WCR (vol. 2)
KINGFISH-8
(W690)

Esso Australia Ltd.

WELL COMPLETION REPORT

KINGFISH 8
(INCLUDING KINGFISH 8 STI)

VOLUME 2

INTERPRETED DATA

GIPPSLAND BASIN, VICTORIA

ESSO AUSTRALIA LTD

SEPTEMBER 1992

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INTRODUCTION

Kingfish 8 was an appraisal well located in the northern part of Vic/L8, 4km west of the West Kingfish Platform.

The objectives of the well were to:

i) delineate and extend the western limit of the West Kingfish field,
ii) locate the original oil-water contact positions in the P-1.1N and M-1.2 reservoirs,
iii) further appraise the P-1.1S reserves potential in the western region of the field and,
iv) provide key stratigraphic and palaeontologic data to assist in the interpretation of the Kingfish 3D seismic survey.

Anomalously high production performance of the W-1 well (completed in the P-1.1N sand) and the W-13B well (M-1.2 completion), ie late water arrival, suggest that the OOWC in these sands may be lower than the assumed field wide contact in the M-1.3 reservoir. Potential existed for significant undrained oil reservoirs to be present on the western flank of the West Kingfish structure.

An appraisal well on the western flank was required to delineate these potential reserves and to select a development strategy for this part of the field, for which options included a new platform or high angle wells from the West Kingfish platform.

To fulfill the above objectives, the Kingfish 8 outpost well was located so as to intersect the Top of Coarse Clastics at -2290m, some 24 metres above the OOWC for the M-1.3 reservoir (-2314m). In the most likely case, the established M-1.3 oil-water contact (-2314) was expected to be intersected within a net sandstone section of the M-1.2 unit, thereby enabling an assessment as to whether the M-1.2 reservoir limit was different from the underlying M-1.3.

The Kingfish 8 well intersected the Top of Coarse Clastics Unconformity at 2292 mSS with oil on rock in both the P-1.1N and M-1.2 reservoirs and with lowest known oil in the M-1.2 at -2317m, three metres below the field OOWC in the M-1.3. RFT pressures also indicate that the M-1.2 and P-1.1 North reservoirs intersected by Kingfish 8 have reservoir pressures 400 - 600 psi higher than the M-1.2 in the central field area. This indicates the reservoirs are not in effective communication with the M-1.2 in the central field area. The well was sidetracked approximately 800m WSW and down structure to further evaluate the downdip extent of the P-1.1N and M-1.2 oil accumulations.

The Kingfish 8 sidetrack well was designed to intersect the Top of Coarse Clastics unconformity, some 40 m downdip of the original well. The sidetrack well intersected the Coarse Clastics Unconformity 20 m high to prediction, with an original oil-water contact at 2328.5mSS in the M-1.2 reservoir, some 14 metres below that in the M-1.3 reservoir intersected in Kingfish 7 in 1977.

The results of the Kingfish 8 and sidetrack wells has resulted in an increase in the proved reserves for the West Kingfish field.

As a consequence of the identification of significant western flank oil reserves, three additional infill wells were programmed to be drilled (W31,W32,W28) from the West Kingfish platform to develop the western oil reserves. As at early October 1992, W31, W32 and W28 have been drilled as high angle wells to the west of the West Kingfish platform, with all wells completed across the P-1.1N and M-1.2 reservoirs.

2.a. KINGFISH 8 FORMATION TOPS

FORMATION	AGE	PREDICTED mTVDSS	ACTUAL mMDRT	ACTUAL mTVDSS
Gippsland Limestone		76.0	109.0	76.0
Top Latrobe Group	Late Eocene	2246.0	2271.0	2248.0
P-1.1S reservoir		2273.0	2305.0	2282.0
Top of Coarse Clastics		2290.0	2315.5	2292.5
P-1.1N reservior		2290.0	2315.5	2292.5
M-1.2 reservoir		2298.0	2326.0	2303.0
M-1.3 reservoir		2320.0	2345.5	2322.5
M-1.4 reservoir		2362.0	2375.0	2352.0
M-1.5 reservoir		2390.0	2414.0	2391.0
M-1.7 reservoir		2403.0	Not	intersected

2.b. KINGFISH 8 ST1 FORMATION TOPS

FORMATION	AGE	PREDICTED mTVDSS	ACTUAL mMDRT	ACTUAL mTVDSS
Gippsland Limestone		76.0	109.0	76.0
Top Latrobe Group	Late Eocene	2487.5	2261.8	
P-1.1S reservoir		Not	developed	
Top of Coarse Clastics		2334.0	2547.0	2314.2
P-1.1N reservoir		2334.0	2547.0	2314.2
M-1.2 reservoir		2559.5	2325.1	
M-1.3 reservoir		2585.0	2347.1	
M-1.4 reservoir		2617.5	2374.8	
M-1.5 reservoir		2656.0	2407.1	
M-1.7 reservoir		2680.2	2426.9	

3. STRUCTURE

The Kingfish/West Kingfish structure is a large eroded unfaulted westerly plunging anticline. The West Kingfish field is a combination trap preserved on the western flank of the Kingfish structure. The West Kingfish reservoirs are preserved on the western flank as they dip more steeply than the Top of Coarse Clastics Unconformity. This is supported by well log correlation and the interpretation of seismic data off the western flank of the field. The reservoirs are truncated to the east, while dip closure exists to the north and south.

The geophysical picks of the Kingfish 8 well were all intersected within 5m of prognosis. In the sidetrack well, the Top of Coarse Clastics Unconformity was intersected 20 metres high to prognosis, indicating that the western flank of the field is considerably higher than previously interpreted.

4. STRATIGRAPHY

The Top of Latrobe Group unconformity was intersected 5m low to prediction in Kingfish 8. This horizon marks the sequence boundary between the marls of Lakes Entrance Formation and the pyritic, glauconitic siltstones of the Gurnard Formation.

The P-1.1 South reservoir lies within the Gurnard Formation and was intersected 9 metres low to prediction in the Kingfish 8 well. The P-1.1 South reservoir is not developed at the sidetrack location. The depositional setting of the P-1.1 South reservoir is interpreted to be lower shoreface, with the Kingfish 8 well defining the western limit of P-1.1 South sandstone development.

The Top of Coarse Clastics Unconformity was intersected 2 metres high to prognosis in the Kingfish 8 well and 20 metres high to prediction at the western sidetrack location. The horizon marks the sequence boundary which separates the Gurnard Formation from the underlying Coarse Clatics sediments. At both the Kingfish 8 and sidetrack locations, the top of Coarse Clastics Unconformity delineates the top of the P-1.1 North reservoir.

The P-1.1N reservoir was deposited in a lower shoreface environment and consists of a single upward coarsening parasequence. The P-1.1N interval is 10m and 11m thick at the Kingfish 8 and sidetrack locations, respectively. The reservoir is truncated towards the east by the incision of the Top of Coarse Clastics Unconformity. The base of the P-1.1 North unit in the Kingfish 8 and 8 ST1 wells is an offshore shale which marks the parasequence boundary between the P-1.1N sand and the underlying M-1.2 reservoir.

The M-1.2 reservoir was intersected 5 metres low to prognosis in Kingfish 8. Similar to the overlying P-1.1N, the M-1.2 was deposited in a lower shoreface to shoreface environment and comprises of an upward coarsening parasequence. The thickness of the M-1.2 interval is comparable between Kingfish 8 and 8 STI, being 20 metres and 22 metres respectively. Reservoir quality is best developed in the western area of field and deteriorates to offshore shales in the eastern part of the West Kingfish field.

The M-1.2 reservoir was intersected 2 metres low to prognosis in the Kingfish 8 outpost well. The M-1.3 unit at the western Kingfish 8 sidetrack location is interpreted to be fluvial, grading laterally into shoreface - lower shoreface and then into offshore shales towards the east. The base of the M-1.3 is defined by the 52.5 Ma sequence boundary.

5. HYDROCARBONS

Kingfish 8 was designed to intersect an original oil-water contact in the P-1.1 North and M-1.2 reservoirs, thereby determining whether these units have oil below the field OOWC of -2314m TVDSS established in the M-1.3 reservoir. In the Kingfish 8 well, the P-1.1 North sandstone was intersected at 2290mTVDSS, while the underlying M-1.2 reservoir was intersected at 2303.0mTVDSS. Both reservoirs contained oil on rock, with the lowest known oil for the M-1.2 identified at 2317mTVDSS where an RFT sample recovered 7 litres of oil. The underlying M-1.3 reservoir was water saturated, being located below the field OOWC.

As a consequence that both the primary objectives (P-1.1N, M-1.2) contained oil on rock, Kingfish 8 was sidetracked to a location 800m WSW and down structure to further investigate the downdip extent of the P-1.1N and M-1.2 oil accumulations.

The Kingfish 8 sidetrack well intersected the P-1.1 North at 2314m TVDSS, while the M-1.2 reservoir was intersected at 2325 m TVDSS.

Hydrocarbons are interpreted in the upper section of the P-1.1 North with the basal sand being water saturated, whilst the M-1.2 reservoir is interpreted to contain a swept hydrocarbon column with an original oil-water contact interpreted at 2328.5 m TVDSS.

Formation fluids/pressures across the P-1.1 North and M-1.2 reservoirs were not obtained in the Kingfish 8 sidetrack well, due to poor hole conditions which prevented the RFT logging run.

6. GEOPHYSICAL SUMMARY

The Kingfish Field and Gurnard-Nannygai area to the west are controlled for geophysical mapping purposes by the G91AK 3D seismic grid. This survey was acquired and processed during 1991. Kingfish-8 was located initially on the basis of pre-1991 seismic interpretation but was moved one kilometre north away from a zone of faulting following inspection of the newer data set.

G91AK data features a better Top Latrobe event than imagined in previous surveys. The Top of Latrobe appears best mapped at least in the West Kingfish area at or slightly beneath the zero crossing of a prominent seismic peak at 1.609 secs (two way seismic time) at the Kingfish -8 location. This is coincident with the prominent gamma ray log shale response on which the Latrobe Group top is generally based.

The Top Coarse Clastics marker is mapped generally on the crest of the following peak where both Gurnard formation thickness and the prevailing seismic frequencies allow discrimination of the top and base of the Gurnard unit. The Coarse Clastics event peak zero crossing appears triggered by sonic and density log shale responses within the Gurnard Formation.

Schlumberger recorded checkshots and provided sonic calibration and synthetic seismirgams to check seismic correlations. A report on this velocity survey and processing is included with the well completion report. Comparison of the synthetic and seismic trace at the location showed a high degree of cancellation when a lag of 17 msecs was incorporated at the Top of Latrobe level. This was expected given the small difference between actual and prognosed tops within the well.

7. GEOLOGICAL SUMMARY

The Kingfish-8 well, located 4km west of the West Kingfish platform was designed to:

1. Extend the western limit of the West Kingfish field and increase the field's proved reserves.

2. Locate the Original Oil Water Contact (OOWC) positions in the P-1.1N and M-1.2 reservoirs and determine whether these units have oil below the field OOWC of 2314m TVDSS established in the M-1.3 reservoir.

3. Determine whether there are sufficient incremental reserves beyond the drilling reach of the WKF platform to justify an additional platform or whether there are incremental reserves that can be recovered by drilling from the existing platform.

4. Provide data on the current OWC position in the P-1.1S sand.

5. Determine whether the interpretation of the P-1.1N reservoir as a younger sand below the Top of Coarse Clastics which is restricted to the western flank of the structure is correct.

6. Provide key velocity, stratigraphic and palaeontologic data to aid the interpretation of the proposed Kingfish 3-D seismic survey.

In the Kingfish-8 well, the Top of Latrobe group was intersected at 2271m MDRT, 2m low to prediction. This consisted of 34m of *N.asperus* to *P.asperolus* greensands of the Gurnard Formation. The *P.asperolus* aged P-1.1S reservoir was intersected at 2305mMDRT, 9m low to prediction. This low quality reservoir contained less than 1m of net oil pay.

25.5m of variable quality, oil bearing, *M.diversus* laminated sands and shales (P-1.1N and M-1.2 reservoirs) were intersected between 2315.5mMDRT and 2345.5mMDRT. The underlying M-1.3 reservoir, consisted of water saturated sands, shales and coals.

In Kingfish-8ST, a near identical sequence was penetrate, with the P-1.1S reservoir absent. A swept oil column of 4m was intersected in the M-1.2 reservoir. In the P-1.1N reservoir, a 3m oil column was intersected, however, the rock quality was poor. The M-1.3 and underlying units were again water saturated.

KINGFISH - 8/8 ST1
LOCALITY MAP

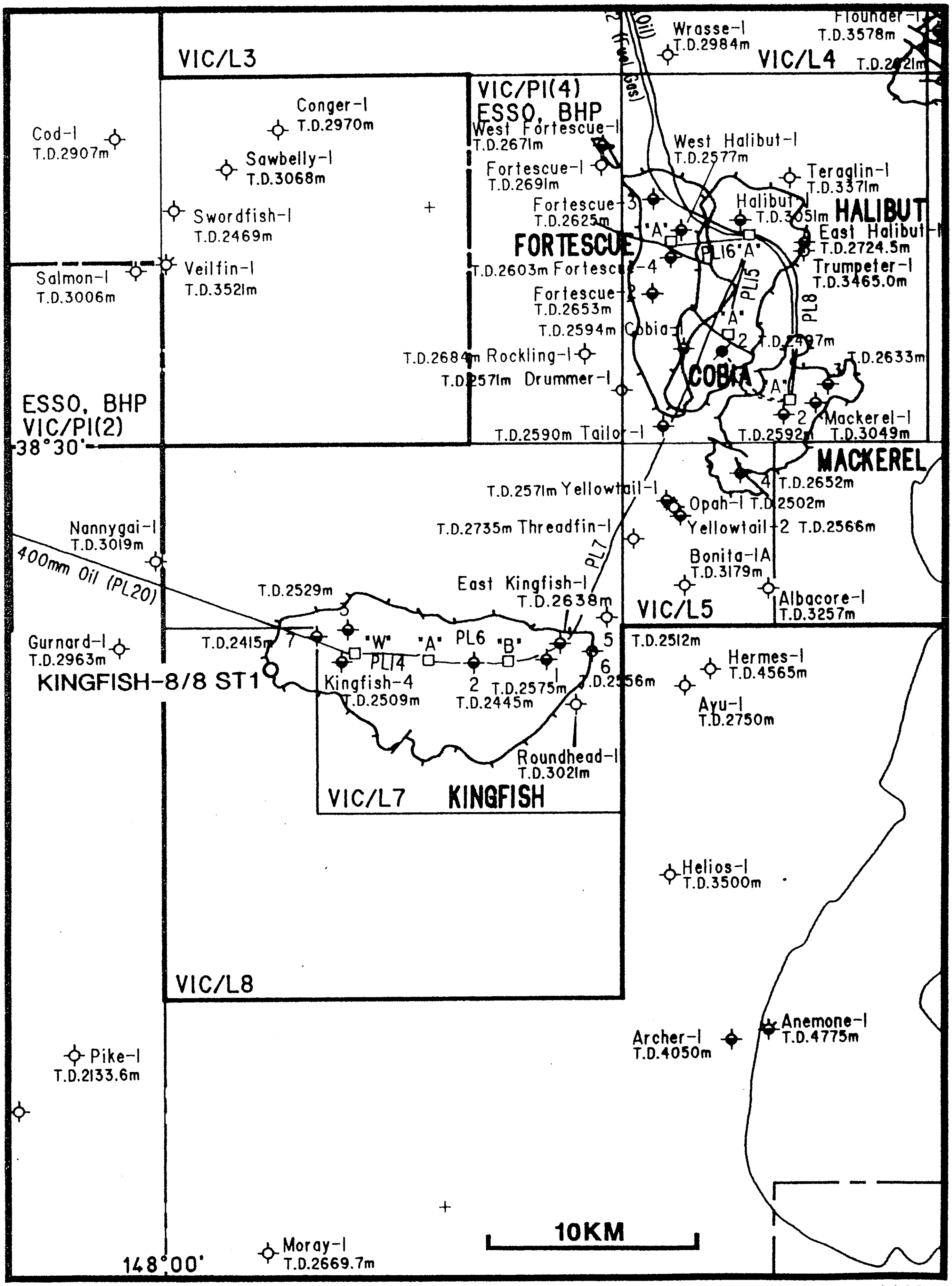
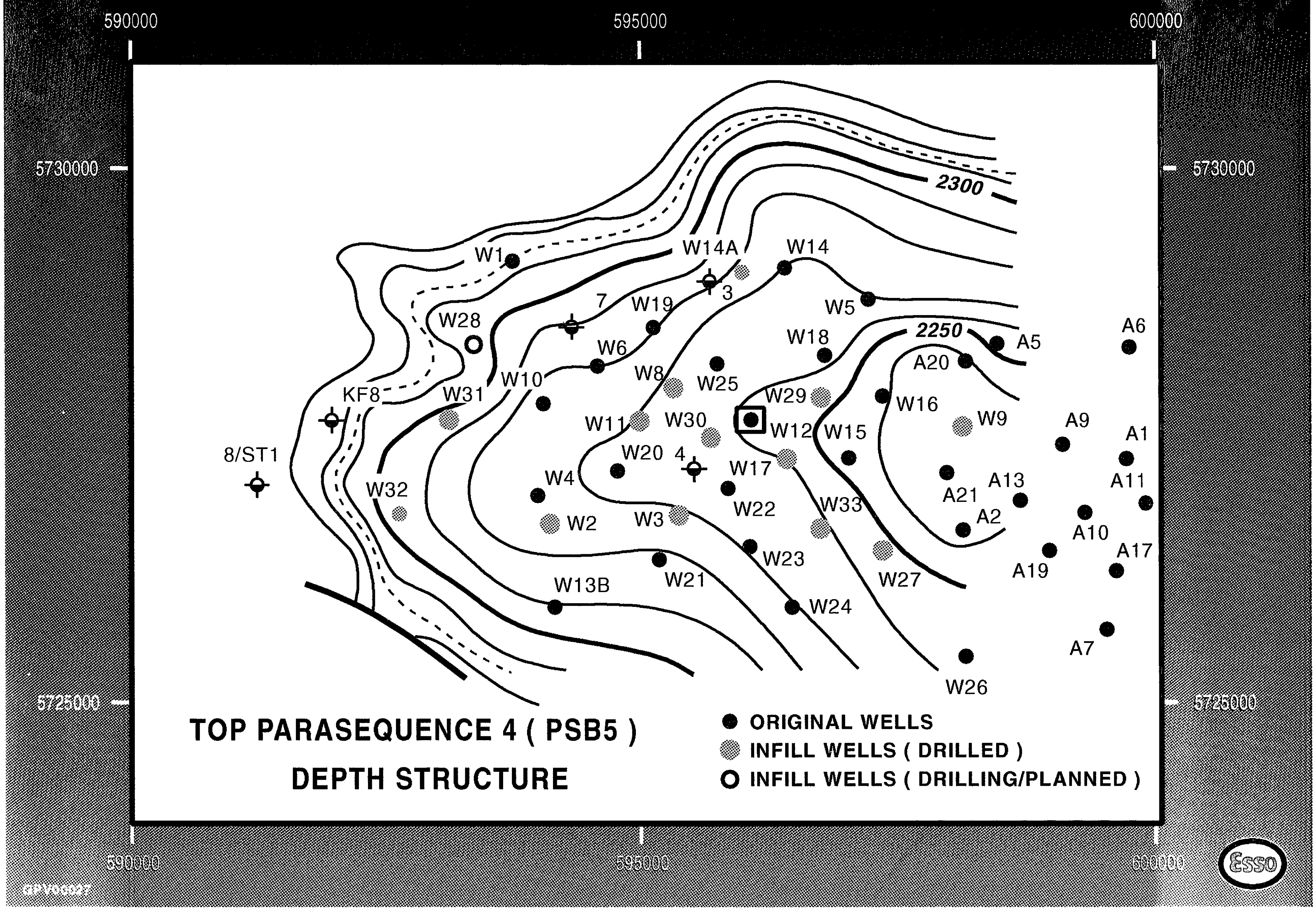


Figure 1

2479/OP/1

WEST KINGFISH



TOP PARASEQUENCE 4 (PSB5)
DEPTH STRUCTURE

Appendix 1

APPENDIX 1.

Preliminary micropalaeontology report on the Kingfish 8 well, Gippsland Basin.

(SWC 32 to SWC 46)

(Esso Australia Ltd report)

by

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PART A *Approach taken in this preliminary report*

In accord with the request from Esso staff to inspect the microfossil faunas with a view to providing a palaeoenvironmental framework that might be a value in the interpretation of seismic profiles the following approach was adopted:

1. Broad preliminary inspection of planktonic foraminifera to determine the geological Epoch of each sample.

2. Broad preliminary inspection of ostracod assemblages and planktonic/benthonic foraminiferal ratios to determine palaeobathymetric setting.

3. Inspection of ostracod preservation states to determine the relationship between depositional environment and diagenesis.

PART B *Preliminary findings (based on data in tables at rear of report)*

A There are three broad palaeoenvironmental settings apparent in the Kingfish 8 well, Gippsland Basin. These are:

1. Late Oligocene(?) to Early Miocene continental slope palaeoenvironmental setting from the intervals 2268 m to 1900 m (SWC 32 to SWC 36). Microfossil faunas indicate undisturbed hemipelagic sedimentation probably in the lower and base of slope region (water depths 2000-2500 m).

2. Early to Late Miocene continental slope palaeoenvironmental setting from the intervals 1767 m to 1090 m (SWC 37 to SWC 44). Microfossil faunas indicate the presence of <u>thick</u> fine grained turbidite deposits probably in the mid to lower slope region (water depths down to 2000 m).

3. Pliocene outer shelf palaeoenvironment between the intervals 858.5 m to 850 m (SWC 45 to SWC 46). Microfossil faunas suggest the presence of <u>thin</u> fine grained turbidites or slump deposits (water depths 160 m to 200 m).

B. Within palaeoenvironmental settings 2 and 3, samples from near the base of turbidity flows occur at the intervals 1434 m, 2816 m and 4576 m. These are recognised by the crushed and fragmented nature of many Ostracoda in association with a high percentage of articulated shells.

C. Within palaeoenvironmental settings 2 and 3 samples from near the top of turbidity flows are 1345 m and 1094.

D. Other sampled intervals within palaeoenvironmental settings 2 and 3 are either from the middle of turbidity flows or are hemipelagic interturbidite palaeoenvironments where deposition has involved a rain of sediment (and microfossils) off the continental shelf.

E. Some intervals (i.e. 1900 m) surprisingly contain allochthonous (transported) near shore marine ostracods that have been transported into a deep marine environment. This suggests periods of lower sea level stands where the shelf break was in relatively shallow water and close to the coast.

F. Maximum diagenetic alteration of microfossils (= cementation) occurs at the top of turbidity flows (good seals). This appears to be syndepositional diagenesis during periods of low sedimentation rate that has been enhanced by post depositional diagenesis.

G. Minimum diagenetic alteration of microfossils occurs near the base of turbidity flows reflecting rapid sedimentation rates (good potential reservoirs). Where it does occur, it is post crushing of ostracod shells (caused by overburden pressures at the base of turbidity flows). It is therefore post depositional diagenesis.

H. Planktonic foraminiferal distribution in the second palaeoenvironmental setting indicates that turbidity flows have in part eroded older strata and redeposited this material at younger times. There is also some differential destruction of delicate planktonic foraminifera at the base of turbidity flows.

I. Most of the autochthonous (*in situ*) ostracod species are deep marine forms. Large numbers of allochthonous (transported) forms have however been introduced from shelf regions.

J. Palaeobathymetric estimates are primarily based on autochthonous (*in situ*) ostracod taxonomic compositions, species diversity, assemblage structure and shell structure. They are comparable to the bathymetric distribution of modern

S.E.Australian continental margin and Indo-Pacific DSDP/ODP ostracod faunas. These ostracod derived estimates suggest that palaeodepths ranged from approximately 2500 m towards the base of the sampled sequence to 200 m at the top.

