APPENDIX 4

FORAMINIFERAL ANALYSIS

TRITON#1 AND TRITON#1 SIDETRACK

OTWAY BASIN

FORAMINIFERAL ANALYSIS, TRITON-1 AND TRITON-1 SIDETRACK

OTWAY BASIN

by

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INTERPRETATIVE DATA

INTRODUCTION:

Eighty five (85) cuttings samples were processed for foraminiferal analysis in Triton-1 and Triton-1 Sidetrack from 270 to 3345 metres, 49 from the original hole and 36 from the sidetrack hole. The majority of the sidetrack samples were selected from the Belfast Formation. Both the planktonic and benthonic foraminiferal assemblages have been analysed. Downhole contamination in the cuttings samples was most apparent in the Belfast Formation in the original hole and the upper 50 metres of the Belfast Formation in the sidetrack hole (see Table 1).

Triton-1 penetrated a Tertiary section which is almost identical to that recorded in the nearby Nautilus-A1 well (see figure 1). A confident age assignment of the Tertiary section in Triton-1 was hampered by the total reliance on cuttings. Biostratigraphic control was therefore dependent on the last appearance or the first appearance downhole of planktonic foraminiferal species. Unfortunately the planktonic foraminiferal zonation scheme of Taylor (in prep.) is based predominantly on the first appearance (or the last appearance downhole) of taxa. Six reliable extinction datums can be used for zonal assignment in Triton-1 (see Figure 1). With the exception of the base of the Tertiary section between 1650 and 1720 metres (Zones J-1 and J-2) the majority of the carbonate sequence in Triton-1 cannot be given a refined biostratigraphic age. A more refined biostratigraphic breakdown is achieved by correlating the planktonic foraminiferal assemblages of Triton-1 with those recorded by Taylor (1968) and Deighton (1974) in Nautilus-A1. The Nautilus-A1 planktonic foraminiferal analyses were based on adequate sidewall core (31) and conventional core coverage (9) in addition to rotary cuttings. Two biostratigraphic breakdowns of Triton-1, one based on extinction datums and one based on correlation with Nautilus A-1, are shown in Figure 1.

APPENDIX 5

The thick section of Belfast Formation in Triton-1 can be confidently assigned the Zone XA of Senonian age to at least a depth of 2860 metres using the zonal scheme of Taylor (1964). This zonation is based on benthonic foraminifera because planktonic foraminifera are rare and of no biostratigraphic value in the Upper Cretaceous of the Otway Basin. The yield, preservation and diversity of the benthonic foraminiferal faunas in Triton-1 is adequate between 1800 and 2860 metres. Meagre foraminiferal yields however occur above and below this level in the Belfast Formation.

Tables 1 & 2 provide a summary (Basic and Interpretative) of the palaeontological analyses in the Triton-1 and Triton-1 Sidetrack wells. Data from these wells have been combined for biostratigraphic and palaeoenvironmental assessment (see Figure 1 and range charts). A summary of the biostratigraphic breakdown of the stratigraphic units in Triton-1 is given below:

SUMMARY

DEPTH(m)	ZONE	AGE	UNIT
270- 320	D-2 to E-1	Mid Miocene	
370- 470	Indeterminate	Mid-Early Miocene	Port Campbell Limestone
520- 560	F	Early Miocene	
600	F	Early Miocene	
650- 950	G	Early Miocene	
1000-1065	H-1	Early Miocene	
1100-1460	Indeterminate	Early Miocene-Late Oligocene	Gellibrand Marl
1460-1550	H-2 to I	Late Oligocene	
1590-1605	I	Late Oligocene	
1650-1690	J-1	Early Oligocene	
1710-1715	J-2	Early Oligocene	
1720	J-2	Early Oligocene	Unnamed Sands/silts.
1725-1730	Indeterminate	-	
1735	Indeterminate	-	
1740-2860	XA	Senonian	Belfast Formation
2900-3395	Indeterminate	-	

GEOLOGICAL COMMENTS

1) The Tertiary carbonate section in Triton-1 represents a continuous stratigraphic sequence that ranges in age from early Middle Miocene to Early Oligocene. There appears to be no major stratigraphic break between the deposition of the Port Campbell Limestone and the Gellibrand Marl Equivalent. The Gellibrand Marl Equivalent conformably overlies a sand/silt unit, the upper part of which is Early Oligocene in age. There appears to be no stratigraphic break across the terrigenous/carbonate boundary. The lower part of the terrigenous unit is predominantly silty and cannot be dated because the foraminiferal fauna is impoverished and poorly preserved. The Tertiary section in Triton-1 is almost identical to that recorded in the nearby Nautilus-A1 well.

2) There is a substantial unconformity between the Early Oligocene sands and silts and the Late Cretaceous Belfast Formation in both Triton-1 and Nautilus-1. The absence of Eocene to uppermost Cretaceous sediments in these wells is atypical for the Otway Basin. Most previous wells have been drilled closer to shore in shallower parts of the basin and record marginal marine terrigenous Eocene to uppermost Cretaceous sections. The Triton-1 and Nautilus-A1 wells are situated in a deeper part of the basin where a substantial period of non-deposition occurred during this interval. The presence of deep water globigerinid ooze at the base of the Tertiary carbonate section in these wells indicates that the unconformity occurred in a marine slope palaeoenvironment.

3) There is a thick section (approximately 1650 metres) of Late Cretaceous Belfast Formation in Triton-1, the upper 1100 metres of which is Senonian in age. No age determination is possible for the lower 500 metres of the unit because of very sparse foraminiferal yields. The Senonian section of Belfast Formation in Triton-1 is considerably thicker than that recorded in the Nautilus-A1 well. On foraminiferal evidence Taylor (1968) recognised 200 metres of Senonian and 68 metres of Turonian Belfast Formation in the Nautilus section. This represents a discrepancy of at least 900 metres between the two wells. Taylor's recognition of Turonian faunas between 1942 and 2010 metres (TD) in Nautilus-A1 is based on primarily on the presence of the Turonian index species Textularia trilobita. Other indigenous Turonian species of Zone XB including Colomia austrotrochus and Gavelinopsis cenomanica were not recorded. In Triton-1 rare occurrences of Textularia trilobita have been recorded at comparable levels (between 1800 and 2005 metres). The species is associated with the Senonian index species for Zone XB, Textularia semicomplanata. In other Otway Basin wells Textularia semicomplanata is well documented as phylogenetically replacing T. trilobita at the Turonian/Senonian boundary. Textularia semicomplanata has been recorded as low as 2815 metres in Triton-1 and another Senonian species, T. anceps, has been recorded at 2860 metres. Taylor has erronously recorded Turonian far too high in the Belfast Formation in Nautilus-A1. Textularia trilobita apparently is not restricted to the Turonian interval in deeper parts of the Otway Basin where it may range well up into the Senonian. The species is facies controlled and together with the Belfast Formation represents a time transgressive entity.

