

# *CONTENTS*

# 1. INTRODUCTION

Kingfish 9 was an appraisal well located on the southern flank of the Kingfish structure, some 3.5 km south of the Kingfish A platform.

The objectives of the Kingfish 9 well were to:

(i) delineate the southern flank of the Kingfish field and prove reserves currently classified as probable.

(ii) locate the current oil water contact in the M-1.5/M-1.7 reservoir and evaluate the presence of lagging oil identified by the Kingfish Field Depletion study.

(iii) determine if there were sufficient undrained reserves outside the reach of the existing platforms to justify as additional platform or whether such reserves may be developed from the existing platforms.

(iv) delineate the structure and stratigraphy of the southern flank.

As a result of the Kingfish Field depletion study, significant potential for undeveloped oil reserves was identified on the southern flank of the Kingfish Field. Due to the crestal development from the A and B platforms and the interpreted shallow dip at the top of the reservoir, the possibility of lagging oil on the southern flank was identified.

Attempts to history match the M-1.5/M-1.7 reservoir performance with no assumed southern flank flow barriers obtained a good match of total reservoir production history, however, was not able to match the high water cuts observed in the Kingfish A-4 and A-18 wells.

Given uncertainties in the depth interpretation at the OWC, attempts were made to obtain a history match on the southern A platform wells by increasing the dip of the southern flank to lower the structure by up to 40 metres at the OWC. This was not sufficient to obtain a history match on the southern flank wells.

In order to obtain a model that would reasonably match all the wells in the field, a barrier was invoked in the simulation model that would restrict flow from the southern flank to the A platform wells but would allow flow around the eastern end of the barrier to support low water cuts noted in the southern flank B platform wells. This resulted in a satisfactory history match of the southern Kingfish A wells and a possible lagging undrained oil accumulation on the southern flank. Kingfish 9 was designed to test this possibility.

Kingfish 9 intersected the M-1.5 reservoir at 2287.5 m TVDSS, 30.5 m low to prediction. No hydrocarbons were encountered in the M-1.5/M-1.7 sandstones, with the original column being efficiently swept at the southern Kingfish 9 location. The well was plugged and abandoned, with the Kingfish 9 result leading to a write-down of 30 MB proved undeveloped and 50 MB probable on the southern flank of the Kingfish Field.

## 2. FORMATION TOPS

| FORMATION | AGE | PREDICTED mTVDSS | ACTUAL mMDRT | ACTUAL mTVDSS | DIFFERENCE PRED. V's ACT. TVD |
|---|---|---|---|---|---|
| Top of Coarse Clastics | Late Eocene | 2257.0 | 2304.0 | 2281.0 | 24 m low |
| Top Coarse Clastics | Early Eocene | 2257.0 | 2310.5 | 2287.5 | 30.5 m low |
| M-1.5 reservoir | | 2257.0 | 2310.5 | 2287.5 | 30 m low |
| M-1.7 reservoir | | 2344.0 | 2366.5 | 2343.5 | 23 m high |
| 54.0 Ma Seq. Boundary | Late Paloecene | 2354.0 | 2410.0 | 2387.0 | 33 m low |

# 3. STRUCTURE

The Kingfish structure is a large eroded unfaulted westerly plunging anticline. The Kingfish reservoirs in the central and western parts of the field form a gentle westerly plunging anticline. At the eastern end of the field these reservoirs are partially truncated by the unconformity at the Top of Latrobe Group and are preserved as a series of southeast prograding sandstone wedges across a shelf margin generated by the incision of the 54.0 MY sequence boundary. In the west the beds dip more steeply than the Top of Latrobe Group Unconformity, so that the younger West Kingfish reservoirs subcrop the Top of Coarse Clastics Unconformity. The West Kingfish M-1.3, M-1.4 reservoirs are separated hydraulically from the main Kingfish reservoirs and have different original oil-water contacts (-2314m ss for West Kingfish and -2306m ss for Kingfish).

The intersection of the Top Coarse Clastics Unconformity at the Kingfish 9 location, some 30 metres low to prognosis, indicates that the southern flank is steeper than originally interpreted.

# 5. HYDROCARBONS

A principal objective of the southern flank Kingfish 9 outpost well was to locate the current oil-water contact (OWC) position in the M-1.5/M-1.7 reservoir and confirm the presence of lagging oil identified by the field study. Kingfish 9 intersected the M-1.5 reservoir at 2287.5m TVDSS, some 30.5 m low to prognosis, but still, 18.5 metres above the original oil-water contact (-2306 m TVDSS)..

Whilst minor fluorescence shows were recorded across to M-1.5 sandstone to the OOWC, the entire reservoir section is interpreted to be swept at the Kingfish 9 location.

The low resistivity response recorded across the swept hydrocarbon column indicates very low residual oil saturations. Core analysis studies from the Kingfish M-1.5 reservoir are in progress to ascertain ROS measurements across the residual oil column.

# 4. STRATIGRAPHY

The Top of Latrobe Group unconformity was intersected 24 metres low to prognosis. This sequence boundary marks the interface between the marls of the Lakes Entrance Formation and the pyritic, glauconitic sandstones of the Gurnard Formation, which is 6.5 m thick in Kingfish 9. The Gurnard section was not prognosed at the southern Kingfish 9 location, as it was interpreted that the Top of Latrobe Unconformity had cut down to the Top Coarse Clastics Unconformity. The Top of Latrobe Group, Top Coarse Clastics and the M-1.5 reservoir were all expected to be coincident in the Kingfish 9 well.

## M-1.5 RESERVOIR

The base of the M-1.5 reservoir is the parasequence boundary marking the top of the M-1.7 reservoir, whilst the top of the M-1.5 is defined by the base of the overlying Coastal plain M-1.4 reservoir. The reservoir was deposited in a shoreface setting and shows a characteristic upward coarsening log character. The reservoir thickness increases across the field in an easterly direction, reflecting progradation into the basin. The upper portion of the M-1.5 reservoir was deposited in an upper shoreface setting while the lower section was deposited in a lower shoreface to offshore environment. On the eastern and south eastern margins the M-1.5 reservoir is preserved as a series of prograding wedges. The reservoir has an average porosity of 21% and an average permeability of 3 darcies.

As previously referenced , the M-1.5 reservoir was intersected 30.5 metres low to prognosis, as a result of a steeper dipping southern flank and the intersection of 6.5 m of Gurnard Formation.

## M-1.7 RESERVOIR

The base of the M-1.7 reservoir is marked by the 54.0 MY sequence boundary with the top identified by a parasequence boundary.

The reservoir was deposited in a fluvial/estuarine environment. The average reservoir thickness across the field is 35 m with an average porosity of 22%. The lower half of the M-1/7 sandstone exhibits good reservoir quality over the field while the upper interval is seen to deteriorate eastward in a basinward direction into shoreface sands. Similar to the overlying M-1.5, the M-1.7 reservoir is preserved as a series of prograding wedges to the south east.

# 6. GEOPHYSICAL SUMMARY

The Kingfish field is currently controlled for geophysical mapping purposes by the G91AK 3D seismic grid. This survey was acquired and processed in 1991.

The G91AK data features a better Top Latrobe event than imaged in previous surveys. The Top of Latrobe event at Kingfish-9 is mapped at the upper zero crossing of a prominent seismic peak at 1.724 seconds (seismic two way time). Gurnard Formation thickness at the top of the sequence is too thin to allow seismic resolution of the top and base of the unit.

Schlumburger recorded checkshots at 11 levels and provided sonic calibration and synthetic seismograms to check correlations. A report on this velocity survey and processing is included with the well completion report.

The synthetic seismic trace correlates well with the actual seismic trace although the lag of approximately 2 milliseconds incorporated in the match is unusually small compared with the range of lags (10-17 m/secs) seen in other field wells. The reason for this discrepancy is not clear.

The Top of Latrobe section came in 24 metres low to prediction and whilst the velocity of 2649 in/sec used to convert seismic time to depth is comparable to that measured in the well (2643 in/sec) the difference in predicted vs actual lag is almost solely responsible for the depth discrepancy.

# 7. GEOLOGICAL SUMMARY

The Kingfish-9 well, located 3.5km south of the Kingfish A platform was designed to:

1. Delineate the southern flank of the Kingfish field and prove reserves currently classified as probable.

2. Locate the current Oil Water Contact position in the M-1.5/M-1.7 reservoir and confirm the presence of lagging oil identified by the field study.

3. Determine if there were sufficient undrained reserves outside the reach of the existing platforms to justify an additional platform or whether the reserves could be developed by drilling from the existing platforms.

Kingfish-9 intersected the Top of Latrobe Group at 2304m MDRT, some 24m low to prognosis. The intersection of 6.5 metres of Gurnard Formation which was not prognosed at the southern location, resulted in the Top of Coarse Clastics/M-1.5 reservoir being penetrated 30.5m low to prediction. Whilst the M-1.5 reservoir was intersected 18.5m above the original oil-water contact, the entire original column was swept at the southern Kingfish-9 location.