K. Oil present inside the shells of fossil Ostracoda occurs most abundantly at the top of the first palaeoenvironmental setting and the base of the second palaeoenvironmental setting (Early Miocene).

PART C *Recommendations for further work*

Long Term

Verification of the above findings requires rigorous scholarly research suitable as a micropalaeontology post-graduate or post-doctoral research program.

Short Term

Further reconnaissance consultancy style micropalaeontology may be of assistance to the interpretation of seismic and E-log profiles.

Depth (metres)	Key planktonic foraminifera first appearances	Geol. Epoch	Plank./Benth. Foram. ratio	Ostracoda: shallow shelf species	Ostracoda: deep shelf species	Ostracoda: continental slope species	Preservation: %Diagenetic alteration	Preservation: %Frags.& crushed	Preservation: %shells articulated	Depositional phases, systems and settings		SWC
800												
		Pliocene	H	O	●	-	H	L	H	Deposit phase 3	Thin bedded outer-shelf slumps or turbidites	46
900	G. crassaformis ^		L·	O	●	-	L	H	H			45
1000		?								?		
1100		Late Miocene to Early Miocene	H	-	O	●	H	L	M	Depositional phase 2	Thick bedded mid. to lower slope turbidites interbedded with hemipelagic sediments; shallower at bottom of phase	44
1300	^ G. conomiozea		H	-	O	●	H	M	H			43
1400	>G. acostaensis		H	-	O	●	L	H	H			42
			M	-	O	●	M	M	H			41
1500			L	O	O	●	L	H	H			40
1600			H	O	O	-	L	M	M			39
	>G. mayeri		H	-	O	●	L	L	M			38
1800	>Orbulina spp.		L	O	O	●	M	L	M			37
1900	>G. sicanus	?	VH	O	-	O	H	L	M	?		36
2100	>G. trilobus	Early Miocene to Late Oligocene	VH	-	-	●	L	L	H	Depositional phase 1	Lower to base of slope, mainly hemipelagic sediments	35
2200	> G. woodi		VH	-	O	●	L	M	M			34
			VH	-	-	O	M	M	M			33
2300	>G.kugleri? ?	?	VH	-	-	O	L	L	M			32
2400												

Data Table.Symbols: VH=very high, H=high, M=medium, L=low, ●=autochthonous (in situ), O=allochthonous (transported), - =not present, ^ =first apearance.

Sidewall core depths: 32=2268m, 33=2225m, 34=2200m, 35=2100m, 36=1900m, 37=1767m, 38=1649m, 39=1545m, 40=1434m, 41=1408m, 42=1395m, 43=1345m, 44=1094m, 45=858.5m, 46=850m.

Shallow shelf Ostracoda: Neonesidea sp. (shallow water grp), Uroleberis sp., Loxoconcha sp., Callistocythere sp., Xestoleberis sp., Cytherella spp.(shallow water grp), Orlovibairdia sp., Microcytherura sp., Cytheropteron sp..

Deep shelf Ostracoda: Neonesidea cf. chapmani, Neonesidea cf. australis, Bythocypris sp., Macrocypris sp., Arcacythere sp.(deep water grp), Neonesidea? spp.,Argilloecia sp., Cytherella sp. (consueta grp), Xestoleberis sp., Krithe spp., Parakrithella spp., Pontocypris sp., Propontocypris sp., Eucythere sp.(deep water grp), Australoecia spp., Eopaijenborchella sp., Bradleya sp.(dictyon grp).

Continental slope Ostracoda: Krithe spp.,Parakrithella spp., "Bairdia" sp (cassida grp), Abbysocypris sp., Zabythocypris sp., Ambocythere sp., Bathycythere sp., Xylocythere sp., Abbysocythere sp., Henryhowella sp.

APPENDIX 2

Appendix 2

APPENDIX 2.

Carbonate microfacies of sidewall cores from Seaspray Group in Kingfish 8, Gippsland Basin

by

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Date: June 1992

SUMMARY

The samples are all marls, with a clay matrix, a small quartz/feldspar silt content, and a variable bioclast content dominated by planktonic forams. The cement infilling the bioclast chambers varies considerably (see Fig. 1), both in a composition (non-ferroan calcite, ferroan calcite, quartz and glauconite) and crystallinity (very fine-grained, prismatic, equant). The upper samples are dominated by non-ferroan prismatic calcite, the middle samples by ferroan micritic and prismatic calcite, and the lower samples by ?glauconite. Hydrocarbon intergrowths and droplets are commonly associated with the prismatic or equant calcite cements. Within the clay matrix there are commonly tiny ferroan calcite cement crystals, and in a few samples larger patches of ferroan cement are present in the matrix.

Insufficient work has been done to understand the full significance of all these trends, but it appears the upper samples may represent shallower, more oxygenated conditions, and within the middle samples there may be incipient hardground development. Pore fluids in the deeper samples were probably more silica rich.

Thus the Seaspray Group, which appears almost uniform on brief inspection, in fact contains considerable information regarding changing sea floor and burial diagenesis conditions. There is great potential for a larger scale project.

DESCRIPTIONS

General characteristics (see Fig. 1)

The samples are all marls, with mixed siliciclastic and bioclastic components. The dominant siliciclastic component is a dark grey-green very fine-grained clay matrix; within this are varying amounts of subangular silt-sized quartz and K-feldspar (rarely plagioclase) fragments, with rare muscovite flakes and subrounded glauconite grains. The silt component is most abundant in SWC45 (858.5 m) and 34 (2200 m).

The bioclastic grains are dominated by planktonic and, to a lesser extent, benthonic forams; these are generally intact, except in SWC46 (850 m), which has a high percentage of fragments. Ostracods are also common, and there are occasional echinoid fragments, as well as siliceous sponge spicules, and pieces of ?bone and ?resin.

All samples contain abundant irregular patches of black organic matter, opaque in thin section, scattered through the clay matrix.

Diagenesis (see Fig. 1)

Matrix

The clay matrix has been affected by diagenesis to varying degrees, but the bioclast (particularly foram) cement infills display more marked diversity and variation.

The matrix in almost all samples contains tiny scattered crystals of ferroan (blue-stained) calcite; these are abundant in some specimens, e.g. SWC38 (1649 m), 39 (1545 m). They appear to represent diagenetic recrystallization rather than bioclastic grains. In the uppermost samples (SWC45 - 858.5 m, 46 - 850 m), they are very rare. In a few specimens (SWC37 - 1767 m, 38 - 1649 m) patches of intergrown ferroan calcite crystals are scattered through the matrix, forming well-cemented areas that become obvious when the sample is disaggregated for microfossil recovery. In SWC34 (2200 m) a poorly developed vein of ferroan calcite cross-cuts the specimen.

Quartz is also present in the clay matrix of most specimens, as occasional small patches with very diffuse boundaries.

Bioclast cement infills

The small amount of cement development within the matrix reflects the low porosity of the clay material (as might be expected). The only significant pore spaces within the sediment were the foram chambers and interiors of articulated ostracods; these display a variety of diagenetic textures.

The most common infill of the foram chambers is calcite; this may be either non-ferroan (pink-stained) or ferroan (blue-stained), and either micritic or clear spar; the latter may be prismatic syntaxial, equant, or single crystal. The most common form is prismatic syntaxial; the crystals radiate from the centre of the chamber, and are in optical continuity with the calcite crystals in the foram wall. As a result, under crossed polars the cement displays a pseudo-uniaxial cross. In the deeper samples (SWC32-35; 2100-2268 m) the cement has often recrystallized to a single crystal infilling the foram chamber, but retaining vestiges of the original pseudo-uniaxial cross. The micritic cement, which dominates the middle level samples, is very fine-grained and cloudy under plane polarized light. In samples where both micrite and clear spar are present, they are generally in separate forams, and are only occasionally intergrown. The order of crystallization is difficult to discern, but in at least some specimens the micrite pre-dates the spar.

Non-ferroan (pink-stained) calcite cement is commonly only in the uppermost samples (SWC44 - 1094 m, 46 - 850 m). In SWC44, the centres of the cement infills of the foram chambers are occasionally blue. As non-ferroan calcite is precipitated by relatively oxidized pore fluids, and ferroan calcite is precipitated by reducing solutions, this implies that only the uppermost samples were cemented by oxidized fluids. In SWC44, the solutions became progressively more reducing as cement precipitation occurred (a very common phenomenon), and all lower samples were cemented by reducing solutions. Examination of representative samples under the cathode luminoscope showed that the calcite cement, no matter what its form, is always very dully luminescent. This presumably reflects its high iron content and perhaps also its low manganese content.

After calcite, the most common cement infilling the bioclasts is glauconite. Green glauconite is rarely present as a cement infill in SWC41-43 (1345-1408 m); it is never intergrown with another mineral. In SWC32-35 (2100-2268 m) a brownish-green fine-grained mineral, most likely glauconite, is the dominant cement, often intergrown with clear, fine-grained quartz (see below) or ferroan calcite. Frequently the calcite rims a cavity filled with brown ?glauconite.

The third common cement mineral is quartz. In the upper samples this occurs occasionally as clear, equant crystals intergrown with calcite, and often occupying the centres of the bioclast cavities. In SWC45 (858.5 m), clear quartz crystals, intergrown with fine-grained cloudy quartz, infill all the foram chambers. In the lower samples a different form of quartz occurs occasionally; fine-grained and clear, and generally intergrown with ?glauconite.

Also present in bioclast cavities, in varying abundances in all samples, is opaque hydrocarbon material, either intergrown with cement minerals or as discreet droplets, sometimes filling the entire chamber. It is most commonly intergrown with prismatic or equant calcite spar, and is much less common in cavities infilled with glauconite.

The changes in cement infills down-section are summarized in Figure 1; briefly, the lower samples are dominated by ?glauconite (+ ferroan recrystallized calcite ± fine grained quartz), the middle samples by ferroan micrite (+ ferroan prismatic calcite ± equant quartz), the upper samples by non-ferroan prismatic calcite (± equant quartz).

Other processes
Apart from cementation, there is little evidence of other diagenetic processes. The bioclasts are predominantly composed of low magnesium calcite, so they are diagenetically stable, and have not been obviously subject to dissolution, even in the deepest samples. Likewise there are few indications of compaction, like fractured or spalled bioclasts. Many of the silt-sized quartz grains have poorly defined edges, resulting from incipient replacement by calcite.

SIGNIFICANCE OF DOWN-SECTION CHANGES (see Fig. 1)

(1) Evidence of higher energy conditions.
SWC46 (850 m) with its very high content of bioclast fragments, and SWC34 (2200 m) and 45 (858.5 m), with their higher siliciclastic silt components, may represent higher energy deposits than the rest of the sequence. The micropalaeontology report indicates that, overall, the zsequence shallows upwards from continental slope at the base to outer shelf at the top. Thus the upper samples may have been reworked by storm currents affecting deeper parts of the shelf; the lower sample may represent the effect of deep ocean contour currents or turbidity currents. Mixed microfaunas present in some samples (see micropalaeontology report) may be the result of turbidity currents.

(2) Evidence of more oxygenated conditions.
SWC45 and 46 (850-858.5 m) contain non-ferroan cements, indicating more oxygenated pore fluids than in any of the other samples. This could result from more energetic (?shallower) floor conditions.

(3) Evidence of hardgrounds (breaks in sedimentation).
Given the likely water depths and the clay-rich nature of the sediments, development of cemented hardgrounds would not be expected. However, the larger patches of calcite cement in the matrix of SWC37 and 38 (1649-1767 m) might represent incipient hardground development. In addition,

the micritic cement infilling the bioclasts in SWC36-42 (1395-1900 m) appears similar to the type of cement often present in deep ocean hardgrounds.

(4) Evidence of hydrocarbon migration.
The presence of hydrocarbon droplets in many of the bioclasts indicates hydrocarbon migration; presumably the source is the organic material in the clay matrix of the samples. The significance of the strong association between sparry calcite cement and hydrocarbons is at present unknown.

(5) Evidence of changing burial conditions.
The change, up-section, from ?glauconite (+ ferroan recrystallized calcite ± fine grained quartz) to ferroan micrite (+ ferroan prismatic calcite ± equant quartz) to non-ferroan prismatic calcite (± equant quartz) must reflect changing pore fluid compositions in the sediments. There is little evidence of replacement, so the differences appear to be original. The precise causes are at present unclear, but presumably reflect a higher silica concentration in the pore fluids in the deeper samples.

CONCLUDING REMARKS

This preliminary thin-section study has shown that within the marly part of the Seaspray Group there is some variation in clast composition, but major variations in diagenetic history. Insufficient work has been undertaken to understand the full implications of these, but more study would almost certainly result in an understanding of how sea floor and burial diagenesis conditions have changed with time. The results of the micropalaeontological study provide additional information which can be readily integrated with the thin section work. A full microfacies/micropalaeontological study would form a powerful tool for unravelling the history of the Seaspray Group.

I would like to make two sets of recommendations for further work.

(1) **Short term**
In order to maximize our understanding of the Kingfish 8 samples, some additional data is needed.
(a) microprobe analyses of the various cement phases, to check the mineral identifications.
(b) integration of the results with well logs and seismic data for the area.

Note: The polished sections already prepared would be suitable for the microprobe study.

(2) **Long term**

A long term two-pronged study on both the carbonate microfacies/diagenesis and micropalaeontology of the Seaspray Group should enable a rapid increase in our understanding of this unit. This study should involve the shallower water facies as well as the deeper water facies studied in this report, and would preferably be integrated with work on the seismic stratigraphy and well correlations.

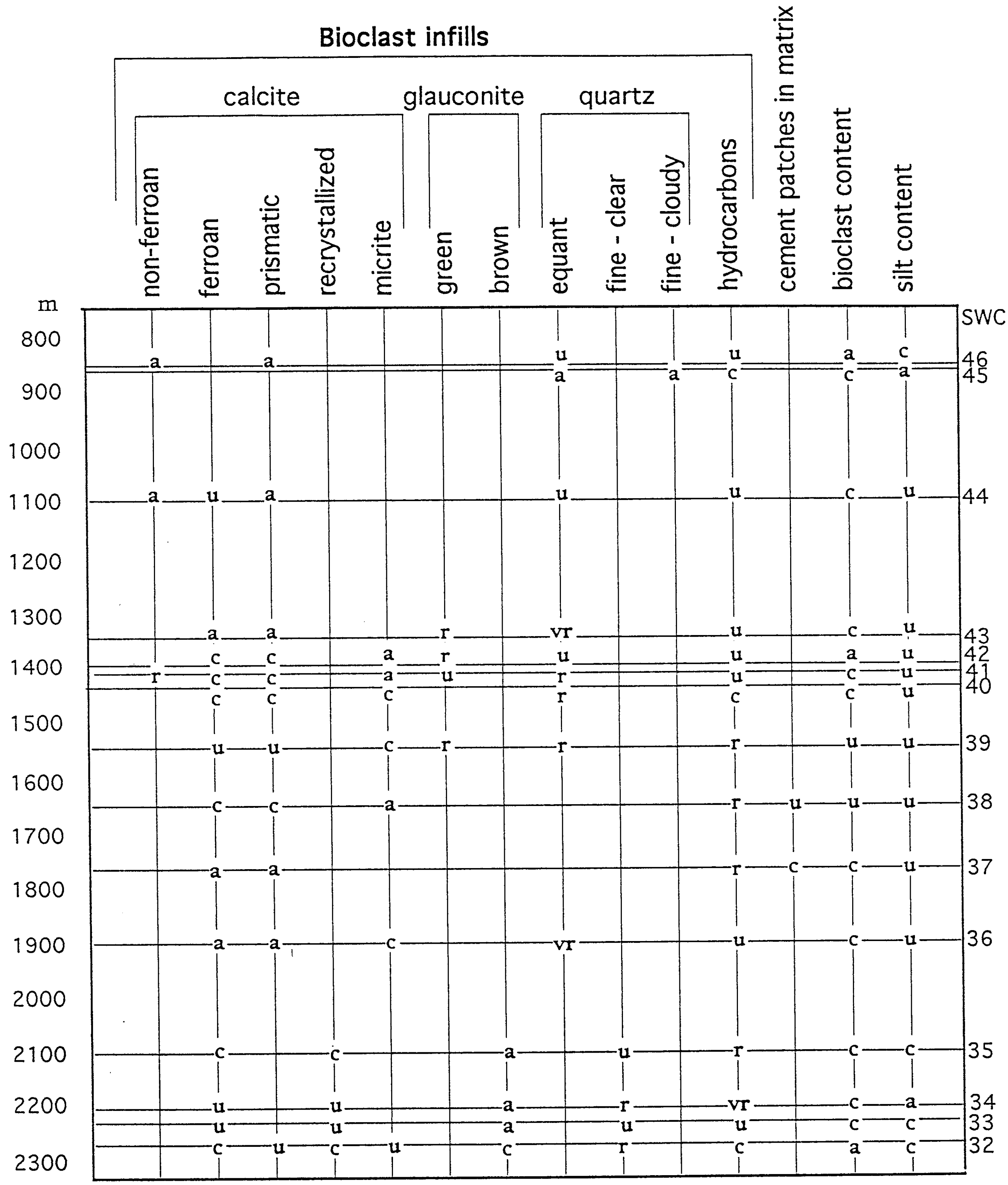

Figure 1. Summary of diagenetic features and components within the sidewall cores of the Seaspray Group in Kingfish 8.
Symbols: a - abundant, c - common, u - uncommon, r - rare, vr - very rare.
All based on visual estimates only.

APPENDIX 3

Appendix 3

<u>APPENDIX 3.</u>

PALYNOLOGICAL ANALYSIS OF KINGFISH-8 GIPPSLAND BASIN

by

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Palaeontological Report 1992/1

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INTERPRETED DATA

INTRODUCTION

Thirty-one sidewall cores in Kingfish-8 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 5 to 12g (8.5g average) of each sidewall core was processed for palynological analysis and low to high residue yields were recovered from the Latrobe Group coarse clastic section and overall low to very low yields from the overlying condensed greensand interval and basal Lakes Entrance Formation. Only moderate spore-pollen and microplankton diversities were recorded from the samples as a consequence of the low yields. Spore-pollen diversity averaged 18+ species per sample. Microplankton diversity was very low in the Latrobe coarse clastics section and low to moderate in marine greensand section and above where it averaged 8+ 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.

It was noticeable that the yield of palynomorphs from the sidewall cores and their preservation and presentation (for identification) was poorer than the results obtained from the adjacent Kingfish-7 which was processed in Esso's former Sydney Palynological laboratory in 1977 (Partridge, 1977). The reasons for this can be attributed to the limited experience of Laola Pty Ltd in processing Gippsland Basin samples, and the location of their laboratory in Perth which limited supervision by the palynologist of the quality of the processing. The poorer preparations resulted in lower diversity assemblages, difficulty in finding index species and lower confidence in zone identifications. Overall the results obtained from Kingfish-8 are not as precise as those obtained from Kingfish-7. The worst affected portion of the well is the lower portion of the condensed greensand interval samples between 2299.5 to 2324m. It also should be noted that aside from typical Gippsland Basin palynomorphs most palynological slides (and especially the low yield slides) contained laboratory contamination from *modern* pollen and/or Mesozoic spore, pollen and dinoflagellates typical of the Northwest Shelf sequences. These contaminants have not been recorded on the range charts to prevent confusion.

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

PALYNOLOGICAL SUMMARY OF KINGFISH-8

AGE	UNIT/FACIES		SPORE-POLLEN ZONES	DEPTHS(mKB)	DINOFLAGELLATE ZONES	DEPTHS (mKB)
OLIGOCENE	Lakes Entrance Formation		*P. tuberculatus*	2268.0		
LATE EOCENE	LATROBE GROUP	Gurnard Formation	Upper *N. asperus*	2277.0	*P. comatum*	2277.0
			Middle *N. asperus*	2280.0	*C. incompositum*	2280.0
			Lower *N. asperus*	2286.0-2297.0	*D. heterophlycta* *A. australicum*	2286.0-2290.0 2293.5-2297.0
MIDDLE EOCENE			*P. asperopolus*	2299.5		
		Unnamed Greensand	*P. asperopolus*	2305.5-2306.0	*K. thompsonae*	2305.5-2306.0
			P. asperopolus to Upper *M. diversus*	2308.0-2314.0		
EARLY EOCENE		Undiff. marine sands & shales	Middle *M. diversus*	2325.5-2345.0		
		Coastal plain sands, shales & coals	Lower *M. diversus*	2369.5-2410.0		

Ratings are recorded in Table-1 and basic data on residue yields, preservation and diversity are recorded on Tables-2 and 3. Nine samples between 2325.5m to 2410m contained sufficiently good assemblages that their palynomorphs were counted. Percentage data from these counts are recorded in Table-4. All species which have been identified with binomial names are tabulated on the accompanying range charts.

GEOLOGICAL COMMENTS:

1. Kingfish-8 has intersected the same interval of "greensand" facies as Kingfish-7. There is an Early Eocene portion (samples between 2305.5m to 2314m) equivalent in age to the Flounder Formation and a Middle to Late Eocene portion (samples between 2277m to 2299.5m) which is age equivalent to the Gurnard Formation. Within the Gippsland Basin it has been traditional to restrict the use of the term Gurnard Formation for those "greensands" which lie stratigraphically above the unconformity surface <u>and its lateral extensions</u> produced by the cutting of the Marlin Channel. The wells Kingfish-7 and 8 are the best wells currently drilled in the basin where sampling density and detailed palynology is available to demonstrate that in parts of the Gippsland Basin marine environments existed seemingly without interruption through the submarine channelling event that cut the Marlin Channel. Because of the importance of this event to regional stratigraphy in the summary the "greensand" facies in Kingfish-8 is split between the Gurnard Formation and a lower "Unnamed Greensand". The boundary between these units is placed at 2302.5m for the reasons outlined below.

2. Based on the occurrences and ranges of species of the acritarch *Tritonites*, Marshall & Partridge (1988) advanced the hypothesis that the most likely time of initiation of cutting of the Marlin Channel was the 49.5 Ma Sequence Boundary in the late Early Eocene. This event was argued to be within the *P. asperopolus* Spore-Pollen Zone below the FAD (First Appearance Datum) of the acritarch species. *Tritonites asteris*, but above the LAD (Last Appearance Datum) for the zone index dinoflagellate *Kisselovia edwardsii*.

   Examination of the gamma and bulk density/neutron porosity logs in Kingfish-8 suggests the most likely log break for the Marlin Channel event would be at 2302.5m. Because of this interpretation of the sidewall core at 2299.5m was examined twice to check for the presence of *T. asteris* without success. Overall, however, the assemblage is reminiscent of samples containing *T. asteris* from Opah-1 and Tailor-1 (Marshall & Partridge, 1981) justifying placing it in the Middle Eocene. As additional rock sample remains from this sample, and the underlying sidewall core at 2303.5m which gave an indeterminate results, it is recommended that both these samples should be reprocessed.

3. In Kingfish-8 the index dinoflagellate *Kisselovia thompsonae* ms was recovered from the two samples at 2305.5m and 2306m from the metre thick sand between 2305.4m-2306.3m.

In Kingfish-7 the eight metre sand between 2285.4m-2293.3m (7498-7524ft) in the same relative stratigraphic position was largely unsampled or barren of palynomorphs except near the top where the index species *Kisselovia edwardsii* was found at 2286.6m (7502ft).

As these two dinoflagellates do not usually have overlapping range in the Gippsland Basin the simplest interpretation is to say the sands do not correlate. However, as the section in both Kingfish-7 and 8 is very condensed it is just as likely that *K. thompsonae* ms could be reworked into the sand in Kingfish-8 or that *K. edwardsii* may be introduced by burrowing into the top of the sand in Kingfish-7.