4) In Triton-1 the Senonian part of the Belfast Formation was deposited rapidly (approximately 80-100 metres per million years) in a relatively deep marine palaeoenvironment. The dominance of agglutinated foraminifera over calcareous benthonic foraminifera and the very low planktonic foraminiferal yields in the unit is attributed to deposition in a partly anaerobic marine palaeoenvironment with substantial influx of fine terrigenous muds.

DISCUSSION OF ZONES

The Tertiary biostratigraphy in Triton-1 is based primarily on the foraminiferal investigation of the nearby Nautilus-A1 well by Taylor (1968) and Deighton (1974), and the Gippsland Basin planktonic foraminiferal scheme of Taylor (1972) and Taylor (in prep.). Studies by Jenkins (1960, 1971), Hornibrook (1961), Blow (1969, 1979), Postuma (1971) and Stainforth et al., (1976) have also been consulted.

The Cretaceous biostratigraphy is based primarily on Taylor (1964) and Taylor (1968). Other studies considered included Cushman (1946), Belford (1960) and Shell Development (Australia) Pty Ltd (1968).

ZONES D-2 and E-1: 270 - 320 metres.

The recognition of zones D-2 to E-1 in Triton-1 is dependent on correlation with Nautilus-A1 (see Figure 1). The occurrence of Orbulina suturalis at 270 and 320 metres is considered to be in situ because the species was recorded at a comparable level in Nautilus-A1 (in a sidewall core at 305 metres). Taylor (1972) records the extinction of Orbulina suturalis at the top of Zone D-2. On the basis of cuttings alone the interval between 270 and 320 metres must therefore be no younger than D-2. The presence of

Orbulina universa at 320 metres, if in situ, would indicate that the interval is D-2 in age. However it is possible that the species is a downhole contaminant because it was not recorded in Nautilus-A1. Since Orbulina suturalis defines the base of Zone E-1 it is proposed that the interval 270 to 320 metres is assignable to Zones D-2 and E-1.

INDETERMINATE INTERVAL: 370 - 470 metres

This interval could be assigned to Zones D-2, E-1, E-2 or F. The planktonic foraminiferal faunas within the interval are impoverished. The presence of Globigerinoides ruber at 470 metres puts a lower limit of Zone F to the level. The absence of Praeorbulina glomerosa (base Zone E-2), Orbulina suturalis (base Zone E-1) and Orbulina universa (base Zone D-2) does not necessarily preclude assignment to Zones D-2, E-1 or E-2. Depth correlation with Nautlius-A1 would favour assignment to Zones E or F.

ZONE F: 520 - 600 metres

The uphole appearance of Globigerinoides bisphericus and G. ruber at 600 metres defines the base of Zone F. These species make a comparable entry in Nautilus-A1 at 671 metres (see Figure 1). The extinction of Globigerina woodi connecta within Zone F is well defined in Triton-1, Nautilus-A1 (Deighton, 1974) and in Gippsland Basin wells (see Range Chart - Taylor, 1972).

ZONE G: 650 - 950 metres

The uphole appearance of Globigerinoides trilobus defines the base of Zone G. This datum occurs at comparable depths in Triton-1 (950 metres) and Nautilus-A1 (975 metres).

ZONE H-1: 1000 - 1065 metres

The presence of Globigerina woodi connecta and the absence of Globigerinoides trilobus within this interval defines Zone H-1.

Deighton (1974) records Zone H-I down to 1189 metres in Nautilus-A1. In Triton-1 the lower limit of Zone H-1 cannot be determined because of impoverished foraminiferal faunas between 1100 and 1450 metres. It is probable that Zone H-1 extends down to a level comparable with that recorded in Nautilus-A1.

INDETERMINATE INTERVAL: 1100 - 1460 metres

No zonal assignment is possible within this interval because of very impoverished planktonic foraminiferal yields. On the basis of superposition the interval could be assigned to Zones H-1, H-2 or I. Depth correlation with Nautilus-A1 favours assignment to Zones H-I and H-2 (see Figure 1).

ZONES H-2 and I: 1460 and 1550 metres

The presence of Globigerina tripartita and the absence of Globigerina angiporoides within this interval indicates zonal assignment to H-2 or I. Taylor (1972) records the extinction of Globigerina tripartita in the Gippsland Basin within Zone H-2 (Late Oligocene) and Stainforth et al., (1976) also record its extinction in the Late Oligocene. The extinction uphole of Globigerina tripartita at 1460 metres is therefore considered to indicate an age no younger than Zone H-2. The absence of Globigerina angiporoides (which defines the top of Zone J-2) indicates an age no older than Zone I. Depth correlation with Nautilus-A1 favours assignment to Zone I.

ZONE I: 1590 - 1605 metres

The absence of Globigerina angiporoides and Globigerina woodi and the presence of Globigerina tripartita is typical of Zone I. The absence of the Zone I index species Globorotalia opima does not discount assignment to Zone I.

ZONE J-1: 1650 - 1690 metres

The presence of Globigerina angiporoides and the absence of Globigerina brevis and Globorotalia gemma clearly defines this interval as Zone J-1.

ZONE J-2: 1710 - 1720 metres

The common occurrence of Globigerina angiporoides in association with Globigerina brevis and Globorotalia gemma and the absence of Globigerina linaperta and Globigerinatheka within this interval represents a typical Gippsland Basin Zone J-2 assemblage.