# KINGFISH-9
# LOCALITY MAP

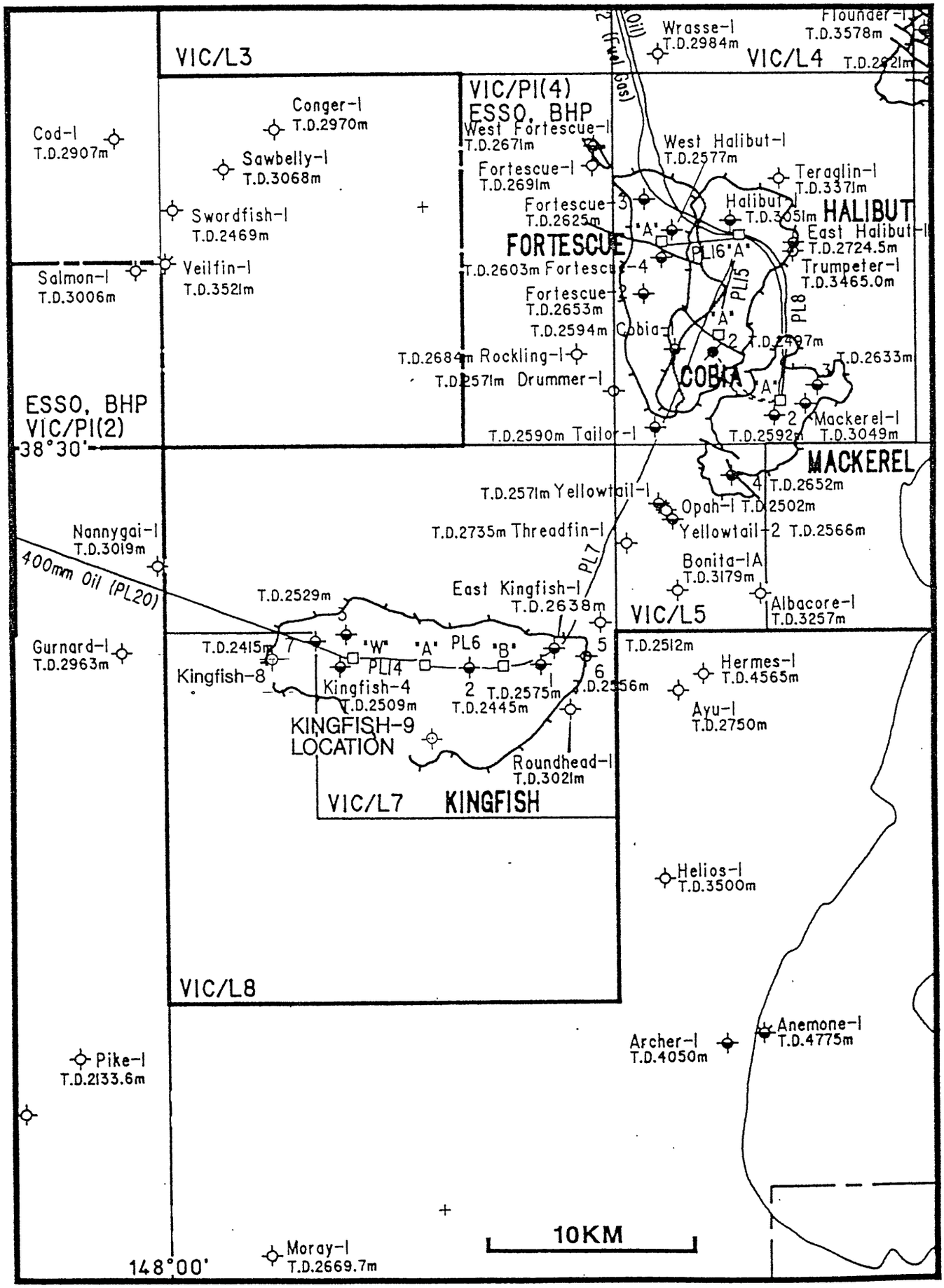


*Figure 1*

Dwg 2505/OP/1 6/

# APPENDIX 1

# APPENDIX 1.

# PALYNOLOGICAL ANALYSIS OF KINGFISH-9 GIPPSLAND BASIN

by

A.D. PARTRIDGE
CONSULTANT

Biostrata Pty Ltd
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# INTERPRETED DATA

# INTRODUCTION

Eleven sidewall cores in Kingfish-9 were examined, cleaned and split by author and then forwarded to Laola Pty Ltd in Perth for processing to extract organic microfossils (palynomorphs). All samples were examined by author for their contained spores, pollen and microplankton to derive the data and interpretations in this report.

Between 8 to 12 grams (average 9.9g) of each sidewall core was processed for palynological analysis. High residue yields were recovered from most samples in the Latrobe Group coarse clastic section, very low yields from the overlying Gurnard Formation and variable low to high yields from the basal Lakes Entrance Formation. Palynomorph concentrations in general was directly proportional to yield. Spore-pollen diversity averaged 18+ species per sample. Microplankton were very rare and of very low diversity in the Latrobe coarse clastics section but occurred in abundance and of moderate diversity in the overlying Gurnard and Lakes Entrance Formations. From the latter units diversity averaged 11+ species per sample. Preservation varied from poor to good but overall was fair. Some degrading of the preservation was caused by the use of polyvinyl alcohol (PVA) and EUKITT mounting medium.

The palynological preparation by Laola Pty Ltd were overall better than in the Kingfish-8 well, drilled immediately preceding Kingfish-9. This reflects increasing experience in processing Gippsland Basin samples.

Lithological units and palynological zones from the base of the Lakes Entrance Formation to Total Depth are given in the following summary. The interpretative data with zone identification and Old and New Confidence Ratings are recorded in Table-1 and basic data on residue yields, preservation and diversity are recorded on Tables-2 and 3. All species which have been identified with binomial names are tabulated on the accompanying range charts. Relinquishment lists for palynological slides and residues from samples analysed in Kingfish-9 are provided at the end of the report.

# PALYNOLOGICAL SUMMARY OF KINGFISH-9

| AGE | UNIT/FACIES | | SPORE-POLLEN ZONES (DINOFLAGELLATE ZONES) | DEPTHS (mKB) |
|---|---|---|---|---|
| OLIGOCENE | Lakes Entrance Formation | | *P. tuberculatus* | 2290.0-2300.5 |
| MIDDLE EOCENE | LATROBE GROUP | Gurnard Formation | Lower *N. asperus* (*A. australicum*) | 2305.5-2307.5 |
| LATE EOCENE | LATROBE GROUP | Undifferentiated coastal plain sands, shales & coals | Lower *M. diversus* | 2357.5-2365.5 |

## GEOLOGICAL COMMENTS:

1. The Latrobe Group coarse clastics penetrated in Kingfish-9 was only datable from the four sidewall core samples clustered over the short interval between 2357.5m to 2365.5m. All four samples were confidently assigned to the Lower *M. diversus* Zone. Seven of the other eight sidewall cores recovered from the Latrobe coarse clastics were rejected, after inspection, as unsuitable for palynology, whilst SWC-8 at 2328.5 gave a very low residue yield which contained insufficient palynomorphs for confident zone assignment. Additional palynological age dating of the coarse clastic facies may however still be possible by analysis of selected lithologies and larger sized samples from core-2 cut between 2313m to 2331m.

2. The Gurnard Formation in Kingfish-9 is identified between 2304.0m to 2309.0m. It is characterised on the gamma ray log by high values raising from a background of below 80 gapi to two discrete peaks of 180 gapi at 2305m and 128 gapi at 2307.5m. Both peaks were sampled by sidewall cores which were subsequently analysed for palynology. There is also a characteristic wide separation of the Bulk Density and Neutron Porosity logs. The lithologies of the two sidewall cores taken in this interval are, however, somewhat atypical as they contained only minor glauconite. The shallowest sample at 2305m identified as a mottled siltstone, which upon cleaning for the palynological analysis was found to contain burrows up to 1cm in diameter distinguished by a change in colour of the siltstone from green to grey. The deeper sample at 2307.5m was a firm homogeneous dark grey-green to almost black claystone which apparently contained only minor amounts of glauconite. Both samples could be confidently assigned to the Lower *N. asperus* and *A. australicum* Zones based on very low yielding but obviously highly diverse assemblages. The occurrence of the *A. australicum* Zone and associated acritarchs species *Tritonites pandus* and *T. tricornus* indicate that only the lower part of the Gurnard Formation is to be found in Kingfish-9. As was recorded in Kingfish-8 (Partridge, 1992) the absence of an interval in Kingfish-9 containing *T. tricornus* before the FAD (First Appearance Datum) of *T. pandus* suggests that part of the early Middle Eocene (approx. 44-48 Ma) is missing at the base of the Gurnard Formation in Kingfish-9 (see fig.5 in Marshall & Partridge 1988).

   Additional palynological age dating of the Gurnard Formation is still possible by processing samples from the 1.6 metres recovered from core-1 cut between 2307m to 2309m.

3. All samples from the Lakes Entrance Formation are dominated by open marine dinoflagellate assemblages. The rare but consistent presence of the spore *Cyatheacidites annulatus* associated with *Foveotriletes lacunosus* the index species for the Middle subzone of the *P. tuberculatus* Zone suggests that the very basal part of Lakes Entrance Formation is probably missing. The length of the hiatus is also extended by apparent absence of both the Upper and Middle *N. asperus* Zones from the underlying Gurnard Formation.

## BIOSTRATIGRAPHY

Zone and age determinations are based on the spore-pollen zonation scheme proposed by Stover & Partridge (1973), partially modified by Stover & Partridge (1982) and Helby, Morgan & Partridge (1987), and a dinoflagellate zonation scheme which has only been published in outline by Partridge (1976). Other modifications and embellishments to both zonation schemes can be found in the many palynological reports on the Gippsland Basin wells drilled by Esso Australia Ltd. Unfortunately this work is not collated or summarised in a single report.

Author citations for most spore-pollen species can be sourced from Stover & Partridge (1973, 1982), Helby, Morgan & Partridge (1987) or other references cited herein. Author citations for dinoflagellates can be found in Lentin & Williams (1985, 1989). Species names followed by "ms" are unpublished manuscript names.

Lower *Malvacipollis diversus* Zone: 2357.5-2365.5 metres Early Eocene.

The four deepest sidewall cores in Kingfish-9 are confidently assigned to this zone based principally on the common to frequent occurrence of *Proteacidites grandis*. Other species which are frequent to common on visual estimates and support this zone assignment are *Haloragacidites harrisii* and *Malvacipollis subtilis*. Although all samples display moderate to high spore-pollen species diversity distinctive zone species are rare and most of species are long ranging forms which range beyond the zone. The only other significant species recorded are *Tetracolporites multistrixus* ms (at 2364m) and *Dryptopollenites semilunatus* (at 2358.5m and 2365.5m). Rare specimens of *Lygistepollenites balmei* were also recorded at 2358.5m and 22364.0m. This species was also recorded very rarely in this zone in Kingfish-8 (Partridge, 1992).

Dinoflagellates present are *Paralecaniella indentata* and a single indeterminate specimen of *Apectodinium*, associated with a few downhole contaminants from the Lakes Entrance Formation which are regarded as indicative of some mud penetration of the sidewall cores.

The assemblage from the sidewall core at 2328.5m was too limited for any zone assignment.

Lower *Nothofagidites asperus* Zone: 2305.0-2307.5 metres Middle Eocene.
and
*Areosphaeridium australicum* Dinoflagellate Zone: 2305.0-2307.5 metres.

Two samples are confidently assigned to the Lower *N. asperus* Zone. Although key spore-pollen are very rare the age dating is amply supported

by moderate diversity microplankton assemblages with key zone species. The most significantly spore-pollen identified are *Conbaculites apiculatus* ms and *Proteacidites asperopolus* both identified on single specimens from the deeper sample and *Proteacidites pachypolus* recorded as a single specimen from the shallower sample.

The index dinoflagellate species *Areosphaeridium australicum* ms is abundant in both samples assigned to the zone. Other key dinoflagellate species are *Achilleodinium biformoides* (2307.5m), *Deflandrea flounderensis* (2307.5m) and *Deflandrea truncata* (2305.0m). Associates of the dinoflagellates are the frequent occurrence in both samples of the key acritarch species *Tritonites pandus* and *T. tricornus*. Anomalous dinoflagellate species occurring in the deeper of the two samples are *Areosphaeridium* sp. cf. *A. capricornum* which was poorly preserved and may be misidentified and *Homotryblium tasmaniense* which is considered to be reworked.