Therefore, within the resolution of the available sampling and palynological age dating it is most likely that the sands do correlate between Kingfish-7 and 8, and lie at the boundary between the *K. thompsonae* and *K. edwardsii* Zones. This boundary has been correlated to the 50 Ma sequence boundary on the timescale and cycle chart of Haq *et. al.* (1987, 1988).

4. The 9.3 metres of "Unnamed" greensand (2306.3m-2315.6m) in Kingfish-8 below the above sand is nearly identical in thickness to the 8.8 metres of greensand (2293.3m-2302.1m) in the equivalent stratigraphic position in Kingfish-7. Because this section was conventionally cored in Kingfish-7 the better sampling enabled more precise age dating. Furthermore, the conclusion reached in Kingfish-7, based on the reworking of dinoflagellate index species, that the greensand deposition probably commenced in the Upper *M. diversus* Zone but was reworked in the *P. asperopolus* Zone is also valid for Kingfish-8 although the available data is poorer.

5. The Gurnard Formation interval between 2271.5m-2302.5m in Kingfish-8 contains a complete sequence of Middle to Late Eocene spore-pollen and dinoflagellate zones suggesting continuous marine deposition of the Kingfish-8 location. In addition four of the six species of the acritarch *Tritonites* described by Marshall & Partridge (1988) were recorded. None of these species were recorded in the earlier Kingfish-7 report by Partridge (1977) because their stratigraphic significance was not appreciated and they were undoubtedly overlooked.

There is an anomaly with the earlier work as the FAD of *Tritonites pandus* at 2297m before the FAD of *T. tricornus* at 2295m conflicts with known stratigraphic ranges. This most likely reflects the low yields and therefore limited assemblages recorded from all samples from the Gurnard Formation, rather than a reversal of first appearances or an extension of the range of *T. pandus*. However, the absence of an interval in Kingfish-8 containing *T. tricornus* before the FAD of *T. pandus* suggests that part of the early Middle Eocene (approx. 44-48 Ma) is either missing or very condensed in Kingfish-8 (see fig.5 *in* Marshall & Partridge 1988). This particular part of the Middle Eocene is poorly documented or dated in nearly all wells in the Gippsland Basin.

6. The top of the Latrobe coarse clastics in Kingfish-8 is confidently assigned to the Middle *M. diversus* Zone. This contrasts with the results from Kingfish-7 where only the Lower *M. diversus* Zone has been recorded below the condensed greensand section. Because of this apparent extra section in Kingfish-8 the recorded assemblage lists in Kingfish-7 have been reviewed. Although no spore-pollen considered definitive of the Middle *M. diversus* Zone were identified two samples from core-3 at 7580ft and 7591ft (adjusted to electric logs as 7575ft and 7586ft; see table-1 in Partridge, 1977) contained very low diversity dinoflagellate assemblages similar to those found in the Middle *M. diversus* Zone samples in Kingfish-8. This similarity is reinforced by the general lack of dinoflagellates in the underlying Lower *M. diversus* Zone samples in Kingfish-7 as is the case with this latter zone in Kingfish-8.

In summary, there may be a short interval of Middle *M. diversus* Zone section in Kingfish-7 at the top of the Latrobe coarse clastics but re-examination of Kingfish-7 would be necessary to confirm this.

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: 2369.5-2410.0 metres Early Eocene.

Seven of the deepest nine sidewall cores in Kingfish-8 were confidently assigned to this zone based principally on assemblage counts. These are dominated by angiosperm pollen (37-55%) or occasionally fungal spores and hyphae (up to 42%) expressed as a percentage of the total count. The key species (or species groups) amongst the angiosperms are *Casuarina* pollen (fossil species *Haloragacidites harrisii* and *H. trioratus*) with abundances of 5-17%; *Malvacipollis* spp. (modern affinity is with Euphorbiaceae) with range 1-12% and *Proteacidites grandis* (modern affinity suggested to coastal Proteaceae heath) with abundance range of 2-6%. The combined abundances of these three species groups clearly distinguish the assemblages from those in the underlying *L. balmei* Zone which was clearly not reached in Kingfish-8. Representative counts of palynomorph assemblages from the *L. balmei* Zone for comparison can be found in the palynological reports from Roundhead-1 (Partridge, 1989) and Sweetlips-1 (Partridge, 1990).

Although the majority of samples from the zone 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. Aside from species mentioned above and counted the only other zone species recorded are *Tetracolporites multistrixus* ms (at 2376m, 2384m and 2410m) and *T. textus* ms (at 2382 and 2410m) which are typically not considered to range above the Lower *M. diversus* Zone. Single specimens of *Lygistepollenites balmei* were recorded at 2410m and 2413m. This species has been recorded very rarely in other wells in this zone.

Dinoflagellates recorded from three samples in this zone are all considered to be contaminants from the Lakes Entrance Formation and are indicative of some mud penetration of the sidewall cores. No definitive marine incursion is therefore recorded from the Lower *M. diversus* Zone in Kingfish-8.

Middle *Malvacipollis diversus* Zone: 2325.5-2345.0 metres Early Eocene.

Three sidewall cores are confidently assigned to this zone on the presence of a single specimen of the key index species *Proteacidites tuberculiformis* at 2341.5m and the secondary index species *Polycolpites esobalteus* at 2325.5m and 2345.0m. Other significant species recorded are *Liliacidites bainii* and *Triporopollenites ambiguus* both from 2345.0m and *Intratriporopollenites notabilis* at 2325.5m and 2345.0m. The assemblage counts on the samples show a distribution of species abundances similar to counts from the underlying Lower *M. diversus* Zone. The only noteworthy features are the abundance peaks or acmes for *Casuarina* pollen of 27.6% at 2325.5m and *Proteacidites grandis* of 11.9% at 2345.0m. Diversity of the spore-pollen was moderate to high. Very low diversity dinoflagellates assemblages were recorded in all three samples. Although the dinoflagellates could not be assigned to an established zone or association they do suggest a continuous marine environment during the Middle *M. diversus* Zone. This is reinforced by lack of any coals in this zone interval.

Proteacidites asperopolus to
Upper *Malvacipollis diversus* Zone: 2308.0-2314.0 metres Early Eocene.

Although poor palynomorph recoveries did not allow precise zone identification the two shallowest samples at 2308m and 2311.5m clearly belong to the above zone interval based on the presence of both *Myrtaceidites tenuis* and *Proteacidites pachypolus*. The deepest sample at 2314m contained far fewer spores and pollen but is confidently assigned as no older than the Upper *M. diversus* Zone on common occurrence of the dinoflagellate *Homotryblium tasmaniense*, which is not known to range below that spore-pollen zone in the Gippsland Basin.

In Kingfish-7 where the equivalent section was conventionally cored the larger sample sizes available and better preparations and palynomorph recoveries enabled the base of the greensand to be assigned solely to the *P. asperopolus* Zone (Partridge, 1977). However, in the Kingfish-7 samples there was evidence of substantial reworking of dinoflagellates indicative of an Upper *M. diversus* Zone age into the *P. asperopolus* Zone assemblages, and it was proposed that the deposition of the "greensand" facies may have started in the older zone. The same may be true for Kingfish-8 but unfortunately the assemblages are too poor to demonstrate this clearly.

Proteacidites asperopolus Zone: 2299.5-2306.0 metres
Early-basal Middle Eocene.

and

Kisselovia thompsonae Zone: 2305.5-2306.0 metres Early Eocene.

The shallowest sample at 2299.5m can confidently be assigned to *P. asperopolus* Zone on the LAD (Last Appearance Datum) for *Myrtaceidites tenuis* in association with the index species *Proteacidites asperopolus* (single specimen) and *Conbaculites apiculatus* ms (several specimens) which do not range below this zone. The record of *Proteacidites ornatus* is a fragment of a specimen and may not be reliable. The microplankton in the sample was dominated by *Systematophora tarphosus* ms which is also common in the shallowest *P. asperopolus* Zone sample in Kingfish-7 at 7480ft (2279.9m). Overall the Kingfish-8 assemblage was reminiscent of samples containing the index acritarch *Tritonites asteris* (Marshall & Partridge, 1988) but although the available sides were searched twice under the microscope this latter species could not be found. It would still be worthwhile to reprocess the remaining samples from this sidewall core in an attempt to find *T. asteris* in Kingfish-8.

The two deeper samples at 2305.5m and 2306m are assigned to the *P. asperopolus* Zone principally because the samples contain the index species for the associated *K. thompsonae* dinoflàgellate Zone. Significant spore-pollen are the presence of *M. tenuis* in both samples, the common occurrence of *Proteacidites pachypolus* at 2305.5m and presence of *Santalumidites cainozoicus* at 2306m.

Kisselovia thompsonae ms was identified from a single specimen in the sample at 2305.5m and from three specimens at 2306m. The other stratigraphically significant dinoflagellate is the presence of *Wetzeliella articulata* at 2305.5m.

The sidewall at 2303.5m within this zone interval gave only a very low yield which could not be assigned to either a spore-pollen or dinoflagellate zone.

Lower *Nothofagidites asperus* Zone: 2286.0-2297.0 metres Middle Eocene.

Five samples over 11 metres are confidently assigned to the Lower *N. asperus* Zone. Although key spore-pollen are sparsely identified over this interval the age dating is amply supported by moderate diversity microplankton assemblages with key zone species. The most significantly spore-pollen identified are: *Tricolporities leuros* at (2297.0m); *Nothofagidites falcatus* at 2286m, and *Tricolpites simatus* at 2286m, whose occurrence justify higher confidence ratings for those samples. Overall the spore-pollen assemblages are characterised by high *Nothofagidites* spp. to *Haloragacidites harrisii* ratios.

Areosphaeridium australicum Dinoflagellate Zone: 2293.5-2297.0 metres.

The index species *Areosphaeridium australicum* ms is common to abundant in all three samples assigned to this zone. Other key dinoflagellate species are *Areosphaeridium arcuatum* (2297m), *Arachnodinium antarcticum* (2295m), and the *Deflandrea flounderensis/antarctica* species complex which is common as mostly fragmented specimens in all three samples. In Kingfish-7 this latter species-complex was recorded incorrectly as *Deflandrea oebisfeldensis* (Partridge, 1977). Associates of the dinoflagellates are the key acritarch species *Tritonites pandus* (at 2293.5m and 2297m) and *T. tricornus* (2293.5m and 2295m).

Deflandrea heterophlycta Dinoflagellate Zone: 2286.0-2290.0 metres.

The two samples are assigned to the zone on the occurrence of the eponymous species. Other key species are *Corrudinium corrugatum* ms and *Phthanoperidinium comatum* in both samples and *Rhombodinium glabrum* and *Tectactodinium marlum* ms both at 2290m. The occurrence of *Arachnodinium antarcticum* in the shallowest sample is considered exceptional as this species has been considered as restricted to the underlying *A. australicum* Zone (Marshall & Partridge 1988, fig.4). The key acritarch species *Tritonites inaequalis* recorded at 2286m also supports this zone assignment.

Middle *Nothofagidites asperus* Spore-Pollen Zone and
Corrudinium incompositum Dinoflagellate Zone: 2280.0 metres Late Eocene.

The occurrence of *Proteacidites pachypolus*, *P. rugulatus* and *Santalumidites cainozoicus* indicate an age no younger than the Middle *N. asperus* Zone. Unfortunately no spore-pollen species restricted to the zone were recorded, so the zone confidence rating is by necessity poor. The maximum age for the sample is derived from the associated microplankton referred to the equivalent *C. incompositum* Zone based on the occurrence of the eponymous species in association with the key dinoflagellate species *Alisocysta ornata, Deflandrea leptodermata* and *Gippslandia extensa* and the acritarch *Tritonites spinosus.*

Upper *Nothofagidites asperus* Spore-pollen Zone and
Phthanoperidinium comatum Dinoflagellate Zone: 2277.0 metres
basal Oligocene-Late Eocene.

This single sample is assigned to the Upper *N. asperus* Zone solely on the basis of the associated microplankton assemblage which contains abundant *Spiniferites* spp., common *Phthanoperidinium comatum* and frequent *Tectatodinium marlum* ms. An open marine environment is indicated by dominance of microplankton over spore-pollen and associate presence of microforaminiferal organic liners and a scolecodont.

Proteacidites tuberculatus Zone: 2268.0 metres Oligocene.

Assigned to the *P. tuberculatus* Zone on associated microplankton assemblages which contains the Lakes Entrance Formation index dinoflagellate species *Protoellipsodinium simplex* ms and *Tectactodinium scabroellipticus* ms. Overall the sample is dominated by the dinoflagellate *Operculodinium centrocarpum* which also dominates the underlying sample at 2271m. Even though this latter sample lacks key species its assemblage has the overall character of samples from the Lakes Entrance Formation. The fact that the sample is significantly more calcareous than the underlying sidewall cores would support this interpretation.

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TABLE 1: Interpretative Palynological Data Kingfish-8, Gippsland Basin

SAMPLE TYPE	DEPTH (M)	SPORE-POLLEN ZONES	*CR OLD	*CR NEW	DINOFLAGELLATE ZONE (OR ASSOCIATION)	*CR OLD	*CR NEW	COMMENTS
SWC 32	2268.0	*P. tuberculatus*	2	B5	(*Operculodinium* spp.)			Dinoflagellates dominate.
SWC 31	2271.0	Indeterminate			(*Operculodinium* spp.)			Similar to SWC-32.
SWC 29	2277.0	Upper *N. asperus*	2	B5	*P. comatum*	0	B2	*P. comatum* Acme
SWC 28	2280.0	Middle *N. asperus*	2	B4	*C. incompositum*	0	B2	FAD *Tritonites spinosus*
SWC 27	2286.0	Lower *N. asperus*	1	B2	*D. heterophlycta*	0	B2	FAD *Tritonites inaequalis*
SWC 26	2290.0	Lower *N. asperus*	2	B4	*D. heterophlycta*	1	B3	
SWC 25	2293.5	Lower *N. asperus*	2	B4	*A. australicum*	0	B2	LAD *Tritonites tricornus*
SWC 24	2295.0	Lower *N. asperus*	2	B4	*A. australicum*	0	B3	FAD *T. tricornus*
SWC 23	2297.0	Lower *N. asperus*	1	B2	*A. australicum*	1	B2	FAD *Tritonites pandus*
SWC 22	2299.5	*P. asperopolus*	1	B2	Indeterminate			LAD *Myrtaceidites tenuis*
SWC 21	2303.5	Indeterminate			Indeterminate			
SWC 20	2305.5	*P. asperopolus*	2	B4	*K. thompsonae*	1	B2	
SWC 19	2306.0	*P. asperopolus*	2	B4	*K. thompsonae*	1	B3	
SWC 18	2308.0	*P. asperopolus* to Upper *M. diversus*			Indeterminate			
SWC 17	2311.5	*P. asperopolus* to Upper *M. diversus*			Indeterminate	1		
SWC 16	2314.0	*P. asperopolus* to Upper *M. diversus*			(*H. tasmaniense*)	1		*H. tasmaniense* acme
SWC 15	2322.0	Indeterminate						Virtually barren.
SWC 14	2324.0	Indeterminate						Virtually barren.
SWC 13	2325.5	Middle *M. diversus*	2	B4				*Polycolpites esobalteus* present.
SWC 12	2341.5	Middle *M. diversus*	1	B2				*Proteacidites tuberculiformis* present.
SWC 11	2345.0	Middle *M. diversus*	2	B4				*P. esobalteus* present.

TABLE 1: Interpretative Palynological Data Kingfish-8, Gippsland Basin

Sheet 2 of 2

SAMPLE TYPE	DEPTH (M)	SPORE-POLLEN ZONES	*CR OLD	*CR NEW	DINOFLAGELLATE ZONE (OR ASSOCIATION)	*CR OLD	*CR NEW	COMMENTS
SWC 10	2356.0	Indeterminate						
SWC 9	2369.5	Lower *M. diversus*	1	B2				*Proteacidites grandis* 3%
SWC 8	2376.0	Lower *M. diversus*	1	B2				*P. grandis* 6%
SWC 7	2382.0	Lower *M. diversus*	1	B2				*P. grandis* 2%
SWC 6	2384.0	Lower *M. diversus*	1	B2				Some contamination
SWC 5	2387.0	Lower *M. diversus*	1	B2				*P. grandis* 6%
SWC 4	2400.0	Indeterminate						Virtually barren
SWC 3	2404.0	Lower *M. diversus*	2	B3				
SWC 2	2410.0	Lower *M. diversus*	2	B3				Fungal spores & hyphae 42%
SWC 1	2413.0	Indeterminate						Virtually barren

*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, <u>Excellent Confidence</u>, assemblage with zone species of spore, pollen <u>and</u> microplankton.

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

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

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

4 CUTTINGS, <u>No Confidence</u>, 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

TABLE 4: Palynomorph Percentages for samples counted

RANGE CHARTS

RELINQUISHMENT LISTS

TABLE 2: Basic Sample Data Kingfish-8, Gippsland Basin.

SAMPLE TYPE	DEPTH (M)	LITHOLOGY	SAMPLE WT(g)	RESIDUE YIELD
SWC 32	2268.0	Calcisiltite	8.3	Very low
SWC 31	2271.0	Cal. glauc. siltst.	7.5	Very low
SWC 29	2277.0	Glauconitic siltst.	8.4	Moderate
SWC 28	2280.0	Glauconitic sst.	10.2	Low
SWC 27	2286.0	Glauconitic siltst.	10.4	Low
SWC 26	2290.0	Glauconitic siltst.	8.8	Low
SWC 25	2293.5	Glauconitic siltst.	11.2	Moderate
SWC 24	2295.0	Glauconitic siltst.	8.7	Low
SWC 23	2297.0	Glauconitic sst.	8.7	Moderate
SWC 22	2299.5	Glauconitic sst.	9.8	Low
SWC 21	2303.5	Glauconitic sst.	11.8	Very low
SWC 20	2305.5	Sandstone vf-f.	8.4	Very low
SWC 19	2306.0	Pyritic sst.	10.3	Low
SWC 18	2308.0	Glauconitic sst.	11.5	Moderate
SWC 17	2311.5	Glauconitic sst.	11.4	Low
SWC 16	2314.0	Glauconitic sst.	9.9	Low
SWC 15	2322.0	Sandstone f-vf.	7.4	Very low
SWC 14	2324.0	Sandstone f.	7.4	Very low
SWC 13	2325.5	Sst/clay partings	7.0	Low
SWC 12	2341.5	Sandstone f-med.	9.1	High
SWC 11	2345.0	Sandstone f-crs.	7.0	Low
SWC 10	2356.0	Sandstone f-vf.	6.6	Low
SWC 9	2369.5	Siltstone/claystone	6.9	High
SWC 8	2376.0	Sandstone/siltst.	5.2	High
SWC 7	2382.0	Mudstone	8.0	High
SWC 6	2384.0	Sst f-vf/Siltst.	8.6	High
SWC 5	2387.0	Siltstone	6.5	High
SWC 4	2400.0	Sandstone vf-f.	4.8	Very low
SWC 3	2404.0	Sandstone f.	8.6	Low
SWC 2	2410.0	Siltstone	7.0	High
SWC 1	2413.0	Sandstone vf-f.	8.1	Very low

TABLE 3: Basic Palynomorph Data Kingfish-8, Gippsland Basin

SAMPLE TYPE	DEPTH (M)	PALYNOMORPH CONCENTRATION	PALYNOMORPH PRESERVATION	NUMBERS S-P SPECIES*	MICROPLANKTON ABUNDANCE & NO. OF SPECIES*	
SWC 32	2268.0	Moderate	Poor-fair	14+	Abundant	8+
SWC 31	2271.0	Moderate	Poor	9+	Common	6+
SWC 29	2277.0	High	Fair	19+	Abundant	5+
SWC 28	2280.0	High	Good	35+	Abundant	17+
SWC 27	2286.0	Moderate	Poor-good	38+	Common	15+
SWC 26	2290.0	Low	Poor	16+	Common	11+
SWC 25	2293.5	Moderate	Poor-fair	23+	Abundant	9+
SWC 24	2295.0	Moderate	Fair	18+	Abundant	7+
SWC 23	2297.0	Moderate	Fair	25+	Common	12+
SWC 22	2299.5	Moderate	Poor	28+	Common	6+
SWC 21	2303.5	Very low	Poor	11+	Frequent	6+
SWC 20	2305.5	High	Fair	26+	Common	9+
SWC 19	2306.0	Low	Fair-good	19+	Low	6+
SWC 18	2308.0	Very low	Fair-good	14+	Common	3+
SWC 17	2311.5	Very low	Fair-good	10+	Common	8+
SWC 16	2314.0	Low	Fair	7+	Common	3+
SWC 15	2322.0	Very low	Poor	2+		NR
SWC 14	2324.0	Very low	Poor	5+	Rare	1
SWC 13	2325.5	High	Good	34+	Rare	4+
SWC 12	2341.5	Low	Poor-fair	16+	Rare	2+
SWC 11	2345.0	Moderate	Fair	31+	Rare	5+
SWC 10	2356.0	Very low	Fair	11+		
SWC 9	2369.5	High	Poor	18+	(Very rare)	(1)
SWC 8	2376.0	Moderate	Poor	23+		
SWC 7	2382.0	High	Good	29+		
SWC 6	2384.0	Moderate	Poor-fair	33+	(Rare)	(2+)
SWC 5	2387.0	Moderate	Poor	20+		
SWC 4	2400.0	Very low	Poor	4+		
SWC 3	2404.0	Low	Poor-fair	11+		
SWC 2	2410.0	Low	Poor	18+		
SWC 1	2413.0	Very low	Poor	7+	(Rare)	(1+)

Microplankton shown in (brackets) = contamination.

