APPENDIX III

TIGRAPHY OF WELL 31/2-3 (NORSKE SHELL)

by

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(SIPM, EP/12)

a·s Norske Shell
Oljeletings- og utvinningsavdelingen
(Exploration and Production)

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BIOSTRATIGRAPHY OF WELL 31/2-3 (NORSKE SHELL)

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(SIPM, EP/12.1)

1. INTRODUCTION

At request of Norske Shell, SIPM (EP/12.1) carried out a biostratigraphic study of the sedimentary section penetrated by well 31/2-3.

Previous experience in Mesozoic-Cenozoic biostratigraphy of the general North Sea region suggested the approach to this study to be as follows:

a) Tertiary : microfaunal analyses

b) Cretaceous : calcareous nannoplankton

c) Jurassic-Triassic : study of palynomorphs

As shown by this report, overlap of biostratigraphic disciplines around the boundaries of the major systems was required, e.g. microfaunal and nannoplankton studies of the lowermost Tertiary strata.

The major objective of this well was the Jurassic sequence. For the Tertiary, the main interest was on establishing the most important time-stratigraphic boundaries. Therefore, only ditch cuttings were available from the interval of 470 to 990 m, whilst SWS and cores in addition to cutting samples were recovered from 1000 m down to TD.

The microfaunal and palynological data are plotted on distribution charts (encls. 1, 2); the main nannoplankton data are enumerated in the text.

The biostratigraphic results led to the following time-stratigraphic interpretation (not adjusted to wireline log readings) :

500	-	920	m	: Oligocene - Mio/Pliocene
920	-	1203	m	: Eocene
1211	-	1382.5	m	: Paleocene
1388	-	1392.5	m	: Early Kimmeridgian
1392.5	-	1402.3	m	: Late Oxfordian and/or Early Kimmeridgian
1402.3	-	1406.0	m	: Late Oxfordian
1408.3	-	1456.6	m	: Indeterminable
1462.2	-	1478.6	m	: Early Oxfordian
1511.8	-	1537.9	m	: Indeterminable
1559	-	1642.0	m	: Callovian
1655	-	1700.5	m	: Late Bathonian and/or Early Callovian

1728 m				: Indeterminable
1732.9	-	1806.5	m	: Middle Bathonian
1815.5	-	1867	m	: Indeterminable
1874	-	1903	m	: Aalenian and/or Bajocian
1933	-	2007.5	m	: Toarcian
2028.5	-	2089	m	: Sinemurian-Pliensbachian
2158.5	-	2398	m	: Indeterminable
2411 m				: Rhaetian
2443.5	-	2584	m	: Indeterminable

2. MICROFAUNA

2.1 General

As for previous wells in the 31/2 block, the microfaunal studies of well 31/2-3 were aimed at establishing the major age-subdivision of the Tertiary. For this purpose, 38 cutting samples (470-1362 m) and 16 sidewall cores (1000-1382,5 m) have been analysed micropalaeontologically. As these studies concentrated on checking of presence/absence of marker types only, the data as presented on the faunal distribution chart (encl. 1) do not give a full account of the assemblages encountered, as only key types and more common species have been recorded.

The quoted depth figures are sample depths, no adjustments to wireline log depths have been attempted. Especially where cutting samples had to be used, discrepancies might be expected.

2.2 Miocene and/or younger (500 - 650 m)

The cutting samples from this interval yielded microfaunal assemblages which are essentially composed of foraminiferal species known from Miocene to Quaternary. As no types with a more restricted age range have been encountered, a more precise age determination appeared impossible.

The base of the Miocene and/or younger interval has been defined at the lowermost sample above the interval with Oligocene markers.

Occasionally (in ctgs at 620 and 630 m) a few reworked Cretaceous specimens were noticed.

Depositional environment: The few calcareous foraminifera (amongst others, miliolids) and bryozoans are indicative for an open marine, inner neritic environment.