INDETERMINATE INTERVAL: 1725 - 1735 metres

The lower part of this interval (1725 - 1730 metres) represents an unnamed sand/silt unit while the upper part (1735 metres) represents Belfast Formation. Downhole contamination is severe at 1725 and 1735 metres. The upper part of the unnamed sand/silt unit (1720 metres) is Early Oligocene (J-2) in age. No age assignment is possible for the lower part of the unit (1725 - 1730 metres) and there is no evidence of pre J-2 planktonic foraminifera within the interval.

The Belfast Formation at 1735 metres is barren of Late Cretaceous foraminifera. It may be Senonian (Zone XA) or Maastrichtian in age. An inferred Late Cretaceous age is assigned based on lithology.

ZONE X-A: 1740 - 2860 metres

Impoverished Late Cretaceous faunas are restricted to the upper part of the Belfast Formation in Triton-1 between 1740 and 1775 metres. The interval is assigned to Zone X-A despite the absence of the Senonian index species Textularia semicomplanata. Taylor (1968) noted a similar impoverished fauna in the upper part of the Belfast Formation in Nautilus-A1 and included it in Zone X-A. Definite Zone X-A benthonic foraminiferal assemblages occur between 1780 and 2860

metres in Triton-1. The Senonian index species Textularia semicomplanata ranges through most of the interval (between 1880 and 2750 metres). The occurrence of Textularia anceps, another species restricted to Zone X-A (Taylor 1964), defines the lower limit of the zone in Triton-1.

Planktonic foraminifera have a rare and sporadic distribution throughout Zone X-A. With the exception of Heterohelix striata, the Late Cretaceous planktonic foraminiferal species in Triton-1 are of no biostratigraphic value. The presence of Heterohelix striata at 1940 metres (if in situ) indicates an age no older than Santonian. Palynological evidence suggests a Campanian age for this level (Stacy, 1982). The occurrence of one specimen of Bolivinoides pustulatus at 1990 metres indicates a Lower Campanian age. Bolivinoides pustulatus is restricted to the Lower Campanian in Western Australia, Israel, British Isles and North America (Rexilius, in prep.). Palynological evidence confirms a Lower Campanian age at this level in Triton-1 (Stacy, 1982).

The rare occurrence of the Turonian index species Textularia trilobita at 1800, 1975 and 2005 metres in Triton-1 indicates the time transgressive nature of the species in the Otway Basin. Taylor (1968) erronously recorded Turonian (Zone X-B) far too high in Nautilus-A1 on the basis of the rare occurrence of Textularia trilobita between 1942 and 2010 metres. The species is restricted to the Turonian in shallower parts of the Otway Basin but ranges well up into the Senonian in deeper parts of the basin (in Triton-1 and Nautilus-A1). In Triton-1 Textularia trilobita ranges as high as the Late Campanian where it occurs within the palynological Xenikoon australis Zone, defined by Stacy (1982).

INDETERMINATE INTERVAL: 2900 - 3345 metres

Very impoverished faunas below 2860 metres make zonal assignment impossible.

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MICROPALEONTOLOGICAL DATA SHEET

BASIN: OTWAY ELEVATION: KB: 21m GL: -100m

WELL NAME: TRITON-1 & TRITON SIDETRACK TOTAL DEPTH: 3545 metres

AGE		FORAM. ZONULES	HIGHEST DATA					LOWEST DATA				
			Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3										
		A_4										
MIOCENE	LATE	B_1										
		B_2										
		C										
	MIDDLE	D_1										
		D_2	270	4				320	4			
		E_1										
		E_2										
	EARLY	F	520	4				600	4			
		G	650	4				950	4			
		H_1	1000	4				1000	4			
OLIGOCENE	LATE	H_2										
		I_1	1590	4								
		I_2						1605	4			
	EARLY	J_1	1650	3				1690	3			
		J_2	1710	3				1720	3			
EOCENE		K										
		Pre-K										

COMMENTS: Tertiary planktonic foraminiferal analysis based on 35 cutting samples. Zonal assignment dependent primarily on correlation with planktonic foraminiferal investigation of the Nautilus-A-1 well by Taylor (1968) and Deighton (1974). Preservation and yield of planktonic foraminifera adequate except in the interval 1035-1550 metres.

CONFIDENCE RATING:

- 0: SWC or Core - Complete assemblage (very high confidence).
- 1: SWC or Core - Almost complete assemblage (high confidence).
- 2: SWC or Core - Close to zonule change but able to interpret (low confidence).
- 3: Cuttings - Complete assemblage (low confidence).
- 4: Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: J.P. REXILIUS DATE: 1.5.82

DATA REVISED BY: J.P. REXILIUS DATE: 22.7.82

APPENDIX 5

TABLE-1

SUMMARY OF PALAEONTOLOGICAL ANALYSIS

TRITON-1, OTWAY BASIN

INTERPRETATIVE DATA

NATURE OF SAMPLE	DEPTH IN METRES	MICROFOSSIL YIELD	PRESERVATION	DIVERSITY	ZONE	CONFIDENCE RATING	AGE	COMMENTS
Cuttings	270	Low	Moderate	Low	D-2 to E-1	4	Mid Miocene	
Cuttings	320	Low	Good	Moderate	D-2 to E-1	4	Mid Miocene	
Cuttings	370	Low	Moderate	Low	Indeterminate	-		
Cuttings	400	Low	Moderate	Low	Indeterminate	-		
Cuttings	470	Low	Good	Low	Indeterminate	-		
Cuttings	520	High	Good	Moderate	F	4	Early Miocene	
Cuttings	560	High	Good	High	F	4	Early Miocene	
Cuttings	600	Moderate	Good	Moderate	F	4	Early Miocene	
Cuttings	650	High	Good	Moderate	G	4	Early Miocene	
Cuttings	700	Moderate	Good	Moderate	G	4	Early Miocene	
Cuttings	760	Moderate	Good	Moderate	G	4	Early Miocene	
Cuttings	820	High	Good	High	G	4	Early Miocene	
Cuttings	900	High	Good	Moderate	G	4	Early Miocene	
Cuttings	950	Moderate	Moderate	Moderate	G	4	Early Miocene	
Cuttings	1000	High	Good	Moderate	H-1	4	Early Miocene	
Cuttings	1035	Low	Poor	Low	H-1	4	Early Miocene	
Cuttings	1065	Low	Poor	Low	H-1	4	Early Miocene	
Cuttings	1100	Low	Poor	Low	Indeterminate	-		
Cuttings	1155	Low	Poor	Low	Indeterminate	-		
Cuttings	1200	Low	Poor	Low	Indeterminate	-		
Cuttings	1280	Moderate	Poor	Low	Indeterminate	-		
Cuttings	1360	Low	Poor	Low	Indeterminate	-		
Cuttings	1410	Low	Poor	Low	Indeterminate	-		
Cuttings	1460	Low	Poor	Low	H-2 to I	4	Late Oligocene	
Cuttings	1590	High	Moderate	Moderate	I	4	Late Oligocene	
Cuttings	1605	Moderate	Moderate	Moderate	I	4	Late Oligocene	
Cuttings	1650	Moderate	Moderate	Moderately low	J-1	3	Early Oligocene	
Cuttings	1690	Moderate	Moderate	Moderate	J-1	3	Early Oligocene	