*Proteacidites tuberculatus* Zone: 2290.0-2300.5 metres Oligocene.

Four sidewall core samples are assigned to the *P. tuberculatus* Zone on the occurrence of the key spore *Cyatheacidites annulatus* which is present in the highest three sidewall cores and represented by a corroded (ghosted) specimen in the deepest sidewall core at 2300.5m. Other indicator spores present in these samples are *Foveotriletes crater* at 2291.5m and *Foveotriletes lacunosus* at 2297.0m. The latter spore is regarded as the key indicator species for the **Middle subzone** of the *P. tuberculatus* Zone by Stover & Partridge (1973). The associated microplankton assemblages contain typical Lakes Entrance Formation index dinoflagellate species including *Protoellipsodinium simplex* ms (common in all samples), *P. mamilatus* ms and *Tectactodinium scabroellipticus* ms. Overall the samples are dominated by the dinoflagellates *Spiniferites ramosus* s.l., *Operculodinium centrocarpum*, *Dapsilidinium pseudocolligerum* and *Nematosphaeropsis* spp. Most samples also contain microforaminiferal liners and scolecodonts.

## REFERENCES

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TABLE 1: Interpretative Palynological Data Kingfish-9, Gippsland Basin.

| SAMPLE TYPE | DEPTH (M) | SPORE-POLLEN ZONES | *CR OLD | *CR NEW | DINOFLAGELLATE ZONE (OR ASSOCIATION) | *CR OLD | *CR NEW | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| SWC 20 | 2290.0 | *P. tuberculatus* | 0 | B2 | (*Operculodinium* spp.) | 1 | B2 | *Cyatheacidites annulatus* present. |
| SWC 19 | 2291.5 | *P. tuberculatus* | 0 | B2 | (*Operculodinium* spp.) | 1 | B2 | *C. annulatus* present. |
| SWC 18 | 2297.0 | *P. tuberculatus* | 0 | B2 | (*Operculodinium* spp.) | 1 | B3 | Frequent *C. annulatus.* |
| SWC 17 | 2300.5 | *P. tuberculatus* | 2 | B5 | (*Operculodinium* spp.) | 1 | B3 | Corroded specimen of *C. annulatus* present. |
| SWC 16 | 2305.0 | Lower *N. asperus* | 2 | B5 | *A. australicum* | 1 | B4 | *Tritonites pandus* and *T. tricornus* present. |
| SWC 15 | 2307.5 | Lower *N. asperus* | 0 | B1 | *A. australicum* | 0 | B2 | *T. pandus* and *T. tricornus* present. |
| SWC 8 | 2328.5 | Indeterminate | | | | | | Virtually barren. |
| SWC 7 | 2357.5 | Lower *M. diversus* | 1 | B2 | | | | Common *Proteacidites grandis.* |
| SWC 6 | 2358.5 | Lower *M. diversus* | 1 | B2 | | | | |
| SWC 5 | 2364.0 | Lower *M. diversus* | 1 | B2 | | | | Common *P. grandis.* |
| SWC 4 | 2365.5 | Lower *M. diversus* | 1 | B2 | | | | Frequent *P. grandis.* |

*CR = Confidence Ratings OLD & NEW

# CONFIDENCE RATINGS

The concept of Confidence Ratings applied to palaeontological zone picks was originally proposed by Dr. L.E. Stover in 1971 to aid the compilation of micropalaeontological and palynological data and to expedite the revision of the then rapidly evolving zonation concepts in the Gippsland Basin. The original or OLD scheme which mixes confidence in fossil species assemblage with confidence due to sample type has gradually proved to be rather limiting as additional refinements to existing zonations have been made. With the development of the STRATDAT computer database as a replacement for the increasingly unwieldy paper based Palaeontological Data Sheet files a NEW set of Confidence Ratings have been proposed. Both OLD and NEW Confidence Ratings for zone picks are given on Table 1, and their meanings are summarised below:

OLD CONFIDENCE RATINGS

0 SWC or CORE, Excellent Confidence, assemblage with zone species of spore, pollen and microplankton.

1 SWC or CORE, Good Confidence, assemblage with zone species of spores and pollen or microplankton.

2 SWC or CORE, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

3 CUTTINGS, Fair Confidence, assemblage with zone species of either spore and pollen or microplankton, or both.

4 CUTTINGS, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NEW CONFIDENCE RATINGS

**Alpha codes:** Linked to sample type

**A** Core

**B** Sidewall core

**C** Coal cuttings

**D** Ditch cuttings

**E** Junk basket

**F** Miscellaneous/unknown

**G** Outcrop

**Numeric codes:** Linked to fossil assemblage

1 **Excellent confidence:** High diversity assemblage recorded with key zone species.

2 **Good confidence:** Moderately diverse assemblage recorded with key zone species.

3 **Fair confidence:** Low diversity assemblage recorded with key zone species.

4 **Poor confidence:** Moderate to high diversity assemblage recorded without key zone species.

5 **Very low confidence:** Low diversity assemblage recorded without key zone species.

# BASIC DATA

TABLE 2: Basic Sample Data

TABLE 3: Basic Palynomorph Data

RANGE CHARTS

RELINQUISHMENT LISTS

TABLE 2: Basic Sample Data Kingfish-9, Gippsland Basin.

| SAMPLE TYPE | DEPTH (M) | LITHOLOGY | SAMPLE WT(g) | RESIDUE YIELD |
|---|---|---|---|---|
| SWC 20 | 2290.0 | Calcilutite | 10.1 | Moderate |
| SWC 19 | 2291.5 | Calcilutite | 9.5 | High |
| SWC 18 | 2297.0 | Calcilutite | 9.7 | Moderate |
| SWC 17 | 2300.5 | Calc. claystone | 9.9 | Low |
| SWC 16 | 2305.0 | Mottled siltstone | 9.8 | Very low |
| SWC 15 | 2307.5 | Dk gry claystone | 10.5 | Low |
| SWC 8 | 2328.5 | Sandstone | 12.4 | Very low |
| SWC 7 | 2357.5 | Mottled sandstone | 8.6 | Low |
| SWC 6 | 2358.5 | Fine sandstone | 9.7 | High |
| SWC 5 | 2364.0 | Silty sandstone | 9.2 | High |
| SWC 4 | 2365.5 | Laminated siltstone | 10.0 | High |

TABLE 3: Basic Palynomorph Data Kingfish-9, Gippsland Basin

| SAMPLE TYPE | DEPTH (M) | PALYNOMORPH CONCENTRATION | PALYNOMORPH PRESERVATION | NUMBERS S-P SPECIES* | MICROPLANKTON ABUNDANCE & NO. OF SPECIES* | |
|---|---|---|---|---|---|---|
| SWC 20 | 2290.0 | Moderate | Fair | 18+ | Abundant | 11+ |
| SWC 19 | 2291.5 | High | Poor | 17+ | Abundant | 13+ |
| SWC 18 | 2297.0 | High | Poor-Fair | 15+ | Abundant | 8+ |
| SWC 17 | 2300.5 | High | Poor | 8+ | Abundant | 8+ |
| SWC 16 | 2305.0 | Very low | Poor-good | 10+ | Moderate | 12+ |
| SWC 15 | 2307.5 | High | Poor-good | 35+ | Abundant | 16+ |
| SWC 8 | 2328.5 | Very low | Fair | 4+ | Very rare | 1 |
| SWC 7 | 2357.5 | Low | Good | 13+ | | |
| SWC 6 | 2358.5 | Moderate | Good | 20+ | Very rare | 1? |
| SWC 5 | 2364.0 | Moderate | Fair | 31+ | Very rare | 1 |
| SWC 4 | 2365.5 | Moderate | Fair-good | 30+ | Very rare | 1 |

*Diversity: Very Low = 1- 5 species.
Low = 6-10 species.
Moderate = 11-25 species.
High = 26-74 species.
Very High = 75+ species.

# RELINQUISHMENT LIST - PALYNOLOGICAL SLIDES

**WELL NAME & NO:** KINGFISH-9
**PREPARED BY:** A.D. PARTRIDGE
**DATE:** July 1992

| SAMPLE TYPE | DEPTH (M) | CATALOGUE NUMBER | DESCRIPTION |
|---|---|---|---|
| SWC 20 | 2290.0 | P195984 | Kerogen slide sieved/unsieved fractions |
| SWC 20 | 2290.0 | P195985 | Kerogen slide unsieved fraction |
| SWC 20 | 2290.0 | P195986 | Oxidized slide 2 (1/2 cover slip) |
| SWC 20 | 2290.0 | P195987 | Oxidized slide 3 (1/2 cover slip) |
| SWC 19 | 2291.5 | P195988 | Kerogen slide sieved/unsieved fractions |
| SWC 19 | 2291.5 | P195989 | Kerogen slide unsieved fraction |
| SWC 19 | 2291.5 | P195990 | Oxidized slide 2 |
| SWC 19 | 2291.5 | P195991 | Oxidized slide 3 |
| SWC 18 | 2297.0 | P195992 | Kerogen slide sieved/unsieved fractions |
| SWC 18 | 2297.0 | P195993 | Kerogen slide unsieved fraction |
| SWC 18 | 2297.0 | P195994 | Oxidized slide 2 |
| SWC 18 | 2297.0 | P195995 | Oxidized slide 3 (1/2 cover slip) |
| SWC 17 | 2300.5 | P195996 | Kerogen slide sieved/unsieved fractions |
| SWC 17 | 2300.5 | P195997 | Kerogen slide unsieved fraction |
| SWC 17 | 2300.5 | P195998 | Oxidized slide 2 (1/2 cover slip) |
| SWC 16 | 2305.0 | P195999 | Kerogen slide sieved/unsieved fractions |
| SWC 16 | 2305.0 | P196000 | Kerogen slide unsieved fraction |
| SWC 16 | 2305.0 | P196001 | Oxidized slide 2 (1/4 cover slip) |
| SWC 15 | 2307.5 | P196002 | Kerogen slide sieved/unsieved fractions |
| SWC 15 | 2307.5 | P196003 | Kerogen slide unsieved fraction |
| SWC 15 | 2307.5 | P196004 | Oxidized slide 2 (1/2 cover slip) |
| SWC 8 | 2328.5 | P196005 | Kerogen slide unsieved fraction |
| SWC 7 | 2357.5 | P196006 | Kerogen slide sieved/unsieved fractions |
| SWC 7 | 2357.5 | P196007 | Oxidized slide 2 |
| SWC 7 | 2357.5 | P196008 | Oxidized slide 3 (1/2 cover slip) |
| SWC 6 | 2358.5 | P196009 | Kerogen slide sieved/unsieved fractions |
| SWC 6 | 2358.5 | P196010 | Kerogen slide unsieved fraction |
| SWC 6 | 2358.5 | P196011 | Oxidized slide 2 |
| SWC 6 | 2358.5 | P196012 | Oxidized slide 3 |
| SWC 5 | 2364.0 | P196013 | Kerogen slide sieved/unsieved fractions |
| SWC 5 | 2364.0 | P196014 | Kerogen slide unsieved fraction |
| SWC 5 | 2364.0 | P196015 | Oxidized slide 2 |
| SWC 5 | 2364.0 | P196016 | Oxidized slide 3 |
| SWC 4 | 2365.5 | P196017 | Kerogen slide sieved/unsieved fractions |
| SWC 4 | 2365.5 | P196018 | Kerogen slide unsieved |
| SWC 4 | 2365.5 | P196019 | Oxidized slide 2 |
| SWC 4 | 2365.5 | P196020 | Oxidized slide 3 |