2.3 Oligocene (660 - 910 m)

The top occurrences of Turrilina alsatica ANDREAE and Coscinodiscus sp. A, at 660 m, define the top of the Oligocene interval. In the same sample, sponge rhaxes and small pyritized diatoms occur as well.

Lowerdown, other Oligocene markers were found, i.e.:
Rotaliatina bulimoides (REUSS)
Nodosaria longiscata D'ORBIGNY,
both often considered as indicative for Middle Oligocene.

The base of the Oligocene is taken at the level of the last sample above the supposed top of the Eocene, as defined below, probably coinciding with a marked log change at approximately 920 m.

Depositional environment: The general faunal picture as gained from the reported studies suggests a (shallow) shelf type of deposition.

2.4 Eocene (920 - 1203 m)

At 920 m a conspicuous change in faunal composition and preservation was noticed, the foraminiferal assemblages consisting of whitish coloured arenaceous specimens.

The highest two samples (ctgs 920 and 930 m) yielded Bathysiphon and large, white radiolarians.

The samples from the middle section (950 - 1130 m) contain relatively rich and diversified arenaceous assemblages, with as typical Eocene species:

Haplophragmoides glabra CUSHMAN & WATERS
Dorothia eocenica (CUSHMAN)
Spiroplectammina spectabilis (GRZYBOWSKI)
Textularia plummerae LALICKER
Ammomarginulina sp.
Cyclammina amplectens GRZYBOWSKI
Cystammina pauciloculata (BRADY)

At 1130 - 1150 m pink coloured foraminifera were noticed, as occurring in wells 31/2-1 (1170 - 1180 m) and 31/2-2 (1100 - 1130 m), in association with Globigerina triloculinoides PLUMMER.

The lower part of the Eocene interval (1140 - 1203 m) shows a dominance of mainly pyritized diatoms, i.e.:

Coscinodiscus sp. 1	BETTENSTAEDT
C. sp. 2	BETTENSTAEDT
Triceratium sp. 1	BETTENSTAEDT

In the cutting sample at 1210 m and the SWS at 1203 m Clavulina sp. A occurs, indicative for the lower part of the Early Eocene. In well 31/2-1 this species was encountered in SWS at 1221 and 1239 m.

In analogy with well 31/2-2, the Eocene/Paleocene boundary was taken at the base of the tuffaceous lithologies.

Depositional environment: Open marine, outer neritic - bathyal.

2.5 Paleocene (1211 - 1382.5 m, deepest sample examined)

The higher part of this interval (SWS 1211 - 1242 m) is barren of microfauna, as commonly observed below the Eocene tuffaceous interval. In previous studies of the North Sea Palaeogene stratigraphy, such barren strata, above beds with rich Paleocene arenaceous foraminifera, are interpreted as of Late Paleocene age.

The next deeper section (1251 - 1350 m) yielded rich, exclusively arenaceous faunas with occasionally typical green colours. Marker species for the Paleocene in this interval are:

Rzehakina minima CUSHMAN & RENZ
Saccammina rhumbleri (FRANKE)
Trochammina ruthven-murrayi CUSHMAN & RENZ

These types co-occur with the following common species:

Glomospira charoides (JONES & PARKER)
Trochammina inflata (MONTAGU)
Haplophragmoides kirki WICKENDEN

From 1314 m downwards, very coarse-grained Bathysiphon specimens occur, as observed in well 31/2-1 below 1332.1 m and in well 31/2-2 below 1284.3 m.

The lowermost samples (1355 - 1382.5 m) contain a rich and diversified fauna with the following planktonic species

Chiloguembelina crinata (GLAESSNER)
Globorotalia pseudobulloides (PLUMMER)

in association with various benthonic types, e.g.

Bolivinoides paleocenicus (BROTZEN)
Bulimina aff. aculeata D'ORBIGNY
B. denticulata CUSHMAN & PARKER
B. triangularis CUSHMAN & PARKER
B. trigonalis TEN DAM
Cibicides voltziana (D'ORBIGNY)
Gaudryina ? bentonensis (CARMAN)
Gavelinopsis bembix (MARSSON)
Pyramidina curvisuturata BROTZEN
Rotalia parvula TEN DAM

These foraminiferal species are indicative for an Early Paleocene (Danian) age.