TABLE-1 CONT. /2

SUMMARY OF PALAEONTOLOGICAL ANALYSIS

TRITON-1, OTWAY BASIN

INTERPRETATIVE DATA

NATURE OF SAMPLE	DEPTH IN METRES	MICROFOSSIL YIELD	PRESERVATION	DIVERSITY	ZONE	CONFIDENCE RATING	AGE	COMMENTS
Cuttings	1710	Very High	Moderate	High	J-2	3	Early Oligocene	
Cuttings	1715	High	Moderate	Moderate	J-2	3	Early Oligocene	
Cuttings	1720	Low	Good	Moderate	J-2	3	Early Oligocene	
Cuttings	1725	Very very Low	Poor	Low	Indeterminate	-	-	Severe downhole contamination
Cuttings	1730	Very very Low	Poor	Low	Indeterminate	-		
Cuttings	1760	Very Low	Poor	Very Low	X-A	4	Senonian	Moderate to severe downhole contamination.
Cuttings	1775	Low	Poor	Low	X-A	4	Senonian	" "
Cuttings	1820	Moderate	Moderate	Low	X-A	4	Senonian	" "
Cuttings	1880	Moderate	Moderate	Moderately low	X-A	3	Senonian	" "
Cuttings	1940	Moderate	Moderate	Moderately low	X-A	3	Senonian	
Cuttings	1990	Moderate	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2005	Moderate	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2065	Moderately Low	Moderate	Low	X-A	3	Senonian	Moderate to severe downhole contamination.
Cuttings	2135	Moderately Low	Moderate	Low	X-A	3	Senonian	" "
Cuttings	2140	Moderately Low	Moderate	Low	X-A	3	Senonian	" "
Cuttings	2180	Low	Moderate	Low	X-A	4	Senonian	" "
Cuttings	2215	Low	Moderate	Low	X-A	4	Senonian	Moderate downhole contamination
Cuttings	2340	Low	Poor	Low	X-A	4	Senonian	" "
Cuttings	2390	Low	Poor	Low	X-A	4	Senonian	Minor downhole contamination
Cuttings	2610	Very Low	Poor	Very Low	X-A	4	Senonian	" "
Cuttings	1680	Low	Poor	Moderately Low	X-A	4	Senonian	

TABLE-2

SUMMARY OF PALAEONTOLOGICAL ANALYSIS

TRITON-1 SIDETRACK, OTWAY BASIN

INTERPRETATIVE DATA

NATURE OF SAMPLE	DEPTH IN METRES	MICROFOSSIL YIELD	PRESERVATION	DIVERSITY	ZONE	CONFIDENCE RATING	AGE	COMMENTS
Cuttings	1495	Low	Poor	Low	Indeterminate	-		
Cuttings	1550	Low	Poor	Low	N-2 to I	4		
Cuttings	1735	N.F.F.	-	-	-	-		Moderate to severe downhole contamination.
Cuttings	1740	Low	Very Poor	Low	X-A	4	Senonian	" "
Cuttings	1750	Very Low	Poor	Very Low	X-A	4	Senonian	" "
Cuttings	1765	Low	Poor	Low	X-A	4	Senonian	" "
Cuttings	1780	Very Low	Moderate	Low	X-A	4	Senonian	" "
Cuttings	1800	Moderate	Poor	Moderate	X-A	4	Senonian	
Cuttings	1910	Moderate	Moderate	Mod. High	X-A	3	Senonian	
Cuttings	1930	Moderate	Moderate	Mod. High	X-A	3	Senonian	
Cuttings	1975	Moderate	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2030	Moderately Low	Moderate	Mod. High	X-A	3	Senonian	
Cuttings	2080	Moderately Low	Moderate	Moderately High	X-A	3	Senonian	
Cuttings	2100	Moderately Low	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2120	Moderately Low	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2250	Moderately Low	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2300	Low	Moderate	Moderate	X-A	3	Senonian	
Cuttings	2440	Low	Poor	Low	X-A	3	Senonian	
Cuttings	2500	Low	Poor	Low	X-A	4	Senonian	
Cuttings	2550	Low	Poor	Low	X-A	4	Senonian	
Cuttings	2750	Low	Poor	Low	X-A	3	Senonian	
Cuttings	2805	Low	Poor	Low	X-A	3	Senonian	
Cuttings	2815	Low	Poor	Low	X-A	3	Senonian	
Cuttings	2860	Very Low	Poor	Very Low	X-A	4	Senonian	
Cuttings	2900	Very Low	Poor	Very Low	Indeterminate	-		
Cuttings	2950	Very Low	Poor	Very Low	Indeterminate	-		
Cuttings	3005	Very Very Low	Poor	Very Very Low	Indeterminate	-		
Cuttings	3050	N.F.F.	-	-	Indeterminate	-		
Cuttings	3100	N.F.F.	-	-	Indeterminate	-		
Cuttings	3150	N.F.F.	-	-	Indeterminate	-		
Cuttings	3200	Very Very Low	Poor	Very Very Low	Indeterminate	-		
Cuttings	3265	N.F.F.	-	-	Indeterminate	-		
Cuttings	3280-85	N.F.F.	-	-	Indeterminate	-		
Cuttings	3315-20	N.F.F	-	-	Indeterminate	-		
Cuttings	3355-60	N.F.F.	-	-	Indeterminate	-		
Cuttings	3390-95	N.F.F.	-	-	Indeterminate	-		