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

TABLE-4: PALYNOMORPHS PERCENTAGES FOR KINGFISH-8 Page 1 of 2

	2325.5 m SWC-13	2341.5m SWC -12	2345.0m SWC-11	2369.5m SWC-9	2376.0m SWC-8
TRILETE SPORES undiff.	0.5%	2.4%	1.8%	1.4%	1.0%
Baculatisporites spp.				2.1%	2.7%
Cyathidites spp.	6.7%	7.1%	8.3%	8.6%	2.7%
Gleicheniidites/Clavifera spp.	8.1%	4.8%	13.7%	8.6%	14.1%
Stereisporites spp.	1.9%	2.4%	0.6%	1.4%	2.0%
MONOLETE SPORES					
Laevigatosporites spp.	5.2%	4.8%	4.8%	0.7%	1.0%
TOTAL SPORES	22.4%	21.5%	29.2%	22.8%	23.5%
GYMNOSPERM POLLEN				1.4%	
Araucariacites australis	0.5%		2.4%	1.4%	2.0%
Dilwynites spp.	4.3%	2.4%	2.4%	9.2%	10.1%
Lygistepollenites balmei					
Lygistepollenites florinii	0.5%	2.4%	1.2%		1.0%
Phyllocladidites mawsonii (s.l.)			5.9%	0.7%	
Phyllocladus palaeogenicus					
Podocarpidites spp.	1.9%	2.4%	0.6%	0.7%	3.4%
Podosporites microsaccatus	2.4%	2.4%	1.8%	0.7%	0.7%
TOTAL GYMNOSPERM POLLEN	9.6%	9.6%	14.3%	14.1%	17.2%
ANGIOSPERM POLLEN undiff.	0.9%		1.2%	0.7%	0.7%
Basopollis spp.					
Casuarina (H. harrisii)	27.6%	14.3%	15.5%	14.3%	12.8%
Cupanieidites orthoteichus				0.7%	
Dicotetradites clavatus	3.8%		0.6%		
Ilexpollenites sp.	1.4%	2.4%	0.6%	1.4%	
Malvacipollis spp.	8.1%	4.8%	2.4%	12.1%	12.1%
Myrtaceidites spp.			0.6%	1.4%	
Nothofagidites "brassi"	2.4%		0.6%	0.7%	0.7%
Nothofagidites "fusca"	0.9%		1.8%	0.7%	
Proteacidites grandis	4.3%	4.8%	11.9%	5.0%	6.0%
Proteacidites spp.	12.9%	38.1%	18.5%	20.0%	20.1%
Tetracolporites spp.					1.0%
Tricolp(or)ates undiff.	4.8%	4.8%	3.0%	6.4%	4.7%
Triporopollenites spp. (small)					
TOTAL ANGIOSPERM POLLEN	67.1%	69.2%	56.7%	63.4%	58.1%
TOTAL SPORES-POLLEN COUNT	210	42	168	140	149
MAJOR CATEGORIES %					
Spores %	19.6%	16.7%	22.8%	13.3%	21.2%
Gymnosperm Pollen %	8.3%	7.4%	11.2%	7.9%	15.3%
Angiosperm Pollen %	59.6%	53.7%	44.2%	37.1%	51.2%
TOTAL SPORE-POLLEN %	87.5%	77.8%	78.2%	58.3%	87.7%
Fungal Spores and Hyphae %	9.6%	13.0%	14.9%	41.7%	12.4%
Microplankton %	2.9%	9.3%	7.0%		
TOTAL COUNT	240	54	215	240	170

TABLE-4: PALYNOMORPHS PERCENTAGES FOR KINGFISH-8

	2382.0m SWC-7	2384.0m SWC-6	2387.5m SWC-5	2410.0m SWC-2
TRILETE SPORES undiff.	2.7%	1.9%	2.1%	2.3%
Baculatisporites spp.	1.3%		2.8%	1.6%
Cyathidites spp.	2.2%	1.9%		3.9%
Gleicheniidites/Clavifera spp.	18.8%	14.9%	19.7%	17.2%
Stereisporites spp.	3.5%	2.8%	6.3%	5.5%
MONOLETE SPORES				
Laevigatosporites spp.	0.9%	2.3%	4.9%	1.6%
TOTAL SPORES	29.4%	23.8%	35.8%	32.1%
GYMNOSPERM POLLEN				
Araucariacites australis	0.4%	1.9%	1.4%	0.8%
Dilwynites spp.	3.1%	6.0%	6.3%	3.9%
Lygistepollenites balmei				0.8%
Lygistepollenites florinii		0.9%		
Phyllocladidites mawsonii (s.l.)	3.5%	2.3%	2.1%	2.3%
Phyllocladus palaeogenicus		0.9%		
Podocarpidites spp.	2.2%	3.3%	7.0%	4.7%
Podosporites microsaccatus	2.7%	1.9%	0.7%	0.8%
TOTAL GYMNOSPERM POLLEN	11.9%	17.2%	17.5%	13.3%
ANGIOSPERM POLLEN undiff.				0.8%
Basopollis spp.	0.4%	3.3%		0.8%
Casuarina (H. harrisii)	16.5%	5.1%	8.5%	4.7%
Cupanieidites orthoteichus		0.5%		
Dicotetradites clavatus		0.9%		
Ilexpollenites sp.	0.4%	1.9%		
Malvacipollis spp.	0.9%	2.8%		0.8%
Myrtaceidites spp.	0.4%			0.8%
Nothofagidites "brassi"	2.7%	1.4%	3.5%	
Nothofagidites "fusca"	1.8%	1.9%	2.8%	
Penninsulapollis gillii				
Periporopollenites spp.				
Proteacidites grandis	1.8%	1.9%	6.3%	2.3%
Proteacidites spp.	29.9%	34.4%	21.1%	39.1%
Tetracolporites spp.	0.5%	0.5%		1.6%
Tricolp(or)ates undiff.	3.1%	4.6%	4.2%	3.1%
Triporopollenites spp. (small)				
TOTAL ANGIOSPERM POLLEN	58.4%	59.2%	46.4%	54.0%
TOTAL SPORES-POLLEN COUNT	224	215	142	128
MAJOR CATEGORIES %				
Spores %	26.4%	21.3%	33.8%	19.2%
Gymnosperm Pollen %	10.8%	15.4%	16.6%	7.8%
Angiosperm Pollen %	52.4%	52.9%	43.7%	31.5%
TOTAL SPORE-POLLEN %	89.6%	89.6%	94.1%	58.5%
Fungal Spores and Hyphae %	10.4%	10.4%	6.0%	41.5%
Microplankton %				
TOTAL COUNT	250	240	151	219

RELINQUISHMENT LIST - PALYNOLOGICAL SLIDES

WELL NAME & NO: KINGFISH-8
PREPARED BY: A.D. PARTRIDGE
DATE: May 1992

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
SWC 32	2268.0	P195874	Kerogen slide sieved/unsieved fractions
SWC 32	2268.0	P195875	Oxidized slide 1
SWC 32	2268.0	P195876	Oxidized slide 2
SWC 31	2271.0	P195877	Kerogen slide sieved/unsieved fractions
SWC 31	2271.0	P195878	Oxidized slide 2
SWC 29	2277.0	P195879	Kerogen slide sieved/unsieved fractions
SWC 29	2277.0	P195880	Kerogen slide unsieved
SWC 29	2277.0	P195881	Oxidized slide 2
SWC 28	2280.0	P195882	Kerogen slide sieved/unsieved fractions
SWC 28	2280.0	P195883	Kerogen slide unsieved
SWC 28	2280.0	P195884	Oxidized slide 2
SWC 27	2286.0	P195885	Kerogen slide sieved/unsieved fractions
SWC 27	2286.0	P195886	Kerogen slide unsieved
SWC 27	2286.0	P195887	Oxidized slide 2
SWC 26	2290.0	P195888	Kerogen slide sieved/unsieved fractions
SWC 26	2290.0	P195889	Kerogen slide unsieved
SWC 26	2290.0	P195890	Oxidized slide 2
SWC 25	2293.5	P195891	Kerogen slide sieved/unsieved fractions
SWC 25	2293.5	P195892	Kerogen slide unsieved
SWC 25	2293.5	P195893	Oxidized slide 2
SWC 25	2293.5	P195894	Oxidized slide 3
SWC 24	2295.0	P195895	Kerogen slide sieved/unsieved fractions
SWC 24	2295.0	P195896	Kerogen slide unsieved
SWC 24	2295.0	P195897	Oxidized slide 2
SWC 23	2297.0	P195898	Kerogen slide sieved/unsieved fractions
SWC 23	2297.0	P195899	Kerogen slide unsieved
SWC 23	2297.0	P195900	Oxidized slide 2
SWC 23	2297.0	P195901	Oxidized slide 3
SWC 22	2299.5	P195902	Kerogen slide sieved/unsieved fractions
SWC 22	2299.5	P195903	Kerogen slide unsieved
SWC 22	2299.5	P195904	Oxidized slide 2
SWC 21	2303.5	P195905	Kerogen slide sieved/unsieved fractions
SWC 21	2303.5	P195906	Oxidized slide 2
SWC 21	2303.5	P195907	Oxidized slide 3
SWC 20	2305.5	P195908	Kerogen slide sieved/unsieved fractions
SWC 20	2305.5	P195909	Kerogen slide unsieved
SWC 20	2305.5	P195910	Oxidized slide 2
SWC 19	2306.0	P195911	Kerogen slide unsieved
SWC 19	2306.0	P195912	Oxidized slide 2
SWC 19	2306.0	P195913	Oxidized slide 3
SWC 18	2308.0	P195914	Kerogen slide unsieved
SWC 18	2308.0	P195915	Oxidized slide 2
SWC 18	2308.0	P195916	Oxidized slide 3
SWC 17	2311.5	P195917	Kerogen slide unsieved
SWC 17	2311.5	P195918	Oxidized slide 2
SWC 17	2311.5	P195919	Oxidized slide 3

RELINQUISHMENT LIST - PALYNOLOGICAL SLIDES

WELL NAME & NO: KINGFISH-8
PREPARED BY: A.D. PARTRIDGE
DATE: May 1992

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
SWC 16	2314.0	P195920	Kerogen slide unsieved
SWC 16	2314.0	P195921	Oxidized slide 2
SWC 16	2314.0	P195922	Oxidized slide 3
SWC 16	2314.0	P195923	Oxidized slide 4
SWC 15	2322.0	P195924	Kerogen slide sieved/unsieved fractions
SWC 15	2322.0	P195925	Oxidized slide 1
SWC 14	2324.0	P195926	Kerogen slide sieved/unsieved fractions
SWC 14	2324.0	P195927	Oxidized slide 2
SWC 13	2325.5	P195928	Kerogen slide sieved/unsieved fractions
SWC 13	2325.5	P195929	Kerogen slide unsieved
SWC 13	2325.5	P195930	Oxidized slide 2
SWC 12	2341.5	P195931	Kerogen slide sieved/unsieved fractions
SWC 12	2341.5	P195932	Kerogen slide unsieved
SWC 12	2341.5	P195933	Oxidized slide 2
SWC 12	2341.5	P195934	Oxidized slide 3
SWC 12	2341.5	P195935	Oxidized slide 4
SWC 11	2345.0	P195936	Kerogen slide sieved/unsieved fractions
SWC 11	2345.0	P195937	Kerogen slide unsieved
SWC 11	2345.0	P195938	Oxidized slide 2
SWC 11	2345.0	P195939	Oxidized slide 3A
SWC 11	2345.0	P195940	Oxidized slide 3B
SWC 11	2345.0	P195941	Oxidized slide 4
SWC 10	2356.0	P195942	Kerogen slide sieved/unsieved fractions
SWC 10	2356.0	P195943	Oxidized slide 2
SWC 10	2356.0	P195944	Oxidized slide 3
SWC 10	2356.0	P195945	Oxidized slide 4
SWC 9	2369.5	P195946	Kerogen slide sieved/unsieved fractions
SWC 9	2369.5	P195947	Kerogen slide unsieved
SWC 9	2369.5	P195948	Oxidized slide 2
SWC 9	2369.5	P195949	Oxidized slide 3
SWC 9	2369.5	P195950	Oxidized slide 4
SWC 8	2376.0	P195951	Kerogen slide sieved/unsieved fractions
SWC 8	2376.0	P195952	Kerogen slide unsieved
SWC 8	2376.0	P195953	Oxidized slide 2
SWC 8	2376.0	P195954	Oxidized slide 3
SWC 8	2376.0	P195955	Oxidized slide 4
SWC 7	2382.0	P195956	Kerogen slide sieved/unsieved fractions
SWC 7	2382.0	P195957	Kerogen slide unsieved
SWC 7	2382.0	P195958	Oxidized slide 2
SWC 7	2382.0	P195959	Oxidized slide 3
SWC 7	2382.0	P195960	Oxidized slide 4
SWC 6	2384.0	P195961	Kerogen slide sieved/unsieved fractions
SWC 6	2384.0	P195962	Kerogen slide unsieved
SWC 6	2384.0	P195963	Oxidized slide 2
SWC 6	2384.0	P195964	Oxidized slide 3
SWC 6	2384.0	P195965	Oxidized slide 4
SWC 5	2387.0	P195966	Kerogen slide sieved/unsieved fractions
SWC 5	2387.0	P195967	Kerogen slide unsieved
SWC 5	2387.0	P195968	Oxidized slide 2
SWC 5	2387.0	P195969	Oxidized slide 3
SWC 5	2387.0	P195970	Oxidized slide 4

RELINQUISHMENT LIST - PALYNOLOGICAL SLIDES

WELL NAME & NO: KINGFISH-8
PREPARED BY: A.D. PARTRIDGE
DATE: May 1992

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
SWC 4	2400.0	P195971	Kerogen slide sieved/unsieved fractions
SWC 4	2400.0	P195972	Oxidized slide 2
SWC 3	2404.0	P195973	Kerogen slide sieved/unsieved fractions
SWC 3	2404.0	P195974	Oxidized slide 2
SWC 3	2404.0	P195975	Oxidized slide 3
SWC 2	2410.0	P195976	Kerogen slide sieved/unsieved fractions
SWC 2	2410.0	P195977	Kerogen slide unsieved
SWC 2	2410.0	P195978	Oxidized slide 2
SWC 2	2410.0	P195979	Oxidized slide 3
SWC 2	2410.0	P195980	Oxidized slide 4
SWC 1	2413.0	P195981	Kerogen slide sieved/unsieved fractions
SWC 1	2413.0	P195982	Oxidized slide 2
SWC 1	2413.0	P195983	Oxidized slide 3

RELINQUISHMENT LIST - PALYNOLOGICAL RESIDUES

WELL NAME & NO: KINGFISH-8
PREPARED BY: A.D. PARTRIDGE
DATE: May 1992

SAMPLE TYPE	DEPTH (M)	DESCRIPTION
SWC 19	2306.0	Oxidized residue
SWC 18	2308.0	Oxidized residue
SWC 17	2311.5	Oxidized residue
SWC 16	2314.0	Oxidized residue
SWC 11	2345.0	Oxidized residue
SWC 9	2369.5	Kerogen residue
SWC 9	2369.5	Oxidized residue
SWC 8	2376.0	Oxidized residue
SWC 7	2382.0	Kerogen residue
SWC 7	2382.0	Oxidized residue
SWC 5	2387.0	Kerogen residue
SWC 5	2387.0	Oxidized residue
SWC 2	2410.0	Kerogen residue
SWC 2	2410.0	Oxidized residue

Appendix 4

APPENDIX 4

APPENDIX 4.

KINGFISH 8/8STI

A. LOG ANALYSIS REPORT

Kingfish 8
Quantiative Formation Evaluation

The Kingfish 8 exploration well has been evaluated for reservoir quality and hydrocarbon saturation. The Gurnard and top of Latrobe reservoirs were analysed from 2299m MDKB to 2388m MDKB. The petrophysical logs were acquired conventially on wireline . The wellbore deviation is 2 degrees SE and structural dip 1 to 2 degrees W/NW as determined from dipmetre mean square dip processing. Overall the hole conditions and log quality were excellent.

Summary

The M1.2 and M1.3 reservoirs are confirmed to contain hydrocarbons in Kingfish 8. All deeper Latrobe reservoirs are determined to be wet and are below the West Kingfish field oil-water contact at -2314m TVDSS. Figure 1 and Attachment 1 shows the processed log data and interpretations.

Two cores were cut using a bland mud and low invasion coring system. Core number 1 was from 2312.6m MDKB to 2331m MDKB. This core covered the main oil reservoirs in the M1.2 and M1.3. Core number 2 from 2331m MDKB to 2349.4m MDKB recovered the remaining oil leg in the M1.3 poorer quality reservoir. Measurable oil saturations from core analysis were observed as deep as 2346.7m MDKB. Although the core contained oil in the lower most sand from 2345.5m MDKB to 2346.7m MDKB, the log oil saturations average 4 percent which indicates this reservoir to be swept. A final formation evaluation report will be issued upon completion of the standard core analysis.

The hydrocarbon bearing M1.3 reservoir has been segmented into two discrete units. The better quality clean sandstone from 2325.7m MDKB to 2331.6m MDKB has an average effective porosity of 22 percent and average effective water saturation of 26 percent in 5.8 meters of net pay. Table 1 contains the reservoir summary. The poorer quality reservoir facies from 2331.7m MDKB to 2341m MDKB contains 9.1 metres of pay with an average effective porosity and water saturation of 16 percent and 59 percent. An oil sample was recovered from 2340.4m MDKB containing 35 litres of water, 7 litres of oil, and 0.25 cubic metres of gas. This oil recovery is significant in that it locates the lowest known oil in the M1.3 reservoir. Additionally, the reservoir quality in this zone was previously thought to be non-productive.

The M1.2 reservoir has also been segmented into two units. The better quality reservoir facies from 2315.7m MDKB to 2320.5m MDKB contains 3.9 metres net pay with an average effective porosity and water saturation of 20 percent and 47 percent respectively. A formation tester sample was taken at 2317.2m MDKB recovering 37 litres water and 7 litres of oil. A second 1 gallon sample at the same depth was sealed and taken for fluid analysis. The poorer quality siltier facies from 2320.6m MDKB to 2325.4m MDKB contains 2.5 metres net pay with a mean effective porosity of 14 percent and 60 percent effective water saturation. The poorer quality reservoir facies in both the M1.2 and M1.3 should not produce connate water upon production. The high water saturations result from finer grain size and increased clay content which traps a greater volume of connate water in the form of capillary bound water and clay absorbed water.

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\SGT-L\AHSA 34.8 metres
Suite #2	FMS-C\LDT-D\CNT-H\PCD-B\EPT-G\NGT-D\AMS-A 34.04 metres
Suite #3	DSI-A\GR\AMS
Suite #4	CSAT 6.4 metres
Suite #5	MDT\GR 22 metres
Suite #6	CST

COMPUTATION MEASUREMENTS

LLD	(laterlog deep)
LLS	(laterlog shallow)
MSFL	(micro-spherical)
DT	(transit time)
HNRH	(hi-res alpha processed bulk density)
HNPO	(hi-res alpha processed neutron porosity)
HDRH	(hi-res density correction)
CGR	(uranium free computed gamma ray)
POTA	(spectral gamma ray potassium)
URAN	(spectral gamma ray uranium)
THOR	(spectral gamma ray thorium)
CALI	(caliper)

Data processing consisted of environmentally correcting the LLD\LLS\MSFL measurements for borehole resistivity effects. The CNT HIRES Alpha processed thermal neutron porosity measurement is corrected for formation temperature effects. This correction increases the neutron porosity measurement approximately 3 porosity units at the 93 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 2 percent potassium in the drilling field. This correction removed the negative uranium values and prevents the computed gamma ray, CGR, from measuring greater than the total gamma ray count, SGR.

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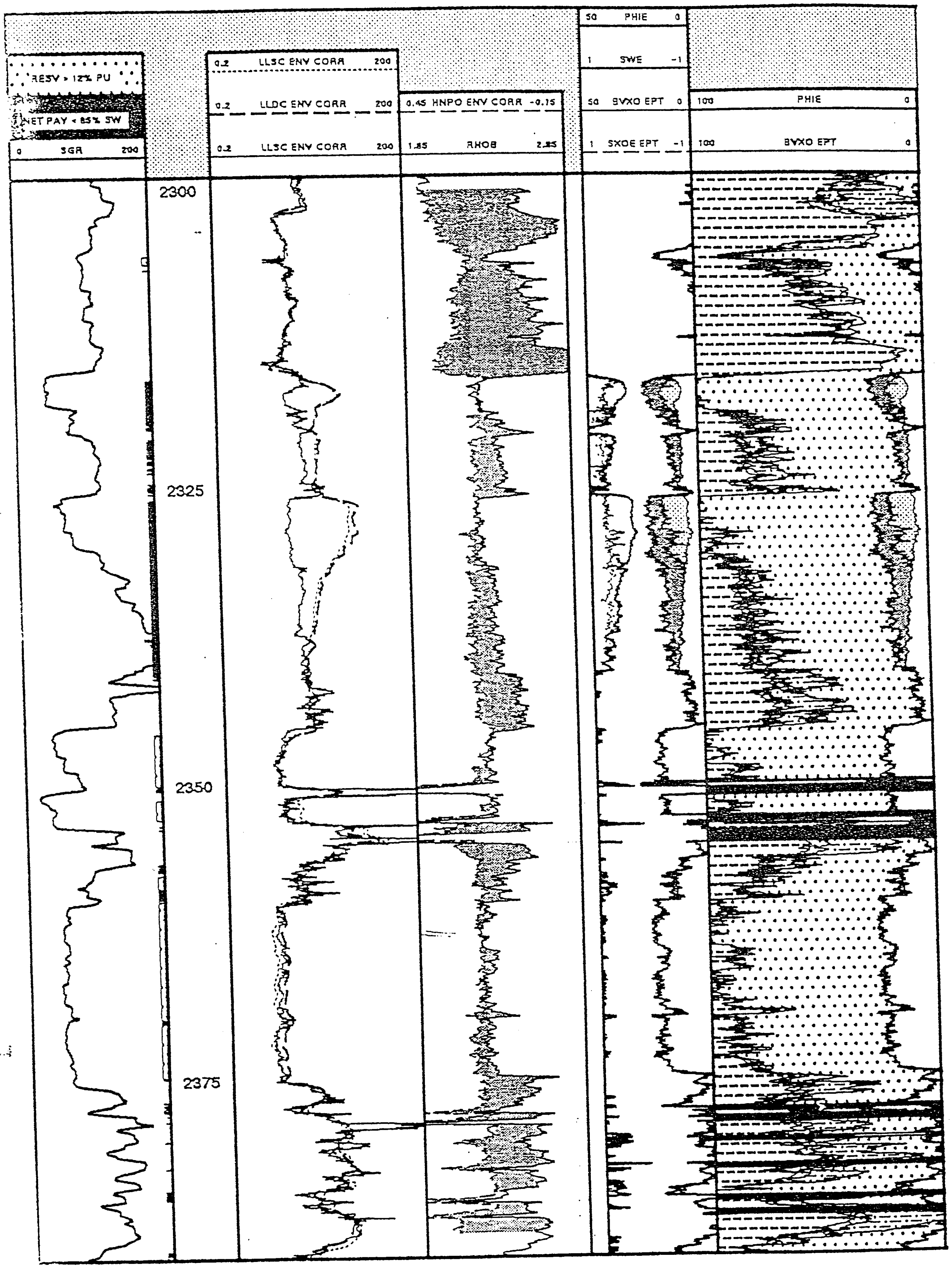

FIGURE 1 KINGFISH 8 PROCESSED AND INTERPRETATION RESULTS

KINGFISH 8 ST 1

QUANTIATIVE FORMATION EVALUATION

The Kingfish 8 ST1 exploration well has been evaluated for reservoir quality and hydrocarbon saturation. The Latrobe reservoir was analysed from 2545m MDKB to 2675m MDKB. The first run in the hole on wireline failed to reach bottom and sat down at 1776m MDKB. Subsequently the petrophysical logs were acquired using TLC on drillpipe. The wellbore deviation is 37 degrees through the Latrobe reservoirs in this sidetrack well.

Summary

P1.1 North Reservoir

The P1.1 North reservoir is thought to contain unswept oil from 2547.1 MDKB to 2549.7m MDKB. However, an underlying reservoir sand from 2550.4m MDKB to 2551.6m MDKB appears to be swept from production in the West Kingfish field. A sealing vertical permeability barrier at 2550m MDKB as identified with the MSFL log helps to support the compartmentalisation of fluids at this location. The average effective porosity in these reservoirs is 19% with an effective water saturation of 71 percent in the unswept reservoir and 83 percent in the swept reservoir. The lowermost porous reservoir from 2552.8m MDKB to 2559.7m MDKB is a silty argillaceous facies which could contain unswept oil in the P1.1 North reservoir. No formation test sampling was possible due to hole conditions therefore fluid content in this zone in uncertain. The average effective porosity is 17 percent and effective water saturation 77 percent.

It is felt that the petrophysical parameters are not well know for this reservoir and that the effective water saturation difference between a swept zone and virgin oil zone are likely to be greater than calculated.

M1.2 Reservoir

The M1.2 reservoir from 2559.8m MDKB to 2584.1m MDKB has been subdivided into 5 reservoir units based upon differences in stratigraphic facies and fluid content. The uppermost reservoir is a clean, highly porous sandstone which contains an oil-water contact at 2564.0m MDKB. The oil bearing interval from 2559.8m MDKB to 2563.9m MDKB is interpreted to contain swept oil that is at 24 percent residual oil saturation. The resistivity of this zone is 3 ohm-m which is comparable to that which is observed in known swept reservoirs in the West Kingfish field proper. The sand contains only moderate mud filtrate invasion up to 60cm based on invasion corrections. This invasion requires an increase of 15 to 20 percent to the deep laterolog measurement to determine true formation resistivity, however, the water saturation is only reduced by 5 percent with the correction. The average effective porosity of this swept interval is 24 percent and effective water saturation 76 percent.

All porous reservoir sands below the residual oil-water contact at 2564m MDKB are water saturated. Table 1 in Appendix A summarises the formation evaluation results.