Depositional environment: Open marine, outer neritic - bathyal.

3. CALCAREOUS NANNOPLANKTON

3.1 General

Four sidewall cores (1374, 1377.5, 1379.8 and 1382.5 m) have been investigated on calcareous nannoplankton. (Quoted depths are sample depths).

3.2 Danian (1374 - 1382.5 m)

1374 - 1382.5 m: Upper Danian, Zone NP4

The investigated SWS all contain rich and very diversified nannofloras with the age-diagnostic species Chiasmolithus bidens, C. sp. 20, Cruciplacolithus tenuis s.s., Neochiastozygus perfectus, Prinsius dimorphosus (in very high numbers) and P. martinii.
The absence of specimens intermediate between Prinsius martinii and P. bisulcus, of Chiasmolithus sp. 17 and of Neochiastozygus saepes suggests that this interval represents the middle part of the zone NP4, straddling the boundary between Lower and Middle Paleocene.

4. PALYNOMORPHS

4.1 General

A total of 86 samples of supposedly Jurassic and older age have been investigated, i.e. 19 core samples and 67 sidewall cores. All samples have been prepared following the standard preparation method, consisting of treatment with HCl and HF, followed by a heavy liquid separation (zinc bromide with S.G. of 2.2). The organic residue was finally sieved through microsieves of 15 micron to concentrate palynomorphs and of 30 micron in order to concentrate dinocysts. Especially in the Jurassic interval the organic residues received an oxidation by means of cold HNO_3, prior to sieving, for a further concentration of the dinocysts.

Twenty-three samples proved to be entirely barren of palynomorphs. A further nine samples did not contain any dinocysts.

Palynomorph distributions have been recorded on a distribution chart (encl. 2). For the Middle and Upper Jurassic only dinocysts have been plotted, as general experience has shown such microfossils to be of better stratigraphic use than sporomorphs, provided marine strata are investigated. It should be realized, however, that the overall sandy development of the Middle-Upper Jurassic influenced dinoflagellate recoveries unfavourably. In the Pliensbachian-uppermost Triassic interval, the diversity of dinocyst species decreases drastically, in agreement with the known evolutionary development of dinocysts. Therefore, selected sporomorph types have been applied for a subdivision of this interval, starting from the top occurrence of the dinocyst species Nannoceratopsis gracilis, at 1874 m.

A number of samples appeared to yield fair numbers of palynomorphs obviously derived from caved material or mud infiltration.

Throughout the studied section, the palynomorph colour is estimated as "upper light", corresponding to a FCC of less than about 69. The quoted depth figures are sample depths, no adjustments to wireline log depths have been attempted.

4.2. Indeterminable (1384.5-1386.5 m)

The two highest sidewall cores studied palynologically proved to be barren of palynomorphs.

4.3. Early Kimmeridgian (1388-1392.5 m)

Two SWS (1388 and 1392.5 m) yielded moderately rich dinocyst assemblages with the following diagnostic species :

Egmontodinium polyplacophorum

(indicative for an age generally not older than Kimmeridgian), and

Gonyaulacysta jurassica

(with a top regular occurrence in the Early Kimmeridgian and an absolute top in the Portlandian).

4.4. Late Oxfordian (1402.3-1406 m)

Three sidewall cores from this interval yielded a distinct dinocyst assemblage, in which the following species are significant :

Endoscrinium galeritum (top in Late Oxfordian)

Nov. gen G nov. sp. 1 (ranging from Callovian to Oxfordian)

Scriniodinium crystallinum (occurring very regularly in the Oxfordian, with its top occurrence in the Early Kimmeridgian)

Leptodinium eumorphum (base in Late Oxfordian)

Stephanelytron redcliffense (known to have its top occurrence in the Late Oxfordian and its base in the Late Callovian)

4.5. Indeterminable (1408.3-1456.6 m)

Four core samples and one sidewall sample from this interval were found to be completely devoid of palynomorphs. An Oxfordian age can only be inferred from their stratigraphic position.