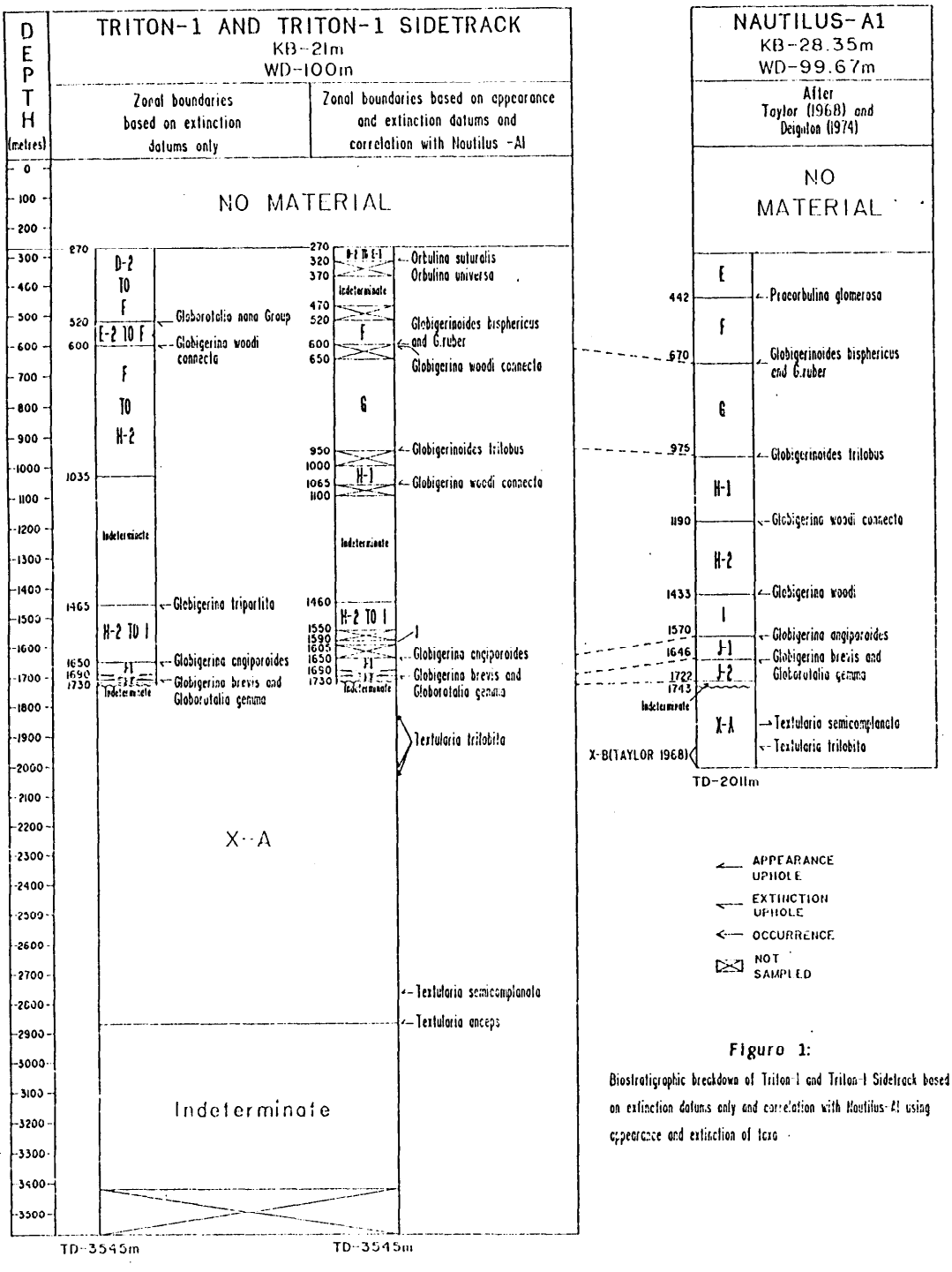


Figure 1:

Biostratigraphic breakdown of Triton-1 and Triton-1 Sidetrack based on extinction datums only and correlation with Nautilus-A1 using appearance and extinction of taxa