Fluid Contacts

The lowest known oil in the Kingfish 8 M1.2 reservoir is at -2317m TVDSS and at 2550m MDKB in the Kingfish 8 ST 1. The original oil-water contact in this sidetrack is at 2564m MDKB and -2328.5m TVDSS, 11.5 metres below lowest known oil in Kingfish 8. Because the M1.2 reservoir in the sidetrack is swept, highest known water is located at 2560m MDKB or -2325m TVDSS. Based on the lowest known oil in Kingfish 8 at -2317m TVDSS and highest known water in the sidetrack at -2325m TVDSS, the present day oil-water contact in the M1.2 reservoir is located between these depths.

DATA ACQUISITION AND PROCESSING	
Suite #1	DLT-E/SRT-C/SDT-C/SGT-L/AMS-A Tool length 48.67m; TLC Drillpipe conveyed TLI=2000m BLI=2725m
Suite #2	DLT-E/SRT-C/SDT-C/SGT-L/AMS-A Tool length; 35.4 metres TLI=815m BLI=1746m Conventional Wireline

COMPUTATION MEASUREMENTS

LLD	(laterolog deep)
LLS	(laterolog shallow)
MSFL	(micro-spherical)
RHOB	(bulk density)
DRHO	(density correction)
NPOR	(neutron porosity)
SGR	(gamma ray)

Log data processing consisted of depth aligning the neutron porosity to the bulk density as the base measurement. The CNT NPOR thermal neutron porosity measurement is corrected for formation temperature effects. This correction improves the RHOB/NPOR interpretation by removing apparent gas crossover in the non-hydrocarbon bearing clean sand reservoirs. However, below 2556m MDKB there still remains 3 to 5 porosity units gas affect in a water bearing sandstone reservoir. Assuming the CNT-H is providing accurate measurements (while TLC logging) the presence of orthoclase feldspar, which is known to be present in the M1.5 reservoir, has a matrix density of 2.54 g/cc creating an artificial gas affect on the bulk density measurement. This mineralogic effect has been modelled successfully using an iterative least squares inversion forward modelling program. The presence of 20 percent bulk volume potassium feldspar matches the response of the bulk density and neutron porosity.

The most significant change to the final interpretation hinges on the error associated with the deep laterlog measurement when logging with drill pipe conveyed TLC. Schlumberger has confirmed that the deep laterolog measurement experiences a Groningen like effect due to the voltage reference on the mass insulated housing, "MIH". The effect is to increase deep laterolog measurements at low resistivities, 1 ohmm, and become less significant at higher resistivities, above 20 ohmm. The apparent formation water salinity is 14000 ppm computed using the deep laterolog, whereas the salinity is 30000 ppm from the shallow laterolog. Hence, the analysis was performed using the borehole corrected dual laterolog shallow measurement as being most representative of formation fluid content.

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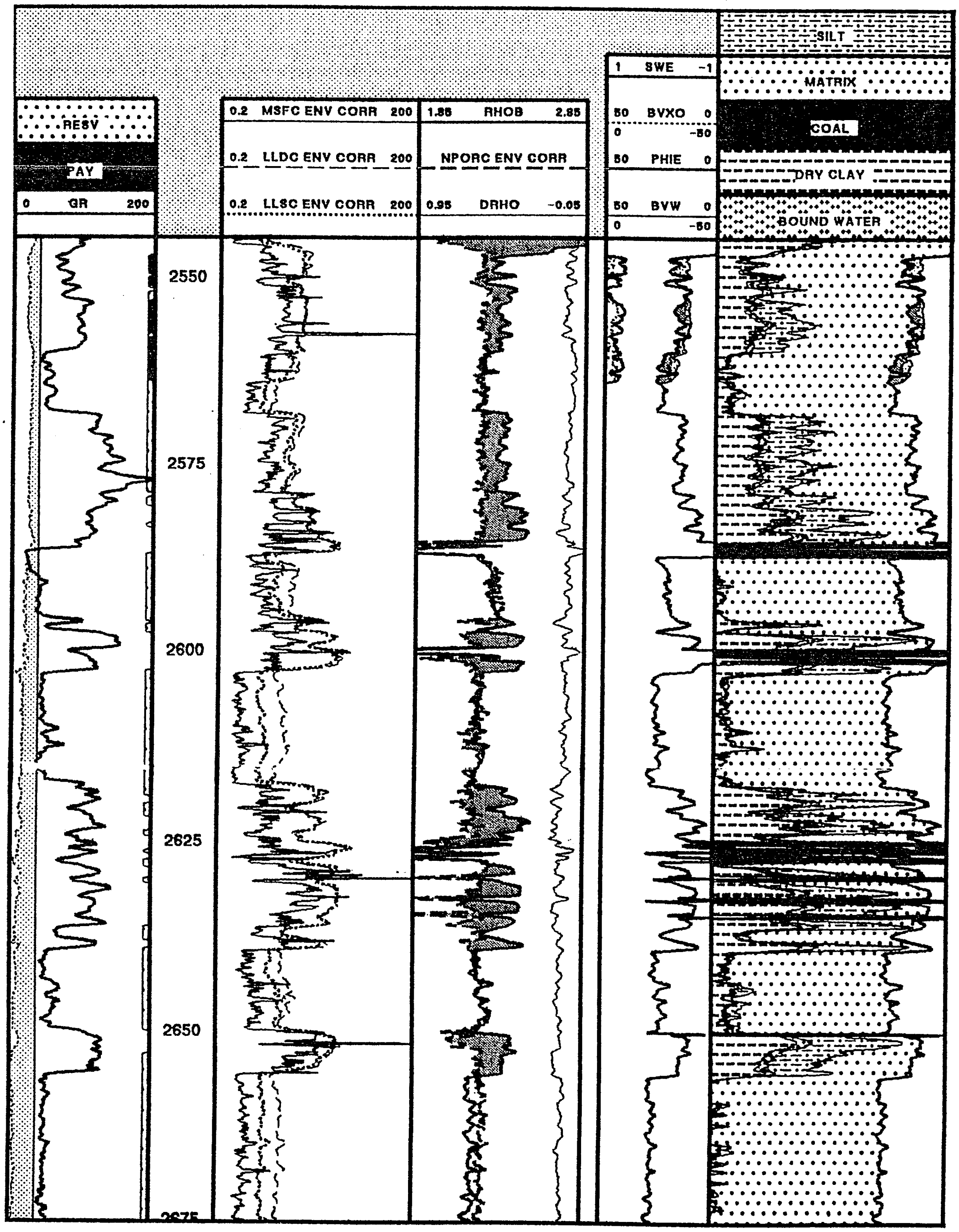

Figure 1 Kingfish 8 ST 1 - PROCESSED AND INTERPRETED FORMATION EVALUATION

APPENDIX 4

KINGFISH 8/8 STI

B. LOG ANALYSIS SUMMARY & PLOT

KINGFISH 8

ANALYSIS SUMMARY.

Net porosity cut-off..........: 0.120 volume per volume
Net water saturation cut-off..: 0.850 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	INTEGRATED HYDROCARBON PORE VOLUME	
MDKB	2305.3-2306.4	1.1	0.7	64 %	0.23	(0.089)	0.16	(0.017)	0.18	1.00	0.000	water
MDKB	2315.7-2320.5	4.8	3.9	81 %	0.07	(0.095)	0.20	(0.037)	0.23	0.47	0.431	oil
MDKB	2320.6-2325.4	4.8	2.5	53 %	0.27	(0.051)	0.14	(0.011)	0.14	0.60	0.143	oil
MDKB	2325.7-2331.6	5.9	5.8	98 %	0.06	(0.066)	0.22	(0.020)	0.23	0.26	0.954	oil
MDKB	2331.7-2341.0	9.3	9.1	98 %	0.27	(0.069)	0.16	(0.018)	0.16	0.59	0.595	oil
MDKB	2345.2-2347.0	1.8	1.6	86 %	0.02	(0.041)	0.20	(0.021)	0.21	0.96	0.000	swept
MDKB	2347.1-2349.9	2.8	2.8	100 %	0.10	(0.075)	0.20	(0.016)	0.20	1.00	0.000	water
MDKB	2351.2-2352.8	1.6	1.6	100 %	0.08	(0.064)	0.19	(0.014)	0.20	1.00	0.000	water
MDKB	2356.4-2360.0	3.6	3.0	82 %	0.26	(0.099)	0.16	(0.026)	0.17	1.00	0.000	water
MDKB	2360.1-2374.9	14.8	14.6	99 %	0.10	(0.082)	0.22	(0.028)	0.23	1.00	0.000	water

TABLE 1 KINGFISH 8 ANALYSIS SUMMARY

KINGFISH 8 ST ANALYSIS SUMMARY (cont'd)

Table 1 - Kingfish 8 ST1
Formation Evaluation Summary

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	INTEGRATED HYDROCARBON PORE VOLUME	
MDKB	2596.3-2597.5	1.2	1.1									
TVDSS	2335.3-2336.3	1.0	1.0	96 %	0.15	(0.108)	0.21	(0.044)	0.26	1.00	0.000	water
MDKB	2602.6-2617.5	14.9	14.9									
TVDSS	2340.7-2353.5	12.8	12.8	100 %	0.08	(0.059)	0.26	(0.020)	0.26	1.00	0.000	water
MDKB	2619.8-2622.1	2.3	1.8									
TVDSS	2355.5-2357.5	2.0	1.5	76 %	0.45	(0.098)	0.16	(0.027)	0.14	1.00	0.000	water
MDKB	2623.5-2624.4	0.9	0.8									
TVDSS	2358.7-2359.4	0.8	0.6	83 %	0.32	(0.067)	0.15	(0.015)	0.17	1.00	0.000	water
MDKB	2627.8-2628.8	1.0	0.7									
TVDSS	2362.3-2363.2	0.9	0.6	70 %	0.26	(0.152)	0.17	(0.038)	0.12	1.00	0.000	water
MDKB	2636.2-2638.3	2.1	2.0									
TVDSS	2369.5-2371.3	1.8	1.7	95 %	0.23	(0.118)	0.19	(0.035)	0.23	1.00	0.000	water
MDKB	2639.5-2649.9	10.4	10.4									
TVDSS	2372.3-2381.1	8.8	8.8	100 %	0.11	(0.036)	0.24	(0.021)	0.24	1.00	0.000	water
MDKB	2653.0-2655.5	2.5	2.5									
TVDSS	2383.7-2385.8	2.1	2.1	100 %	0.47	(0.034)	0.15	(0.005)	0.15	1.00	0.000	water
MDKB	2655.6-2675.0	19.4	19.4									
TVDSS	2385.9-2402.1	16.2	16.2	100 %	0.03	(0.035)	0.27	(0.016)	0.27	1.00	0.000	water

PE600833

This is an enclosure indicator page.
The enclosure PE600833 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600833 has the following characteristics:

ITEM_BARCODE =	PE600833
CONTAINER_BARCODE =	PE902048
NAME =	Quantitative Log
BASIN =	GIPPSLAND
PERMIT =	VIC/L8
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Quantitative Log(enclosure from appendix 4 of WCR vol.2) of Kingfish-8 & 8ST1
REMARKS =	TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED =	25/09/1992
DATE_RECEIVED =	13/10/1992
W_NO =	W1057
WELL_NAME =	Kingfish-8 & 8ST1
CONTRACTOR =	SOLAR
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE600834

This is an enclosure indicator page.
The enclosure PE600834 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600834 has the following characteristics:

ITEM_BARCODE =	PE600834
CONTAINER_BARCODE =	PE902048
NAME =	Quantitative Log
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Quantitative Log(enclosure from appendix 4 of WCR vol.2) of Kingfish-8 & 8ST1
REMARKS =	TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED =	29/09/1992
DATE_RECEIVED =	13/10/1992
W_NO =	W1057
WELL_NAME =	Kingfish-8 & 8ST1
CONTRACTOR =	SOLAR
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 4

KINGFISH 8/8 STI

C. LOG ANALYSIS LISTING

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

KINGFISH_8

DEPTH	PHIE	SWE	BVW	VSH	RESV	PAY	COAL
2304.00	0.00	1.000	0.00	0.796	0.0	0.0	0.0
2304.25	0.00	1.000	0.00	0.813	0.0	0.0	0.0
2304.50	0.00	1.000	0.00	0.776	0.0	0.0	0.0
2304.75	0.00	1.000	0.00	0.756	0.0	0.0	0.0
2305.00	1.41	1.000	1.41	0.767	0.0	0.0	0.0
2305.25	3.21	1.000	3.21	0.751	0.0	0.0	0.0
2305.50	11.48	1.000	11.48	0.423	0.0	0.0	0.0
2305.75	18.06	1.000	18.06	0.156	1.0	0.0	0.0
2306.00	18.90	1.000	18.90	0.090	1.0	0.0	0.0
2306.25	5.00	1.000	5.00	0.541	0.0	0.0	0.0
2306.50	0.00	1.000	0.00	0.600	0.0	0.0	0.0
2306.75	6.97	1.000	6.97	0.517	0.0	0.0	0.0
2307.00	8.87	1.000	8.87	0.406	0.0	0.0	0.0
2307.25	4.09	1.000	4.09	0.578	0.0	0.0	0.0
2307.50	4.28	1.000	4.28	0.554	0.0	0.0	0.0
2307.75	0.00	1.000	0.00	0.507	0.0	0.0	0.0
2308.00	1.01	1.000	0.54	0.541	0.0	0.0	0.0
2308.25	0.00	1.000	0.00	0.597	0.0	0.0	0.0
2308.50	0.00	1.000	0.00	0.601	0.0	0.0	0.0
2308.75	3.00	1.000	3.00	0.677	0.0	0.0	0.0
2309.00	1.02	1.000	1.02	0.652	0.0	0.0	0.0
2309.25	0.00	1.000	0.00	0.650	0.0	0.0	0.0
2309.50	0.00	1.000	0.00	0.717	0.0	0.0	0.0
2309.75	0.00	1.000	0.00	0.745	0.0	0.0	0.0
2310.00	0.00	1.000	0.00	0.633	0.0	0.0	0.0
2310.25	0.00	1.000	0.00	0.535	0.0	0.0	0.0
2310.50	0.00	1.000	0.00	0.584	0.0	0.0	0.0
2310.75	0.00	1.000	0.00	0.684	0.0	0.0	0.0
2311.00	0.00	1.000	0.00	0.709	0.0	0.0	0.0
2311.25	0.00	1.000	0.00	0.738	0.0	0.0	0.0
2311.50	0.00	1.000	0.00	0.751	0.0	0.0	0.0
2311.75	0.00	1.000	0.00	0.715	0.0	0.0	0.0
2312.00	0.00	1.000	0.00	0.675	0.0	0.0	0.0
2312.25	0.00	1.000	0.00	0.709	0.0	0.0	0.0
2312.50	0.00	1.000	0.00	0.692	0.0	0.0	0.0
2312.75	0.00	1.000	0.00	0.688	0.0	0.0	0.0
2313.00	0.00	1.000	0.00	0.740	0.0	0.0	0.0
2313.25	0.00	1.000	0.00	0.766	0.0	0.0	0.0
2313.50	0.00	1.000	0.00	0.807	0.0	0.0	0.0
2313.75	0.00	1.000	0.00	0.898	0.0	0.0	0.0
2314.00	0.00	1.000	0.00	0.915	0.0	0.0	0.0
2314.25	0.00	1.000	0.00	0.887	0.0	0.0	0.0
2314.50	0.00	1.000	0.00	0.887	0.0	0.0	0.0
2314.75	0.00	1.000	0.00	0.850	0.0	0.0	0.0
2315.00	0.00	1.000	0.00	0.816	0.0	0.0	0.0
2315.25	0.00	1.000	0.00	0.816	0.0	0.0	0.0
2315.50	0.00	1.000	0.00	0.741	0.0	0.0	0.0
2315.75	1.71	1.000	1.71	0.409	0.0	0.0	0.0
2316.00	14.88	0.740	10.98	0.147	1.0	1.0	0.0
2316.25	20.98	0.463	9.71	0.003	1.0	1.0	0.0
2316.50	24.25	0.346	8.39	0.000	1.0	1.0	0.0
2316.75	24.43	0.316	7.72	0.000	1.0	1.0	0.0
2317.00	23.61	0.294	6.94	0.000	1.0	1.0	0.0
2317.25	24.74	0.293	7.25	0.000	1.0	1.0	0.0
2317.50	22.68	0.341	7.73	0.000	1.0	1.0	0.0
2317.75	22.10	0.382	8.43	0.011	1.0	1.0	0.0
2318.00	23.21	0.448	10.40	0.000	1.0	1.0	0.0
2318.25	20.79	0.503	10.47	0.024	1.0	1.0	0.0
2318.50	20.82	0.499	10.39	0.032	1.0	1.0	0.0
2318.75	14.94	0.603	9.00	0.140	1.0	1.0	0.0
2319.00	14.88	0.587	8.74	0.225	1.0	1.0	0.0

2319.25	18.84	0.513	9.67	0.111	1.0	1.0	0.0
2319.50	14.22	0.632	8.99	0.222	1.0	1.0	0.0
2319.75	12.57	0.673	8.46	0.294	1.0	1.0	0.0
2320.00	11.30	0.750	8.47	0.393	0.0	0.0	0.0
2320.25	8.20	1.000	8.20	0.330	0.0	0.0	0.0
2320.50	1.46	1.000	1.27	0.416	0.0	0.0	0.0
2320.75	11.80	0.657	7.74	0.245	0.4	0.4	0.0
2321.00	16.17	0.524	8.46	0.163	1.0	1.0	0.0
2321.25	14.54	0.544	7.91	0.260	1.0	1.0	0.0
2321.50	14.19	0.534	7.58	0.305	1.0	1.0	0.0
2321.75	12.80	0.597	7.62	0.313	0.7	0.7	0.0
2322.00	13.49	0.547	7.37	0.314	1.0	1.0	0.0
2322.25	14.39	0.558	8.03	0.247	1.0	1.0	0.0
2322.50	11.81	0.632	7.46	0.350	0.3	0.3	0.0
2322.75	14.00	0.587	8.22	0.282	1.0	1.0	0.0
2323.00	10.74	0.680	7.30	0.403	0.0	0.0	0.0
2323.25	13.86	0.597	8.27	0.269	1.0	1.0	0.0
2323.50	11.55	0.691	7.98	0.340	0.0	0.0	0.0
2323.75	9.90	0.806	7.98	0.355	0.0	0.0	0.0
2324.00	10.78	0.717	7.73	0.381	0.0	0.0	0.0
2324.25	9.02	0.777	7.01	0.504	0.0	0.0	0.0
2324.50	12.11	0.691	8.37	0.358	1.0	1.0	0.0
2324.75	13.25	0.705	9.34	0.273	1.0	1.0	0.0
2325.00	13.79	0.682	9.40	0.238	1.0	1.0	0.0
2325.25	9.17	0.876	7.93	0.412	0.0	0.0	0.0
2325.50	3.48	1.000	3.48	0.594	0.0	0.0	0.0
2325.75	8.86	0.593	5.23	0.448	0.0	0.0	0.0
2326.00	22.85	0.306	7.00	0.000	1.0	1.0	0.0
2326.25	23.75	0.240	5.69	0.000	1.0	1.0	0.0
2326.50	21.85	0.226	4.95	0.022	1.0	1.0	0.0
2326.75	24.36	0.224	5.46	0.000	1.0	1.0	0.0
2327.00	24.01	0.235	5.63	0.000	1.0	1.0	0.0
2327.25	23.06	0.254	5.87	0.000	1.0	1.0	0.0
2327.50	25.31	0.231	5.84	0.000	1.0	1.0	0.0
2327.75	19.11	0.249	4.76	0.071	1.0	1.0	0.0
2328.00	22.91	0.235	5.37	0.018	1.0	1.0	0.0
2328.25	22.47	0.238	5.35	0.002	1.0	1.0	0.0
2328.50	23.90	0.223	5.32	0.000	1.0	1.0	0.0
2328.75	23.27	0.197	4.59	0.062	1.0	1.0	0.0
2329.00	21.76	0.186	4.04	0.132	1.0	1.0	0.0
2329.25	18.94	0.209	3.95	0.158	1.0	1.0	0.0
2329.50	22.31	0.236	5.27	0.048	1.0	1.0	0.0
2329.75	21.51	0.265	5.71	0.064	1.0	1.0	0.0
2330.00	21.83	0.262	5.72	0.085	1.0	1.0	0.0
2330.25	22.26	0.272	6.06	0.057	1.0	1.0	0.0
2330.50	22.10	0.291	6.42	0.049	1.0	1.0	0.0
2330.75	21.55	0.284	6.13	0.130	1.0	1.0	0.0
2331.00	22.74	0.307	6.98	0.074	1.0	1.0	0.0
2331.25	18.89	0.323	6.11	0.210	1.0	1.0	0.0
2331.50	17.05	0.366	6.24	0.227	1.0	1.0	0.0
2331.75	16.16	0.479	7.74	0.083	1.0	1.0	0.0
2332.00	18.61	0.405	7.53	0.129	1.0	1.0	0.0
2332.25	16.44	0.416	6.85	0.297	1.0	1.0	0.0
2332.50	19.34	0.422	8.17	0.182	1.0	1.0	0.0
2332.75	16.47	0.475	7.82	0.244	1.0	1.0	0.0
2333.00	15.21	0.486	7.40	0.300	1.0	1.0	0.0
2333.25	16.11	0.496	7.99	0.233	1.0	1.0	0.0
2333.50	16.31	0.523	8.53	0.213	1.0	1.0	0.0
2333.75	15.50	0.559	8.66	0.198	1.0	1.0	0.0
2334.00	15.64	0.537	8.40	0.243	1.0	1.0	0.0
2334.25	15.08	0.570	8.59	0.235	1.0	1.0	0.0
2334.50	14.25	0.573	8.16	0.294	1.0	1.0	0.0
2334.75	16.50	0.524	8.64	0.246	1.0	1.0	0.0