4.6. Early Oxfordian (1462.6-1478.6 m)

Four core samples yielded a very distinct dinocyst assemblage of obviously Early Oxfordian age. Typical are :

Gonyaulacysta areolata (with a distinct top occurrence at the higher limit of the Early Oxfordian)
Adnatosphaeridium aemulum (Bathonian to Late Oxfordian)
Gonyaulacysta jurassica subsp. longicornis (Callovian to Oxfordian)
Wanaea fimbriata (virtually restricted to part of the Early Oxfordian)
Stephanelytron redcliffense (Late Callovian to Late Oxfordian)
Stephanelytron scarburghense (Oxfordian)
Scriniodinium crystallinum (Oxfordian to Early Kimmeridgian, rare in Late Callovian)
Nov. gen G nov. sp. 1(Callovian to Oxfordian)

4.7. Indeterminable (1511.8-1537.9 m)

One core sample, at 1511.8 m, was barren of palynomorphs. Two others yielded a few dinocysts only, indicative for an age not older than Bathonian, and a Callovian to Oxfordian age has been inferred.

4.8. Callovian (1559-1642.0 m)

Ten core samples and one sidewall core have been examined, of which three core samples were barren of dinocysts. The general yield of palynomorphs appeared to be relatively poor. A Callovian age was concluded based on the presence of the following marker species :

Lithodinia sp. (reticulate) at 1559 m (not known younger than Callovian)
Systematophora sp. 1 (restricted to Callovian)
Ctenidodinium ornatum at 1605.5 m (Callovian)
Lithodinia sp. 1 at 1618.35 m (Late Bathonian to Middle Callovian)
aff. Lunatadinium sp. 1 (Middle Bathonian to Callovian)
Atopodinium prostatum at 1641.5 m (generally not older than Callovian)
Sentusidinium rioultii (not older than Callovian)
Nov. gen. G sp. 1 (Callovian to Oxfordian)

4.9. Late Bathonian - Early Callovian (1655-1700.5 m)

In total 7 samples have been examined, of which six sidewall cores yielded a moderately rich dinocyst assemblage, in which some unknown species were encountered. The age of this assemblage is based mainly on the occurrence of

Gonyaulacysta jurassica (base in Late Bathonian),
Emmetrocysta sp. nov. (id.), and
Lithodinia sp. 10 (id.)

and on the total absence of any Middle Bathonian and younger Callovian markers.

4.10. Indeterminable (1728 m)

The sidewall core, from 1728 m, yielded no autochthonous dinocysts but only Tertiary and Late Cretaceous types, obviously derived from mud contamination. A Middle Bathonian to Early Callovian age can be inferred from the stratigraphic position of the sample.

4.11. Middle Bathonian (1732.9-1806.5 m)

Ten sidewall cores were examined from this interval. They all yielded poor to moderately rich dinocyst assemblages, of which the following species are significant :

Nannoceratopsis pellucida (base occurrence in Middle Bathonian)
Hystrichogonyaulax cladophora (id.)
H. sp. 5 (Middle Bathonian to Early Callovian)
H. regalis (Middle Bathonian)
H. sp. 6 (Id.)
Ctenidodinium sp. 1 (id.)
Pareodinia sp. 2 (id.)
P. sp. 4 (id.)

4.12. Indeterminable (1815.5-1867.0 m)

Five sidewall cores proved to be barren of palynomorphs, and an Aalenian-Middle Bathonian age can be inferred.

4.13. Aalenian-Bajocian (1874-1903 m)

Two sidewall cores were examined. They yielded moderately rich palynomorph assemblages, of which the following species are significant :

Nannoceratopsis gracilis (Late Pliensbachian to Bajocian)
Quadraeculina anellaeformis (generally not younger than Bajocian)

4.14. Toarcian (1933-2007.5 m)

Three sidewall cores were examined. One, at 2007.5 m, yielded no dinocysts, but a rather paucispecific sporomorph assemblage with :

Klukisporites variegatus (not older than Toarcian).