APPENDIX 5

BASIC DATA

TABLE-1: FORAMINIFERAL DATA - TRITON-1

TABLE -2: FORAMINIFERAL DATA - TRITON-1 SIDETRACK

RANGE CHARTS: TERTIARY PLANTONIC FORAMINIFERA

RANGE CHARTS: TERTIARY BENTHONIC FORAMINIFERA

RANGE CHARTS: CRETACEOUS PLANKTONIC FORAMINIFERA

RANGE CHARTS: CRETACEOUS BENTHONIC FORAMINIFERA

APPENDIX 5

TABLE-1
FORAMINIFERAL DATA
TRITON-1, OTWAY BASIN
BASIC DATA

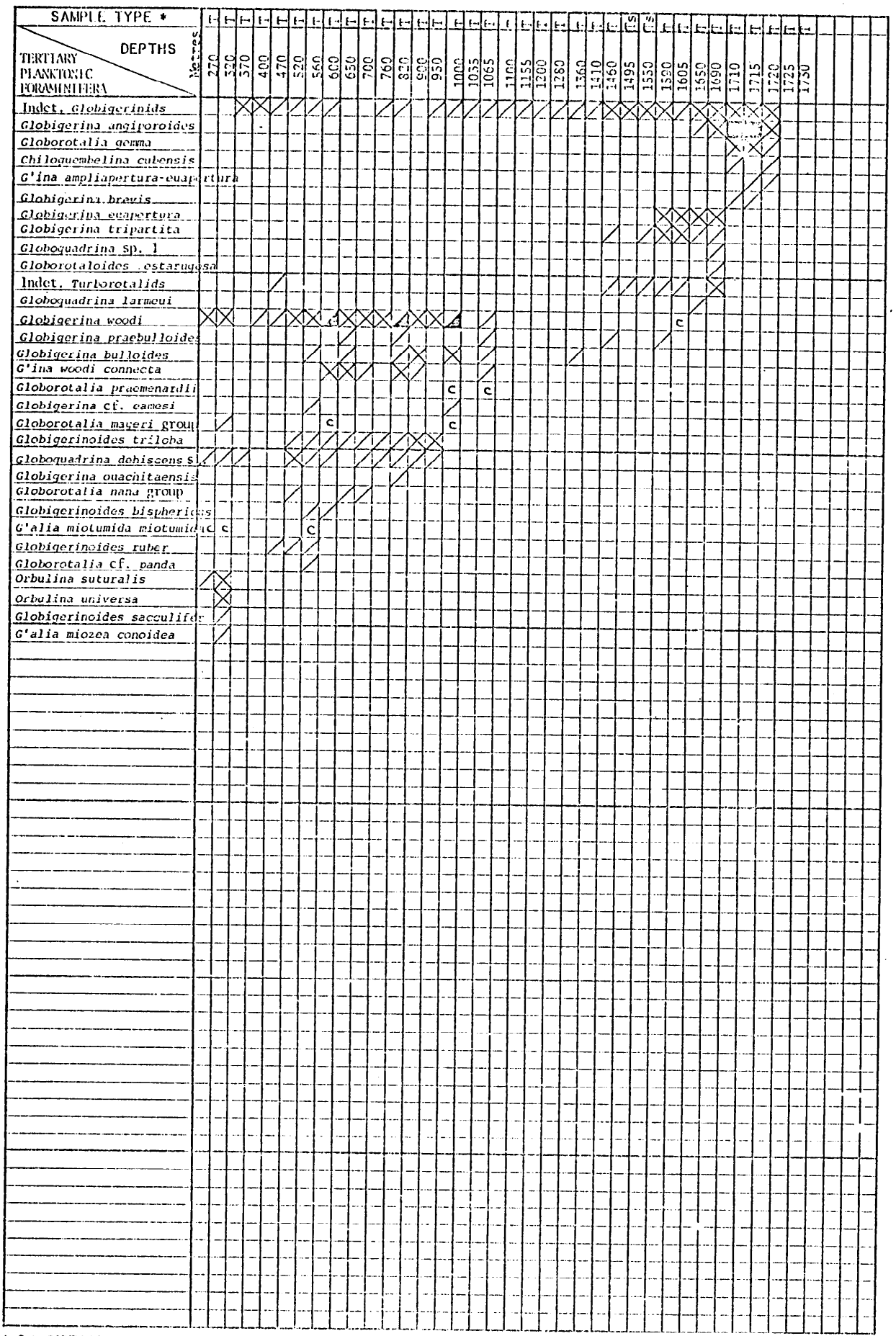
NATURE OF SAMPLE	DEPTH IN METRES	MICROFOSSIL YIELD	PRESERVATION	DIVERSITY	COMMENTS
Cuttings	270	Low	Moderate	Low	
Cuttings	320	Low	Good	Moderate	
Cuttings	370	Low	Moderate	Low	
Cuttings	400	Low	Moderate	Low	
Cuttings	470	Low	Good	Low	
Cuttings	520	High	Good	Moderate	
Cuttings	560	High	Good	High	
Cuttings	600	Moderate	Good	Moderate	
Cuttings	650	High	Good	Moderate	
Cuttings	700	Moderate	Good	Moderate	
Cuttings	760	Moderate	Good	Moderate	
Cuttings	820	High	Good	High	
Cuttings	900	High	Good	Moderate	
Cuttings	950	Moderate	Moderate	Moderate	
Cuttings	1000	High	Good	Moderate	
Cuttings	1035	Low	Poor	Low	
Cuttings	1065	Low	Poor	Low	
Cuttings	1100	Low	Poor	Low	
Cuttings	1155	Low	Poor	Low	
Cuttings	1200	Low	Poor	Low	
Cuttings	1280	Moderate	Poor	Low	
Cuttings	1360	Low	Poor	Low	
Cuttings	1410	Low	Poor	Low	
Cuttings	1460	Low	Poor	Low	
Cuttings	1590	High	Moderate	Moderate	
Cuttings	1605	Moderate	Moderate	Moderate	
Cuttings	1650	Moderate	Moderate	Moderate	
Cuttings	1690	Moderate	Moderate	Moderate	
Cuttings	1710	Very High	Moderate	High	
Cuttings	1715	High	Moderate	Moderate	
Cuttings	1720	Low	Good	Moderate	
Cuttings	1725	Very Very Low	Poor	Low	Severe downhole contamination
Cuttings	1730	Very Very Low	Poor	Low	" "
Cuttings	1760	Very Very Low	Poor	Very Low	Moderate to severe downhole contamination
Cuttings	1775	Low	Poor	Low	" "
Cuttings	1820	Moderate	Moderate	Low	" "
Cuttings	1880	Moderate	Moderate	Moderately Low	" "
Cuttings	1940	Moderate	Moderate	Moderately High	
Cuttings	1990	Moderate	Moderate	Moderate	
Cuttings	2005	Moderate	Moderate	Moderate	
Cuttings	2065	Moderately Low	Moderate	Low	Moderate to severe downhole contamination
Cuttings	2135	Moderately Low	Moderate	Low	
Cuttings	2140	Moderately Low	Moderate	Low	
Cuttings	2180	Low	Moderate	Low	
Cuttings	2215	Low	Moderate	Low	
Cuttings	2340	Low	Poor	Low	Moderate downhole contamination
Cuttings	2390	Low	Poor	Low	Minor downhole contamination
Cuttings	2160	Very Low	Poor	Very Low	" "
Cuttings	2680	Low	Poor	Low	