2335.00	16.02	0.539	8.63	0.276	1.0	1.0	0.0
2335.25	17.22	0.535	9.21	0.207	1.0	1.0	0.0
2335.50	16.74	0.517	8.66	0.269	1.0	1.0	0.0
2335.75	15.42	0.558	8.60	0.280	1.0	1.0	0.0
2336.00	18.52	0.491	9.09	0.215	1.0	1.0	0.0
2336.25	17.16	0.559	9.59	0.197	1.0	1.0	0.0
2336.50	15.64	0.568	8.87	0.324	1.0	1.0	0.0
2336.75	15.43	0.630	9.72	0.230	1.0	1.0	0.0
2337.00	18.13	0.531	9.62	0.218	1.0	1.0	0.0
2337.25	20.83	0.531	11.06	0.115	1.0	1.0	0.0
2337.50	12.80	0.730	9.35	0.427	1.0	1.0	0.0
2337.75	13.35	0.774	10.33	0.291	1.0	1.0	0.0
2338.00	14.53	0.656	9.53	0.277	1.0	1.0	0.0
2338.25	15.30	0.612	9.36	0.288	1.0	1.0	0.0
2338.50	18.31	0.591	10.83	0.196	1.0	1.0	0.0
2338.75	15.05	0.737	11.09	0.275	1.0	1.0	0.0
2339.00	13.11	0.805	10.55	0.382	1.0	1.0	0.0
2339.25	12.51	0.776	9.71	0.472	1.0	1.0	0.0
2339.50	16.03	0.655	10.48	0.338	1.0	1.0	0.0
2339.75	14.46	0.754	10.90	0.339	1.0	1.0	0.0
2340.00	13.38	0.826	11.05	0.333	1.0	1.0	0.0
2340.25	16.23	0.712	11.56	0.238	1.0	1.0	0.0
2340.50	16.59	0.665	11.03	0.279	1.0	1.0	0.0
2340.75	10.02	1.000	10.02	0.421	0.0	0.0	0.0
2341.00	6.71	1.000	6.71	0.473	0.0	0.0	0.0
2341.25	7.07	1.000	7.07	0.451	0.0	0.0	0.0
2341.50	5.66	1.000	5.66	0.525	0.0	0.0	0.0
2341.75	9.52	1.000	9.52	0.460	0.0	0.0	0.0
2342.00	5.77	1.000	5.77	0.560	0.0	0.0	0.0
2342.25	7.90	1.000	7.90	0.513	0.0	0.0	0.0
2342.50	7.05	1.000	7.05	0.424	0.0	0.0	0.0
2342.75	8.92	0.953	8.50	0.438	0.0	0.0	0.0
2343.00	7.93	1.000	7.93	0.464	0.0	0.0	0.0
2343.25	4.31	1.000	4.31	0.608	0.0	0.0	0.0
2343.50	3.50	1.000	3.50	0.595	0.0	0.0	0.0
2343.75	5.01	1.000	5.01	0.549	0.0	0.0	0.0
2344.00	4.75	1.000	4.75	0.546	0.0	0.0	0.0
2344.25	4.33	1.000	4.33	0.612	0.0	0.0	0.0
2344.50	6.00	1.000	6.00	0.535	0.0	0.0	0.0
2344.75	7.44	1.000	7.44	0.446	0.0	0.0	0.0
2345.00	4.90	1.000	4.90	0.472	0.0	0.0	0.0
2345.25	6.40	1.000	6.40	0.438	0.0	0.0	0.0
2345.50	13.36	0.965	12.87	0.176	0.7	0.0	0.0
2345.75	18.79	0.944	17.74	0.037	1.0	0.0	0.0
2346.00	20.12	0.983	19.77	0.007	1.0	0.0	0.0
2346.25	21.16	0.986	20.87	0.000	1.0	0.0	0.0
2346.50	22.81	0.918	20.93	0.000	1.0	0.0	0.0
2346.75	20.23	1.000	20.22	0.014	1.0	0.0	0.0
2347.00	20.15	1.000	20.15	0.010	1.0	0.0	0.0
2347.25	18.85	1.000	18.85	0.065	1.0	0.0	0.0
2347.50	21.43	1.000	21.43	0.082	1.0	0.0	0.0
2347.75	19.58	1.000	19.58	0.109	1.0	0.0	0.0
2348.00	21.43	1.000	21.43	0.040	1.0	0.0	0.0
2348.25	22.69	1.000	22.69	0.000	1.0	0.0	0.0
2348.50	21.64	1.000	21.64	0.028	1.0	0.0	0.0
2348.75	20.30	1.000	20.30	0.170	1.0	0.0	0.0
2349.00	17.94	1.000	17.94	0.213	1.0	0.0	0.0
2349.25	19.42	1.000	19.42	0.157	1.0	0.0	0.0
2349.50	22.55	1.000	22.55	0.077	1.0	0.0	0.0
2349.75	21.65	1.000	21.65	0.003	1.0	0.0	0.0
2350.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2350.25	30.00	0.550	16.49	0.000	1.0	1.0	0.0
2350.50	0.00	1.000	0.00	0.000	0.0	0.0	1.0

2350.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2351.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2351.25	19.92	1.000	19.92	0.000	1.0	0.0	0.0
2351.50	18.24	1.000	18.24	0.038	1.0	0.0	0.0
2351.75	19.86	1.000	19.86	0.030	1.0	0.0	0.0
2352.00	19.90	0.995	19.81	0.113	1.0	0.0	0.0
2352.25	17.67	1.000	17.67	0.183	1.0	0.0	0.0
2352.50	16.98	1.000	16.98	0.129	1.0	0.0	0.0
2352.75	20.44	0.992	20.26	0.000	1.0	0.0	0.0
2353.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2353.25	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2353.50	6.63	0.522	3.27	0.674	0.0	0.0	0.0
2353.75	1.55	1.000	1.55	0.959	0.0	0.0	0.0
2354.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2354.25	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2354.50	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2354.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2355.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2355.25	6.18	1.000	6.18	0.805	0.0	0.0	0.0
2355.50	4.03	1.000	4.03	0.824	0.0	0.0	0.0
2355.75	5.21	1.000	5.21	0.765	0.0	0.0	0.0
2356.00	1.92	1.000	1.92	0.793	0.0	0.0	0.0
2356.25	1.73	1.000	1.73	0.732	0.0	0.0	0.0
2356.50	12.59	0.945	11.88	0.344	0.7	0.0	0.0
2356.75	11.93	1.000	11.93	0.409	0.5	0.0	0.0
2357.00	13.23	1.000	13.23	0.362	1.0	0.0	0.0
2357.25	9.21	1.000	9.21	0.495	0.0	0.0	0.0
2357.50	12.77	1.000	12.77	0.400	1.0	0.0	0.0
2357.75	19.73	0.867	17.11	0.154	1.0	0.0	0.0
2358.00	21.69	0.864	18.72	0.098	1.0	0.0	0.0
2358.25	14.95	1.000	14.95	0.325	1.0	0.0	0.0
2358.50	14.65	0.978	14.33	0.322	1.0	0.0	0.0
2358.75	20.73	0.743	15.41	0.048	1.0	1.0	0.0
2359.00	14.21	0.937	13.31	0.248	1.0	0.0	0.0
2359.25	17.24	0.839	14.47	0.147	1.0	1.0	0.0
2359.50	16.46	0.856	14.08	0.231	1.0	0.2	0.0
2359.75	13.61	1.000	13.61	0.383	1.0	0.0	0.0
2360.00	21.96	0.983	21.54	0.062	1.0	0.0	0.0
2360.25	24.16	1.000	24.16	0.039	1.0	0.0	0.0
2360.50	24.78	0.974	24.14	0.044	1.0	0.0	0.0
2360.75	21.94	1.000	21.94	0.088	1.0	0.0	0.0
2361.00	22.16	1.000	22.16	0.050	1.0	0.0	0.0
2361.25	19.49	1.000	19.49	0.182	1.0	0.0	0.0
2361.50	23.18	0.954	22.10	0.098	1.0	0.0	0.0
2361.75	25.57	0.920	23.51	0.014	1.0	0.0	0.0
2362.00	26.58	0.926	24.61	0.000	1.0	0.0	0.0
2362.25	24.79	1.000	24.79	0.030	1.0	0.0	0.0
2362.50	26.09	0.969	25.29	0.000	1.0	0.0	0.0
2362.75	24.46	1.000	24.46	0.034	1.0	0.0	0.0
2363.00	22.76	1.000	22.76	0.050	1.0	0.0	0.0
2363.25	25.91	0.927	24.03	0.000	1.0	0.0	0.0
2363.50	25.91	0.920	23.84	0.000	1.0	0.0	0.0
2363.75	24.74	0.971	24.02	0.000	1.0	0.0	0.0
2364.00	20.75	1.000	20.75	0.102	1.0	0.0	0.0
2364.25	19.18	1.000	19.18	0.175	1.0	0.0	0.0
2364.50	19.65	1.000	19.65	0.104	1.0	0.0	0.0
2364.75	19.25	1.000	19.25	0.181	1.0	0.0	0.0
2365.00	19.14	1.000	19.14	0.140	1.0	0.0	0.0
2365.25	21.74	0.999	21.72	0.095	1.0	0.0	0.0
2365.50	18.95	1.000	18.95	0.153	1.0	0.0	0.0
2365.75	19.77	1.000	19.77	0.178	1.0	0.0	0.0
2366.00	22.19	1.000	22.19	0.048	1.0	0.0	0.0
2366.25	23.88	0.981	23.42	0.039	1.0	0.0	0.0

2366.50	22.77	1.000	22.77	0.095	1.0	0.0	0.0
2366.75	24.25	0.989	23.98	0.051	1.0	0.0	0.0
2367.00	24.59	0.965	23.73	0.058	1.0	0.0	0.0
2367.25	22.52	1.000	22.52	0.073	1.0	0.0	0.0
2367.50	21.53	1.000	21.53	0.056	1.0	0.0	0.0
2367.75	23.41	1.000	23.41	0.016	1.0	0.0	0.0
2368.00	23.66	0.999	23.64	0.047	1.0	0.0	0.0
2368.25	26.11	0.949	24.78	0.000	1.0	0.0	0.0
2368.50	20.60	1.000	20.60	0.137	1.0	0.0	0.0
2368.75	22.07	1.000	22.07	0.141	1.0	0.0	0.0
2369.00	22.12	1.000	22.12	0.060	1.0	0.0	0.0
2369.25	19.85	1.000	19.85	0.146	1.0	0.0	0.0
2369.50	14.94	1.000	14.94	0.347	1.0	0.0	0.0
2369.75	19.68	0.963	18.83	0.207	1.0	0.0	0.0
2370.00	23.48	0.892	20.95	0.074	1.0	0.0	0.0
2370.25	22.18	0.974	21.60	0.106	1.0	0.0	0.0
2370.50	20.98	1.000	20.98	0.142	1.0	0.0	0.0
2370.75	22.07	1.000	22.07	0.138	1.0	0.0	0.0
2371.00	20.99	1.000	20.99	0.142	1.0	0.0	0.0
2371.25	22.54	1.000	22.54	0.133	1.0	0.0	0.0
2371.50	19.56	1.000	19.56	0.262	1.0	0.0	0.0
2371.75	26.28	0.952	25.02	0.071	1.0	0.0	0.0
2372.00	23.40	1.000	23.40	0.098	1.0	0.0	0.0
2372.25	23.18	1.000	23.18	0.074	1.0	0.0	0.0
2372.50	23.69	0.978	23.18	0.111	1.0	0.0	0.0
2372.75	18.98	1.000	18.98	0.256	1.0	0.0	0.0
2373.00	24.29	0.941	22.83	0.122	1.0	0.0	0.0
2373.25	26.04	0.944	24.58	0.029	1.0	0.0	0.0
2373.50	22.97	0.999	22.96	0.129	1.0	0.0	0.0
2373.75	20.65	1.000	20.65	0.188	1.0	0.0	0.0
2374.00	20.64	1.000	20.64	0.168	1.0	0.0	0.0
2374.25	18.60	1.000	18.60	0.252	1.0	0.0	0.0
2374.50	19.27	1.000	19.27	0.224	1.0	0.0	0.0
2374.75	7.66	1.000	7.66	0.261	0.0	0.0	0.0
2375.00	3.96	1.000	3.96	0.438	0.0	0.0	0.0
2375.25	7.32	1.000	7.32	0.540	0.0	0.0	0.0
2375.50	9.02	1.000	9.02	0.423	0.0	0.0	0.0
2375.75	2.82	1.000	2.82	0.668	0.0	0.0	0.0
2376.00	2.42	1.000	2.42	0.682	0.0	0.0	0.0
2376.25	5.92	1.000	5.92	0.554	0.0	0.0	0.0
2376.50	5.77	1.000	5.77	0.627	0.0	0.0	0.0
2376.75	11.84	0.900	10.66	0.378	0.1	0.0	0.0
2377.00	13.98	0.993	13.89	0.326	1.0	0.0	0.0
2377.25	15.31	0.999	15.29	0.269	1.0	0.0	0.0
2377.50	14.97	0.881	12.04	0.000	0.6	0.6	0.4
2377.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2378.00	2.82	1.000	2.82	0.628	0.0	0.0	0.0
2378.25	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2378.50	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2378.75	5.34	0.956	4.94	0.000	0.0	0.0	0.4
2379.00	3.13	1.000	3.13	0.589	0.0	0.0	0.0
2379.25	1.81	1.000	1.81	0.679	0.0	0.0	0.0
2379.50	2.87	1.000	2.87	0.610	0.0	0.0	0.0
2379.75	5.48	0.916	5.02	0.461	0.0	0.0	0.0
2380.00	11.21	0.611	6.84	0.420	0.0	0.0	0.0
2380.25	6.60	0.741	4.83	0.591	0.0	0.0	0.0
2380.50	7.93	0.598	4.74	0.578	0.0	0.0	0.0
2380.75	8.12	0.790	6.41	0.446	0.0	0.0	0.0
2381.00	1.11	1.000	1.11	0.759	0.0	0.0	0.0
2381.25	1.67	1.000	1.67	0.720	0.0	0.0	0.0
2381.50	1.10	1.000	1.10	0.694	0.0	0.0	0.0
2381.75	3.00	0.985	2.94	0.662	0.0	0.0	0.0
2382.00	0.00	1.000	0.00	0.891	0.0	0.0	0.0

2382.25	3.08	1.000	3.08	0.743	0.0	0.0	0.0
2382.50	4.30	1.000	4.30	0.564	0.0	0.0	0.2
2382.75	4.13	0.804	3.32	0.567	0.0	0.0	0.0
2383.00	6.77	1.000	6.77	0.383	0.0	0.0	0.0
2383.25	4.32	1.000	4.32	0.562	0.0	0.0	0.0
2383.50	1.74	1.000	1.74	0.643	0.0	0.0	0.0
2383.75	3.71	0.981	3.62	0.574	0.0	0.0	0.0
2384.00	4.78	0.941	4.50	0.518	0.0	0.0	0.0
2384.25	14.14	0.734	10.37	0.182	1.0	1.0	0.0
2384.50	19.12	0.764	14.62	0.076	1.0	1.0	0.0
2384.75	19.07	0.849	16.19	0.000	1.0	0.8	0.0
2385.00	22.77	0.618	14.08	0.000	1.0	1.0	0.0
2385.25	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2385.50	5.45	1.000	5.45	0.646	0.0	0.0	0.0
2385.75	10.50	1.000	10.50	0.345	0.0	0.0	0.0
2386.00	8.52	0.891	7.59	0.430	0.0	0.0	0.0

KINGFISH_8_ST

DEPTH	PHIE	SWE	BVW	VSH	RESV	PAY	COAL
2545.00	0.00	1.000	0.00	0.561	0.0	0.0	0.0
2545.25	0.00	1.000	0.00	0.401	0.0	0.0	0.0
2545.50	0.00	1.000	0.00	0.378	0.0	0.0	0.0
2545.75	0.00	1.000	0.00	0.447	0.0	0.0	0.0
2546.00	0.00	1.000	0.00	0.385	0.0	0.0	0.0
2546.25	0.21	1.000	0.00	0.314	0.0	0.0	0.0
2546.50	0.11	1.000	0.00	0.272	0.0	0.0	0.0
2546.75	1.33	1.000	1.33	0.250	0.0	0.0	0.0
2547.00	7.52	1.000	7.52	0.214	0.0	0.0	0.0
2547.25	15.46	0.825	12.56	0.148	0.8	0.8	0.0
2547.50	20.54	0.655	13.44	0.126	1.0	1.0	0.0
2547.75	21.56	0.646	13.92	0.150	1.0	1.0	0.0
2548.00	16.98	0.754	12.73	0.219	1.0	1.0	0.0
2548.25	17.06	0.746	12.72	0.208	1.0	1.0	0.0
2548.50	18.93	0.653	12.36	0.157	1.0	1.0	0.0
2548.75	20.08	0.641	12.87	0.137	1.0	1.0	0.0
2549.00	21.03	0.678	14.26	0.142	1.0	1.0	0.0
2549.25	20.89	0.643	13.44	0.192	1.0	1.0	0.0
2549.50	18.10	0.706	12.65	0.249	1.0	1.0	0.0
2549.75	12.06	0.981	11.83	0.291	0.0	0.0	0.0
2550.00	14.24	0.877	12.42	0.280	0.8	0.8	0.0
2550.25	20.42	0.743	15.21	0.263	1.0	1.0	0.0
2550.50	23.66	0.807	19.09	0.211	1.0	1.0	0.0
2550.75	23.38	0.749	17.51	0.170	1.0	1.0	0.0
2551.00	19.91	0.731	14.51	0.202	1.0	1.0	0.0
2551.25	15.13	0.919	13.90	0.325	1.0	0.0	0.0
2551.50	12.33	0.996	12.28	0.363	0.3	0.0	0.0
2551.75	11.54	1.000	11.54	0.281	0.0	0.0	0.0
2552.00	13.44	0.968	13.00	0.237	0.9	0.0	0.0
2552.25	15.06	0.909	13.69	0.182	1.0	0.0	0.0
2552.50	14.58	0.925	13.48	0.173	1.0	0.0	0.0
2552.75	14.03	0.896	12.57	0.203	1.0	0.0	0.0
2553.00	14.21	0.874	12.43	0.279	1.0	0.0	0.0
2553.25	15.22	0.802	12.21	0.350	1.0	1.0	0.0
2553.50	16.35	0.731	11.93	0.331	1.0	1.0	0.0
2553.75	18.01	0.710	12.79	0.303	1.0	1.0	0.0
2554.00	17.97	0.695	12.49	0.320	1.0	1.0	0.0
2554.25	19.18	0.664	12.74	0.267	1.0	1.0	0.0
2554.50	19.13	0.646	12.37	0.287	1.0	1.0	0.0
2554.75	18.86	0.649	12.25	0.301	1.0	1.0	0.0
2555.00	17.32	0.715	12.37	0.335	1.0	1.0	0.0
2555.25	17.01	0.708	12.05	0.335	1.0	1.0	0.0
2555.50	17.45	0.695	12.12	0.361	1.0	1.0	0.0
2555.75	15.70	0.743	11.67	0.390	1.0	1.0	0.0
2556.00	14.14	0.830	11.73	0.400	1.0	0.8	0.0
2556.25	14.48	0.812	11.75	0.416	1.0	0.8	0.0
2556.50	16.79	0.752	12.63	0.409	1.0	1.0	0.0
2556.75	17.90	0.702	12.57	0.370	1.0	1.0	0.0
2557.00	18.67	0.702	13.11	0.302	1.0	1.0	0.0
2557.25	16.30	0.756	12.28	0.336	1.0	1.0	0.0
2557.50	13.67	0.862	11.79	0.364	1.0	0.0	0.0
2557.75	13.65	0.913	12.47	0.362	1.0	0.0	0.0
2558.00	16.86	0.858	14.44	0.310	1.0	0.3	0.0
2558.25	19.24	0.795	15.29	0.272	1.0	1.0	0.0
2558.50	18.42	0.825	15.18	0.287	1.0	1.0	0.0
2558.75	17.44	0.837	14.59	0.301	1.0	1.0	0.0
2559.00	18.01	0.811	14.59	0.288	1.0	1.0	0.0
2559.25	18.29	0.800	14.64	0.284	1.0	1.0	0.0
2559.50	17.27	0.800	13.81	0.283	1.0	1.0	0.0
2559.75	18.30	0.768	14.03	0.174	1.0	1.0	0.0
2560.00	22.77	0.724	16.48	0.098	1.0	1.0	0.0

2560.25	23.42	0.822	19.24	0.063	1.0	0.9	0.0
2560.50	23.33	0.838	19.54	0.056	1.0	0.7	0.0
2560.75	24.00	0.722	17.31	0.058	1.0	1.0	0.0
2561.00	24.03	0.702	16.86	0.052	1.0	1.0	0.0
2561.25	23.95	0.693	16.60	0.056	1.0	1.0	0.0
2561.50	25.64	0.686	17.60	0.075	1.0	1.0	0.0
2561.75	26.56	0.665	17.67	0.053	1.0	1.0	0.0
2562.00	26.12	0.699	18.24	0.003	1.0	1.0	0.0
2562.25	23.02	0.780	17.92	0.030	1.0	1.0	0.0
2562.50	18.72	0.924	17.26	0.093	1.0	0.2	0.0
2562.75	22.66	0.800	18.05	0.112	1.0	1.0	0.0
2563.00	26.57	0.715	18.99	0.102	1.0	1.0	0.0
2563.25	26.25	0.752	19.72	0.019	1.0	1.0	0.0
2563.50	26.80	0.773	20.73	0.032	1.0	1.0	0.0
2563.75	26.72	0.851	22.73	0.074	1.0	1.0	0.0
2564.00	25.07	0.993	24.87	0.072	1.0	0.0	0.0
2564.25	24.46	1.000	24.46	0.057	1.0	0.0	0.0
2564.50	23.90	1.000	23.90	0.072	1.0	0.0	0.0
2564.75	22.06	1.000	22.06	0.114	1.0	0.0	0.0
2565.00	22.82	1.000	22.82	0.128	1.0	0.0	0.0
2565.25	23.96	1.000	23.96	0.135	1.0	0.0	0.0
2565.50	23.71	1.000	23.71	0.123	1.0	0.0	0.0
2565.75	24.10	1.000	24.10	0.113	1.0	0.0	0.0
2566.00	23.75	1.000	23.75	0.091	1.0	0.0	0.0
2566.25	23.59	1.000	23.59	0.076	1.0	0.0	0.0
2566.50	22.95	1.000	22.95	0.073	1.0	0.0	0.0
2566.75	24.00	1.000	24.00	0.078	1.0	0.0	0.0
2567.00	24.99	1.000	24.99	0.068	1.0	0.0	0.0
2567.25	26.01	1.000	26.01	0.070	1.0	0.0	0.0
2567.50	26.47	1.000	26.47	0.062	1.0	0.0	0.0
2567.75	24.29	1.000	24.29	0.085	1.0	0.0	0.0
2568.00	18.32	1.000	18.32	0.170	1.0	0.0	0.0
2568.25	14.50	1.000	14.50	0.371	1.0	0.0	0.0
2568.50	15.19	1.000	15.19	0.379	1.0	0.0	0.0
2568.75	14.03	1.000	14.03	0.407	1.0	0.0	0.0
2569.00	12.89	1.000	12.89	0.447	1.0	0.0	0.0
2569.25	13.69	1.000	13.69	0.428	1.0	0.0	0.0
2569.50	16.21	1.000	16.21	0.351	1.0	0.0	0.0
2569.75	16.53	1.000	16.53	0.302	1.0	0.0	0.0
2570.00	15.37	1.000	15.37	0.370	1.0	0.0	0.0
2570.25	13.46	1.000	13.46	0.498	1.0	0.0	0.0
2570.50	14.44	1.000	14.44	0.447	1.0	0.0	0.0
2570.75	15.82	1.000	15.82	0.340	1.0	0.0	0.0
2571.00	14.81	1.000	14.81	0.348	1.0	0.0	0.0
2571.25	15.25	1.000	15.25	0.399	1.0	0.0	0.0
2571.50	16.88	1.000	16.88	0.419	1.0	0.0	0.0
2571.75	16.86	1.000	16.86	0.412	1.0	0.0	0.0
2572.00	17.42	1.000	17.42	0.397	1.0	0.0	0.0
2572.25	17.39	1.000	17.39	0.335	1.0	0.0	0.0
2572.50	15.24	1.000	15.24	0.377	1.0	0.0	0.0
2572.75	14.47	1.000	14.47	0.451	1.0	0.0	0.0
2573.00	16.15	1.000	16.15	0.407	1.0	0.0	0.0
2573.25	17.15	1.000	17.15	0.353	1.0	0.0	0.0
2573.50	17.34	1.000	17.34	0.314	1.0	0.0	0.0
2573.75	18.27	1.000	18.27	0.281	1.0	0.0	0.0
2574.00	19.13	1.000	19.13	0.317	1.0	0.0	0.0
2574.25	18.62	1.000	18.62	0.388	1.0	0.0	0.0
2574.50	17.47	1.000	17.47	0.385	1.0	0.0	0.0
2574.75	14.60	1.000	14.60	0.461	1.0	0.0	0.0
2575.00	12.89	1.000	12.89	0.503	1.0	0.0	0.0
2575.25	14.09	1.000	14.09	0.413	1.0	0.0	0.0
2575.50	14.24	1.000	14.24	0.438	1.0	0.0	0.0
2575.75	15.04	1.000	15.04	0.395	1.0	0.0	0.0