# RELINQUISHMENT LIST - PALYNOLOGICAL RESIDUES

**WELL NAME & NO:** KINGFISH-9
**PREPARED BY:** A.D. PARTRIDGE
**DATE:** July 1992

| SAMPLE TYPE | DEPTH (M) | DESCRIPTION |
|---|---|---|
| SWC 19 | 2291.5 | Kerogen residue |
| SWC 15 | 2307.5 | Kerogen residue |
| SWC 6 | 2358.5 | Oxidized residue |
| SWC 5 | 2364.0 | Oxidized residue |
| SWC 4 | 2365.5 | Oxidized residue |

PE906042

This is an enclosure indicator page.
The enclosure PE906042 is enclosed within the container PE902046 at this location in this document.

The enclosure PE906042 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE906042 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = Micro-plankton Range Chart |
| BASIN | = GIPPSLAND |
| ON_OFF | = OFFSHORE |
| PERMIT | = VIC/L7 |
| TYPE | = WELL |
| SUBTYPE | = CHART |
| DESCRIPTION | = Microplankton range chart for Kingfish-9 |
| REMARKS | = |
| DATE_CREATED | = 31/07/1992 |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = W1060 |
| WELL_NAME | = KINGFISH-9 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO AUSTRALIA LIMITED |

(Inserted by DNRE - Vic Govt Mines Dept)

PE906043

This is an enclosure indicator page.
The enclosure PE906043 is enclosed within the container PE902046 at this location in this document.

The enclosure PE906043 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE906043 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = Spore Pollen Range Chart |
| BASIN | = GIPPSLAND |
| ON_OFF | = OFFSHORE |
| PERMIT | = VIC/L7 |
| TYPE | = WELL |
| SUBTYPE | = CHART |
| DESCRIPTION | = Spore-pollen range chart for Kingfish-9 |
| REMARKS | = |
| DATE_CREATED | = 31/07/1992 |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = W1060 |
| WELL_NAME | = KINGFISH-9 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = ESSO AUSTRALIA LIMITED |

(Inserted by DNRE - Vic Govt Mines Dept)

# APPENDIX 2

# APPENDIX 2.

# KINGFISH 9

## A. LOG ANALYSIS REPORT

# Kingfish 9

## Quantitative Formation Evaluation

The Kingfish 9 exploration well has been evaluated for reservoir quality and hydrocarbon saturation. The top of Latrobe reservoir was analysed from 2308m MDKB to 2423m MDKB with the well total depth of 2448m MDKB. The petrophysical logs were acquired conventionally on wireline by Schlumberger Well Services. The wellbore deviation is 1 degree NE and structural dip 1 to 2 degrees south as determined from the SHDT dipmeter.

### Summary

The M1.5 oil bearing reservoir in the Kingfish field is swept at this location by updip production. All reservoir sands in this well are water bearing. The Kingfish field oil-water contact at 2328m MDKB compares with an observed contact by logs and core at 2327m MDKB. Figure 1 and Table 1 show the processed log data and interpretation summary.

Two cores were cut using a bland mud and low invasion coring system designed for measuring the residula oil saturation (ROS) in the oil swept reservoirs. Core number 1 was cut form 2307.0m MDKB to 2308.32m MDKB in non-reservoir facies. Core number 2 from 2313.0m MDKB to 2331.4m MDKB covered the swept oil reservoir through the oil-water contact. The oil-water contact in the core is at 2327m MDKB. The core depths were shifted up 1.2 metres to match log depths based on core gamma ray permeability and porosity correlations to log response.

The average oil saturation in the clean fluvial quartzose sandstone from 2311.8m MDKB to 2323.2m MDKB is 10.5 percent. This compares to 8.6 percent determined from log evaluation. Over the same interval the core overburden porosity is 19.5 percent and 19.9 percent from log effective porosity. The ROS measurement from core was initially thought to be a low-side measurement due to expulsion of oil while bringing the core to the surface, however, the log oil saturations are lower than core which indicates oil flushing is not a significant factor in achieving valid ROS from conventional coring. Using a bland mud system, low invasion coring bit, resin injection and cold temperature storage are all factors which have contributed to this success. The table below summarises these results.

CORE ANALYSIS AND LOG DERIVED PETROPHYSICAL PROPERTIES
2311.8 TO 2323.2m MDKB

| | Core at Overburden | Log Derived |
|---|---|---|
| Effective porosity (p.u.) | 19.5 | 19.9 |
| Residual Oil Saturation (%) | 10.5 | 8.6 |

The log analysis summary is shown in Table 1. The top two intervals represent the swept oil reservoirs in the fluvial facies from 2310.5m MDKB to 2323.2m MDKB and the marginal marine facies from 2323.3m MDKB to 2328.0m MDKB. The fluvial reservoir contains 12.7m net reservoir with an average effective porosity and water saturation of 20 and 92 percent respectively. The porosity and water saturation in the marine facies is 17 and 85 percent in 4.7 metres of net reservoir. The higher ROS in the marine arkosic sandstone reservoir reflects the poorer reservoir quality with lower relative permeability to oil than the overlying fluvial sandstone reservoir. The average overburden core permeability is 10700 md in the fluvial sandstone and 299md in the marine reservoir.

The remaining non-hydrocarbon bearing reservoirs have been analysed and are summarised in the attached Table 1.

| DATA ACQUISITION AND PROCESSING | | |
|---|---|---|
| SUITE #1 | DLT-E/SRT-C/SDT-C/LDT-D/SGT-L/AMS-A | 41.29 metres |
| SUITE #2 | LDT-D/CNT-H/PCD-B/EPT-G/NGT-D/AMS-A | 25.68 metres |
| SUITE #3 | MDT/GR | 22.00 metres |
| SUITE #4 | SHDT-B/GR | 11.47 metres |
| SUITE #5 | CSAT/CST | |

## COMPUTATION MEASUREMENTS

| | |
|---|---|
| LLD | (laterlog deep) |
| LLS | (laterlog shallow) |
| MSFL | (micro-spherical) |
| DT | (transit time) |
| RHOB | (bulk density) |
| TNPH | (thermal neutron porosity) |
| CGR | (uranium free computed gamma ray) |
| POTA | (spectral gamma ray potassium) |
| THOR | (spectral gamma ray thorium) |
| TPL | (electromagnetic propogation time) |
| CALI | (caliper) |

Data processing consisted of environmentally correcting the LLD/LLS/MSFL measurements for borehole resistivity effects. These corrections make a significant impact on resolving the correct resistivity profile for this bland mud system which has the same salinity as formation water. The corrected data shows no invasion separation which is expected with similar borehole and formation fluids.

The CNT TNPH thermal neutron porosity measurement is corrected for temperature effects. The correction increases the neutron porosity measurement approximately 3 porosity units at the 95 degree centigrade bottom hole temperature. The correction improves the quality of the RHOB\NPOR interpretation by removing apparent gas crossover in the clean sand reservoirs that are non-hydrocarbon bearing.

Schlumberger environmentally corrected the NGT spectra gamma ray for the 12.25 inch hole size and 1.2 percent potassium in the drilling fluid. This correction removed the negative uranium values and prevents the computed gamma ray, CGR, from measuring greater than the total gamma ray count, SGR.

*Ref:61:WSD:ldn:430.doc*

# APPENDIX 2.

# KINGFISH 9

## B. LOG ANALYSIS SUMMARY & PLOT

TABLE 1 - KINGFISH 9 FORMATION EVALUATION SUMMARY.

KINGFISH 9

ANALYSIS SUMMARY

Net porosity cut-off.....: 0.120 volume per volume
Net water saturation cut-off..: 0.500 volume per volume

Net Porous Interval based on Porosity cut-off only.
Both Porosity and Sw cut-offs invoked when generating Hydrocarbon-Metres.

| | GROSS INTERVAL (metres) (top) -(base) | Gross Metres | NET POROUS INTERVAL Net Metres | Net to Gross | Mean Vsh | (Std.) (Dev.) | Mean Porosity | (Std.) (Dev.) | Mode Porosity | Mean Sw | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MDKB | 2310.5-2323.2 | 12.7 | 12.7 | 100 % | 0.00 | (0.003) | 0.20 | (0.013) | 0.20 | 0.92 | swept |
| MDKB | 2323.3-2328.0 | 4.7 | 4.7 | 100 % | 0.08 | (0.055) | 0.17 | (0.020) | 0.16 | 0.85 | swept |
| MDKB | 2328.1-2355.4 | 27.3 | 26.8 | 98 % | 0.03 | (0.029) | 0.22 | (0.014) | 0.22 | 1.00 | water |
| MDKB | 2355.5-2366.6 | 11.1 | 3.4 | 31 % | 0.12 | (0.069) | 0.17 | (0.034) | 0.20 | 1.00 | water |
| MDKB | 2366.7-2423.0 | 56.3 | 56.3 | 100 % | 0.01 | (0.033) | 0.21 | (0.021) | 0.22 | 1.00 | water |

PE600830

This is an enclosure indicator page.
The enclosure PE600830 is enclosed within the container PE902046 at this location in this document.