APPENDIX 5

TABLE-2
FORAMINIFERAL DATA
TRITON-1 SIDETRACK, OTWAY BASIN
BASIC DATA

NATURE OF SAMPLE	DEPTH IN METRES	MICROFOSSIL YIELD	PRESERVATION	DIVERSITY	COMMENTS
Cuttings	1495	Low	Poor	Low	
Cuttings	1550	Low	Poor	Low	
Cuttings	1735	N.F.F.	-	-	Moderate to severe downhole contamination
Cuttings	1740	Low	Very Poor	Low	" "
Cuttings	1750	Very Low	Poor	Very Low	" "
Cuttings	1765	Low	Poor	Low	" "
Cuttings	1780	Very Low	Moderate	Low	
Cuttings	1800	Moderate	Poor	Moderate	
Cuttings	1910	Moderate	Moderate	Moderately High	
Cuttings	1930	Moderate	Moderate	Moderately High	
Cuttings	1975	Moderate	Moderate	Moderate	
Cuttings	2030	Moderately Low	Moderate	Moderately High	
Cuttings	2080	Moderately Low	Moderate	Moderately High	
Cuttings	2100	Moderately Low	Moderate	Moderate	
Cuttings	2120	Moderately Low	Moderate	Moderate	
Cuttings	2250	Moderately Low	Moderate	Moderate	
Cuttings	2300	Low	Moderate	Moderate	
Cuttings	2440	Low	Poor	Low	
Cuttings	2500	Low	Poor	Low	
Cuttings	2550	Low	Poor	Low	
Cuttings	2750	Low	Poor	Low	
Cuttings	2805	Low	Poor	Low	
Cuttings	2815	Low	Poor	Low	
Cuttings	2860	Very Low	Poor	Very Low	
Cuttings	2900	Very Low	Poor	Very Low	
Cuttings	2950	Very Low	Poor	Very Low	
Cuttings	3005	Very Very Low	Poor	Very Very Low	
Cuttings	3050	N.F.F.	-	-	
Cuttings	3100	N.F.F	-	-	
Cuttings	3150	N.F.F	-	-	
Cuttings	3200	Very Very Low	Poor	Very Very Low	
Cuttings	3265	N.F.F.	-	-	
Cuttings	3280-85	N.F.F.	-	-	
Cuttings	3280-85	N.F.F.	-	-	
Cuttings	3280-85	N.F.F.	-	-	
Cuttings	3280-85	N.F.F.	-	-	

Well Name TRITON-1 Basin OTWAY Sheet No 1 of 7



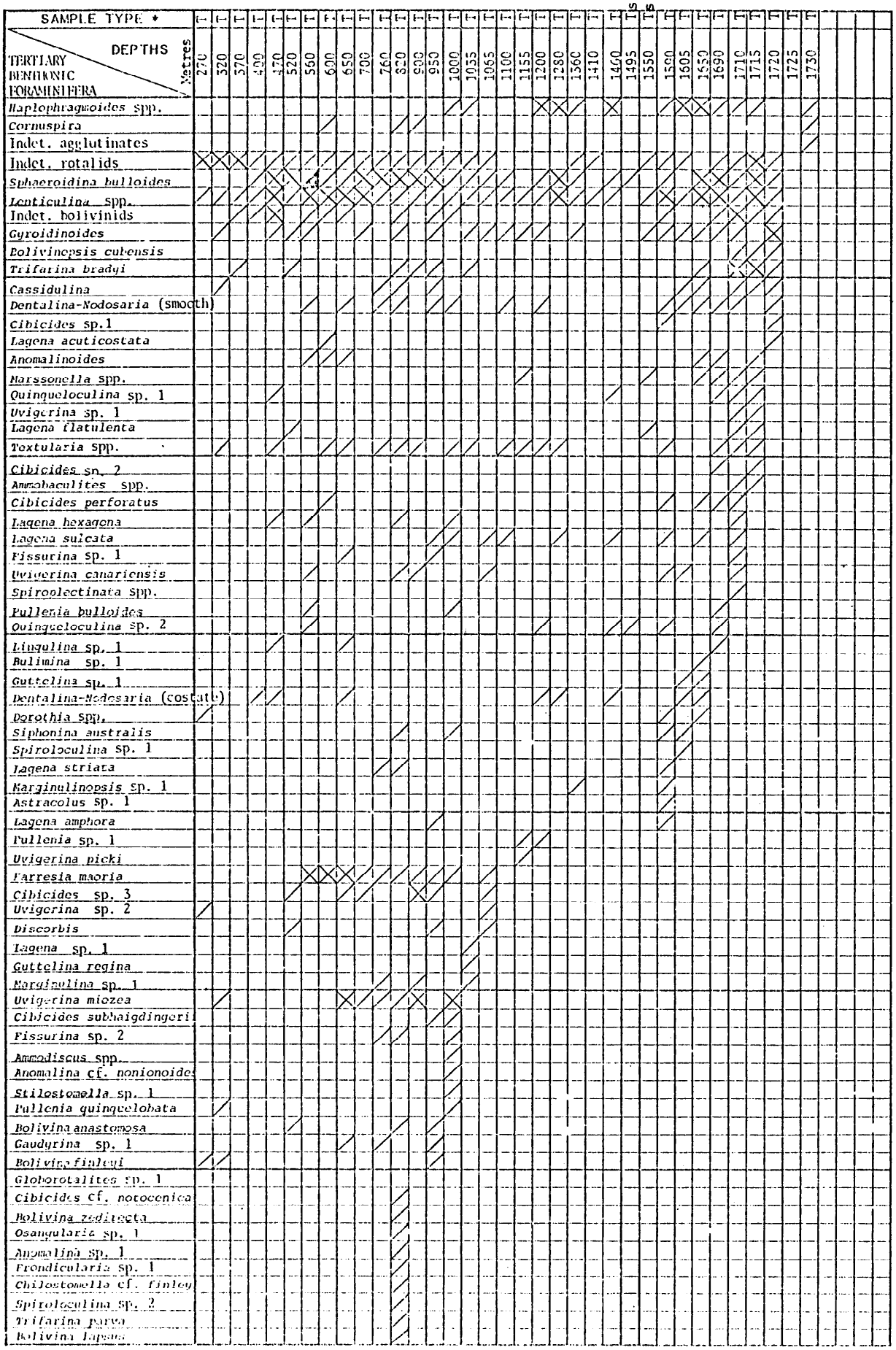
* S = SIDEWALL CORE: T = CUTTINGS: TS = SIDETRACK CUTTINGS
C = CONTAMINATION

/ = RARE (less than 5 specimens)
X = FEW (5-25 specimens)
▨ = COMMON (25-150 specimens)
▩ = ABUNDANT (more than 150 specimens)

DIST.CHART DWG.1107/OP/227

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 2 of 7



* S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION

DIST.CHART DWG.1107/OP/227

/ - rare (less than 5 specimens)
x - few (5-25 specimens)
- common (25-150 specimens)