2576.00	14.77	1.000	14.77	0.363	1.0	0.0	0.0
2576.25	15.37	1.000	15.37	0.316	1.0	0.0	0.0
2576.50	15.75	1.000	15.75	0.334	1.0	0.0	0.0
2576.75	14.66	1.000	14.66	0.442	1.0	0.0	0.0
2577.00	15.75	1.000	15.75	0.419	1.0	0.0	0.0
2577.25	17.11	1.000	17.11	0.364	1.0	0.0	0.0
2577.50	18.69	1.000	18.69	0.341	1.0	0.0	0.0
2577.75	18.84	1.000	18.84	0.324	1.0	0.0	0.0
2578.00	18.78	1.000	18.78	0.294	1.0	0.0	0.0
2578.25	18.69	1.000	18.69	0.324	1.0	0.0	0.0
2578.50	18.64	1.000	18.64	0.297	1.0	0.0	0.0
2578.75	14.96	1.000	14.96	0.371	1.0	0.0	0.0
2579.00	9.88	1.000	9.88	0.511	0.0	0.0	0.0
2579.25	11.02	1.000	11.02	0.476	0.0	0.0	0.0
2579.50	12.57	1.000	12.57	0.458	0.4	0.0	0.0
2579.75	13.76	1.000	13.76	0.464	1.0	0.0	0.0
2580.00	15.90	1.000	15.90	0.390	1.0	0.0	0.0
2580.25	16.24	1.000	16.24	0.346	1.0	0.0	0.0
2580.50	16.23	1.000	16.23	0.392	1.0	0.0	0.0
2580.75	11.92	1.000	11.92	0.545	0.4	0.0	0.0
2581.00	8.15	1.000	8.15	0.663	0.0	0.0	0.0
2581.25	8.16	1.000	8.16	0.662	0.0	0.0	0.0
2581.50	6.54	1.000	6.54	0.614	0.0	0.0	0.0
2581.75	6.43	1.000	6.43	0.541	0.0	0.0	0.0
2582.00	8.11	1.000	8.11	0.562	0.0	0.0	0.0
2582.25	9.03	1.000	9.03	0.526	0.0	0.0	0.0
2582.50	8.56	1.000	8.56	0.608	0.0	0.0	0.0
2582.75	7.12	1.000	7.12	0.650	0.0	0.0	0.0
2583.00	10.65	1.000	10.65	0.530	0.3	0.0	0.0
2583.25	13.05	1.000	13.05	0.477	1.0	0.0	0.0
2583.50	14.03	1.000	14.03	0.409	1.0	0.0	0.0
2583.75	10.31	1.000	10.31	0.498	0.0	0.0	0.0
2584.00	6.21	1.000	6.21	0.648	0.0	0.0	0.0
2584.25	5.59	1.000	5.59	0.729	0.0	0.0	0.0
2584.50	6.51	1.000	6.51	0.684	0.0	0.0	0.0
2584.75	6.53	1.000	6.53	0.617	0.0	0.0	0.0
2585.00	7.81	1.000	7.81	0.594	0.0	0.0	0.0
2585.25	0.00	1.000	0.00	0.436	0.0	0.0	0.0
2585.50	0.00	1.000	0.00	0.000	0.0	0.0	0.7
2585.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2586.00	0.00	1.000	0.00	0.396	0.0	0.0	0.0
2586.25	0.00	1.000	0.00	0.000	0.0	0.0	0.7
2586.50	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2586.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2587.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2587.25	5.89	1.000	5.89	0.000	1.0	0.0	0.8
2587.50	25.81	1.000	25.81	0.002	1.0	0.0	0.0
2587.75	26.35	1.000	26.35	0.004	1.0	0.0	0.0
2588.00	25.50	1.000	25.50	0.005	1.0	0.0	0.0
2588.25	23.99	1.000	23.99	0.006	1.0	0.0	0.0
2588.50	23.09	1.000	23.09	0.007	1.0	0.0	0.0
2588.75	22.72	1.000	22.72	0.008	1.0	0.0	0.0
2589.00	21.84	1.000	21.84	0.011	1.0	0.0	0.0
2589.25	21.36	1.000	21.36	0.004	1.0	0.0	0.0
2589.50	21.06	1.000	21.06	0.010	1.0	0.0	0.0
2589.75	20.85	1.000	20.85	0.020	1.0	0.0	0.0
2590.00	21.21	1.000	21.21	0.017	1.0	0.0	0.0
2590.25	20.58	1.000	20.58	0.036	1.0	0.0	0.0
2590.50	21.03	1.000	21.03	0.020	1.0	0.0	0.0
2590.75	22.85	1.000	22.85	0.006	1.0	0.0	0.0
2591.00	21.84	1.000	21.84	0.074	1.0	0.0	0.0
2591.25	21.78	1.000	21.78	0.049	1.0	0.0	0.0
2591.50	21.71	1.000	21.71	0.000	1.0	0.0	0.0

2591.75	19.94	1.000	19.94	0.021	1.0	0.0	0.0
2592.00	20.74	1.000	20.74	0.036	1.0	0.0	0.0
2592.25	23.15	1.000	23.15	0.049	1.0	0.0	0.0
2592.50	22.95	1.000	22.95	0.048	1.0	0.0	0.0
2592.75	21.36	1.000	21.36	0.045	1.0	0.0	0.0
2593.00	20.37	1.000	20.37	0.039	1.0	0.0	0.0
2593.25	21.65	1.000	21.65	0.037	1.0	0.0	0.0
2593.50	21.00	1.000	21.00	0.008	1.0	0.0	0.0
2593.75	20.13	1.000	20.13	0.005	1.0	0.0	0.0
2594.00	21.06	1.000	21.06	0.004	1.0	0.0	0.0
2594.25	20.40	1.000	20.40	0.011	1.0	0.0	0.0
2594.50	20.04	1.000	20.04	0.033	1.0	0.0	0.0
2594.75	19.71	1.000	19.71	0.034	1.0	0.0	0.0
2595.00	19.84	1.000	19.84	0.038	1.0	0.0	0.0
2595.25	18.80	1.000	18.80	0.053	1.0	0.0	0.0
2595.50	17.69	1.000	17.69	0.066	1.0	0.0	0.0
2595.75	16.16	1.000	16.16	0.133	1.0	0.0	0.0
2596.00	12.74	1.000	12.74	0.369	1.0	0.0	0.0
2596.25	11.36	1.000	11.36	0.438	0.0	0.0	0.0
2596.50	14.13	1.000	14.13	0.200	0.9	0.0	0.0
2596.75	18.79	1.000	18.79	0.086	1.0	0.0	0.0
2597.00	24.08	1.000	24.08	0.059	1.0	0.0	0.0
2597.25	25.93	1.000	25.93	0.099	1.0	0.0	0.0
2597.50	18.82	1.000	18.82	0.425	1.0	0.0	0.0
2597.75	11.02	1.000	11.02	0.709	0.0	0.0	0.0
2598.00	7.73	1.000	7.73	0.841	0.0	0.0	0.0
2598.25	6.68	1.000	6.68	0.841	0.0	0.0	0.0
2598.50	7.03	1.000	7.03	0.780	0.0	0.0	0.0
2598.75	7.81	1.000	7.81	0.708	0.0	0.0	0.0
2599.00	9.54	1.000	9.54	0.591	0.0	0.0	0.0
2599.25	10.06	1.000	10.06	0.594	0.0	0.0	0.0
2599.50	5.86	1.000	5.86	0.217	0.0	0.0	0.6
2599.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2600.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2600.25	0.00	1.000	0.00	0.000	0.0	0.0	0.5
2600.50	0.00	1.000	0.00	0.369	0.0	0.0	0.2
2600.75	0.00	1.000	0.00	0.546	0.0	0.0	1.0
2601.00	0.00	1.000	0.00	0.216	0.0	0.0	1.0
2601.25	0.54	1.000	0.54	0.606	0.0	0.0	0.9
2601.50	7.12	1.000	7.12	0.685	0.0	0.0	0.0
2601.75	7.83	1.000	7.83	0.749	0.0	0.0	0.0
2602.00	8.64	1.000	8.64	0.678	0.0	0.0	0.0
2602.25	9.37	1.000	9.37	0.688	0.0	0.0	0.0
2602.50	12.24	1.000	12.24	0.635	0.3	0.0	0.0
2602.75	21.98	1.000	21.98	0.296	1.0	0.0	0.0
2603.00	24.92	1.000	24.92	0.131	1.0	0.0	0.0
2603.25	26.07	1.000	26.07	0.062	1.0	0.0	0.0
2603.50	27.18	1.000	27.18	0.058	1.0	0.0	0.0
2603.75	27.70	1.000	27.70	0.060	1.0	0.0	0.0
2604.00	27.96	1.000	27.96	0.059	1.0	0.0	0.0
2604.25	25.84	1.000	25.84	0.062	1.0	0.0	0.0
2604.50	25.29	1.000	25.29	0.060	1.0	0.0	0.0
2604.75	24.40	1.000	24.40	0.057	1.0	0.0	0.0
2605.00	25.02	1.000	25.02	0.061	1.0	0.0	0.0
2605.25	25.74	1.000	25.74	0.064	1.0	0.0	0.0
2605.50	26.24	1.000	26.24	0.056	1.0	0.0	0.0
2605.75	26.54	1.000	26.54	0.055	1.0	0.0	0.0
2606.00	27.13	1.000	27.13	0.038	1.0	0.0	0.0
2606.25	27.80	1.000	27.80	0.045	1.0	0.0	0.0
2606.50	27.92	1.000	27.92	0.066	1.0	0.0	0.0
2606.75	26.90	1.000	26.90	0.067	1.0	0.0	0.0
2607.00	25.07	1.000	25.07	0.059	1.0	0.0	0.0
2607.25	25.60	1.000	25.60	0.052	1.0	0.0	0.0

2607.50	26.15	1.000	26.15	0.067	1.0	0.0	0.0
2607.75	26.63	1.000	26.63	0.057	1.0	0.0	0.0
2608.00	26.37	1.000	26.37	0.002	1.0	0.0	0.0
2608.25	25.96	1.000	25.96	0.065	1.0	0.0	0.0
2608.50	26.99	1.000	26.99	0.070	1.0	0.0	0.0
2608.75	27.55	1.000	27.55	0.046	1.0	0.0	0.0
2609.00	27.16	1.000	27.16	0.049	1.0	0.0	0.0
2609.25	25.62	1.000	25.62	0.061	1.0	0.0	0.0
2609.50	25.02	1.000	25.02	0.069	1.0	0.0	0.0
2609.75	26.69	1.000	26.69	0.081	1.0	0.0	0.0
2610.00	25.34	1.000	25.34	0.124	1.0	0.0	0.0
2610.25	22.90	1.000	22.90	0.168	1.0	0.0	0.0
2610.50	22.38	1.000	22.38	0.136	1.0	0.0	0.0
2610.75	25.99	1.000	25.99	0.078	1.0	0.0	0.0
2611.00	26.55	1.000	26.55	0.058	1.0	0.0	0.0
2611.25	25.74	1.000	25.74	0.072	1.0	0.0	0.0
2611.50	25.52	1.000	25.52	0.094	1.0	0.0	0.0
2611.75	26.79	1.000	26.79	0.097	1.0	0.0	0.0
2612.00	25.49	1.000	25.49	0.097	1.0	0.0	0.0
2612.25	21.22	1.000	21.22	0.186	1.0	0.0	0.0
2612.50	21.14	1.000	21.14	0.193	1.0	0.0	0.0
2612.75	23.39	1.000	23.39	0.089	1.0	0.0	0.0
2613.00	24.49	1.000	24.49	0.067	1.0	0.0	0.0
2613.25	25.07	1.000	25.07	0.068	1.0	0.0	0.0
2613.50	25.90	1.000	25.90	0.046	1.0	0.0	0.0
2613.75	25.74	1.000	25.74	0.051	1.0	0.0	0.0
2614.00	24.95	1.000	24.95	0.060	1.0	0.0	0.0
2614.25	24.04	1.000	24.04	0.047	1.0	0.0	0.0
2614.50	24.30	1.000	24.30	0.036	1.0	0.0	0.0
2614.75	24.26	1.000	24.26	0.037	1.0	0.0	0.0
2615.00	24.69	1.000	24.69	0.028	1.0	0.0	0.0
2615.25	27.61	1.000	27.61	0.001	1.0	0.0	0.0
2615.50	30.00	1.000	30.00	0.000	1.0	0.0	0.0
2615.75	30.00	1.000	30.00	0.000	1.0	0.0	0.0
2616.00	29.64	1.000	29.64	0.045	1.0	0.0	0.0
2616.25	28.51	1.000	28.51	0.066	1.0	0.0	0.0
2616.50	27.05	1.000	27.05	0.082	1.0	0.0	0.0
2616.75	27.46	1.000	27.46	0.069	1.0	0.0	0.0
2617.00	28.50	1.000	28.50	0.108	1.0	0.0	0.0
2617.25	28.60	1.000	28.60	0.093	1.0	0.0	0.0
2617.50	23.06	1.000	23.06	0.267	1.0	0.0	0.0
2617.75	17.00	1.000	17.00	0.400	1.0	0.0	0.0
2618.00	13.30	1.000	13.30	0.366	1.0	0.0	0.0
2618.25	13.86	1.000	13.86	0.578	1.0	0.0	0.0
2618.50	15.07	1.000	15.07	0.546	1.0	0.0	0.0
2618.75	15.02	1.000	15.02	0.519	1.0	0.0	0.0
2619.00	11.61	1.000	11.61	0.622	0.4	0.0	0.0
2619.25	9.06	1.000	9.06	0.813	0.0	0.0	0.0
2619.50	8.41	1.000	8.41	0.859	0.0	0.0	0.0
2619.75	9.02	1.000	9.02	0.738	0.0	0.0	0.0
2620.00	12.75	1.000	12.75	0.574	1.0	0.0	0.0
2620.25	15.54	1.000	15.54	0.463	1.0	0.0	0.0
2620.50	20.70	1.000	20.70	0.313	1.0	0.0	0.0
2620.75	18.78	1.000	18.78	0.265	1.0	0.0	0.0
2621.00	14.08	1.000	14.08	0.455	1.0	0.0	0.0
2621.25	14.03	1.000	14.03	0.544	1.0	0.0	0.0
2621.50	14.71	1.000	14.71	0.491	1.0	0.0	0.0
2621.75	10.54	1.000	10.54	0.640	0.4	0.0	0.0
2622.00	6.11	1.000	6.11	0.693	0.0	0.0	0.0
2622.25	3.76	1.000	3.76	0.717	0.0	0.0	0.0
2622.50	4.18	1.000	4.18	0.754	0.0	0.0	0.0
2622.75	8.20	1.000	8.20	0.660	0.0	0.0	0.0
2623.00	8.23	1.000	8.23	0.722	0.0	0.0	0.0

2623.25	6.35	1.000	6.35	0.887	0.0	0.0	0.0
2623.50	9.84	1.000	9.84	0.572	0.1	0.0	0.0
2623.75	15.74	1.000	15.74	0.366	1.0	0.0	0.0
2624.00	16.20	1.000	16.20	0.281	1.0	0.0	0.0
2624.25	13.04	1.000	13.04	0.240	1.0	0.0	0.0
2624.50	11.01	1.000	11.01	0.378	0.0	0.0	0.0
2624.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2625.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2625.25	12.40	1.000	12.40	0.682	0.0	0.0	0.0
2625.50	0.00	1.000	0.00	0.667	0.0	0.0	0.2
2625.75	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2626.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2626.25	30.00	1.000	30.00	0.003	1.0	0.0	0.0
2626.50	18.86	1.000	18.86	0.502	1.0	0.0	0.0
2626.75	11.10	1.000	11.10	0.432	0.0	0.0	0.4
2627.00	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2627.25	0.00	1.000	0.00	0.000	0.0	0.0	1.0
2627.50	23.27	1.000	23.27	0.161	1.0	0.0	0.0
2627.75	23.70	1.000	23.70	0.002	1.0	0.0	0.0
2628.00	18.99	1.000	18.99	0.166	1.0	0.0	0.0
2628.25	14.16	1.000	14.16	0.377	1.0	0.0	0.0
2628.50	11.75	1.000	11.75	0.467	0.1	0.0	0.0
2628.75	10.74	1.000	10.74	0.537	0.0	0.0	0.0
2629.00	10.08	1.000	10.08	0.662	0.0	0.0	0.0
2629.25	12.88	1.000	12.88	0.756	0.0	0.0	0.8
2629.50	11.36	1.000	11.36	0.341	0.0	0.0	1.0
2629.75	27.01	1.000	27.01	0.251	0.1	0.0	0.9
2630.00	19.33	1.000	19.33	0.292	1.0	0.0	0.0
2630.25	15.48	1.000	15.48	0.342	1.0	0.0	0.0
2630.50	13.11	1.000	13.11	0.432	1.0	0.0	0.0
2630.75	9.90	1.000	9.90	0.563	0.0	0.0	0.0
2631.00	7.80	1.000	7.80	0.689	0.0	0.0	0.0
2631.25	7.33	1.000	7.33	0.771	0.0	0.0	0.0
2631.50	6.85	1.000	6.85	0.771	0.0	0.0	0.0
2631.75	7.87	1.000	7.87	0.685	0.0	0.0	0.0
2632.00	7.58	1.000	7.58	0.569	0.0	0.0	0.0
2632.25	8.15	1.000	8.15	0.236	0.0	0.0	1.0
2632.50	4.04	1.000	4.04	0.011	0.0	0.0	1.0
2632.75	20.91	1.000	20.91	0.376	0.0	0.0	0.2
2633.00	9.60	1.000	9.60	0.795	0.0	0.0	0.0
2633.25	7.43	1.000	7.43	0.768	0.0	0.0	0.0
2633.50	7.43	1.000	7.43	0.777	0.0	0.0	0.0
2633.75	7.82	1.000	7.82	0.719	0.0	0.0	0.0
2634.00	8.17	1.000	8.17	0.653	0.0	0.0	0.0
2634.25	8.41	1.000	8.41	0.676	0.0	0.0	0.0
2634.50	18.26	1.000	18.26	0.608	0.0	0.0	1.0
2634.75	2.06	1.000	2.06	0.059	0.0	0.0	1.0
2635.00	13.88	1.000	13.88	0.387	0.0	0.0	0.0
2635.25	11.06	1.000	11.06	0.542	0.0	0.0	0.0
2635.50	9.15	1.000	9.15	0.729	0.0	0.0	0.0
2635.75	9.58	1.000	9.58	0.822	0.0	0.0	0.0
2636.00	10.59	1.000	10.59	0.840	0.0	0.0	0.0
2636.25	13.84	1.000	13.84	0.536	0.7	0.0	0.0
2636.50	18.00	1.000	18.00	0.216	1.0	0.0	0.0
2636.75	20.67	1.000	20.67	0.167	1.0	0.0	0.0
2637.00	22.73	1.000	22.73	0.146	1.0	0.0	0.0
2637.25	23.29	1.000	23.29	0.164	1.0	0.0	0.0
2637.50	20.89	1.000	20.89	0.170	1.0	0.0	0.0
2637.75	17.71	1.000	17.71	0.171	1.0	0.0	0.0
2638.00	14.00	1.000	14.00	0.300	1.0	0.0	0.0
2638.25	10.89	1.000	10.89	0.578	0.1	0.0	0.0
2638.50	7.09	1.000	7.09	0.839	0.0	0.0	0.0
2638.75	6.24	1.000	6.24	0.804	0.0	0.0	0.0

2639.00	10.85	1.000	10.85	0.637	0.0	0.0	0.0
2639.25	21.88	1.000	21.88	0.286	1.0	0.0	0.0
2639.50	27.20	1.000	27.20	0.113	1.0	0.0	0.0
2639.75	25.43	1.000	25.43	0.086	1.0	0.0	0.0
2640.00	25.44	1.000	25.44	0.099	1.0	0.0	0.0
2640.25	24.33	1.000	24.33	0.089	1.0	0.0	0.0
2640.50	23.87	1.000	23.87	0.084	1.0	0.0	0.0
2640.75	25.70	1.000	25.70	0.080	1.0	0.0	0.0
2641.00	26.62	1.000	26.62	0.056	1.0	0.0	0.0
2641.25	25.76	1.000	25.76	0.072	1.0	0.0	0.0
2641.50	25.51	1.000	25.51	0.076	1.0	0.0	0.0
2641.75	25.84	1.000	25.84	0.078	1.0	0.0	0.0
2642.00	27.29	1.000	27.29	0.061	1.0	0.0	0.0
2642.25	27.83	1.000	27.83	0.052	1.0	0.0	0.0
2642.50	26.62	1.000	26.62	0.082	1.0	0.0	0.0
2642.75	25.66	1.000	25.66	0.061	1.0	0.0	0.0
2643.00	25.86	1.000	25.86	0.026	1.0	0.0	0.0
2643.25	23.29	1.000	23.29	0.099	1.0	0.0	0.0
2643.50	19.48	1.000	19.48	0.130	1.0	0.0	0.0
2643.75	18.71	1.000	18.71	0.145	1.0	0.0	0.0
2644.00	21.46	1.000	21.46	0.176	1.0	0.0	0.0
2644.25	23.90	1.000	23.89	0.183	1.0	0.0	0.0
2644.50	24.06	1.000	24.06	0.168	1.0	0.0	0.0
2644.75	24.45	1.000	24.45	0.152	1.0	0.0	0.0
2645.00	25.50	1.000	25.50	0.113	1.0	0.0	0.0
2645.25	25.88	1.000	25.88	0.090	1.0	0.0	0.0
2645.50	24.15	1.000	24.15	0.097	1.0	0.0	0.0
2645.75	20.00	1.000	20.00	0.123	1.0	0.0	0.0
2646.00	21.75	1.000	21.75	0.164	1.0	0.0	0.0
2646.25	23.56	1.000	23.55	0.131	1.0	0.0	0.0
2646.50	24.13	1.000	24.13	0.132	1.0	0.0	0.0
2646.75	23.64	1.000	23.64	0.113	1.0	0.0	0.0
2647.00	22.62	1.000	22.62	0.107	1.0	0.0	0.0
2647.25	22.28	1.000	22.28	0.123	1.0	0.0	0.0
2647.50	20.88	1.000	20.88	0.123	1.0	0.0	0.0
2647.75	20.24	1.000	20.24	0.129	1.0	0.0	0.0
2648.00	22.40	1.000	22.40	0.085	1.0	0.0	0.0
2648.25	23.41	1.000	23.41	0.074	1.0	0.0	0.0
2648.50	24.58	1.000	24.58	0.060	1.0	0.0	0.0
2648.75	23.58	1.000	23.58	0.085	1.0	0.0	0.0
2649.00	23.82	1.000	23.82	0.124	1.0	0.0	0.0
2649.25	23.20	1.000	23.20	0.121	1.0	0.0	0.0
2649.50	24.05	1.000	24.05	0.114	1.0	0.0	0.0
2649.75	25.05	1.000	25.05	0.143	1.0	0.0	0.0
2650.00	28.65	1.000	28.65	0.006	0.0	0.0	1.0
2650.25	10.98	1.000	10.98	0.339	0.0	0.0	0.4
2650.50	12.57	1.000	12.57	0.618	0.0	0.0	0.0
2650.75	11.18	1.000	11.18	0.756	0.0	0.0	0.0
2651.00	10.14	1.000	10.14	0.811	0.0	0.0	0.0
2651.25	10.90	1.000	10.90	0.812	0.0	0.0	0.0
2651.50	10.64	1.000	10.64	0.759	0.0	0.0	0.0
2651.75	11.15	1.000	11.15	0.748	0.0	0.0	0.0
2652.00	12.45	1.000	12.45	0.699	0.0	0.0	0.0
2652.25	12.42	1.000	12.42	0.592	0.0	0.0	0.0
2652.50	10.49	1.000	10.49	0.558	0.0	0.0	0.0
2652.75	9.03	1.000	9.03	0.589	0.0	0.0	0.0
2653.00	12.46	1.000	12.46	0.530	0.6	0.0	0.0
2653.25	14.51	1.000	14.51	0.506	1.0	0.0	0.0
2653.50	14.61	1.000	14.61	0.523	1.0	0.0	0.0
2653.75	14.34	1.000	14.34	0.471	1.0	0.0	0.0
2654.00	14.38	1.000	14.38	0.435	1.0	0.0	0.0
2654.25	14.51	1.000	14.51	0.470	1.0	0.0	0.0
2654.50	15.21	1.000	15.21	0.447	1.0	0.0	0.0