The other samples yielded abundant

Nannoceratopsis gracilis gr. (acme in Toarcian), and
Chasmatosporites magnolioides (id.)

The total absence of the normally omnipresent sporomorph group Callialasporites (base in Late Toarcian) may suggest that this whole interval has even an Early Toarcian age.

4.15. Sinemurian-Pliensbachian (2028.5-2089 m)

Four sidewall samples have been examined. Microplankton appeared to be virtually absent. The samples yielded relatively abundant saccate sporomorphs. A few, readily distinguishable sporomorphs have been selected for age determination, viz.

Cerebropollenites thiergarti (with a distinct maximum top occurrence in Pliensbachian), and
C. macroverrucosus (base regular occurrence in Sinemurian).

4.16. Indeterminable (2158.5-2398 m)

Sixteen sidewall cores were investigated. They all proved to be barren of autochthonous palynomorphs. Three samples yielded some Tertiary and Late Cretaceous palynomorphs evidently derived from mud contamination, and a Rhaetian to Pliensbachian age can be inferred.

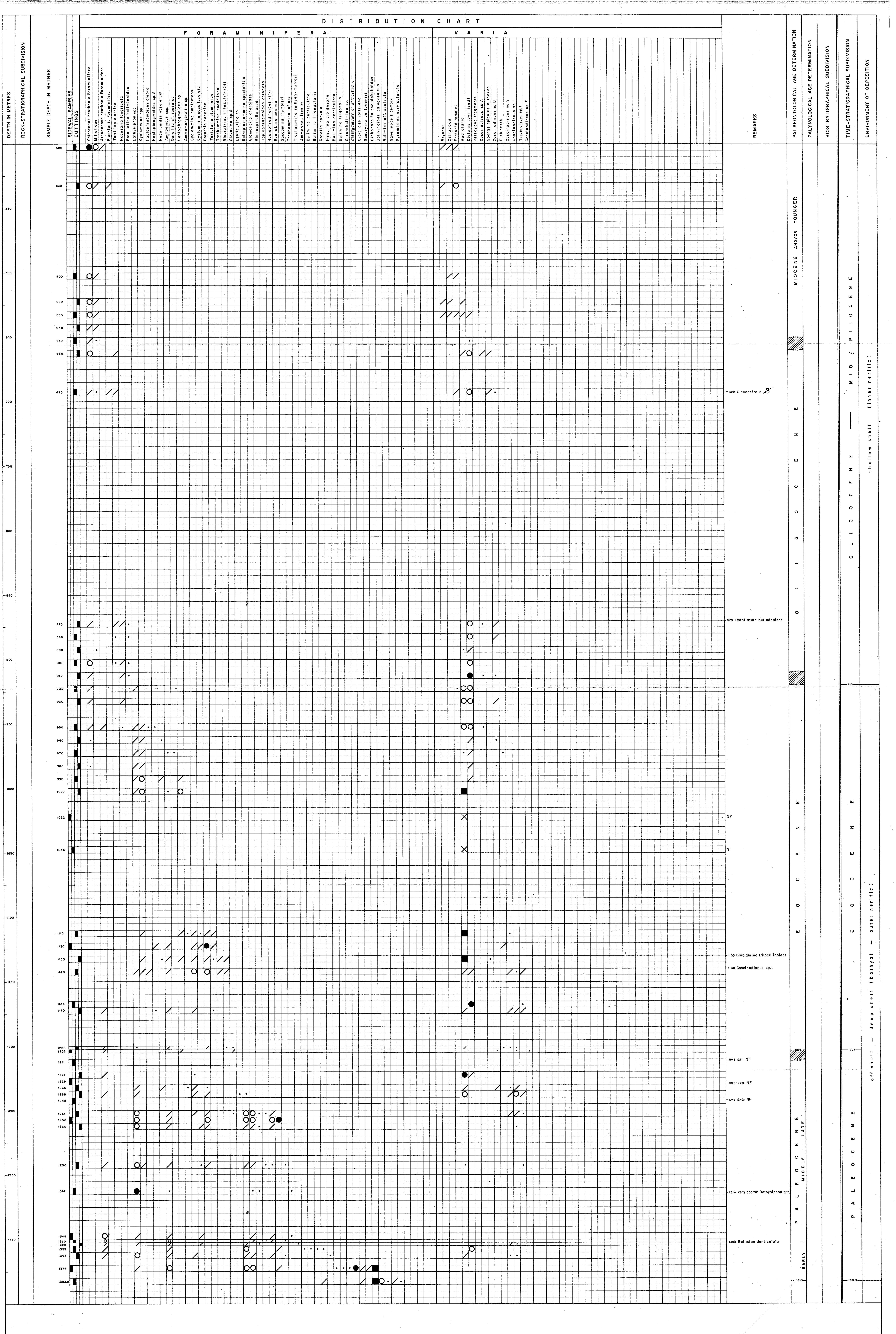
4.17. Rhaetian (2411 m)