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 3 of 7

TERTIARY BENTHONIC FORAMINIFERA / DEPTHS (Metres)	270	320	370	400	470	520	560	600	650	700	760	820	900	950	1000	1035	1065	1100	1135	1200	1280	1360	1410	1460	1495	1550	1590	1605	1650	1690	1710	1715	1720	1725	1730
SAMPLE TYPE *	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Pyrulina sp. 1			/								/	/																							
Cibicides brevorlis								/	/		X																								
Heronallenia lingulata					/	/	/		/	/	/																								
Gaudyrina sp. 2											/																								
Heronallenia sp. 1								/																											
Alabamina tenuimarginata								/																											
?Darbyella sp. 1								/																											
Vaginulinopsis aff. mokaurensis							/																												
Marginulinopsis sp 2							/																												
Vagulina sp. 1							/																												
Textularia cf. semicarinata							/																												
Patellina sp. 1						/																													
Robertina cf. pukeuriensis						/																													
Alabamina sp. 1			/		/																														
Guttelina sp. 2		/			/																														
Lingulina metungensis				/																															
Vaginulinopsis sp. 1			/																																
Pyrulina sp. 2			/																																
Operculina victoriaensis		/	/																																
Karresia sp. 1		/																																	
Frondicularia sp. 2	/																																		
Uvigerina sp. 2	/																																		

* S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION.

/ - rare (less than 5 specimens)
X - few (5-25 specimens)
A - common (25-150 specimens)

DIST.CHART DWG.H07/OP/227

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 4 of 7

SAMPLE TYPE *	T	S	S	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S	T	S	S
CRETACEOUS PLANKTONIC FORAMINIFERA / DEPTHS Metres	1735	1740	1750	1760	1765	1775	1780	1800	1820	1880	1910	1930	1940	1975	1999	2005	2030	2065	2080	2100	2120	2135	2140	2180	2215	2250	2300	2340	2390	2440	2500	2550	2610	2680	2750	2805	2815	2860	2900
Globigerinelloides ultramicra						/			/			/												/																			
Heterohelix globulosa										/	/	X		/	X	X	X	X	/	/	/	/	/	/	/		X	/							/							
Heterohelix striata																																											
Hedbergella trochoidea group																												X		X													
Hedbergella delrioensis																																											

* S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION

DIST.CHART DWG.H07/OP/227

/ - rare (less than 5 specimens)
X - few (5-25 specimens)
▲ - common (25-150 specimens)

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 5 of 7

SAMPLE TYPE *		TS	TS	TS	TS	TS	TS	TS	TS	TS
CRETACEOUS PLANKTONIC FORAMINIFERA	DEPTHS Metres	2950	3005	3100	3150	3200	3265	3280-85	3315-20	3355-60	3390-95
G'oides ultramicra		-	-	-	-	-	-	-	-	-	-
Heterohelix globulosa		-	-	-	-	-	-	-	-	-	-
Heterohelix striata		-	-	-	-	-	-	-	-	-	-
Hedbergella trochoidea group		-	-	-	-	-	-	-	-	-	-
Hedbergella delrioensis		-	-	-	-	-	-	-	-	-	-

* S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION.

DIST.CHART DWG.1107/OP/227

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 6 of 7

SAMPLE TYPE *	T	TS	TS	T	TS	T	TS	T	T	T	TS	TS	T	T	T	TS	T	T	TS	TS	T	T	T	TS	TS	T	TS	TS	T	T	TS	TS	TS	TS
DEPTHS Metres / CRETACEOUS BENTHONIC FORAMINIFERA	1735	1740	1750	1760	1765	1775	1780	1800	1820	1880	1910	1930	1940	1975	1990	2005	2030	2065	2080	2100	2120	2135	2140	2180	2215	2250	2300	2340	2390	2440	2500	2550	2610	2680	2750	2805	2815	2860	2900
Lenticulina spp.	/			/		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Haplophragmoides spp.	/					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dorothia filaformis	/					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Trochammina spp.				/		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marginulinopsis curvisepta						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dorothia bulletta						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ammobaculites subcretacea						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ammobaculites fragmentaria						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Palmula cf. pilulata								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Eponides cf. diversus								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pentalina spp. (non-costate)								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pentalina spp. (costate)								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pyrulina cylindroides								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Osangularia								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Globorotalites aff. conicus								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Frondicularia mucronata								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Textularia trilobita								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Alabamina australis								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marssonella sp. 1									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Textularia semicomplanata										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Textularia sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cornuspira involvens										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Quinqueloculina sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marginulinopsis jarvisi										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gyroidinoides nitida										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Frondicularia sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gavelinella										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bolivina sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pallaimorphina helicoformis										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Valvulineria erugata										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nodosaria cf. obscura										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bolivinoides cf. pustulatus										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marssonella oxycona										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Valvulineria undulata										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marginulinopsis sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cibicides cf. ribbingi										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Valvulineria cf. lenticula										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nodosaria limbata										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Nodosaria alternistriata										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pleurostomella subnodosa										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gyroidinoides sp.										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Gavelinopsis cf. eriksdalensis										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pullenia americana										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pullenia cf. cretacea										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Marssonella cf. ellisorae										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Quadrimorphina cf. allomorphinoides										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Anomalinoides cf. canalicularis										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Anomalinoides cf. undulatus										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Anomalinoides sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Globorotalites sp. 1										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Textularia sp. 2										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Textularia anceps										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

*S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION

DIST.CHART DW6.1107/OP/227

/ - rare (less than 5 specimens)
x - few (5-25 specimens)
▲ - common (25-150 specimens)

APPENDIX 5

Well Name TRITON-1 Basin OTWAY Sheet No 7 of 7

SAMPLE TYPE *	ts	ts	ts	ts	ts	ts	ts	ts	ts	ts	ts
CRETACEOUS BENTHONIC FORAMINIFERA / DEPTHS Metres	2950	3005	3050	3100	3150	3200	3265	3280-85	3315-20	3355-60	3390-95
Lenticulina spp.	/					/					
Gyroidinoides nitida	/										

* S = SIDEWALL CORE; T = CUTTING; TS = SIDETRACK CUTTING
C = CONTAMINATION

CHART DWG.H077/OP/227

/ - rare (less than 5 specimens)

APPENDIX 5