2654.75	14.89	1.000	14.89	0.420	1.0	0.0	0.0
2655.00	15.25	1.000	15.25	0.475	1.0	0.0	0.0
2655.25	14.74	1.000	14.74	0.520	1.0	0.0	0.0
2655.50	14.80	1.000	14.80	0.428	1.0	0.0	0.0
2655.75	19.73	1.000	19.73	0.150	1.0	0.0	0.0
2656.00	26.20	1.000	26.20	0.084	1.0	0.0	0.0
2656.25	28.80	1.000	28.80	0.002	1.0	0.0	0.0
2656.50	27.84	1.000	27.84	0.025	1.0	0.0	0.0
2656.75	27.62	1.000	27.62	0.000	1.0	0.0	0.0
2657.00	28.33	1.000	28.33	0.000	1.0	0.0	0.0
2657.25	28.91	1.000	28.91	0.000	1.0	0.0	0.0
2657.50	28.83	1.000	28.83	0.008	1.0	0.0	0.0
2657.75	28.12	1.000	28.12	0.013	1.0	0.0	0.0
2658.00	27.80	1.000	27.80	0.000	1.0	0.0	0.0
2658.25	27.83	1.000	27.83	0.000	1.0	0.0	0.0
2658.50	28.36	1.000	28.36	0.000	1.0	0.0	0.0
2658.75	28.97	1.000	28.97	0.000	1.0	0.0	0.0
2659.00	27.87	1.000	27.87	0.000	1.0	0.0	0.0
2659.25	25.85	1.000	25.85	0.054	1.0	0.0	0.0
2659.50	25.22	1.000	25.22	0.081	1.0	0.0	0.0
2659.75	26.11	1.000	26.11	0.042	1.0	0.0	0.0
2660.00	26.49	1.000	26.49	0.032	1.0	0.0	0.0
2660.25	27.37	1.000	27.37	0.017	1.0	0.0	0.0
2660.50	26.77	1.000	26.77	0.052	1.0	0.0	0.0
2660.75	24.64	1.000	24.64	0.065	1.0	0.0	0.0
2661.00	25.57	1.000	25.57	0.000	1.0	0.0	0.0
2661.25	26.82	1.000	26.82	0.000	1.0	0.0	0.0
2661.50	27.05	1.000	27.05	0.006	1.0	0.0	0.0
2661.75	28.01	1.000	28.01	0.000	1.0	0.0	0.0
2662.00	26.36	1.000	26.36	0.054	1.0	0.0	0.0
2662.25	25.62	1.000	25.62	0.073	1.0	0.0	0.0
2662.50	26.22	1.000	26.22	0.005	1.0	0.0	0.0
2662.75	26.77	1.000	26.77	0.008	1.0	0.0	0.0
2663.00	27.07	1.000	27.07	0.001	1.0	0.0	0.0
2663.25	28.86	1.000	28.86	0.001	1.0	0.0	0.0
2663.50	28.90	1.000	28.90	0.000	1.0	0.0	0.0
2663.75	28.56	1.000	28.56	0.000	1.0	0.0	0.0
2664.00	27.96	1.000	27.96	0.000	1.0	0.0	0.0
2664.25	27.45	1.000	27.45	0.000	1.0	0.0	0.0
2664.50	27.44	1.000	27.44	0.000	1.0	0.0	0.0
2664.75	25.13	1.000	25.13	0.024	1.0	0.0	0.0
2665.00	24.05	1.000	24.05	0.094	1.0	0.0	0.0
2665.25	25.65	1.000	25.65	0.075	1.0	0.0	0.0
2665.50	26.64	1.000	26.64	0.079	1.0	0.0	0.0
2665.75	27.22	1.000	27.22	0.088	1.0	0.0	0.0
2666.00	27.03	1.000	27.03	0.072	1.0	0.0	0.0
2666.25	27.70	1.000	27.70	0.026	1.0	0.0	0.0
2666.50	26.76	1.000	26.76	0.027	1.0	0.0	0.0
2666.75	27.01	1.000	27.01	0.003	1.0	0.0	0.0
2667.00	27.44	1.000	27.44	0.021	1.0	0.0	0.0
2667.25	27.59	1.000	27.59	0.075	1.0	0.0	0.0
2667.50	27.78	1.000	27.78	0.036	1.0	0.0	0.0
2667.75	27.61	1.000	27.61	0.009	1.0	0.0	0.0
2668.00	27.52	1.000	27.52	0.002	1.0	0.0	0.0
2668.25	24.69	1.000	24.69	0.063	1.0	0.0	0.0
2668.50	26.16	1.000	26.16	0.054	1.0	0.0	0.0
2668.75	28.09	1.000	28.09	0.000	1.0	0.0	0.0
2669.00	27.56	1.000	27.56	0.002	1.0	0.0	0.0
2669.25	28.40	1.000	28.40	0.000	1.0	0.0	0.0
2669.50	28.09	1.000	28.09	0.000	1.0	0.0	0.0
2669.75	27.10	1.000	27.10	0.067	1.0	0.0	0.0
2670.00	27.10	1.000	27.10	0.043	1.0	0.0	0.0
2670.25	27.57	1.000	27.57	0.000	1.0	0.0	0.0

2670.50	27.01	1.000	27.01	0.001	1.0	0.0	0.0
2670.75	26.79	1.000	26.79	0.025	1.0	0.0	0.0
2671.00	27.02	1.000	27.02	0.030	1.0	0.0	0.0
2671.25	26.15	1.000	26.15	0.040	1.0	0.0	0.0
2671.50	27.15	1.000	27.15	0.035	1.0	0.0	0.0
2671.75	29.22	1.000	29.22	0.000	1.0	0.0	0.0
2672.00	29.35	1.000	29.35	0.012	1.0	0.0	0.0
2672.25	27.69	1.000	27.69	0.017	1.0	0.0	0.0
2672.50	26.29	1.000	26.29	0.000	1.0	0.0	0.0
2672.75	26.07	1.000	26.07	0.015	1.0	0.0	0.0
2673.00	26.47	1.000	26.47	0.055	1.0	0.0	0.0
2673.25	26.96	1.000	26.96	0.054	1.0	0.0	0.0
2673.50	26.65	1.000	26.65	0.034	1.0	0.0	0.0
2673.75	27.26	1.000	27.26	0.005	1.0	0.0	0.0
2674.00	28.70	1.000	28.70	0.007	1.0	0.0	0.0
2674.25	29.92	1.000	29.92	0.000	1.0	0.0	0.0
2674.50	29.80	1.000	29.80	0.000	1.0	0.0	0.0
2674.75	28.51	1.000	28.51	0.000	1.0	0.0	0.0
2675.00	26.71	1.000	26.71	0.004	1.0	0.0	0.0

Appendix 5

APPENDIX 5

APPENDIX 5

KINGFISH 8

WIRELINE TEST (RFT/MDT) REPORT
AND PLOT

WIRELINE TEST REPORTS

INTRODUCTION

A total of 4 RFT runs were made in Kingfish-8 . The first run consisted of a pretest/sample run which was followed by 3 dedicated sample runs designed to test the reservoir fluid type and obtain preserved samples for PVT analysis.

During the pretest run, 31 tests were attempted resulting in 24 valid tests, 2 low permeability tests and 5 tight tests. Samples were attempted in the P-1.1 South, P-1.1 North and M-1.2 reservoir with oil recovered from all reservoirs except the P-1.1 South. A detailed listing of the pressure data and recoveries is included in the Kingfish 8 WCR Volume 1.

Detailed gradient analysis for fluid contact determination is not possible due to the variable drawdown in the reservoirs caused by production from the West Kingfish Field. The pressure differential between the reservoirs is shown on figure 1.

The plot indicates the M-1.3 reservoir at the Kingfish 8 location is drawndown 17 psi below the overlying M-1.2 and P-1.1 North reservoirs due to production from the field. Less drawdown is present in the M-1.4 reservoir which matches the trend seen on the field proper. This is due to a combination of less production from this reservoir and better connection to the aquifer.

P-1.1 NORTH & M-1.2 RESERVOIRS

An average pressure differential of 3 psi is present between the P-1.1 North and M-1.2 reservoirs in the higher quality reservoir sections. Reservoir pressure can be seen to vary with rock quality (figure 2) and is lowest in the best quality reservoir sections and increases as porosity and permeability decreases. This is interpreted to indicate communication to the producing reservoirs on West Kingfish Field. Further support for this concept is provided by the sweep seen in the P-1.1 North and M-1.2 reservoirs at the Kingfish 8 sidetrack location.

M-1.3, M-1.4 &M-1.5 RESERVOIRS

Data from the M-1.3 reservoir appears to fall on a gradient of 1.4 PSI/M however some pressure variation is evident and is interpreted to be due to variability in rock quality.

KINGFISH 8
RFT PRESSURE DATA

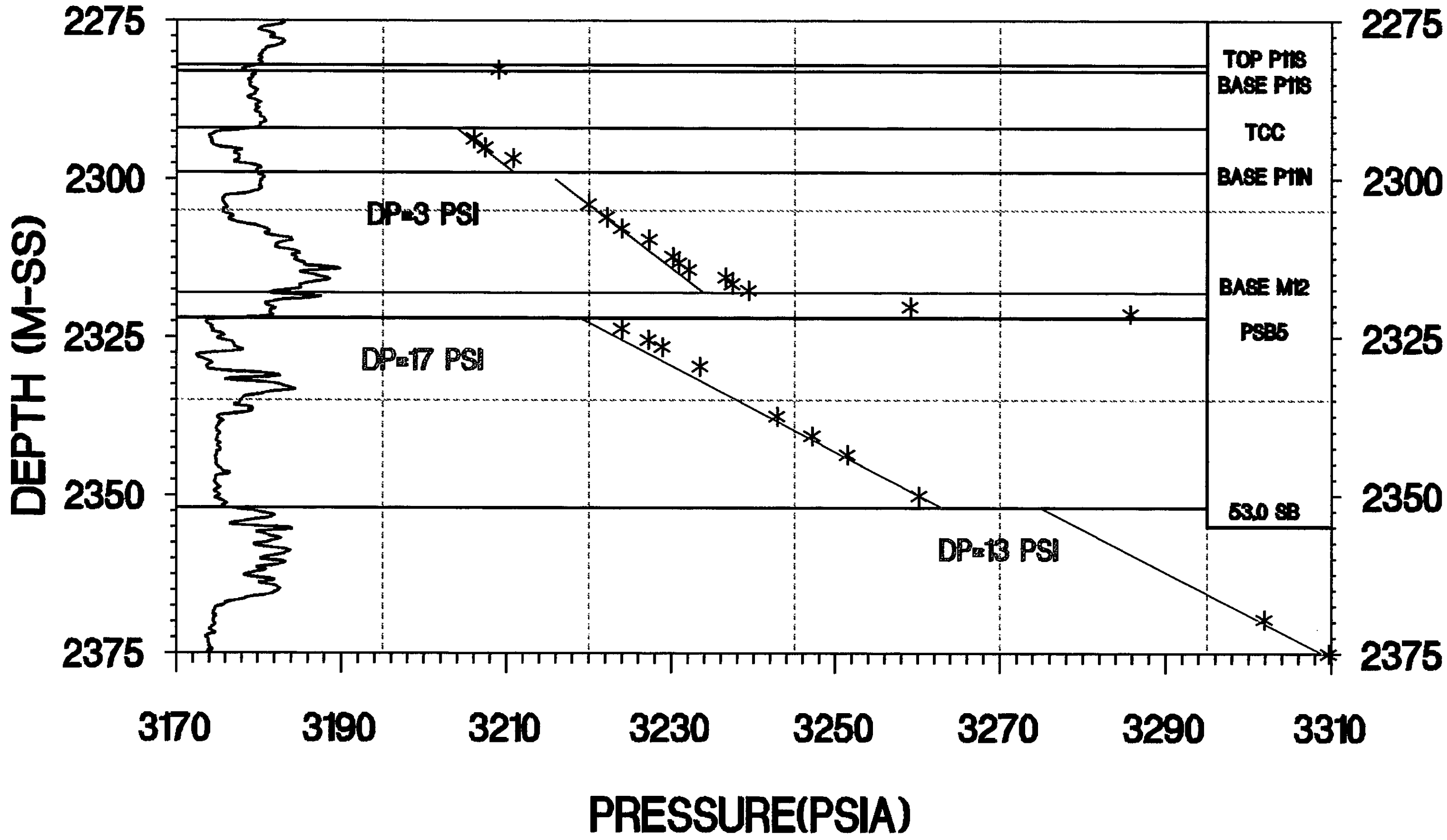

FIGURE 1

LOG CURVE TYPE IS GR

KINGFISH 8

RFT PRESSURE DATA
P–1.1 NORTH & M–1.2 RESERVOIR

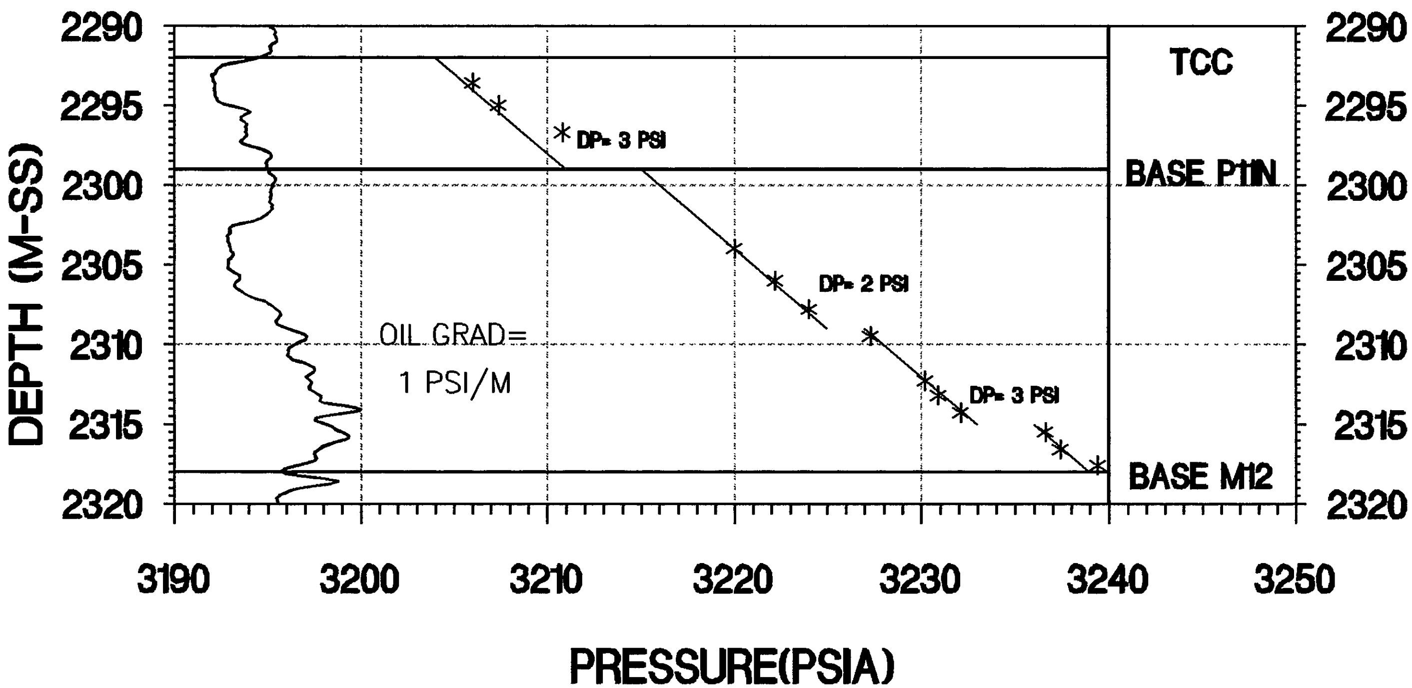

FIGURE 2

LOG CURVE TYPE IS GR

KINGFISH 8

RFT PRESSURE DATA

M-1.3 AND M-1.4 WATER SANDS

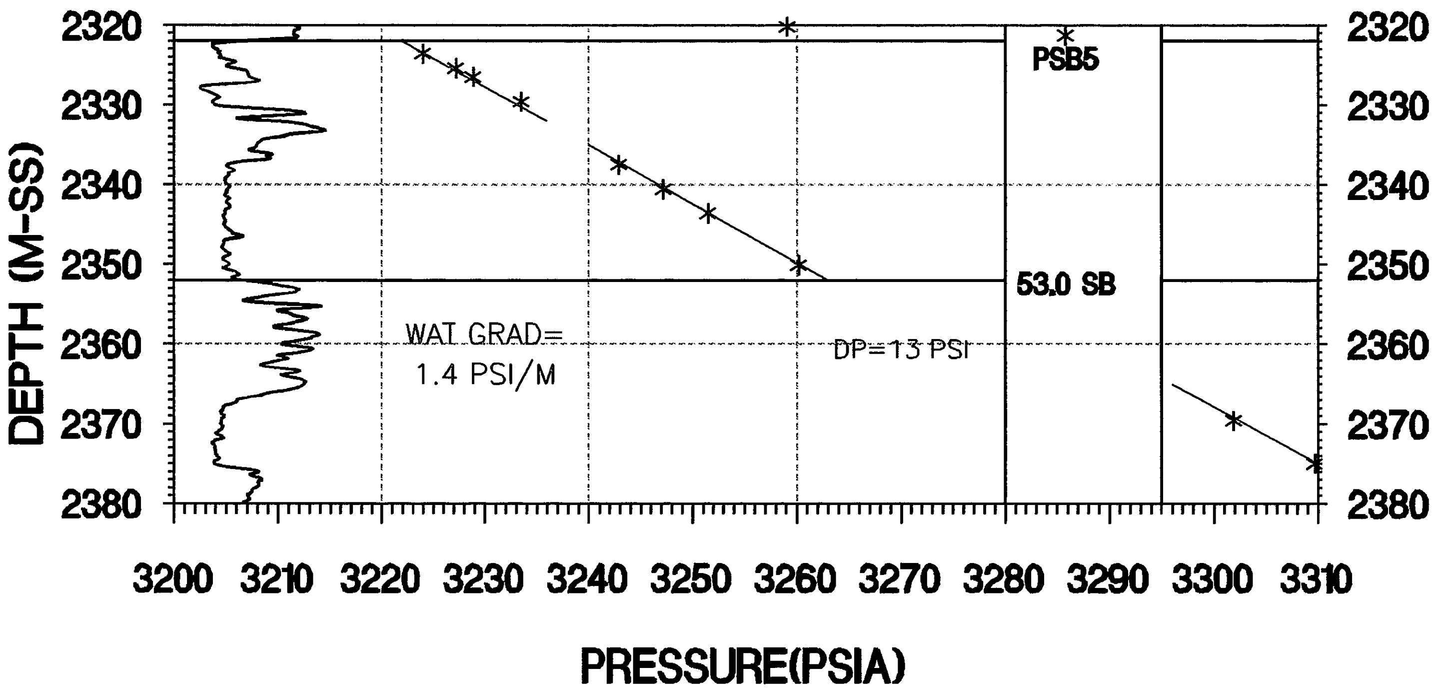

FIGURE 3

LOG CURVE TYPE IS GR

Enclosure 1

ENCLOSURE 1

ENCLOSURE 1

KINGFISH 8/ST1

TOP OF COARSE CLASTICS: DEPTH STRUCTURE MAP

PE902049

This is an enclosure indicator page.
The enclosure PE902049 is enclosed within the container PE902048 at this location in this document.

The enclosure PE902049 has the following characteristics:

ITEM_BARCODE =	PE902049
CONTAINER_BARCODE =	PE902048
NAME =	Top of Coarse Clastics Depth Structure Map
BASIN =	GIPPSLAND
PERMIT =	VIC/L8
TYPE =	SEISMIC
SUBTYPE =	HRZN_CONTR_MAP
DESCRIPTION =	Top of Coarse Clastics Depth Structure Map (enclosure 1 of WCR) for Kingfish-8 & 8ST1
REMARKS =	TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED =	01/10/1992
DATE_RECEIVED =	13/10/1992
W_NO =	W1057
WELL_NAME =	Kingfish-8 & 8ST1
CONTRACTOR =	ESSO
CLIENT_OP_CO =	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 2

Enclosure 2

ENCLOSURE 2

KINGFISH 8/ST1

MUD LOGS

PE600835

This is an enclosure indicator page.
The enclosure PE600835 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600835 has the following characteristics:

ITEM_BARCODE = PE600835
CONTAINER_BARCODE = PE902048
NAME = Formation Evaluation Log
BASIN = GIPPSLAND
PERMIT = VIC/L8
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Formation Evaluation Log (enclosure 2 of WCR) for Kingfish-8 & 8ST1
REMARKS = TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED = 23/03/1992
DATE_RECEIVED = 13/10/1992
W_NO = W1057
WELL_NAME = Kingfish-8 & 8ST1
CONTRACTOR = HALLIBURTON GEODATA SDL
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE600836

This is an enclosure indicator page.
The enclosure PE600836 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600836 has the following characteristics:

ITEM_BARCODE =	PE600836
CONTAINER_BARCODE =	PE902048
NAME =	Formation Evaluation Log
BASIN =	GIPPSLAND
PERMIT =	VIC/L8
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Formation Evaluation Log (enclosure 2 of WCR) for Kingfish-8 & 8ST1
REMARKS =	TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED =	02/04/1992
DATE_RECEIVED =	13/10/1992
W_NO =	W1057
WELL_NAME =	Kingfish-8 & 8ST1
CONTRACTOR =	HALLIBURTON GEODATA SDL
CLIENT_OP_CO =	ESSO

ENCLOSURE 3

Enclosure 3

ENCLOSURE 3

KINGFISH 8/ST1

WELL COMPLETION LOGS

PE600837

This is an enclosure indicator page.
The enclosure PE600837 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600837 has the following characteristics:

ITEM_BARCODE = PE600837
CONTAINER_BARCODE = PE902048
NAME = Well Completion Log
BASIN = GIPPSLAND
PERMIT = VIC/L8
TYPE = WELL
SUBTYPE = COMPLETION_LOG
DESCRIPTION = Well Completion Log (enclosure 2 of WCR) for Kingfish-8 & 8ST1
REMARKS = TD for Kingfish-8 = 2444m; TD for Kingfish-8ST1 = 2731m
DATE_CREATED = 30/09/1992
DATE_RECEIVED = 13/10/1992
W_NO = W1057
WELL_NAME = Kingfish-8 & 8ST1
CONTRACTOR = ESSO
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE600838

This is an enclosure indicator page.
The enclosure PE600838 is enclosed within the container PE902048 at this location in this document.

The enclosure PE600838 has the following characteristics:

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     ITEM_BARCODE = PE600838
CONTAINER_BARCODE = PE902048
             NAME = Well Completion Log
            BASIN = GIPPSLAND
           PERMIT = VIC/L8
             TYPE = WELL
          SUBTYPE = COMPLETION_LOG
      DESCRIPTION = Well Completion Log (enclosure 2 of
                    WCR) for Kingfish-8 & 8ST1
          REMARKS = TD for Kingfish-8 = 2444m; TD for
                    Kingfish-8ST1 = 2731m
     DATE_CREATED = 30/09/1992
    DATE_RECEIVED = 13/10/1992
             W_NO = W1057
        WELL_NAME = Kingfish-8 & 8ST1
       CONTRACTOR = ESSO
     CLIENT_OP_CO = ESSO
```

(Inserted by DNRE - Vic Govt Mines Dept)