The enclosure PE600830 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE600830 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = Formation Evaluation Log |
| BASIN | = |
| PERMIT | = Vic/L7 |
| TYPE | = WELL |
| SUBTYPE | = well log |
| DESCRIPTION | = Formation Evaluation Log |
| REMARKS | = |
| DATE_CREATED | = 23/10/1992 |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = |
| WELL_NAME | = Kingfish 9 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)

# APPENDIX 2.

## KINGFISH 9

## C. LOG ANALYSIS LISTING

Note: The RESV flag column indicates net and non-net interval
Values of 0.000 indicate non-net
Values of 1.000 indicate net reservoir

TABLE 2 - LASER ZONE SUMMARY AND RESULTS LISTING

KINGFISH 9 ANALYSIS SUMMARY

---

ZONE : INT.1 NET DEPTH : 56.100
MODEL INTERVALS : TOP BOTTOM
2367.0 2423.0

----- FORMATION AVERAGES -----

| NAME | VALUE |
|---|---|
| PHIE | 0.206 |
| SWE | 1.000 |
| BVWE | 0.205 |
| BVOE | 0.004 |
| BVBE | 0.003 |
| QRTZ | 0.652 |
| PYRT | 0.010 |
| ILLT | 0.005 |
| KAOL | 0.005 |
| K-FELDS | 0.116 |

---

ZONE : INT.2 NET DEPTH : 10.900
MODEL INTERVALS : TOP BOTTOM
2356.0 2366.5

----- FORMATION AVERAGES -----

| NAME | VALUE |
|---|---|
| PHIE | 0.083 |
| SWE | 1.000 |
| BVWE | 0.074 |
| BVOE | 0.010 |
| BVBE | 0.072 |
| QRTZ | 0.543 |
| PYRT | 0.018 |
| ILLT | 0.176 |
| KAOL | 0.065 |
| K-FELDS | 0.044 |

---

ZONE : INT.3 NET DEPTH : 27.100
MODEL INTERVALS : TOP BOTTOM
2328.0 2355.5

----- FORMATION AVERAGES -----

| NAME | VALUE |
|---|---|
| PHIE | 0.217 |
| SWE | 1.000 |
| BVWE | 0.218 |
| BVOE | 0.001 |
| BVBE | 0.007 |
| QRTZ | 0.617 |
| PYRT | 0.000 |
| ILLT | 0.003 |
| KAOL | 0.020 |
| K-FELDS | 0.135 |

---

ZONE : INT.4 NET DEPTH : 4.500
MODEL INTERVALS : TOP BOTTOM
2323.5 2328.0

----- FORMATION AVERAGES -----

| NAME | VALUE |
|---|---|
| PHIE | 0.174 |
| SWE | 0.837 |
| BVWE | 0.146 |
| BVOE | 0.029 |
| BVBE | 0.019 |
| QRTZ | 0.661 |
| PYRT | 0.000 |
| ILLT | 0.005 |
| KAOL | 0.059 |
| K-FELDS | 0.079 |

---

ZONE : INT.5 NET DEPTH : 12.500

MODEL INTERVALS : TOP BOTTOM

2310.5 2323.0

----- FORMATION AVERAGES -----

| NAME | VALUE |
|---|---|
| PHIE | 0.199 |
| SWE | 0.925 |
| BVWE | 0.185 |
| BVOE | 0.015 |
| BVBE | 0.000 |
| QRTZ | 0.764 |
| PYRT | 0.012 |
| ILLT | 0.000 |
| KAOL | 0.000 |
| K-FELDS | 0.021 |

| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
|---|---|---|---|---|---|---|---|
| 2310.50 | 0.1787 | 0.7640 | 0.0248 | 0.0101 | 0.0000 | 0.0195 | 0.6942 |
| ***** TOP OF ZONE INT.5 | | | | | ***** | | |
| 2311.00 | 0.1679 | 0.7768 | 0.0187 | 0.0000 | 0.0000 | 0.0355 | 0.7997 |
| 2311.50 | 0.1586 | 0.7748 | 0.0182 | 0.0000 | 0.0000 | 0.0432 | 0.8569 |
| 2312.00 | 0.1806 | 0.7710 | 0.0202 | 0.0000 | 0.0000 | 0.0267 | 0.8921 |
| 2312.50 | 0.1945 | 0.7659 | 0.0156 | 0.0000 | 0.0000 | 0.0220 | 0.9677 |
| 2313.00 | 0.1981 | 0.7436 | 0.0168 | 0.0000 | 0.0000 | 0.0387 | 0.9472 |
| 2313.50 | 0.1887 | 0.7457 | 0.0194 | 0.0000 | 0.0000 | 0.0460 | 0.9741 |
| 2314.00 | 0.1952 | 0.7700 | 0.0103 | 0.0000 | 0.0000 | 0.0207 | 0.9744 |
| 2314.50 | 0.2023 | 0.7674 | 0.0115 | 0.0000 | 0.0000 | 0.0161 | 0.9343 |
| 2315.00 | 0.2016 | 0.7774 | 0.0082 | 0.0000 | 0.0000 | 0.0076 | 0.9387 |
| 2315.50 | 0.1985 | 0.7893 | 0.0102 | 0.0000 | 0.0000 | 0.0000 | 0.9205 |
| 2316.00 | 0.1906 | 0.8011 | 0.0044 | 0.0000 | 0.0000 | 0.0000 | 0.9571 |
| 2316.50 | 0.2090 | 0.7791 | 0.0059 | 0.0000 | 0.0000 | 0.0000 | 0.8962 |
| 2317.00 | 0.2061 | 0.7833 | 0.0065 | 0.0000 | 0.0000 | 0.0011 | 0.9420 |
| 2317.50 | 0.2196 | 0.7506 | 0.0097 | 0.0000 | 0.0000 | 0.0137 | 0.8844 |
| 2318.00 | 0.2107 | 0.7734 | 0.0084 | 0.0000 | 0.0000 | 0.0031 | 0.8892 |
| 2318.50 | 0.2065 | 0.7750 | 0.0091 | 0.0000 | 0.0000 | 0.0070 | 0.9035 |
| 2319.00 | 0.1990 | 0.7635 | 0.0106 | 0.0000 | 0.0000 | 0.0225 | 0.9738 |
| 2319.50 | 0.2082 | 0.7510 | 0.0111 | 0.0000 | 0.0000 | 0.0248 | 0.9445 |
| 2320.00 | 0.2173 | 0.7437 | 0.0161 | 0.0000 | 0.0000 | 0.0198 | 0.8944 |
| 2320.50 | 0.2084 | 0.7560 | 0.0089 | 0.0000 | 0.0000 | 0.0236 | 0.9240 |
| 2321.00 | 0.2085 | 0.7498 | 0.0100 | 0.0000 | 0.0000 | 0.0283 | 0.9472 |
| 2321.50 | 0.2117 | 0.7467 | 0.0142 | 0.0000 | 0.0000 | 0.0250 | 0.9547 |
| 2322.00 | 0.2008 | 0.7704 | 0.0076 | 0.0000 | 0.0000 | 0.0212 | 1.0064 |
| 2322.50 | 0.2069 | 0.7607 | 0.0113 | 0.0000 | 0.0000 | 0.0178 | 1.0049 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2323.00 | 0.2012 | 0.7167 | 0.0156 | 0.0000 | 0.0000 | 0.0642 | 0.8252 |
| ***** TOP OF ZONE INT.4 | | | | | ***** | | |
| 2323.50 | 0.1771 | 0.7076 | 0.0027 | 0.0000 | 0.0114 | 0.0955 | 0.7931 |
| 2324.00 | 0.2056 | 0.6807 | 0.0000 | 0.0000 | 0.0034 | 0.1039 | 0.7452 |
| 2324.50 | 0.2126 | 0.6761 | 0.0022 | 0.0001 | 0.0101 | 0.0951 | 0.7504 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2325.00 | 0.1738 | 0.6148 | 0.0000 | 0.0000 | 0.0852 | 0.0975 | 0.7342 |
| 2325.50 | 0.1948 | 0.6636 | 0.0000 | 0.0000 | 0.0358 | 0.0923 | 0.7332 |
| 2326.00 | 0.1563 | 0.6888 | 0.0000 | 0.0000 | 0.0596 | 0.0736 | 0.8391 |
| 2326.50 | 0.1577 | 0.6473 | 0.0000 | 0.0000 | 0.0954 | 0.0682 | 0.9779 |
| 2327.00 | 0.1501 | 0.6062 | 0.0004 | 0.0000 | 0.1427 | 0.0563 | 1.0106 |
| 2327.50 | 0.1633 | 0.6641 | 0.0006 | 0.0000 | 0.0847 | 0.0614 | 1.0022 |
| 2328.00 | 0.1275 | 0.6804 | 0.0000 | 0.0757 | 0.0570 | 0.0196 | 0.9855 |

***** TOP OF ZONE INT.3 *****

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2328.50 | 0.0842 | 0.5801 | 0.0014 | 0.1724 | 0.0526 | 0.0423 | 1.0000 |
| 2329.00 | 0.1797 | 0.6024 | 0.0063 | 0.0448 | 0.0394 | 0.1027 | 1.0000 |
| 2329.50 | 0.2284 | 0.6227 | 0.0000 | 0.0000 | 0.0122 | 0.1309 | 1.0000 |
| 2330.00 | 0.2397 | 0.6150 | 0.0000 | 0.0000 | 0.0051 | 0.1351 | 1.0000 |
| 2330.50 | 0.2050 | 0.6505 | 0.0000 | 0.0000 | 0.0083 | 0.1280 | 1.0000 |
| 2331.00 | 0.2164 | 0.6817 | 0.0041 | 0.0000 | 0.0000 | 0.0989 | 1.0000 |
| 2331.50 | 0.2116 | 0.6648 | 0.0000 | 0.0000 | 0.0000 | 0.1240 | 1.0000 |
| 2332.00 | 0.2342 | 0.6289 | 0.0000 | 0.0000 | 0.0000 | 0.1361 | 1.0000 |
| 2332.50 | 0.2230 | 0.5972 | 0.0000 | 0.0000 | 0.0298 | 0.1395 | 1.0000 |
| 2333.00 | 0.2210 | 0.6316 | 0.0000 | 0.0000 | 0.0000 | 0.1439 | 1.0000 |
| 2333.50 | 0.2314 | 0.6122 | 0.0000 | 0.0000 | 0.0000 | 0.1532 | 1.0000 |
| 2334.00 | 0.2255 | 0.6230 | 0.0000 | 0.0000 | 0.0000 | 0.1488 | 1.0000 |
| 2334.50 | 0.2092 | 0.6595 | 0.0013 | 0.0000 | 0.0032 | 0.1258 | 1.0000 |
| 2335.00 | 0.2280 | 0.6402 | 0.0000 | 0.0000 | 0.0000 | 0.1291 | 1.0000 |

| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
|---|---|---|---|---|---|---|---|
| 2335.50 | 0.2038 | 0.6676 | 0.0000 | 0.0000 | 0.0000 | 0.1282 | 1.0000 |
| 2336.00 | 0.2372 | 0.5982 | 0.0000 | 0.0000 | 0.0000 | 0.1604 | 1.0000 |
| 2336.50 | 0.2173 | 0.6621 | 0.0020 | 0.0000 | 0.0000 | 0.1155 | 1.0000 |
| 2337.00 | 0.2163 | 0.6971 | 0.0000 | 0.0000 | 0.0000 | 0.0863 | 1.0000 |
| 2337.50 | 0.2124 | 0.6947 | 0.0000 | 0.0000 | 0.0000 | 0.0904 | 1.0000 |
| 2338.00 | 0.2115 | 0.6972 | 0.0000 | 0.0000 | 0.0000 | 0.0900 | 1.0000 |
| 2338.50 | 0.2261 | 0.6513 | 0.0000 | 0.0000 | 0.0012 | 0.1197 | 1.0000 |
| 2339.00 | 0.2252 | 0.6446 | 0.0000 | 0.0000 | 0.0011 | 0.1250 | 1.0000 |
| 2339.50 | 0.2211 | 0.5830 | 0.0000 | 0.0000 | 0.0480 | 0.1313 | 1.0000 |
| 2340.00 | 0.2219 | 0.6252 | 0.0000 | 0.0000 | 0.0110 | 0.1339 | 1.0000 |
| 2340.50 | 0.2231 | 0.5664 | 0.0000 | 0.0000 | 0.0465 | 0.1478 | 1.0000 |
| 2341.00 | 0.2298 | 0.5490 | 0.0018 | 0.0000 | 0.0235 | 0.1871 | 1.0000 |
| 2341.50 | 0.2237 | 0.5722 | 0.0000 | 0.0000 | 0.0181 | 0.1788 | 1.0000 |
| 2342.00 | 0.2195 | 0.5989 | 0.0000 | 0.0000 | 0.0166 | 0.1574 | 1.0000 |
| 2342.50 | 0.2225 | 0.6341 | 0.0000 | 0.0000 | 0.0120 | 0.1262 | 1.0000 |
| 2343.00 | 0.2143 | 0.6296 | 0.0000 | 0.0000 | 0.0229 | 0.1251 | 1.0000 |
| 2343.50 | 0.2109 | 0.6478 | 0.0000 | 0.0000 | 0.0098 | 0.1248 | 1.0000 |
| 2344.00 | 0.2252 | 0.5968 | 0.0000 | 0.0000 | 0.0261 | 0.1413 | 1.0000 |
| 2344.50 | 0.2288 | 0.6098 | 0.0000 | 0.0000 | 0.0156 | 0.1367 | 1.0000 |
| 2345.00 | 0.2375 | 0.6060 | 0.0000 | 0.0000 | 0.0113 | 0.1386 | 1.0000 |
| 2345.50 | 0.2305 | 0.6104 | 0.0000 | 0.0000 | 0.0098 | 0.1416 | 1.0000 |
| 2346.00 | 0.2258 | 0.5728 | 0.0027 | 0.0000 | 0.0306 | 0.1580 | 1.0000 |
| 2346.50 | 0.2201 | 0.5856 | 0.0000 | 0.0000 | 0.0296 | 0.1521 | 1.0000 |
| 2347.00 | 0.2299 | 0.6161 | 0.0000 | 0.0000 | 0.0071 | 0.1417 | 1.0000 |
| 2347.50 | 0.2029 | 0.5849 | 0.0000 | 0.0000 | 0.0527 | 0.1382 | 1.0000 |

| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
|---|---|---|---|---|---|---|---|
| 2348.00 | 0.2148 | 0.5913 | 0.0000 | 0.0000 | 0.0422 | 0.1374 | 1.0000 |
| 2348.50 | 0.2199 | 0.6486 | 0.0000 | 0.0000 | 0.0000 | 0.1300 | 1.0000 |
| 2349.00 | 0.2147 | 0.6226 | 0.0000 | 0.0000 | 0.0171 | 0.1379 | 1.0000 |
| 2349.50 | 0.2229 | 0.5845 | 0.0000 | 0.0000 | 0.0154 | 0.1699 | 1.0000 |
| 2350.00 | 0.1989 | 0.5666 | 0.0000 | 0.0000 | 0.0614 | 0.1501 | 1.0000 |
| 2350.50 | 0.2097 | 0.5444 | 0.0000 | 0.0000 | 0.0681 | 0.1544 | 1.0000 |
| 2351.00 | 0.2190 | 0.6029 | 0.0000 | 0.0000 | 0.0221 | 0.1465 | 1.0000 |
| 2351.50 | 0.2101 | 0.5829 | 0.0008 | 0.0000 | 0.0397 | 0.1520 | 1.0000 |
| 2352.00 | 0.2140 | 0.6652 | 0.0000 | 0.0000 | 0.0013 | 0.1168 | 1.0000 |
| 2352.50 | 0.2129 | 0.6349 | 0.0000 | 0.0000 | 0.0328 | 0.1075 | 1.0000 |
| 2353.00 | 0.2181 | 0.6445 | 0.0000 | 0.0000 | 0.0039 | 0.1305 | 1.0000 |
| 2353.50 | 0.2263 | 0.6314 | 0.0000 | 0.0000 | 0.0057 | 0.1336 | 1.0000 |
| 2354.00 | 0.2394 | 0.6013 | 0.0017 | 0.0000 | 0.0000 | 0.1551 | 1.0000 |
| 2354.50 | 0.2196 | 0.5431 | 0.0000 | 0.0000 | 0.0573 | 0.1594 | 1.0000 |
| 2355.00 | 0.2267 | 0.5474 | 0.0007 | 0.0000 | 0.0468 | 0.1607 | 1.0000 |
| 2355.50 | 0.2184 | 0.6011 | 0.0031 | 0.0165 | 0.0061 | 0.1477 | 1.0000 |