A Rhaetian age was concluded for a sidewall core, at 2411 m, based on the co-occurrence, in high quantities, of

Ovalipollis pseudoalatus, and
Riccisporites tuberculatus in combination, but in minor quantities, with
Vallasporites ignacii (Carnian to Rhaetian), and
Densoisporites fissus.

4.18. Indeterminable (2443.5-2584 m)

Seven sidewall cores have been examined and proved all to be barren of palynomorphs.



LEGEND

- · single occurrence
- ⁄ 2-5 specimens
- ○ 6-20 "
- ● 21-100 "
- ■ >100 "
- ✕ quantity not specified

NOTE: only marker types and common species are plotted.

SHELL INTERNATIONALE PETROLEUM MAATSCHAPPIJ N.V.			
THE HAGUE	EXPLORATION & PRODUCTION		
NORWAY OFFSHORE MICROFAUNAL DISTRIBUTION CHART NORSKE SHELL WELL 31/2-3 INTERVAL 500m - 1382.5m Scale 1:1000			
Author: E. Noordermeer		Date: July 1980	
Appendix III Well Résumé 31/2-3	Encl 1	Draw. No G.66228/1	

SCHLUMBERGER

ELECTRICAL LOG

DEPTH IN DECIMETRES

STANDARD LEGEND

NF NO FAUNA/FLORA

- . 1 SPECIMEN
- / 2 - 5 SPECIMENS
- o 6 - 20 "
- ● 21-100 "
- ■ > 100 "
- ▪ QUALITATIVE DETERMINATION

S SINGLE

R RARE

C COMMON

F FREQUENT

A ABUNDANT

1 CORE SAMPLE

2 SIDEWALL SAMPLE

3 DITCH CUTTING

4 SURFACE SAMPLE

5 SEDIMENTOLOGY SAMPLE

SAMPLES EXAMINED:

NF	SAMPLES EXAMINED SP. NO.	SAMPLES EXAMINED GENUS	SAMPLES EXAMINED REG NO.	SPECIFIC DETERMINATION GENUS AND SPECIES		INDEX SP. NO.	INDEX GENUS	INDEX REG NO.
		80000046	1	CHASMATOSPORITES MAJOR			80000018	5
		80000065	2	CHASMATOSPORITES THIERGARTI			80000046	1
		80000143	3	CEREBROPOLLENITES MACROVERRUCOSUS			80000065	2
		80000225	4	QUADRAECULINA ANELLAEFORMIS			80000143	3
		80000018	5	KLUKISPORITES VARIEGATUS			80000203	7
		80000214	6	MELIOSPORITES REISSINGERI			80000214	6
		80000203	7	RUGULATISPORITES RUGULATUS			80000225	4
		80000381	8	OVALIPOLLIS PSEUDOALATUS			80000381	9
		80000419	9	ENZONALASPORITES CF.VIGENS			80000419	9
		80000428	10	RICCISPORITES TUBERCULATUS			80000428	10
		80000431	11	PORCELLISPORA LONGDONENSIS			80000431	11
		80000492	12	PITYOSPORITES NEOMUNDANUS			80000492	12
					SPOROMORPHS			
		85001200	13	HYSTRICHODINIUM PULCHRUM				98
		85001329	14	SYSTEMATOPHORA CF.VESTITUM			1	77
			15	ACANTHAULAX SP.A(IORANNIDES ET AL)CF.			1	15
		85100001	16	ACANTHAULAX SP.			1	82
		85001003	17	ENDOSCRINIUM LURIDUM			1	92
		85001765	18	PROLIXOSPHAERIDIUM CAPITATUM			1	84
		85001681	19	ESCHARISPHAERIDIA POCOCK 11			1	82
		85001344	20	EGMONTODINIUM POLYPLACOPHORUM			1	93
		85001006	21	GONYAULACYSTA JURASSICA			1	39
		85001461	22	SIRMIODINIUM GROSSI			1	85
		85001005	23	PAREODINIA CERATOPHORA			1	72
		85001543	24	ACANTHAULAX SP.A (IORANNIDES ET.AL.)			1	36
		85001757	25	LINOULODINIUM SP.1			1	61
		85001322	26	LEPTODINIUM SUBTILE			1	29
		85001320	27	HYSTRICHODONYAULAX SP.2				96
		85001777	28	SENTUSIDINIUM PILOSUM			1	94
			29	SYSTEMATOPHORA SP.(CF S.VESTITUM)			1	74
		85001120	30	HYSTRICHODONYAULAX CLADOPHORA			85001000	63
		85001321	31	LEPTODINIUM EUNORPHUM			85001001	53
		85001326	32	ENDOSCRINIUM CRYSTALLINUM			85001002	60
		85001338	33	NOV.GEN.G N.SP.1 (M+R)			85001003	17
		85001778	34	LITHODINIA SP.3			85001005	23
		85100092	35	ENDOSCRINIUM SP.			85001006	21
			36	CASSICULOSPHAERIDIA MAGNA AFF.			85001038	100
		85001345	37	STEPHANELYTRON REDCLIFFENSE			85001048	86
		85001460	38	ENDOSCRINIUM GALERITUM			85001120	30
			39	LITHODINIA CF.SP.3			85001200	19
		85001570	40	LEPTODINIUM MIRABILE			85001302	48
		85100085	41	CTENIODINIUM SP.			85001319	90
		85100179	42	OCCISUCYSTA SP.			85001320	27
		85001782	43	CHYTROEISPHAERIDIA CHYTROEIDES			85001321	31
		85001541	44	SENTUSIDINIUM RIDULTII			85001322	26
		85001732	45	ENDOSCRINIUM GALERITUM RETICULATUM			85001326	32
		85001346	46	STEPHANELYTRON SCARBURGHENSE			85001329	14
		85001355	47	WANAEA FIMBRIATA			85001338	33
		85001302	48	OCCISUCYSTA AREOLATA			85001339	51
		85001482	49	ADNATOSPHAERIDIUM AEMULUM			85001342	71
		85001779	50	GONYAULACYSTA JURASSICA LONGICORNIS			85001344	20
		85001339	51	NOV.GEN.G.N.SP.2 (M+R)			85001345	37
		85001470	52	NANNOCERATOPSIS PELLUCIDA			85001346	45