***** TOP OF ZONE INT.2 *****

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2356.00 | 0.1519 | 0.5598 | 0.0177 | 0.1569 | 0.0000 | 0.0669 | 1.0000 |
| 2356.50 | 0.1110 | 0.5363 | 0.0176 | 0.2389 | 0.0000 | 0.0257 | 1.0000 |
| 2357.00 | 0.1246 | 0.5766 | 0.0183 | 0.1626 | 0.0000 | 0.0693 | 1.0000 |
| 2357.50 | 0.0977 | 0.5616 | 0.0229 | 0.2294 | 0.0000 | 0.0206 | 1.0000 |
| 2358.00 | 0.0925 | 0.5783 | 0.0261 | 0.1348 | 0.0390 | 0.0771 | 1.0000 |
| 2358.50 | 0.0724 | 0.5462 | 0.0167 | 0.1631 | 0.0693 | 0.0627 | 1.0000 |
| 2359.00 | 0.0546 | 0.5367 | 0.0173 | 0.1655 | 0.1003 | 0.0462 | 1.0000 |
| 2359.50 | 0.2240 | 0.6046 | 0.0182 | 0.0000 | 0.0221 | 0.1235 | 1.0000 |
| 2360.00 | 0.2084 | 0.5820 | 0.0075 | 0.0436 | 0.0173 | 0.1224 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2360.50 | 0.2005 | 0.5515 | 0.0074 | 0.0688 | 0.0405 | 0.0981 | 1.0000 |
| 2361.00 | 0.0979 | 0.6078 | 0.0139 | 0.2158 | 0.0000 | 0.0000 | 1.0000 |
| 2361.50 | 0.0794 | 0.5722 | 0.0165 | 0.1905 | 0.0481 | 0.0217 | 1.0000 |
| 2362.00 | 0.0340 | 0.5250 | 0.0144 | 0.2290 | 0.1014 | 0.0000 | 1.0000 |
| 2362.50 | 0.0299 | 0.5131 | 0.0147 | 0.2561 | 0.0870 | 0.0000 | 1.0000 |
| 2363.00 | 0.0409 | 0.5141 | 0.0233 | 0.2426 | 0.0747 | 0.0093 | 1.0000 |
| 2363.50 | 0.0093 | 0.5119 | 0.0189 | 0.2536 | 0.1009 | 0.0000 | 1.0000 |
| 2364.00 | 0.0000 | 0.4852 | 0.0192 | 0.2531 | 0.1317 | 0.0000 | 1.0000 |
| 2364.50 | 0.0326 | 0.5067 | 0.0225 | 0.2331 | 0.1051 | 0.0000 | 1.0000 |
| 2365.00 | 0.0022 | 0.4602 | 0.0203 | 0.2598 | 0.1398 | 0.0000 | 1.0000 |
| 2365.50 | 0.0000 | 0.4912 | 0.0196 | 0.2586 | 0.1260 | 0.0000 | 1.0000 |
| 2366.00 | 0.0000 | 0.4804 | 0.0236 | 0.2620 | 0.1224 | 0.0000 | 1.0000 |
| 2366.50 | 0.1494 | 0.6922 | 0.0280 | 0.0000 | 0.0205 | 0.1024 | 1.0000 |
| ***** TOP OF ZONE INT.1 | | | | | ***** | | |
| 2367.00 | 0.2098 | 0.7009 | 0.0039 | 0.0000 | 0.0000 | 0.0836 | 1.0000 |
| 2367.50 | 0.2236 | 0.7019 | 0.0039 | 0.0000 | 0.0000 | 0.0681 | 1.0000 |
| 2368.00 | 0.2057 | 0.7372 | 0.0027 | 0.0000 | 0.0000 | 0.0520 | 1.0000 |
| 2368.50 | 0.1966 | 0.7062 | 0.0049 | 0.0000 | 0.0000 | 0.0908 | 1.0000 |
| 2369.00 | 0.1990 | 0.7061 | 0.0027 | 0.0000 | 0.0000 | 0.0911 | 1.0000 |
| 2369.50 | 0.1801 | 0.7033 | 0.0062 | 0.0000 | 0.0000 | 0.1081 | 1.0000 |
| 2370.00 | 0.1939 | 0.7097 | 0.0047 | 0.0000 | 0.0000 | 0.0888 | 1.0000 |
| 2370.50 | 0.1708 | 0.7345 | 0.0013 | 0.0000 | 0.0000 | 0.0922 | 1.0000 |
| 2371.00 | 0.1968 | 0.7015 | 0.0000 | 0.0000 | 0.0000 | 0.1000 | 1.0000 |
| 2371.50 | 0.1985 | 0.6916 | 0.0003 | 0.0000 | 0.0000 | 0.1077 | 1.0000 |
| 2372.00 | 0.2257 | 0.6529 | 0.0013 | 0.0000 | 0.0000 | 0.1165 | 1.0000 |
| 2372.50 | 0.2248 | 0.6673 | 0.0073 | 0.0000 | 0.0000 | 0.1002 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2373.00 | 0.1647 | 0.6704 | 0.0115 | 0.0363 | 0.0093 | 0.0939 | 1.0000 |
| 2373.50 | 0.1614 | 0.6416 | 0.0130 | 0.0608 | 0.0103 | 0.0914 | 1.0000 |
| 2374.00 | 0.1895 | 0.6032 | 0.0081 | 0.0168 | 0.0495 | 0.1127 | 1.0000 |
| 2374.50 | 0.1330 | 0.6132 | 0.0118 | 0.1411 | 0.0023 | 0.0555 | 1.0000 |
| 2375.00 | 0.1244 | 0.6078 | 0.0105 | 0.1284 | 0.0340 | 0.0462 | 1.0000 |
| 2375.50 | 0.1541 | 0.6547 | 0.0109 | 0.0756 | 0.0006 | 0.0807 | 1.0000 |
| 2376.00 | 0.1719 | 0.6336 | 0.0151 | 0.0000 | 0.0330 | 0.1328 | 1.0000 |
| 2376.50 | 0.1793 | 0.6128 | 0.0118 | 0.0000 | 0.0385 | 0.1451 | 1.0000 |
| 2377.00 | 0.1576 | 0.6026 | 0.0098 | 0.0000 | 0.0605 | 0.1494 | 1.0000 |
| 2377.50 | 0.1622 | 0.6580 | 0.0113 | 0.0000 | 0.0260 | 0.1334 | 1.0000 |
| 2378.00 | 0.1992 | 0.6876 | 0.0140 | 0.0000 | 0.0000 | 0.0972 | 1.0000 |
| 2378.50 | 0.1892 | 0.7160 | 0.0082 | 0.0203 | 0.0000 | 0.0603 | 1.0000 |
| 2379.00 | 0.2036 | 0.7045 | 0.0051 | 0.0000 | 0.0000 | 0.0849 | 1.0000 |
| 2379.50 | 0.2262 | 0.6186 | 0.0060 | 0.0000 | 0.0000 | 0.1454 | 1.0000 |
| 2380.00 | 0.2139 | 0.5864 | 0.0000 | 0.0000 | 0.0312 | 0.1558 | 1.0000 |
| 2380.50 | 0.2152 | 0.5699 | 0.0097 | 0.0000 | 0.0295 | 0.1647 | 1.0000 |
| 2381.00 | 0.2234 | 0.5701 | 0.0040 | 0.0000 | 0.0281 | 0.1620 | 1.0000 |
| 2381.50 | 0.2338 | 0.5885 | 0.0075 | 0.0000 | 0.0004 | 0.1649 | 1.0000 |
| 2382.00 | 0.2273 | 0.5973 | 0.0053 | 0.0000 | 0.0049 | 0.1610 | 1.0000 |
| 2382.50 | 0.2129 | 0.6248 | 0.0021 | 0.0000 | 0.0000 | 0.1545 | 1.0000 |
| 2383.00 | 0.2177 | 0.5789 | 0.0056 | 0.0000 | 0.0214 | 0.1648 | 1.0000 |
| 2383.50 | 0.2073 | 0.5481 | 0.0080 | 0.0000 | 0.0527 | 0.1658 | 1.0000 |
| 2384.00 | 0.2393 | 0.5661 | 0.0047 | 0.0000 | 0.0122 | 0.1709 | 1.0000 |
| 2384.50 | 0.2195 | 0.5494 | 0.0029 | 0.0000 | 0.0345 | 0.1801 | 1.0000 |
| 2385.00 | 0.2213 | 0.5577 | 0.0044 | 0.0000 | 0.0304 | 0.1736 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2385.50 | 0.2229 | 0.5487 | 0.0090 | 0.0000 | 0.0299 | 0.1764 | 1.0000 |
| 2386.00 | 0.2069 | 0.5731 | 0.0090 | 0.0000 | 0.0331 | 0.1667 | 1.0000 |
| 2386.50 | 0.1708 | 0.6535 | 0.0186 | 0.0000 | 0.0016 | 0.1538 | 1.0000 |
| 2387.00 | 0.2154 | 0.6277 | 0.0110 | 0.0000 | 0.0000 | 0.1427 | 1.0000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2387.50 | 0.2148 | 0.6446 | 0.0072 | 0.0000 | 0.0000 | 0.1303 | 1.0000 |
| 2388.00 | 0.2064 | 0.6871 | 0.0079 | 0.0000 | 0.0000 | 0.0963 | 1.0000 |
| 2388.50 | 0.2051 | 0.6915 | 0.0114 | 0.0000 | 0.0000 | 0.0902 | 1.0000 |
| 2389.00 | 0.2073 | 0.6835 | 0.0070 | 0.0000 | 0.0000 | 0.0980 | 1.0000 |
| 2389.50 | 0.2116 | 0.6918 | 0.0102 | 0.0000 | 0.0000 | 0.0829 | 1.0000 |
| 2390.00 | 0.2176 | 0.6923 | 0.0114 | 0.0000 | 0.0000 | 0.0770 | 1.0000 |
| 2390.50 | 0.2116 | 0.7086 | 0.0049 | 0.0000 | 0.0000 | 0.0735 | 1.0000 |
| 2391.00 | 0.2244 | 0.6892 | 0.0079 | 0.0000 | 0.0000 | 0.0743 | 1.0000 |
| 2391.50 | 0.2207 | 0.6846 | 0.0124 | 0.0000 | 0.0000 | 0.0793 | 1.0000 |
| 2392.00 | 0.2154 | 0.6818 | 0.0080 | 0.0000 | 0.0000 | 0.0903 | 1.0000 |
| 2392.50 | 0.2179 | 0.6870 | 0.0093 | 0.0000 | 0.0000 | 0.0843 | 1.0000 |
| 2393.00 | 0.2109 | 0.7000 | 0.0095 | 0.0000 | 0.0000 | 0.0784 | 1.0000 |
| 2393.50 | 0.2076 | 0.6991 | 0.0134 | 0.0000 | 0.0000 | 0.0799 | 1.0000 |
| 2394.00 | 0.2092 | 0.6952 | 0.0096 | 0.0000 | 0.0000 | 0.0822 | 1.0000 |
| 2394.50 | 0.2256 | 0.6776 | 0.0115 | 0.0000 | 0.0000 | 0.0830 | 1.0000 |
| 2395.00 | 0.1883 | 0.7125 | 0.0171 | 0.0000 | 0.0000 | 0.0789 | 1.0000 |
| 2395.50 | 0.1821 | 0.7263 | 0.0092 | 0.0000 | 0.0000 | 0.0822 | 1.0000 |
| 2396.00 | 0.1921 | 0.7000 | 0.0112 | 0.0000 | 0.0000 | 0.0930 | 1.0000 |
| 2396.50 | 0.1865 | 0.7120 | 0.0117 | 0.0000 | 0.0000 | 0.0881 | 1.0000 |
| 2397.00 | 0.1772 | 0.7045 | 0.0127 | 0.0000 | 0.0000 | 0.1033 | 1.0000 |
| 2397.50 | 0.1810 | 0.7012 | 0.0142 | 0.0000 | 0.0000 | 0.1008 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2398.00 | 0.1762 | 0.7225 | 0.0098 | 0.0000 | 0.0000 | 0.0896 | 1.0000 |
| 2398.50 | 0.1907 | 0.6705 | 0.0343 | 0.0000 | 0.0000 | 0.0993 | 1.0000 |
| 2399.00 | 0.1850 | 0.7172 | 0.0171 | 0.0000 | 0.0000 | 0.0764 | 1.0000 |
| 2399.50 | 0.1819 | 0.7502 | 0.0116 | 0.0000 | 0.0000 | 0.0535 | 1.0000 |
| 2400.00 | 0.1943 | 0.7434 | 0.0122 | 0.0000 | 0.0000 | 0.0514 | 1.0000 |
| 2400.50 | 0.2017 | 0.7288 | 0.0086 | 0.0000 | 0.0000 | 0.0581 | 1.0000 |
| 2401.00 | 0.2144 | 0.7067 | 0.0175 | 0.0000 | 0.0000 | 0.0591 | 1.0000 |
| 2401.50 | 0.2066 | 0.7138 | 0.0128 | 0.0000 | 0.0000 | 0.0630 | 1.0000 |
| 2402.00 | 0.2006 | 0.7174 | 0.0112 | 0.0000 | 0.0000 | 0.0671 | 1.0000 |
| 2402.50 | 0.2091 | 0.7049 | 0.0121 | 0.0000 | 0.0000 | 0.0703 | 1.0000 |
| 2403.00 | 0.2063 | 0.7068 | 0.0078 | 0.0000 | 0.0000 | 0.0753 | 1.0000 |
| 2403.50 | 0.2032 | 0.7083 | 0.0123 | 0.0000 | 0.0000 | 0.0726 | 1.0000 |
| 2404.00 | 0.2059 | 0.7016 | 0.0117 | 0.0000 | 0.0000 | 0.0767 | 1.0000 |
| 2404.50 | 0.2061 | 0.7011 | 0.0118 | 0.0000 | 0.0000 | 0.0777 | 1.0000 |
| 2405.00 | 0.2138 | 0.6948 | 0.0162 | 0.0000 | 0.0000 | 0.0727 | 1.0000 |
| 2405.50 | 0.2058 | 0.7022 | 0.0135 | 0.0000 | 0.0000 | 0.0773 | 1.0000 |
| 2406.00 | 0.2165 | 0.6925 | 0.0141 | 0.0000 | 0.0000 | 0.0726 | 1.0000 |
| 2406.50 | 0.2165 | 0.6942 | 0.0099 | 0.0000 | 0.0000 | 0.0741 | 1.0000 |
| 2407.00 | 0.2202 | 0.6846 | 0.0118 | 0.0000 | 0.0000 | 0.0788 | 1.0000 |
| 2407.50 | 0.2207 | 0.6902 | 0.0086 | 0.0000 | 0.0000 | 0.0752 | 1.0000 |
| 2408.00 | 0.2218 | 0.6670 | 0.0106 | 0.0000 | 0.0000 | 0.0957 | 1.0000 |
| 2408.50 | 0.2191 | 0.6607 | 0.0098 | 0.0000 | 0.0000 | 0.1039 | 1.0000 |
| 2409.00 | 0.2087 | 0.6719 | 0.0130 | 0.0000 | 0.0000 | 0.1013 | 1.0000 |
| 2409.50 | 0.1987 | 0.6844 | 0.0165 | 0.0000 | 0.0000 | 0.0962 | 1.0000 |
| 2410.00 | 0.2163 | 0.5853 | 0.0178 | 0.0000 | 0.0000 | 0.1763 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2410.50 | 0.2417 | 0.5470 | 0.0178 | 0.0000 | 0.0000 | 0.1910 | 1.0000 |
| 2411.00 | 0.2298 | 0.6028 | 0.0141 | 0.0000 | 0.0000 | 0.1500 | 1.0000 |
| 2411.50 | 0.2329 | 0.5909 | 0.0142 | 0.0000 | 0.0000 | 0.1574 | 1.0000 |
| 2412.00 | 0.2296 | 0.5786 | 0.0192 | 0.0000 | 0.0000 | 0.1692 | 1.0000 |
| 2412.50 | 0.2063 | 0.5909 | 0.0174 | 0.0000 | 0.0000 | 0.1819 | 1.0000 |
| 2413.00 | 0.2326 | 0.5695 | 0.0130 | 0.0000 | 0.0000 | 0.1825 | 1.0000 |
| 2413.50 | 0.2395 | 0.5553 | 0.0104 | 0.0000 | 0.0000 | 0.1893 | 1.0000 |
| 2414.00 | 0.2379 | 0.5587 | 0.0104 | 0.0000 | 0.0000 | 0.1885 | 1.0000 |
| 2414.50 | 0.2150 | 0.6070 | 0.0127 | 0.0000 | 0.0000 | 0.1620 | 1.0000 |
| 2415.00 | 0.2014 | 0.6404 | 0.0098 | 0.0000 | 0.0000 | 0.1440 | 1.0000 |
| 2415.50 | 0.2142 | 0.6204 | 0.0129 | 0.0000 | 0.0000 | 0.1503 | 1.0000 |
| 2416.00 | 0.2230 | 0.6038 | 0.0101 | 0.0000 | 0.0000 | 0.1579 | 1.0000 |
| 2416.50 | 0.2203 | 0.5939 | 0.0104 | 0.0000 | 0.0000 | 0.1695 | 1.0000 |
| 2417.00 | 0.2142 | 0.6067 | 0.0102 | 0.0000 | 0.0000 | 0.1643 | 1.0000 |
| 2417.50 | 0.2031 | 0.6138 | 0.0094 | 0.0000 | 0.0000 | 0.1713 | 1.0000 |
| 2418.00 | 0.2211 | 0.5880 | 0.0074 | 0.0000 | 0.0000 | 0.1788 | 1.0000 |
| 2418.50 | 0.2320 | 0.5762 | 0.0109 | 0.0000 | 0.0000 | 0.1773 | 1.0000 |
| 2419.00 | 0.2043 | 0.6129 | 0.0121 | 0.0000 | 0.0000 | 0.1677 | 1.0000 |
| 2419.50 | 0.2194 | 0.6068 | 0.0082 | 0.0000 | 0.0000 | 0.1632 | 1.0000 |
| 2420.00 | 0.2330 | 0.5963 | 0.0086 | 0.0000 | 0.0000 | 0.1580 | 1.0000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2420.50 | 0.2290 | 0.5614 | 0.0092 | 0.0000 | 0.0112 | 0.1797 | 1.0000 |
| 2421.00 | 0.2176 | 0.5813 | 0.0050 | 0.0000 | 0.0000 | 0.1905 | 1.0000 |
| 2421.50 | 0.2060 | 0.5873 | 0.0129 | 0.0000 | 0.0440 | 0.1345 | 1.0000 |
| 2422.00 | 0.2176 | 0.6532 | 0.0147 | 0.0000 | 0.0000 | 0.1116 | 1.0000 |
| 2422.50 | 0.2210 | 0.6085 | 0.0167 | 0.0000 | 0.0140 | 0.1354 | 1.0000 |
| DEPTH | PHIE | QRTZ | PYRT | ILLT | KAOL | K-FELDS | SWE |
| 2423.00 | 0.2207 | 0.6272 | 0.0132 | 0.0000 | 0.0000 | 0.1350 | |

# APPENDIX 3

# APPENDIX 3.

## KINGFISH 9

## WIRELINE TEST (RFT/MDT) REPORT AND PLOT

## WIRELINE TEST REPORTS

An RFT program of 29 pretests was attempted in Kingfish 9 on the 24/4/92. Of the 29 tests run only 5 were successful with the remaining being unsuccessful due to either tight formation or seal failures. The poor success rate was not expected given the apparent high quality of reservoir intervals based on log response. The cause of the tight tests is not certain however no tool malfunction could be identified. Analysis of the cored interval and log response indicates the tight tests were located in fine grained sands while the successful tests were obtained in the coarser grained units. It is possible that the mineralogy of the finer grained reservoir units exhibit greater sensitivity to the drilling fluid and this has resulted in a reduction in permeability in the near wellbore area. A full listing of RFT pretests is included in Kingfish 9 WCR Volume 1.

The successful pressure data exhibits a gradient of 1.48 psi/m across the reservoir units (figure 1). Pressures in Kingfish 9 are comparable to current pressures in the producing wells.

PE905119

This is an enclosure indicator page.
The enclosure PE905119 is enclosed within the container PE902046 at this location in this document.

The enclosure PE905119 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE905119 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = RFT Pressure Data |
| BASIN | = GIPPSLAND |
| PERMIT | = VIC/L7 |
| TYPE | = WELL |
| SUBTYPE | = DIAGRAM |
| DESCRIPTION | = Kingfish-9 RFT Pressure Data. Figure 1 from appendix 3 of WCR volume2 |
| REMARKS | = |
| DATE_CREATED | = |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = W1060 |
| WELL_NAME | = Kingfish-9 |
| CONTRACTOR | = |
| CLIENT_OP_CO | = Esso Australia Limited |

(Inserted by DNRE - Vic Govt Mines Dept)

# KINGFISH 9

## RFT PRESSURE DATA

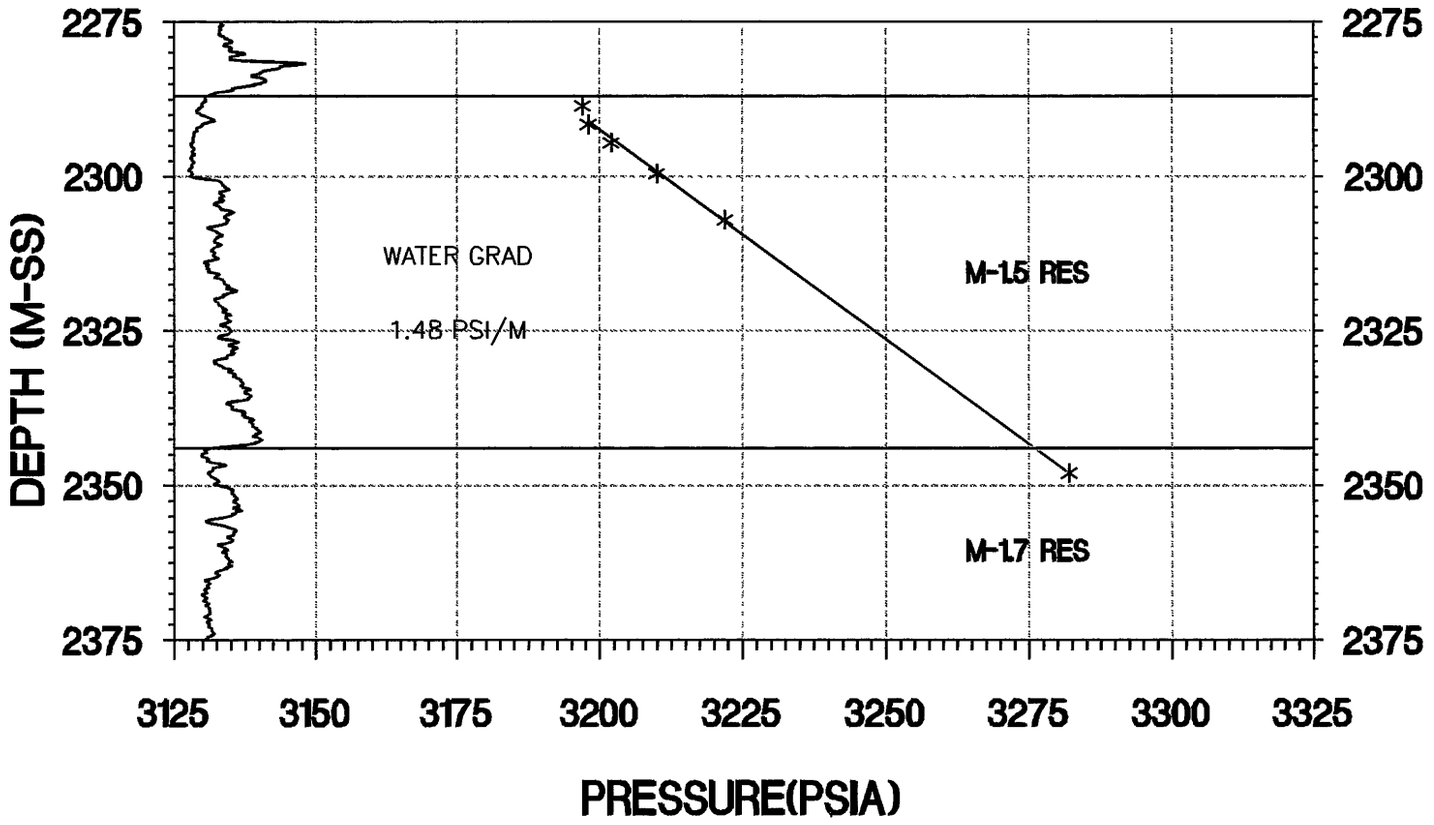


FIGURE 1

LOG CURVE TYPE IS GR

ENCLOSURE 1

ENCLOSURE 1

# ENCLOSURE 1

# MUD LOG

PE 600831

PE600831

This is an enclosure indicator page.
The enclosure PE600831 is enclosed within the container PE902046 at this location in this document.

The enclosure PE600831 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE600831 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = Formation Evaluation Log |
| BASIN | = |
| PERMIT | = Vic/L7 |
| TYPE | = WELL |
| SUBTYPE | = well log |
| DESCRIPTION | = Formation Evaluation Log |
| REMARKS | = |
| DATE_CREATED | = 23/04/1992 |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = |
| WELL_NAME | = Kingfish 9 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 2

ENCLOSURE 2

# ENCLOSURE 2

# WELL COMPLETION LOG

PE600832

PE600832

This is an enclosure indicator page.
The enclosure PE600832 is enclosed within the container PE902046 at this location in this document.

The enclosure PE600832 has the following characteristics:

| | |
|---|---|
| ITEM_BARCODE | = PE600832 |
| CONTAINER_BARCODE | = PE902046 |
| NAME | = Well Completion Log |
| BASIN | = |
| PERMIT | = Vic/L7 |
| TYPE | = WELL |
| SUBTYPE | = well log |
| DESCRIPTION | = Well Completion Log |
| REMARKS | = |
| DATE_CREATED | = 01/10/1992 |
| DATE_RECEIVED | = 30/10/1992 |
| W_NO | = |
| WELL_NAME | = Kingfish 9 |
| CONTRACTOR | = ESSO |
| CLIENT_OP_CO | = ESSO |

(Inserted by DNRE - Vic Govt Mines Dept)