		85001001	53	TUBOTUBERELLA APATELA			85001355	47
		85001480	54	ESCHARISPHAERIDIA SP.2			85001460	38
		85100154	55	LITHODINIA SP.			85001461	22
		85001746	56	PALAEOSTOMOCYSTIS TORNATILIS			85001469	68
		85001693	57	YALENSIELLA VERMICULATA			85001470	52
		85001477	58	MENDICODINIUM WOODHAMENSIS			85001472	101
		85001539	59	SYSTEMATOPHORA DIVARICA MANUSCR.NAME			85001474	64
		85001002	60	GONYAULACYSTA EISENACKII			85001477	58
			61	CHLAMYDOPHORELLA RECTILINEA MAN.NAME			85001478	78
		!	62	SYSTEMATOPHORA CF. DIVARICA MAN.NAME			85001480	54
		85001000	63	CTENIODINIUM ORNATUM			85001482	49
		85001474	64	LITHODINIA SUTUROCOMPLEXA MANUSCR.N.			85001483	75
		85001495	65	LUNATADINIUM CF.			85001491	79
		85001494	66	MYSTRICHODONYAULAX PECTINIGERA			85001494	66
		85001495	67	ATOMODINIUM PROSTATUM			85001495	65
		85001469	68	LITHODINIA JURASSICA			85001496	67
		85001712	69	LITHODINIA SP.6			85001539	59
		85025142	70	OVOIDINIUM WALTONI			85001541	44
		85001342	71	LITHODINIA ?			85001543	24
			72	LITHODINIA SP.10			85001569	91
		85001707	73	PAREODINIA EVITTII			85001570	40
			74				85001659	87
		85001483	75	KALYPTEA DICERAS			85001672	88
		85001784	76	CLEISTOSPHAERIDIUM LUMECTUM			85001681	19
		85091523	77	LITHODINIA BULLOIDEA CF.			85001683	89
		85001478	78	NOV.GEN.B.N.SP.2 (DE H.)			85001693	57
		85001491	79	LANTERNA			85001699	80
		85001699	80	OCCISUCYSTA			85001707	73
		85100091	81	EMETROCYSTA SP.			85001712	69
			82	MYSTRICHODONYAULAX SP.5			85001718	98
		85015815	83	ESCHARISPHAERIDIA			85001732	45
			84	CASSICULOSPHAERIDIA MAGNA AFF.			85001746	56
		!	85	OCCISUCYSTA AFF.			85001757	25
		85001048	86	YALENSIELLA OVULUM			85001765	18
		85001659	87	LITHODINIA			85001777	28
		85001672	88	ELLIPSOIDICTYUM CINCTUM			85001778	34
		85001683	89	DIACANTHUM FILAPICATUM			85001779	50
		85001319	90	CTENIODINIUM SELWOODII			85001782	43
		85001569	91	MYSTRICHODONYAULAX REGALIS			85001784	76
			92	PAREODINIA SP4			85001797	97
		!	93	MYSTRICHODONYAULAX SP.6			85015815	93
		85001831	94	PAREODINIA SP.2			85025142	70
		85100197	95	PAREODINIA SP.			85100001	16
		85091780	96	CHYTROEISPHAERIDIA CERASTES CF.			85100085	41
		85001797	97	KALLOSPHAERIDIUM "BATHONICUM"			85100091	81
			98	CTENIODINIUM SP-1			85100092	35
		85001718	99	NOV.GEN.G N.SP.2 (DE H.)			85100154	55
		85001038	100	NANNOCERATOPSIS GRACILIS			85100179	42
		85001472	101	MANCODINIUM SEMITABULATUM			85100197	95

MICRO PLANKTON

REMARKS

BIOFACIES DEVELOPMENT

MICROFAUNAL ZONATION | BIOSTRATIGRAPHIC SUBDIVISION

MICROFLORAL ZONATION

TIME-STRATIGRAPHIC SUBDIVISION

DEPOSITIONAL ENVIRONMENTS

RHAETIAN AND/OR OLDER | RHAETIAN – PLIENSBACHIAN | SINEMURIAN – PLIENSBACHIAN | TOARCIAN | TOARCIAN | AALENIAN – MIDDLE BATHONIAN | MIDDLE BATHONIAN | CALLOVIAN | CALLOVIAN – EARLY OXFORDIAN | OXFORDIAN

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